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Periodic Monitoring Report for Vapor-Sampling Activities at Material Disposal Area T, Consolidated Unit 21-016(a)-99, at Technical Area 21, September to November 2009

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Responsible project leader:

Bruce Wedgeworth		Project Leader	Environmental Programs	1/28/10
Printed Name	Signature	Title	Organization	Date

Responsible LANS representative:

Michael J. Graham		Associate Director	Environmental Programs	1/28/10
Printed Name	Signature	Title	Organization	Date

Responsible DOE representative:

David R. Gregory	Edwin P. Worth for	Project Director	DOE-LASO	2/1/10
Printed Name	Signature	Title	Organization	Date

EXECUTIVE SUMMARY

This periodic monitoring report summarizes the latest results of the vapor-monitoring activities (September–November 2009) conducted at Material Disposal Area (MDA) T, Consolidated Unit 21-016(a)-99, within Technical Area 21 at Los Alamos National Laboratory. The objectives of vapor-monitoring at MDA T are (1) to collect additional samples from vapor-monitoring wells previously sampled at MDA T and (2) to compare the results with previously detected volatile organic compound (VOC) concentrations and tritium activities in pore gas beneath MDA T.

Samples taken during the current quarter were collected in September, October, and November of 2009 from vapor-monitoring wells 21-25262, 21-25264, 21-603058, and 21-603059 and in December of 2009 from vapor-monitoring well 21-607955, all located outside the MDA T nuclear facility boundary. Vapor-monitoring wells 21-25262 and 21-603059 are located immediately south of MDA T. Vapor-monitoring wells 21-25264, 21-603058, and 21-607955 are located immediately north of MDA T along North Perimeter Road.

To date, vapor-monitoring wells 21-25264, 21-603058, and 21-603059 have been sampled for 12 rounds, from October 2007 to November 2009 (rounds 1–12); vapor-monitoring well 21-25262 has been sampled for 6 rounds, from June to November 2009 (rounds 7–12); and vapor-monitoring well 21-607955 has been sampled for 1 round, in early December 2009 (for discussion purposes in this report, these samples are considered to be part of sampling round 12, November 2009). Pore-gas data collected from all locations sampled from September to November 2009 are presented and evaluated in this report. Pore-gas data from the previous three quarters of vapor monitoring at MDA T(February, April, and June through August 2009) are also presented and compared to the current quarter data, as appropriate, to help establish trends over time.

A total of 25 VOCs were detected in MDA T pore gas during the September–November 2009 sampling activities, and the results are consistent with previous sampling results for permanent vapor-monitoring wells 21-25262, 21-25264, 21-603058, and 21-603059. Pore-gas analytical results obtained from samples collected during the initial round of sampling at vapor-monitoring well 21-607955 also reflect the VOC trends observed at the other MDA T vapor-monitoring wells, with the exception of acetone and toluene. For most VOCs, a decrease in concentration to nondetect values are observed below ~550 ft below ground surface (bgs). For both acetone and toluene, the highest detected concentrations were in the sample collected at total depth (TD) (Port 11 at ~950 ft bgs). Additional sampling rounds at vapor-monitoring well 21-607955 will determine whether these detections are indicative of deep (900+ ft bgs) conditions beneath MDA T or whether they are a temporary condition resulting from recent drilling activities.

Tritium activities in vapor-monitoring wells 21-25262, 21-25264, 21-603058 were consistently low at TD but showed multiple peaks at varying depths in the middle ports. Tritium results obtained from samples collected during the initial round of sampling at vapor-monitoring well 21-607955 also generally reflect this trend. However, in vapor-monitoring well 21-603059, tritium activities consistently increase with depth to TD.

The VOC vapor data collected from September–November 2009 were also compared to screening levels based on equilibrium partitioning of vapor with groundwater cleanup levels, to evaluate the potential for the reported VOC concentrations to result in contamination of groundwater in excess of cleanup levels. The VOC screening evaluation identified two VOCs, methylene chloride and 1,1,2-trichloroethane, in MDA T pore gas at concentrations resulting in screening values greater than 1.0. In the deepest sample collected at MDA T (Port 11 at ~950 ft bgs in vapor-monitoring well 21-607955), methylene chloride and 1,1,2-trichloroethane were not detected.

Monthly sampling of vapor-monitoring wells 21-25262, 21-25264, 21-603058, 21-603059, and 21-607955 and quarterly reporting will continue for the foreseeable future and at least 1 yr after installation of the final MDA T vapor-monitoring well, near building 21-257, has been completed and sampled.

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1.0 INTRODUCTION

This report presents the results of vapor-monitoring activities conducted during September–November 2009 at Material Disposal Area (MDA) T, Consolidated Unit 21-016(a)-99, in Technical Area 21 (TA-21) at Los Alamos National Laboratory (LANL or the Laboratory). These activities are being conducted per the requirements outlined in the MDA T vapor-monitoring plan and the associated New Mexico Environment Department (NMED) approval with modifications (LANL 2007, 098944; NMED 2007, 098946) and the approved MDA T Phase III investigation work plan and associated NMED correspondence (LANL 2009, 105645; NMED 2009, 105691; NMED 2009, 106455). Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with U.S. Department of Energy (DOE) policy.

The objectives of the MDA T vapor-monitoring activities are (1) to collect additional vapor samples from vapor-monitoring wells previously sampled at MDA T and (2) to compare the results with previously detected volatile organic compound (VOC) concentrations and tritium activities beneath MDA T. In addition, this report presents the results of a screening evaluation of the pore-gas VOC data, which compares maximum concentrations of VOCs in pore gas to pore-gas screening levels (SLs). This conservative screening process evaluates the potential for the observed VOC concentrations to result in contamination of groundwater above applicable regulatory criteria.

To date, intermediate vapor-monitoring wells 21-25264, 21-603058, and 21-603059 have been sampled for 12 rounds, from October 2007 to November 2009 (rounds 1–12); vapor-monitoring well 21-25262 has been sampled for 6 rounds, from June to November 2009 (rounds 7–12); and the newest vapor-monitoring well 21-607955 has been sampled for 1 round in December 2009 (for discussion purposes in this report, these samples are considered to be part of sampling round 12, November 2009). All pore-gas samples were submitted for off-site analysis of VOCs and tritium.

This report primarily presents and discusses all results obtained during the most recent quarter of monitoring activities (September–November 2009) at MDA T; however, vapor data presented in the three consecutive quarterly periodic monitoring reports immediately prior to the current quarter for MDA T (February 2009, April 2009, and June–August 2009) are also included in the data evaluation section of this report for comparison and to establish trends over time. Beginning in June 2009, the frequency of sample collection at all MDA T vapor-monitoring wells was switched from quarterly to monthly to allow for improved trend comparisons of chemicals of potential concern (COPCs) at depth and over time. Table 1.0-1 summarizes all sampling events presented in this report and conducted during the current quarter, three previous quarters, and all other quarters since the beginning of permanent vapor-monitoring well installation at TA-21.

The MDA T vapor data collected during all previous quarters (October 2007–August 2009) are presented and discussed in previous periodic monitoring reports as well as the Phase III investigation report (LANL 2009, 105187; LANL 2009, 106665; LANL 2009, 107106).

In addition, geotechnical data associated with core samples collected during the drilling of vapor-monitoring well 21-607955 are also presented in this report. These data were not available for inclusion in the revised MDA T Phase III investigation report submitted to NMED in December 2009 (LANL 2009, 108012) and are included in this report (section 5) for completion purposes.

1.1 Site Location and Description

MDA T is located within TA-21 on DP Mesa and contains the following waste storage and disposal sites: (1) four absorption beds (subsurface), (2) multiple buried shafts (subsurface), and (3) a former retrievable waste storage area (subsurface) (Figures 1.0-1 and 1.0-2). Current vegetation at MDA T includes grasses, chamisa bushes, and two young ponderosa pines. The top of the regional aquifer occurs approximately 1300 ft below MDA T, based on water-level information from regional well R-6 (Kleinfelder 2005, 091693). The MDA T investigation report (LANL 2006, 094151) presents further details regarding MDA T waste storage and disposal sites, operations, and historical investigation activities.

2.0 SCOPE OF ACTIVITIES

As directed by the approved MDA T vapor-monitoring plan (LANL 2007, 098944; NMED 2007, 098946) and the approved MDA T Phase III investigation work plan (LANL 2009, 105645; NMED 2009, 105691; NMED 2009, 106455), 12 rounds of pore-gas field-screening and sampling activities have been completed at intermediate-depth vapor-monitoring wells 21-603058, 21-603059, and 21-25264; 6 rounds have been completed at deep vapor-monitoring well 21-25262; and 1 round has been completed at deep vapor-monitoring well 21-607955 (Figure 1.0-2 and Table 2.0-1). The as-built well constructions as applicable to the five MDA T vapor-monitoring wells are described below.

Per the approved MDA T vapor-monitoring plan (LANL 2007, 098944; NMED 2007, 098946), five vapor-sampling ports were installed at wells 21-603058 and 21-25264 and six vapor-sampling ports were installed at well 21-603059 at the following intervals:

- base elevation of the nearby disposal unit (69–81 ft below ground surface [bgs]);
- intermediate depths correlated to the 2005–2006 packer sampling depths at locations 21-25262 and 21-25263; and
- borehole total depth (TD) (342–375 ft bgs).

Per the approved MDA T Phase III investigation work plan (LANL 2009, 105645; NMED 2009, 105691; NMED 2009, 106455), nine vapor-sampling ports were installed at well 21-25262 at the following intervals:

- depths correlated to the sampling port depths at well 21-603059 (sampling ports 1–4); and
- depths correlated to different lithologic units encountered beneath MDA T (i.e., Cerro Toledo interval of the Bandelier Tuff [sampling port 5], Otowi Member of the Bandelier Tuff [sampling ports 6–8], and the Guaje Pumice Bed [TD, sampling port 9]).

Per the approved MDA T Phase III investigation work plan (LANL 2009, 105645; NMED 2009, 105691; NMED 2009, 106455), eleven vapor-sampling ports were installed at well 21-607955 at the following intervals:

- depths correlated to the intermediate vapor-monitoring wells (sampling ports 1–6); and
- depths within different lithologic units encountered beneath MDA T (e.g., Otowi Member) (sampling ports 7 and 8); Guaje Pumice Bed (sampling port 9); and the Puye Formation (sampling ports 10 and 11).

During the most recent quarter of sampling activities (September–November 2009), a total of 104 pore-gas samples (80 characterization and 24 quality assurance/quality control [QA/QC]) were collected for VOC analysis, and 93 samples (80 characterization and 13 QA/QC) were collected for tritium analysis from (1) five out of five ports in well 21-25264; (2) five out of six ports in well 21-603059; (3) four out of five ports in well 21-603058; (4) nine out of nine ports in well 21-25262; and (5) eleven out of eleven ports in well 21-607955. Field duplicate (FD) and field blank (FB) samples were collected at a minimum frequency of 1 for every 10 samples. Samples were not collected at port 2 in either well 21-603058 or 21-603059 for reasons discussed in section 2.1.

Table 2.0-1 summarizes the MDA T pore-gas sampling depths and sample collection dates for the current and previous three quarters (February–November 2009) by well location. Tables 2.0-2 through 2.0-6 summarize, by well location, the February–November 2009 samples collected at MDA T monitoring wells 21-25262, 21-25264, 21-603058, 21-603059, and 21-607955 and their respective analyses.

All samples were collected in accordance with the current version of Standard Operating Procedure (SOP) EP-ERSS-SOP-5074, Sampling for Sub-Atmospheric Air, and submitted to off-site analytical laboratories for VOC analysis using U.S. Environmental Protection Agency (EPA) Method TO-15 and for tritium analysis using EPA Method 906.0. Further discussion of the field methods used for pore-gas field-screening and sample collection are presented in Appendix B. Field chain-of-custody forms and sample collection logs are provided on CD (Appendix D). No investigation-derived waste was generated during execution of vapor-monitoring activities at MDA T.

The current quarter (September–November 2009) pore-gas field-screening results are presented in section 4, and the September–November 2009 pore-gas analytical results are presented in section 5. Any deviations from the scope of activities presented in the approved MDA T vapor-monitoring plan (LANL 2007, 098944; NMED 2007, 098946) and/or the approved MDA T Phase III investigation work plan (LANL 2009, 105645; NMED 2009, 105691; NMED 2009, 106455) that relate to periodic monitoring activities are described in the following section.

2.1 Deviations

Pore-gas samples were not collected from port 2 in either vapor-monitoring well 21-603058 or 21-603059 during the September–November 2009 sampling activities at MDA T. As previously reported, sampling port 2 (160.5–165.5 ft bgs) in vapor-monitoring well 21-603058 stopped producing pore gas after February 2008 (round 2) either because of a mechanical failure or because it was installed within unit 2 of the Bandelier Tuff, a densely welded unit, which may inhibit vapor flow (LANL 2009, 105187). Sampling port 2 (112.5–117.5 ft bgs) in vapor-monitoring well 21-603059 has never produced pore gas since it was installed, again possibly because of its positioning within a massive welded unit (unit 2) (LANL 2009, 105187). During every sampling round, the continued inoperability of these ports is verified during field screening.

Results for several geotechnical samples collected at borehole (BH) 21-607955 were not received from the analytical laboratory by December 15, 2009. Consequently, these results could not be included in the geotechnical data presentation of the Phase III investigation report, revision 1 (LANL 2009, 108012). In addition, unsaturated hydraulic conductivity properties have not been previously reported for either BH 21-25262 or 21-607955. These data are presented in this periodic monitoring report (section 5).

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 T. Because the primary objective of the 2009 investigation is to characterize the nature and extent of VOCs and tritium in subsurface vapor, a screening evaluation is provided comparing maximum concentrations of VOCs in pore gas with SLs. These SLs are based on equilibrium partitioning using the appropriate Henry's law constant with groundwater cleanup levels. This screening process evaluates the potential for the reported VOC concentrations to result in contamination of groundwater in excess of cleanup levels. Details regarding pore-gas screening evaluation criteria are presented in the following section. Results of the pore-gas screening evaluation are presented in section 5. There are no applicable standards for tritium in pore vapor.

The analysis evaluated the groundwater concentration that would be in equilibrium with the maximum concentrations of VOCs detected at MDA T during the current vapor-monitoring quarter (September–November 2009). The equilibrium relationship between air and water concentrations is described by the following equation.

$$C_{water} = C_{air} / H' \qquad \textbf{Equation 3.0-1}$$

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 an exceedance of the groundwater cleanup level at the contaminant/groundwater interface.

Because no SLs for pore gas 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:

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

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

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

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 standards or EPA regional 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) (per the Consent Order) 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 to come 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

Before each sampling event, field screening was performed in each vapor-monitoring well and targeted sampling interval to ensure percent carbon dioxide (%CO_2) and oxygen (%O_2) levels at each sampling port had stabilized at values representative of subsurface pore-gas conditions. Table 4.0-1 presents a summary of all field-screening results obtained during the September–November 2009 sampling events at vapor-monitoring wells 21-25262, 21-25264, 21-603058, 21-603059, and 21-607955 by sampling port and sampling round.

Atmospheric information was obtained from http://www.srh.noaa.gov/data/obhistory/KLAM.html on each day of sampling using the closest automated weather station to MDA T (Los Alamos Airport, latitude 35.88°, longitude 106.28°). Table 4.0-2 summarizes the barometric pressure, temperature, and relative humidity for the sampling dates.

5.0 ANALYTICAL DATA RESULTS

Analytical results for VOCs in pore gas were produced from laboratory analyses of vapor collected in SUMMA canisters and analyzed using EPA Method TO-15. Analytical results for tritium were produced from laboratory analysis of vapor collected in silica gel columns and analyzed using EPA Method 906.0. Geotechnical analytical results for dry density, percent moisture (gravimetric and volumetric), and saturated and unsaturated hydraulic conductivity were produced from laboratory analyses of core samples collected during the drilling of vapor-monitoring well 21-607955.

All analytical data were subject to extensive QA/QC and data validation reviews in accordance with Laboratory guidance and procedures. The QA/QC and data validation review for September–November 2009 MDA T pore-gas data are presented in Appendix C. All validated analytical results from September–November 2009 pore-gas sampling and from geotechnical sampling of vapor-monitoring well 21-607955 are presented on a CD in Appendix D. Similar detail regarding vapor data collected during February–August 2009 is presented in prior periodic monitoring reports (LANL 2009, 105187; LANL 2009, 107448; LANL 2009, 106665).

Vapor analytical sampling data are also available at the Risk Analysis, Communication, Evaluation, and Reduction (RACER) website (http://www.racernm.com/).

5.1 VOC Pore-Gas Results

VOC results from the current and previous three vapor-monitoring quarters (February–November 2009) are summarized by well location in Tables 5.1-1 through 5.1-5. Concentration with depth profiles for each VOC detected in each well for all samples collected from February–November 2009 are presented by sampling round in Figures 5.1-1 through 5.1-31. Data associated with February–August 2009 have been previously presented and are included for comparison purposes only.

The initial VOC results from the first round of sampling at vapor-monitoring well 21-607955, collected in December 2009, are also included; however, because only a single round of data has been collected at this location, contaminant trends in time cannot be confirmed at this time. An initial comparison of the VOC data collected at depth at vapor-monitoring well 21-607955 is generally consistent to the spatial trends currently observed at depth at vapor-monitoring well 21-25262. Organic chemicals detected at or near the standard quantitation limit (SQL) for the analysis are considered present at trace concentrations; these low concentration levels are more likely representative of analytical variability than of true spatial chemical distributions. Further sampling at vapor-monitoring well 21-607955 is needed to corroborate these initial observations.

A total of 25 VOCs were detected in MDA T pore gas during the current quarter (September–November 2009) sampling activities and the results are consistent with previous sampling results. Five VOCs, methylene chloride, carbon tetrachloride, chloroform, trichloroethene (TCE), and tetrachloroethene (PCE), were consistently detected at the greatest concentrations relative to other detected VOCs during the MDA T monitoring period. Concentration with depth profiles for each of these five COPCs for all samples collected during the current quarter are presented by well in Figures 5.1-32 through 5.1-36 and discussed below. Results obtained for these COPCs during the previous three quarters (February–August 2009) are also presented in Figures 5.1-32 through 5.1-36 for comparison with the current-quarter data.

As illustrated in Figures 5.1-19 through 5.1-36, the results of the MDA T pore-gas VOC sampling from September–November 2009 show several general spatial trends. These results are generally consistent with results obtained during earlier sampling rounds (LANL 2009, 105187; LANL 2009, 106665; LANL 2009, 108012; LANL 2009, 107448).

- Methylene chloride pore-gas concentrations consistently increased with depth to TD in vapor-monitoring wells 21-25264, 21-603058, and 21-603059. In vapor-monitoring well 21-25262, methylene chloride concentrations increased with depth to a maximum at ~475–575 ft bgs before decreasing with depth to TD (Figure 5.1-32). In the initial sampling round at vapor-monitoring well 21-607955, methylene chloride concentrations generally increased to a maximum at ~375 ft bgs and then decreased to nondetect values below ~800 ft bgs.
- Carbon tetrachloride pore-gas concentrations also increased with depth in vapor-monitoring wells 21-25264, 21-603058, 21-603059, and 21-25262 to ~250–300 ft bgs; after 300 ft bgs, carbon tetrachloride decreased with depth to TD (Figure 5.1-33). In the initial sampling round at vapor-monitoring well 21-607955, carbon tetrachloride concentrations showed no obvious trend other than a decrease to nondetect values below ~575 ft bgs.
- Chloroform pore-gas concentrations displayed an S-shaped profile in vapor-monitoring well 21-25262, in which the concentrations were higher near the surface, lower at the lower-middle ports, and lowest in the upper-middle ports and at TD (Figure 5.1-34). In vapor-monitoring well 21-603059, chloroform concentrations decreased from a maximum near the surface (port 1, 80 ft bgs) to fairly constant concentrations from ~190 ft to TD. Chloroform results obtained from vapor-monitoring wells 21-25264 and 21-603058 were less consistent between rounds but, on average, the concentrations increased slightly with depth to TD in both wells during the current quarter. In the initial sampling round at vapor-monitoring well 21-607955, chloroform concentrations showed no obvious trend other than a decrease to nondetect values below ~800 ft bgs.

- Similar to chloroform, TCE pore-gas concentrations also displayed an S-shaped profile in vapor-monitoring well 21-25262 but not in vapor-monitoring wells 21-25264 and 21-603058 (Figure 5.1-35). In vapor-monitoring wells 21-25264 and 21-603058, the concentration trends were less consistent between wells and sampling rounds. During rounds 10–12, TCE concentrations, on average, slightly increased with depth to TD in vapor-monitoring well 21-603058 but decreased with depth to TD in vapor-monitoring well 21-25264 (except during round 12). In vapor-monitoring well 21-603059, TCE concentrations decreased from a maximum near the surface port to ~190 ft bgs, followed by an increasing trend to ~300 ft bgs, below which concentrations remained fairly constant to TD. In the initial sampling round at vapor-monitoring well 21-607955, TCE concentrations showed no obvious trend other than a decrease to nondetect values below ~800 ft bgs.
- PCE concentrations consistently decreased with depth to TD in all five vapor-monitoring wells (Figure 5.1-36).
- Acetone and toluene were detected at their maximum concentrations at TD (~950 ft bgs) during the initial round of pore-gas sampling in vapor-monitoring well 21-607955 (concentrations of 30,000 $\mu g/m^3$ and 690 $\mu g/m^3$, respectively), as shown in Figure 5.1-31. These elevated acetone and toluene detections are considered anomalous for the following reasons: (1) neither was detected in the solid media sample taken at TD in this borehole (LANL 2009, 108012), (2) they are currently only represented in the initial round of sampling for this new well, (3) these samples were retrieved under expedited sampling conditions, and (4) similar detections are not observed in any pore-gas data obtained from the other MDA T wells. Additional sampling rounds at vapor-monitoring well 21-607955 will determine whether these detections are indicative of deep (900+ ft bgs) conditions beneath MDA T or whether they are a temporary condition resulting from recent drilling activities.
- Benzene, bromodichloromethane, bromomethane, 2-butanone, carbon disulfide, cyclohexane, 1,4-dichlorobenzene, dichlorodifluoromethane, 1,2-dichloroethane, 1,2-cis-dichloroethene, ethanol, hexane, methanol, propylene, 1,1,2-trichloro-1,2,2-trifluoroethane, and 1,1,1-trichloroethane concentrations showed no trends. These VOCs were either infrequently detected or detected at very low concentrations (at or near the SQLs).
- Dichloroethene[1,1-] and 1,1,2-trichloroethane were both detected at depths of ~250–300 ft bgs in vapor-monitoring wells 21-25262 and 21-603059. Concentrations increased with depth to sampling port 6 (475 ft bgs) in vapor-monitoring well 21-25262, and then decreased in sampling port 9 (TD at 690 ft bgs). These two VOCs were detected at lower concentrations in vapor-monitoring wells 21-25264, 21-603058, and 21-607955. The maximum concentration of 1,1,2-trichloroethane in July 2009, exceeded the groundwater standard at ~450 ft bgs in vapor-monitoring well 21-25262 (LANL 2009, 107448). A profile of 1,1,2-trichloroethane concentration with depth for all vapor-monitoring wells from February–November 2009 is presented in Figure 5.1-37.
- Fifteen VOCs previously detected during all previous quarters of vapor-monitoring (October 2007–August 2009) (bromoform; 1,3-butadiene; 1-butanol; chlorodibromomethane; 1,2-dichlorobenzene; ethylbenzene; 4-ethyltoluene; 2-hexanone; 4-methyl-2-pentanone; n-heptane; 2-propanol; tetrahydrofuran; 1,3,5-trimethylbenzene; 1,2-xylene; and 1,3-xylene+1,4-xylene) were not detected during the current quarter (September–November 2009). In previous rounds, these VOCs were infrequently detected and at very low concentrations (at or near the SQL).

- Bromomethane and methanol were detected for the first time in October and September 2009, respectively. Bromomethane was detected at a concentration of 6.7 µg/m^3 in a single sample collected at port 9 (~690 ft bgs) in vapor-monitoring well 21-25262. However, this result is low, near the SQL. Methanol was detected in two samples at concentrations of 120 and 140 µg/m^3. Both results were estimated (J-qualified) and detected at ~375 ft bgs in vapor-monitoring wells 21-25262 and 21-603059, respectively. Methanol was not detected in any other sample.

5.2 VOC Screening Evaluation

The VOC results from the September–November 2009 sampling rounds were screened to evaluate whether the concentrations of VOCs could be a potential source of groundwater contamination. Because no SLs for pore gas 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 (section 3.0).

Equation 3.0-3 was used to calculate SVs for the maximum concentrations of VOCs detected at MDA T during the September–November 2009 sampling. The evaluation included the 22 detected VOCs in MDA T samples for which there are MCLs, NMWQCC standards, or EPA regional tap water SLs (Table 5.2-1). Ethanol, methanol, and propylene were detected but do not have MCLs, NMWQCC standards, or tap water SLs, and were not evaluated.

The results of the September–November 2009 VOC screening evaluation are presented in Table 5.2-1. The SVs were less than 1.0 for all detected VOCs, except for methylene chloride and 1,1,2-trichloroethane. The concentrations of methylene chloride in 28 out of 80 samples collected resulted in SVs greater than 1.0, with a maximum SV of 3.69; the concentration of 1,1,2-trichloroethane in 1 out of 80 samples resulted in an SV of 1.41 (Figure 5.2-1).

Methylene chloride and 1,1,2-trichloroethane decrease from the maximum concentration with depth to TD in vapor-monitoring well 21-25262 and are not detected at TD in vapor-monitoring well 21-607955, indicating that the observed levels of VOCs in MDA T pore gas do not present the potential to contaminate groundwater in excess of applicable regulatory criteria.

5.3 Pore-Vapor Tritium Results

The results of the current and previous three quarters (February–November 2009) of sampling for tritium are summarized by vapor-monitoring well location in Tables 5.3-1 through 5.3-5. Figure 5.3-1 presents tritium activity profiles for all samples collected during September–November 2009. Results obtained for tritium during the previous three quarters (February–August 2009) are also presented in Figure 5.3-1 for comparison with the current quarter data. Certain activity trends observed during the September–November 2009 sampling period in vapor-monitoring wells 21-25262, 21-25264, 21-603058, and 21-603059 are similar to those reported during previous sampling rounds.

- During the September–November 2009 sampling period, maximum pore-gas tritium activities were higher in samples collected from vapor-monitoring well 21-25264 than in samples collected from vapor-monitoring wells 21-603058 and 21-603059, with the maximum tritium activity (129,340 pCi/L) in a sample collected during round 12 (November 2009) at port 2 (at a depth of 155.5 ft bgs).

- Vapor-monitoring wells 21-25264 and 21-603058 show a peak of tritium activity at a particular sampling port, followed by a marked decrease to TD. Tritium activities in vapor-monitoring well 21-603058 showed an anomalous spike of 116,521 pCi/L at port 4 (~250 ft bgs) during a single round (November 2009). Historically, the next highest detected activity in this well was 25, 118 pCi/L at the same port in October 2007; the third highest was 6339.59 pCi/L at port 3 in February 2009.
- During the September–November 2009 sampling period, tritium activities in vapor-monitoring well 21-603059 generally increased with depth, with maximum tritium activities in samples collected at TD, with the exception of September 2009. In September 2009, tritium activities reached a maximum at ~300 ft bgs, followed by a decrease to TD.
- Vapor-monitoring well 21-25262 shows a peak of tritium activity around 375 ft bgs, followed by a decrease to TD and nondetects below ~475 ft bgs.
- Initial results from vapor-monitoring well 21-607955 indicate low tritium activities (less than 4580 pCi/L), with two peaks of tritium activity at ~160 ft bgs and ~230 ft bgs, followed by a decrease to nondetect values at ports 9 and 10. Tritium is detected at TD at a low activity of 844.5 pCi/L.

5.4 Geotechnical Core Sample Results

The results of the geotechnical sampling of BH 21-607955 are summarized in Table 5.4-1. Depth profiles are presented in Figure 5.4-1. Unsaturated hydraulic conductivity properties, which have not been previously reported for BHs 21-25262 and 21-607955, are presented in Table 5.4-2.

6.0 SUMMARY

The objectives of the MDA T vapor-monitoring activities are (1) to collect additional vapor samples from BHs previously sampled at MDA T and (2) to compare the results with previously detected VOC concentrations and tritium activities beneath MDA T. Vapor-monitoring wells 21-25262, 21-25264, 21-603058, and 21-603059 were sampled from September–November 2009, and vapor-monitoring well 21-607955 was sampled in early December 2009, per the requirements outlined in the approved MDA T vapor-monitoring plan (LANL 2007, 098944; NMED 2007, 098946) and the approved MDA T Phase III investigation work plan (LANL 2009, 105645; NMED 2009, 105691; NMED 2009, 106455). The results of the current quarter of monitoring activities (September–November 2009) indicate similar trends to those reported during previous monitoring activities (October 2007–August 2009) (LANL 2009, 105187; LANL 2009, 106665; LANL 2009, 108012; LANL 2009, 107448).

A review of the analytical results from the September–November 2009 monitoring activities detected a total of 25 VOCs and tritium in the pore gas beneath MDA T (Tables 5.1-1 through 5.1-5 and 5.3-1 through 5.3-5). Concentrations for most VOCs detected in MDA T pore gas decreased with depth, were consistently detected at or near the SQL, or were infrequently detected. These results are consistent with data obtained during previous quarters (LANL 2009, 105187; LANL 2009, 106665; LANL 2009, 108012; LANL 2009, 107448).

Five VOCs, methylene chloride, carb.on tetrachloride, chloroform, TCE, and PCE, were consistently detected throughout the MDA T monitoring period at the greatest concentrations relative to the other detected VOCs and are summarized below. Other VOCs of interest (acetone, toluene, and 1,1,2-trichloroethane) are also summarized.

- Methylene chloride pore-gas concentrations consistently increased with depth to TD in vapor-monitoring wells 21-25264, 21-603058, and 21-603059. In vapor-monitoring wells 21-25262 and 21-607955, methylene chloride concentrations increased with depth to a maximum at ~475–575 ft bgs before decreasing with depth to TD.
- Carbon tetrachloride pore-gas concentrations also increased with depth in vapor-monitoring wells 21-25262, 21-25264, 21-603058, and 21-603059 to ~250–300 ft bgs; after 300 ft bgs, carbon tetrachloride decreased with depth to TD.
- Chloroform and TCE pore-gas concentrations generally show an S-shaped profile in vapor-monitoring wells 21-25262 and 21-603059, in which the concentrations were highest near the surface, lower at the lower-middle ports, and lowest in the upper-middle ports and at TD. Chloroform and TCE pore-gas concentrations in vapor-monitoring wells 21-25264 and 21-603058 were less consistent between rounds, but overall (1) chloroform concentrations increased slightly with depth to TD in both vapor-monitoring wells, and (2) TCE concentrations increased slightly with depth to TD in vapor-monitoring well 21-603058 and decreased with depth to TD in vapor-monitoring well 21-25264.
- In the initial sampling round at vapor-monitoring well 21-607955, carbon tetrachloride, chloroform, and TCE concentrations showed no obvious trends other than a decrease to nondetect values by ~800 ft bgs.
- PCE concentrations consistently decreased with depth to TD in all five vapor-monitoring wells.
- Acetone and toluene were detected at their maximum concentrations at TD (~950 ft bgs) during the initial round of pore-gas sampling in vapor-monitoring well 21-607955 (concentrations of 30,000 $\mu g/m^3$ and 690 $\mu g/m^3$, respectively). Additional sampling round data from vapor-monitoring well 21-607955 will determine whether these detections are indicative of deep (900+ ft bgs) conditions beneath MDA T or whether they are a temporary condition resulting from recent drilling activities.
- In vapor-monitoring wells 21-25262 and 21-603059, 1,1,2-trichloroethane concentrations increased with depth from ~225 ft bgs to TD (375 ft bgs) in vapor-monitoring well 21-603059 and to sampling port 6 (475 ft bgs) in vapor-monitoring well 21-25262, then decreased to TD (690 ft bgs). These two VOCs were detected at lower concentrations in vapor-monitoring wells 21-25264, 21-603058, and 21-607955.

Consistent with previous results, tritium activities were substantially higher in samples collected from vapor-monitoring well 21-25264 than in samples collected from vapor-monitoring wells 21-25262, 21-603058, 21-603059, and 21-607955 (except during the November 2009 sampling period, when vapor-monitoring well 21-603058 experienced an anomalous spike of 116,521 pCi/L at ~250 ft bgs). Tritium activities in vapor-monitoring wells 21-25264, 21-603058, and 21-25262 have one or two peaks at a particular port, followed by a marked decrease to TD. Vapor-monitoring well 21-603059 consistently showed an increase in tritium activities to TD throughout the September–November 2009 monitoring period. In the initial sampling round at vapor-monitoring well 21-607955, tritium activities showed two peaks, the larger at a depth of ~250 ft bgs, followed by a decrease to nondetect values from ~650–800 ft bgs, then followed by a low detection at TD.

The VOC vapor data collected during the September–November 2009 sampling were also compared to SLs based on equilibrium partitioning of vapor with groundwater cleanup levels in order to evaluate the reported VOC concentrations for their potential to contaminate groundwater in excess of applicable regulatory criteria. The VOC screening evaluation identified two VOCs, methylene chloride and 1,1,2-trichloroethane, in MDA T pore gas at concentrations resulting in an SV greater than 1.0. However, methylene chloride and 1,1,2-trichloroethane were not detected in the deepest MDA T pore-gas sample (950 ft bgs in vapor-monitoring well 21-607955). Therefore, the observed levels of VOCs in MDA T pore gas do not present the potential to contaminate groundwater in excess of applicable regulatory criteria.

Vapor-monitoring activities are scheduled to continue at MDA T per the requirements outlined in the approved MDA T Phase III investigation work plan (LANL 2009, 105645; NMED 2009, 106455; NMED 2009, 105691). Vapor-monitoring wells 21-25262, 21-25264, 21-603058, 21-603059, and 21-607955 will be monitored on a monthly basis and in conjunction with the sampling (on completion and installation) of a new MDA T monitoring well near building 21-257 (Figure 1.0-2). Data collected during future monitoring activities at vapor-monitoring wells 21-25262, 21-25264, 21--603058, 21-603059, and 21-607955 as well as the new MDA T monitoring well near building 21-257 (upon completion) will be presented and evaluated, as available, in subsequent quarterly monitoring and investigation reports (LANL 2009, 105645; NMED 2009, 105691; NMED 2009, 106455).

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.

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LANL (Los Alamos National Laboratory), September 2006. "Investigation Report for Material Disposal Area T, Consolidated Unit 21-016(a)-99, at Technical Area 21," Los Alamos National Laboratory document LA-UR-06-6506, Los Alamos, New Mexico. (LANL 2006, 094151)

LANL (Los Alamos National Laboratory), October 2007. "Subsurface Vapor-Monitoring Plan for Material Disposal Area T at Technical Area 21," Los Alamos National Laboratory document LA-UR-07-7037, Los Alamos, New Mexico. (LANL 2007, 098944)

LANL (Los Alamos National Laboratory), February 2009. "Periodic Monitoring Report for Vapor-Sampling Activities at Material Disposal Area T, Consolidated Unit 21-016(a)-99, Technical Area 21, Fiscal Year 2008," Los Alamos National Laboratory document LA-UR-09-0791, Los Alamos, New Mexico. (LANL 2009, 105187)

LANL (Los Alamos National Laboratory), April 2009. "Phase III Investigation Work Plan for Material Disposal Area T, Consolidated Unit 21-016(a)-99," Los Alamos National Laboratory document LA-UR-09-2140, Los Alamos, New Mexico. (LANL 2009, 105645)

LANL (Los Alamos National Laboratory), July 2009. “Periodic Monitoring Report for Vapor-Sampling Activities at Material Disposal Area T, Consolidated Unit 21-016(a)-99, at Technical Area 21, February and April 2009,” Los Alamos National Laboratory document LA-UR-09-4674, Los Alamos, New Mexico. (LANL 2009, 106665)

LANL (Los Alamos National Laboratory), September 2009. “Phase III Investigation Report for Material Disposal Area T at Technical Area 21,” Los Alamos National Laboratory document LA-UR-09-5805, Los Alamos, New Mexico. (LANL 2009, 107106)

LANL (Los Alamos National Laboratory), October 2009. “Periodic Monitoring Report for Vapor-Sampling Activities at Material Disposal Area T, Consolidated Unit 21-016(a)-99, at Technical Area 21, June to August 2009,” Los Alamos National Laboratory document LA-UR-09-6878, Los Alamos, New Mexico. (LANL 2009, 107448)

LANL (Los Alamos National Laboratory), December 2009. “Phase III Investigation Report for Material Disposal Area T at Technical Area 21, Revision 1,” Los Alamos National Laboratory document LA-UR-09-8109, Los Alamos, New Mexico. (LANL 2009, 108012)

NMED (New Mexico Environment Department), October 31, 2007. “Approval with Modifications, Subsurface Vapor-Monitoring Plan for MDA T,” 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, 098946)

NMED (New Mexico Environment Department), May 4, 2009. “Approval with Modifications, Phase III Work Plan for Material Disposal Area T, Consolidated Unit 21-016(a)-99,” 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, 105691)

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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)

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/Type	Data Source
Rio Grande	Drainage Arcs; Los Alamos National Laboratory; Water Quality and Hydrology Group; 03 June 2003
LANL boundary	LANL Areas Used and Occupied; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Division; 19 September 2007.
TA boundary	Technical Area Boundaries; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Division; 19 September 2007.
NES boundary	Nuclear Environmental Sites; Los Alamos National Laboratory, EP Environment and Remediation Support Services Division, EP2006-1092; 1:2,500 Scale Data; 11 January 2007.
Major paved road	New Mexico Roads; Earth Data Analysis Center, Albuquerque, NM; 01 December1995.
Paved road	Paved Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 04 January 2008.
Dirt road	Dirt Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 04 January 2008.
Structure	Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 04 January 2008.
Former structure	Former Structures; Los Alamos National Laboratory, Waste and Environmental Services Division, EP2008-0441; 1:2,500 Scale Data; 08 August 2008.
Waste storage features	Waste Storage Features; Los Alamos National Laboratory, Environment and Remediation Support Services Division, GIS/Geotechnical Services Group, EP2007-0032; 1:2,500 Scale Data; 13 April 2007.
Contours	Hypsography, 100-, 20-, and 10-Ft Contour Intervals; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; 1991.
Fence	Security and Industrial Fences and Gates; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
Revised MDA T fence	Revised MDA T Fencing; Los Alamos National Laboratory, Waste and Environmental Services Division, unpublished data, personal communication with N. Plannerer.
Gas line	Primary Gas Distribution Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
Water line	Water Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
Electric line	Primary Electric Grid; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
Sewer line	Sewer Line System; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
Steam line	Steam Line Distribution System; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
Communication line	Communication Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 08 August 2002; as published 28 May 2009.
Building-associated features /structures	Primary Landscape Features; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 28 May 2009.
Sampling locations	Point Feature Locations of the Environmental Restoration Project Database; Los Alamos National Laboratory, Waste and Environmental Services Division, EP2008-0109; 4 June 2009.

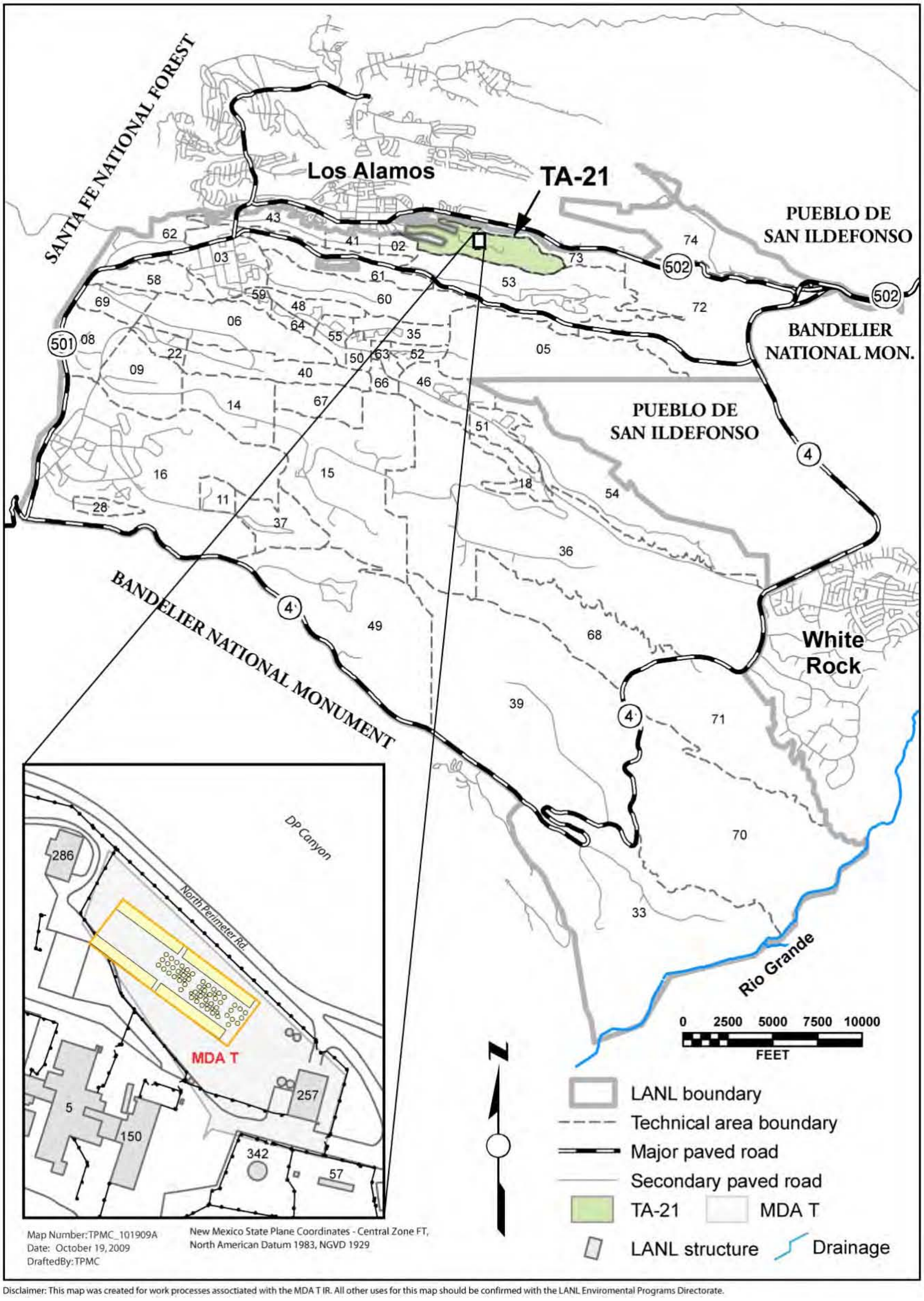


Figure 1.0-1 Location of MDA T at TA-21

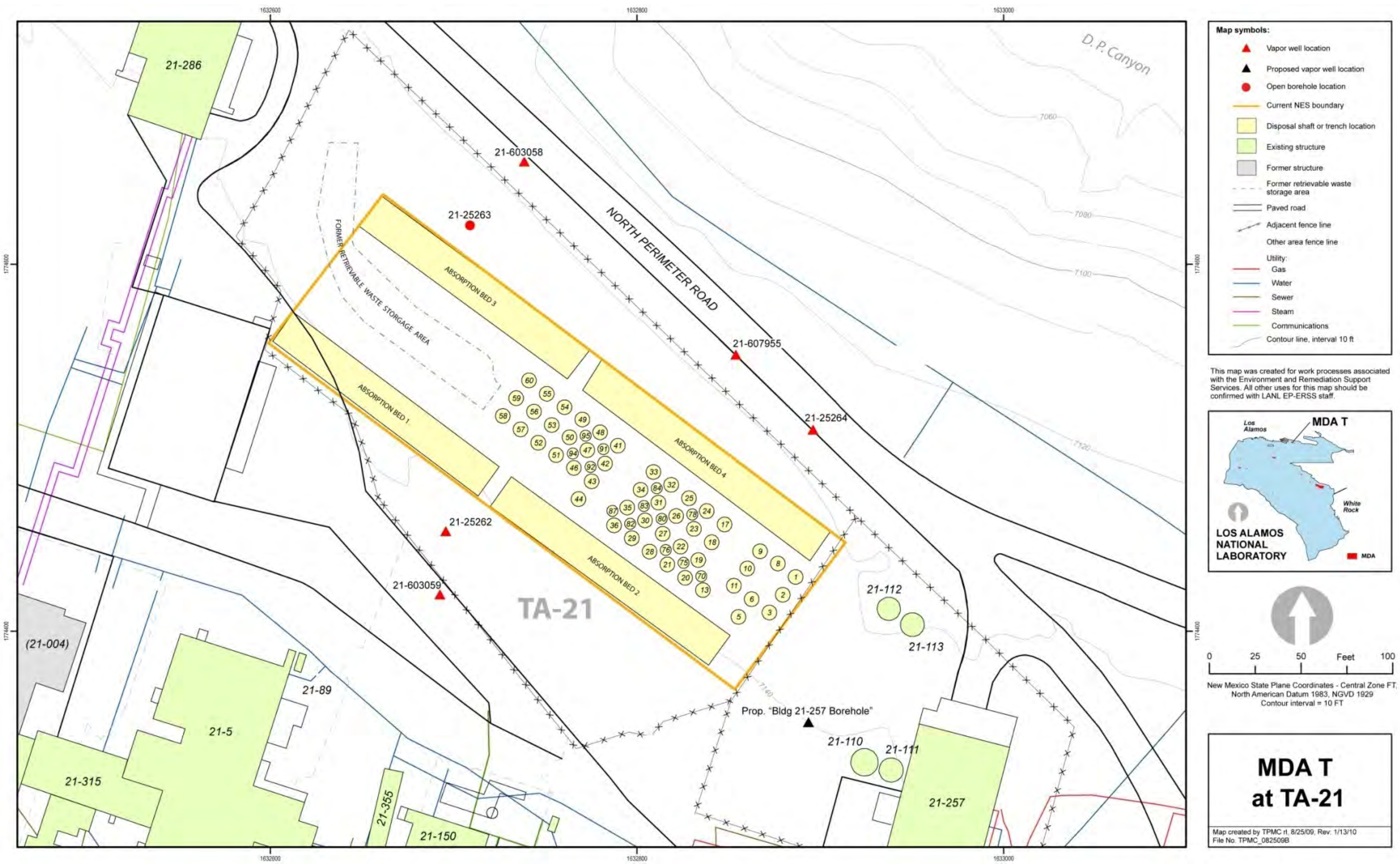


Figure 1.0-2 Locations of MDA T vapor-monitoring wells and associated structures and features

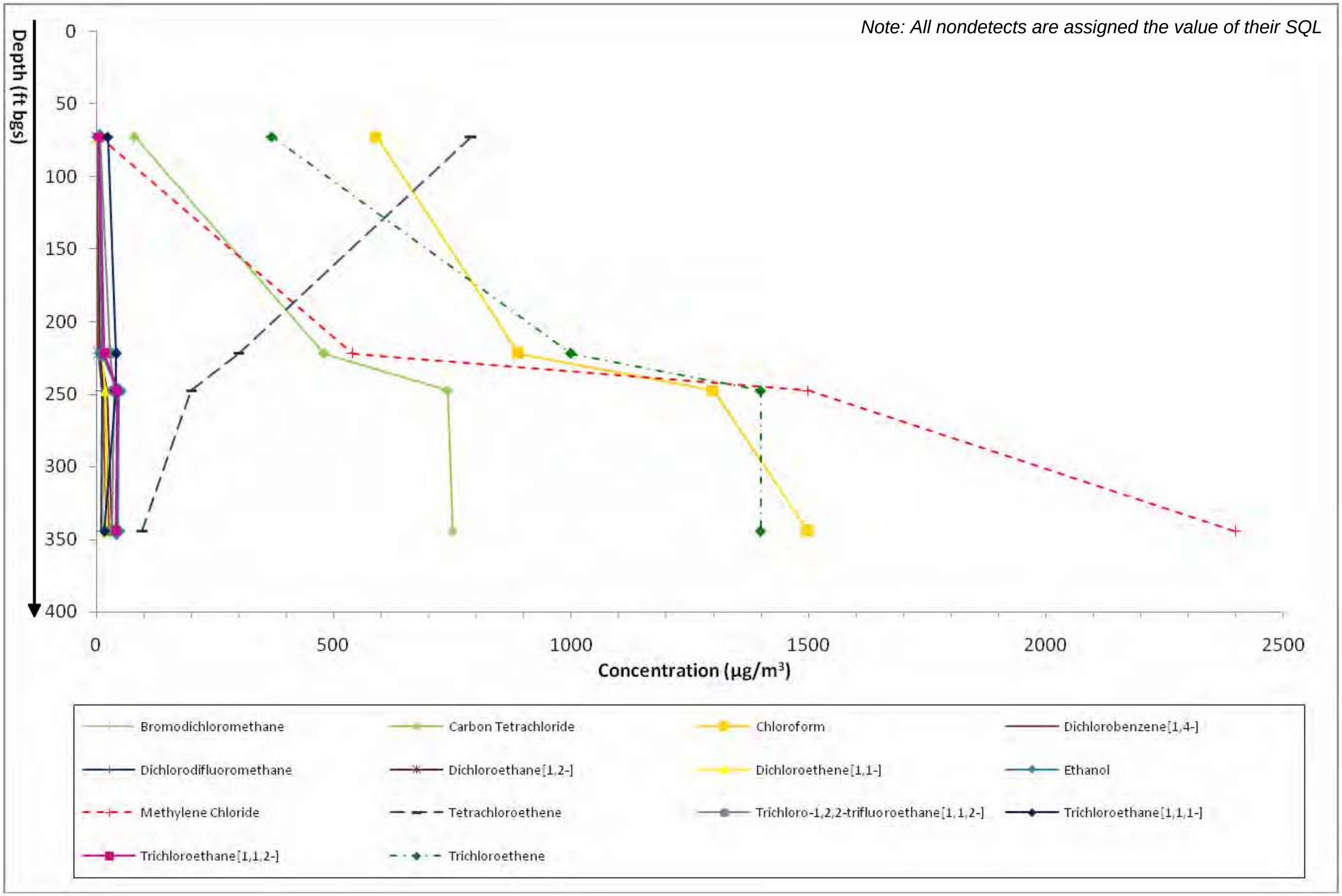


Figure 5.1-1 Vertical profile of detected VOCs in vapor-monitoring well 21-603058, February 2009

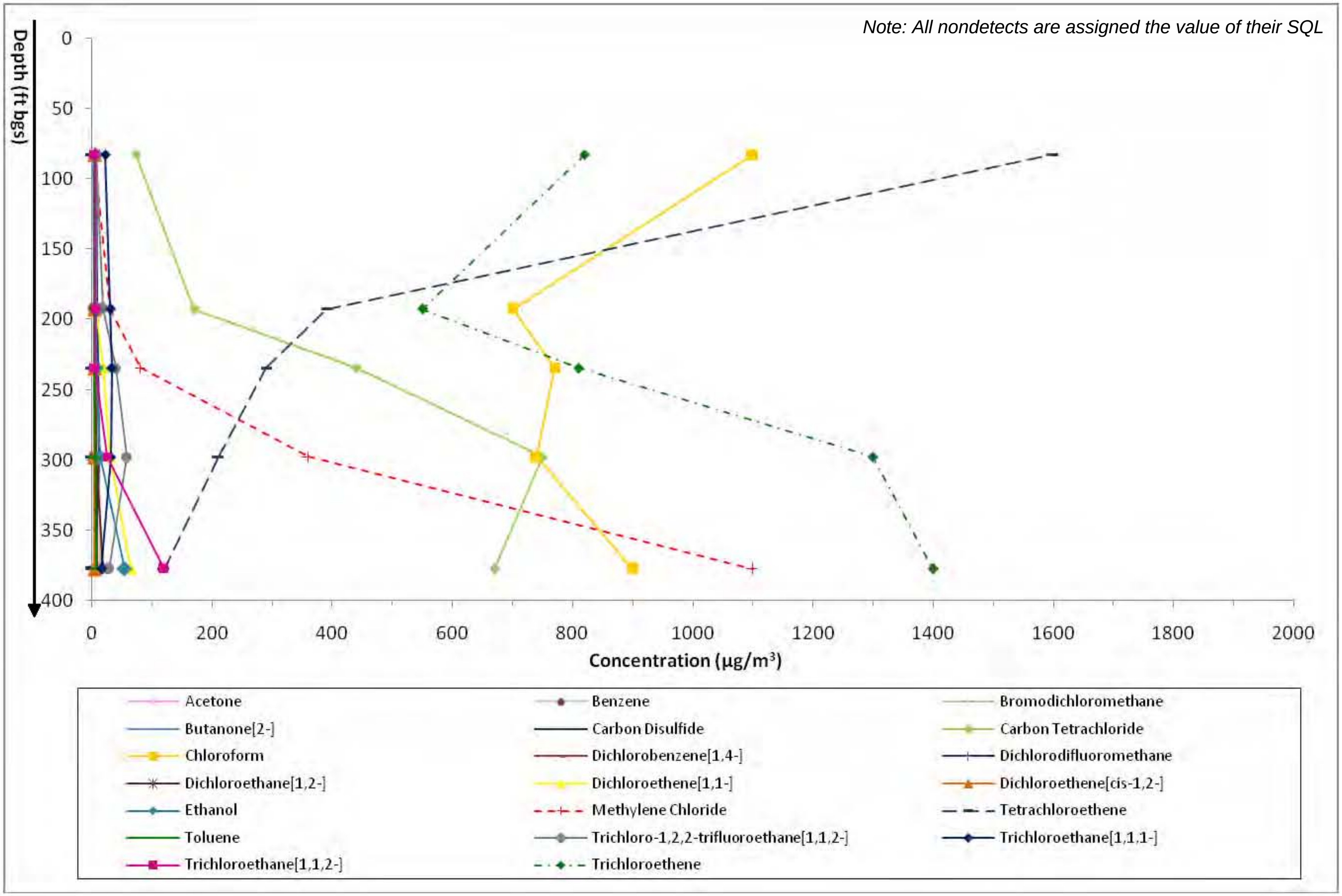


Figure 5.1-2 Vertical profile of detected VOCs in vapor-monitoring well 21-603059, February 2009

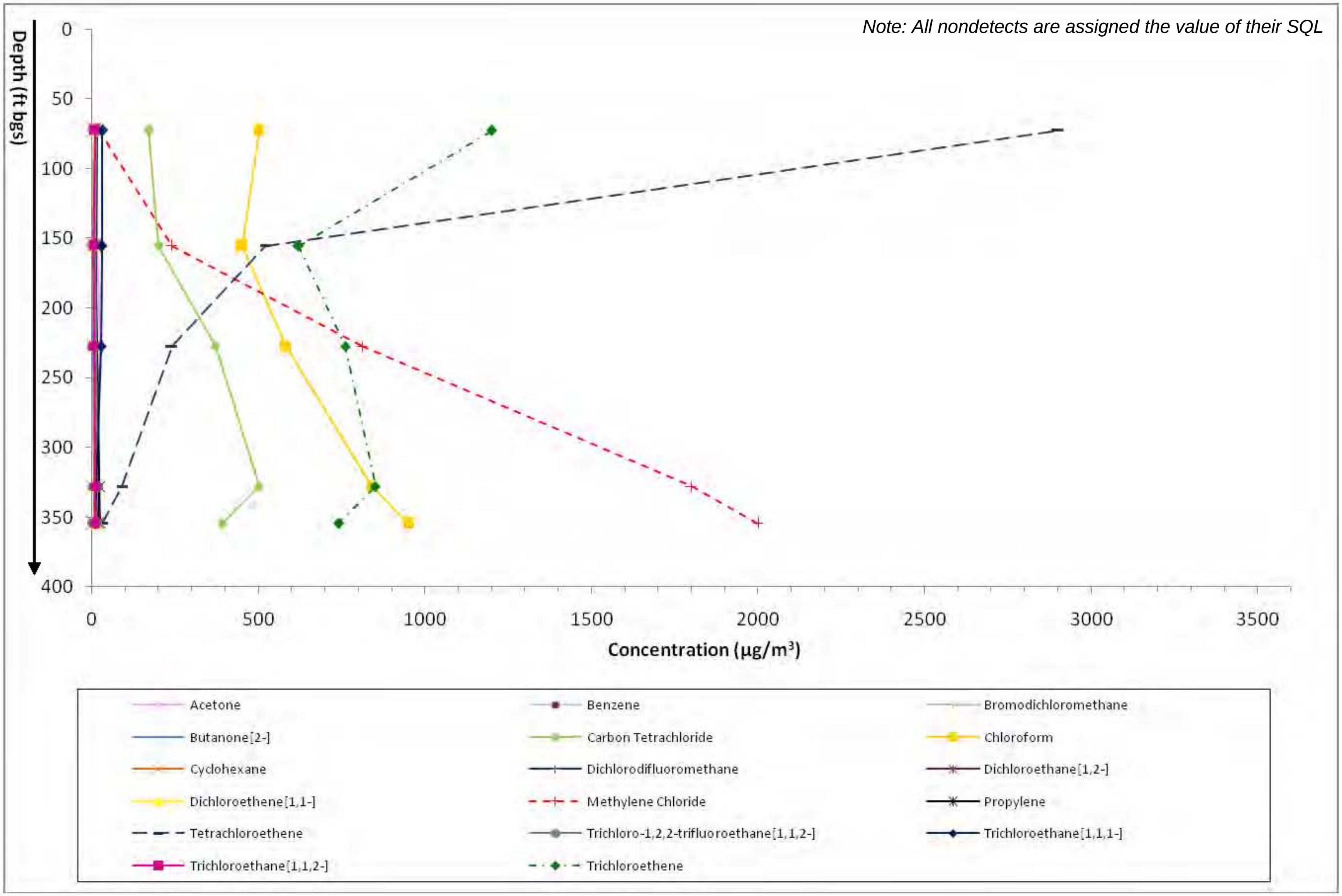


Figure 5.1-3 Vertical profile of detected VOCs in vapor-monitoring well 21-25264, February 2009

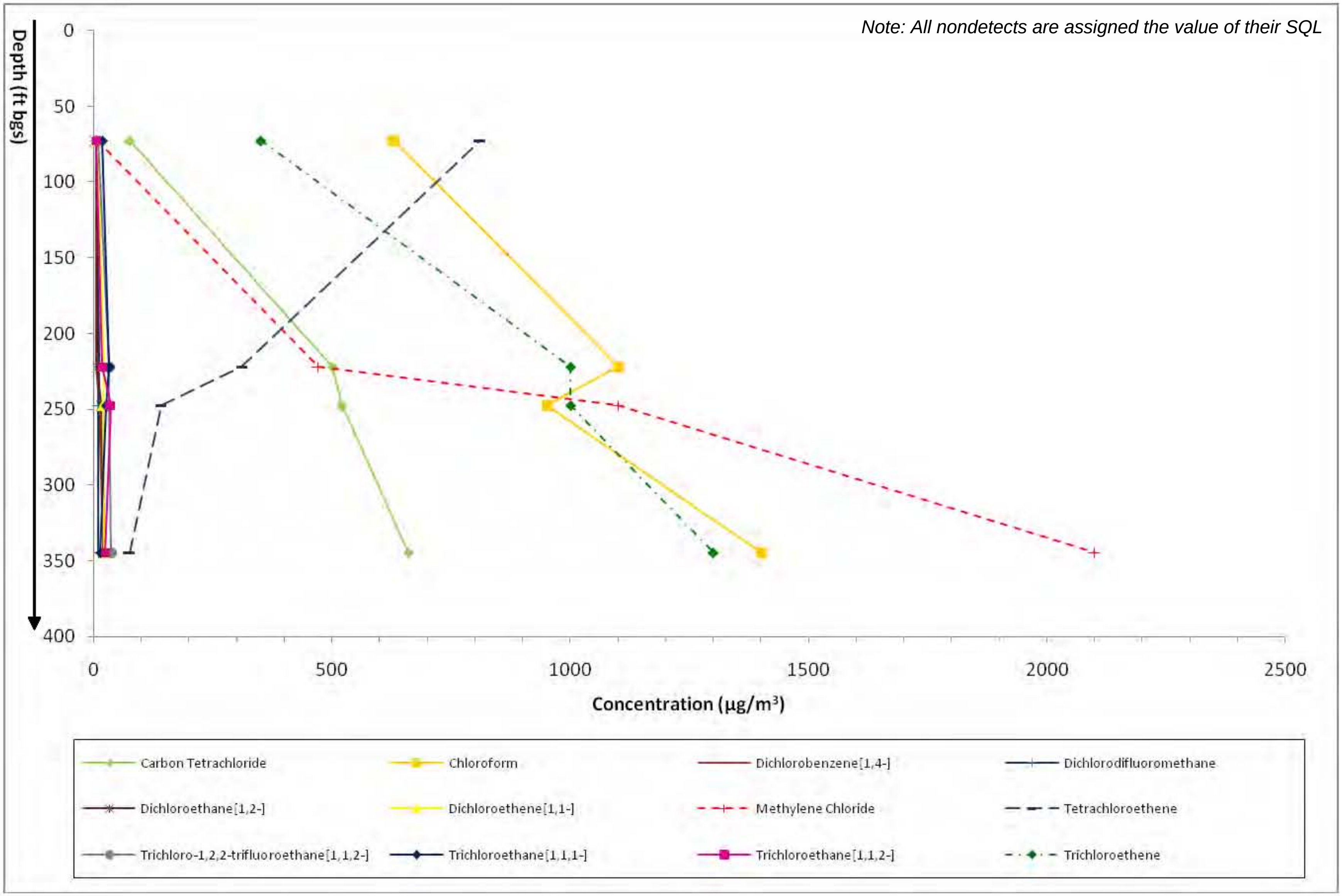


Figure 5.1-4 Vertical profile of detected VOCs in vapor-monitoring well 21-603058, April 2009

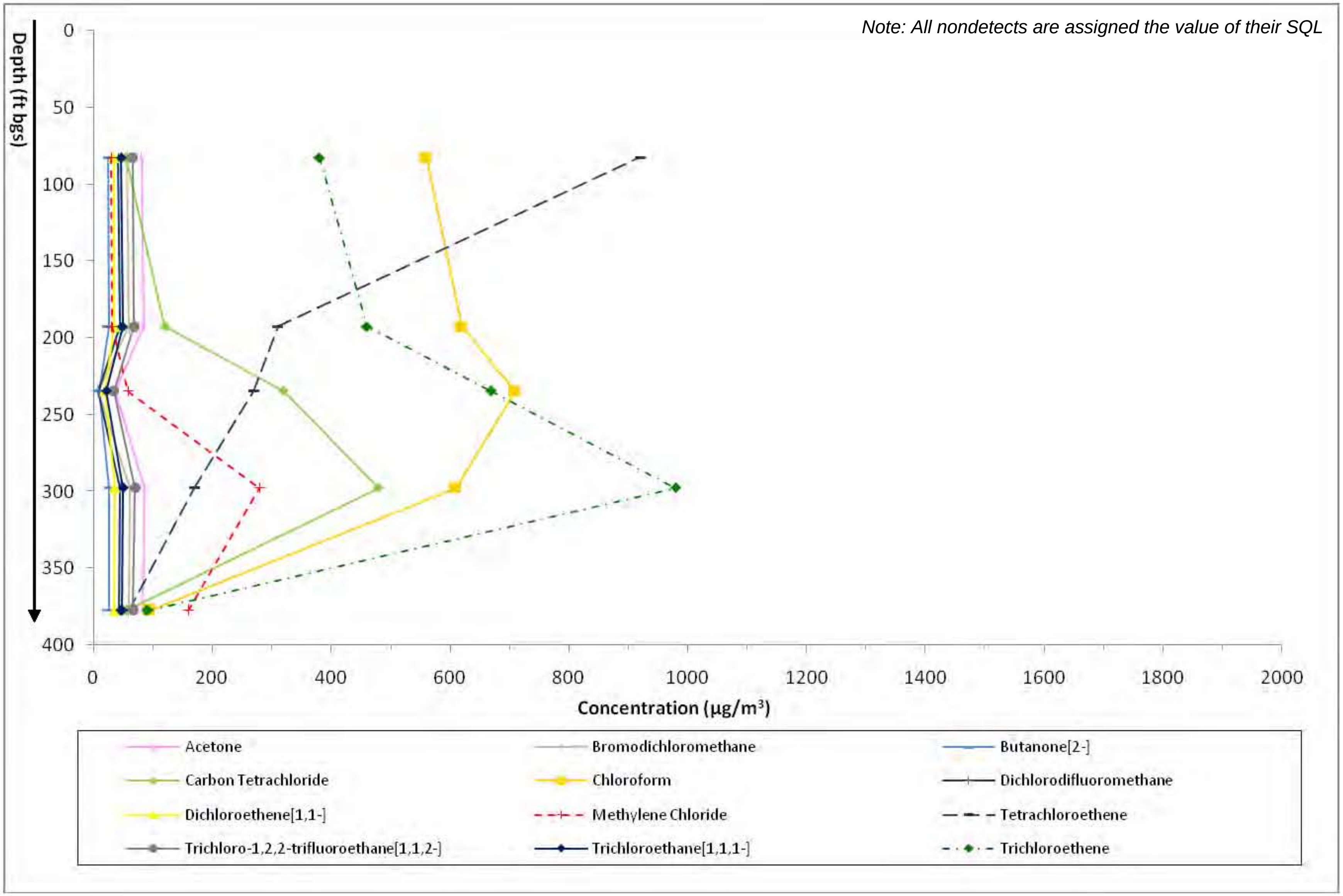


Figure 5.1-5 Vertical profile of detected VOCs in vapor-monitoring well 21-603059, April 2009

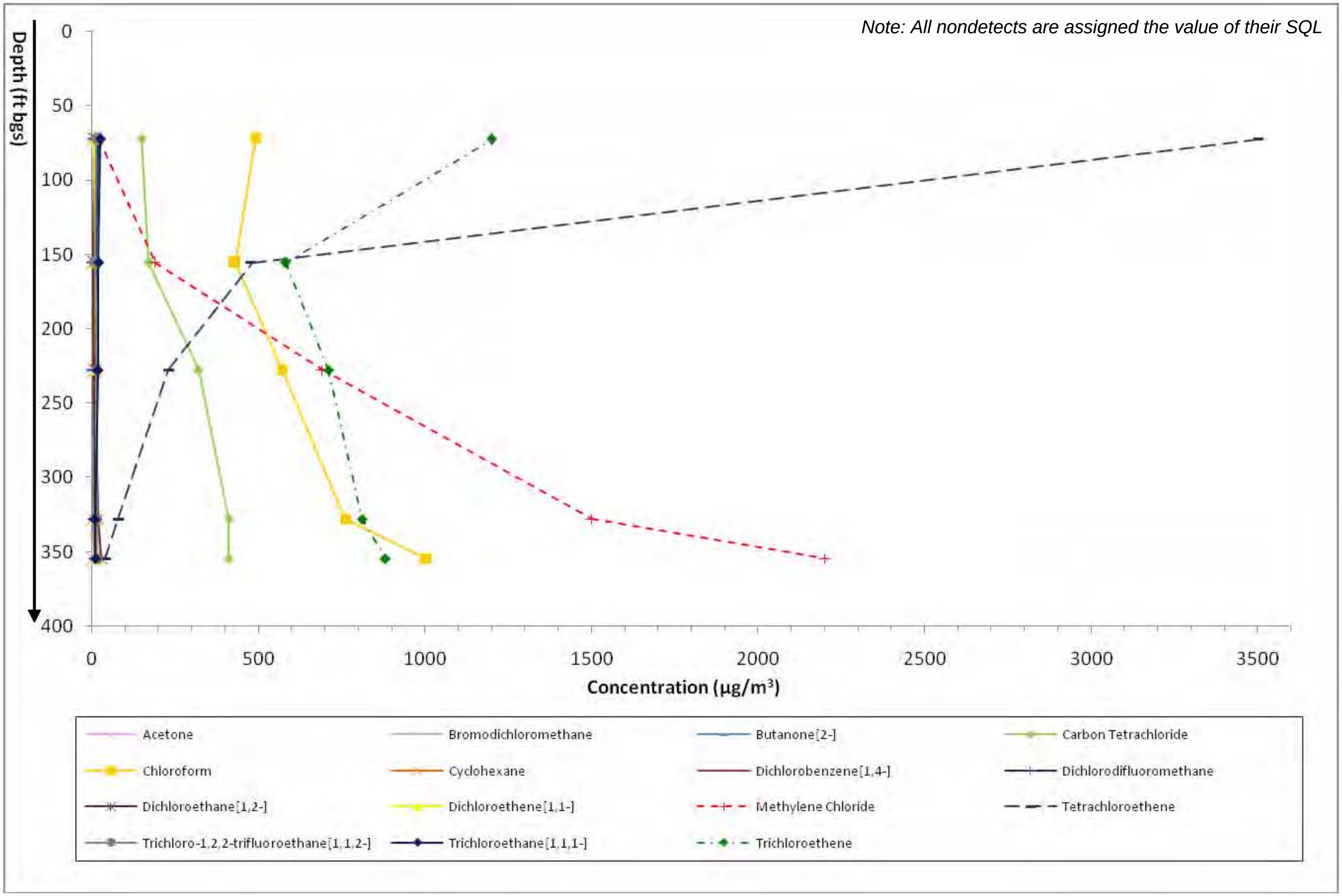


Figure 5.1-6 Vertical profile of detected VOCs in vapor-monitoring well 21-25264, April 2009

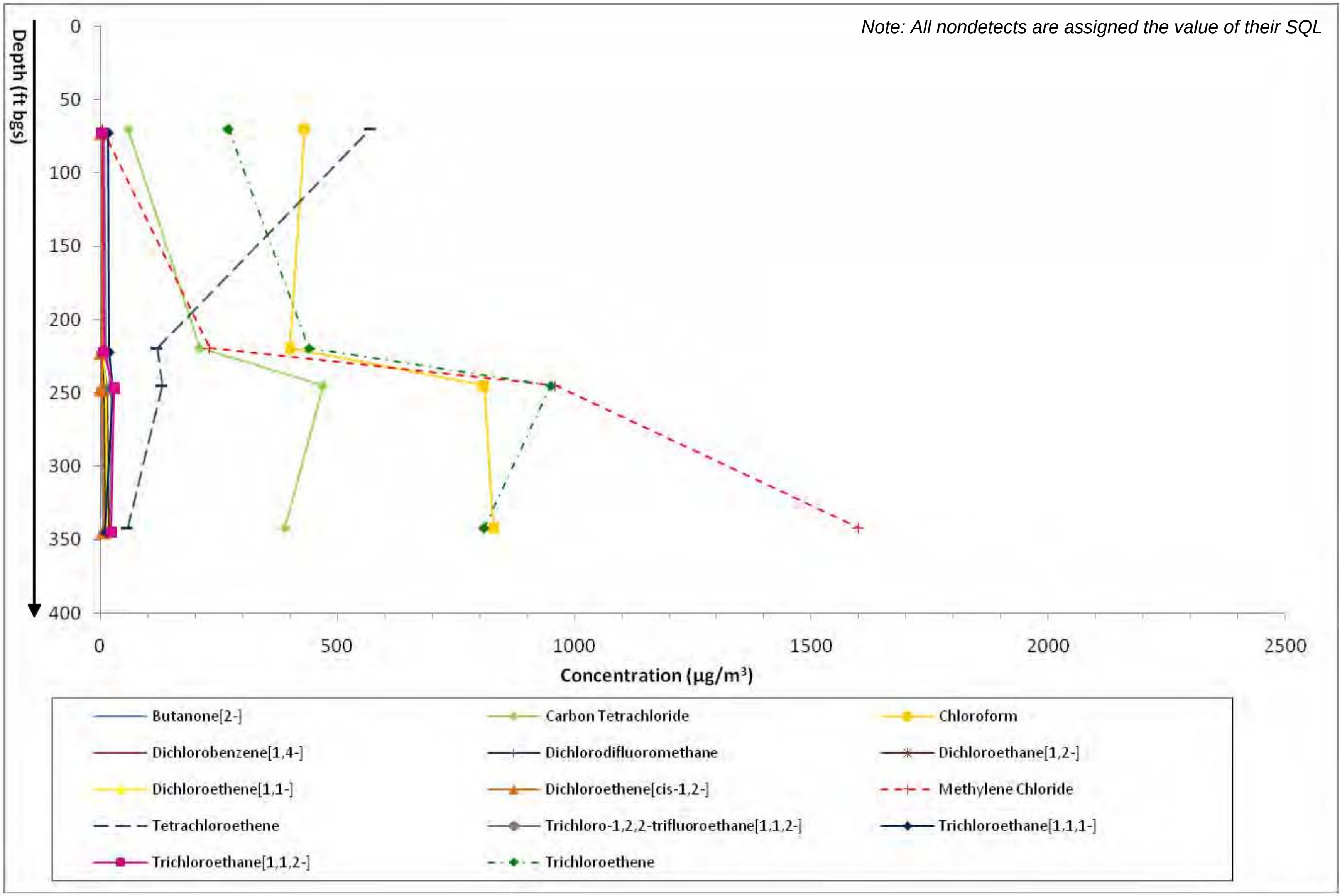


Figure 5.1-7 Vertical profile of detected VOCs in vapor-monitoring well 21-603058, June 2009

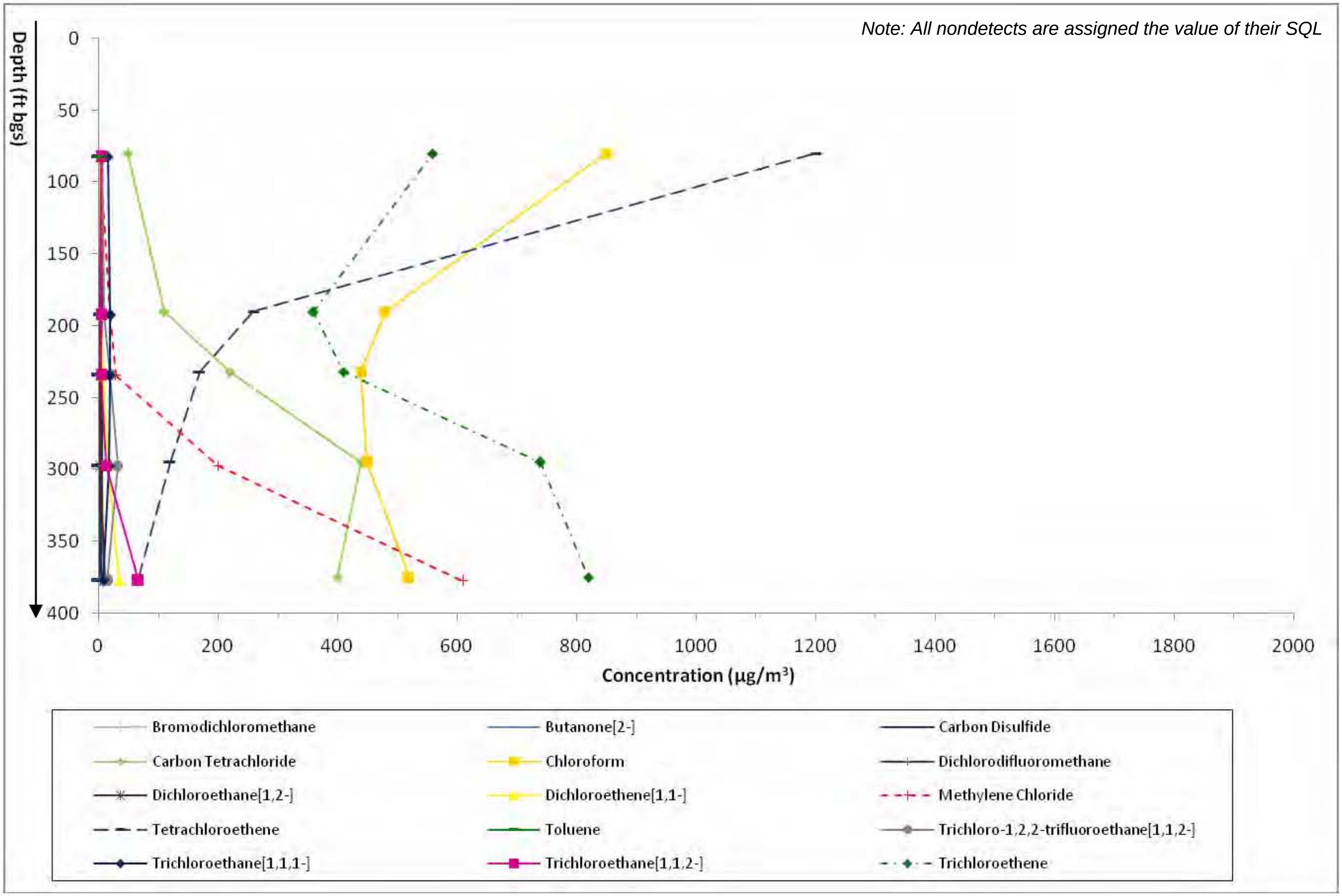


Figure 5.1-8 Vertical profile of detected VOCs in vapor-monitoring well 21-603059, June 2009

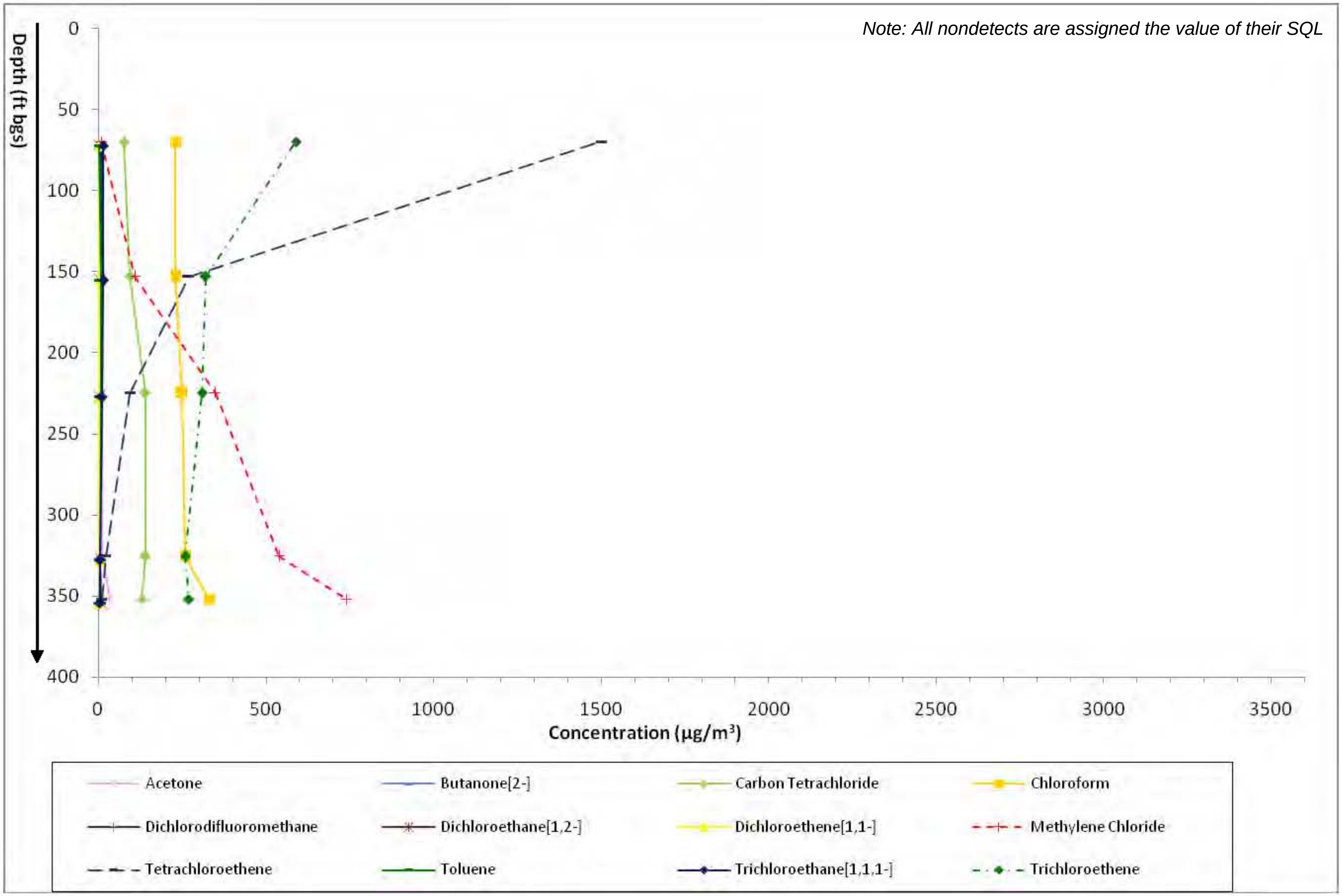


Figure 5.1-9 Vertical profile of detected VOCs in vapor-monitoring well 21-25264, June 2009

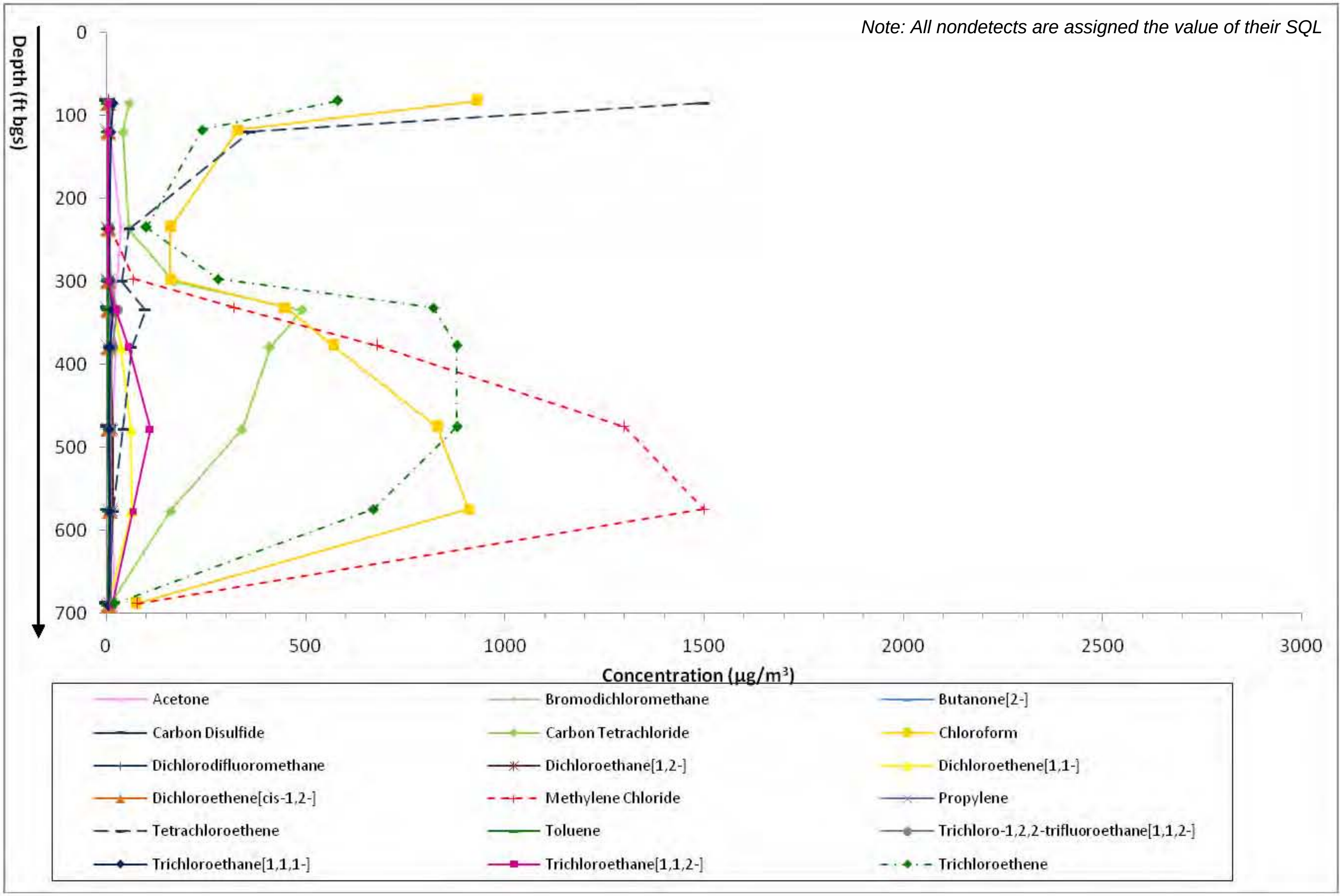


Figure 5.1-10 Vertical profile of detected VOCs in vapor-monitoring well 21-25262, June 2009

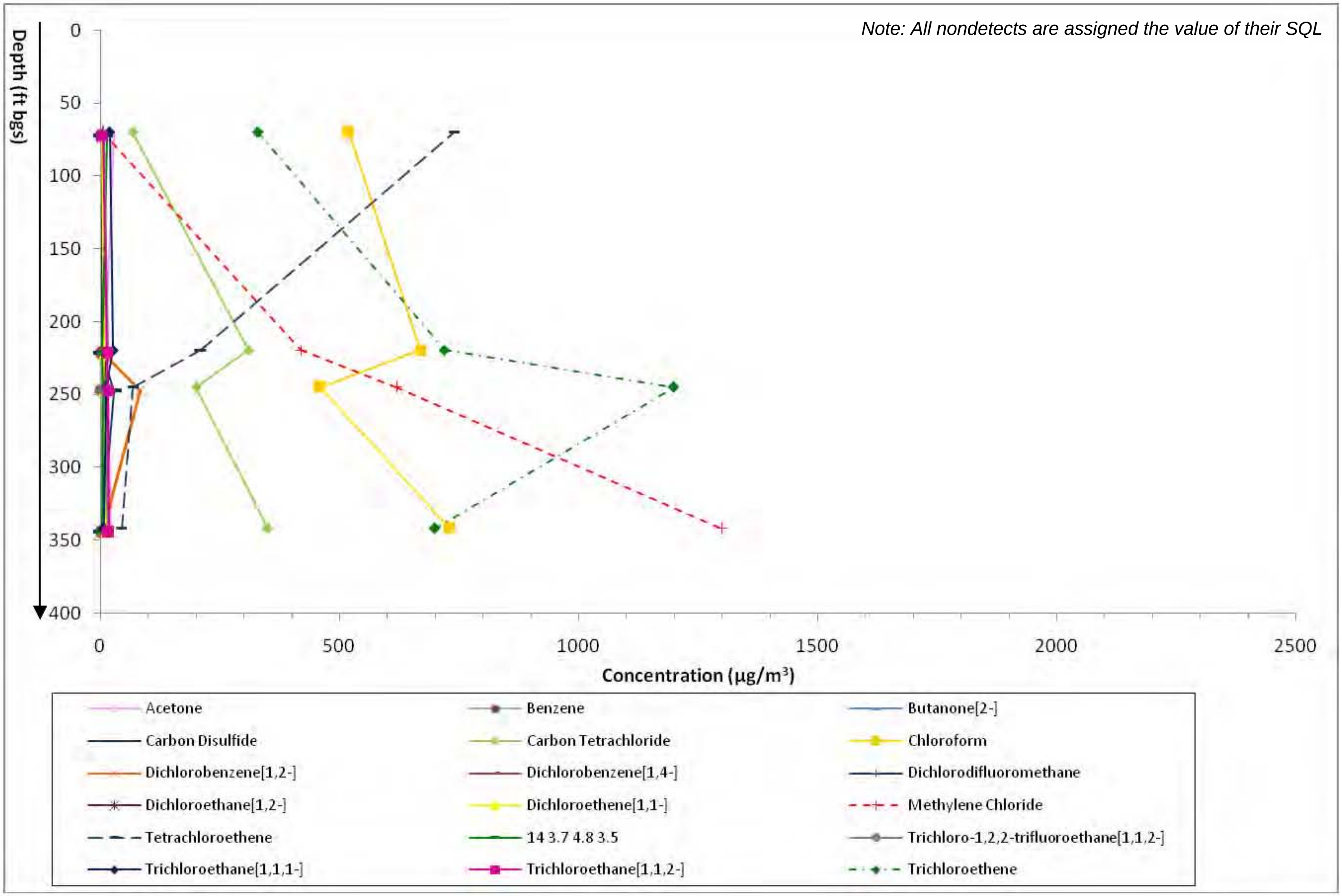


Figure 5.1-11 Vertical profile of detected VOCs in vapor-monitoring well 21-603058, July 2009

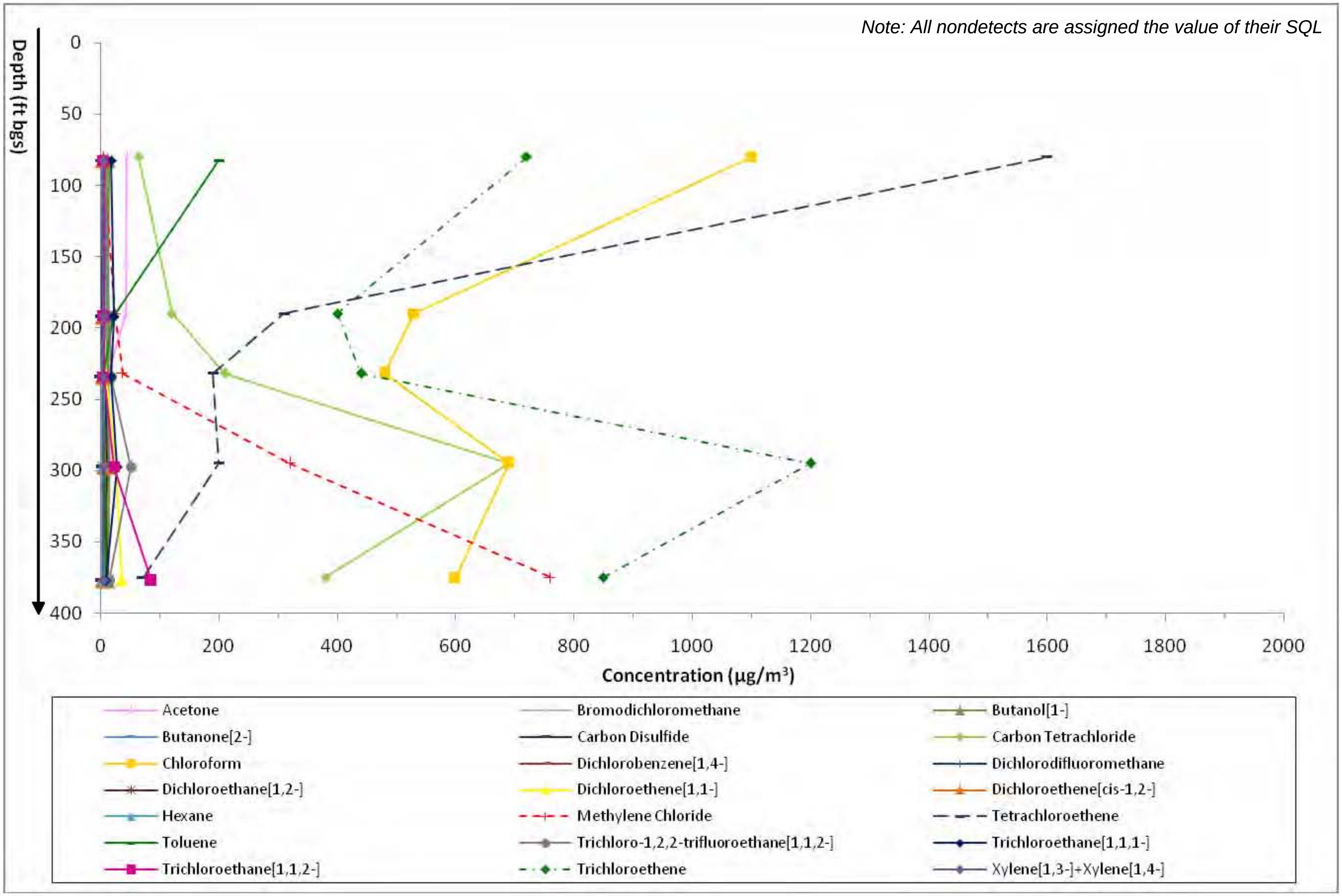


Figure 5.1-12 Vertical profile of detected VOCs in vapor-monitoring well 21-603059, July 2009

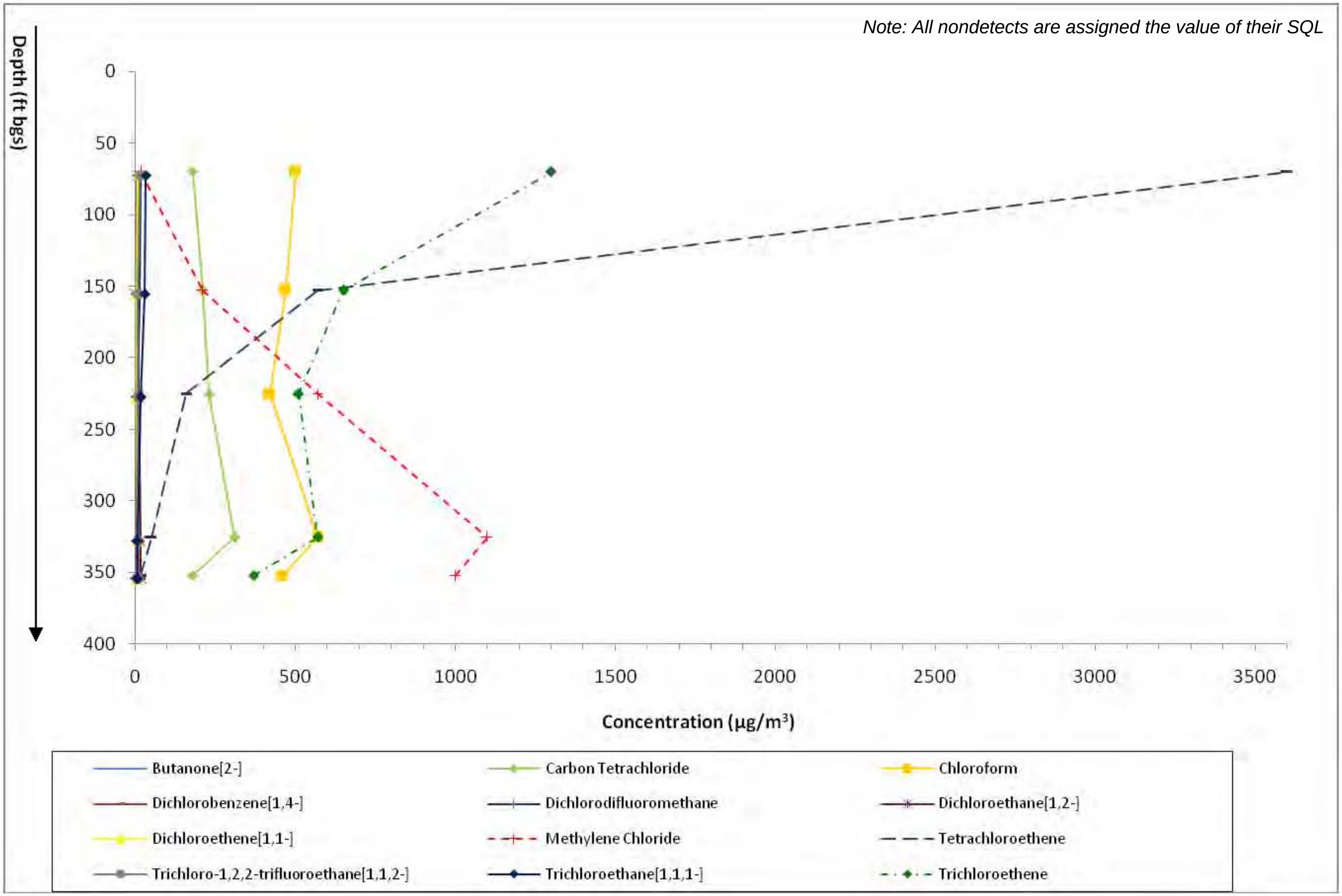


Figure 5.1-13 Vertical profile of detected VOCs in vapor-monitoring well 21-25264, July 2009

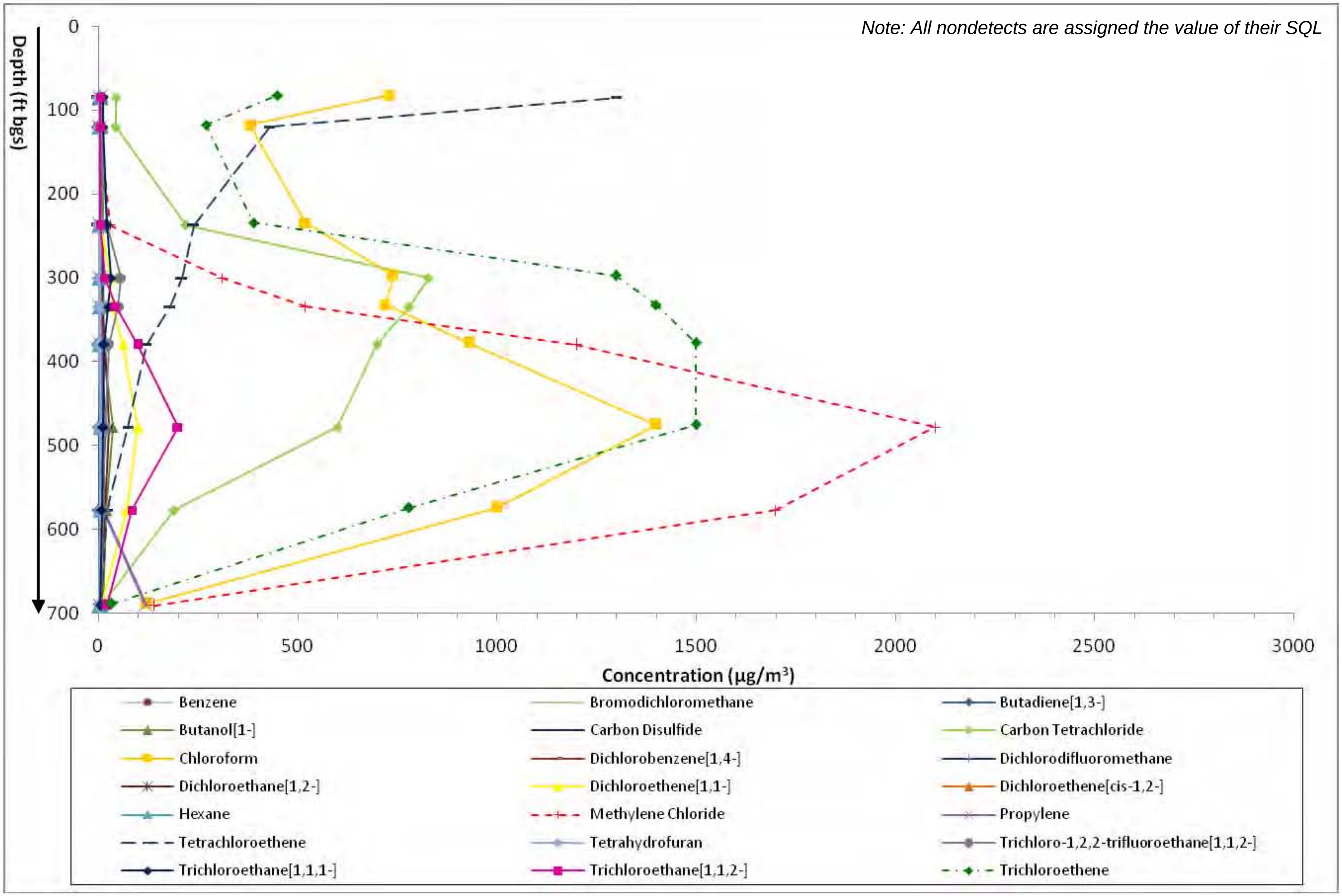


Figure 5.1-14 Vertical profile of detected VOCs in vapor-monitoring well 21-25262, July 2009

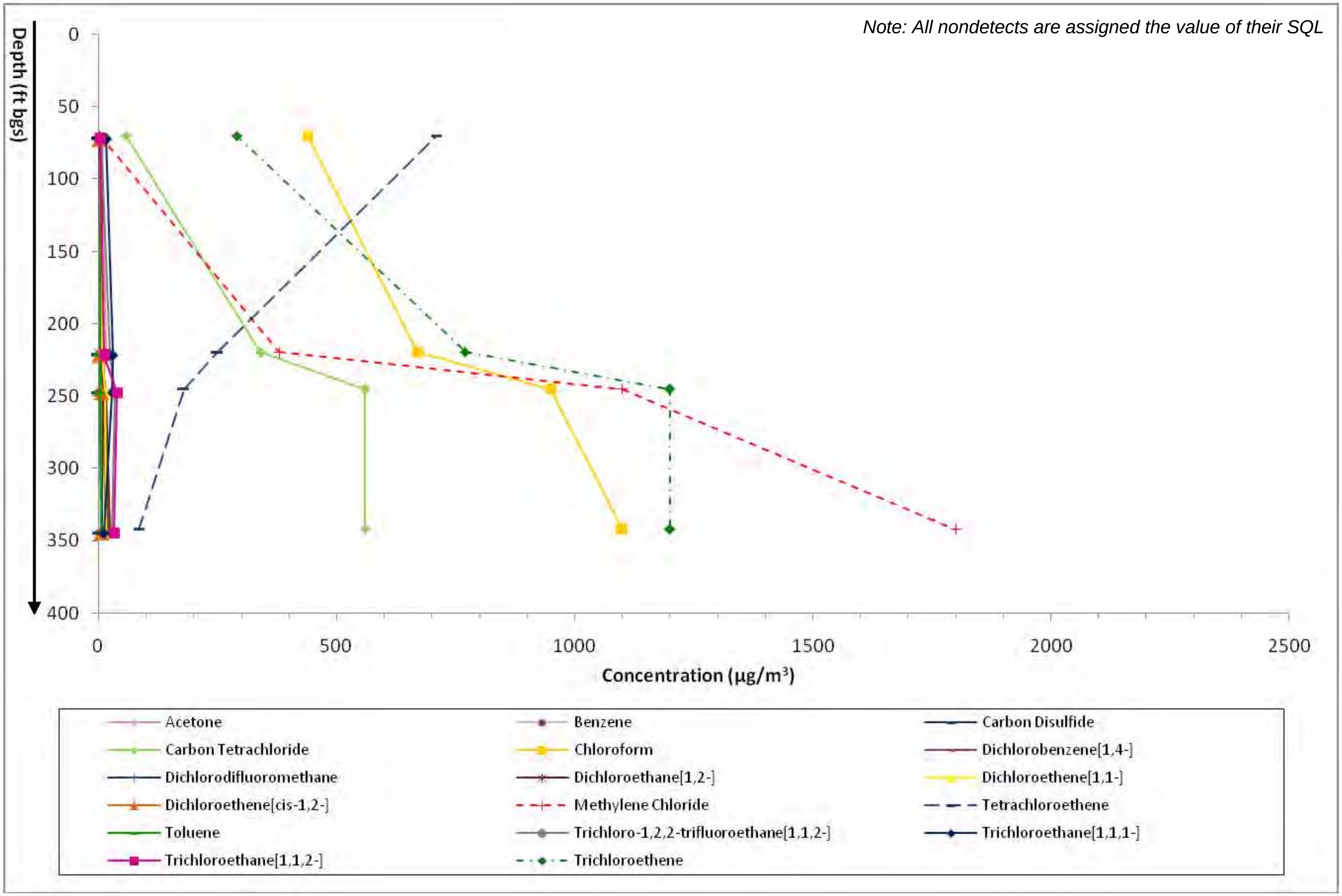


Figure 5.1-15 Vertical profile of detected VOCs in vapor-monitoring well 21-603058, August 2009

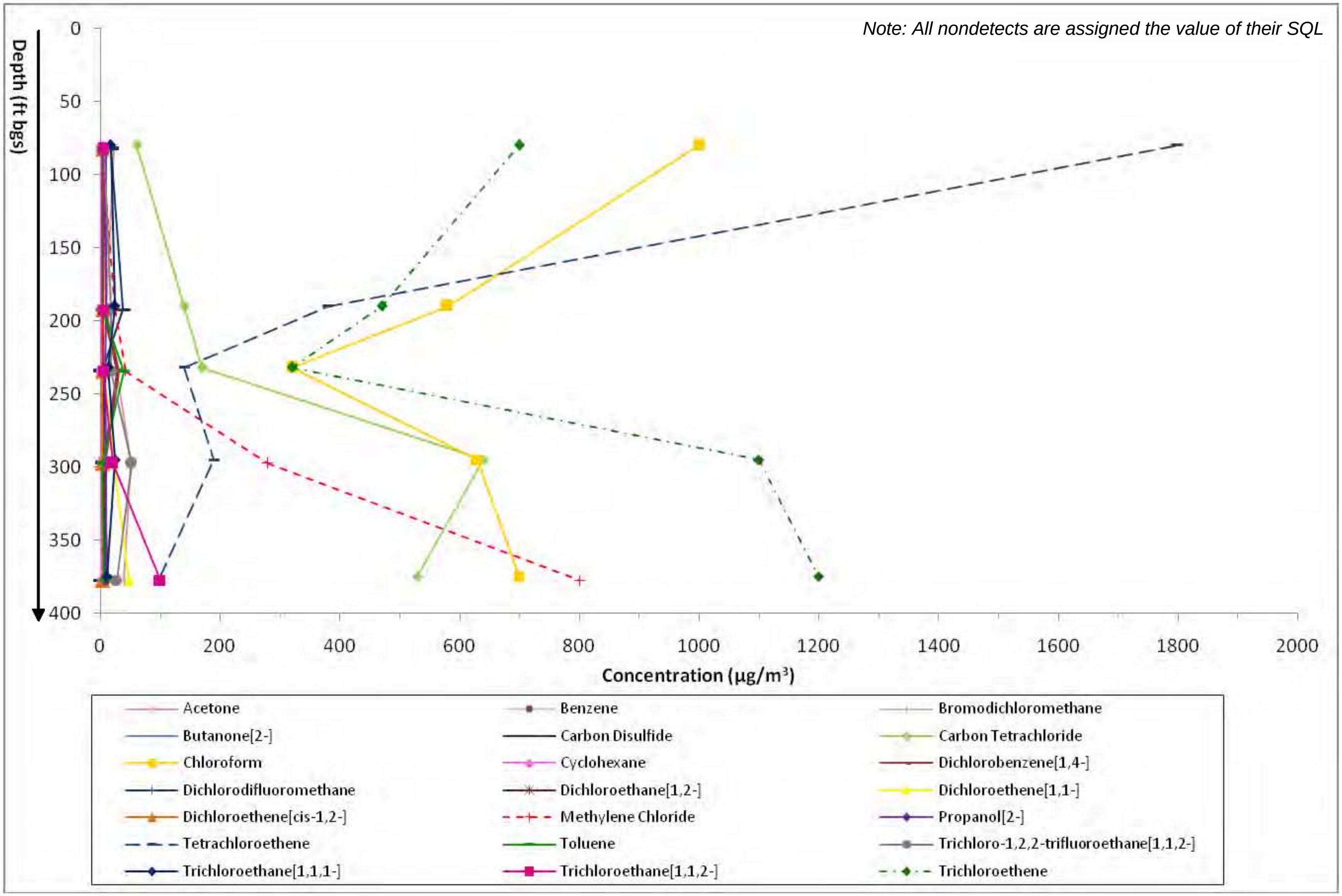


Figure 5.1-16 Vertical profile of detected VOCs in vapor-monitoring well 21-603059, August 2009

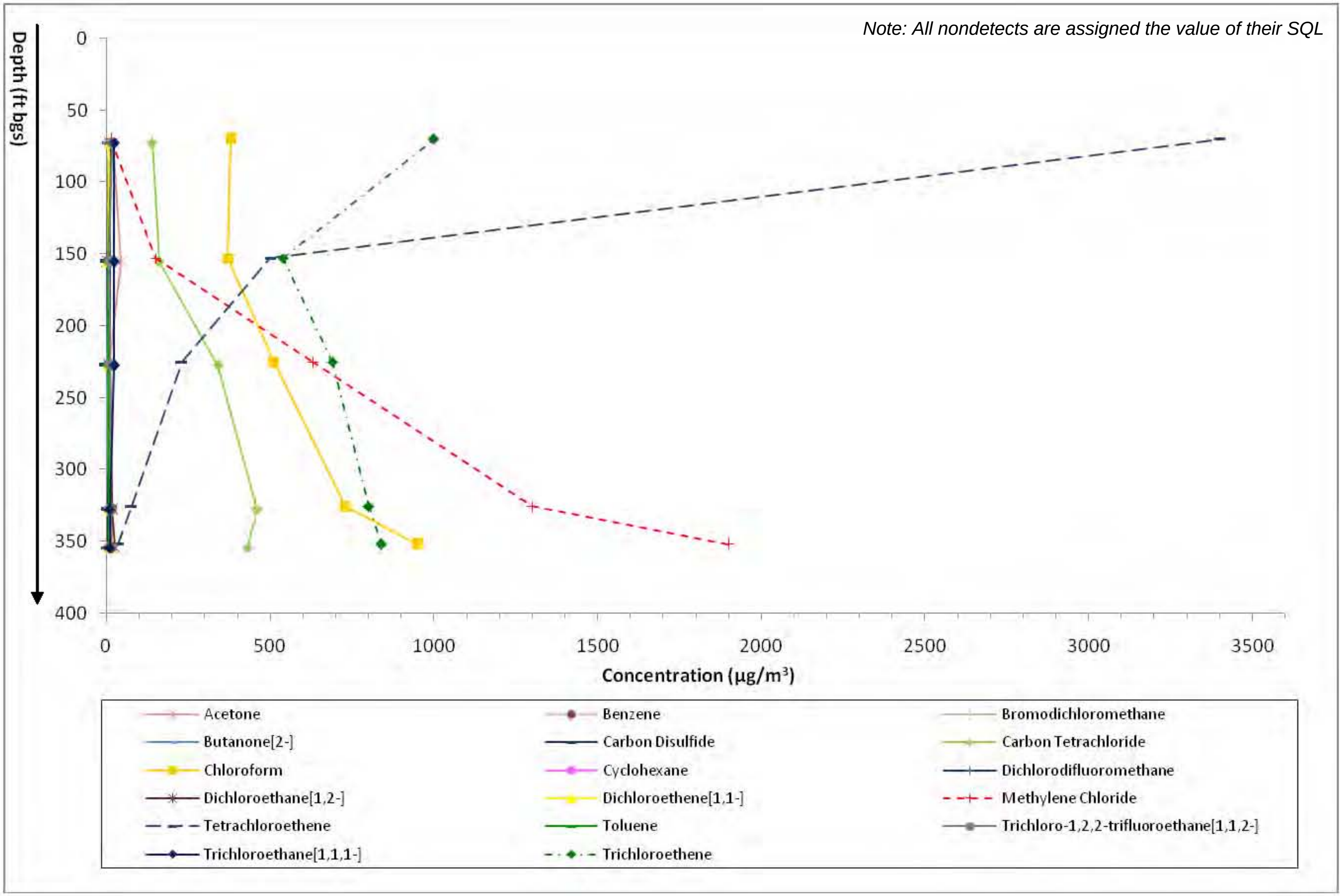


Figure 5.1-17 Vertical profile of detected VOCs in vapor-monitoring well 21-25264, August 2009

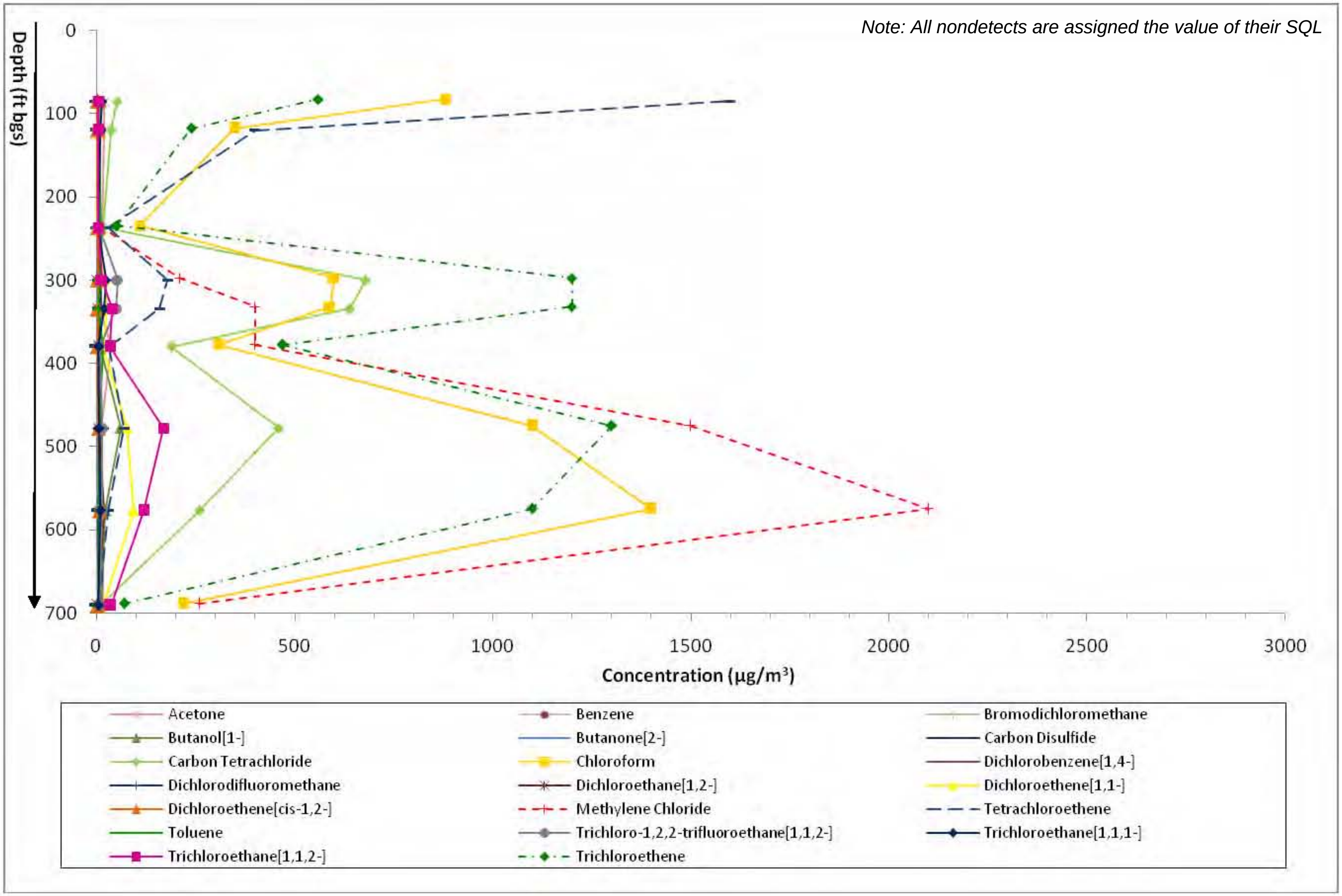


Figure 5.1-18 Vertical profile of detected VOCs in vapor-monitoring well 21-25262, August 2009

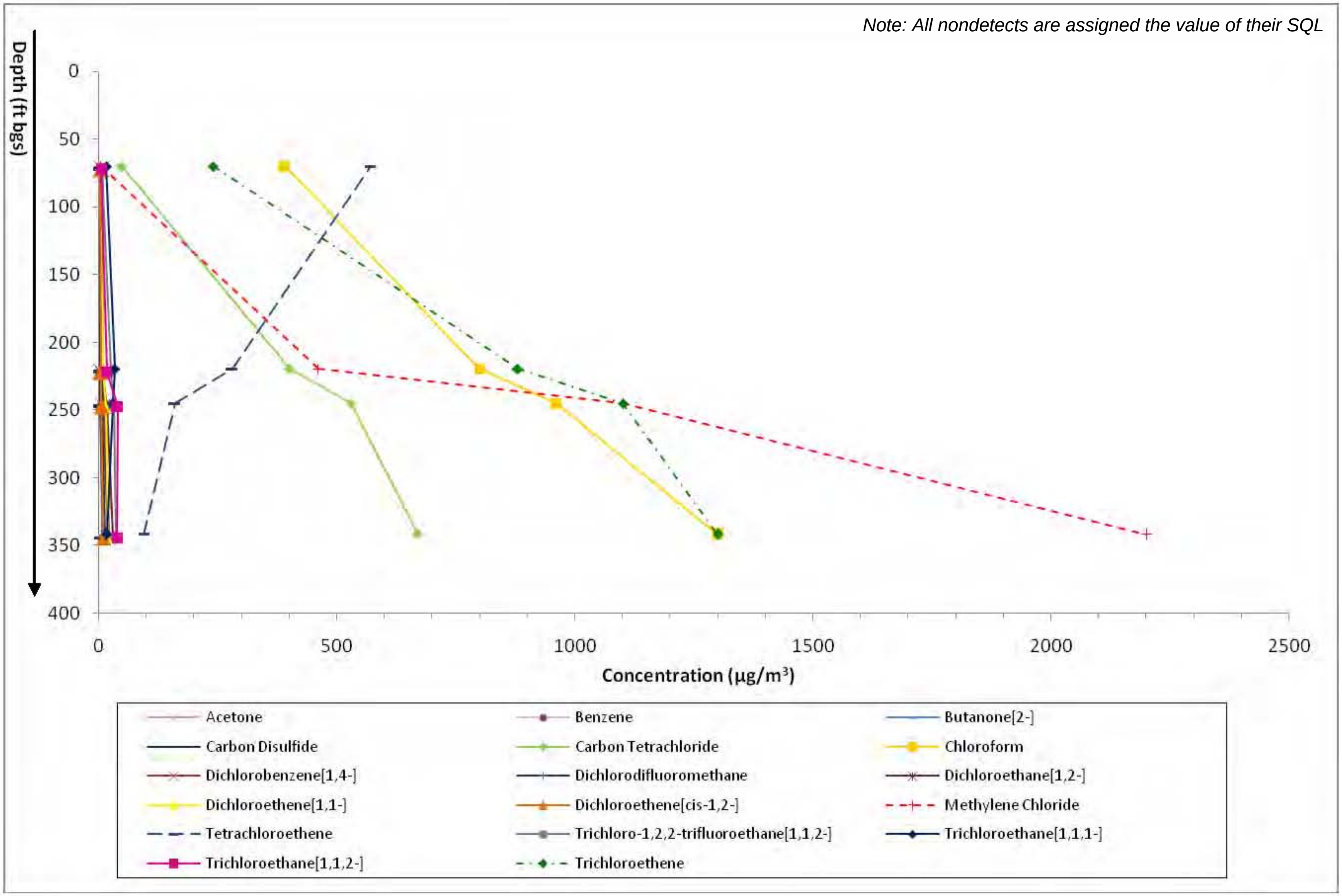


Figure 5.1-19 Vertical profile of detected VOCs in vapor-monitoring well 21-603058, September 2009

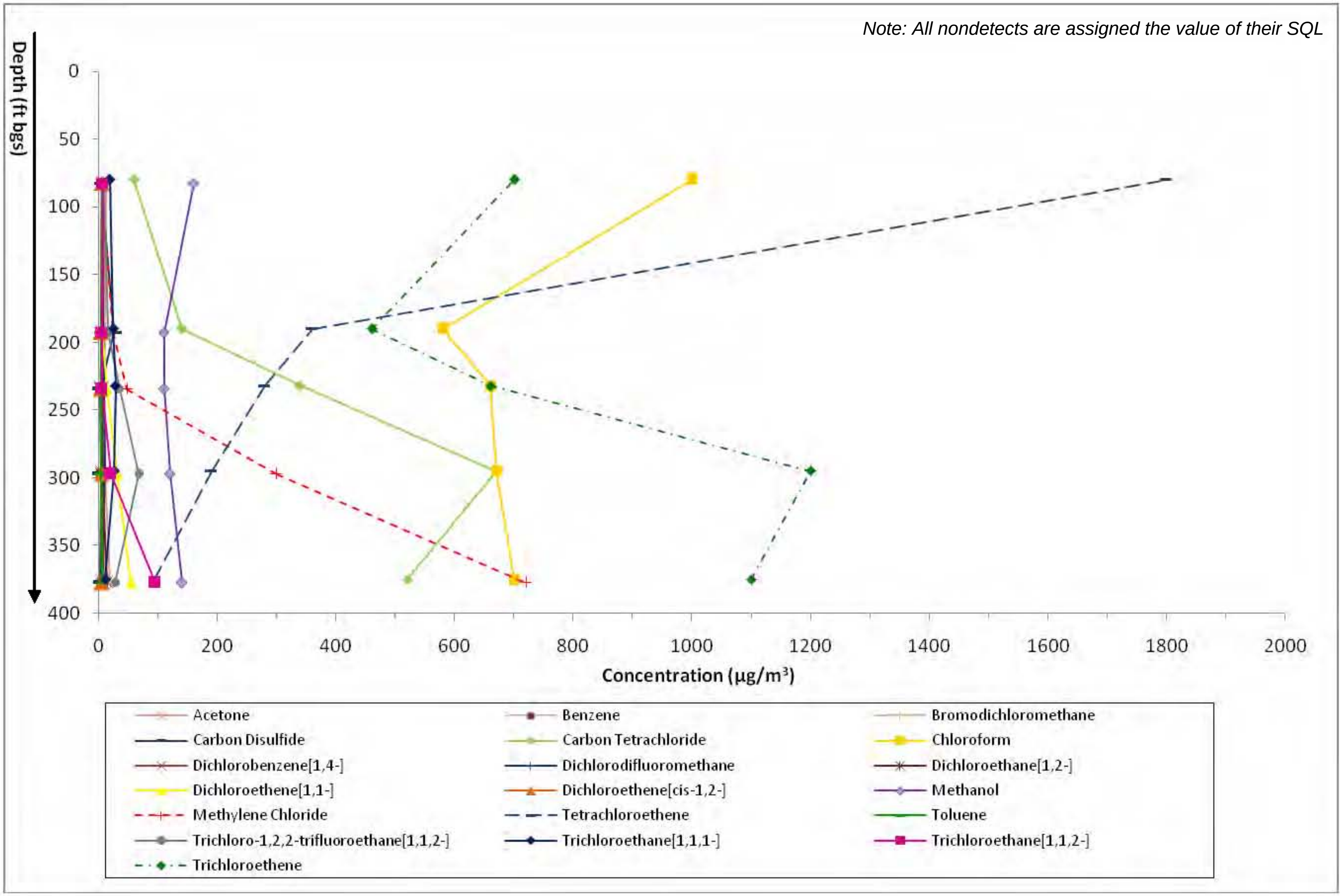


Figure 5.1-20 Vertical profile of detected VOCs in vapor-monitoring well 21-603059, September 2009

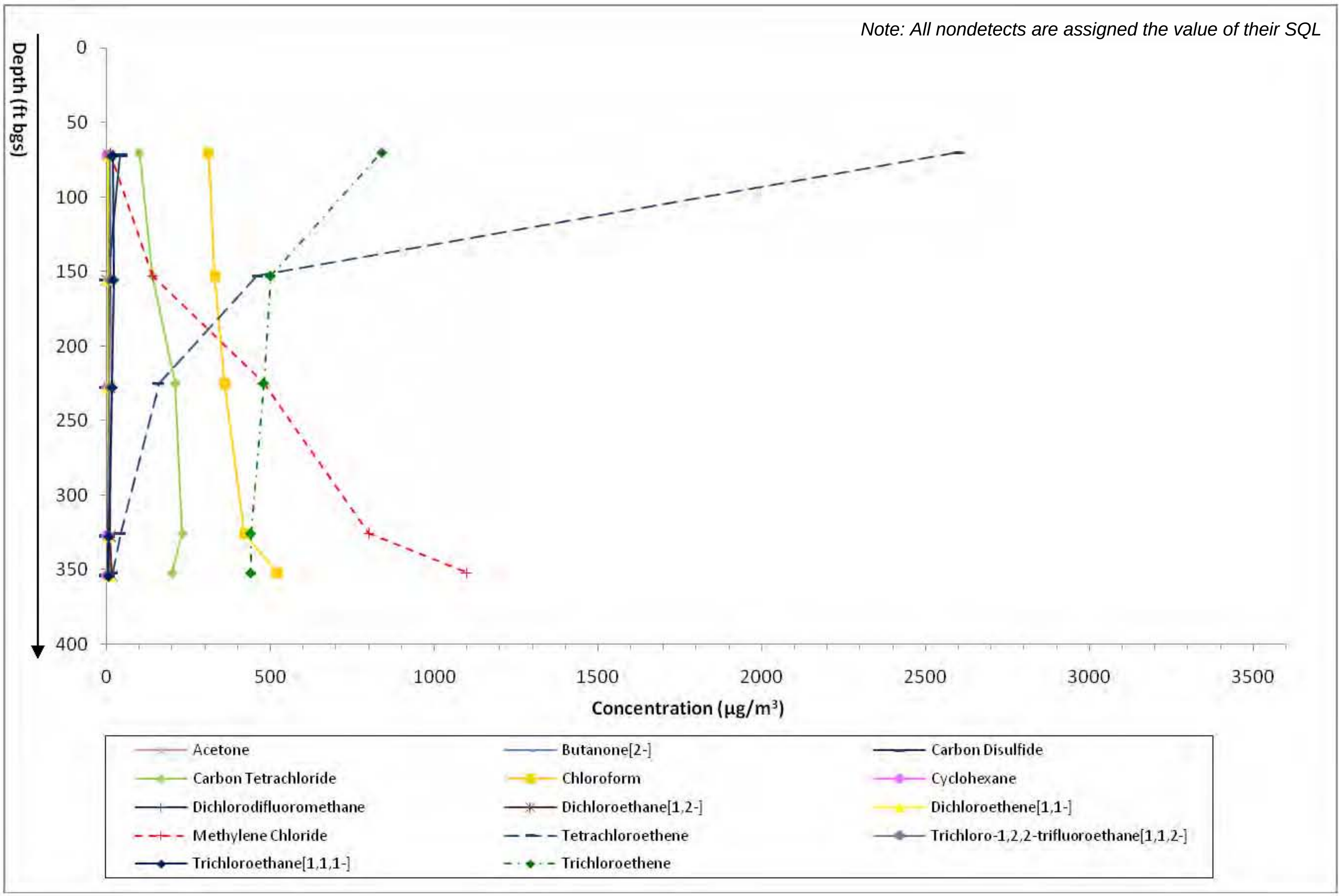


Figure 5.1-21 Vertical profile of detected VOCs in vapor-monitoring well 21-25264, September 2009

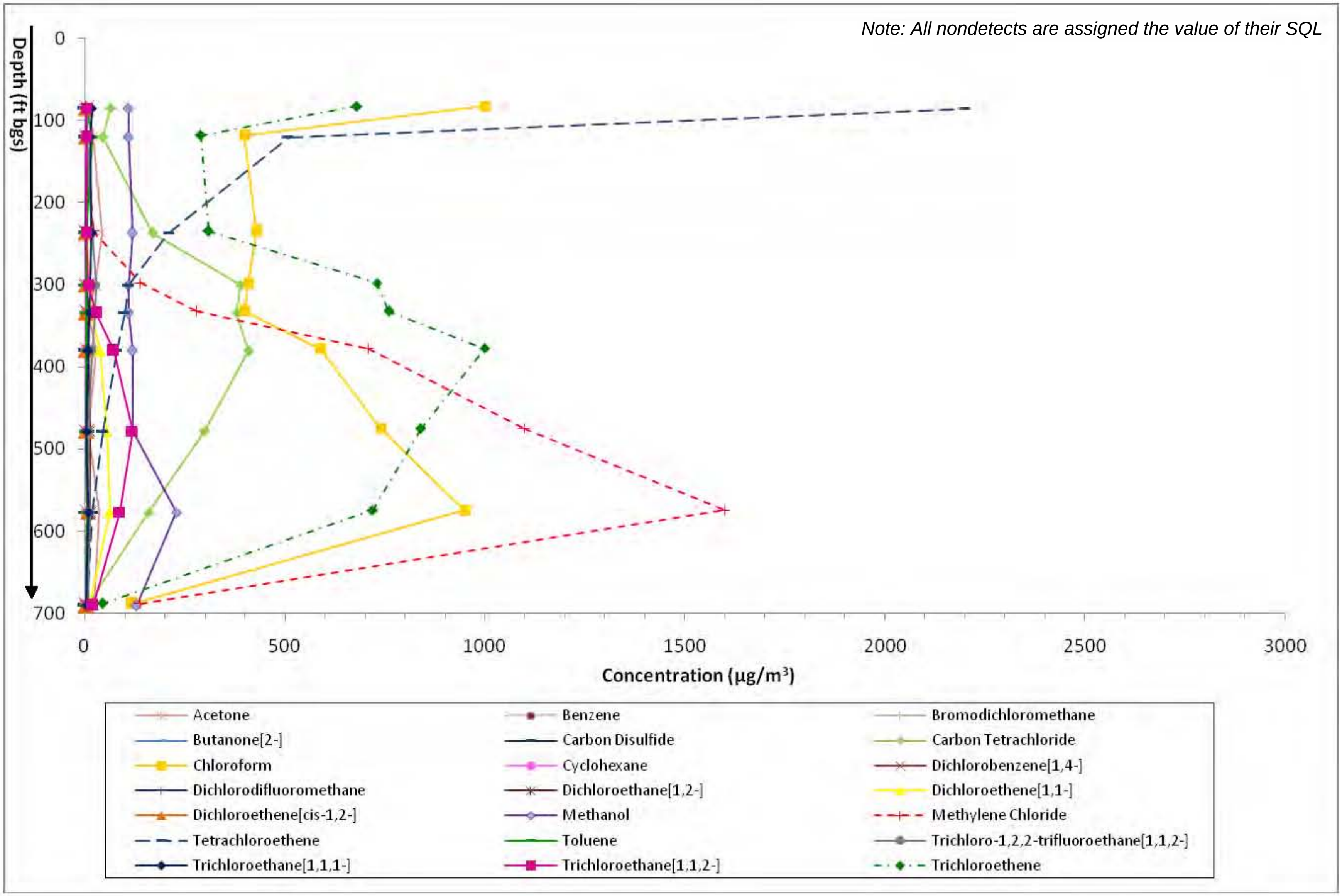


Figure 5.1-22 Vertical profile of detected VOCs in vapor-monitoring well 21-25262, September 2009

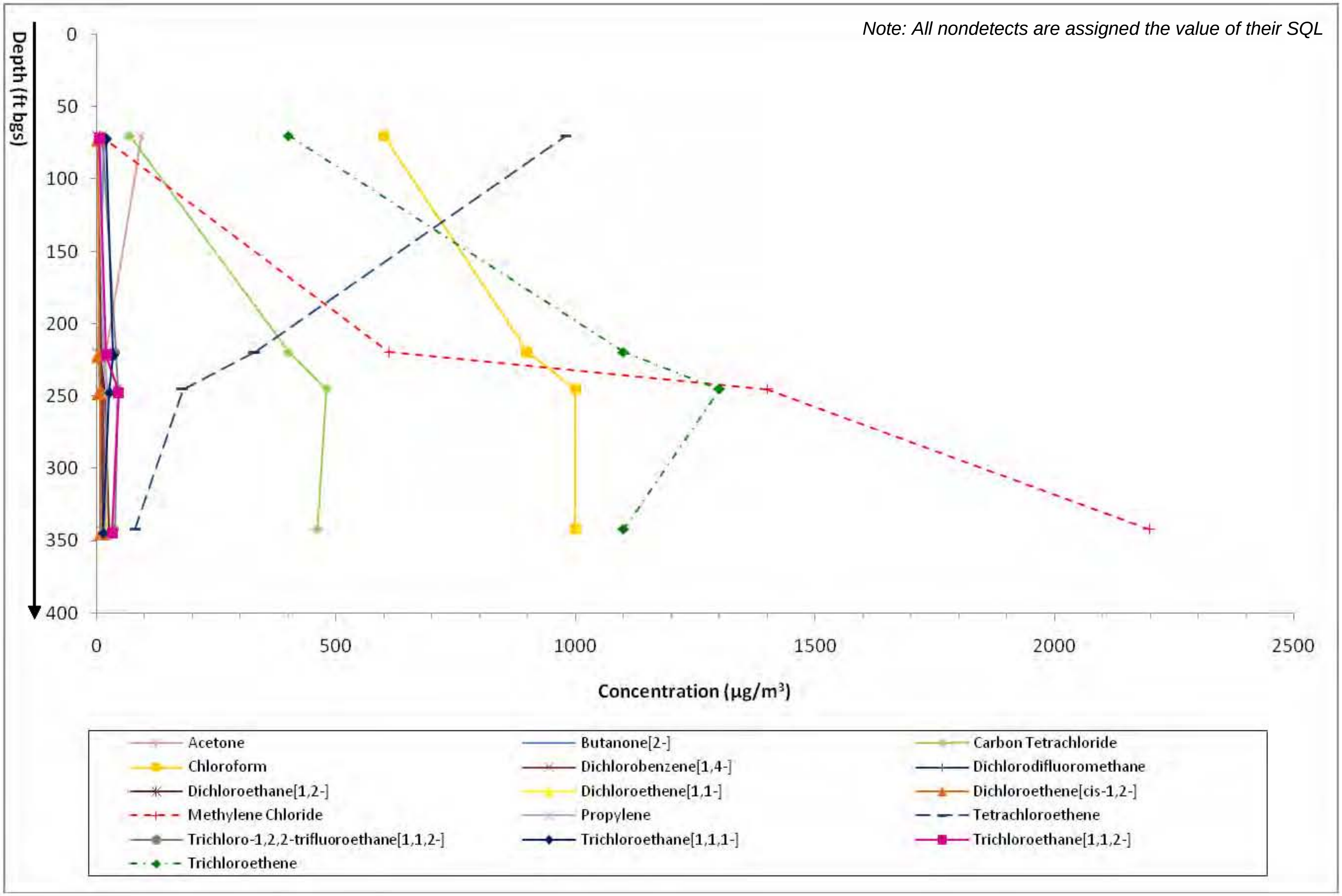


Figure 5.1-23 Vertical profile of detected VOCs in vapor-monitoring well 21-603058, October 2009

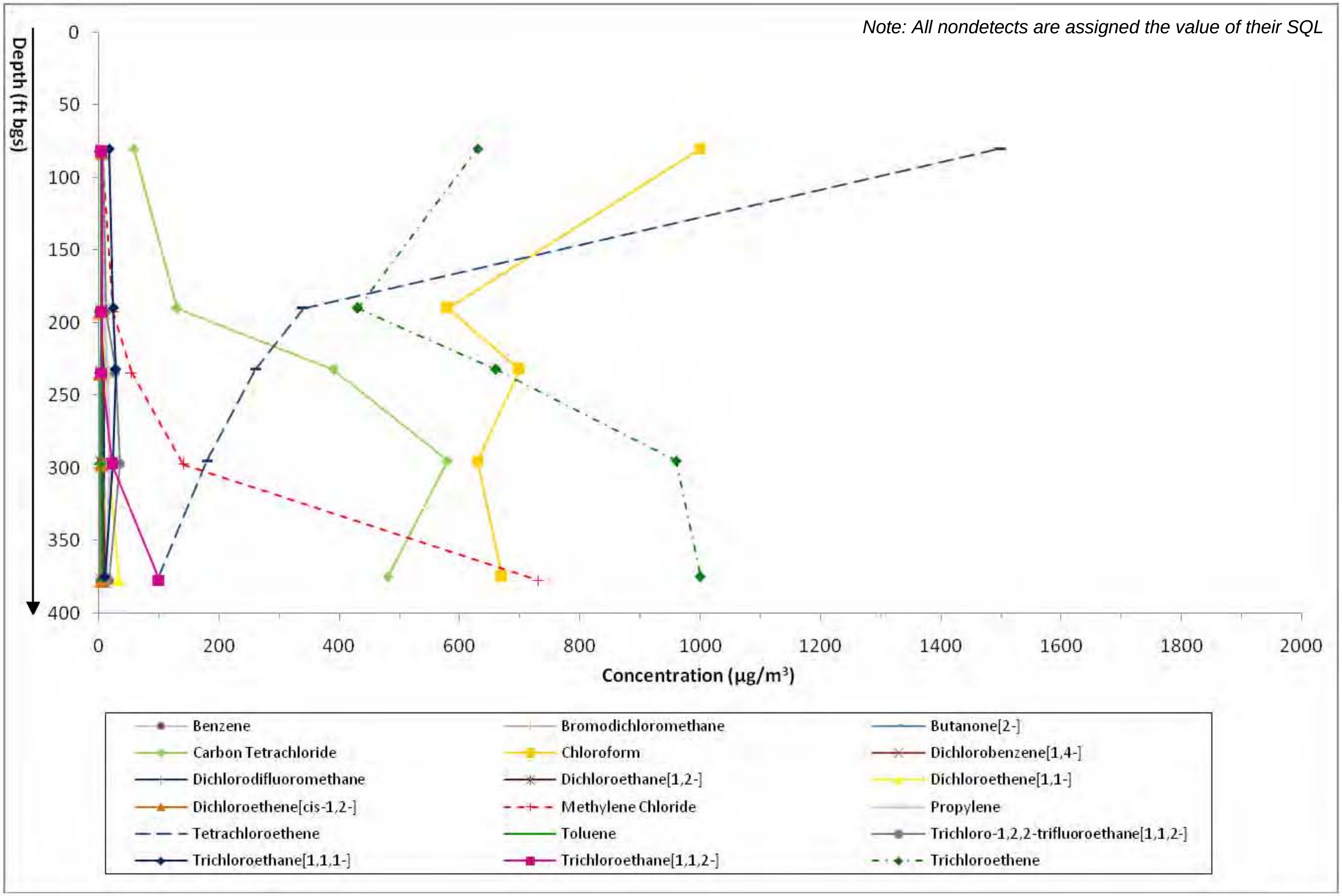


Figure 5.1-24 Vertical profile of detected VOCs in vapor-monitoring well 21-603059, October 2009

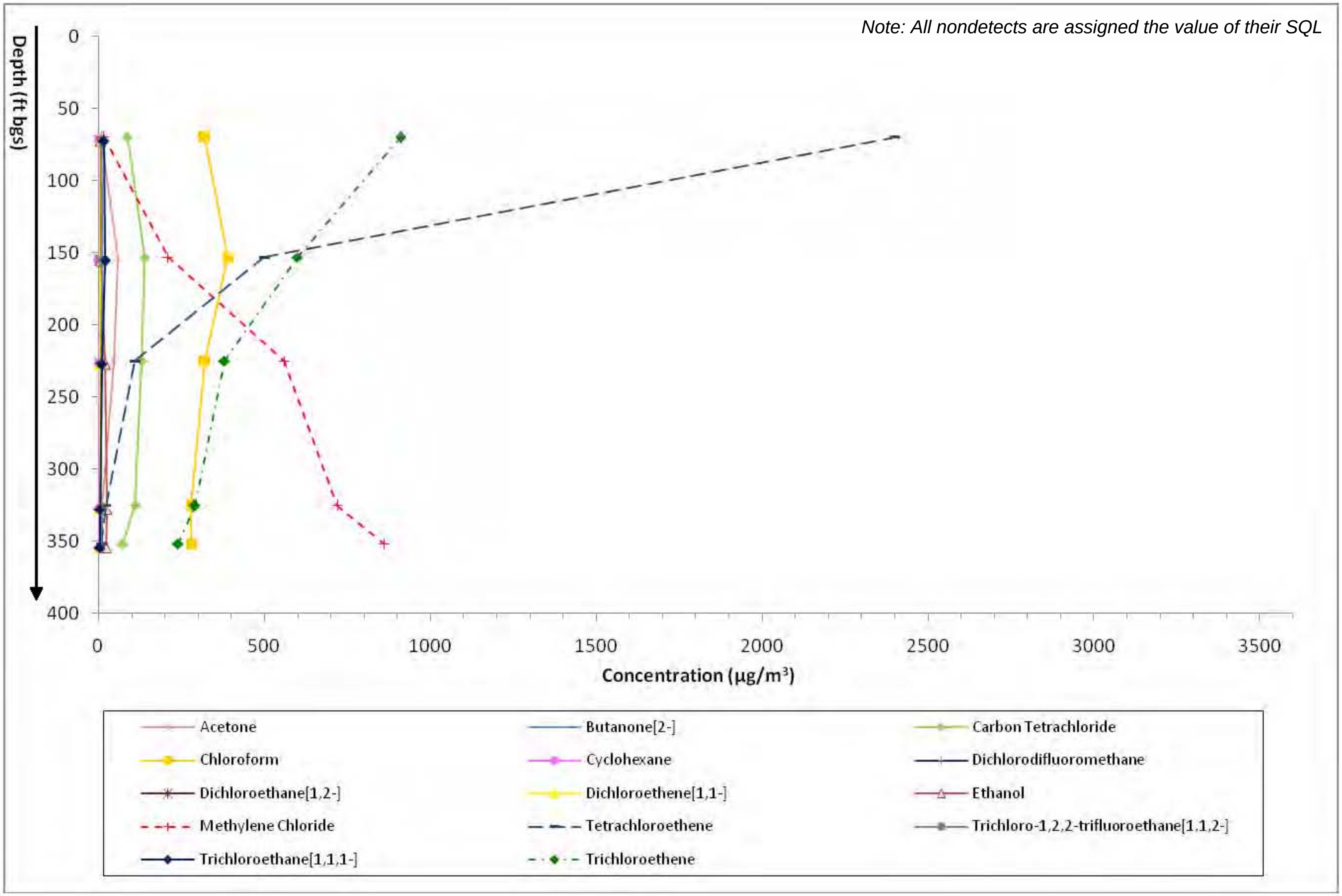


Figure 5.1-25 Vertical profile of detected VOCs in vapor-monitoring well 21-25264, October 2009

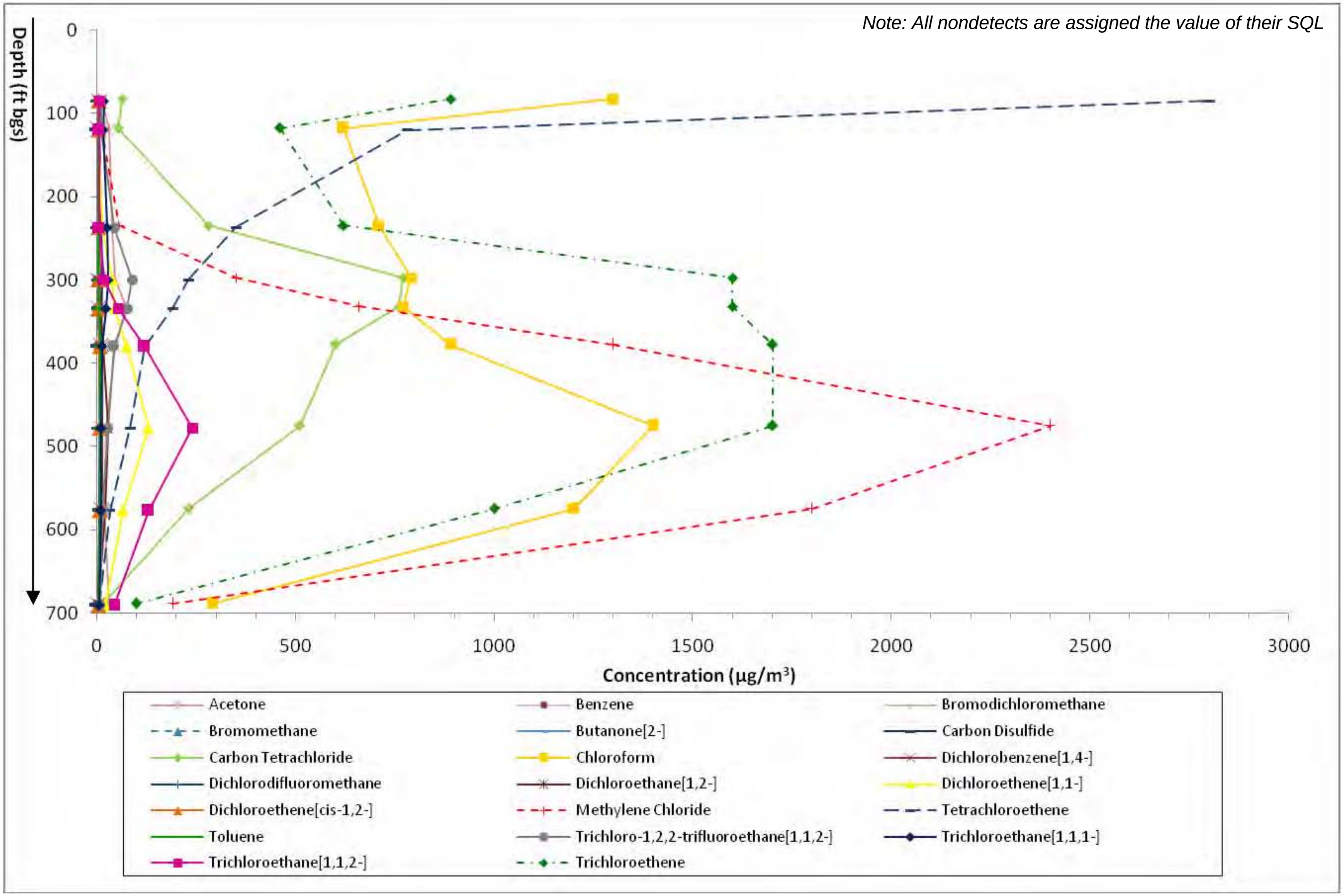


Figure 5.1-26 Vertical profile of detected VOCs in vapor-monitoring well 21-25262, October 2009

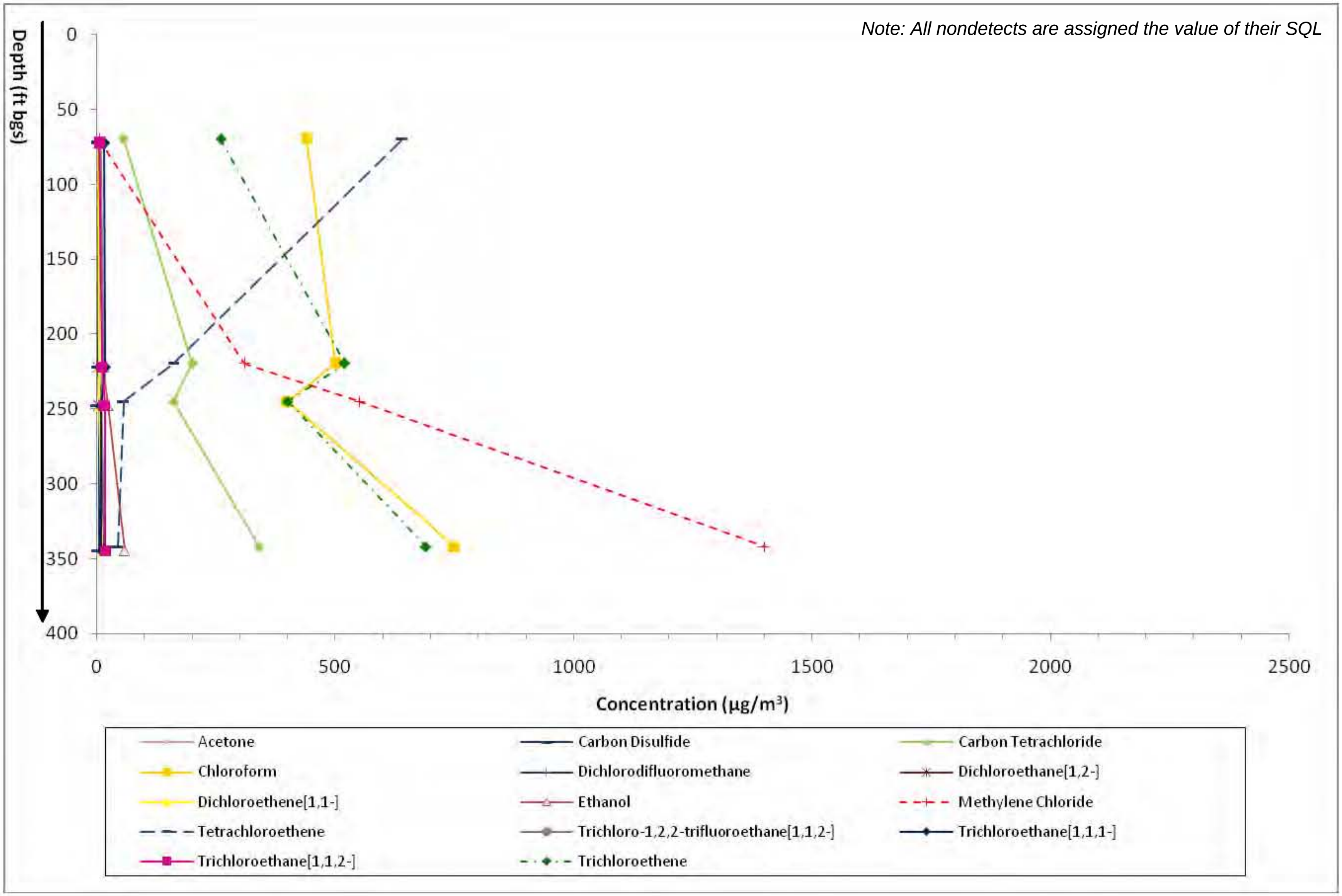


Figure 5.1-27 Vertical profile of detected VOCs in vapor-monitoring well 21-603058, November 2009

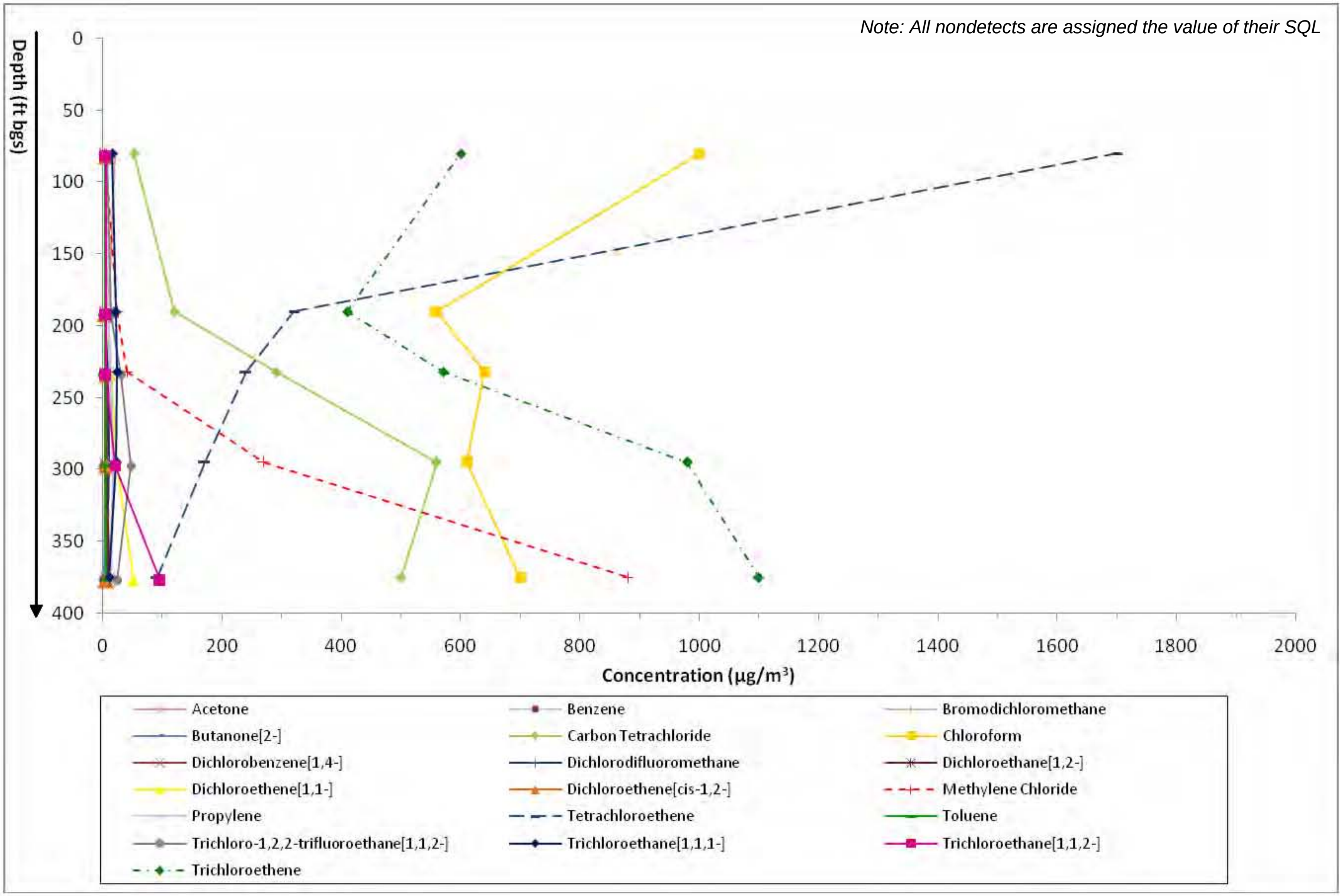


Figure 5.1-28 Vertical profile of detected VOCs in vapor-monitoring well 21-603059, November 2009

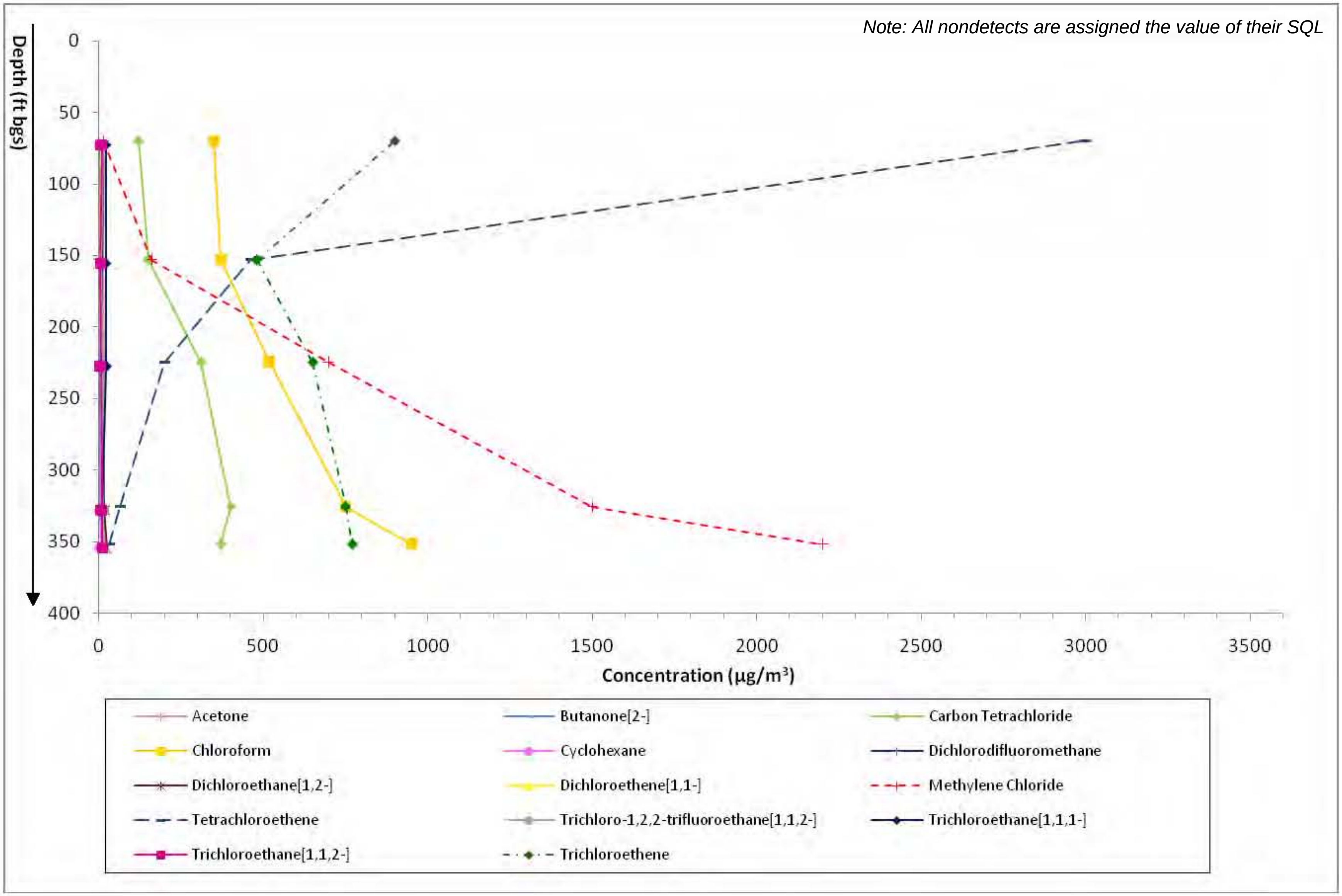


Figure 5.1-29 Vertical profile of detected VOCs in vapor-monitoring well 21-25264, November 2009

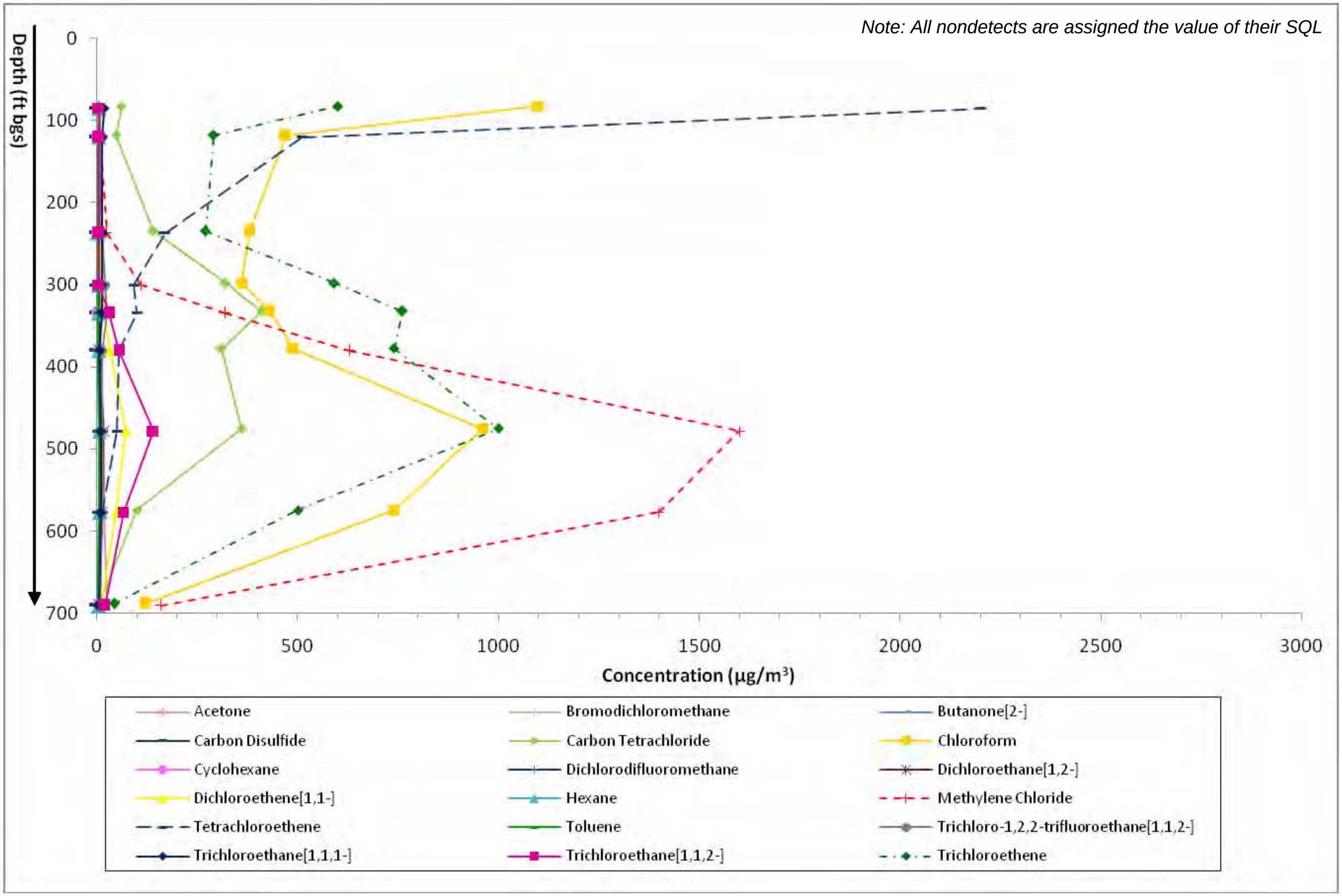


Figure 5.1-30 Vertical profile of detected VOCs in vapor-monitoring well 21-25262, November 2009

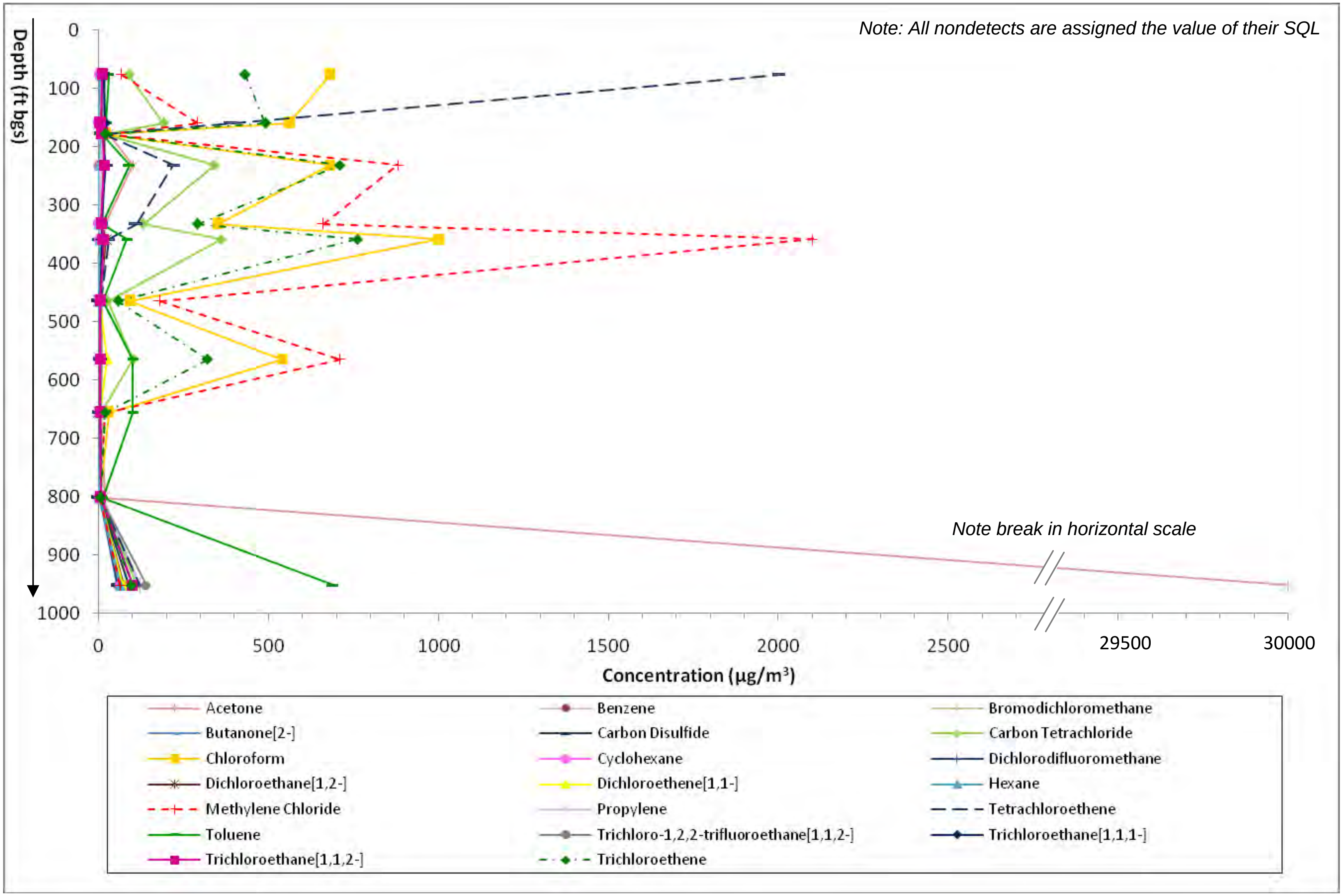


Figure 5.1-31 Vertical profile of detected VOCs in vapor-monitoring well 21-607955, November 2009

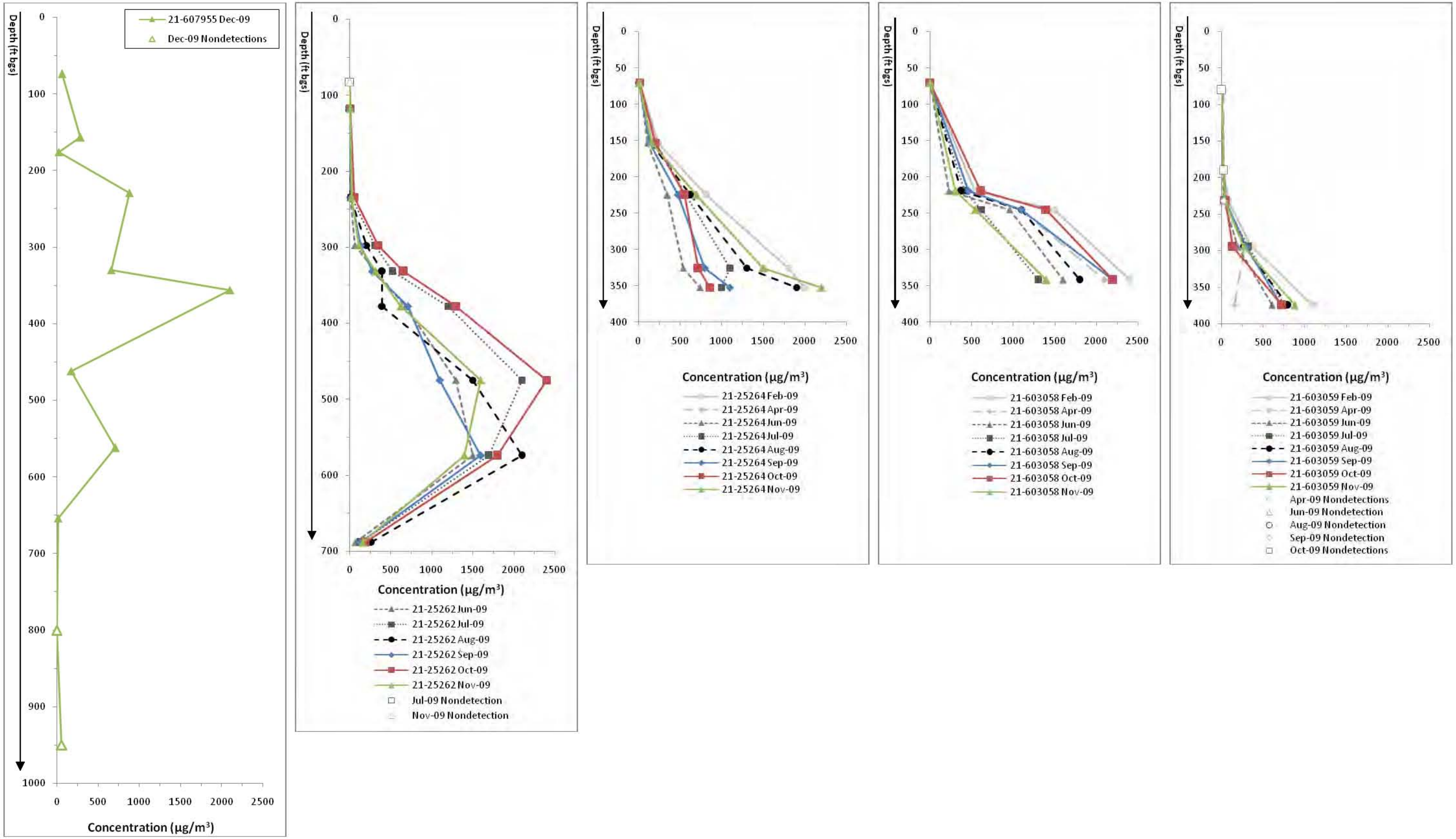


Figure 5.1-32 Vertical profile of methylene chloride in vapor-monitoring wells 21-607955, 21-25262, 21-25264, 21-603058, and 21-603059, February–November 2009

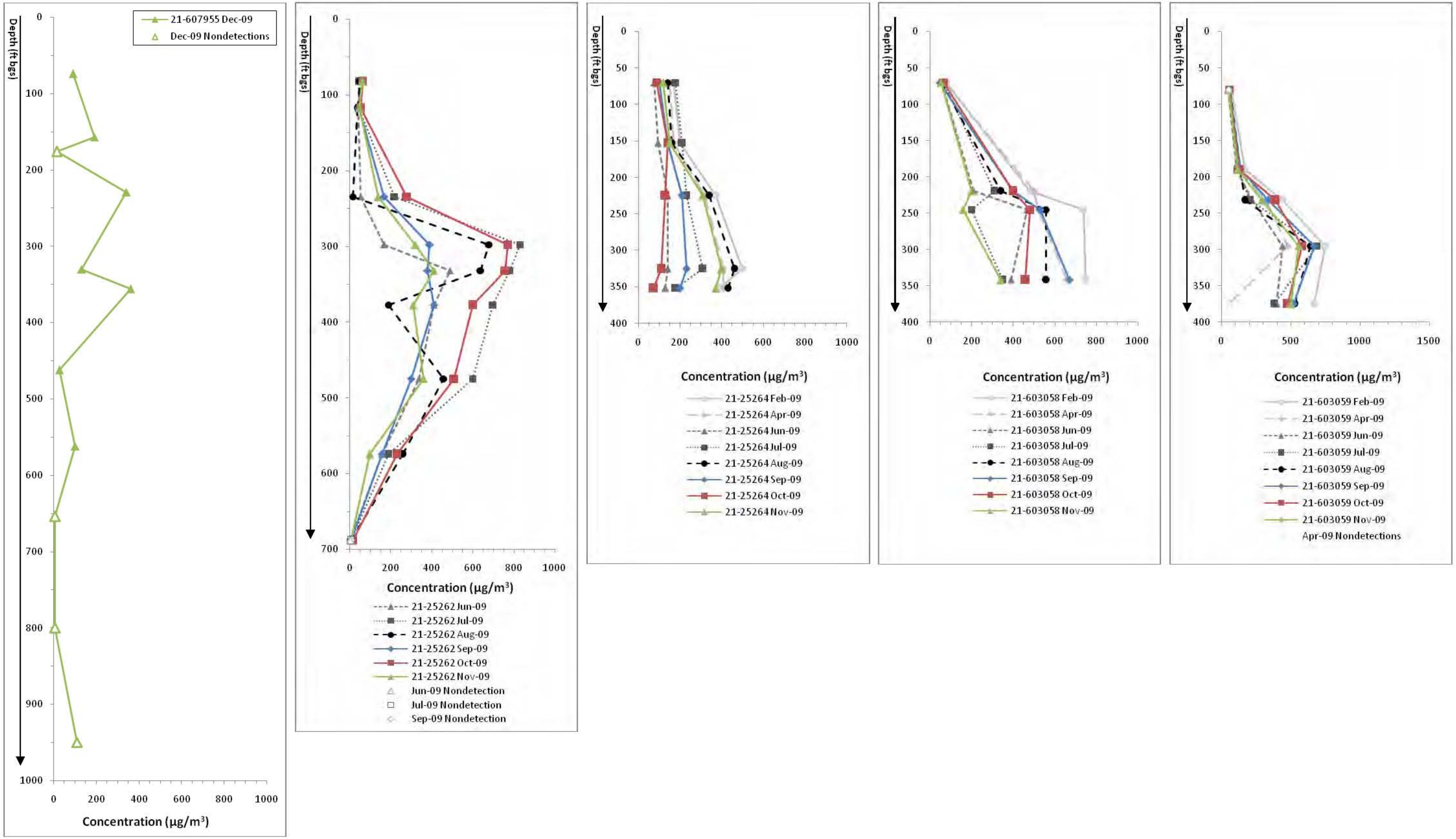


Figure 5.1-33 Vertical profile of carbon tetrachloride in vapor-monitoring wells 21-607955, 21-25262, 21-25264, 21-603058, and 21-603059, February–November 2009

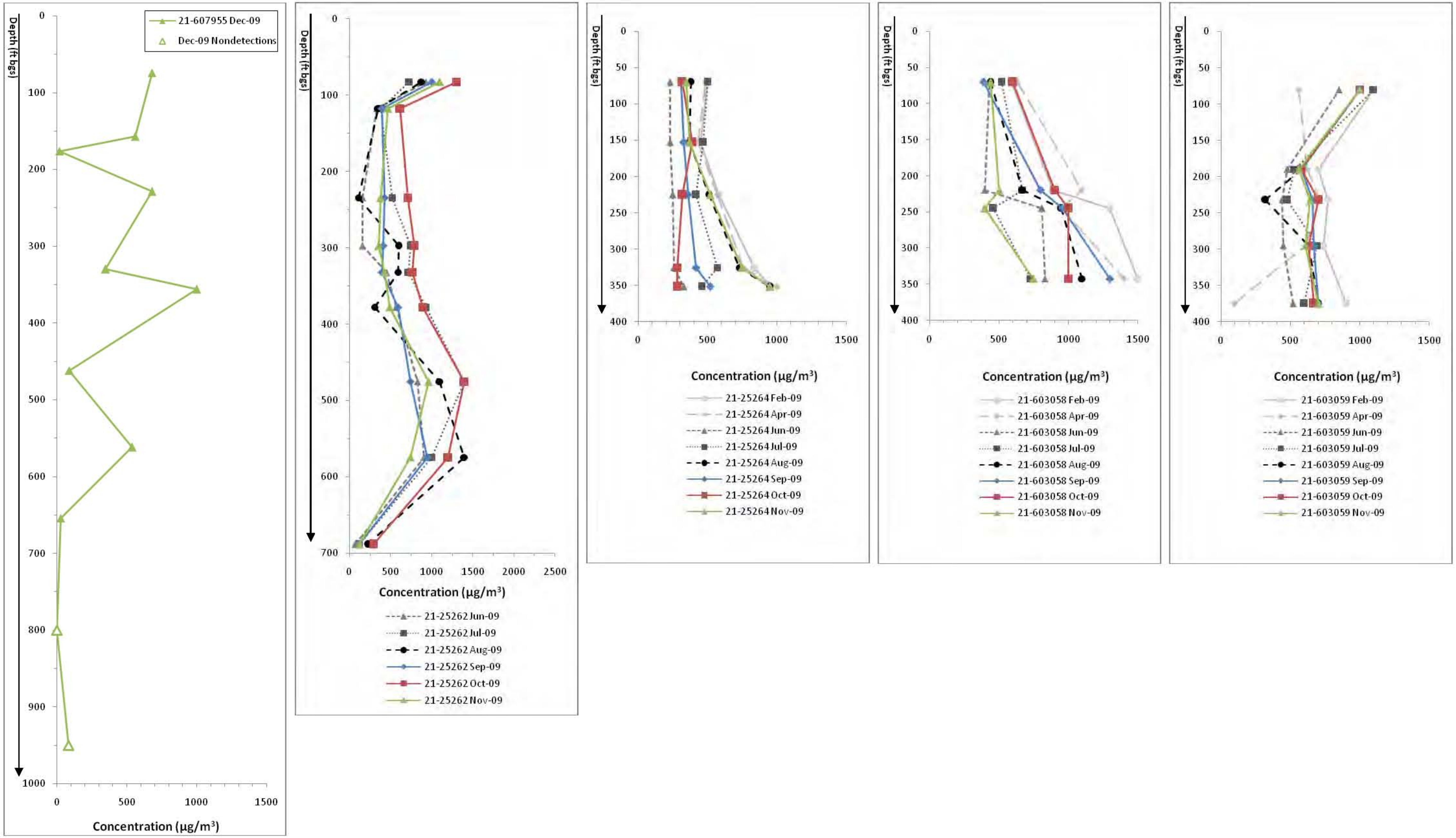


Figure 5.1-34 Vertical profile of chloroform in vapor-monitoring wells 21-607955, 21-25262, 21-25264, 21-603058, and 21-603059, February–November 2009

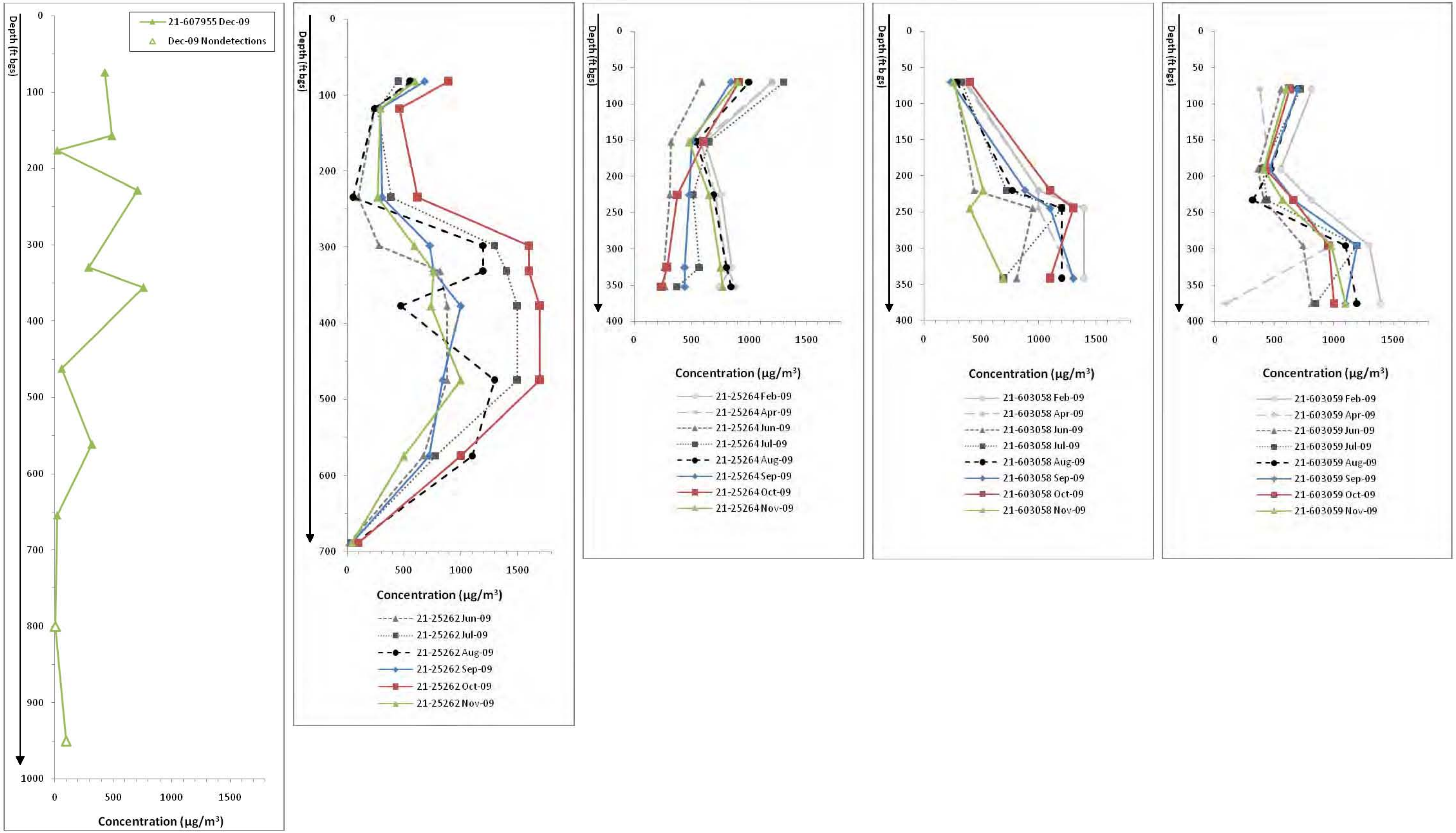


Figure 5.1-35 Vertical profile of TCE in vapor-monitoring wells 21-607955, 21-25262, 21-25264, 21-603058, and 21-603059, February–November 2009

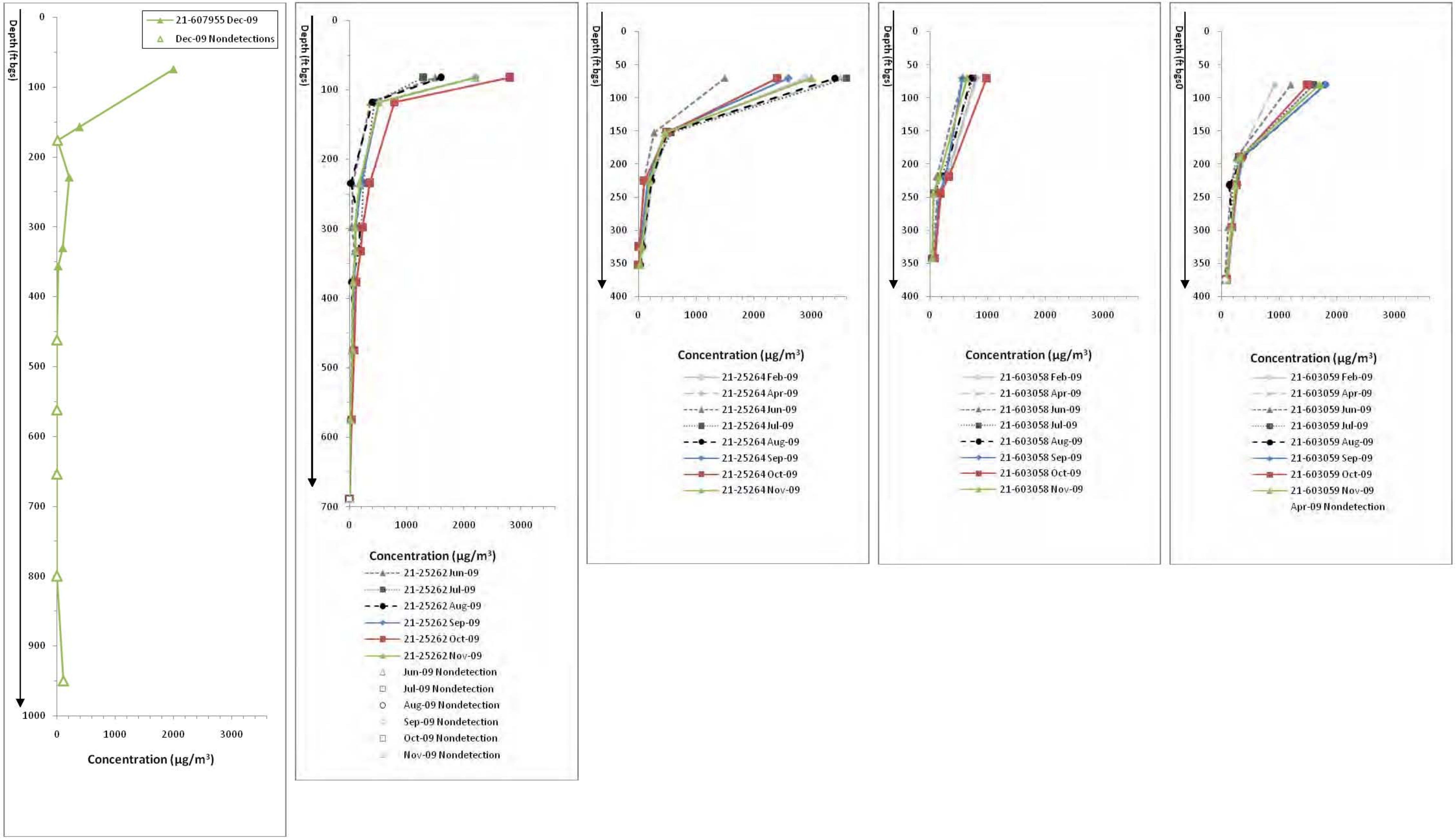


Figure 5.1-36 Vertical profile of PCE in vapor-monitoring wells 21-607955, 21-25262, 21-25264, 21-603058, and 21-603059, February–November 2009

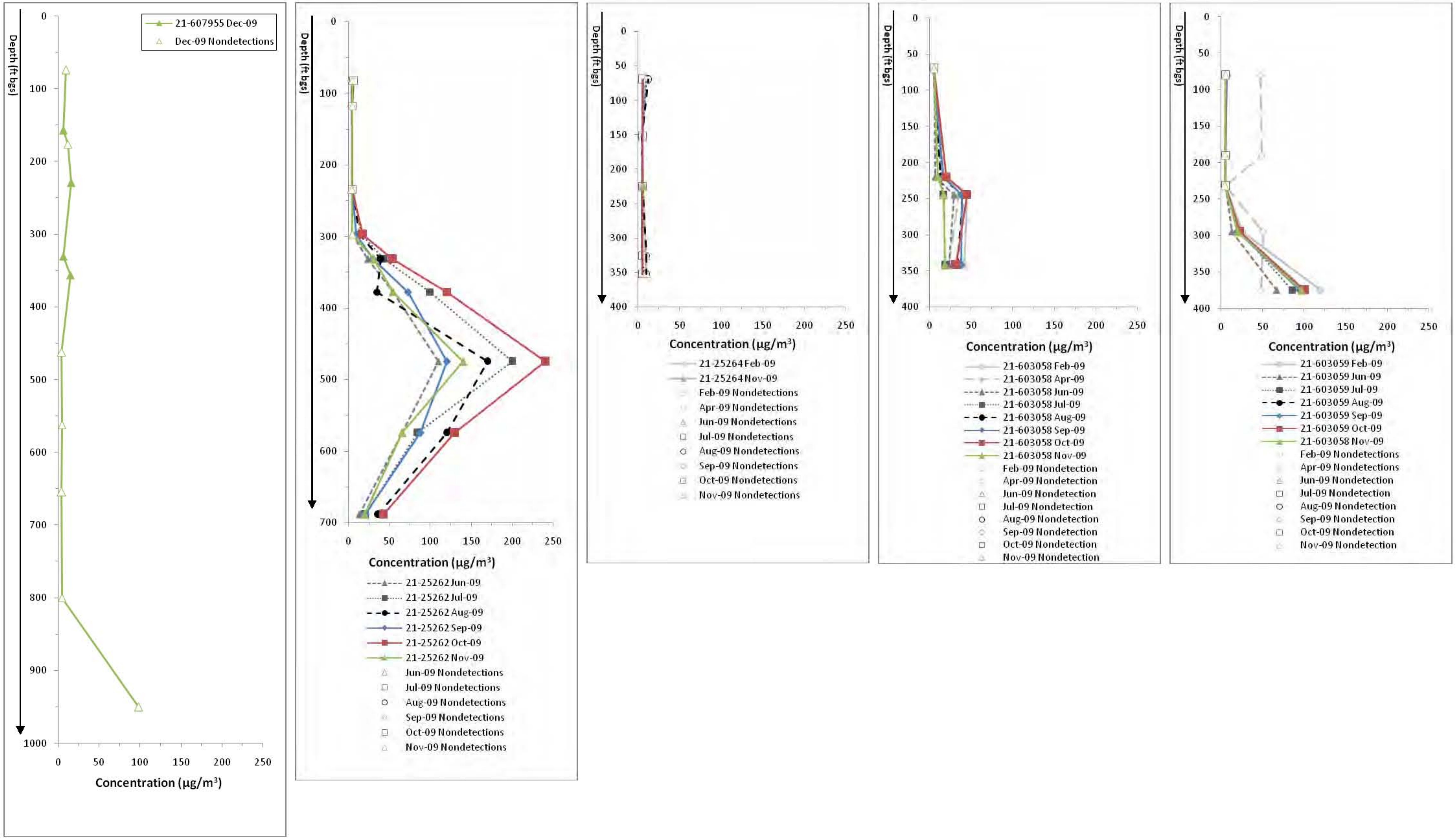
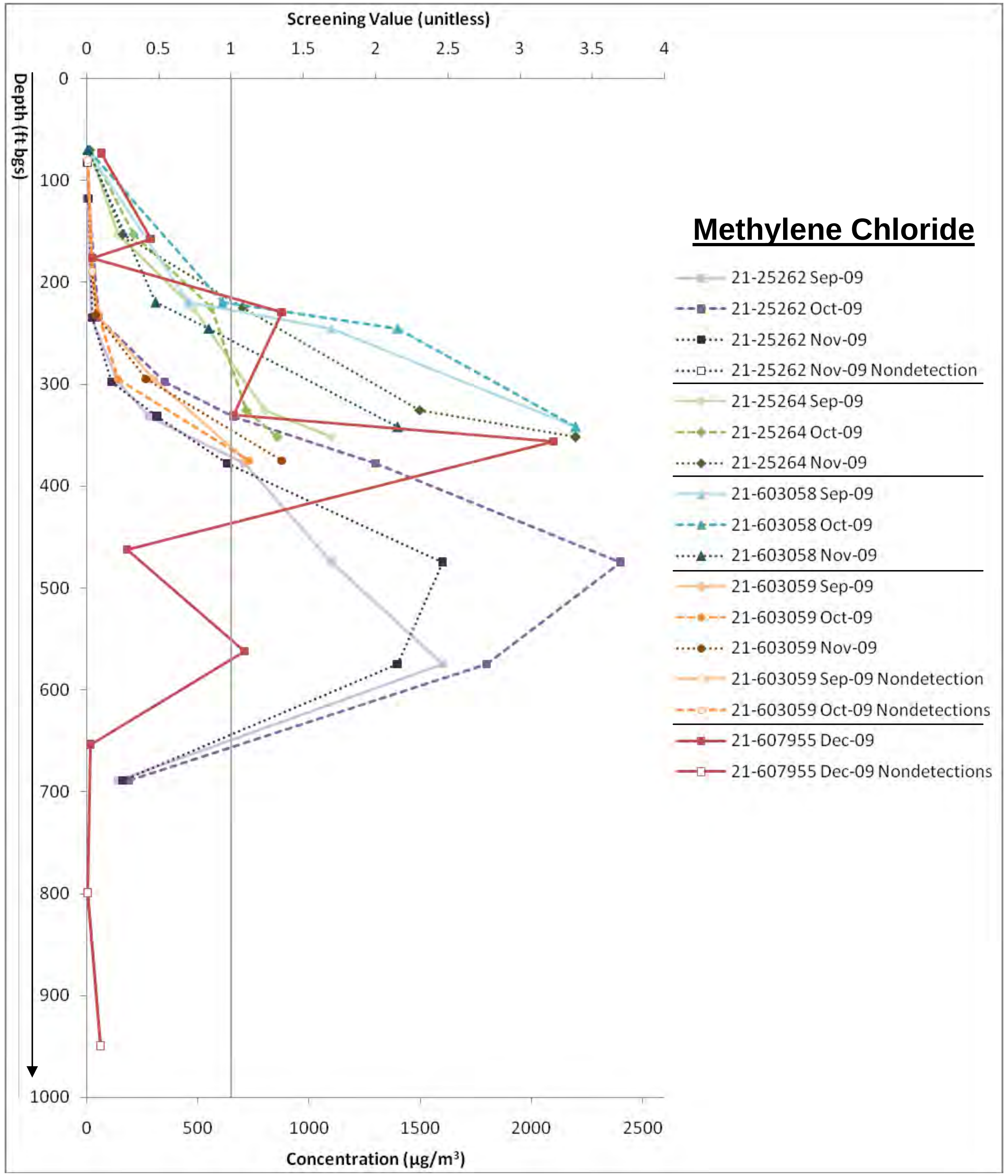


Figure 5.1-37 Vertical profile of 1,1,2-trichloroethane in vapor-monitoring wells 21-607955, 21-25262, 21-25264, 21-603058, and 21-603059, February–November 2009



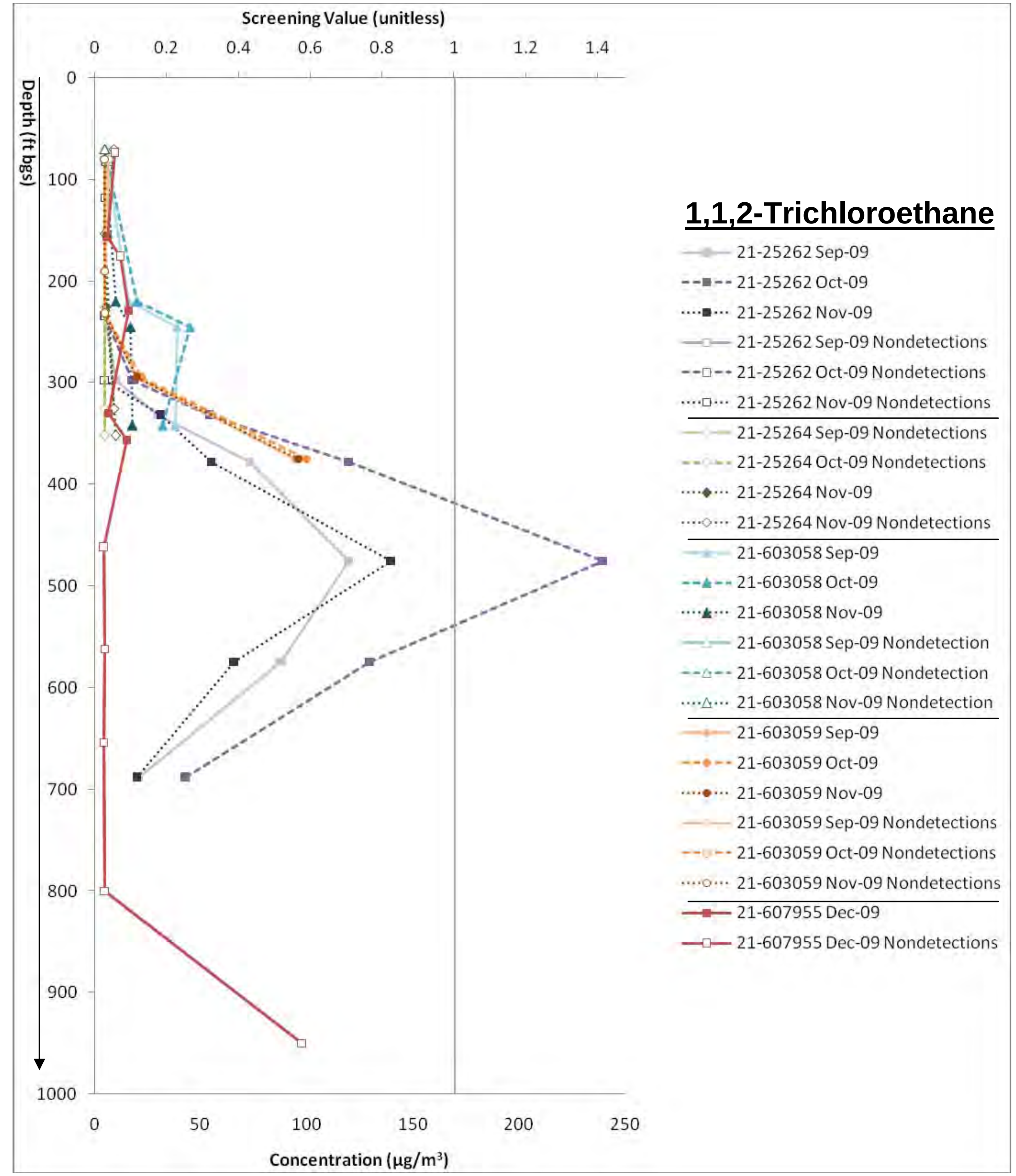


Figure 5.2-1 Groundwater screening of methylene chloride and 1,1,2-trichloroethane, September–November 2009

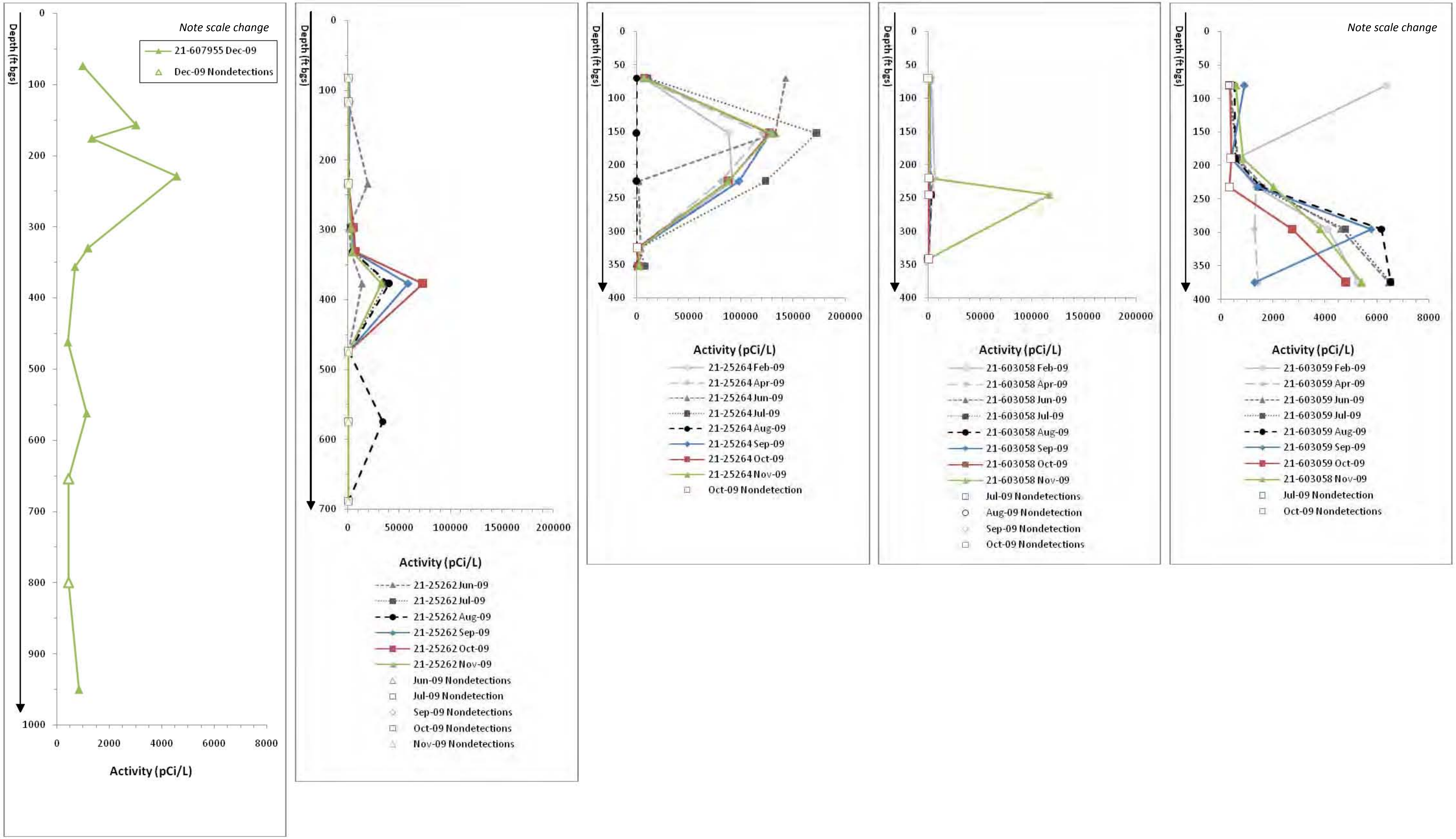


Figure 5.3-1 Vertical profile of tritium in vapor-monitoring wells 21-607955, 21-25262, 21-25264, 21-603058, and 21-603059, February–November 2009

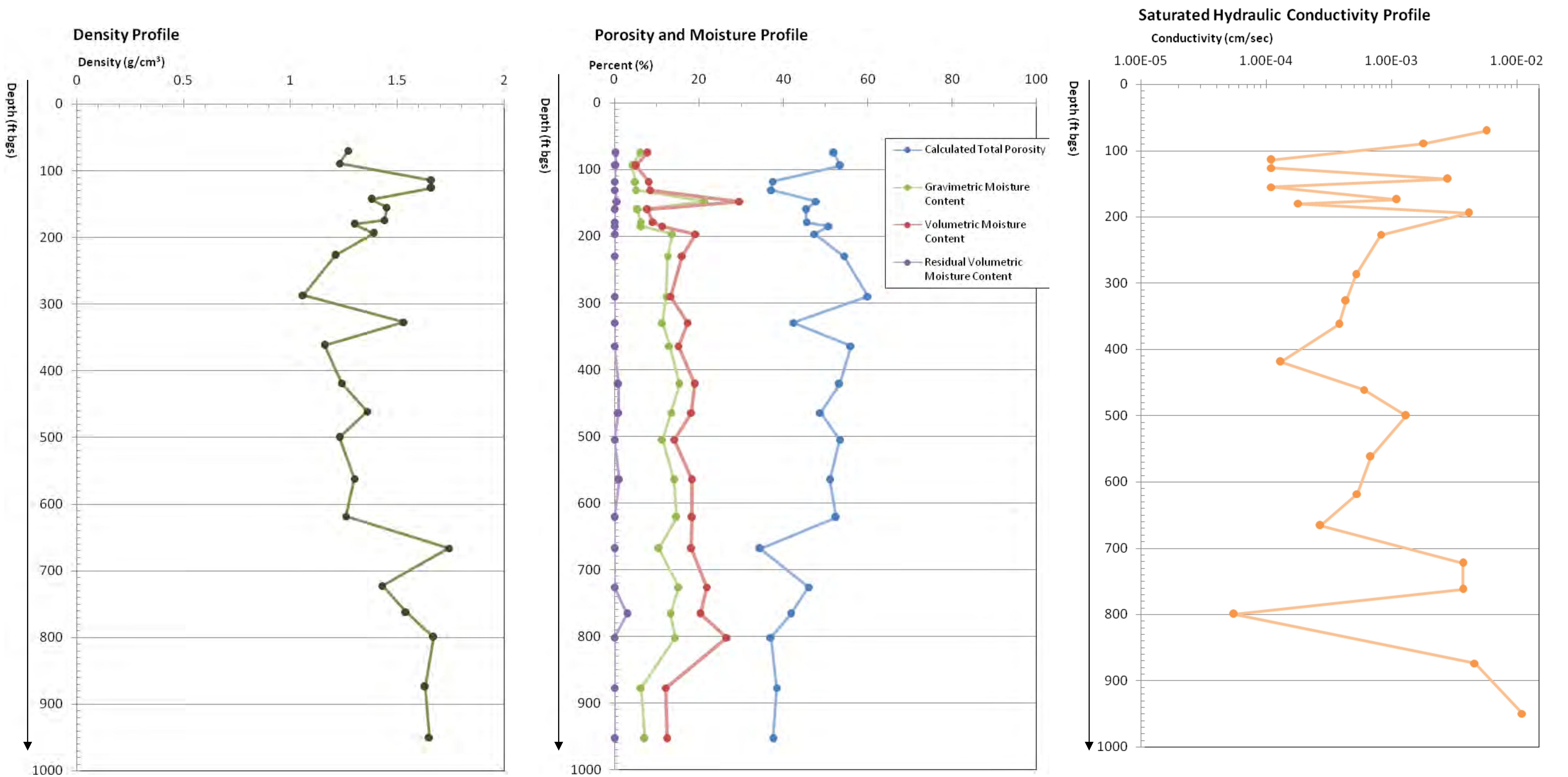


Figure 5.4-1 Depth profiles of reported density; calculated porosity; gravimetric, volumetric, and residual volumetric moisture content; and saturated hydraulic conductivity for BH 21-607955

Table 1.0-1
History of MDA T Periodic Monitoring Events

Quarters	Sampling Event Date	Round	Event ID	Vapor-Monitoring Wells Sampled	Associated Periodic Monitoring Report
Current Quarter	November 2009	12	2434/2487	21-25262, 21-25264, 21-603058, 21-603059, 21-607955[a]	September to November 2009 MDA T Periodic Monitoring Report
	October 2009	11	2280		
	September 2009	10	2235		
1st Previous Quarter[b]	August 2009	9	2192	21-25264, 21-603058, 21-603059, 21-25262[c]	June to August 2009 MDA T Periodic Monitoring Report (LANL 2009, 107448)
	July 2009	8	912		
	June 2009	7	877		
2nd Previous Quarter	April 2009	6	751	21-25264, 21-603058, 21-603059	February and April 2009 MDA T Periodic Monitoring Report (LANL 2009, 106665)
3rd Previous Quarter	February 2009	5	649	21-25264, 21-603058, 21-603059	
4th Previous Quarter	September 2008[d]	4	487	21-25264, 21-603058, 21-603059	Fiscal year (FY) 2008 MDA T Periodic Monitoring Report (LANL 2009, 105187)[d]
5th Previous Quarter	May 2008[d]	3	407	21-25264, 21-603058, 21-603059	
6th Previous Quarter	February 2008[d]	2	340	21-25264, 21-603058, 21-603059	
7th Previous Quarter	October 2007[d]	1	236	21-25264, 21-603058, 21-603059	

[a] Vapor-monitoring well 21-607955 was completed and sampled in early December 2009 (round 12) only.
[b] Sampling frequency increased from quarterly to monthly in June 2009.
[c] Vapor-monitoring well 21-25262 was completed and sampled beginning in June 2009.
[d] FY2008 vapor-monitoring data are not included in this report.

Table 2.0-1
MDA T Pore-Gas Sampling Depths and Collection Dates, February–November 2009

Vapor-Monitoring Well ID	Sample Port	Begin Depth (ft bgs)	End Depth (ft bgs)	Round 5 Collection Date (Event ID 649)	Round 6 Collection Date (Event IDs 677 & 751)	Round 7 Collection Date (Event ID 877)	Round 8 Collection Date (Event ID 912)	Round 9 Collection Date (Event ID 2192)	Round 10 Collection Date (Event ID 2235)	Round 11 Collection Date (Event ID 2280)	Round 12 Collection Date (Event IDs 2434 & 2487)
21-25262	1	80	85	n/a[a]	n/a	6/12/2009	7/14/2009	8/11/2009	9/17/2009	10/19/2009	11/17/2009
21-25262	2	115	120	n/a	n/a	6/12/2009	7/14/2009	8/11/2009	9/17/2009	10/19/2009	11/17/2009
21-25262	3	232	237	n/a	n/a	6/12/2009	7/14/2009	8/11/2009	9/17/2009	10/19/2009	11/17/2009
21-25262	4	295	300	n/a	n/a	6/12/2009	7/14/2009	8/13/2009	9/17/2009	10/19/2009	11/17/2009
21-25262	5	329.5	334.5	n/a	n/a	6/12/2009	7/14/2009	8/13/2009	9/17/2009	10/19/2009	11/17/2009
21-25262	6	375	380	n/a	n/a	6/12/2009	7/14/2009	8/11/2009	9/17/2009	10/19/2009	11/17/2009
21-25262	7	472	478	n/a	n/a	6/12/2009	7/14/2009	8/13/2009	9/17/2009	10/19/2009	11/17/2009
21-25262	8	572	577	n/a	n/a	6/12/2009	7/14/2009	8/14/2009	9/17/2009	10/19/2009	11/17/2009
21-25262	Single packer[b]	679.25	680.75	n/a	4/23/2009	n/a	n/a	n/a	n/a	n/a	n/a
21-25262	9	686	691	n/a	n/a	6/15/2009	7/14/2009	8/14/2009	9/17/2009	10/19/2009	11/17/2009
21-25264	1	67.5	72.5	2/4/2009	4/16/2009	6/17/2009	7/17/2009	8/19/2009	9/16/2009	10/16/2009	11/19/2009
21-25264	2	150.5	155.5	2/4/2009	4/17/2009	6/17/2009	7/17/2009	8/19/2009	9/16/2009	10/16/2009	11/19/2009
21-25264	3	222.5	227.5	2/3/2009	4/17/2009	6/17/2009	7/17/2009	8/19/2009	9/16/2009	10/16/2009	11/19/2009
21-25264	4	323	328	2/3/2009	4/17/2009	6/17/2009	7/17/2009	8/19/2009	9/16/2009	10/16/2009	11/19/2009
21-25264	5	349.5	354.5	2/3/2009	4/16/2009	6/17/2009	7/17/2009	8/19/2009	9/16/2009	10/16/2009	11/19/2009
21-603058	1	67.5	72.5	2/5/2009	4/14/2009	6/18/2009	7/16/2009	8/18/2009	9/15/2009	10/14/2009	11/20/2009
21-603058	2	160.5	165.5	—[c]	—	—	—	—	—	—	—
21-603058	3	217	222	2/5/2009	4/14/2009	6/18/2009	7/16/2009	8/18/2009	9/15/2009	10/14/2009	11/20/2009
21-603058	4	242.5	247.5	2/5/2009	4/15/2009	6/18/2009	7/16/2009	8/18/2009	9/15/2009	10/14/2009	11/20/2009
21-603058	5	339.5	344.5	2/5/2009	4/15/2009	6/18/2009	7/16/2009	8/18/2009	9/15/2009	10/14/2009	11/20/2009
21-603059	1	77.5	82.5	2/8/2009	4/13/2009	6/16/2009	7/15/2009	8/14/2009	9/18/2009	10/20/2009	11/18/2009
21-603059	2	112.5	117.5	—	—	—	—	—	—	—	—
21-603059	3	187.5	192.5	2/6/2009	4/10/2009	6/16/2009	7/15/2009	8/14/2009	9/18/2009	10/20/2009	11/18/2009
21-603059	4	229.5	234.5	2/8/2009	4/20/2009	6/16/2009	7/15/2009	8/14/2009	9/18/2009	10/20/2009	11/18/2009
21-603059	5	292.5	297.5	2/6/2009	4/10/2009	6/16/2009	7/15/2009	8/14/2009	9/18/2009	10/20/2009	11/18/2009
21-603059	6	372.5	377.5	2/6/2009	4/13/2009	6/16/2009	7/15/2009	8/14/2009	9/18/2009	10/20/2009	11/18/2009
21-607955	1	71.1	76.4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12/2/2009
21-607955	2	153.8	159.7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12/3/2009
21-607955	3	173.4	179	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12/2/2009
21-607955	4	225.9	232.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12/2/2009
21-607955	5	326.6	333.4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12/3/2009
21-607955	6	353.3	359.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12/2/2009
21-607955	7	459.4	464.8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12/2/2009

Table 2.0-1 (Continued)

Vapor-Monitoring Well ID	Sample Port	Begin Depth (ft bgs)	End Depth (ft bgs)	Round 5 Collection Date (Event ID 649)	Round 6 Collection Date (Event IDs 677 & 751)	Round 7 Collection Date (Event ID 877)	Round 8 Collection Date (Event ID 912)	Round 9 Collection Date (Event ID 2192)	Round 10 Collection Date (Event ID 2235)	Round 11 Collection Date (Event ID 2280)	Round 12 Collection Date (Event IDs 2434 & 2487)
21-607955	8	559	565	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12/2/2009
21-607955	9	651.3	657.3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12/2/2009
21-607955	10	797.2	803.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12/3/2009
21-607955	11	946.2	952.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12/3/2009

Note: Event IDs refer to the sample collection log and chain of custody packages provided in Appendix D.

[a] n/a = Not applicable.

[b] Single packer sample collected during drilling.

[c] — = Sample not collected.

Table 2.0-2
Summary of Pore-Gas Samples Collected at MDA T
Vapor-Monitoring Well 21-25262, June–November 2009

Sample ID	Depth (ft bgs)	Collection Date	Field QC Type	Request Number	
				Tritium	VOCs
June 2009					
MD21-09-10355	80–85	6/12/2009	n/a[a]	09-2321	09-2320
MD21-09-10356	115–120	6/12/2009	n/a	09-2321	09-2320
MD21-09-10357	232–237	6/12/2009	n/a	09-2321	09-2320
MD21-09-10358	295–300	6/12/2009	n/a	09-2321	09-2320
MD21-09-10359	329.5–334.5	6/12/2009	n/a	09-2334	09-2333
MD21-09-10360	375–380	6/12/2009	n/a	09-2334	09-2333
MD21-09-10361	472–478	6/12/2009	n/a	09-2334	09-2333
MD21-09-10362	572–577	6/12/2009	n/a	09-2334	09-2333
MD21-09-10363	686–691	6/15/2009	n/a	09-2334	09-2333
MD21-09-10364	686–691	6/15/2009	FD	09-2334	09-2333
July 2009					
MD21-09-11294	80–85	7/14/2009	n/a	09-2636	09-2635
MD21-09-11295	115–120	7/14/2009	n/a	09-2636	09-2635
MD21-09-11296	232–237	7/14/2009	n/a	09-2636	09-2635
MD21-09-11297	295–300	7/14/2009	n/a	09-2636	09-2635
MD21-09-11298	329.5–334.5	7/14/2009	n/a	09-2636	09-2635
MD21-09-11299	375–380	7/14/2009	n/a	09-2636	09-2635
MD21-09-11300	472–478	7/14/2009	n/a	09-2636	09-2635
MD21-09-11301	572–577	7/14/2009	n/a	09-2636	09-2635
MD21-09-11302	686–691	7/14/2009	n/a	09-2636	09-2635
MD21-09-11303	686–691	7/14/2009	FB	—[b]	09-2635
MD21-09-11304	686–691	7/14/2009	FD	09-2636	09-2635
August 2009					
MD21-09-11488	80–85	8/11/2009	n/a	09-2853	09-2852
MD21-09-11489	115–120	8/11/2009	n/a	09-2853	09-2852
MD21-09-11490	232–237	8/11/2009	n/a	09-2853	09-2852
MD21-09-11491	295–300	8/13/2009	n/a	09-2882	09-2881
MD21-09-11492	329.5–334.5	8/13/2009	n/a	09-2882	09-2881
MD21-09-11493	375–380	8/11/2009	n/a	09-2853	09-2852
MD21-09-11498	375–380	8/11/2009	FB	—	09-2852
MD21-09-11494	472–478	8/13/2009	n/a	09-2882	09-2881
MD21-09-11495	572–577	8/14/2009	n/a	09-2885	09-2884
MD21-09-11496	686–691	8/14/2009	n/a	09-2885	09-2884
MD21-09-11497	686–691	8/14/2009	FD	09-2885	09-2884

Table 2.0-2 (continued)

Sample ID	Depth (ft bgs)	Collection Date	Field QC Type	Request Number	
				Tritium	VOCs
September 2009					
MD21-09-12622	0–0	9/17/2009	FB	—	09-3282
MD21-09-12612	80–85	9/17/2009	n/a	09-3283	09-3282
MD21-09-12613	115–120	9/17/2009	n/a	09-3283	09-3282
MD21-09-12614	232–237	9/17/2009	n/a	09-3283	09-3282
MD21-09-12615	295–300	9/17/2009	n/a	09-3283	09-3282
MD21-09-12616	329.5–334.5	9/17/2009	n/a	09-3283	09-3282
MD21-09-12621	329.5–334.5	9/17/2009	FD	09-3283	09-3282
MD21-09-12617	375–380	9/17/2009	n/a	09-3283	09-3282
MD21-09-12618	472–478	9/17/2009	n/a	09-3283	09-3282
MD21-09-12619	572–577	9/17/2009	n/a	09-3283	09-3282
MD21-09-12620	686–691	9/17/2009	n/a	09-3283	09-3282
October 2009					
MD21-10-9	0–0	10/19/2009	FB	—	10-181
MD21-10-32	80–85	10/19/2009	n/a	10-182	10-181
MD21-10-33	115–120	10/19/2009	n/a	10-182	10-181
MD21-10-34	232–237	10/19/2009	n/a	10-182	10-181
MD21-10-35	295–300	10/19/2009	n/a	10-182	10-181
MD21-10-36	329.5–334.5	10/19/2009	n/a	10-182	10-181
MD21-10-41	329.5–334.5	10/19/2009	FD	10-182	10-181
MD21-10-37	375–380	10/19/2009	n/a	10-182	10-181
MD21-10-38	472–478	10/19/2009	n/a	10-182	10-181
MD21-10-39	572–577	10/19/2009	n/a	10-182	10-181
MD21-10-40	686–691	10/19/2009	n/a	10-182	10-181
November 2009					
MD21-10-5023	0–0	11/17/2009	FB	—	10-555
MD21-10-5007	80–85	11/17/2009	n/a	10-556	10-555
MD21-10-5008	115–120	11/17/2009	n/a	10-556	10-555
MD21-10-5009	232–237	11/17/2009	n/a	10-556	10-555
MD21-10-5010	295–300	11/17/2009	n/a	10-556	10-555
MD21-10-5011	329.5–334.5	11/17/2009	n/a	10-556	10-555
MD21-10-5022	329.5–334.5	11/17/2009	FD	10-556	10-555
MD21-10-5012	375–380	11/17/2009	n/a	10-556	10-555
MD21-10-5013	472–478	11/17/2009	n/a	10-556	10-555
MD21-10-5014	572–577	11/17/2009	n/a	10-556	10-555
MD21-10-5015	686–691	11/17/2009	n/a	10-556	10-555

[a] n/a = Not applicable.

[b] — = Sample not collected.

Table 2.0-3
Summary of Pore-Gas Samples Collected at MDA T Vapor-Monitoring Well 21-25264, February–November 2009

Sample ID	Depth (ft bgs)	Collection Date	Field QC Type	Request Number	
				Tritium	VOCs
February 2009					
MD21-09-3564	67.5–72.5	2/4/2009	n/a[a]	09-812	09-811
MD21-09-3563	150.5–155.5	2/4/2009	n/a	09-812	09-811
MD21-09-3565	150.5–155.5	2/4/2009	FD	09-812	09-811
MD21-09-3560	222.5–227.5	2/3/2009	n/a	09-812	09-811
MD21-09-3561	323–328	2/3/2009	n/a	09-812	09-811
MD21-09-3562	349.5–354.5	2/3/2009	n/a	09-812	09-811
April 2009					
MD21-09-7164	67.5–72.5	4/16/2009	n/a	09-1505	09-1504
MD21-09-7166	150.5–155.5	4/17/2009	n/a	09-1510	09-1509
MD21-09-7168	222.5–227.5	4/17/2009	n/a	09-1510	09-1509
MD21-09-7167	323–328	4/17/2009	n/a	09-1510	09-1509
MD21-09-7165	349.5–354.5	4/16/2009	n/a	09-1505	09-1504
MD21-09-7174	349.5–354.5	4/16/2009	FD	09-1505	09-1504
June 2009					
MD21-09-10354	n/a	6/18/2009	FB	—[b]	09-2406
MD21-09-10344	67.5–72.5	6/17/2009	n/a	09-2363	09-2362
MD21-09-10345	150.5–155.5	6/17/2009	n/a	09-2363	09-2362
MD21-09-10353	150.5–155.5	6/17/2009	FD	09-2363	09-2362
MD21-09-10346	222.5–227.5	6/17/2009	n/a	09-2363	09-2362
MD21-09-10347	323–328	6/17/2009	n/a	09-2363	09-2362
MD21-09-10348	349.5–354.5	6/17/2009	n/a	09-2363	09-2362
July 2009					
MD21-09-11292	n/a	7/17/2009	FB	—	09-2683
MD21-09-11283	67.5–72.5	7/17/2009	n/a	09-2684	09-2683
MD21-09-11284	150.5–155.5	7/17/2009	n/a	09-2684	09-2683
MD21-09-11293	150.5–155.5	7/17/2009	FD	09-2684	09-2683
MD21-09-11285	222.5–227.5	7/17/2009	n/a	09-2684	09-2683
MD21-09-11286	323–328	7/17/2009	n/a	09-2684	09-2683
MD21-09-11287	349.5–354.5	7/17/2009	n/a	09-2684	09-2683

Table 2.0-3 (continued)

Sample ID	Depth (ft bgs)	Collection Date	Field QC Type	Request Number	
				Tritium	VOCs
August 2009					
MD21-09-11477	67.5–72.5	8/19/2009	n/a	09-2947	09-2946
MD21-09-11478	150.5–155.5	8/19/2009	n/a	09-2947	09-2946
MD21-09-11486	150.5–155.5	8/19/2009	FD	09-2947	09-2946
MD21-09-11479	222.5–227.5	8/19/2009	n/a	09-2947	09-2946
MD21-09-11480	323–328	8/19/2009	n/a	09-2947	09-2946
MD21-09-11481	349.5–354.5	8/19/2009	n/a	09-2947	09-2946
MD21-09-11483	349.5–354.5	8/19/2009	FB	—	09-2946
September 2009					
MD21-09-12611	0–0	9/16/2009	FB	—	09-3260
MD21-09-12605	67.5–72.5	9/16/2009	n/a	09-3261	09-3260
MD21-09-12606	150.5–155.5	9/16/2009	n/a	09-3261	09-3260
MD21-09-12610	150.5–155.5	9/16/2009	FD	09-3261	09-3260
MD21-09-12607	222.5–227.5	9/16/2009	n/a	09-3261	09-3260
MD21-09-12608	323–328	9/16/2009	n/a	09-3261	09-3260
MD21-09-12609	349.5–354.5	9/16/2009	n/a	09-3261	09-3260
October 2009					
MD21-10-31	0–0	10/16/2009	FB	—	10-157
MD21-10-25	67.5–72.5	10/16/2009	n/a	10-158	10-157
MD21-10-26	150.5–155.5	10/16/2009	n/a	10-158	10-157
MD21-10-30	150.5–155.5	10/16/2009	FD	10-158	10-157
MD21-10-27	222.5–227.5	10/16/2009	n/a	10-158	10-157
MD21-10-28	323–328	10/16/2009	n/a	10-158	10-157
MD21-10-29	349.5–354.5	10/16/2009	n/a	10-158	10-157
November 2009					
MD21-10-5021	0–0	11/19/2009	FB	—	10-627
MD21-10-5002	67.5–72.5	11/19/2009	n/a	10-628	10-627
MD21-10-5003	150.5–155.5	11/19/2009	n/a	10-628	10-627
MD21-10-5020	150.5–155.5	11/19/2009	FD	10-628	10-627
MD21-10-5004	222.5–227.5	11/19/2009	n/a	10-628	10-627
MD21-10-5005	323–328	11/19/2009	n/a	10-628	10-627
MD21-10-5006	349.5–354.5	11/19/2009	n/a	10-628	10-627

[a] n/a = Not applicable.

[b] — = Sample not collected.

Table 2.0-4
Summary of Pore-Gas Samples Collected at MDA T Vapor-Monitoring Well 21-603058, February–November 2009

Sample ID	Depth (ft bgs)	Collection Date	Field QC Type	Request Number	
				Tritium	VOCs
February 2009					
MD21-09-3559	n/a[a]	2/8/2009	FB	—[b]	09-842
MD21-09-3553	67.5–72.5	2/5/2009	n/a	09-836	09-835
MD21-09-3554	217–222	2/5/2009	n/a	09-836	09-835
MD21-09-3558	217–222	2/5/2009	FD	09-836	09-835
MD21-09-3555	242.5–247.5	2/5/2009	n/a	09-836	09-835
MD21-09-3556	339.5–344.5	2/5/2009	n/a	09-836	09-835
April 2009					
MD21-09-7169	n/a	4/15/2009	FB	—	09-1494
MD21-09-7159	67.5–72.5	4/14/2009	n/a	09-1491	09-1476
MD21-09-7160	217–222	4/14/2009	n/a	09-1491	09-1476
MD21-09-7162	242.5–247.5	4/15/2009	n/a	09-1495	09-1494
MD21-09-7161	339.5–344.5	4/15/2009	n/a	09-1495	09-1494
MD21-09-7172	339.5–344.5	4/15/2009	FD	09-1495	09-1494
June 2009					
MD21-09-10352	n/a	6/18/2009	FB	—	09-2406
MD21-09-10339	67.5–72.5	6/18/2009	n/a	09-2407	09-2406
MD21-09-10341	217–222	6/18/2009	n/a	09-2407	09-2406
MD21-09-10351	217–222	6/18/2009	FD	09-2407	09-2406
MD21-09-10342	242.5–247.5	6/18/2009	n/a	09-2407	09-2406
MD21-09-10343	339.5–344.5	6/18/2009	n/a	09-2407	09-2406
July 2009					
MD21-09-11290	n/a	7/16/2009	FB	—	09-2669
MD21-09-11278	67.5–72.5	7/16/2009	n/a	09-2670	09-2669
MD21-09-11280	217–222	7/16/2009	n/a	09-2670	09-2669
MD21-09-11291	217–222	7/16/2009	FD	09-2670	09-2669
MD21-09-11281	242.5–247.5	7/16/2009	n/a	09-2670	09-2669
MD21-09-11282	339.5–344.5	7/16/2009	n/a	09-2670	09-2669
August 2009					
MD21-09-11472	67.5–72.5	8/18/2009	n/a	09-2920	09-2919
MD21-09-11484	217–222	8/18/2009	FD	09-2920	09-2919
MD21-09-11473	217–222	8/18/2009	n/a	09-2920	09-2919
MD21-09-11474	242.5–247.5	8/18/2009	n/a	09-2920	09-2919
MD21-09-11485	339.5–344.5	8/18/2009	FB	—	09-2919
MD21-09-11475	339.5–344.5	8/18/2009	n/a	09-2920	09-2919

Table 2.0-4 (continued)

Sample ID	Depth (ft bgs)	Collection Date	Field QC Type	Request Number	
				Tritium	VOCs
September 2009					
MD21-09-12598	67.5–72.5	9/15/2009	n/a	09-3228	09-3227
MD21-09-12600	217–222	9/15/2009	n/a	09-3228	09-3227
MD21-09-12603	242.5–247.5	9/15/2009	FD	09-3228	09-3227
MD21-09-12601	242.5–247.5	9/15/2009	n/a	09-3228	09-3227
MD21-09-12602	339.5–344.5	9/15/2009	n/a	09-3228	09-3227
October 2009					
MD21-10-18	67.5–72.5	10/14/2009	n/a	10-139	10-138
MD21-10-20	217–222	10/14/2009	n/a	10-139	10-138
MD21-10-21	242.5–247.5	10/14/2009	n/a	10-139	10-138
MD21-10-23	242.5–247.5	10/14/2009	FD	10-139	10-138
MD21-10-22	339.5–344.5	10/14/2009	n/a	10-139	10-138
November 2009					
MD21-10-5019	0–0	11/20/2009	FB	—	10-651
MD21-10-4997	67.5–72.5	11/20/2009	n/a	10-652	10-651
MD21-10-4998	217–222	11/20/2009	n/a	10-652	10-651
MD21-10-4999	242.5–247.5	11/20/2009	n/a	10-652	10-651
MD21-10-5018	242.5–247.5	11/20/2009	FD	10-652	10-651
MD21-10-5000	339.5–344.5	11/20/2009	n/a	10-652	10-651

[a] n/a = Not applicable.

[b] — = Sample not collected.

Table 2.0-5
Summary of Pore-Gas Samples Collected at MDA T
Vapor-Monitoring Well 21-603059, February–November 2009

Sample ID	Depth (ft bgs)	Collection Date	Field QC Type	Request Number	
				Tritium	VOCs
February 2009					
MD21-09-3552	n/a[a]	2/6/2009	FB	—[b]	09-842
MD21-09-3546	77.5–82.5	2/8/2009	n/a	09-843	09-842
MD21-09-3545	187.5–192.5	2/6/2009	n/a	09-843	09-842
MD21-09-3547	229.5–234.5	2/8/2009	n/a	09-843	09-842
MD21-09-3549	292.5–297.5	2/6/2009	n/a	09-836	09-835
MD21-09-3550	372.5–377.5	2/6/2009	n/a	09-836	09-835
April 2009					
MD21-09-7170	n/a	4/20/2009	FB	—	09-1513
MD21-09-7155	77.5–82.5	4/13/2009	n/a	09-1455	09-1454
MD21-09-7154	187.5–192.5	4/10/2009	n/a	09-1453	09-1452
MD21-09-7157	229.5–234.5	4/13/2009	n/a	09-1455	09-1454
MD21-09-7163	229.5–234.5	4/20/2009	n/a	09-1514	09-1513
MD21-09-7153	292.5–297.5	4/10/2009	n/a	09-1453	09-1452
MD21-09-7156	372.5–377.5	4/13/2009	n/a	09-1455	09-1454
June 2009					
MD21-09-10350	n/a	6/18/2009	FB	—	09-2406
MD21-09-10333	77.5–82.5	6/16/2009	n/a	09-2343	09-2342
MD21-09-10334	187.5–192.5	6/16/2009	n/a	09-2343	09-2342
MD21-09-10335	229.5–234.5	6/16/2009	n/a	09-2343	09-2342
MD21-09-10336	292.5–297.5	6/16/2009	n/a	09-2343	09-2342
MD21-09-10349	292.5–297.5	6/16/2009	FD	09-2343	09-2342
MD21-09-10337	372.5–377.5	6/16/2009	n/a	09-2343	09-2342
July 2009					
MD21-09-11272	77.5–82.5	7/15/2009	n/a	09-2655	09-2654
MD21-09-11273	187.5–192.5	7/15/2009	n/a	09-2655	09-2654
MD21-09-11274	229.5–234.5	7/15/2009	n/a	09-2655	09-2654
MD21-09-11275	292.5–297.5	7/15/2009	n/a	09-2655	09-2654
MD21-09-11276	372.5–377.5	7/15/2009	n/a	09-2655	09-2654
MD21-09-11289	372.5–377.5	7/15/2009	FD	09-2655	09-2654

Table 2.0-5 (continued)

Sample ID	Depth (ft bgs)	Collection Date	Field QC Type	Request Number	
				Tritium	VOCs
August 2009					
MD21-09-11469	77.5–82.5	8/14/2009	n/a	09-2901	09-2900
MD21-09-11470	187.5–192.5	8/14/2009	n/a	09-2901	09-2900
MD21-09-11471	229.5–234.5	8/14/2009	n/a	09-2901	09-2900
MD21-09-11468	292.5–297.5	8/14/2009	n/a	09-2901	09-2900
MD21-09-11467	372.5–377.5	8/14/2009	n/a	09-2901	09-2900
MD21-09-11482	372.5–377.5	8/14/2009	FD	09-2901	09-2900
September 2009					
MD21-09-12630	0–0	9/18/2009	FB	—	09-3289
MD21-09-12623	77.5–82.5	9/18/2009	n/a	09-3290	09-3289
MD21-09-12624	187.5–192.5	9/18/2009	n/a	09-3290	09-3289
MD21-09-12625	229.5–234.5	9/18/2009	n/a	09-3290	09-3289
MD21-09-12626	292.5–297.5	9/18/2009	n/a	09-3290	09-3289
MD21-09-12627	372.5–377.5	9/18/2009	n/a	09-3290	09-3289
MD21-09-12629	372.5–377.5	9/18/2009	FD	09-3290	09-3289
October 2009					
MD21-10-17	0–0	10/20/2009	FB	—	10-195
MD21-10-10	77.5–82.5	10/20/2009	n/a	10-196	10-195
MD21-10-11	187.5–192.5	10/20/2009	n/a	10-196	10-195
MD21-10-12	229.5–234.5	10/20/2009	n/a	10-196	10-195
MD21-10-13	292.5–297.5	10/20/2009	n/a	10-196	10-195
MD21-10-14	372.5–377.5	10/20/2009	n/a	10-196	10-195
MD21-10-16	372.5–377.5	10/20/2009	FD	10-196	10-195
November 2009					
MD21-10-5017	0–0	11/18/2009	FB	—	10-586
MD21-10-4991	77.5–82.5	11/18/2009	n/a	10-587	10-586
MD21-10-4993	187.5–192.5	11/18/2009	n/a	10-587	10-586
MD21-10-4994	229.5–234.5	11/18/2009	n/a	10-587	10-586
MD21-10-4995	292.5–297.5	11/18/2009	n/a	10-587	10-586
MD21-10-4996	372.5–377.5	11/18/2009	n/a	10-587	10-586
MD21-10-5016	372.5–377.5	11/18/2009	FD	10-587	10-586

[a] n/a = Not applicable.

[b] — = Sample not collected.

Table 2.0-6
Summary of Pore-Gas Samples Collected at MDA T
Vapor-Monitoring Well 21-607955, December 2009

Sample ID	Depth (ft bgs)	Collection Date	Field QC Type	Request Number	
				Tritium	VOCs
MD21-10-7578	0–0	12/3/2009	FB	—[a]	10-793
MD21-10-7567	71.1–76.4	12/2/2009	n/a[b]	10-765	10-764
MD21-10-7568	153.8–159.7	12/3/2009	n/a	10-794	10-793
MD21-10-7569	173.4–179	12/2/2009	n/a	10-765	10-764
MD21-10-7570	225.9–232.1	12/2/2009	n/a	10-765	10-764
MD21-10-7571	326.6–333.4	12/3/2009	n/a	10-794	10-793
MD21-10-7579	326.6–333.4	12/3/2009	FD	10-794	10-793
MD21-10-7572	353.3–359.6	12/2/2009	n/a	10-765	10-764
MD21-10-7573	459.4–464.8	12/2/2009	n/a	10-765	10-764
MD21-10-7574	559–565	12/2/2009	n/a	10-765	10-764
MD21-10-7575	651.3–657.3	12/2/2009	n/a	10-765	10-764
MD21-10-7576	797.2–803.1	12/3/2009	n/a	10-794	10-793
MD21-10-7577	946.2–952.1	12/3/2009	n/a	10-794	10-793

[a] — = Sample not collected.

[b] n/a = Not applicable.

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 Screening Level (µg/L)	Calculated Concentrations in Pore Gas Corresponding to Groundwater Standard[b] ($\mu g/m^3$)
Acetone	0.0016	22,000[c]	35,200
Benzene	0.228	5[d]	1140
Bromodichloromethane	0.087	1.2[c]	104
Bromomethane	0.256	8.7[c]	2227
2-Butanone	0.0023	7100[c]	16,330
Carbon Disulfide	0.59	1000[c]	590,000
Carbon Tetrachloride	1.1	5[d]	5500
Chloroform	0.15	100[e]	15,000
Cyclohexane	6.1[c]	13,000[c]	79,300,000
1,4-Dichlorobenzene	0.0996	75[d]	7470
Dichlorodifluoromethane	14	390[c]	5,460,000

Table 3.0-1 (continued)

VOC	Henry's Law Constant[a] (dimensionless)	Groundwater Screening Level (µg/L)	Calculated Concentrations in Pore Gas Corresponding to Groundwater Standard[b] (µg/m³)
1,2-Dichloroethane	0.048	5[d]	240
1,1-Dichloroethene	1.1	5[e]	5500
cis-1,2-Dichloroethane	0.17	70[d]	11,900
Ethanol	na[f]	na	na
Hexane	74	880[c]	65,120,000
Methanol	na	na	na
Methylene chloride	0.13	5[d]	650
Propylene	na	na	na
Tetrachloroethene	0.72	5[d]	3600
Toluene	0.272	750[e]	204,000
1,1,2-Trichloro-1,2,2-trifluoroethane	22	59,000[c]	1,298,000,000
1,1,1-Trichloroethane	0.705	60[e]	42,300
1,1,2-Trichloroethane	0.034	5[d]	170
Trichloroethene	0.4	5[d]	2000

[a] NMED (2009, 106420, Appendix B) unless otherwise noted.

[b] Derived from denominator of Equation 3.0-3.

[c] Henry's law constant and tap water screening levels from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

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

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

[f] na = Not available.

Table 4.0-1
Summary of Pore-Gas Field-Screening Results, September–November 2009

Event ID	Collection Date	Sampling Round	Location ID	Sampling Port Number	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Percent (%) CO_2	Percent (%) O_2
2235	9/17/2009	10	21-25262	1	80	85	1.1	17.4
2280	10/19/2009	11	21-25262	1	80	85	0.9	19.7
2434	11/17/2009	12	21-25262	1	80	85	0.8	20.9
2235	9/17/2009	10	21-25262	2	115	120	0.7	17.7
2280	10/19/2009	11	21-25262	2	115	120	0.5	19.9
2434	11/17/2009	12	21-25262	2	115	120	0.5	21.4
2235	9/17/2009	10	21-25262	3	232	237	0.7	17.7
2280	10/19/2009	11	21-25262	3	232	237	0.9	19.5
2434	11/17/2009	12	21-25262	3	232	237	0.5	21.6
2235	9/17/2009	10	21-25262	4	295	300	0.7	18

Table 4.0-1 (continued)

Event ID	Collection Date	Sampling Round	Location ID	Sampling Port Number	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Percent (%) CO_2	Percent (%) O_2
2280	10/19/2009	11	21-25262	4	295	300	1	19.3
2434	11/17/2009	12	21-25262	4	295	300	0.4	21.7
2235	9/17/2009	10	21-25262	5	329.5	334.5	0.5	18.1
2280	10/19/2009	11	21-25262	5	329.5	334.5	0.8	19.4
2434	11/17/2009	12	21-25262	5	329.5	334.5	0.3	22.1
2235	9/17/2009	10	21-25262	6	375	380	0.4	18.1
2280	10/19/2009	11	21-25262	6	375	380	0.3	19.1
2434	11/17/2009	12	21-25262	6	375	380	0.2	22
2235	9/17/2009	10	21-25262	7	472	478	0	18.5
2280	10/19/2009	11	21-25262	7	472	478	0.2	18.9
2434	11/17/2009	12	21-25262	7	472	478	0.1	21.8
2235	9/17/2009	10	21-25262	8	572	577	0.1	18.4
2280	10/19/2009	11	21-25262	8	572	577	0.1	18.8
2434	11/17/2009	12	21-25262	8	572	577	0	22.1
2235	9/17/2009	10	21-25262	9	686	691	0	18.5
2280	10/19/2009	11	21-25262	9	686	691	0	19.2
2434	11/17/2009	12	21-25262	9	686	691	0	22.2
2235	9/16/2009	10	21-25264	1	67.5	72.5	0.7	18
2280	10/16/2009	11	21-25264	1	67.5	72.5	0.5	20.6
2434	11/19/2009	12	21-25264	1	67.5	72.5	0.8	21.3
2235	9/16/2009	10	21-25264	2	150.5	155.5	1.1	17.7
2280	10/16/2009	11	21-25264	2	150.5	155.5	0.8	20.3
2434	11/19/2009	12	21-25264	2	150.5	155.5	0.9	21.6
2235	9/16/2009	10	21-25264	3	222.5	227.5	0.7	18
2280	10/16/2009	11	21-25264	3	222.5	227.5	0.4	20.7
2434	11/19/2009	12	21-25264	3	222.5	227.5	0.9	21.7
2235	9/16/2009	10	21-25264	4	323	328	0	18.4
2280	10/16/2009	11	21-25264	4	323	328	0.1	20.7
2434	11/19/2009	12	21-25264	4	323	328	0.7	21.8
2235	9/16/2009	10	21-25264	5	349.5	354.5	0	18.4
2280	10/16/2009	11	21-25264	5	349.5	354.5	0.1	20.7
2434	11/19/2009	12	21-25264	5	349.5	354.5	0.5	21.8
2235	9/15/2009	10	21-603058	1	67.5	72.5	0.9	18
2280	10/14/2009	11	21-603058	1	67.5	72.5	1	19.8
2434	11/20/2009	12	21-603058	1	67.5	72.5	1	20.1
2235	9/15/2009	10	21-603058	3	217	222	0.9	18.2

Table 4.0-1 (continued)

Event ID	Collection Date	Sampling Round	Location ID	Sampling Port Number	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Percent (%) CO_2	Percent (%) O_2
2280	10/14/2009	11	21-603058	3	217	222	0.7	20.3
2434	11/20/2009	12	21-603058	3	217	222	0.4	20.8
2235	9/15/2009	10	21-603058	4	242.5	247.5	0.7	18.3
2280	10/14/2009	11	21-603058	4	242.5	247.5	0.6	20.5
2434	11/20/2009	12	21-603058	4	242.5	247.5	0.2	21.4
2235	9/15/2009	10	21-603058	5	339.5	344.5	0.2	18.5
2280	10/14/2009	11	21-603058	5	339.5	344.5	0.5	20.9
2434	11/20/2009	12	21-603058	5	339.5	344.5	0.3	21.5
2235	9/18/2009	10	21-603059	1	77.5	82.5	0.9	17.8
2280	10/20/2009	11	21-603059	1	77.5	82.5	0.8	19.9
2434	11/18/2009	12	21-603059	1	77.5	82.5	0.7	20
2235	9/18/2009	10	21-603059	3	187.5	192.5	0.8	17.9
2280	10/20/2009	11	21-603059	3	187.5	192.5	0.8	19.8
2434	11/18/2009	12	21-603059	3	187.5	192.5	0.7	20.2
2235	9/18/2009	10	21-603059	4	229.5	234.5	1.1	17.8
2280	10/20/2009	11	21-603059	4	229.5	234.5	1.1	19.4
2434	11/18/2009	12	21-603059	4	229.5	234.5	1	20.4
2235	9/18/2009	10	21-603059	5	292.5	297.5	1.2	17.6
2280	10/20/2009	11	21-603059	5	292.5	297.5	1.1	19.2
2434	11/18/2009	12	21-603059	5	292.5	297.5	1	20.3
2235	9/18/2009	10	21-603059	6	372.5	377.5	0.4	18
2280	10/20/2009	11	21-603059	6	372.5	377.5	0.4	19.2
2434	11/18/2009	12	21-603059	6	372.5	377.5	0.4	21.1
2487	12/2/2009	12	21-607955	1	71.1	76.4	1.1	23.2
2487	12/3/2009	12	21-607955	2	153.8	159.7	0.8	22.5
2487	12/2/2009	12	21-607955	3	173.4	179	0.2	23.9
2487	12/2/2009	12	21-607955	4	225.9	232.1	0.5	23.2
2487	12/3/2009	12	21-607955	5	326.6	333.4	0.2	24.1
2487	12/2/2009	12	21-607955	6	353.3	359.6	0.7	23.1
2487	12/2/2009	12	21-607955	7	459.4	464.8	0.5	23.6
2487	12/2/2009	12	21-607955	8	559	565	0.4	23.3
2487	12/2/2009	12	21-607955	9	651.3	657.3	0.3	23.3
2487	12/3/2009	12	21-607955	10	797.2	803.1	0.2	23.8
2487	12/3/2009	12	21-607955	11	946.2	952.1	0.1	24.7

Table 4.0-2
Barometric Pressure, Relative Humidity, and Temperature at Los Alamos Airport during Sample Collection, September–November 2009

Sampling Round	Date/Time of Measurement	Barometric Pressure (in. Hg)	Relative Humidity (%)	Temperature (°F)
10	9/14/09 at 8:10	30.27*	59	59
	9/15/09 at 6:50	30.29	77	54
	9/15/09 at 10:10	30.33	64	63
	9/16/09 at 8:10	30.37	72	54
	9/16/09 at 10:50	30.39	59	61
	9/17/09 at 9:10	30.39	94	52
	9/18/09 at 8:10	30.38	94	50
	9/18/09 at 9:30 & 9:50	30.38	88	54
11	10/14/09 at 9:10	30.21	36	55
	10/14/09 at 14:30	30.15	28	66
	10/15/09 at 9:10	30.28	58	52
	10/16/09 at 8:30	30.38	46	48
	10/16/09 at 11:30	30.38	41	55
	10/19/09 at 10:10	30.21	59	57
	10/19/09 at 14:10	30.10	26	68
	10/20/09 at 8:30	30.01	30	54
12	11/16/09 at 9:10	30.37	47	28
	11/17/09 at 7:50	30.30	59	28
	11/17/09 at 12:10	30.25	31	45
	11/17/09 at 12:30	30.23	31	45
	11/18/09 at 8:10	30.11	52	36
	11/19/09 at 8:10	30.10	44	34
	11/19/09 at 10:50	30.12	36	43
	11/20/09 at 9:30	30.31	45	39
	11/20/09 at 14:30	30.22	28	50
	12/01/09 at 9:10	29.90	74	28
	12/02/09 at 7:30	29.88	69	28
	12/03/2009 at 8:30	29.96	93	16
	12/03/09 at 10:30	29.96	31	45

*Data obtained from http://www.srh.noaa.gov/data/obhistory/KLAM.html.

Table 5.1-1
Summary of VOCs Detected in Pore-Gas Samples at MDA T Vapor-Monitoring Well 21-25262, June–November 2009

Sample ID	Depth (ft)	Collection Date	Acetone	Benzene	Bromodichloromethane	Bromomethane	Butadiene[1,3-]	Butanol[1-]	Butanone[2-]	Carbon Disulfide	Carbon Tetrachloride	Chloroform	Cyclohexane	Dichlorobenzene[1,4-]	Dichlorodifluoromethane	Dichloroethane[1,2-]	Dichloroethene[1,1-]	Dichloroethene[cis-1,2-]	Hexane	Methanol	Methylene Chloride	Propylene	Tetrachloroethene	Tetrahydrofuran	Toluene	Trichloro-1,2,2-trifluoroethane[1,1,2-]	Trichloroethane[1,1,1-]	Trichloroethane[1,1,2-]	Trichloroethene
June 2009																													
MD21-09-10355	80–85	06/12/09	—*	—	—	—	—	—	—	3.2	57	930	—	—	4.7	—	—	—	—	—	3.8	—	1500	—	—	—	17	—	580
MD21-09-10356	115–120	06/12/09	—	—	—	—	—	—	—	—	41	330	—	—	4.5	—	—	—	—	—	5.1	—	360	—	—	—	11	—	240
MD21-09-10357	232–237	06/12/09	37	—	—	—	—	—	4.4	—	56	160	—	—	—	—	—	—	—	—	8.1	—	57	—	—	—	5.8	—	100
MD21-09-10358	295–300	06/12/09	26	—	—	—	—	—	2.8	—	170	160	—	—	—	—	5.7	—	—	—	67	—	39	—	—	10	6.3	—	280
MD21-09-10359	329.5–334.5	06/12/09	12	—	7.8	—	—	—	—	6.2	490	450	—	—	6	6	20	3.6	—	—	320	—	97	—	—	27	16	24	820
MD21-09-10360	375–380	06/12/09	24	—	7.9	—	—	—	4.1	—	410	570	—	—	—	9.4	36	—	—	—	680	—	63	—	3.9	14	8.3	55	880
MD21-09-10361	472–478	06/12/09	14	—	—	—	—	—	—	4.9	340	830	—	—	—	16	61	—	—	—	1300	—	41	—	4.5	9.3	—	110	880
MD21-09-10362	572–577	06/12/09	—	—	—	—	—	—	—	5.2	160	910	—	—	—	15	63	—	—	—	1500	—	17	—	—	—	—	66	670
MD21-09-10363	686–691	06/15/09	22	—	—	—	—	—	6	3.5	—	74	—	—	—	—	—	—	—	—	77	9.2	—	—	—	—	—	14	19
July 2009																													
MD21-09-11294	80–85	07/14/09	—	—	—	—	—	—	—	3.6	45	730	—	—	4.9	—	—	—	—	—	—	—	1300	—	—	—	12	—	450
MD21-09-11295	115–120	07/14/09	—	—	—	—	—	—	—	—	44	380	—	—	4.9	—	—	—	—	—	5.8	—	430	—	—	—	12	—	270
MD21-09-11296	232–237	07/14/09	—	—	6.3	—	—	—	—	3.2	220	520	—	—	7.4	—	6	—	—	—	30	—	240	—	—	21	21	—	390
MD21-09-11297	295–300	07/14/09	—	—	11	—	—	—	—	8.2	830	740	—	—	11	5.1	29	4.5	—	—	310	—	210	—	—	56	31	16	1300
MD21-09-11298	329.5–334.5	07/14/09	—	—	14	—	—	—	—	4.6	780	720	—	—	8.4	9.4	35	4.8	—	—	520	—	180	—	—	50	25	44	1400
MD21-09-11299	375–380	07/14/09	—	3.9	15	—	—	—	—	5.1	700	930	—	7.4	5.1	17	62	5.5	—	—	1200	—	120	3.7	—	26	14	100	1500
MD21-09-11300	472–478	07/14/09	—	—	—	—	—	36	—	19	600	1400	—	—	—	27	100	—	—	—	2100	—	74	—	—	18	—	200	1500
MD21-09-11301	572–577	07/14/09	—	—	—	—	—	—	—	—	190	1000	—	—	—	17	71	—	—	—	1700	13	23	—	—	—	—	85	780
MD21-09-11302	686–691	07/14/09	—	13	—	—	7.4	—	—	4.8	—	120	—	—	—	—	7.1	—	5.6	—	140	120	—	—	—	—	—	21	34
August 2009																													
MD21-09-11488	80–85	08/11/09	20	—	—	—	—	12(J)	—	3.9	53	880	—	—	4.5	—	—	—	—	—	3.1	—	1600	—	8.9	—	14	—	560
MD21-09-11489	115–120	08/11/09	20	—	—	—	—	—	3.6	—	38	350	—	—	—	—	—	—	—	—	4.4	—	400	—	5.9	—	10	—	240
MD21-09-11490	232–237	08/11/09	16	—	—	—	—	—	—	—	17	110	—	—	—	—	—	—	—	—	7.2	—	29	—	12	—	—	—	52
MD21-09-11491	295–300	08/13/09	13	—	8.5	—	—	—	3	11	680	600	—	—	9	—	22	—	—	—	210	—	180	—	8.8	54	24	14	1200
MD21-09-11492	329.5–334.5	08/13/09	8.9	—	9.6	—	—	—	—	12	640	590	—	—	6.5	7.1	28	4.2	—	—	400	—	160	—	4.9	50	20	40	1200
MD21-09-11493	375–380	08/11/09	37	—	—	—	—	—	3.4	4.6	190	310	—	—	—	5.6	18	—	—	—	400	—	33	—	18	8.6	—	35	470
MD21-09-11494	472–478	08/13/09	—	4.8	9.1	—	—	62(J)	4.9	14	460	1100	—	9.3	—	—	78	—	—	—	1500	—	70	—	8	16	—	170	1300
MD21-09-11495	572–577	08/14/09	—	—	—	—	—	—	—	—	260	1400	—	—	—	20	94	—	—	—	2100	—	30	—	7.6	—	—	120	1100
MD21-09-11496	686–691	08/14/09	18	—	—	—	—	—	3.9	3.6	8.6	220	—	—	—	—	17	—	—	—	260	—	—	—	—	—	—	37	70

Table 5.1-1 (continued)

Sample ID	Depth (ft)	Collection Date	Acetone	Benzene	Bromodichloromethane	Bromomethane	Butadiene[1,3-]	Butanol[1-]	Butanone[2-]	Carbon Disulfide	Carbon Tetrachloride	Chloroform	Cyclohexane	Dichlorobenzene[1,4-]	Dichlorodifluoromethane	Dichloroethane[1,2-]	Dichloroethene[1,1-]	Dichloroethene[cis-1,2-]	Hexane	Methanol	Methylene Chloride	Propylene	Tetrachloroethene	Tetrahydrofuran	Toluene	Trichloro-1,2,2-trifluoroethane[1,1,2-]	Trichloroethane[1,1,1-]	Trichloroethane[1,1,2-]	Trichloroethene
September 2009																													
MD21-09-12612	80–85	09/17/09	—	—	—	—	—	—	—	3.3	64	1000	3.4	—	4.9	—	—	—	—	—	3	—	2200	—	—	—	18	—	680
MD21-09-12613	115–120	09/17/09	22	—	—	—	—	—	—	—	46	400	—	—	4.3	—	—	—	—	—	6.3	—	510	—	18	—	13	—	290
MD21-09-12614	232–237	09/17/09	43	—	—	—	—	—	4.2	—	170	430	—	—	6.2	—	4.4	—	—	—	22	—	210	—	—	18	17	—	310
MD21-09-12615	295–300	09/17/09	27	—	6	—	—	—	6	—	390	410	—	—	6.3	—	14	—	—	—	140	—	110	—	—	28	14	10	730
MD21-09-12616	329.5–334.5	09/17/09	—	—	7	—	—	—	—	13	380	400	—	—	5	5.2	17	—	—	—	280	—	100	—	3.4	26	12	30	760
MD21-09-12617	375–380	09/17/09	28	—	8.9	—	—	—	3.6	—	410	590	—	—	—	10	38	4	—	120(J)	710	—	80	—	5	18	8.3	73	1000
MD21-09-12618	472–478	09/17/09	—	3.4	6.1	—	—	—	—	5.3	300	740	—	5.7	—	14	55	—	—	—	1100	—	46	—	4.2	9.6	—	120	840
MD21-09-12619	572–577	09/17/09	36	—	—	—	—	—	7.5	—	160	950	—	—	—	15	63	—	—	—	1600	—	20	—	—	—	—	88	720
MD21-09-12620	686–691	09/17/09	24	—	—	—	—	—	3	—	—	120	—	—	—	—	11	—	—	—	140	—	—	—	—	—	—	21	44
October 2009																													
MD21-10-32	80–85	10/19/09	13	—	—	—	—	—	—	5.4	64	1300	—	—	6.8	—	—	—	—	—	5.2	—	2800	—	—	11	17	—	890
MD21-10-33	115–120	10/19/09	31	—	—	—	—	—	4.6	—	54	620	—	—	6.1	—	—	—	—	—	9.6	—	780	—	—	9.9	15	—	460
MD21-10-34	232–237	10/19/09	37	—	7	—	—	—	3.5	4.2	280	710	—	—	9.8	—	13	—	—	—	55	—	350	—	—	44	25	—	620
MD21-10-35	295–300	10/19/09	46	—	12	—	—	—	5.9	7.3	770	790	—	—	14	4.5	39	4.6(J+)	—	—	350	—	230	—	—	88	28	18	1600
MD21-10-36	329.5–334.5	10/19/09	76	3.1	14	—	—	—	7.2	3.5	760	770	—	—	10	9	44	5.5(J+)	—	—	660	—	190	—	5.2	76	22	54	1600
MD21-10-37	375–380	10/19/09	45	—	15	—	—	—	—	—	600	890	—	—	—	16	75	—	—	—	1300	—	120	—	6.9	42	12	120	1700
MD21-10-38	472–478	10/19/09	23	6.7	13	—	—	—	—	6.9	510	1400	—	11	—	27	130	—	—	—	2400	—	84	—	7.4	27	—	240	1700
MD21-10-39	572–577	10/19/09	—	—	—	—	—	—	—	—	230	1200	—	13	—	21	65(J)	—	—	—	1800(J-)	—	32	—	—	—	—	130	1000
MD21-10-40	686–691	10/19/09	31	—	—	6.7	—	—	6.4	—	16	290	—	—	—	—	20(J)	—	—	—	190(J-)	—	—	—	—	—	—	43	98

Table 5.1-1 (continued)

Sample ID	Depth (ft)	Collection Date	Acetone	Benzene	Bromodichloromethane	Bromomethane	Butadiene[1,3-]	Butanol[1-]	Butanone[2-]	Carbon Disulfide	Carbon Tetrachloride	Chloroform	Cyclohexane	Dichlorobenzene[1,4-]	Dichlorodifluoromethane	Dichloroethane[1,2-]	Dichloroethene[1,1-]	Dichloroethene[cis-1,2-]	Hexane	Methanol	Methylene Chloride	Propylene	Tetrachloroethene	Tetrahydrofuran	Toluene	Trichloro-1,2,2-trifluoroethane[1,1,2-]	Trichloroethane[1,1,1-]	Trichloroethane[1,1,2-]	Trichloroethene
November 2009																													
MD21-10-5007	80–85	11/17/09	—	—	—	—	—	—	—	—	61	1100	3.2(J)	—	5.5	—	—	—	5.5	—	—	—	2200	—	4.6	—	17	—	600
MD21-10-5008	115–120	11/17/09	—	—	—	—	—	—	—	—	48	470	—	—	5	—	—	—	—	—	7.2	—	510	—	—	—	14	—	290
MD21-10-5009	232–237	11/17/09	—	—	—	—	—	—	—	—	140	380	—	—	5.7	—	4.5	—	—	—	24	—	170	—	—	14(J-)	14	—	270
MD21-10-5010	295–300	11/17/09	—	—	—	—	—	—	—	—	320	360	—	—	5.8	—	12	—	—	—	110	—	92	—	—	21(J-)	12	—	590
MD21-10-5011	329.5–334.5	11/17/09	9.7	—	8.2	—	—	—	—	—	410	430	—	—	6.3	5.6	19	—	—	—	320	—	100	—	3.3	26(J-)	12	31	760
MD21-10-5012	375–380	11/17/09	9.2	—	7.4	—	—	—	—	—	310	490	—	—	—	7.9	32	—	—	—	630	—	55	—	3.7	13(J-)	6.2	55	740
MD21-10-5013	472–478	11/17/09	—	—	—	—	—	—	—	9.7	360	960	—	—	—	16	73	—	—	—	1600	—	51	—	—	—	—	140	1000
MD21-10-5014	572–577	11/17/09	—	—	—	—	—	—	—	—	100	740	—	—	—	12	48	—	—	—	1400	—	13	—	—	—	—	66	500
MD21-10-5015	686–691	11/17/09	25	—	—	—	—	—	3.8	—	6.4	120	—	—	—	—	10	—	—	—	160	—	—	—	—	—	—	20	43

Notes: Results are in µg/m^3. See Appendix A for data qualifier definitions.

* — = Not detected.

Table 5.1-2
Summary of VOCs Detected in Pore-Gas Samples at MDA T Vapor-Monitoring Well 21-25264, February–November 2009

Sample ID	Depth (ft)	Collection Date	Acetone	Benzene	Bromodichloromethane	Butanone[2-]	Carbon Disulfide	Carbon Tetrachloride	Chloroform	Cyclohexane	Dichlorobenzene[1,4-]	Dichlorodifluoromethane	Dichloroethane[1,2-]	Dichloroethene[1,1-]	Ethanol	Methylene Chloride	Propylene	Tetrachloroethene	Toluene	Trichloro-1,2,2-trifluoroethane[1,1,2-]	Trichloroethane[1,1,1-]	Trichloroethane[1,1,2-]	Trichloroethene
February 2009																							
MD21-09-3564	67.5–72.5	2/4/09	—*	—	—	—	—	170	500	—	—	15	—	—	—	20	—	2900	—	—	31	—	1200
MD21-09-3563	150.5–155.5	2/4/09	14	2.8	—	4.3	—	200	450	5.8	—	13	3.8	—	—	240	9.4	520	—	8	29	—	620
MD21-09-3560	222.5–227.5	2/3/09	23	—	7.7	3.5	—	370	580	7.6	—	11	12	6.7	—	810	16	240	—	12	28	5	760
MD21-09-3561	323–328	2/3/09	—	—	—	—	—	500	840	—	—	9.2	22	11	—	1800	22	90	—	16	12	—	850
MD21-09-3562	349.5–354.5	2/3/09	—	—	—	—	—	390	950	—	—	—	25	13	—	2000	19	30	—	—	—	—	740
April 2009																							
MD21-09-7164	67.5–72.5	4/16/09	—	—	—	—	—	150	490	—	—	19	—	—	—	21	—	3500	—	—	24	—	1200
MD21-09-7166	150.5–155.5	4/17/09	—	—	—	—	—	170	430	6.1	—	11	—	8.5	—	190	—	480	—	7.8	19	—	580
MD21-09-7168	222.5–227.5	4/17/09	—	—	6.8	—	—	320	570	7.3	—	9	10	11	—	690	—	230	—	13	18	—	710
MD21-09-7167	323–328	4/17/09	—	—	—	—	—	410	760	—	—	—	18	12	—	1500	—	78	—	14	—	—	810
MD21-09-7165	349.5–354.5	4/16/09	22	—	—	6.4	—	410	1000	—	11	—	28	14	—	2200	—	39	—	—	—	—	880
June 2009																							
MD21-09-10344	67.5–72.5	6/17/09	11	—	—	—	—	77	230	—	—	8.4	—	—	—	9.5	—	1500	—	—	15	—	590
MD21-09-10345	150.5–155.5	6/17/09	10	—	—	—	—	95	230	—	—	7.1	—	—	—	110	—	270	7.3	—	15	—	320
MD21-09-10346	222.5–227.5	6/17/09	10	—	—	—	—	140	250	—	—	5.9	5.4	—	—	350	—	94	8	—	11	—	310
MD21-09-10347	323–328	6/17/09	12	—	—	—	—	140	260	—	—	4.4	6.6	—	—	540	—	23	6.8	—	—	—	260
MD21-09-10348	349.5–354.5	6/17/09	34	—	—	5	—	130	330	—	—	—	9.6	4.4	—	740	—	10	5.9	—	—	—	270
July 2009																							
MD21-09-11283	67.5–72.5	7/17/09	—	—	—	—	—	180	500	—	—	17	—	—	—	18	—	3600	—	—	32	—	1300
MD21-09-11284	150.5–155.5	7/17/09	—	—	—	—	—	210	470	—	—	14	3.9	—	—	210	—	570	—	8.3	30	—	650
MD21-09-11285	222.5–227.5	7/17/09	—	—	—	—	—	230	420	—	—	8.6	9.1	3.8	—	570	—	160	—	—	17	—	510
MD21-09-11286	323–328	7/17/09	—	—	—	9.6	—	310	570	—	5.2(J)	7.1	16	7.8	—	1100	—	50	—	8.3	7.1	—	570
MD21-09-11287	349.5–354.5	7/17/09	—	—	—	—	—	180	460	—	—	—	17	6.1	—	1000	—	18	—	—	—	—	370
August 2009																							
MD21-09-11477	67.5–72.5	8/19/09	—	11	—	—	8.2	140	380	—	—	12	—	—	—	14	—	3400	16	—	24	—	1000
MD21-09-11478	150.5–155.5	8/19/09	45	—	—	5.4	—	160	370	4.8	—	9.9	—	—	—	150	—	500	—	8.2	23	—	540
MD21-09-11479	222.5–227.5	8/19/09	—	—	5.9	—	4.3	340	510	6.3	—	9.2	10	5.7	—	630	—	230	—	12	23	—	690

Table 5.1-2 (continued)

Sample ID	Depth (ft)	Collection Date	Acetone	Benzene	Bromodichloromethane	Butanone[2-]	Carbon Disulfide	Carbon Tetrachloride	Chloroform	Cyclohexane	Dichlorobenzene[1,4-]	Dichlorodifluoromethane	Dichloroethane[1,2-]	Dichloroethene[1,1-]	Ethanol	Methylene Chloride	Propylene	Tetrachloroethene	Toluene	Trichloro-1,2,2-trifluoroethane[1,1,2-]	Trichloroethane[1,1,1-]	Trichloroethane[1,1,2-]	Trichloroethene
MD21-09-11480	323–328	8/19/09	—	—	—	—	—	460	730	—	—	—	18	8.7	—	1300	—	76	—	15	10	—	800
MD21-09-11481	349.5–354.5	8/19/09	—	—	—	—	—	430	950	—	—	—	26	13	—	1900	—	36	—	—	—	—	840
September 2009																							
MD21-09-12605	67.5–72.5	9/16/09	—	—	—	4.3	41	100	310	—	—	11	—	—	—	11	—	2600	—	—	19	—	840
MD21-09-12606	150.5–155.5	9/16/09	12	—	—	2.9	—	140	330	4.3	—	8.6	—	—	—	140	—	460	—	7.4	22	—	500
MD21-09-12607	222.5–227.5	9/16/09	17	—	—	2.9	—	210	360	3.9	—	6.8	7.7	3.9	—	480	—	160	—	8.2	16	—	480
MD21-09-12608	323–328	9/16/09	10	—	—	—	—	230	420	—	—	5.1	11	5.6	—	800	—	42	—	7.9	5.7	—	440
MD21-09-12609	349.5–354.5	9/16/09	—	—	—	—	—	200	520	—	—	—	16	7.2	—	1100	—	19	—	—	—	—	440
October 2009																							
MD21-10-25	67.5–72.5	10/16/09	9	—	—	—	—	87	320	—	—	9.3	—	—	—	16	—	2400	—	8.1	16	—	910
MD21-10-26	150.5–155.5	10/16/09	57	—	—	5	—	140	390	4.4	—	11	—	5.1	—	210	—	500	—	10	21	—	600
MD21-10-27	222.5–227.5	10/16/09	48	—	—	5.3	—	130	320	—	—	5.8	7.2	4.3	21	560	—	110	—	—	9.9	—	380
MD21-10-28	323–328	10/16/09	12	—	—	—	—	110	280	—	—	—	8.2	4.6	25	720	—	22	—	—	—	—	290
MD21-10-29	349.5–354.5	10/16/09	11	—	—	—	—	73	280	—	—	—	11	4.2	23	860	—	9.1	—	—	—	—	240
November 2009																							
MD21-10-5002	67.5–72.5	11/19/09	—	—	—	—	—	120	350	—	—	12	—	—	—	13	—	3000	—	—	21	—	900
MD21-10-5003	150.5–155.5	11/19/09	12	—	—	—	—	150	370	4.2	—	11	—	—	—	160	—	460	—	—	21	—	480
MD21-10-5004	222.5–227.5	11/19/09	15	—	—	3.5	—	310	520	5.1	—	11	9.5	5.6	—	700	—	200	—	12	22	5.6	650
MD21-10-5005	323–328	11/19/09	17	—	—	—	—	400	750	—	—	8.3	17	10	—	1500	—	65	—	13	9.4	—	750
MD21-10-5006	349.5–354.5	11/19/09	—	—	—	—	—	370	950	—	—	—	24	13	—	2200	—	32	—	—	—	—	770

Notes: Results are in µg/m^3. See Appendix A for data qualifier definitions.

* — = Not detected.

Table 5.1-3
Summary of VOCs Detected in Pore-Gas Samples at MDA T Vapor-Monitoring Well 21-603058, February–November 2009

Sample ID	Depth (ft)	Collection Date	Acetone	Benzene	Bromodichloromethane	Butanone[2-]	Carbon Disulfide	Carbon Tetrachloride	Chloroform	Dichlorobenzene[1,2-]	Dichlorobenzene[1,4-]	Dichlorodifluoromethane	Dichloroethane[1,2-]	Dichloroethene[1,1-]	Dichloroethene[cis-1,2-]	Ethanol	Methylene Chloride	Propylene	Tetrachloroethene	Toluene	Trichloro-1,2,2-trifluoroethane[1,1,2-]	Trichloroethane[1,1,1-]	Trichloroethane[1,1,2-]	Trichloroethene
February 2009																								
MD21-09-3553	67.5–72.5	2/5/09	—*	—	—	—	—	80	590	—	—	6	—	—	—	—	6.6	—	790	—	7.9	24	—	370
MD21-09-3554	217–222	2/5/09	—	—	6.2	—	—	480	890	—	6.1	8.5	7.7	13	—	14	540	—	300	—	29	42	17	1000
MD21-09-3555	242.5–247.5	2/5/09	—	—	—	—	—	740	1300	—	14	—	22	19	—	46	1500	—	200	—	37	41	45	1400
MD21-09-3556	339.5–344.5	2/5/09	—	—	—	—	—	750	1500	—	25	—	33	22	—	43	2400	—	96	—	33	17	42	1400
April 2009																								
MD21-09-7159	67.5–72.5	4/14/09	—	—	—	—	—	74	630	—	—	7	—	5.6	—	—	5.6	—	810	—	7.5	17	—	350
MD21-09-7160	217–222	4/14/09	—	—	—	—	—	500	1100	—	5.8	11	6.9	21	—	—	470	—	310	—	32	32	17	1000
MD21-09-7162	242.5–247.5	4/15/09	—	—	—	—	—	520	950	—	12	—	15	18	—	—	1100	—	140	—	31	25	35	1000
MD21-09-7161	339.5–344.5	4/15/09	—	—	—	—	—	660	1400	—	20	—	23	21	—	—	2100	—	74	—	36	13	23	1300
June 2009																								
MD21-09-10339	67.5–72.5	6/18/09	—	—	—	—	—	58	430	—	—	5	—	—	—	—	4.2	—	570	—	—	17	—	270
MD21-09-10341	217–222	6/18/09	—	—	—	—	—	210	400	—	—	5.3	—	5.2	—	—	230	—	120	—	12	19	6.8	440
MD21-09-10342	242.5–247.5	6/18/09	—	—	—	—	—	470	810	—	8.6	6.7	14	12	3.6	—	960	—	130	—	22	26	29	950
MD21-09-10343	339.5–344.5	6/18/09	—	—	—	5.8	—	390	830	—	14	—	18	14	—	—	1600	—	57	—	23	—	23	810
July 2009																								
MD21-09-11278	67.5–72.5	7/16/09	29	—	—	4.8	—	68	520	—	—	5.8	—	—	—	—	5.6	—	740	14	—	20	—	330
MD21-09-11280	217–222	7/16/09	—	3.1	—	—	—	310	670	—	—	6.7	7.8	8	—	—	420	—	210	3.7	17	27	14	720
MD21-09-11281	242.5–247.5	7/16/09	15	—	—	5.4	29	200	460	83	16	5.2	8.9	6.2	—	—	620	—	68	4.8	9.5	12	17	1200
MD21-09-11282	339.5–344.5	7/16/09	22	—	—	—	—	350	730	—	8.9	5	17	11	—	—	1300	—	44	—	16	7.7	18	700
August 2009																								
MD21-09-11472	67.5–72.5	8/18/09	—	—	—	—	—	58	440	—	—	4.9	—	—	—	—	3.6	—	710	6.7	—	17	—	290
MD21-09-11473	217–222	8/18/09	16	—	—	—	—	340	670	—	—	6.6	5.3	8.5	—	—	380	—	250	—	24	30	13	770
MD21-09-11474	242.5–247.5	8/18/09	—	3.2	—	—	3.4	560	950	—	13	7.8	16	15	6	—	1100	—	180	—	34	29	40	1200
MD21-09-11475	339.5–344.5	8/18/09	—	—	—	—	—	560	1100	—	19	—	25	17	—	—	1800	—	85	—	29	12	33	1200

Table 5.1-3 (continued)

Sample ID	Depth (ft)	Collection Date	Acetone	Benzene	Bromodichloromethane	Butanone[2-]	Carbon Disulfide	Carbon Tetrachloride	Chloroform	Dichlorobenzene[1,2-]	Dichlorobenzene[1,4-]	Dichlorodifluoromethane	Dichloroethane[1,2-]	Dichloroethene[1,1-]	Dichloroethene[cis-1,2-]	Ethanol	Methylene Chloride	Propylene	Tetrachloroethene	Toluene	Trichloro-1,2,2-trifluoroethane[1,1,2-]	Trichloroethane[1,1,1-]	Trichloroethane[1,1,2-]	Trichloroethene
September 2009																								
MD21-09-12598	67.5–72.5	9/15/09	—	—	—	—	—	48	390	—	—	4.4	—	—	—	—	4	—	570	—	—	15	—	240
MD21-09-12600	217–222	9/15/09	—	—	—	—	—	400	800	—	—	7.4	6.1	9.4	—	—	460	—	280	—	26	33	16	880
MD21-09-12601	242.5–247.5	9/15/09	15	2.8	—	3.9	—	530	960	—	9.7	7.1	16	14	5.4	—	1100	—	160	—	31	29	39	1100
MD21-09-12602	339.5–344.5	9/15/09	—	—	—	—	7.9	670	1300	—	20	—	29	19	—	—	2200	—	94	—	35	16	38	1300
October 2009																								
MD21-10-18	67.5–72.5	10/14/09	93	—	—	14	—	68	600	—	—	6.1	—	—	—	—	6.5	—	980	—	11	20	—	400
MD21-10-20	217–222	10/14/09	20	—	—	—	—	400	900	—	—	8.1	7.3	17	—	—	610	13	330	—	39	34	20	1100
MD21-10-21	242.5–247.5	10/14/09	43	—	—	6	—	480	1000	—	11	7.6	17	21	6(J+)	—	1400	23	180	—	43	26	45	1300
MD21-10-22	339.5–344.5	10/14/09	32	—	—	—	—	460	1000	—	—	—	25	20	—	—	2200	—	79	—	37	—	32	1100
November 2009																								
MD21-10-4997	67.5–72.5	11/20/09	—	—	—	—	—	56	440	—	—	5.1	—	—	—	—	5.4	—	640	—	—	16	—	260
MD21-10-4998	217–222	11/20/09	13	—	—	—	—	200	500	—	—	4.8	4.1	5.4	—	—	310	—	160	—	12	18	10	520
MD21-10-4999	242.5–247.5	11/20/09	—	—	—	—	4.3	160	400	—	—	—	6.5	5.4	—	—	550	—	56	—	8.5	8.8	17	400
MD21-10-5000	339.5–344.5	11/20/09	—	—	—	—	—	340	750	—	—	—	14	11	—	58(J)	1400	—	44	—	17	—	18	690

Notes: Results are in µg/m^3. See Appendix A for data qualifier definitions.

* — = Not detected.

Table 5.1-4
Summary of VOCs Detected in Pore-Gas Samples at MDA T Vapor-Monitoring Well 21-603059, February–November 2009

Sample ID	Depth (ft)	Collection Date	Acetone	Benzene	Bromodichloromethane	Butanol[1-]	Butanone[2-]	Carbon Disulfide	Carbon Tetrachloride	Chloroform	Cyclohexane	Dichlorobenzene[1,4-]	Dichlorodifluoromethane	Dichloroethane[1,2-]	Dichloroethene[1,1-]	Dichloroethene[cis-1,2-]	Ethanol	Hexane	Methanol	Methylene Chloride
February 2009																				
MD21-09-3546	77.5–82.5	2/8/09	—*	—	6.4	—	—	—	73	1100	—	—	6.4	—	—	—	—	—	—	4
MD21-09-3545	187.5–192.5	2/6/09	—	—	8.7	—	4.1	6.8	170	700	—	—	7.8	—	7.2	—	—	—	—	29
MD21-09-3547	229.5–234.5	2/8/09	9	—	8.6	—	—	—	440	770	3.1(J)	—	10	—	19	—	—	—	—	80
MD21-09-3549	292.5–297.5	2/6/09	—	—	11	—	—	—	750	740	—	—	11	6.1	30	—	13	—	—	360
MD21-09-3550	372.5–377.5	2/6/09	—	4.1	14	—	—	—	670	900	—	7.8	5.3	19	65	4.1	54	—	—	1100
April 2009																				
MD21-09-7155	77.5–82.5	4/13/09	—	—	—	—	—	—	—	560	—	—	—	—	—	—	—	—	—	—
MD21-09-7154	187.5–192.5	4/10/09	—	—	—	—	—	—	120	620	—	—	—	—	—	—	—	—	—	—
MD21-09-7157	229.5–234.5	4/13/09	—	—	—	—	—	—	130	400	—	—	—	—	—	—	—	—	—	—
MD21-09-7163	229.5–234.5	4/20/09	37	—	7.6	—	10	—	320	710	—	—	8.3	—	19	—	—	—	—	58
MD21-09-7153	292.5–297.5	4/10/09	—	—	—	—	—	—	480	610	—	—	—	—	—	—	—	—	—	280
MD21-09-7156	372.5–377.5	4/13/09	—	—	—	—	—	—	—	94	—	—	—	—	—	—	—	—	—	160
June 2009																				
MD21-09-10333	77.5–82.5	6/16/09	—	—	—	—	—	—	50	850	—	—	5.1	—	—	—	—	—	—	—
MD21-09-10334	187.5–192.5	6/16/09	—	—	—	—	—	3.3	110	480	—	—	6.1	—	4.3	—	—	—	—	19
MD21-09-10335	229.5–234.5	6/16/09	—	—	—	—	2.7	—	220	440	—	—	6.2	—	8.8	—	—	—	—	29
MD21-09-10336	292.5–297.5	6/16/09	—	—	—	—	—	—	440	450	—	—	7.1	—	17	—	—	—	—	200
MD21-09-10337	372.5–377.5	6/16/09	—	—	7.6	—	2.6	—	400	520	—	—	—	11	35	—	—	—	—	610
July 2009																				
MD21-09-11272	77.5–82.5	7/15/09	44	—	6.2	12	5.4	—	64	1100	—	—	5.9	—	—	—	—	—	—	4
MD21-09-11273	187.5–192.5	7/15/09	43	—	6.2	—	5.4	—	120	530	—	—	7	—	5.5	—	—	5.5	—	24
MD21-09-11274	229.5–234.5	7/15/09	13	—	—	—	—	—	210	480	—	—	6.8	—	8.4	—	—	—	—	37
MD21-09-11275	292.5–297.5	7/15/09	15	—	11	—	—	4.2	690	690	—	—	11	5.3	26	7	—	—	—	320
MD21-09-11276	372.5–377.5	7/15/09	12	—	10	—	—	4.6	380	600	—	6	—	13	35	—	—	—	—	760

Table 5.1-4 (continued)

Sample ID	Depth (ft)	Collection Date	Acetone	Benzene	Bromodichloromethane	Butanol[1-]	Butanone[2-]	Carbon Disulfide	Carbon Tetrachloride	Chloroform	Cyclohexane	Dichlorobenzene[1,4-]	Dichlorodifluoromethane	Dichloroethane[1,2-]	Dichloroethene[1,1-]	Dichloroethene[cis-1,2-]	Ethanol	Hexane	Methanol	Methylene Chloride
August 2009																				
MD21-09-11469	77.5–82.5	8/14/09	22	—	—	—	4.6	18	61	1000	—	—	5.1	—	—	—	—	—	—	—
MD21-09-11470	187.5–192.5	8/14/09	8.7	—	6.8	—	3.1	38	140	580	—	—	7	—	5.6	—	—	—	—	24
MD21-09-11471	229.5–234.5	8/14/09	28	—	—	—	5	—	170	320	4.1	30	5.2	—	6.4	—	—	—	—	42
MD21-09-11468	292.5–297.5	8/14/09	51	—	9.1	—	9	—	640	630	—	—	9.3	4.6	22	—	—	—	—	280
MD21-09-11467	372.5–377.5	8/14/09	40	3.1	11	—	7.2	—	530	700	—	7	—	13	48	4.4	—	—	—	800
September 2009																				
MD21-09-12623	77.5–82.5	9/18/09	12	—	—	—	—	—	59	1000	—	—	—	—	—	—	—	—	—	—
MD21-09-12624	187.5–192.5	9/18/09	11	—	6	—	—	26	140	580	—	—	6.4	—	5.6	—	—	—	—	24
MD21-09-12625	229.5–234.5	9/18/09	—	—	6.9	—	—	—	340	660	—	—	8.3	—	13	—	—	—	—	47
MD21-09-12626	292.5–297.5	9/18/09	10	—	9.2	—	—	—	670	670	—	—	11	5.2	31	—	—	—	—	300
MD21-09-12627	372.5–377.5	9/18/09	19	2.8	11	—	—	—	520	700	—	5.8	—	14	54	4.5	—	—	140(J)	720
October 2009																				
MD21-10-10	77.5–82.5	10/20/09	—	—	—	—	3.5	—	58	1000	—	—	5.2	—	—	—	—	—	NA	—
MD21-10-11	187.5–192.5	10/20/09	—	—	6.4	—	4.5	—	130	580	—	—	6.2	—	4.6(J)	—	—	—	NA	—
MD21-10-12	229.5–234.5	10/20/09	—	—	7.1	—	—	—	390	700	—	—	8.8	—	12(J)	—	—	—	NA	54(J-)
MD21-10-13	292.5–297.5	10/20/09	—	—	8.8	—	—	—	580	630	—	—	9	4.2	17(J)	3.8	—	—	NA	140(J-)
MD21-10-14	372.5–377.5	10/20/09	—	2.8(J)	11	—	2.6	—	480	670	—	8.2	—	12	33(J)	3.9	—	—	NA	730(J-)
November 2009																				
MD21-10-4991	77.5–82.5	11/18/09	20	—	—	—	3.3	—	52	1000	—	—	5.4	—	—	—	—	—	NA	3.3(J-)
MD21-10-4993	187.5–192.5	11/18/09	—	—	6.1	—	—	—	120	560	—	—	6.4	—	5.4(J-)	—	—	—	NA	24(J-)
MD21-10-4994	229.5–234.5	11/18/09	13	—	6.9	—	3.3	—	290	640	—	—	8.4	—	13(J-)	—	—	—	NA	40(J-)
MD21-10-4995	292.5–297.5	11/18/09	—	—	7.8	—	—	—	560	610	—	—	9.4	4	23(J-)	—	—	—	NA	270(J-)
MD21-10-4996	372.5–377.5	11/18/09	—	2.7	10	—	—	—	500	700	—	7	4.4	12	51(J-)	4.2	—	—	NA	880(J-)

Notes: Results are in $\mu g/m^3$. See Appendix A for data qualifier definitions.

* — = Not detected.

Table 5.1-5
Summary of VOCs Detected in Pore-Gas Samples at MDA T Vapor-Monitoring Well 21-607955, December 2009

Sample ID	Depth (ft)	Collection Date	Acetone	Benzene	Bromodichloromethane	Butanone[2-]	Carbon Disulfide	Carbon Tetrachloride	Chloroform	Cyclohexane	Dichlorodifluoromethane	Dichloroethane[1,2-]	Dichloroethene[1,1-]	Hexane	Methylene Chloride	Propylene	Tetrachloroethene	Toluene	Trichloro-1,2,2-trifluoroethane[1,1,2-]	Trichloroethane[1,1,1-]	Trichloroethane[1,1,2-]	Trichloroethene
MD21-10-7567	71.1–76.4	12/2/09	—*	—	—	—	9.4	89	680	—	—	—	—	—	66	—	2000	29	—	16	—	430
MD21-10-7568	153.8–159.7	12/3/09	—	—	—	—	4.6	190	560	—	8	4.4	—	—	290	—	390	22	9.8	18	6.3	490
MD21-10-7569	173.4–179	12/2/09	31	—	—	—	—	—	19	—	—	—	—	—	25	—	—	—	—	—	—	20
MD21-10-7570	225.9–232.1	12/2/09	100	3	5.5	2.6	20	340	680	3.6	7.4	11	8	2.9	880	—	220	90	16	17	16	710
MD21-10-7571	326.6–333.4	12/3/09	—	—	—	—	4.5	130	350	—	4.6	7.5	4	—	660	—	110	9.4	—	9.4	6.6	290
MD21-10-7572	353.3–359.6	12/2/09	16	—	—	—	5.6	360	1000	—	—	21	15	—	2100	—	29	83	13	—	15	760
MD21-10-7573	459.4–464.8	12/2/09	—	—	—	—	—	26	91	—	—	—	—	—	180	—	—	12	—	—	—	57
MD21-10-7574	559–565	12/2/09	8.9	3.4	—	—	4.5	100	540	—	—	—	24	5.2	710	—	—	100	—	—	—	320
MD21-10-7575	651.3–657.3	12/2/09	—	—	—	—	6.1	—	29	—	—	—	3.8	3.9	17	—	—	100	—	—	—	18
MD21-10-7576	797.2–803.1	12/3/09	—	—	—	—	3.3	—	—	—	—	—	—	—	—	8.6	—	11	—	—	—	—
MD21-10-7577	946.2–952.1	12/3/09	30,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	690	—	—	—	—

Note: Results are in µg/m^3.
* — = Not detected.

Table 5.2-1
Screening of VOCs Detected in Pore Gas at MDA T, September–November 2009

VOC	Maximum Pore Gas Concentration (µg/m³)	Groundwater SL (µg/L)	Calculated Concentrations in Pore Gas Corresponding to Groundwater Standard (µg/m³)	SV (unitless)
Acetone	30,000	22,000[a]	35,200	8.52E-01
Benzene	6.7	5[b]	1140	5.88E-03
Bromodichloromethane	15	1.2[a]	104	1.44E-01
Bromomethane	6.7	8.7[a]	2227	3.01E-03
2-Butanone	14	7100[a]	16,330	8.57E-04
Carbon Disulfide	41	1000[a]	590,000	6.95E-05
Carbon Tetrachloride	770	5[b]	5500	1.40E-01
Chloroform	1400	100[c]	15,000	9.33E-02
Cyclohexane	5.1	13,000[a]	79,300,000	6.43E-08
1,4-Dichlorobenzene	20	75[b]	7470	2.68E-03
Dichlorodifluoromethane	14	390[a]	5,460,000	2.56E-06
1,2-Dichloroethane	29	5[b]	240	1.21E-01
1,1-Dichloroethene	130	5[c]	5500	2.36E-02
cis-1,2-Dichloroethane	5.4	70[b]	11,900	4.54E-04
Hexane	5.5	880[a]	65,120,000	8.45E-08
Methylene chloride	2400	5[b]	650	**3.69E00**
Tetrachloroethene	3,000	5[b]	3600	8.33E-01
Toluene	690	750[c]	204,000	3.38E-03
1,1,2-Trichloro-1,2,2-trifluoroethane	88	59,000[a]	1,298,000,000	6.78E-08
1,1,1-Trichloroethane	34	60[c]	42,300	8.04E-04
1,1,2-Trichloroethane	240	5[b]	170	**1.41E00**
Trichloroethene	1700	5[b]	2000	8.50E-01

Note: Calculated concentrations in pore gas corresponding to groundwater standard derived from denominator of Equation 3.0-3.
[a] EPA regional tap water screening levels (http://www.epa.gov/region06/6pd/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).

Table 5.3-1
Summary of Detected Tritium Results in Pore-Gas Samples at MDA T Vapor-Monitoring Well 21-25262, June–November 2009

Sample ID	Depth (ft)	Collection Date	Tritium*
June 2009			
MD21-09-10357	232–237	6/12/09	19570.9
MD21-09-10358	295–300	6/12/09	901.051
MD21-09-10359	329.5–334.5	6/12/09	3062.27
MD21-09-10360	375–380	6/12/09	13958.3
July 2009			
MD21-09-11294	80–85	7/14/09	1041.73
MD21-09-11295	115–120	7/14/09	441.102
MD21-09-11296	232–237	7/14/09	556.992
MD21-09-11297	295–300	7/14/09	3199.46
MD21-09-11298	329.5–334.5	7/14/09	6803.85
MD21-09-11299	375–380	7/14/09	37413.2
MD21-09-11301	572–577	7/14/09	321.425
MD21-09-11302	686–691	7/14/09	420.838
August 2009			
MD21-09-11488	80–85	8/11/09	1129.79
MD21-09-11489	115–120	8/11/09	516.154
MD21-09-11490	232–237	8/11/09	930.317
MD21-09-11491	295–300	8/13/09	3885.76
MD21-09-11493	375–380	8/11/09	40119.3
MD21-09-11492	329.5–334.5	8/13/09	5167.16
MD21-09-11494	472–478	8/13/09	1401.18
MD21-09-11495	572–577	8/14/09	33963.9
MD21-09-11496	686–691	8/14/09	721.544
September 2009			
MD21-09-12612	80–85	9/17/09	950.746
MD21-09-12613	115–120	9/17/09	1566.48
MD21-09-12614	232–237	9/17/09	638.959
MD21-09-12615	295–300	9/17/09	3571.87
MD21-09-12616	329.5–334.5	9/17/09	6374.78
MD21-09-12617	375–380	9/17/09	58756.5
MD21-09-12618	472–478	9/17/09	397.554
October 2009			
MD21-10-35	295–300	10/19/09	5711.58 (J)
MD21-10-36	329.5–334.5	10/19/09	7315.18 (J)
MD21-10-37	375–380	10/19/09	73332.4

Table 5.3-1 (continued)

Sample ID	Depth (ft)	Collection Date	Tritium*
November 2009			
MD21-10-5010	295–300	11/17/09	3194.14
MD21-10-5011	329.5–334.5	11/17/09	4274.57
MD21-10-5012	375–380	11/17/09	32455

*Units are in pCi/L.

Table 5.3-2
Summary of Detected Tritium Results in Pore-Gas Samples at MDA T Vapor-Monitoring Well 21-25264, February–November 2009

Sample ID	Depth (ft)	Collection Date	Tritium*
February 2009			
MD21-09-3564	67.5–72.5	02/04/09	6608.33
MD21-09-3563	150.5–155.5	02/04/09	88523.8
MD21-09-3560	222.5–227.5	02/03/09	91886.9
MD21-09-3561	323–328	02/03/09	3613.93
MD21-09-3562	349.5–354.5	02/03/09	2228.43
April 2009			
MD21-09-7164	67.5–72.5	04/16/09	5647
MD21-09-7166	150.5–155.5	04/17/09	120741
MD21-09-7168	222.5–227.5	04/17/09	80587.5
MD21-09-7167	323–328	04/17/09	1421.08
MD21-09-7165	349.5–354.5	04/16/09	1557.89
June 2009			
MD21-09-10344	67.5–72.5	06/17/09	142818
MD21-09-10345	150.5–155.5	06/17/09	133254
MD21-09-10346	222.5–227.5	06/17/09	2093.28
MD21-09-10347	323–328	06/17/09	3952.86
MD21-09-10348	349.5–354.5	06/17/09	2873.74
July 2009			
MD21-09-11283	67.5–72.5	07/17/09	10560.3
MD21-09-11284	150.5–155.5	07/17/09	173113
MD21-09-11285	222.5–227.5	07/17/09	123530
MD21-09-11286	323–328	07/17/09	2323.85
MD21-09-11287	349.5–354.5	07/17/09	7802.76

Table 5.3-2 (continued)

Sample ID	Depth (ft)	Collection Date	Tritium*
August 2009			
MD21-09-11477	67.5–72.5	08/19/09	12.3201
MD21-09-11478	150.5–155.5	08/19/09	198.29
MD21-09-11479	222.5–227.5	08/19/09	143.559
MD21-09-11480	323–328	08/19/09	2.95949
MD21-09-11481	349.5–354.5	08/19/09	3.10597
September 2009			
MD21-09-12605	67.5–72.5	09/16/09	8471.59
MD21-09-12606	150.5–155.5	09/16/09	128286
MD21-09-12607	222.5–227.5	09/16/09	98443.1
MD21-09-12608	323–328	09/16/09	1847.38
MD21-09-12609	349.5–354.5	09/16/09	2511.64
MD21-09-12605	67.5–72.5	09/16/09	8471.59
October 2009			
MD21-10-25	67.5–72.5	10/16/09	7391.34 (J)
MD21-10-26	150.5–155.5	10/16/09	127242
MD21-10-27	222.5–227.5	10/16/09	88576.4
MD21-10-29	349.5–354.5	10/16/09	2091.07 (J)
November 2009			
MD21-10-5002	67.5–72.5	11/19/09	6934.95
MD21-10-5003	150.5–155.5	11/19/09	129340
MD21-10-5004	222.5–227.5	11/19/09	87464.5
MD21-10-5005	323–328	11/19/09	2339.12
MD21-10-5006	349.5–354.5	11/19/09	2621.98

Note: See Appendix A for data qualifier definitions.

* Units are in pCi/L.

Table 5.3-3
Summary of Detected Tritium Results in Pore-Gas Samples at MDA T Vapor-Monitoring Well 21-603058, February–November 2009

Sample ID	Depth (ft)	Collection Date	Tritium*
February 2009			
MD21-09-3553	67.5–72.5	2/5/09	3346.86
MD21-09-3554	217–222	2/5/09	6339.59
MD21-09-3555	242.5–247.5	2/5/09	2155.65
MD21-09-3556	339.5–344.5	2/5/09	581.996
April 2009			
MD21-09-7159	67.5–72.5	4/14/09	812.322
MD21-09-7160	217–222	4/14/09	390.326
MD21-09-7162	242.5–247.5	4/15/09	1172.45
MD21-09-7161	339.5–344.5	4/15/09	997.037
June 2009			
MD21-09-10339	67.5–72.5	6/18/09	545.965
MD21-09-10341	217–222	6/18/09	2627.8
MD21-09-10342	242.5–247.5	6/18/09	3203.44
MD21-09-10343	339.5–344.5	6/18/09	530.518
July 2009			
MD21-09-11280	217–222	7/16/09	980.78
MD21-09-11281	242.5–247.5	7/16/09	3253.15
August 2009			
MD21-09-11472	67.5–72.5	8/18/09	258.446
MD21-09-11473	217–222	8/18/09	991.636
MD21-09-11474	242.5–247.5	8/18/09	2949.12
September 2009			
MD21-09-12598	67.5–72.5	9/15/09	1706.59
MD21-09-12600	217–222	9/15/09	1936.29
MD21-09-12601	242.5–247.5	9/15/09	1787.14
November 2009			
MD21-10-4997	67.5–72.5	11/20/09	1394.73
MD21-10-4998	217–222	11/20/09	1380.68
MD21-10-4999	242.5–247.5	11/20/09	116521
MD21-10-5000	339.5–344.5	11/20/09	368.266

* Units are in pCi/L.

Table 5.3-4
Summary of Detected Tritium Results in Pore-Gas Samples at MDA T Vapor-Monitoring Well 21-603059, February–November 2009

Sample ID	Depth (ft)	Collection Date	Tritium*
February 2009			
MD21-09-3546	77.5–82.5	2/8/09	6357.79
MD21-09-3545	187.5–192.5	2/6/09	556.668
MD21-09-3547	229.5–234.5	2/8/09	1368.89
MD21-09-3549	292.5–297.5	2/6/09	4105.41
MD21-09-3550	372.5–377.5	2/6/09	5277.58
April 2009			
MD21-09-7155	77.5–82.5	4/13/09	353.451
MD21-09-7157	229.5–234.5	4/13/09	756.393
MD21-09-7163	229.5–234.5	4/20/09	1332.55
MD21-09-7153	292.5–297.5	4/10/09	1284.11
MD21-09-7156	372.5–377.5	4/13/09	1420.85
June 2009			
MD21-09-10333	77.5–82.5	6/16/09	334.831
MD21-09-10334	187.5–192.5	6/16/09	628.593
MD21-09-10335	229.5–234.5	6/16/09	1660.84
MD21-09-10336	292.5–297.5	6/16/09	4605.51
MD21-09-10337	372.5–377.5	6/16/09	6449.81
July 2009			
MD21-09-11273	187.5–192.5	7/15/09	601.61
MD21-09-11274	229.5–234.5	7/15/09	1428.52
MD21-09-11275	292.5–297.5	7/15/09	4776.39
MD21-09-11276	372.5–377.5	7/15/09	6527.3
August 2009			
MD21-09-11469	77.5–82.5	8/14/09	501.312
MD21-09-11470	187.5–192.5	8/14/09	538.605
MD21-09-11471	229.5–234.5	8/14/09	1529.32
MD21-09-11468	292.5–297.5	8/14/09	6175.57
MD21-09-11467	372.5–377.5	8/14/09	6520.03
September 2009			
MD21-09-12623	77.5–82.5	9/18/09	889.354
MD21-09-12624	187.5–192.5	9/18/09	376.235
MD21-09-12625	229.5–234.5	9/18/09	1400.04
MD21-09-12626	292.5–297.5	9/18/09	5764.99
MD21-09-12627	372.5–377.5	9/18/09	1279.39

Table 5.3-4 (continued)

Sample ID	Depth (ft)	Collection Date	Tritium*
October 2009			
MD21-10-13	292.5–297.5	10/20/09	2720.89 (J)
MD21-10-14	372.5–377.5	10/20/09	4812.58 (J)
November 2009			
MD21-10-4991	77.5–82.5	11/18/09	569.51
MD21-10-4993	187.5–192.5	11/18/09	835.233
MD21-10-4994	229.5–234.5	11/18/09	2006.55
MD21-10-4995	292.5–297.5	11/18/09	3811.4
MD21-10-4996	372.5–377.5	11/18/09	5400.51

Note: See Appendix A for data qualifier definitions.

* Units are in pCi/L.

Table 5.3-5
Summary of Detected Tritium Results in Pore-Gas Samples at MDA T Vapor-Monitoring Well 21-607955, December 2009

Sample ID	Depth (ft)	Collection Date	Tritium*
MD21-10-7567	71.1–76.4	12/2/2009	1005.55
MD21-10-7568	153.8–159.7	12/3/2009	3022.43
MD21-10-7569	173.4–179	12/2/2009	1350.52
MD21-10-7570	225.9–232.1	12/2/2009	4580.07
MD21-10-7571	326.6–333.4	12/3/2009	1201.62
MD21-10-7572	353.3–359.6	12/2/2009	694.773
MD21-10-7573	459.4–464.8	12/2/2009	424.773
MD21-10-7574	559–565	12/2/2009	1143.6
MD21-10-7577	946.2–952.1	12/3/2009	844.549

* Units are in pCi/L.

Table 5.4-1
Summary of Geotechnical Sample Results for Borehole 21-607955

Sample ID	Location ID	Depth (ft bgs)	Media	Collection Date	Calculated Total Porosity (%)	Density (g/cm³)	Volumetric Moisture Content (by ASTM) (%)	Gravimetric Moisture Content (%)	Saturated Hydraulic Conductivity (cm/sec)
MD21-09-11594	21-607955	70–75	Qbt3	9/21/2009	52	1.27	7.7	6	5.7E-03
MD21-09-11595	21-607955	89–94	Qbt3	9/21/2009	53.5	1.23	5.1	4.2	1.8E-03
MD21-09-11596	21-607955	114–118	Qbt2	9/22/2009	37.4	1.66	8	4.9	1.1E-04
MD21-09-11597	21-607955	126–131	Qbt2	9/22/2009	37.2	1.66	8.4	5	1.1E-04
MD21-09-11598	21-607955	143–148	Qbt2	9/22/2009	47.8	1.38	29.6	21.4	2.8E-03
MD21-09-11599	21-607955	155–160	Qbt2	9/24/2009	45.3	1.45	7.8	5.4	1.1E-04
MD21-09-11600	21-607955	174–179	Qbt1v	9/24/2009	45.5	1.44	9.1	6.2	1.1E-03
MD21-09-11601	21-607955	180–185	Qbt1v	9/24/2009	50.8	1.3	11.2	6.3	1.8E-04
MD21-09-11602	21-607955	194–197	Qbt1v	9/27/2009	47.4	1.39	19.2	13.7	4.1E-03
MD21-09-11603	21-607955	227–230	Qbt1g	9/27/2009	54.4	1.21	16	12.6	8.2E-04
MD21-09-11604	21-607955	287–290.5	Qbt1g	9/28/2009	60	1.06	13.3	12.2	5.2E-04
MD21-09-11605	21-607955	327–329.8	Qct	9/29/2009	42.3	1.53	17.3	11.3	4.3E-04
MD21-09-11606	21-607955	362–364.8	Qbo	9/30/2009	56	1.16	15.1	13	3.8E-04
MD21-09-11607	21-607955	418.6–421.7	Qbo	10/1/2009	53.3	1.24	19	15.3	1.3E-04
MD21-09-11608	21-607955	461–464.6	Qbo	10/2/2009	48.8	1.36	18.2	13.4	6.0E-04
MD21-09-11609	21-607955	500–505	Qbo	10/3/2009	53.4	1.23	14.1	11.3	1.3E-03
MD21-09-11610	21-607955	562–565	Qbo	10/6/2009	51	1.3	18.3	14.1	6.8E-04
MD21-09-11611	21-607955	618.3–621.7	Qbo	10/7/2009	52.5	1.26	18.4	14.7	5.3E-04
MD21-09-11612	21-607955	666–668.4	Tp	10/8/2009	34.5	1.74	18.2	10.5	2.7E-04
MD21-09-11613	21-607955	722.7–726	Tp	10/9/2009	46	1.43	21.8	15.2	3.7E-03
MD21-09-11614	21-607955	762–766.2	Tp	10/10/2009	41.8	1.54	20.3	13.2	3.7E-03
MD21-09-11615	21-607955	799.6–801.9	Tp	10/12/2009	37	1.67	26.6	14.3	5.5E-05
MD21-09-11616	21-607955	874–877	Tp	10/13/2009	38.4	1.63	12.1	6.3	4.6E-03
MD21-09-11617	21-607955	950–953	Tp	10/15/2009	37.6	1.65	12.4	7.1	1.1E-02

Table 5.4-2
Unsaturated Hydraulic Conductivity Properties
for Boreholes 21-25262 and 21-607955

Sample ID	Location ID	Depth (ft bgs)	α (cm^{-1})	N (dimensionless)	θ_r (% vol)	θ_s (% vol)
MD21-09-4633	21-25262	420–425	0.0021	1.8321	0.75	46.91
MD21-09-4634	21-25262	470–473	0.0062	1.5757	0.35	40.44
MD21-09-4635	21-25262	520–525	0.0071	1.7247	1.04	45.72
MD21-09-4637	21-25262	570–575	0.0066	1.7747	1.25	48.65
MD21-09-4638	21-25262	620–625	0.0065	1.5418	0.86	50.51
MD21-09-4639	21-25262	670–675	0.1501	1.2963	0.00	60.14
MD21-09-4640	21-25262	675–680	0.0422	1.6034	0.00	41.95
MD21-09-11594	21-607955	70–75	0.0087	2.1712	0.19	45.75
MD21-09-11595	21-607955	89–94	0.0104	1.8575	0.24	42.72
MD21-09-11596	21-607955	114–118	0.0012	2.4755	0.00	33.88
MD21-09-11597	21-607955	126–131	0.0012	2.5312	0.00	32.54
MD21-09-11598	21-607955	143–148	0.0057	2.1309	0.53	39.49
MD21-09-11599	21-607955	155–160	0.0033	1.6212	0.00	34.22
MD21-09-11600	21-607955	174–179	0.0020	1.7900	0.00	29.02
MD21-09-11601	21-607955	180–185	0.0024	1.7149	0.00	33.32
MD21-09-11602	21-607955	194–197	0.0025	1.6673	0.00	33.87
MD21-09-11603	21-607955	227–230	0.0021	1.6816	0.00	40.82
MD21-09-11604	21-607955	287–290.5	0.0048	1.6599	0.00	47.53
MD21-09-11605	21-607955	327–329.8	0.0041	1.5122	0.00	35.05
MD21-09-11606	21-607955	362–364.8	0.0042	1.5661	0.00	48.43
MD21-09-11607	21-607955	418.6–421.7	0.0038	1.6486	0.88	47.28
MD21-09-11608	21-607955	461–464.6	0.0037	1.5562	0.92	42.60
MD21-09-11609	21-607955	500–505	0.0084	1.4720	0.00	41.60
MD21-09-11610	21-607955	562–565	0.0056	1.6504	1.06	44.57
MD21-09-11611	21-607955	618.3–621.7	0.0110	1.4221	0.00	45.40
MD21-09-11612	21-607955	666–668.4	0.0111	1.3156	0.00	35.74
MD21-09-11613	21-607955	722.7–726	0.4991	1.1901	0.00	46.08
MD21-09-11614	21-607955	762–766.2	0.0079	1.3857	2.97	40.34
MD21-09-11615	21-607955	799.6–801.9	0.0125	1.3044	0.00	39.33
MD21-09-11616	21-607955	874–877	0.0192	1.3933	0.00	31.59
MD21-09-11617	21-607955	950–953	0.0560	1.3369	0.00	35.03

Appendix A

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

A-1.0 ACRONYMS AND ABBREVIATIONS

$\%CO_2$	percent carbon dioxide
$\%O_2$	percent oxygen
%R	percent recovery
bgs	below ground surface
BH	borehole
CCV	continuing calibration verification
COC	chain of custody
Consent Order	Compliance Order on Consent
COPC	chemical of potential concern
EPA	Environmental Protection Agency (U.S.)
FB	field blank
FD	field duplicate
ICV	initial calibration verification
LAL	lower acceptance limit
LANL	Los Alamos National Laboratory
LCS	laboratory control sample
MCL	maximum contaminant level
MDA	material disposal area
MDC	minimum detectable concentration
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
MS	matrix spike
PB	performance blank
PCE	tetrachloroethene
QA	quality assurance
QC	quality control
RACER	Risk Analysis, Communication, Evaluation, and Reduction
SCL	sample collection log
SL	screening level
SMO	Sample Management Office
SOP	standard operating procedures
SOW	statement of work
SQL	standard quantitation limit

SV	screening value
TA	technical area
TCE	trichloroethene
TD	total depth
UAL	upper acceptance level
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

Field Methods

B-1.0 INTRODUCTION

This appendix summarizes the field methods used during the September–November 2009 quarterly sampling activities at Material Disposal Area (MDA) T, Consolidated Unit 21-016(a)-99, in Technical Area 21 at Los Alamos National Laboratory (LANL or the Laboratory). All activities were conducted in accordance with the applicable standard operating procedures (SOPs), quality procedures, Laboratory implementation requirements, and Laboratory procedural requirements. Table B-1.0-1 provides a summary of the field methods used, and Table B-1.0-2 lists the applicable procedures.

B-2.0 FIELD METHODS

All work was conducted per a site-specific health and safety plan and an integrated work document. Field activities conducted according to SOPs are discussed below.

B-2.1 Volatile Organic Compound Pore-Gas Field-Screening and Sample Collection

All volatile organic compound (VOC) samples were collected in accordance with the current version of the EP-ERSS-SOP-5074, Sampling for Sub-Atmospheric Air.

Before each sampling event, each sample port was purged and monitored with a Landtec GEM2000 instrument (or equivalent) until the percent carbon dioxide and oxygen levels stabilized at values representative of subsurface pore-gas conditions. In addition, the vapor-sample tubing was purged of stagnant air by drawing air from the sampling interval through the line. To ensure the sample collected was representative of the subsurface air at depth, every sampling activity included a purge cycle. Once purging and field screening were complete, vapor samples for VOC analysis were collected using SUMMA canisters and the sample information was recorded on the appropriate sample collection log (SCL). Field-screening results were also recorded on the appropriate SCL and/or in the field logbook. Field chains of custody and SCLs are provided in Appendix D.

In addition to the characterization samples, two types of quality assurance/quality control (QA/QC) samples were collected and analyzed for VOCs using SUMMA canisters; field duplicate (FD) samples and field blanks (FB) of ultra-pure nitrogen. The FD and FB samples were collected at a frequency greater than or equal to 10% per sampling event in accordance with the current version of EP-ERSS-SOP-5059, Field Quality Control Samples. Summaries of all September–November 2009 analytical and QA/QC samples collected from vapor-monitoring wells 21-603058, 21-603059, 21-25264, 21-25262, 21-607955, and their requested analyses, are presented in Tables 2.0-2 through 2.0-6 of the report.

All samples were submitted to the Sample Management Office (SMO) for processing and transport to off-site contract analytical laboratories.

B-2.2 Tritium Pore-Gas Sample Collection

All tritium samples were collected in accordance with the current version of EP-ERSS-SOP-5074. Water vapor intended for tritium analysis was collected from pore gas by pulling a pore-gas sample through a canister of silica gel and the sample information was recorded on the appropriate SCL (Appendix D). Silica gel column FD samples were also collected at a frequency greater than or equal to 10% per sampling event in accordance with the current version of EP-ERSS-SOP-5059.

Following delivery of the canister and silica gel sample to the analytical laboratory, the silica gel was heated and the moisture driven off was collected for liquid scintillation counting. Dry silica gel contains bound water, which dilutes the tritium sample. A correction factor for this dilution was 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 was prepared for sampling by drying it at a temperature above 100°C; however, this drying process did not remove bound water. Before sample collection, the amount of silica gel used in each sample was weighed (typically about 135 g) as well as the sample canister with silica gel. EP-ERSS-SOP-5074 requires that at least 5 g of moisture be collected. After sampling, the sample canister with silica gel was weighed again.

The sample (canister plus silica gel) was shipped to the analytical laboratory where it was weighed again. The silica gel was emptied into a distillation apparatus and heated to 110°C, driving moisture off the silica gel. This moisture was collected and analyzed for tritium by liquid scintillation. The laboratory also weighed the empty canister and calculated 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 were reported to the Laboratory in the analytical data package and the electronic data deliverable. The correction factor for the impact of bound water was determined for each sample from the silica gel field weights.

B-3.0 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 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.

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
Summary of Field Methods

Method	Summary
General Instructions for Field Investigations	This procedure provides an overview of instructions regarding activities performed before, during, and after field investigations. It is assumed field investigations involve standard sampling equipment, personal protective equipment, waste management, and site-control equipment/materials. The procedure covers premobilization activities, mobilization to the site, documentation and sample collection activities, sample media evaluation, surveillance, and completion of lessons learned.
Sample Containers and Preservation	Specific requirements/processes for sample containers, preservation techniques, and holding times are based on the U.S. Environmental Protection Agency guidance for environmental sampling, preservation, and QA. Specific requirements were met for each sample and were printed in the sample collection logs provided by the Laboratory's SMO (size and type of container, preservatives, etc.). All samples were preserved by placing them in insulated containers with ice to maintain a temperature of 4°C.
Handling, Packaging, and Transporting Field Samples	Field team members sealed and labeled samples before packing to ensure sample and transport containers were free of external contamination. All environmental samples were collected, preserved, packaged, and transported to the SMO under chain of custody (COC). The SMO arranged for shipping of the samples to analytical laboratories. Any levels of radioactivity (i.e., action-level or limited-quantity ranges) were documented in SCLs submitted to the SMO.
Sample Control and Field Documentation	The collection, screening, and transport of samples were documented in standard forms generated by the SMO. These forms include SCLs, COC forms, sample container labels, and custody seals. Collection logs were completed at the time of sample collection and were signed by the sampler and a reviewer who verified the logs for completeness and accuracy. Corresponding labels were initialed and applied to each sample container, and custody seals were placed around container lids or openings. COC forms were completed and signed to verify that the samples were not left unattended.
Field QC Samples	Field QC samples were collected as follows: FDs were collected at a frequency of 10% at the same time as a regular sample and submitted for the same analyses. FBs required for all field events that include collecting samples for VOC analyses, were collected. Field blanks were kept with the other sample containers during the sampling process and were submitted for laboratory analyses.
Sampling of Sub-Atmospheric Air	Vapor sampling was performed on three monitoring wells in accordance with the current version of EP-ERSS-SOP-5074 and analyzed for VOCs and tritium. This SOP describes the process of sampling subatmospheric air from vapor ports in monitoring wells and boreholes. The procedure covered presampling activities, sampling to detect and quantify gaseous organic concentration in air, SUMMA sampling (a passive collection and containment system of laboratory-quality air samples), adsorbent column sampling, and sampling through the packer system (a sampling system that uses inflatable bladders to seal off a desired interval in an open borehole or at the end of drill casing to obtain a sample from a discrete section), and postsampling activities.

Table B-1.0-2
List of Applicable General Procedures for MDA T Pore-Gas Monitoring Activities

Document Number	LANL Procedure Title
EP-ERSS-SOP-5055	General Instructions for Field Investigations
EP-ERSS-SOP-5056	Sample Containers and Preservation
EP-ERSS-SOP-5057	Handling, Packaging, and Transporting Field Samples
EP-ERSS-SOP-5058	Sample Control and Field Documentation
EP-ERSS-SOP-5059	Field Quality Control Samples
EP-ERSS-SOP-5061	Field Decontamination of Equipment
EP-ERSS-SOP-5074	Sampling for Sub-Atmospheric Air
P 101-6	Personal Protective Equipment
SOP-01.12	Field Site Closeout Checklist
SOP-01.13,	Initiating and Managing Data Set Requests
SOP-5181	Notebook Documentation for Environmental Restoration Technical Activities
SOP-5228	ADEP Reporting Requirements for Abnormal Events

Appendix C

Quality Assurance/Quality Control Program

C-1.0 INTRODUCTION

This appendix presents the analytical methods and summarizes the data quality review for the September, October, and November 2009 pore gas samples collected at Material Disposal Area (MDA) T, Consolidated Unit 21-016(a)-99, in Technical Area 21 at Los Alamos National Laboratory (LANL or the Laboratory).

Quality assurance (QA), quality control (QC), and data validation procedures were implemented in accordance with the “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, matrix spikes (MSs), laboratory control samples (LCSs), internal standards, initial calibration verifications (ICVs) and continuing calibration verifications (CCVs), surrogates, and tracers, were used to assess analytical laboratory accuracy and bias.

The type and frequency of QC analyses are described in the analytical services SOW (LANL 2000, 071233). Other QC factors such as sample preservation and holding times were also assessed. The requirements for sample preservation and holding times are presented in the standard operating procedure (SOP) EP-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 SOPs used for data validation are presented in Table C-1.0-1. Copies of the analytical data, laboratory logbooks, and instrument printouts are provided in Appendix D (on CD).

Analytical data were reviewed and evaluated based on U.S. Environmental Protection Agency (EPA) National Functional Guidelines for organic chemical data review, where applicable (EPA 1994, 048639; 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 the appropriate analytical records. Definitions of the data qualifiers are presented in Appendix A.

C-2.0 ANALYTICAL DATA ORGANIZATION AND VINTAGE

The September–November 2009 pore-gas analytical data are obtained from 104 samples (80 characterization and 24 QA/QC) collected during three sampling events (September, October, and November 2009) from vapor-monitoring well locations 21-25262, 21-25264, 21-603058, and 21-603059 and one sampling event (December 2009) from vapor-monitoring well 21-607955. Complete data packages and sample documentation for the 2009 samples are provided in Appendix D (on CD).

C-3.0 ORGANIC CHEMICAL ANALYSIS METHODS

Pore-gas samples were submitted for analysis of volatile organic compounds (VOCs) using EPA Method TO-15 (Table C-3.0-1). Tables 2.0-2 through 2.0-6 of the periodic monitoring report summarize all September–November 2009 pore-gas samples collected at MDA T and the requested analyses, in addition to February–August 2009 data, which are included for comparison purposes. All VOC results are provided on CD in Appendix D.

C-3.1 Organic Chemical QA/QC Samples

The QC samples are designed to produce a qualitative measure of the reliability of a specific part of an analytical procedure. The methods for validating organic chemical results on the basis of the various QA/QC sample types are specified in the SOPs. The validation of organic chemical data using QA/QC samples and other methods may have resulted in the rejection of the data or the assignment of various qualifiers to individual sample results.

Calibration verifications, LCSs, method blanks, surrogates, and internal standards were analyzed to assess the accuracy and precision of organic chemical analyses. Each of these QA/QC sample types is defined in the analytical services SOW (LANL 2000, 071233), described in the applicable validation SOPs, and summarized below.

Calibration verification is the establishment of a quantitative relationship between the response of the analytical instrument and the concentration of the target analyte. There are two aspects of calibration verification: initial and continuing. The initial calibration verifies the linearity of the calibration curve as well as the individual calibration standards used to perform the calibration. The continuing calibration verifies the initial calibration is still linear and valid. The continuing calibration also serves to determine that analyte identification criteria, such as retention times and spectral matching, are being met.

The LCS is a sample of the same matrix spiked with the target analytes and serves to monitor the overall performance. Following Laboratory SOP guidance, analytical results were qualified if the individual LCS recoveries were not within method-specific acceptance criteria.

A method blank is an analyte-free matrix to which reagents are added in the same volumes or proportions as those used in the environmental sample processing and 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.

A surrogate compound (surrogate) is an organic chemical used in the analyses of target analytes. The surrogate is similar in composition and behavior to the target analytes but is not normally found in environmental samples. Surrogates are added to every blank, sample, and spike to evaluate the efficiency with which analytes are recovered during extraction and analysis. The recovery percentage of the surrogates must be within specified ranges, or the sample may be rejected or assigned a qualifier.

Internal standards are chemical compounds added to every blank, sample, and standard extract at a known concentration. Internal standards are used as the basis for quantitation of target analytes. The percent recovery (%R) for internal standards should be within the range of 50% to 200%.

The data quality of the September–November 2009 MDA T VOC pore-gas data is summarized below.

C-3.1.1 MDA T Pore-Gas VOC Data

During the September–November 2009 monitoring period, 80 characterization samples and 24 QA/QC samples were collected and submitted for VOC analysis.

No VOC data were rejected.

Two VOC results (one benzene and one cyclohexane) were qualified as J because the analytical laboratory qualified the result as estimated and requalification of the data via data validation did not occur because of QC requirements.

Twenty results (one 2-butanone, one carbon disulfide, eight 1,1-dichloroethene, two ethanol, two methanol, and six 1,1,2-trichloro-1,2,2-trifluoroethane) were qualified as estimated (J) because the ICV and/or continuing CCV were recovered outside the method-specific limits.

Twenty-four results (five 1,1-dichloroethene, fourteen methylene chloride, and five 1,1,2-trichloro-1,2,2-trifluoroethane) were qualified as estimated (J-) because the LCS %R was less than the lower acceptance level (LAL) but greater than 10%.

Three results (cis-1,2-dichloroethene) were qualified as estimated (J+) because the LCS %R was greater than the upper acceptance level (UAL).

There were 5338 VOC results that qualified as U or UJ for one of the following reasons.

- The analytical laboratory qualified the result as a nondetect, and requalification of the data via data validation did not occur because of QC requirements.
- The LCS %R was less than the LAL but greater than 10%.
- The result was less than or equal to 5 times the concentration of the related analyte in the method blank, indicating that the reported detection was indistinguishable from contamination in the blank.
- The VOCs were analyzed with an ICV that exceeded the %R standard deviation criteria and/or the associated multipoint calibration correlation coefficient was less than 0.995.
- The ICV and/or CCV were recovered outside the method-specific limits.
- The mass spectrum did not meet specifications.

C-4.0 RADIONUCLIDE ANALYSIS METHODS

The vapor samples collected in September–November 2009 were analyzed by EPA Method 906.0 for tritium (Table C-3.0-1). Tables 2.0-2 through 2.0-6 of the periodic monitoring report summarize all September–November 2009 pore-gas samples collected at MDA T and the requested analyses, in addition to February–August 2009 data, which are included for comparison purposes. All tritium results are provided on CD in Appendix D.

C-4.1 Radionuclide QA/QC Samples

The minimum detectable concentration (MDC) for tritium in performance blanks (PBs), method blanks, laboratory duplicates, tracer/carrier recovery, LCSs, and MS samples were analyzed to assess the accuracy and precision of the radionuclide analysis. The qualifiers and sample types for radionuclides are defined in the analytical services SOW (LANL 1995, 049738; LANL 2000, 071233), described in the applicable validation SOPs, and discussed briefly below. The validation of radionuclide data using QA/QC samples and other methods may have resulted in the rejection of data or the assignment of various qualifiers to individual sample results.

The MDC for each radionuclide is defined as the minimum activity concentration the analytical laboratory equipment can detect in 95% of the analyzed samples and is used to assess analytical performance.

Uncertainty and MDC results for tritium have been modified in the same manner as the analytical results to account for the bound water found in silica gel used for sample collection.

The PBs and method blanks are used to measure bias and assess potential cross-contamination of samples during preparation and analysis. Blank results should be less than the MDC for each radionuclide.

Laboratory duplicates are used to assess or demonstrate acceptable laboratory method precision at the time of analysis as well as to assess the long-term precision of an analytical method on various matrices. Duplicate results are used to calculate a duplicate error ratio (DER). The DER is based on 1 standard deviation of the sample and the duplicate sample and should be less than 4.

The LCS serves as a monitor of the overall performance of each step during the analysis, and the acceptance criteria for LCSs are method-specific. For radionuclide methods, LCS %Rs should fall within the control limits of 80% to 120%.

The accuracy of radionuclide analyses is also assessed using MS samples. These samples are designed to provide information about the effect of the sample matrix on the sample preparation procedures and analytical technique. The MS %Rs should be within the acceptance range of 75% to 125%; however, if the sampling result is more than 4 times the amount of the spike added, these acceptance criteria do not apply.

The data quality of the September–November 2009 MDA T tritium data is summarized below.

C-4.1.1 MDA T Pore-Gas Tritium Data

During the September–November 2009 monitoring period, 80 characterization samples and 13 QA/QC samples were collected and submitted for tritium analysis.

Eight tritium results were qualified as estimated (J) because the concentration was greater than five times the concentration of the related analyte in the method blank.

A total of 26 tritium results were qualified as U either because (1) the associated sample concentration was less than or equal to the MDC, or (2) the associated sample concentration was less than or equal to five times the concentration of the related analyte in the method blank.

All tritium data collected in September–November 2009 from MDA T pore gas were used to evaluate tritium trends over the monitoring period.

C-5.0 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 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.

EPA (U.S. Environmental Protection Agency), February 1994. “USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review,” EPA-540/R-94/013, Office of Emergency and Remedial Response, Washington, D.C. (EPA 1994, 048639)

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), July 1995. "Statement of Work (Formerly Called "Requirements Document") - Analytical Support, (RFP number 9-XS1-Q4257), (Revision 2 - July, 1995)," Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 1995, 049738)

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)

Table C-1.0-1
Data Validation Procedures

Procedure	Title	Effective Date
SOP-5161, Rev. 0	Routine Validation of Volatile Organic Compound (VOC) Analytical Data	6/10/2008
SOP-5166, Rev. 0	Routine Validation of Gamma Spectroscopy, Chemical Separation Alpha Spectrometry, Gas Proportional Counting, and Liquid Scintillation Analytical Data	6/30/2008

Table C-3.0-1
Analytical Methods for MDA T Pore-Gas Samples

Analytical Method	Analytical Description	Analytical Suite
EPA Method TO-15	Gas Chromatography/Mass Spectrometry	VOC
EPA Method 906	Liquid Scintillation	Tritium

Appendix D

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