Response to the Approval for the Phase III Investigation Report for Material Disposal Area C, Solid Waste Management Unit 50-009, at Technical Area 50 Los Alamos National Laboratory, EPA ID No. NM0890010515, HWB-LANL-11-050, Dated December 8, 2011

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim. Los Alamos National Laboratory's (LANL's or the Laboratory's) responses follow each NMED comment. This response contains data on radioactive materials, including source, special nuclear, and byproduct material. 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 policy.

GENERAL COMMENTS

NMED Comment

1. *The highest measured concentrations of 2-hexanone were recorded in the deepest (600 ft below ground surface [bgs]) port in vapor-monitoring well 50-603467, and the concentrations are between six and nine times greater than the corresponding Tier I screening levels for the 2nd and 3rd quarters of FY2011. The Permittees have not provided any data on the distribution of 2-hexanone below the 600 ft bgs depth; therefore, it is possible that even higher concentrations occur at greater depths. The Permittees have not adequately defined the extent of vapor-phase 2-hexanone contamination which creates uncertainty regarding the potential for that contaminant to reach groundwater. NMED will evaluate future vapor-monitoring results and the Permittees may be required to install groundwater monitoring well R-59 in a downgradient location from vapor-monitoring well 50-603467.*

LANL Response

1. Additional vapor monitoring will be performed as specified in Specific Comment 8. These monitoring results will be presented and evaluated in the corrective measures evaluation (CME) report to determine whether an additional regional groundwater monitoring well is necessary.

   Hexanone(2-) was detected infrequently in vapor samples collected at Material Disposal Area (MDA) C. The attached Table 1 presents the frequency of detection for 2-hexanone during the six rounds of sampling performed during the Phase III investigation. As Table 1 shows, 2-hexanone was detected in only 1 to 4 samples during each sampling event. The highest detected concentration for all six events was in the sample collected at 600 ft below ground surface (bgs) at location 50-603467.

   Although the highest concentration was detected at a depth of 600 ft bgs at location 50-603467, 2-hexanone was detected infrequently and at much lower concentrations (i.e., 2 to 3 orders of magnitude) at similar depths at other locations. The attached Table 2 presents all 2-hexanone results for sample depths of 500 ft bgs and greater for the six Phase III sampling events. The only 2-hexanone concentrations above the Tier I screening level (180 $\mu g/m^3$) were in samples collected at 600 ft bgs at location 50-603467. As Table 2 shows, the only other detected concentrations of 2-hexanone in samples collected at depths of 500 ft or greater were at locations 50-613183 (2.3 $\mu g/m^3$ at 642.5 ft bgs during the January–March 2011 event), 50-613184 (2.4 $\mu g/m^3$at 652 ft bgs during the January–March 2011 event), and 50-613185 (2.0 μg/m^3 at 600 ft bgs during the March–May 2011 event).

The potential presence of 2-hexanone above the Tier I screening level is of very limited extent. Although there are no sample ports deeper than 600 ft bgs at location 50-603467, 2-hexanone was not detected or was detected at very low concentrations (i.e., 2.3 μg/m^3 and 2.4 μg/m^3) in deeper screens (630 ft–680 ft bgs) at nearby locations 50-613183, 50-613184, and 50-613185, which are approximately 250 to 450 ft from location 50-603467. In addition, locations 50-613183, 50-613184, and 50-613185 are the nearest locations downgradient (i.e., to the east) of location 50-603467.

NMED Comment

2. *The Permittees' Tier II analysis is inadequate. The Permittees performed Tier II analysis for specific depths at which the highest concentrations of certain contaminants of interest are currently measured. However, the Permittees neither recognized, nor discussed the fact that Tier II screening levels are depth-dependent. The analysis also only considered diffusion and did not address fracture flow. Both the distance to groundwater and the transport properties of the geologic formations between the contaminant location and the regional aquifer must be considered in order to properly estimate Tier II screening levels.*

For example, the Permittees calculated Tier II screening levels for TCE at the depth of approximately 50 ft bgs. From that location, TCE vapors have to migrate through approximately 550 feet of Bandelier tuff, 300 feet of Tschicoma dacite, and 400 feet of Puye formation before they reach groundwater table. However, these calculations are not applicable to TCE vapors that are already near the top of Tschicoma dacite since they do not have to migrate through a thick sequence of Bandelier tuff before reaching groundwater. Tier II screening levels for TCE at the top of Tschicoma dacite will be much lower than those calculated by the Permittees for the location near the top of Bandelier tuff. The same comments apply to Tier II analysis for tritium. Figures F-3.0-1 and F-4.0-1 give an inaccurate impression that Tier II screening levels for TCE and tritium do not change with depth. The Tier II analysis results are not valid as presented.

LANL Response

2. As discussed in the conceptual site model presented in the Phase III investigation report, the current distribution of volatile organic compound (VOC) vapors in the subsurface beneath MDA C is consistent with vapor-phase diffusion through porous media. Therefore, this was the pathway considered in the Tier II evaluation presented in the investigation report. NMED is correct that Tier II screening levels based on vapor-phase transport are depth dependent. However, the Tier II evaluation was based on the current distribution of trichloroethene (TCE) in the subsurface, which is appropriate for characterizing current conditions. The conclusions from this evaluation might not be applicable, however, if the center of mass of plume were to migrate to lower stratigraphic units in the future. Therefore, the depth dependence of Tier II screening levels was evaluated for the three constituents currently exceeding Tier I screening levels (2-hexanone, methylene chloride, and TCE).

   As noted above, the current conceptual model is consistent with transport of VOC vapors by diffusion through porous media, and fracture flow was not considered in the Tier II evaluation presented in the Phase III investigation report. Although fracture flow does not presently appear to be a significant transport mechanism, it is likely that transport through fractures would result in lower Tier II screening levels than diffusion through porous media. The uncertainty associated with potential future fracture flow is expected to be most pronounced in the Tschicoma dacite (i.e., the effects of any fracture flow in the Bandelier Tuff are already accounted for in the current contaminant distribution, which has been characterized and will continue to be monitored in the future). Therefore, the potential effects of fracture flow through the dacite were accounted for in the Tier II evaluation by conservatively applying the groundwater protection standard at the top of the dacite rather than at the water table. This approach is conservative in that it does not take credit for any attenuation in the dacite or in the unsaturated portion of the Puye Formation, which is not fractured.

The attached Figures 1 through 3 show the depth dependence of Tier II screening levels for 2-hexanone, methylene chloride, and TCE, respectively. The plots labeled “With Tt2 and Tpf” show the screening levels considering attenuation in the dacite and unsaturated Puye Formation. The plots labeled “Without Tt2 and Tpf” do not consider attenuation in the dacite and unsaturated Puye Formation and, therefore, conservatively represent vapor-phase transport through fractures from the top of the dacite to the water table. Similarly, attached Figure 4 shows the screening levels for TCE along with the TCE data presented in Figure F-3.0-1 of the investigation report.

The depth dependence of Tier II screening levels results from concentration gradients associated with diffusive transport (i.e., a greater distance to the water table requires a higher concentration to create the necessary concentration gradient for transport). As explained in Appendix F of the investigation report, the Tier II screening level for tritium was based on pore water transport in the liquid phase rather than vapor diffusion because of the low vapor pressure of tritium (as tritiated water). Because the Tier II screening level for liquid-phase transport considers only advective transport through the unsaturated zone and does not depend on concentration gradients in the unsaturated zone, it would not exhibit depth dependence. Similarly, this Tier II screening level would also be representative of fracture flow since it is based on liquid phase transport. Therefore, additional Tier II screening levels were not evaluated for tritium.

SPECIFIC COMMENTS

NMED Comment

3. *Section 3.3.3.1, Collection of Vapor Samples, page 9, second paragraph*

The Permittees state that vapor sampling was performed in accordance with SOP-5074, Sampling of Subatmospheric Air and included 30-min purge before sample collection. However, a revised version of SOP-5074, Sampling of Subsurface Vapor, Rev. 2, is dated September 17, 2010 and, in this revision, the purge time has been reduced from 30 to 10 minutes for boreholes with sand pack filters. The Permittees do not mention the revised SOP-5074, and it is unknown if they followed the revised SOP-5074 for samples collected after September 17,2010. Section IX. A of the Consent Order requires specific descriptions of the methods and procedures used to collect data. Describe the method used to collect vapor samples during each sampling event in the response letter.

LANL Response

3. All vapor sampling was performed using the version of the procedure in effect at the time that sampling was performed. Standard Operating Procedure (SOP) 5074 was originally issued as Revision 0 in February 2007. This version of the procedure, which was in effect when the Phase III investigation began, specified a 30-min purge time. Revision 1 of SOP-5074 was issued in June 2010, and this version specified a 10-min purge time for boreholes constructed using sand pack filters and a minimum purge time of 10 min for FLUTe systems and open boreholes. Calculation of

required purge times for FLUTe systems and open boreholes was further clarified in immediate procedure change (IPC) 1 to SOP-5074, which was issued in July 2010. SOP-5074 was issued as Revision 2 in September 2010. Revision 2 formalized the changes in Revision 1, IPC-1, including the revised (i.e., 10 min) purge time. The version of the SOP used to collect the samples included in the Phase III investigation report are summarized below.

Sampling Event	Vapor-Sampling Procedure Used
January–April 2010	SOP-5074, Revision 0
April–July 2010	SOP-5074, Revision 0 SOP-5074, Revision 1
July–September 2010	SOP-5074, Revision 1 SOP-5074, Revision 1, IPC-1
October 2010–January 2011	SOP-5074, Revision 2
January–March 2011	SOP-5074, Revision 2
March–May 2011	SOP-5074, Revision 2

NMED Comment

4. ***Section 6.3, Regional Groundwater Sampling Results, page 18, second paragraph, first sentence***

    Correct the listed January 2010 date to January 2011.

LANL Response

4. A replacement page with the correct date is included with this response.

NMED Comment

5. ***Figures 4.3-2, 6.2-1, and F-3.1-8***

    Well 50-603064 contains nine sampling ports, but on the cross-section figures listed in the heading for this item (5), ten ports are shown for this well. Correct this issue for future submittals.

LANL Response

5. Well 50-603064 has nine sampling ports. The eighth port is at a depth of 482 ft bgs. This port was incorrectly reported as having a depth of 400 ft in some of the data sets used to construct Figures 4.3-2, 6.2-1, and F-3.1-8. Therefore, these figures show ports at 400 ft bgs and 482 ft bgs, for a total of 10 ports instead of 9. The sample depths have been corrected in the database, and future submittals will show nine sampling ports for well 50-603064.

NMED Comment

6. ***Tables 3.3-2,3.3-3, 6.2-1, 6.2-2, 6.2-4, 6.2-5, Plates 1 through 4, 7, and 8***

    The depth of the next-to-last port at borehole 50-603064 is incorrectly shown as 400 ft. The correct depth of this port, according to the borehole completion log, is 482 ft. Correct this inconsistency in future submittals.

LANL Response

6. As explained in the response to Specific Comment 5, some data sets incorrectly identified the depth of the next-to-last port at borehole 50-603064 as 400 ft bgs instead of 482 ft bgs. The sample depths have been corrected in the database, and future submittals will show the depth of the next-to-last port at borehole 50-603064 to be at 482 ft.

NMED Comment

7. Tables 6.1-1, 6.2-1, 6.2-2, 6.2-3, 6.2-4, 6.2-5, and 6.2-6, Analytical Results

The analytical result tables must include comparative concentrations of each analyte. Table 6.1-1 must include relative screening levels and/or background values for the tuff adjacent to the Tschicoma dacite. Table 6.2-1, 6.2-2, and 6.2-3 must include the Tier I and Tier II screening levels developed through Henry's Law equations. Tables 6.2-4, 6.2-5, and 6.2-6 must include relative screening levels for tritium. Submit corrected tables as replacement pages for the Report.

LANL Response

7. Table 6.1-1 has been revised to include background values for the Otowi Member of the Bandelier Tuff (Qbo), which is next to the Tschicoma dacite. Tables 6.2-1, 6.2-2, and 6.2-3 have been revised to include Tier I screening levels for all chemicals and the Tier II screening levels presented in Appendix F of the investigation report for those chemicals that exceed Tier I screening levels. Tables 6.2-4, 6.2-5, and 6.2-6 have been revised to include the Tier I and Tier II screening levels for tritium presented in Appendix F of the investigation report. Replacement pages with these revised tables are included with this response.

NMED Comment

8. Table 8.0-1, Recommended Vapor-Monitoring Locations and Frequencies, page 96

In the Frequency column, the Permittees erroneously state 'biannual' sampling frequency instead of 'semiannual'. The Permittees also omitted five of the monitoring wells from the Table. NMED has evaluated the Permittees' recommended locations and frequencies for vapor monitoring and has developed the following table of locations and ports which the Permittees are required to sample on a semiannual basis. The samples must be analyzed for VOCs and tritium. The samples also must be field screened for VOCs, percent oxygen, and percent carbon dioxide.

Location	***Port depths designated for semiannual sampling, ft bgs***
50-24784	*155, 244, 362, 450*
50-24813	*25, 150, 241, 358, 450, 600*
50-24822	*25, 142, 235, 351, 450*
50-603061	*25, 128, 228, 347, 450*
50-603062	*122, 217, 337, 450*
50-603063	*25, 128, 228, 347, 450*
50-603064	*113, 214, 332, 500*
50-603383	*26, 139, 244, 359, 450*

Location	*Port depths designated for semiannual sampling, ft bgs*
50-603467	*143, 244, 360, 500, 600*
50-603468/50-613184	*142, 233, 354, 403, 500, 600, 664.5*
50-603470	*83, 203, 278, 351, 450, 600, 650*
50-603471/50-613183	*90, 209, 288, 360, 450, 550, 642.5*
50-603472/50-613182	*27, 146, 292, 364, 450, 550, 632.5*
50-603503	*133, 237, 347, 450*
50-613185	*145, 235, 350, 450, 600*

LANL Response

8. Future vapor monitoring at MDA C will be performed according to the locations, depths, and frequency (i.e., two times per year) specified in NMED's comment and table. All samples will be field screened for VOCs, percent oxygen, and percent carbon dioxide and analyzed for VOCs and tritium.

NMED Comment

9**. **Section B-5.1, Subsurface Dacite Sampling Methods, pages B-3

Permittees' Statement: 'Air-rotary drilling was used in Phase III activities. The subsurface dacite samples were collected from the drill cuttings in accordance with SOP-06.26, Core Barrel Sampling for Subsurface Earth Materials.

"Samples were collected from the drill cuttings by placing stainless-steel bowl in the path of the cuttings as they exited the Hurricane 655 Dust Vacuum. The samples were field screened for VOCs and radioactivity and were visually inspected and logged. Following inspection, the sample was passed through a sieve to remove fine material, and the dacite was segregated. The samples were placed in sterile sample containers as required for each analysis, sealed, and labeled. Each sample was labeled with the borehole location number, date, time, depth interval, analyses requested, and sample identification number."

NMED Comment: SOP 06.26 is specific to core barrel sampling, which was not the method of sampling used to collect dacite samples at MDA C. Also, screening for VOCs in LANL Response samples collected from the cuttings stream of an air-rotary drill rig is only appropriate for worker health and safety evaluation. The Permittees must remove references to SOPs that were not followed while collecting samples and must provide an explanation of the purpose of field screening air-rotary drilling cuttings for VOCs in the response letter.

LANL Response

9. Section B-5.1 has been revised to remove the reference to SOP-06.26. A replacement page with the revised text is included with this response.

   In accordance with Laboratory industrial hygiene and radiation protection requirements, all samples are field screened for VOCs and radioactivity, regardless of the method used to collect a sample.

NMED Comment

10. ***Section F-2.2, Tier II Soil-Vapor Screen Based on Transport and Dilution in the Regional Aquifer, page F -3, second paragraph***

    The Permittees' statement that "[e]quations F-2.2-1, F-2.2-2, and F-2.2-3 are based on EPA guidance document (EPA 1996,059902, Equations 37 and 45, respectively)" is not entirely correct. The equation F-2.2-2 is not based on any of the cited EPA equations but can be construed as a numerical representation of the EPA statement (EPA 1996,059902, page 46) that "[a]quifer thickness also serves as a limit for mixing zone depth." Correct this statement in future submittals.

LANL Response

10. Comment noted. The text in future submittals will note that Equations F-2.2.-1 and F-2.2-3 are based on the equations in the U.S. Environmental Protection Agency (EPA) guidance document and that Equation F-2.2-2 represents the statement in the EPA guidance document that "[a]quifer thickness also serves as a limit for mixing zone depth" (EPA 1996, 059902, p. 46).

NMED Comment

11. ***Section F-3.1, page F-6, first paragraph and Section F-3.1.2, page F-8, number 1***

    The Permittees' reference to "samples collected during the first quarter FY2010 before the start of Phase III vapor well drilling activities" is incorrect. These samples were collected during the first quarter FY 2011. Correct this typographic error in future submittals.

LANL Response

11. The sampling date will be corrected in future submittals.

NMED Comment

12. ***Table F-2.1-2, Screening of VOCs Detected during Second Quarter FY2010 in Vapor at MDA C, page F -35***

    The Tier I SV value of 46,500 for trichloroethene is incorrect. The correct value is 46.5. Correct this error in future submittals.

LANL Response

12. The Tier I screening value for TCE will be corrected in future submittals.

NMED Comment

13. ***Table F-2.2-1, Tier II Analysis of Chemicals Failing the Tier I Analysis, page F-36***

    The value of 0.64 in the 'Contaminant flux from the vadose-zone source to the water table under steady-state' for TCE is incorrect. The correct value is 233. Correct this error in future submittals.

LANL Response

13. The value for contaminant flux will be corrected in future submittals.

NMED Comment

14. Table F-3.1-1, MDA C Strata-Specific Properties Affecting Mass Estimates, page F-38

The hydrologic property values shown in the Table for Tschicoma dacite (Tvt2) do not agree with corresponding values in other publications by the Permittees. For example, the Table shows porosity value of 0.001 for Tvt2, while the same property is given value of 0.3 (over two orders of magnitude greater) in the 2005 Los Alamos National Laboratory's Hydrogeologic Studies of the Pajarito Plateau: A Synthesis of Hydrogeologic Workplan Activities (1998-2004) *(LA-14263-MS, Table 4-C-2). The Permittees must correct the discrepancy and recalculate mass estimates in the response letter.*

LANL Response

14. The fracture porosity presented in Table 4-C-2 of the 2005 synthesis report (Collins et al. 2005, 092028) was used for a modeling study of Los Alamos Canyon that was performed before any site-specific porosity values for the Tschicoma dacite were available. More recent observations for regional wells near MDA C (R-60, R-46, and R-17) indicate more representative values for porosity and moisture content of 0.15 and 0.1, respectively. Using these porosity and moisture content values, the mass estimate for TCE in the Tschicoma dacite is still negligible and is not different from that presented in Table F-3.1-2 of the investigation report.

NMED Comment

15. Table G-3.0-1, Model Parameters Evaluating the Monitoring Network of Regional Aquifer Wells Near MDA C, page G-9

The porosity values shown in the Table for regional aquifer wells, which are in the Puye Formation (Tpf), do not agree with corresponding values in other publications by the Permittees. For example, the Table shows porosity range for Tpf from 0.05 to 0.15, with the best estimate of 0.1, while the same property is given value of 0.25 in the 2005 Los Alamos National Laboratory's Hydrogeologic Studies of the Pajarito Plateau: A Synthesis of Hydrogeologic Workplan Activities (1998-2004) *(LA-14263-MS, Table 4-C-2). The Permittees must correct the discrepancy and recalculate the detection efficiency of monitoring wells R-60 and R-46 in the response letter.*

LANL Response

15. The porosity values presented in Table 4-C-2 the 2005 synthesis report (Collins et al. 2005, 092028) are characteristic of total porosity available for the water phase (for example, during water imbibition). The porosity values presented in Table G-3.0-1 of the Phase III investigation report are representative of effective porosity available for groundwater transport. Typically, the effective porosity is smaller than the total porosity (cf. Freeze and Cherry 1979, 088742). It is important to emphasize that the lower effective porosity values define higher groundwater velocity, which is a conservative assumption. No revision to the calculated detection efficiency is necessary.

NMED Comment

16. Table G-5.0-1, Detection efficiency of Monitoring Wells R-60 and R-46

> *The calculated average velocities of contaminant transport from potential source areas beneath MDA C to monitoring wells R-60 and R-46, as presented in the table, range from approximately 113 m/yr to 196 m/yr. However, in Section 4.4, page 13, the Permittees state that the groundwater velocity near MDA C is approximately 40 ft/yr. Explain the discrepancy and, if necessary, reevaluate the calculations of detection efficiency for monitoring wells R-60 and R-46 in the response letter.*

LANL Response

16. The groundwater velocity presented in section 4.4 of the Phase III investigation report is outdated. The current best estimate for groundwater velocity in the regional aquifer in the area beneath MDA C is about 450 ft/yr (150 m/yr), with an uncertainty range from 10 to 1000 ft/yr. The uncertainties in flow velocity and direction beneath MDA C are the result of the limited water-level data for defining regional flow to the west and north of MDA C, uncertainty in the properties of the media, and a change in the hydraulic gradient from relatively steep beneath MDA C to more shallow to the east (Figure G-1.0-1). These uncertainties are considered in the evaluation conducted in Appendix G. Section 4.4 has been revised to update the groundwater velocity, and a replacement page is included with this response. No revision to the calculations of detection efficiency for monitoring wells R-60 and R-46 is necessary.

REFERENCES

Collins, K.A., A.M. Simmons, B.A. Robinson, and C.I. Nylander (Eds.), December 2005. “Los Alamos National Laboratory's Hydrogeologic Studies of the Pajarito Plateau: A Synthesis of Hydrogeologic Workplan Activities (1998–2004),” Los Alamos National Laboratory report LA-14263-MS, Los Alamos, New Mexico. (Collins et al. 2005, 092028)

EPA (U.S. Environmental Protection Agency), May 1996. “Soil Screening Guidance: Technical Background Document,” EPA/540/R-95/128, Office of Solid Waste and Emergency Response, Washington, D.C. (EPA 1996, 059902)

Freeze, R.A., and J.A. Cherry, January 1979. *Groundwater*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey. (Freeze and Cherry 1979, 088742)

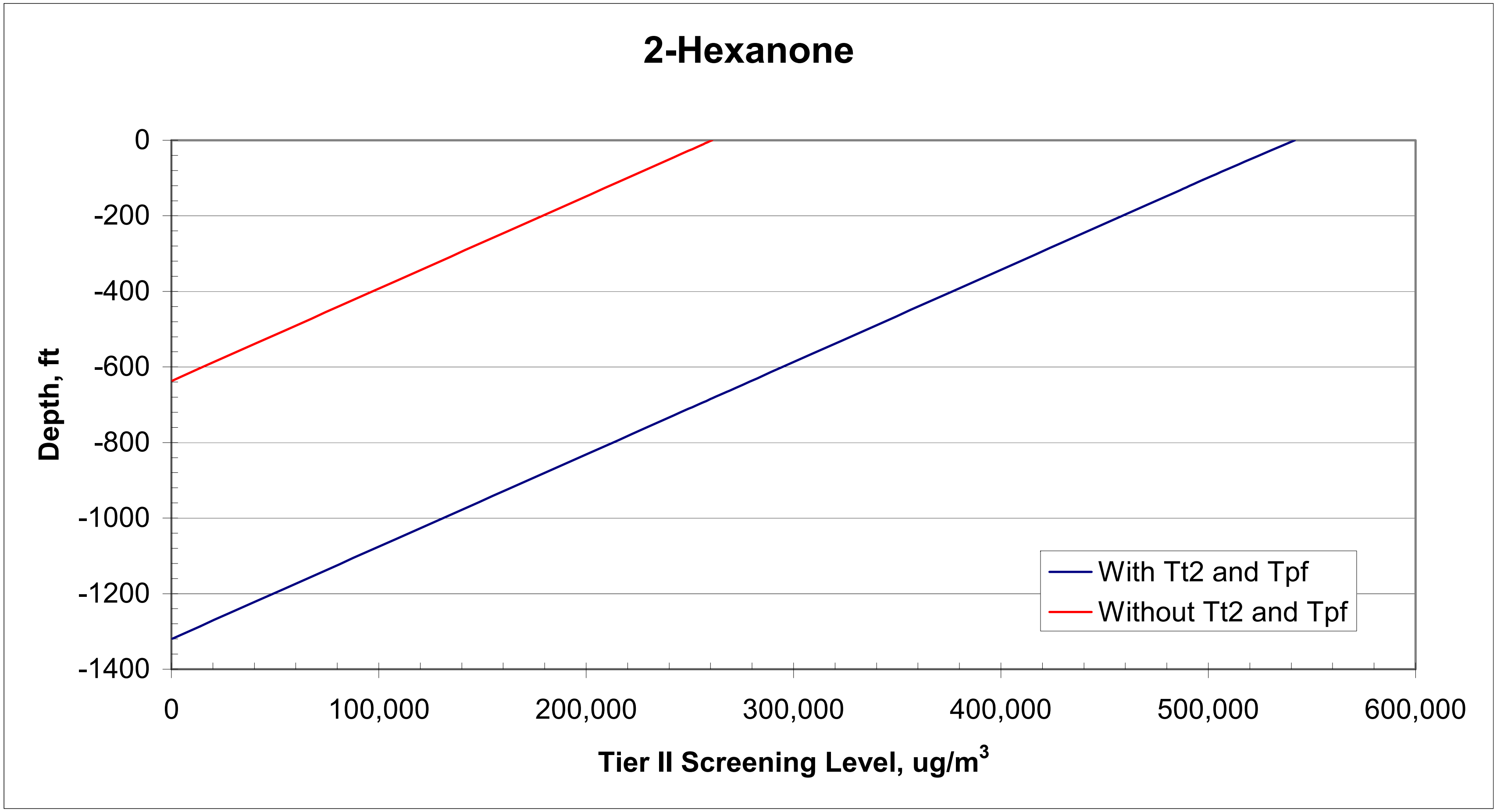

Figure 1 Tier II screening levels for 2-hexanone as a function of depth

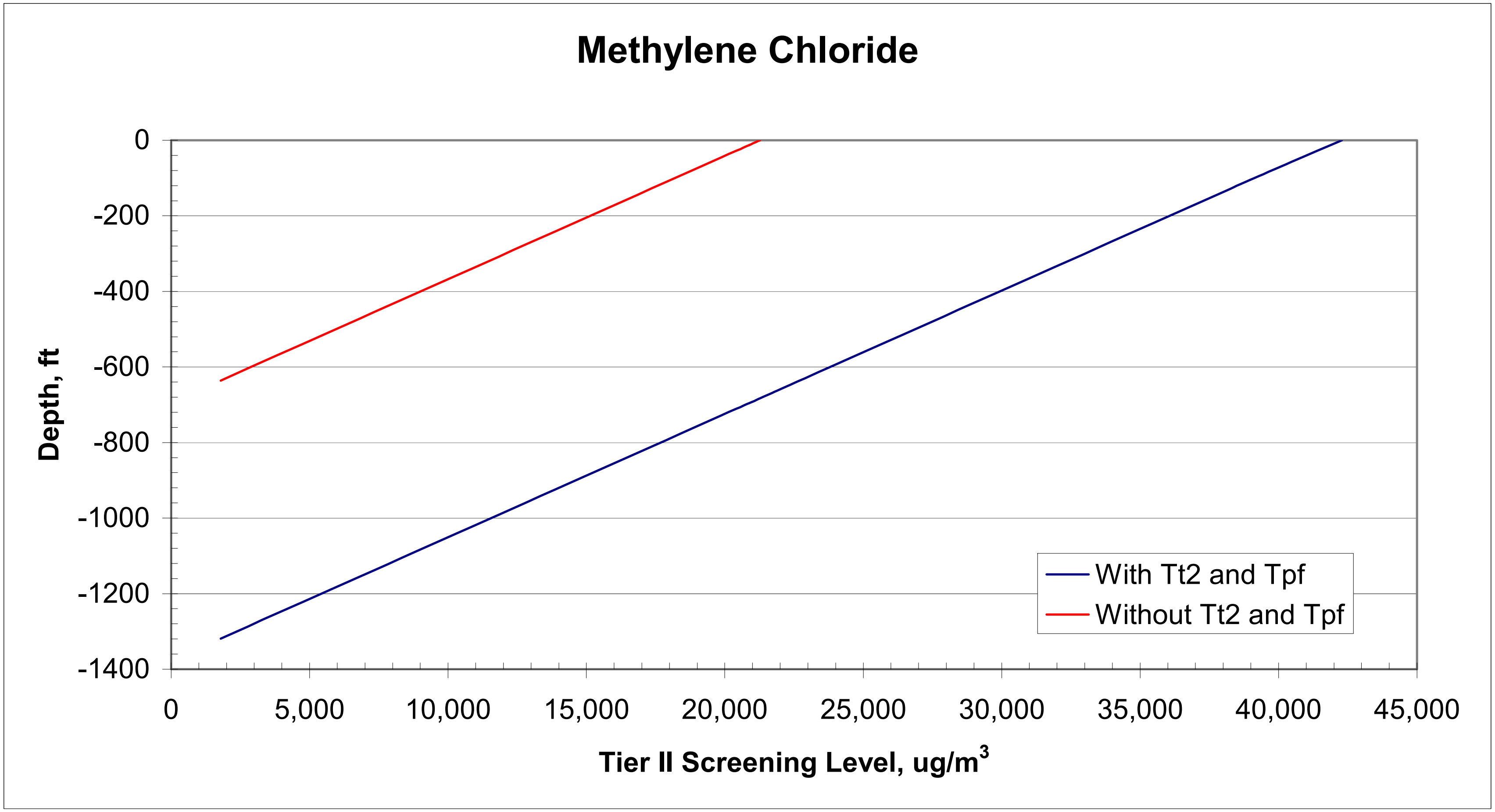

Figure 2 Tier II screening levels for methylene chloride as a function of depth

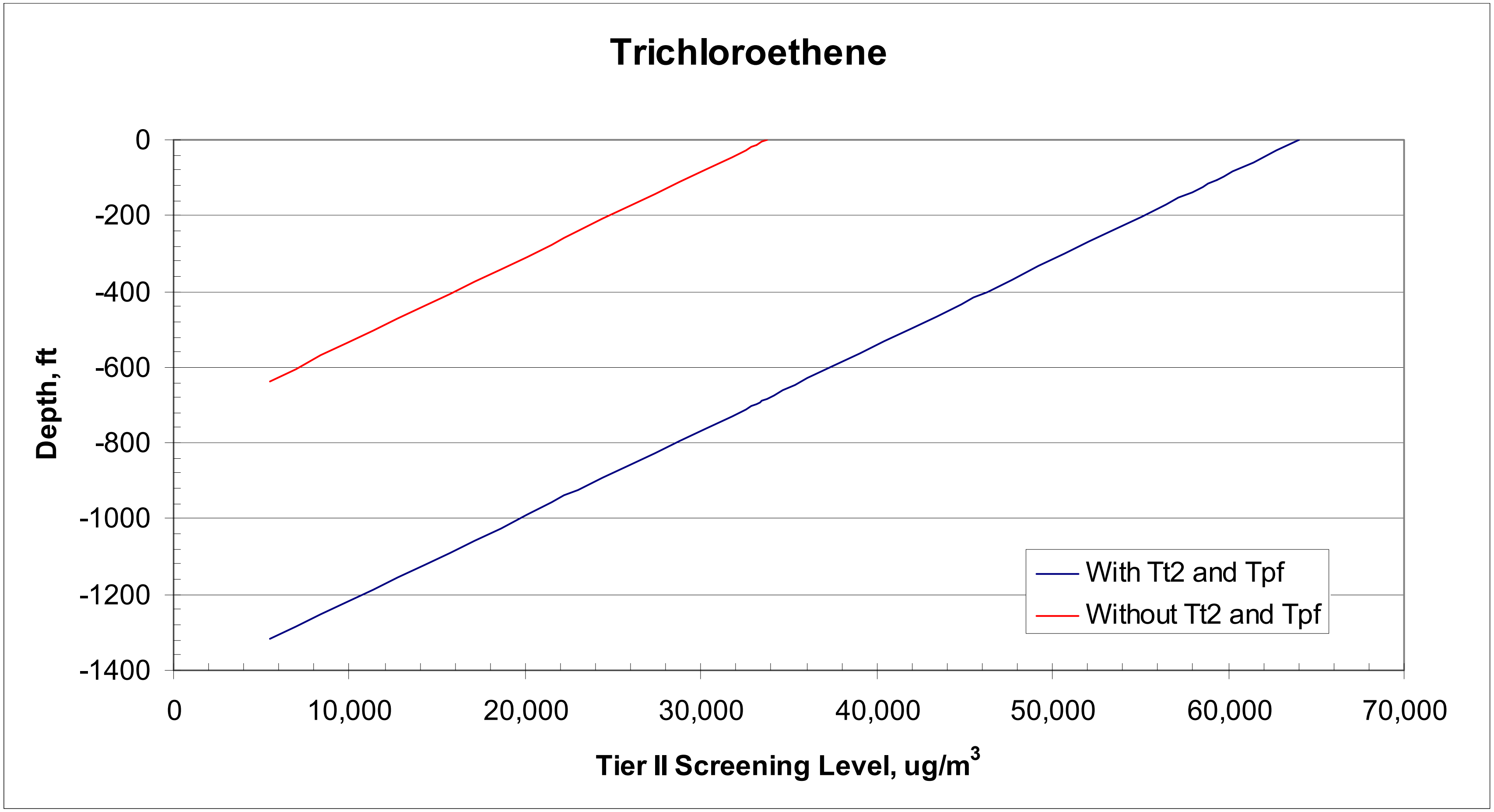

Figure 3 Tier II screening levels for TCE as a function of depth

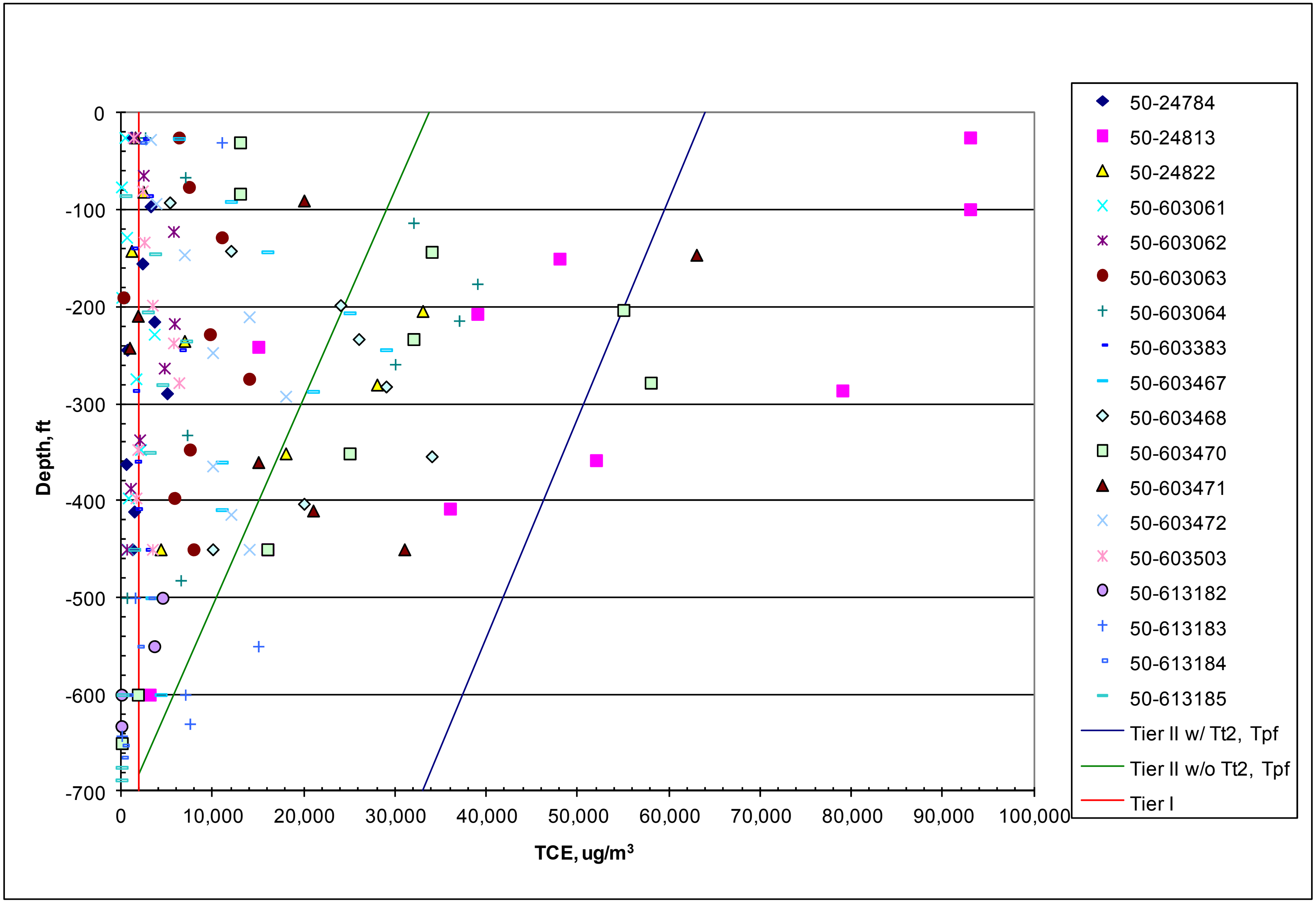

Figure 4 TCE vapor concentrations measured during the third quarter of fiscal year 2011 compared with Tier I and Tier II screening levels

Table 1
Frequency of Detection of 2-Hexanone during Phase III Investigation Sampling at MDA C

Sampling Event	Number of Analyses	Number of Detects	Number of Detected Locations	Concentration Range (µg/m³)	Locations and Depths of Detections	Detected Concentrations (µg/m³)
January–April 2010	132	1	1	[2]* to [4200]	50-603467 (600 ft)	250
April–July 2010	126	1	1	[2] to [3000]	50-603467 (600 ft)	710
July–September 2010	126	1	1	[2] to [3100]	50-603467 (600 ft)	190
October 2010–January 2011	126	1	1	[2] to [2200]	50-603467 (600 ft)	430
January–March 2011	148	4	4	[2] to [2200]	50-24822 (351 ft) 50-603467 (600 ft) 50-613183 (642.5 ft) 50-613184 (652 ft)	2.9 1500 2.3 2.4
March–May 2011	153	2	2	[1.6] to [1900]	50-603467 (600 ft) 50-613185 (600 ft)	1200 2

* Bracket denotes detection limit of nondetected result.

Table 2
Results for 2-Hexanone from MDA C Vapor Sampling Ports at Depths of 500 ft or Greater

Location ID	Depth (ft)	January–April 2010		April–July 2010		July–September 2010		October 2010–January 2011		January–March 2011		March–May 2011	
		Sample ID	Concentration	Sample ID	Concentration	Sample ID	Concentration	Sample ID	Concentration	Sample ID	Concentration	Sample ID	Concentration
50-24813	600	MD50-10-8698	10 U[a]	MD50-10-15911	90 U	MD50-10-24373	96 U	MD50-10-27195	2 U	MD50-11-4016	2.3 U	MD50-11-6014	68 U
50-603064	500	MD50-10-8767	2 U	MD50-10-15821	9.3 U	MD50-10-24466	19 U	MD50-10-27284	23 U	MD50-11-4108	18 U	MD50-11-6106	7.1 U
50-603467	500	MD50-10-8791	80 U	MD50-10-15803	430 U	MD50-10-24392	390 U	MD50-10-27206	380 U	MD50-11-4043	190 U	MD50-11-6035	40 U
50-603467	600	MD50-10-8852	250	MD50-10-15806	710	MD50-10-24390	190	MD50-10-27209	430	MD50-11-4041	1500 J-[b]	MD50-11-6034	1200
50-603470	600	MD50-10-8815	5.9 U	MD50-10-15755	32 U	MD50-10-24332	30 U	MD50-10-27148	23 U	MD50-11-3977	2 U	MD50-11-5975	15 U
50-603470	650	MD50-10-8812	2 U	MD50-10-15759	2 U	MD50-10-24337	4.5 U	MD50-10-27115	2 U	MD50-11-3976	2 U	MD50-11-5974	1.6 U
50-613182	500	—[c]	—	—	—	—	—	—	—	—	—	MD50-11-5933	260 U
50-613182	550	—	—	—	—	—	—	—	—	MD50-11-3943	4.4 U	MD50-11-5934	36 U
50-613182	600	—	—	—	—	—	—	—	—	MD50-11-3942	2 U	MD50-11-5936	2 U
50-613182	620	—	—	—	—	—	—	—	—	MD50-11-3953	4.4 U	MD50-11-5937	2 U
50-613182	632.5	—	—	—	—	—	—	—	—	MD50-11-3941	22 U	MD50-11-5935	2 U
50-613183	500	—	—	—	—	—	—	—	—	MD50-11-3948	160 UJ[d]	MD50-11-5939	18 U
50-613183	550	—	—	—	—	—	—	—	—	MD50-11-3949	180 U	MD50-11-5943	400 U
50-613183	600	—	—	—	—	—	—	—	—	MD50-11-3950	27 U	MD50-11-5941	200 U
50-613183	630	—	—	—	—	—	—	—	—	MD50-11-3951	21 U	MD50-11-5944	200 U
50-613183	642.5	—	—	—	—	—	—	—	—	MD50-11-3952	2.3	MD50-11-5940	2 U
50-613184	500	—	—	—	—	—	—	—	—	MD50-11-3956	88 U	MD50-11-5951	110 U
50-613184	550	—	—	—	—	—	—	—	—	MD50-11-3958	33 UJ	MD50-11-5946	77 U
50-613184	600	—	—	—	—	—	—	—	—	MD50-11-3954	9.8 UJ	MD50-11-5947	8.3 U
50-613184	652	—	—	—	—	—	—	—	—	MD50-11-3957	2.4 J-	MD50-11-5950	7.9 U
50-613184	664.5	—	—	—	—	—	—	—	—	MD50-11-3955	2 UJ	MD50-11-5949	2 U
50-613185	600	—	—	—	—	—	—	—	—	MD50-11-3969	2 U	MD50-11-5953	2
50-613185	675	—	—	—	—	—	—	—	—	MD50-11-3968	2 U	MD50-11-5958	2 U
50-613185	688	—	—	—	—	—	—	—	—	MD50-11-3970	2 U	MD50-11-5956	2 U

Notes: Units are $\mu g/m^3$.

[a] U = The analyte was analyzed for but not detected; value reported is detection limit.

[b] J- = The analyte was positively identified, and the result is likely to be biased low.

[c] — = Sample was not collected.

[d] 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.