SECOND 2012 SEMIANNUAL MONITORING REPORT

CHEVRON CINCINNATI FACILITY

HOOVEN, OHIO

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EXECUTIVE SUMMARY

This report presents results of the routine monitoring conducted by Chevron Environmental Management Company (Chevron) between July 1, 2012 and December 31, 2012 at the former Gulf Oil refinery situated approximately 20 miles west of Cincinnati, Ohio. This report also summarizes the high-grade recovery and horizontal soil vapor extraction (HSVE) system operations during the second half of 2012. Monitoring during this semiannual period was performed in fulfillment of requirements provided in the 2006 Administrative Order on Consent (2006 AOC, Docket No. RCRA-05-2007-0001) following the methods described in the *Remedy Implementation Plan for Final Groundwater Remedy, Chevron Cincinnati Facility* (*RIP*, Trihydro 2007a) and the *Operation, Maintenance, and Monitoring Plan for Final Groundwater Remedy, Chevron Cincinnati Facility* (*OMM Plan*, Trihydro 2007b). Monitoring and groundwater corrective measures that were performed during the second 2012 semiannual period include:

- Fluid level gauging including continuous monitoring using pressure transducers as well as weekly, monthly, and bimonthly manual measurements to track hydraulic gradients and light non-aqueous phase liquid (LNAPL) occurrence.
- Rapid Optical Screening Tool (ROST) monitoring to confirm stability of the LNAPL plume at the lateral edge of the smear zone.
- River monitoring to evaluate groundwater and surface water quality adjacent to, beneath, and within the Great Miami River.
- Vapor monitoring in Hooven to confirm the protectiveness of inhabitants of structures overlying the distribution of petroleum hydrocarbons associated with releases from the former refinery.
- High-grade recovery and associated performance monitoring primarily using groundwater production well PROD_25 located in the Central High-Grade Area, and in the Southwest High-Grade Area utilizing groundwater production wells PROD_19, PROD_21, and PROD_24.
- HSVE system operation to recover additional hydrocarbon mass beneath Hooven and mitigate the effects of alternate sources of petroleum hydrocarbons within the shallow and intermediate portions of the vadose zone.
- Monthly vapor monitoring in selected nested wells in Hooven to confirm the effectiveness of the HSVE system.
- Installation and connection of 14 additional biovent wells south of the existing injection network to enhance aerobic biodegradation of the petroleum hydrocarbons present from historical pipeline releases. This system expansion was completed in accordance with the design presented in the *Five-Year Groundwater Corrective*

Measures Implementation Review, Chevron Cincinnati Facility, Hooven, Ohio (*Five-Year Groundwater CMI Review*, Trihydro 2011).

- Installation of an interior and exterior groundwater monitoring well along the southern barrier wall adjacent to Gulf Park in March 2012 in accordance with the *Remedial Measures Work Plan for Sheet Pile Barrier Construction and Bank Stabilization along the East Bank of the Great Miami River, Gulf Park, Cleves, Ohio* (Trihydro 2008).
- Operation, monitoring, and respirometry testing of the bioventing system in Gulf Park.
- Groundwater sampling in Gulf Park to demonstrate dissolved phase plume stability and efficacy of monitored natural attenuation.

Approximately 30,423 gallons of LNAPL was recovered during the high-grade recovery event performed in the Central Area between July and January 2013. High-grade activities were suspended in the Central Area between August and October 2012, at which time LNAPL recovery in the Southwest Area was conducted totaling an additional 11,673 gallons. Total LNAPL recovery during the 2012 high-grade event was 42,096 gallons. An additional 35,120 pounds of organic carbon were extracted from the subsurface using the HSVE system during the high-grade event.

Monitoring results continue to demonstrate that the final groundwater remedy at the former refinery is progressing as anticipated and will meet remedial goals while ensuring that sensitive receptors remain protected. The United States Environmental Protection Agency (USEPA) has established performance monitoring criteria for remedies incorporating intrinsic natural attenuation processes (USEPA 1999, USEPA 2003). These performance monitoring criteria have been used to evaluate the progress of the final groundwater remedy at the Chevron Cincinnati Facility. Specifically the data collected at the Chevron Cincinnati Facility demonstrate the following:

1. Vapor phase source concentration trends and vertical profiles from soil vapor samples collected during the second half of 2012 from nested wells installed over the limits of the smear zone on the refinery and off-site properties continue to demonstrate that intrinsic biodegradation combined with focused LNAPL and vapor recovery during high-grade events is reducing smear zone mass and concentrations over time.
2. Dissolved phase data collected during the second half of 2012 continue to demonstrate that the concentrations of constituents of concern in groundwater are decreasing over time. Decreasing dissolved phase constituent trends are more pronounced at the margins of the smear zone compared to the interior portion of the plume. At its margins, the smear zone is thinner and LNAPL saturations are lower. In addition, groundwater enriched in electron acceptors intercepts the smear zone north of the facility and again to the southeast of the Buried Valley Aquifer-bedrock interface in Hooven creating a situation whereby petroleum hydrocarbons including benzene are

attenuated more quickly along the margins than within the interior of the smear zone. These observations are consistent with the expectation of outside-in attenuation of petroleum hydrocarbons within the smear zone.

3. ROST and dissolved phase monitoring results verify that the LNAPL and dissolved phase plume were stable beneath the Southwest Quad and on the facility. Based on historical monitoring performed in the Southwest Quad, it is reasonable to conclude that the dissolved phase plume is stable and there has not been redistribution of constituents following termination of continuous hydraulic control (i.e., year round pumping) following execution of the 2006 AOC.

4. Dissolved phase monitoring conducted along the west bank of the Great Miami River continues to indicate that constituents of concern present in the smear zone are not migrating beneath the partial penetrating barrier wall. The surface water screening standards were not exceeded in any of the hyporheic or surface water samples collected during the second half of 2012 and sensitive receptors along the riverbank remain protected.

5. At the main Site, dissolved phase and hydrogeochemical monitoring was not performed within groundwater monitoring wells located within the smear zone during the second semiannual period in 2012, in accordance with the schedule provided within the *OMM Plan* (Trihydro 2007b). Evidence of dissolved phase degradation and natural attenuation processes occurring in the saturated zone have been provided within previous semiannual reports as well as the *Five-Year Groundwater Corrective Measures Implementation Review, Chevron Cincinnati Facility, Hooven, Ohio* (*Five-Year Review*, Trihydro 2011). Additional evidence will be presented in the first semiannual report for 2013. Within Gulf Park, dissolved phase natural attenuation indicators continue to demonstrate that intrinsic biodegradation is occurring within the saturated zone.

1.0 INTRODUCTION

Chevron is performing final groundwater corrective measures implementation and monitoring of the remedy performance at the former Gulf Refinery located approximately 20 miles west of Cincinnati, Ohio, near the intersection of Ohio State Route 128 and US Highway 50 as shown on Figure 1-1. The groundwater remedy was designed to be protective of human health and the environment, with the long-term objective of reducing dissolved phase hydrocarbon concentrations to meet groundwater cleanup standards. Achieving this objective was estimated to take up to 42 years; therefore, the following interim objectives have been adopted for the groundwater remedy:

- Monitor soil vapor concentrations and prevent migration of volatile petroleum hydrocarbons into indoor air above risk based limits
- Measure the stability of LNAPL and dissolved phase petroleum hydrocarbons
- Remove recoverable LNAPL to established end-points
- Stabilize the bank of the Great Miami River on the main facility and in Gulf Park to prevent erosion of soils containing petroleum hydrocarbons

Groundwater remediation and monitoring efforts are being conducted in accordance with a 2006 AOC between Chevron and the USEPA (Docket No. RCRA-05-2007-0001). The primary components of the groundwater remedy specified in the 2006 AOC include:

- Re-establishment of natural hydraulic conditions beneath the facility, Hooven, and off-site properties to the southwest of the former refinery (commonly referred to as the Southwest Quad) through discontinuance of year round groundwater recovery.
- Focused LNAPL removal during periods of extreme low water table conditions through high-grade pumping over the next decade.
- Combined operation of the horizontal soil vapor extraction (HSVE) system beneath Hooven with high-grade recovery.
- Continued seasonal operation of the Gulf Park biovent system during low water table conditions.
- Engineered stabilization of the bank of the Great Miami River at the former refinery and Gulf Park to prevent erosion of soil containing petroleum hydrocarbons.
- Long-term monitoring of natural source zone attenuation including dissolved and vapor phase biodegradation.

A fundamental concept of the final groundwater remedy is the continued stability of the LNAPL and dissolved phase petroleum hydrocarbons. The majority of recoverable LNAPL has been removed beneath the former refinery and off-site properties over the past two decades. This is especially true in the upper and middle reaches of the smear zone, where LNAPL saturations are low. High-grade recovery is intended to focus on remaining LNAPL removal within the lower reaches of the smear zone and portions of the smear zone with the highest remaining LNAPL saturations. However, it is understood that the long-term remedy objective will be accomplished primarily through natural attenuation processes that drive contaminant degradation and removal over time. A detailed discussion of the objectives and activities to be conducted to achieve the groundwater remedy goals are described in the *RIP* (Trihydro 2007a) and the *OMM Plan* (Trihydro 2007b).

1.1 SUMMARY OF SITE CONCEPTUAL MODEL

A detailed site conceptual model (SCM) for groundwater was presented in the *First 2008 Semiannual Monitoring Report, Chevron Cincinnati Facility, Hooven, Ohio* (Trihydro 2009a). A summary of the SCM, including iterative updates made using assessment and routine monitoring results collected since early 2008, was provided in the semiannual reports and most recently updated in the *Five-Year Groundwater Corrective Measures Implementation Review, Chevron Cincinnati Facility, Hooven, Ohio* (*Five-Year Groundwater CMI Review,* Trihydro 2011). Future updates to the SCM will be presented in subsequent groundwater corrective measures implementation reviews, submitted to the USEPA on five-year intervals. Figure 1-2 shows a diagrammatic SCM for the facility, Hooven, and Southwest Quad.

1.2 PURPOSE

The primary purpose of this report is to provide a summary of the operations and monitoring conducted in accordance with the 2006 AOC, *RIP* (Trihydro 2007a), and *OMM Plan* (Trihydro 2007b) from July 1, 2012 to December 31, 2012. This report will also provide a summary of infrastructure installation, and remedial system operations performed during the second half of 2012 including high-grade recovery, additional soil vapor monitoring performed in Hooven and the Southwest Quad, as well as monitored natural attenuation in Gulf Park. The remainder of this report is organized into the following sections:

- Section 2.0 – Describes the infrastructure installation, methods, and results of monitoring activities conducted during the second semiannual monitoring period in 2012.
- Section 3.0 – Presents the preliminary qualitative and quantitative lines of evidence supporting the efficacy of natural attenuation mechanisms to degrade petroleum hydrocarbons within the smear zone.

- Section 4.0 – Provides the results of high-grade recovery operation completed between June 2012 and January 2013 including performance of the HSVE systems during this event.
- Section 5.0 – Describes the results of the expanded biovent system operation conducted in Gulf Park. This section also presents the results of natural attenuation indicator analyses in groundwater across the Park.

2.0 MONITORING NETWORK AND RESULTS

The primary component of the final groundwater corrective measures program is routine monitoring to evaluate the progress towards meeting the interim and long term remedy objectives. The monitoring network has been established to meet multiple performance and compliance monitoring criteria including collection of data to support remedial system operation; confirmation of high-grade pumping and HSVE system effectiveness; determination of compliance at boundaries where sensitive receptors are present; and evaluation of natural attenuation mechanisms. For the purpose of this report, monitoring has been divided into the following activities:

- Fluid level gauging including continuous monitoring using pressure transducers as well as weekly, monthly, and bimonthly manual measurements
- Groundwater sampling to demonstrate dissolved phase plume stability, protection of sensitive receptors, and efficacy of monitored natural attenuation
- ROST monitoring to confirm stability of the LNAPL plume at the lateral edge of the smear zone
- River monitoring to evaluate groundwater and surface water quality adjacent to, beneath, and within the Great Miami River

The following sections describe the results of monitoring conducted to support the groundwater remedy between July 1 and December 31, 2012. A description of the methods used for installation, monitoring, and analysis have been previously described within the *RIP* (Trihydro 2007a) and *OMM Plan* (Trihydro 2007b). Additional information pertinent to these activities is described herein when deviations from these plans was necessary.

2.1 FLUID LEVEL MONITORING

Pressure transducers are generally deployed across the monitoring well network listed on Figure 2-1 to evaluate rapid fluctuations in hydraulic conditions across the facility. The pressure transducers are relocated as the goals of short term monitoring change such as during flood events or high-grade recovery. Transducers log groundwater elevations on a daily or more frequent basis. Groundwater elevation data recorded using pressure transducers are provided in Appendix A.

Pressure transducers were deployed during a portion or all of the second semiannual monitoring period in an expanded network (including wells MW-4, MW-17, MW-20S, MW-21, MW-26R, MW-35, MW-44S, MW-48S, MW-78, MW-79, MW-81S, MW-85S, MW-94S, MW-96S, MW-99, MW-100S, MW-104S, MW-112, MW-131, and MW-132) across the site, Hooven, and Southwest Quad. Transducers were also located in the northern and southern barrier monitoring networks along the west bank of the Great Miami River as described in Section 2.4.1. Transducers were deployed in wells MW-135S, MW-135I, MW-135D, MW-137S, MW-137I, MW-137D, BMW-1S, BMW-1I, BMW-1D, BSW-1, BMW-3S, BMW-3I, BMW-3D and BSW-3 to track hydraulic gradients across the partially penetrating sheet pile wall.

Manual fluid level gauging is conducted on a bimonthly basis in each of the shallow monitoring wells located on the facility, Hooven, Southwest Quad, and Gulf Park. In addition, fluid levels are gauged weekly in select groundwater monitoring wells and river bank gauging point RBGP-44 located along the west bank of the river. Weekly gauging in these wells is conducted to supplement the bimonthly fluid level measurements in tracking trends in river and groundwater table elevations, as wells as LNAPL thickness.

Appendix B provides manual fluid level gauging data collected during the second half of 2012. Potentiometric surface maps for July 30, September 26, and November 27, 2012 generated using data collected during bimonthly monitoring are provided as Figures 2-2 through 2-4. Groundwater flow in the Buried Valley Aquifer is generally to the south under ambient (i.e., non-stressed) conditions. The potentiometric surface maps generated using fluid level data collected on July 30 and September 26, 2012 (Figures 2-2 and 2-3 respectively) show that groundwater flow was predominantly towards the depressions created through groundwater recovery using production wells PROD_19 and PROD_21 in the southwest high-grade area. Groundwater flow during September 26, 2012 as depicted on Figures 2-3, shows a larger radius of influence and increased groundwater depression while pumping during a lower water table. In November 27, 2012, the groundwater flow conditions are significantly altered with predominant flow towards production well PROD_25 within the central portion of the facility as shown on Figure 2-4. The radius of influence from pumping is much greater in the central portion of the facility than the southwest area even with similar pumping rates.

2.2 DISSOLVED PHASE MONITORING

Dissolved phase monitoring is conducted at the facility, Hooven, and Southwest Quad to assess plume stability, evaluate natural attenuation within the saturated portions of the smear zone, and measure performance of the final groundwater remedy. Groundwater samples are analyzed for the constituents of concern including benzene, ethylbenzene, toluene, total xylenes, chlorobenzene, arsenic, and lead. Benzene is the constituent most frequently reported in groundwater samples above remedial objectives, with historic concentrations as high as 13 milligrams per liter (mg/L); therefore many of the analyses conducted as part of the final remedy monitoring focus upon benzene depletion within the smear zone. Dissolved phase benzene is not generally detected more than 200 feet outside the LNAPL smear zone due to intrinsic biodegradation at the plume periphery.

Field forms for groundwater samples collected between July and December 2012 are included in Appendix C. Laboratory analytical reports for groundwater samples collected during the second 2012 semiannual monitoring period are provided in Appendix D-1. Data validation reports for each of the analytical packages provided by the laboratory are provided in Appendix D-2. It should be noted that, Analytical Laboratory Services (ALS) located in Cincinnati, Ohio began analyzing groundwater and soil samples collected at the Chevron Cincinnati Facility beginning in 2011, following approval from the USEPA. The analytical summary reports provided by ALS in Appendix D-1 reference the laboratory reporting limits rather than the method detection limits. The method detection limits have been referenced on the summary tables and figures included within previous semiannual monitoring reports and remain so herein. Both the laboratory reporting limits (as listed on the analytical summary reports) and the method detection limits (included in the electronic data deliverable as well as the summary tables and figures) are below remedial goals for this project (USEPA MCLs). The following subsections present the results of dissolved phase monitoring conducted between July and December 2012.

2.2.1 SENTINEL AND POINT OF COMPLIANCE MONITORING

There are three sentinel wells (MW-35, MW-131, and MW-132) and four point of compliance monitoring wells (MW-37, MW-120, MW-133, and MW-134) located at the down-gradient edge of the dissolved phase plume in the Southwest Quad. The sentinel and point of compliance monitoring networks are presented on Figure 2-5. Groundwater samples were collected from the sentinel and point of compliance monitoring wells during October 2012, as part of semiannual monitoring activities in accordance with the schedule described in the *OMM Plan* (Trihydro 2007b).

Groundwater analytical results for the dissolved phase constituents of concern are provided on Table 2-1. Organic constituents of concern (i.e., benzene, chlorobenzene, ethylbenzene, toluene, and xylene) were not detected in any of the sentinel or point of compliance wells during the second 2012 semiannual monitoring period. Groundwater samples collected in October from sentinel well MW-131 had detections of arsenic at the USEPA MCL (0.010 mg/L). Dissolved arsenic was not reported above the USEPA MCL within the groundwater samples collected from the down gradient point of compliance (POC) well MW-37 or any of the other sentinel or POC wells during this event. However, there were several other samples collected from the monitoring wells adjacent to the landfill with arsenic reported above the USEPA MCL (including wells MW-115, MW-139, and MW-142).

Arsenic has been sporadically detected in groundwater collected from monitoring wells located throughout the Southwest Quad and along the river bank for more than two decades and are believed to be indicative of background metals measured in soils. There are elevated, naturally occurring levels of arsenic in soils throughout Ohio as reported in the *Evaluation of Background Metal Concentrations in Ohio Soils* (Cox-Colvin & Associates, Inc. 1996) and the *Closure Plan Review Guidance for RCRA Facilities* (OEPA 2009). In addition, the United States Geologic Survey reports an average background concentration of arsenic of 9.248 milligrams per kilogram in sediment samples collected in Hamilton County within the *National Geochemical Survey - Database and Documentation*.

Based on these results and monitoring performed in the Southwest Quad over the past five years, it is reasonable to conclude that there has not been redistribution of constituents following termination of continuous hydraulic control.

2.2.2 PERIMETER, INTERIOR, AND SUPPLEMENTAL MONITORING

As discussed in the *Five-Year Groundwater CMI Review* (Trihydro 2011) and supported by data collected to date, the LNAPL and dissolved phase petroleum hydrocarbons are laterally stable and degrading over time. Remaining LNAPL in the smear zone is gradually depleted through several mass loss mechanisms including dissolution into groundwater and subsequent dispersion and biodegradation, as well as volatilization and degradation within the vadose zone. Groundwater samples are typically collected from three groups of monitoring wells for evaluation of natural attenuation mechanisms within the saturated zone: perimeter, interior plume, and supplemental monitoring wells. Per the schedule established within the *OMM Plan* (Trihydro 2007b), only the perimeter groundwater monitoring wells were sampled during the second half of 2012.

- Perimeter groundwater monitoring wells include those wells situated at the margins of the smear zone but not considered to be compliance boundaries for dissolved phase petroleum hydrocarbons in the saturated zone. Monitoring wells that are included in this network include MW-26R, MW-33, MW-48S, MW-85S, MW-94S, MW-95S, MW-100S, MW-104S, and MW-115S.

Groundwater analytical results for the dissolved phase constituents of concern reported in samples collected from the perimeter monitoring wells are provided on Table 2-2.

2.3 ROST MONITORING

Three ROST monitoring transects (RT-1 through RT-3) are in place perpendicular to the leading edge of the LNAPL plume, as shown in Figure 2-5. ROST technology was identified as the preferred tool for monitoring the potential for LNAPL migration at the leading edge of the plume because it is designed to provide real-time analysis of the physical and chemical characteristics of the distribution of petroleum hydrocarbons to distinguish between soils containing LNAPL and those outside of the smear zone.

The ROST monitoring transects consist of blank polyvinyl chloride (PVC) casing above the smear at three locations within each transect: an interior location (I) situated at the approximate lateral limit of the smear zone, an intermediate location (M) located 20-feet from the approximate lateral limit of the smear zone, and an outer location (O) installed 40-feet from the approximate lateral limit of the smear zone. A second interior monitoring location has also been established within the middle ROST transect (located approximately 20 feet inside the smear zone) to track LNAPL depletion over time. ROST technology and installation methodology is presented in greater detail in the *RIP* (Trihydro 2007a).

ROST monitoring was completed within the three ROST transects on December 19 and 20, 2012 The tool was advanced from between 5 and 10 feet above the water table to between 5 and 10 feet below the water table in each of the monitoring locations. ROST monitoring logs are provided in Appendix E. Data collected during the December 2012 event indicate that the smear zone is stable as there was not an indication of the presence of LNAPL within any of the intermediate or outer ROST monitoring wells based on laser induced fluorescence measurements in the three transects.

2.4 RIVER MONITORING

A partially penetrating sheet pile barrier wall and bank stabilization measures were installed along the west bank of the Great Miami River between September and December 2008. As part of these bank stabilization measures, a barrier wall performance monitoring network was installed along the restored river bank in accordance with the *Performance Monitoring Plan, Sheet Pile Barrier Along Great Miami River, Chevron Cincinnati Facility, Hooven, Ohio* (Trihydro 2008b). This work plan specified measures to characterize baseline conditions and monitor performance of the partially penetrating sheet pile wall during implementation of the final corrective measures for groundwater. The performance of the sheet pile wall is monitored by observing the hydraulic gradients in groundwater and surface water, as well as evaluating groundwater, hyporheic water, and surface water quality over time.

The barrier monitoring network is comprised of three monitoring transects along the northern, central, and southern portions of the barrier wall as illustrated on Figure 2-6. Each transect includes a groundwater monitoring nest (shallow, intermediate, and deep wells) situated inboard of the sheet pile wall and another nest on the outboard side of the wall. In addition, a hyporheic/surface water monitoring well was also constructed outboard of the wall at each monitoring transect. A description of the installation and construction details for the sheet pile wall, stabilization measures, and performance monitoring network is provided in the *Second 2008 Semiannual Monitoring Report, Chevron Cincinnati Facility, Hooven, Ohio* (Trihydro 2009b)

2.4.1 FLUID LEVEL MONITORING

Pressure transducers were deployed on December 1, 2009 in the groundwater and surface water monitoring wells in the northern and southern monitoring transects to evaluate horizontal and vertical gradients across the partial penetrating barrier wall. Transducers are programmed to record groundwater and surface water elevations at a four-hour frequency. High-frequency groundwater elevation data recorded using the pressure transducers are provided in Appendix A. Manual fluid level gauging was also conducted on July 30, September 26, and November 27, 2012 to supplement the transducer data and measure LNAPL gradients (if present) within the inboard portions of the barrier wall. LNAPL was not detected in any of the monitoring wells situated on the west bank of the river during this gauging event. Manual fluid level measurements are included in Appendix B.

Transducer data from select monitoring wells was used to illustrate vertical hydraulic gradients on the interior and exterior of the barrier wall at the north and south monitoring transects (Figure 2-7 and Figure 2-8). Along the northern transect (shown on Figure 2-7), the groundwater elevation on the interior of the wall was generally lower than the surface water elevation from July through December 2012. In general, there was a downward gradient on the outside of the wall, and a neutral to upward gradient inside of the wall throughout the second half of 2012. These results are consistent with the relatively low groundwater table elevations and absence of any significant precipitation events.

At the southern transect (shown on Figure 2-8), groundwater elevations are generally higher than surface water elevations with brief reversals during rapid rises in river stage. Generally, there is an upward gradient observed on the outboard side of the partially penetrating sheet pile wall that briefly reverses during river stage increases. On the interior portions of the wall there is generally a small upward vertical gradient for the majority of the second half of 2012 that becomes relatively neutral or downward starting in November. The data collected during the second half of 2012 show that groundwater is typically discharging to surface water beneath the barrier wall except during episodic river stage increases when the gradient reverses and surface water discharges into the aquifer. It should be noted that vertical groundwater and surface flow beneath the wall makes up a small component of the overall flow within the aquifer, as the primary flow direction for groundwater and surface water is generally parallel to the riverbank with limited flux to the river. The pathway for groundwater discharging back into the river has been altered as designed by installation of the barrier wall. Groundwater discharging into the river must first travel beneath the partially penetrating wall before making its way back into the river.

2.4.2 GROUNDWATER, HYPORHEIC, AND SURFACE WATER MONITORING

The groundwater, hyporheic, and surface water monitoring wells were purged and sampled using a low flow methodology to prevent potential disturbance of the water quality. An inflatable packer system was used within the hyporheic/surface water zone monitoring wells to isolate a one-foot interval within the uppermost portion of the water column to collect the surface water sample, and then to isolate a portion of the screen at the surface water/groundwater interface to collect the hyporheic water sample. Samples collected from the barrier monitoring network during November 2012 were analyzed for the dissolved phase constituents of concern. Field forms from this monitoring event are provided in Appendix C. Groundwater, hyporheic zone, and surface water analytical reports and data validation reports are included in Appendix D.

A summary of the groundwater results for constituents of concern are provided on Table 2-5. During the November 2012 monitoring event, detections of dissolved phase arsenic and lead were measured in many of the groundwater samples collected from interior and exterior wells. A low level detection of arsenic (0.039 mg/L) and an estimated detection of arsenic (0.027 mg/L) was reported above the MCL from samples collected from interior wells MW-136S and MW-137I respectively. As reported in the *Evaluation of Background Metal Concentrations in Ohio Soils* (Cox-Colvin & Associates, Inc. 1996) and the *Closure Plan Review Guidance for RCRA Facilities* (OEPA 1999), several metals including arsenic and lead are naturally occurring in soils across Ohio and the United States. Arsenic and lead have been sporadically detected in samples collected from both interior and exterior wells along the barrier wall since 2009. These continuous low level detections of arsenic and lead along the barrier wall are likely not attributable to the smear zone since other constituents of concern were not detected in any of the wells, but rather redistribution of naturally occurring arsenic and lead in the sediments. The dissolved phase analytical results continue to support that the smear zone along the west bank of the river is stable and has not migrated towards the barrier wall. In addition, there were no detections of the constituents of concern in any of the hyporheic or surface water samples collected during the second half of 2012.

2.5 VAPOR MONITORING

Soil vapor monitoring is conducted as part of the routine monitoring program associated with the final corrective measures program to: (1) confirm that there is not a completed pathway or an increase in incremental risk to residents in Hooven associated with intrusion of volatile constituents present in soil vapor that are associated with releases from the former refinery, (2) track remedial system effectiveness on reducing the mass of petroleum hydrocarbons present in the deep portions of the vadose zone, and (3) estimate natural depletion rates within the smear zone over the course of the final groundwater remedy. Soil vapor samples were collected from selected intervals within the nested monitoring wells in Hooven (VW-93, VW-96, VW-99, VW-128, and VW-129) in July 2012 prior to start-up of the HSVE system in accordance with the schedule established in the *RIP* (Trihydro 2007a) and *OMM Plan* (Trihydro 2007b). In addition, soil vapor samples were collected monthly from August through December 2012 from the 10-, 20-, 30-, and 40-foot intervals in nested soil vapor monitoring wells VW-96 and VW-99 during operation of the HSVE system as stipulated within the USEPA AOC amendment dated June 23, 2010.

Field forms for the vapor monitoring activities conducted in 2012 are provided as Appendix F. Laboratory analytical reports for the soil vapor samples collected during each of these events are provided in Appendix G-1 and data validation reports for each of the analytical packages provided by the laboratory are included in Appendix G-2. It should be noted that a comprehensive summary of historical soil vapor monitoring results was presented in the *Hooven Vapor Site Conceptual Model Update, Chevron Cincinnati Facility, Hooven, Ohio* (*Hooven Vapor Update*, Trihydro 2010a). Historical soil vapor results collected prior to the second 2012 semiannual monitoring period are not included herein.

2.5.1 STATIC VACUUM/PRESSURE

Prior to initiating sampling activities, the static pressure or vacuum within the nested soil gas probes was assessed to determine whether there were any gradients that might induce soil gas flow. A summary of the static pressure or vacuum measurements recorded in the nested soil gas probes during the monitoring events conducted between July and December 2012 is provided on Table 2-3. In July 2012, prior to startup of the HSVE system, the initial static pressure or vacuum measurements were between 0.0 and 0.5 inches of water, which is in the range that can be produced from wind and barometric pressure, with the exception of an elevated vacuum reported in the 40-foot interval in nested well VW-129 on July 5, 2012. The increased vacuum observed in this probe may be associated with a decreasing water table during the time of the measurements. Between August and December 2012, pressures or vacuums were measured below 0.5 inches of water in the 10-, 20-, 30-, and 40- foot probes of wells VW-96 and VW-99 during the operation of the HSVE system.

2.5.2 SOIL GAS PERMEABILITY

Pneumatic testing was performed at each probe by measuring the differential pressure over increasing soil vapor extraction rates. The gas permeability of geologic materials around the nested soil gas probes was estimated using data collected through pneumatic testing and is included on Table 2-3. Soil gas permeability within the nested probes were between 1E-8 and 3E-7 square centimeters (cm^2) with specific capacities (flow rate per unit of vacuum applied) ranging from 2 to 47 cubic centimeters per second per inch of water column (cm^3/sec•in-H_2O), which are typical for medium to coarse grained sands. It should be noted that soil gas permeability is directly related to moisture content within the sediment around the soil gas probe. Changes in the moisture content associated with infiltrating precipitation accounts for the variation in the permeability and specific capacity observed in an individual probe over time.

2.5.3 NESTED SOIL GAS ANALYTICAL RESULTS

A summary of the soil vapor analytical results for the nested monitoring wells is provided on Table 2-4. The target analytes have been divided into four classes on these tables including: (a) petroleum related constituents, (b) solvent related constituents, (c) water treatment related and other constituents, and (d) fixed gases.

It should be noted that the October 2012 sample from the 40-foot interval of well VW-99 collected on October 26, 2012 was rejected due to atmospheric air leakage into the sample canister. A final vacuum of 3.48 inches of mercury (in-Hg) was reported at canister departure, the canister was received by the laboratory at 0.20 in-Hg, resulting in 3.28 in-Hg loss of vacuum during shipment. The laboratory reported results of this sample indicated atmospheric air interference during the shipping process. This sample has been excluded from the following analysis.

2.5.3.1 PETROLEUM RELATED CONSTITUENTS

During monitoring performed between July and December 2012, 17 of the 25 petroleum related constituents were detected in at least one of the samples collected from the nested soil vapor monitoring wells. Nine of these constituents (benzene, ethylbenzene, m,p-xylene, o-xylene, 1,2,4-trimethylbenzene, isopropyl benzene, n-propylbenzene, cyclohexane, methyl cyclohexane) were detected at a frequency below 5%. Five of these constituents (4-ethyltoluene, toluene, hexane, heptane, 2,2,4-trimethylpentane) were detected at a frequency between 5% and 10%. The remaining volatile petroleum related constituents including isopentane (16.9%), 1,3,5-trimethylbenzene (19.7%), and butane (19.7%) occurred at a slightly greater frequency than other constituents.

The highest concentrations of petroleum related constituents were detected within the samples collected from the 50- and 60-foot interval of well VW-99 and the 55-foot interval of well VW-96 during the July 2012 monitoring event. These intervals in both wells VW-96 and VW-99 are situated within the smear zone associated with releases from the former refinery and are representative of the vapor source.

During the July 2012 event, the concentrations of petroleum hydrocarbons measured above the vapor source within wells VW-96 and VW-99 decreased rapidly above the 50-foot interval in both nested wells. Volatile petroleum hydrocarbons were reported intermittently at low concentrations within the samples collected from nested wells VW-93 and VW-129 during the July 2012 monitoring event. These wells are located above portions of the smear zone which have been depleted by natural attenuation and remedial measures (VW-93) or located beyond the lateral limits of petroleum hydrocarbons associated with the former refinery (VW-129). Volatile petroleum hydrocarbons were not detected during this event within the samples collected from nested well VW-128.

During the monitoring events performed later in 2012 while the HSVE system was operating, the majority of the petroleum hydrocarbons were reported as non-detect within the 10-, 20-, 30-, and 40-foot intervals within nested wells VW-96 and VW-99. It should be noted that concentrations were not elevated prior to start-up of the system within the shallow and intermediate intervals within these two nested wells and petroleum related hydrocarbons remained depleted irrespective of which line of the HSVE system was operating at the time the samples were collected.

2.5.3.2 SOLVENT RELATED CONSTITUENTS

There were nine solvent related chemicals detected during monitoring conducted in the second half of 2012, of which five were detected at frequencies greater than 5%: tetrahydrofuran (7.0%), chlorobenzene (12.7%), 2-butanone (14.1%), tetrachloroethane (35.2%), and acetone (78.9%). Acetone is ubiquitously used for residential and commercial purposes and is also considered a common laboratory contaminant, used for cleaning and preparation of samples within the laboratory. Tetrahydrofuran, chlorobenzene, 2-butanone, and tetrachloroethane were reported in samples collected during both operation and shut down of the HSVE system. These measured solvent are not associated with releases from the former refinery and is indicative of an alternate localized source beneath certain portions of Hooven.

2.5.3.3 WATER TREATMENT RELATED AND OTHER CONSTITUENTS

Eight of the 22 water treatment related and other chemicals were detected during the monitoring performed in the second half of 2012 with four constituents detected at a frequency greater than 5% including trichlorofluoromethane (9.9%), chloroform (15.5%), dichlorodifluoromethane (19.7%), and ethanol (32.4%). Ethanol and chloroform were sporadically detected at low concentrations within each of the nests in Hooven during both operation and shut down of the HSVE system. Trichlorofluoromethane and dichlorodifluoromethane were predominantly measured in soil vapor samples collected from nested wells VW-128 and VW-129. Nested wells VW-128 and VW-129 are located in the central and western portions of Hooven outside of the distribution of petroleum-related hydrocarbons measured in soil vapor; therefore, an alternate source is suspected for these two constituents. Dichlorodifluoromethane and trichlorofluoromethane were historically used as freon within refrigerants and are ubiquitous in the environment. Freon use decreased in the 1980’s after federal regulatory agencies banned its use due to detrimental effects on the ozone layer. Freons are commonly detected at elevated concentrations beneath landfills due to improper disposal practices.

2.5.3.4 FIXED GASES

Fixed gas concentrations including oxygen (O_2), carbon dioxide (CO_2), and methane (CH_4) were measured during purging of the nested probes to determine that steady state conditions had been achieved prior to the collection of a soil gas sample for laboratory analysis and as a quality assurance/quality control measure of the analytical results. Field screening results indicated that the fixed gas measurements were generally stable prior to collecting samples from the nested soil vapor wells.

The fixed gas measurements are included on the field forms provided in Appendix F and the final O_2 and CO_2 concentrations measured from each probe before collecting the vapor sample for laboratory analysis are summarized on Table 2-3. The O_2, CO_2, and CH_4 results reported by the analytical laboratory are summarized on Table 2-4d. The O_2 and CO_2 concentrations recorded in the field were compared to the fixed gas results provided by the laboratory as a measure to validate the field results. Figures 2-9 and 2-10 provide the correlation plots for O_2 and CO_2 measured during the July 2012 sampling event with the HSVE system off and the August through December events performed during operation of the HSVE system, respectively. As depicted on these two figures there was good correlation between the field measurements and the laboratory reported concentrations of these two fixed gases.

Fixed gas results reported by the laboratory are used to evaluate aerobic biodegradation of petroleum related constituents within the vadose zone. During the July 2012 sampling event, there was reduced O_2 and elevated CO_2 observed in the deepest probes in nested wells VW-96 (30-, 40-, 50-, and 55-foot probes) and VW-99 (40- and 50-foot probes) with concentrations approaching anaerobic conditions (O_2 below 2%). O_2 was able to diffuse into the vadose zone resulting in significant reduction of petroleum hydrocarbon concentrations to non-detect or background levels immediately above the vapor source in wells VW-96 and VW-99 (more than 40 feet below basements in overlying structures). The effects of operating the HSVE system in late 2011 were still observed within the shallow and intermediate portions of the vadose zone where alternate sources present near nested vapor wells VW-96 and VW-99 are known to consume available O_2 at shallow depths limiting transport of oxygen to the intermediate and deeper portions of the vadose zone (Trihydro 2010a).

There was very little reduction in O_2 concentrations with depth observed in the vertical profiles for nested vapor monitoring well VW-128 (located above the dissolved phase plume) and well VW-93 (located above portions of the smear zone which have been depleted via natural attenuation and remedial measures). It should be noted that a similar vertical profile for O_2 concentrations was also observed in nested well VW-129 (located in a background area outside the lateral extent of petroleum hydrocarbons associated with releases from the former refinery) during the July 2012 monitoring event.

O_2 concentrations increased during monitoring performed in August within nests VW-96 and VW-99 following start-up of the HSVE system and were reported near atmospheric conditions throughout operation of the HSVE system. These fixed gases remained at near atmospheric levels throughout the vadose zone irrespective of which line of the system was being operated.

3.0 INTERPRETATION

Data collected during the second half of 2012 and included herein continue to demonstrate that intrinsic processes are degrading petroleum hydrocarbons in the smear zone. In general, natural attenuation occurs as constituents present in the smear zone partition to groundwater and soil vapor, where they are biodegraded via aerobic and anaerobic processes. There are two general lines of evidence provided herein to support the efficacy of natural attenuation processes to degrade petroleum hydrocarbons at a rate that will achieve remedial goals for groundwater (i.e., USEPA MCLs) in a timeframe comparable to active remedial measures. The primary lines of evidence demonstrate the stability of petroleum hydrocarbons in the smear zone and protectiveness of sensitive receptors (Section 3.1), as well as meaningful trends of decreasing constituent concentrations over time (Section 3.2). The secondary lines of evidence (Section 3.3) demonstrate indirectly that natural attenuation mechanisms are acting to transform hydrocarbon constituents, reduce concentrations, and inhibit mobility of the LNAPL, dissolved phase, and vapor phase impacts. Qualitative and quantitative lines of evidence demonstrating natural depletion of the smear zone over the first five years of the groundwater corrective measures implementation were provided in the *Five-Year Groundwater CMI Review* (Trihydro 2011). Updates to these lines of evidence for which data was collected during the second half of 2012 are included herein.

3.1 PLUME STABILITY AND PROTECTIVENESS OF SENSITIVE RECEPTORS

During execution of the final groundwater remedy at the site, Chevron must continue to demonstrate that the LNAPL and dissolved phase plumes are stable and that sensitive receptors remain protected (USEPA 1999). If the extent of the LNAPL, dissolved, or vapor phase petroleum hydrocarbons are determined to be mobile or impacting sensitive receptors above risk based limits, contingency measures would be employed as outlined in the *OMM Plan* (Trihydro 2007b).

3.1.1 LNAPL

As discussed in the *Update to Site Conceptual Model and Summary of Remedial Decision Basis* (Chevron Cincinnati Groundwater Task Force 2005) and outlined within the *First 2008 Semiannual Monitoring Report, Chevron Cincinnati Facility, Hooven, Ohio* (Trihydro 2009a), LNAPL within the smear zone is stable. This determination was made based on (1) the age of the release; (2) a decrease in LNAPL gradients, transmissivity, and saturations due to natural degradation and engineered recovery; (3) morphology of the smear zone with a “thicker” core, which thins at the lateral edges; (4) there having been no expansion of LNAPL beyond the originally defined limits of the smear zone; and (5) preferential depletion of petroleum related constituents within the LNAPL at the soil gas and groundwater interface (otherwise referred to as outside-in weathering of the plume).

Data collected during the second half of 2012 continue to support that the smear zone is stable based on the laser induced fluorescence measurements in the three ROST monitoring transects conducted between December 19 and 20, 2012. Additionally, LNAPL was not measured in any of the sentinel or point of compliance monitoring wells installed in the Southwest Quad. Fluid level gauging within the performance monitoring network installed along the west bank of the Great Miami River also confirmed the stability of the smear zone along the restored river bank.

Historical petrophysical tests on soil cores collected in the saturated portions of the smear zone indicate two-phase (water-oil) LNAPL residual saturation ranges from about 18 to 25%. Data collected from the facility show an exponential decrease in the ability of LNAPL to migrate at saturations below 20 to 25%. Field testing completed in the late 1990s indicates that the two-phase LNAPL saturations in the majority of the plume were below residual values (i.e., immobilized). Additionally, soil core samples were collected on the facility in late-2008 and in Hooven in early-2009 and LNAPL saturations calculated using the total petroleum hydrocarbon analytical results from soil samples collected from the cores within the upper, middle, and lower portions of the smear zone were below residual values. No soil cores or LNAPL samples were collected during the second half of 2012. Additional soil cores will be collected during 2013 and LNAPL saturation estimates will be updated at locations across the smear zone.

3.1.2 DISSOLVED PHASE

Dissolved phase constituents of concern (including benzene, toluene, ethylbenzene, xylene, chlorobenzene, dissolved arsenic, and dissolved lead) have not been measured within routine samples collected from the sentinel and point of compliance groundwater monitoring network with the exception of samples collected following flood events as described in previous semiannual reports and the *Five-Year Groundwater CMI Review* (Trihydro 2011). In addition, dissolved phase constituents have not been measured in groundwater or surface water at concentrations exceeding remedial goals along the Great Miami River. Arsenic and lead have been sporadically detected in groundwater collected from monitoring wells located throughout the Southwest Quad and along the river bank over the more than two decades of monitoring and are generally indicative of background metals measured in soils in Ohio as reported in the *Evaluation of Background Metal Concentrations in Ohio Soils* (Cox-Colvin & Associates, Inc. 1996) and the *Closure Plan Review Guidance for RCRA Facilities* (OEPA 1999).

3.1.3 VAPOR PHASE

In order to evaluate protectiveness of human health from migration of deep soil vapors into structures located in Hooven and the Southwest Quad, the data from the nested wells is compared to conservative risk based screening levels. Screening levels are concentrations that are sufficiently low that any results below these can safely be considered to pose no significant risk. They are developed with consideration for uncertainty, and are designed to be overly protective; therefore, concentrations above the screening levels do not necessarily pose an unacceptable risk.

A screening level evaluation was not conducted for the buildings on the refinery as there are few buildings occupied remaining. Mitigation measures have been incorporated into those structures overlying the smear zone where there is the potential for volatile constituents to migrate into the structure. Proposed environmental covenants for any parcels redeveloped on the former refinery require mitigation measures including passive vapor barriers, and if necessary sub-slab depressurization or venting systems to be incorporated into the building design.

Table 3-1 provides the screening level evaluation for gasoline related constituents measured in soil vapor samples collected from the nested wells located in Hooven during monitoring performed between July and December 2012. The residential indoor air screening levels (assuming a lifetime incremental cancer risk of 1E-5 for carcinogenic constituents and a Hazard Quotient of 1 for non-carcinogenic constituents) provided on the USEPA Regional Screening Level (RSL) tables (USEPA 2012) were divided by semi-site specific attenuation factors from Figure 3a of the USEPA Office of Solid Waste and Emergency Response (OSWER) *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (OSWER Draft VI Guidance*, USEPA 2002) to derive soil vapor screening levels (SVSLs). This approach for defining the SVSLs was developed in cooperation with USEPA Region V risk assessment staff and has been presented in previously submitted semiannual monitoring reports. Application of the attenuation factors from Figure 3a of the *OSWER Draft VI Guidance* is conservative for this evaluation, since these do not account for attenuation due to aerobic biodegradation, which is the chief mechanism limiting vapor transport beneath Hooven.

The November 2012 residential RSLs are used to define the SVSLs, as these were developed with the updates to the toxicity data for inhalation of many petroleum and non-petroleum related constituents, and as such represent the most current understanding of the health effects of inhaling the petroleum related constituents discussed herein. In December 2009, the USEPA Office of Inspector General identified that the indoor air screening levels provided in the *OSWER Draft VI Guidance* were outdated and may impede evaluation of the VI pathway (USEPA 2009b). In general, the RSLs are comparable or lower (more protective) than the screening levels provided within the *OSWER Draft VI Guidance*, with the exception of toluene, hexane, and 1,3-butadiene, which were higher. Four constituents (the alkylbenzenes [n-propyl-, n-butyl-, and sec-butyl-] and methyl cyclohexane) had screening levels in the *OSWER Draft VI Guidance* for which the USEPA did not calculate RSLs, as the most recent toxicity data did not support inclusion of these constituents as an inhalation risk.

It is worth noting that screening levels were not provided in the *OSWER Draft VI Guidance* or included as part of the RSL tables for 2,2,4-trimethylpentane. The constituent 2,2,4-trimethylpentane is a component of gasoline and has been detected in soil gas samples collected from the vapor source above the smear zone since 2005. In July 2007, the USEPA summarized the available hazard and dose-response assessment information for 2,2,4-trimethylpentane in the document titled *Toxicological Review of 2,2,4-Trimethylpentane* (USEPA 2007). This report is intended as a thorough review of the scientific understanding regarding the toxicology of 2,2,4-trimethylpentane with the stated purpose of providing "scientific support and rationale for hazard and dose-response assessment in the Integrated Risk Information System pertaining to chronic exposure." In other words, it specifically addressed the task of developing defendable reference concentrations (rfCs) and reference doses (rfDs) for chronic exposure to 2,2,4-trimethylpentane. This report was prepared by independent toxicologists and was subjected to peer review by both USEPA-internal and external toxicologists prior to finalization. The final version reflects an achieved common understanding among the multiple USEPA branches and concludes that there is insufficient data to develop defendable rfCs or rfDs for 2,2,4-trimethylpentane. As such, a screening evaluation for 2,2,4-trimethylpentane is not provided herein.

The screening level evaluation was applied to the deep soil vapor samples collected from 20 ft-bgs or greater in Hooven. The data collected from the shallow probes was not evaluated because vapor concentrations at depths less than 20 ft-bgs are attributable to alternate, surface-derived sources of petroleum hydrocarbons. Based on Figure 3a of the *OSWER Draft VI Guidance*, an attenuation factor of 0.002 was applied to samples collected from depths of 20 ft-bgs, 0.001 was used to screen soil vapor data from greater than 20 ft-bgs to 35 ft-bgs, and an attenuation factor of 0.0007 was used to screen data greater than 35 ft-bgs. Note that the attenuation factors shown on Figure 3a of the *OSWER Draft VI Guidance* correspond to the depth below the foundation. For this evaluation the depth of the basement was conservatively assumed to be 5 ft-bgs; therefore, a sample depth of 20 ft-bgs corresponds to a depth of 15 feet, as shown on Figure 3a (USEPA 2002).

During the monitoring events performed in 2012 there were no detections that exceeded the SVSLs in any of the samples collected from nested monitoring wells VW-93, VW-96, VW-99, VW-128, and VW-129. However, it should be noted that the laboratory detection limit for 1,2-dibromoethane exceeded the depth-specific SVSL in each of the deep soil gas samples collected from the nested wells in Hooven during July 2012. 1,2-dibromomethane has not been detected in any of the deep vapor samples collected across the refinery or Hooven during this or previous monitoring events. The soil vapor monitoring results collected in 2012 continue to demonstrate that there is not an unacceptable risk to the inhabitants in structures overlying the smear zone in Hooven.

3.2 CONSTITUENT TRENDS

It is expected that the data collected over the course of the remedy will show a meaningful trend of decreasing hydrocarbon mass and/or constituent concentrations over time. Analyses that may be used in evaluating the progress of the long term remedy in meeting remedial goals include evaluation of temporal trends in contaminant concentrations, LNAPL mass, or LNAPL saturations; comparisons of observed contaminant distributions with predictions; as well as comparison of calculated attenuation rates with those necessary to meet remedial goals within the required time frame. These analyses can be complicated as a result of variation in the petroleum hydrocarbon distribution across the site, temporal fluctuations related to seasonal and longer term trends, heterogeneity in the vadose and saturated zones across the plume footprint, along with measurement variability. These complications necessitate the use of multiple lines of evidence and expanded monitoring networks to reduce uncertainty.

3.2.1 DISSOLVED PHASE CONSTITUENT TRENDS

The distribution of total benzene, toluene, ethylbenzene, and xylenes (BTEX) in groundwater for samples collected during the second 2012 semiannual monitoring period are displayed on Figure 3-1. It is useful to evaluate the dissolved phase constituent trends in two ways. First, dissolved phase constituent trends within individual groundwater monitoring wells can be used to assess spatial variability in engineered mass removal and intrinsic biodegradation processes across the smear zone footprint and identify areas that are not behaving as predicted. Temporal trends in individual wells may also indicate changes in climatic, hydrogeochemical, hydrocarbon release, site reuse, or other conditions unrelated to attenuation processes and need to be evaluated in the context of other lines of evidence.

Second, groundwater quality trends can be averaged within areas of the smear zone (i.e., up-gradient, interior, down-gradient) to assess overall trends in natural attenuation processes. These area averages are less sensitive to variations within individual wells that can sometimes complicate temporal analyses and provide an understanding of natural attenuation processes affecting the smear zone as a whole. For discussion purposes, there are two areas up-gradient of the smear zone, one to the north of the facility property and the second to the west along the Buried Valley Aquifer-bedrock interface in Hooven.

Individual well and area-wide trend analyses performed using data collected from monitoring wells across the smear zone during previous semiannual monitoring events have demonstrated a consistent degradation of benzene associated with both natural attenuation and engineered mass removal, with preferential depletion along the smear zone margins (i.e., outside-in weathering). Historically, groundwater samples are collected from a set of interior and supplemental groundwater monitoring wells (L-1RR, L-3R, MW-17, MW-21, MW-22, MW-38, MW-64, MW-81S, MW-85S, MW-93S, MW-99S, and MW-115S) for completing these temporal analyses. As groundwater samples were only collected from two of these interior and supplemental wells during the second 2012 monitoring period, per the schedule established in the *OMM Plan* (Trihydro 2007b), these trend analyses were not updated for this reporting period. However, the trend analyses will be updated as part of the first 2013 semiannual monitoring report as groundwater samples are scheduled to be collected across the interior and supplemental monitoring networks.

3.2.2 VAPOR PHASE CONSTITUENT TRENDS

As with temporal analysis of the dissolved constituents of concern, soil vapor results from samples collected within the smear zone (i.e., vapor source) should be considered as another line of evidence to demonstrate the effectiveness of natural attenuation mechanisms to degrade the petroleum hydrocarbon source over time. Vapor source trend analyses will be conducted using data collected from soil vapor monitoring wells installed across the distribution of petroleum hydrocarbons to assess the rate of attenuation in various portions of the plume. The trends observed in the vapor source should be evaluated in the context of the other lines of evidence to identify secondary causes of variation such as seasonal fluid level fluctuations or longer term cyclical events such as droughts.

Monitoring wells VW-93, VW-96, and VW-99 have a sufficient monitoring history to complete temporal analyses and are located over the smear zone. Figures 3-2 through 3-4 show the concentration of benzene and total petroleum hydrocarbons reported in the vapor source in nested wells VW-93, VW-96, and VW-99 over the past 16 years. Substantial degradation is observed in the vapor source concentration since 1997, with a two to five order of magnitude decrease in benzene and total petroleum hydrocarbon concentrations. This decrease in concentrations is partially attributable to operation of groundwater, LNAPL, and soil vapor recovery systems in Hooven beginning in 1999.

Reduction in the total volatile petroleum hydrocarbons (TVPH) and benzene concentrations has been more significant in well VW-93 compared to wells VW-96 and VW-99. As shown on Table 4-4, Line No. 2 (the closest extraction line to nested vapor well VW-93) has been run substantially less than Lines No. 1 and No. 3 (closest extractions lines near wells VW-96 and VW-99 respectively). This may be an indication that operation of the HSVE system alone does not fully account for the reduction of petroleum related constituents in the smear zone beneath Hooven. Alternate sources of petroleum hydrocarbons have not been observed in the soil vapor profiles from well VW-93; therefore, O_2 transport and aerobic biodegradation is not limited within the deeper portions of the vadose zone near this nested soil vapor monitoring well.

There was a significant increase in the TVPH concentrations in the vapor source (i.e., deepest sample) reported in wells VW-96 and VW-99 between September 2008 and October 2009 associated with extended shutdown of the HSVE system for more than 22 months during the USEPA investigation of the vapor intrusion pathway beneath Hooven. This trend was magnified during the September/October 2009 event by operation of the high-grade system. Induced depression of the water table during high-grade operation exposed the deepest portions of the smear zone containing the highest mole fraction of volatile petroleum hydrocarbons (Trihydro 2009b). Petroleum related concentrations in the deep soil vapor samples collected from nested wells VW-96 and VW-99 decreased again with operation of the HSVE system between 2009 and 2012.

3.3 HYDROGEOCHEMICAL INDICATORS OF NATURAL ATTENUATION

Characterization of geochemical variations in the vadose and saturated zones provides evidence of the types of biodegradation processes that are thought to be attenuating petroleum hydrocarbons in the smear zone. Many of the processes attenuating hydrocarbons in the smear zone cannot be measured directly (e.g., biological transformation of constituents). However, the processes may cause changes in geochemical parameters, leaving an observable "footprint" that can be related qualitatively and quantitatively to the natural attenuation processes (National Research Council 2000). In general, naturally occurring inorganic geochemical species serve as electron acceptors and are reduced during microbial degradation (i.e., oxidation) of petroleum hydrocarbons.

3.3.1 DISSOLVED PHASE CONSTITUENTS

As previously described, hydrogeochemical analyses were not performed during the second half of 2012 per the schedule established within the *OMM Plan* (Trihydro 2007b); and; therefore, these analyses were not updated or included herein. The natural attenuation indicators are scheduled to be collected again during the first semiannual 2013 monitoring period. Tables and charts depicting the spatial distribution of these indicators will be updated and presented as part of the first 2013 semiannual monitoring report.

3.3.2 VAPOR PHASE CONSTITUENTS

Aerobic degradation of petroleum hydrocarbons within the vadose zone occurs (often in a relatively thin zone) where the concentrations of O_2 and volatile constituents are optimal for the growth of petrophyllic bacteria. Aerobic degradation has the potential to reduce volatile petroleum related constituent concentrations by several orders of magnitude, as long as the supply of O_2 is not rate limiting (Roggemans et al. 2001). CO_2 is produced as a result of aerobic biodegradation of hydrocarbons. The expected vertical profiles of O_2 and CO_2 concentrations in the presence of aerobic biodegradation tend to be mirror images. Depth profiles of petroleum related constituent and O_2 concentrations provide qualitative evidence of the occurrence of aerobic biodegradation in the vadose zone.

- For cases where there is little or no hydrocarbon source at depth, the hydrocarbon vapor profiles will show results at or near the reporting limit (i.e., background or non-detectable concentrations) from the deepest to the shallowest portions of the vadose zone. The concentration of O_2 will be nearly constant (approaching atmospheric levels) throughout the unsaturated zone.

- Where there is a significant hydrocarbon source at depth and aerobic biodegradation of volatile constituents, the hydrocarbon vapor profile will show a decrease in hydrocarbon concentration with increasing distance above the source that is more rapid than that expected due to diffusion alone. The petroleum hydrocarbon concentration profile will show three distinct zones. The first zone is from the source to a depth where active aerobic biodegradation is not occurring. This zone is representative of anoxic conditions where diffusion is the primary transport mechanism and hydrocarbon vapor concentrations decrease in a linear profile, if at all. Methane is often measured within this zone. The second portion of the profile represents the active zone of aerobic biodegradation (which can be relatively thin compared to the thickness of the unsaturated zone), where there is rapid attenuation of hydrocarbon concentrations coinciding with consumption of O_2 (Johnson et al. 1999). It is not uncommon to see O_2 concentrations decrease from atmospheric levels (20.9%) to 1-2% (DeVaull et al. 1997) within this zone. In the third zone (above the biologically active layer) hydrocarbon concentrations are typically very low or not detectable and there is generally elevated O_2. These profiles may vary if there are significant stratigraphic layers of different geologic materials, which is not the case beneath Hooven.

- For cases where there is a release of petroleum hydrocarbons at or near the ground surface that is unrelated to historical releases from the former refinery (referred to herein as an alternate source) that has migrated into the unsaturated zone, the vertical profiles will be different than the case of a single source at the bottom of the unsaturated zone. If the alternate source is minor, O_2 depletion may only be a few percent below atmospheric levels and vapor concentrations may be reduced to non-detectable or background levels within a few feet of the alternate source. However, where the alternate source is more significant, O_2 concentrations may be fully consumed and aerobic degradation may be limited, in which case, hydrocarbon vapors would be more persistent. Consumption of O_2 by an alternate source would also limit the supply of O_2 to deeper portions of the vadose zone, thereby reducing the effectiveness of aerobic biodegradation. If this occurs, vapors from the source at depth diffusing upward and those associated with the alternate source diffusing downward may comingle at intermediate depths. Depending on the composition of the alternate source (i.e., weathered gasoline, diesel, motor oil, etc.) it may be difficult to distinguish whether the vapors are derived from shallow or deep sources. Additionally, the presence of alternate sources and preferential depletion of O_2 at shallow depths in the vadose zone may allow migration of vapors from the source at depth to shallower portions of the vadose zone than would otherwise occur if the alternate source was not present.

Vertical profiles for TVPH and O_2 were created for the nested vapor wells for monitoring events conducted during the second 2012 semiannual monitoring period, as described in the subsections below. The vertical soil vapor profiles were grouped into three general categories, based on the location of the nested vapor monitoring wells:

1. Overlying LNAPL, including nested wells VW-93 (Figure 3-5), VW-96 (Figure 3-6), and VW-99 (Figure 3-7)
2. Overlying dissolved phase petroleum hydrocarbons, as represented by nested well VW-128 (Figure 3-5)
3. Background areas beyond the limit of LNAPL and dissolved phase hydrocarbons, as represented by nested well VW-129 (Figure 3-5)

Profiles were constructed for TVPH, which is a mixture of hydrocarbon constituents whose composition can vary significantly both spatially (across depth intervals in each nest) and temporally (across sample events). TVPH was estimated by summing the mass of the detected volatile petroleum related hydrocarbon constituents shown in Table 2-4a. For constituents that were reported as "non-detect", half the detection limit was used as a surrogate in the estimation of the TVPH concentration. CH_4 was not included in calculation of the TVPH values.

3.3.2.1 NESTED WELLS OVERLYING LNAPL

Vapor profiles for data collected in July 2012 from nested wells VW-96 and VW-99 show a rapid decrease in vapor concentrations from the source at the water table to 40 ft-bgs. A corresponding consumption of O_2 is noted in the fixed gas profiles at these depths, indicating that aerobic degradation is the primary mechanism for these reductions. Detections of petroleum related constituents at shallow probes, observed in the TVPH profiles of well VW-96 and VW-99 during the second 2012 semiannual monitoring period, are related to a previously identified alternate sources near these nested vapor monitoring wells. Increasing concentration trends above the 30 foot interval in these wells are not consistent with vapor diffusion from a single vapor source at the water table. Diffusion occurs as a result of a concentration gradient and results in movement of chemicals from areas of high concentration to areas of low concentration. The reverse concentration gradient in shallow probes is consistent with the presence of an alternate source of petroleum hydrocarbons that may have migrated downward into the vadose zone from a release at or near ground surface.

The profiles for data collected in July 2012 for nested well VW-93 are consistent with those from a limited hydrocarbon source (i.e., concentrations near background or not detected throughout the profile). These results are similar with previous sampling events conducted since 2005. It is worth noting that historically the concentrations of TVPH measured above the smear zone in this well were similar to those measured in wells VW-96 and VW-99 and much higher than those observed since 2005. These data support that the vapor source concentrations have decreased dramatically due to the combined effects of aerobic biodegradation and corrective measures system operation, which is similar to trends observed in the LNAPL and soil core samples collected from this well.

3.3.2.2 NESTED WELLS OVERLYING DISSOLVED HYDROCARBONS

Nested vapor monitoring well VW-128 is located over the distribution of dissolved phase hydrocarbons but outside the area of residual LNAPL present in the smear zone. The TVPH profile for this well is consistent with cases where there is a limited hydrocarbon source at depth. The TVPH concentrations were non-detect throughout the vadose zone, and there was a slight reduction in the O_2 concentrations with depth across the vadose zone.

3.3.2.3 NESTED WELLS OUTSIDE OF LNAPL AND DISSOLVED PHASE HYDROCARBONS

Vertical profiles of TVPH and fixed gases for nested vapor well VW-129, located outside the area of petroleum hydrocarbons associated with the former refinery, show TVPH concentrations at non-detect or background levels within the vapor samples and O_2 concentrations remained constant throughout the vadose zone.

3.4 SUMMARY OF LINES OF EVIDENCE SUPPORTING NATURAL ATTENUATION

Performance monitoring for any corrective measures program is necessary to demonstrate that the remedy is progressing as anticipated and will meet remedial goals while ensuring that sensitive receptors remain protected. The USEPA has established additional performance monitoring criteria for remedies incorporating intrinsic natural attenuation processes for degradation of residual impacts (USEPA 1999, USEPA 2003). Performance monitoring programs in these cases must be designed to:

1. Demonstrate that natural attenuation is occurring according to expectations.
2. Detect changes in environmental conditions (e.g., hydrogeologic, geochemical, microbiological, or other changes) that may reduce the efficacy of any of the natural attenuation processes.
3. Identify any potentially toxic and/or mobile transformation products such as CH_4 within the vadose zone.
4. Verify that the LNAPL or dissolved phase plume is not expanding down-gradient.
5. Verify no unacceptable impact to down-gradient receptors.
6. Detect new releases of contaminants to the environment that could impact the effectiveness of the natural attenuation remedy.

These performance monitoring criteria have been achieved during this second semiannual monitoring event based upon the qualitative and quantitative lines of evidence used to demonstrate the stability of petroleum hydrocarbons in the smear zone, protectiveness of sensitive receptors, transformation of petroleum hydrocarbon constituents via intrinsic processes, as well as decreasing petroleum hydrocarbon constituent concentrations and mass over time.

4.0 HIGH-GRADE RECOVERY

The high-grade pumping component of the groundwater remedy focuses on seasonal source removal of LNAPL from the lower reaches of the smear zone where the saturations remain the greatest. The purpose of high-grade recovery is to (1) further reduce LNAPL mobility at the lowest ambient water table conditions and (2) remove additional LNAPL mass from the smear zone. A summary of the high-grade recovery event conducted during the second half of 2012 is provided in this section.

4.1 2012 HIGH-GRADE SUMMARY

High-grade pumping began on June 25, 2012 and concluded on January 9, 2013. High-grade recovery was primarily focused on the Central Area (using production well PROD_25); however, once trigger elevations were achieved in the Southwest High-Grade Area, pumping was performed primarily using well PROD_19. Recovery in the Southwest Area was performed between July 17 and October 11, 2012. A total of 42,096 gallons of LNAPL was recovered during this high-grade event. As described in Section 2.1, transducers were deployed within a monitoring network across the high-grade area to collect continuous drawdown data. Groundwater elevation data collected from the transducers are provided in Appendix A. In addition, fluid levels were gauged within an expanded monitoring network at least once each week to evaluate changes in the LNAPL and groundwater elevations in response to high-grade pumping. Manual fluid level measurements are provided in Appendix B. Groundwater and LNAPL extraction rates from production well PROD_25 were compared weekly against operational logs at the biologically enhanced granular activated carbon (GAC) and recovery volumes measured in Tank No. 291 and Tank No. 50 throughout the high-grade event. Table 4-1 provides a weekly summary of LNAPL recovery and Table 4-2 provides a summary of the daily groundwater extraction rate and fluid levels measured within the production wells during the 2012 high-grade event.

4.1.1 LNAPL RECOVERY

The 2012 high-grade event focused on additional LNAPL recovery from within the central and southwest portions of the smear zone. A total of 42,096 gallons of LNAPL was recovered during the 2012 event with 30,423 gallons recovered using production well PROD_25 in the Central Area, and 11,673 gallons recovered primarily using production well PROD_19 within the Southwest Area. Groundwater extraction rates using well PROD_25 ranged from 1,800 and 2,600 gallons per minute (gpm) from start-up through July 17, 2012, and continued to be sustained between 1,900 and 2,875 gpm from October 11, 2012 through January 9, 2013. In the Southwest High-Grade Area, groundwater was extracted at a rate between 2,000 and 2,860 gpm. Figure 4-1 presents a summary of the LNAPL recovery versus background groundwater elevations as measured in upgradient well MW-21, located outside of the influence of high-grade pumping activities.

Figures 4-3 and 4-4 present the drawdown maps for the fluid levels measured on September 26, 2012 for the Southwest Area and November 27, 2012 for the Central Area. The drawdown for each well was calculated as the difference in groundwater elevation measured on the plotted dates and the respective ambient groundwater elevation reported prior to high-grade pumping on June 25, 2012. The drawdown for each well reported on Figure 4-3 and 4-4 was corrected for the ambient changes in the water table as measured in monitoring well MW-21, located outside the influence of high-grade pumping in the Central and Southwest Areas. As expected, drawdown was greatest within or near the production well including well PROD_25 (10.66 feet) in the Central Area and monitoring well MW-20S (6.82 feet) in the Southwest Area. Drawdown in both areas propagated nearly radially away from the well. Additional drawdown and lateral influence was observed in 2012 compared with previous high-grade events.

Table 4-3 provides a summary of cumulative and daily LNAPL recovery rates, average groundwater extraction rates, as well as the LNAPL removal efficiency for the primary production wells used during the 2007 and 2009 through 2012 high-grade recovery events. During the 2012 event, LNAPL was recovered in the Central Area at an average rate of 229 gallons per day (gpd) from production well PROD_25, with an average of 3,802,738 gallons of groundwater recovered each day, resulting in a LNAPL recovery efficiency of 60 gallons of LNAPL recovered for every million gallons of groundwater extracted. In the Southwest Area, LNAPL was recovered at an average rate of 188 gpd within an average daily groundwater extraction rate of 3,879,522 gpd (primarily from well PROD_19). This resulted in LNAPL recovery efficiency of 48 gallons of LNAPL recovered for every million gallons of groundwater extracted from the production wells installed in the Southwest Area. An evaluation of the entire 2012 high-grade recovery event indicates that LNAPL was recovered at an average rate of 216 gpd with an average of 3,827,151 gallons of groundwater recovered each day with an overall LNAPL recovery efficiency of 57 gallons of LNAPL recovered for every million gallons of groundwater removed from the aquifer. For comparison, the LNAPL recovery efficiency for high-grade pumping performed in 2011 measured 4.8 gallons of LNAPL recovered for every million gallons of groundwater extracted from the aquifer. The low recovery efficiency observed during the 2011 event is attributed to increasing ambient water table elevations following the start-up of the high-grade event.

4.1.2 REVISED TRIGGER ELEVATIONS

Effective LNAPL recovery can only proceed during adequately low water table conditions, which have been determined based on historical trends and field observations during seasonal dry periods. The presence of recoverable LNAPL in wells is a function of water table elevations (triggers) and the thickness of the exposed smear zone. The water table must be low enough to expose the approximate bottom third of the smear zone before LNAPL can be recovered. The goal of high-grade pumping is to use focused groundwater extraction to maximize the exposed smear zone and recover LNAPL during low water table conditions. Maximal exposure of the smear zone occurs when the water table is drawn down below the previous minimum groundwater elevation. Thus, the minimum historical groundwater elevation within a well is used to establish targets for initiating high-grade recovery. With each successful high-grade event, the depth of maximum smear zone exposure will be lowered, thereby establishing new, lower triggers for starting high-grade recovery over subsequent events. The trigger for initiating high-grade recovery is determined via the following equation:

$$\text{Pumping Trigger} = PT_i + s_{i,j}$$

Where:

PT_i = Pumping target at monitoring well location i; value is the historical minimum water table elevation in feet above mean sea level (ft-amsl)

$s_{i,j}$ = Expected drawdown at monitoring well location i caused by high-grade pumping at production well j

As noted by the subscripts in the above equation, pumping triggers are specific to the monitoring location and the production well (central area monitoring wells: MW-18R, MW-40, MW-56, MW-57, and MW-79; southwest area monitoring wells: MW-20S, MW-93S, MW-96S, and MW-99S). Prior to each high-grade event, new pumping triggers will be calculated by analyzing the fluid level data from the preceding event. New triggers will be established at locations where the water table was lowered to a new minimum elevation. Otherwise, triggers from the preceding year will be carried forward. The expected drawdown will be based on fluid level monitoring data collected during previous high-grade pumping events.

Figure 4-5 shows a comparison of MW-20S hydrographs between the last two sustained events in the Southwest Area (2007 and 2012). The hydrographs show that even though groundwater elevations remained below triggers for a shorter period in 2012, high-grade pumping using production well PROD_19 resulted in the lowest recorded groundwater elevation within this well (s_{ij}). This increased flow and communication with the surrounding aquifer is attributed to an increase in drawdown associated with installation of an inflatable packer in production well PROD_19. As such, due to the increase in expected drawdown within the well, the trigger level elevation for MW-20S was increased following the 2012 event.

The hydrograph for monitoring well MW-20S (Figure 4-5) also shows that a lower groundwater elevation must be achieved before LNAPL recovery can be sustained in the production well. Likewise, in the Central Area weekly LNAPL recovery rates achieved in 2010 were significantly higher than those achieved in 2012 even though groundwater elevations were similar (Figure 4-6). These observations indicate that the corrective measures are removing hydrocarbon mass within the lower portions of the smear zone as designed. New trigger elevations for both the Central and Southwest Areas are shown on Table 4-4.

4.2 BIOLOGICAL ENHANCED GAC SYSTEM OPERATION

The biologically enhanced GAC is designed to remove dissolved phase petroleum hydrocarbons, primarily BTEX from extracted groundwater. Extracted groundwater is transmitted to the GAC for treatment from one or more of the production wells located at the Facility. The GAC treatment process is discussed in further detail in the *OMM Plan* (Trihydro 2007b).

Following treatment in the GAC, groundwater is transmitted to the sedimentation pond and constructed wetlands prior to discharge to the Great Miami River through the wetlands outfall. Groundwater samples are collected weekly at the wetlands outfall to evaluate compliance with National Pollutant Discharge Elimination System (NPDES) discharge limits. A composite groundwater sample was collected each week using an automated sampler, which collects a sample aliquot every 45 minutes over a 24-hour period. Composite samples were analyzed to evaluate compliance with discharge requirements set forth in the Facility's NPDES permit. Groundwater samples are analyzed for pH, biological oxygen demand, total suspended solids, oil and grease, total lead, as well as dissolved phase BTEX, total phenols, and 1,2-dichloropropane. Monthly and daily concentration and loading limits are established for these constituents. None of the effluent limits were exceeded in the weekly samples collected from the outfall during the second half of 2012.

4.3 HSVE SYSTEM OPERATION

Chevron installed the HSVE system as an interim measure for reducing petroleum hydrocarbon mass beneath Hooven (ERM 1999). Pilot testing to determine the effectiveness of soil vapor extraction technology was conducted in June and November 1998. Based upon the results of the pilot testing and completion of a remedial options analysis in June 1999, it was determined that soil vapor extraction presented the best available technology for removing volatile hydrocarbons, while minimizing disruptions to residents in Hooven.

The HSVE system is comprised of three six-inch diameter, Schedule 40 carbon steel pipes that extend from the western edge of the facility beneath State Route 128 continuing under Hooven, coincident with the distribution of refinery related hydrocarbons. Line No. 1 extends westward beneath Hooven Avenue, Line No. 2 is located beneath Brotherhood Avenue curving to the south towards the former Hooven Elementary School, and Line No. 3 is located beneath Ohio Street. The well screens for each of the lines were installed approximately 5-feet above the 15 year maximum groundwater elevation at the time of installation (478 ft-amsl for Line Nos. 1 and 2 and 475 ft-amsl for Line No. 3).

Pilot test, modeling, tracer test, and performance monitoring results indicate a radius of influence of the HSVE system of at least 125 and likely more than 450 feet from the extraction lines (Trihydro 2010b). No structure in Hooven, situated over the distribution of petroleum hydrocarbons associated with releases from the former refinery, is more than 200 feet from one of the HSVE extraction lines, with the exception of a single residence located approximately 250 feet north of Line No. 3. Therefore, operation of the HSVE system affects soil vapor conditions within the deeper portions of the vadose zone throughout portions of Hooven overlying the smear zone.

The system commenced operation in November 1999 following installation of HSVE Line No. 1. Lines No. 2 and No. 3 were installed in 2000 and brought online during the first quarter 2001. Currently, operation of the HSVE system occurs in accordance with the USEPA AOC amendment dated June 23, 2010, which states that the system will be operated upon completion of soil vapor monitoring in the 10-, 20-, 30, and 40-foot intervals in nested wells VW-96 and VW-99 once a groundwater elevation of 465 ft-amsl is reached in monitoring well MW-96. Seasonal operation of the HSVE system is terminated once groundwater elevations rebound above the trigger elevation in monitoring well MW-96.

4.3.1 2012 OPERATIONS SUMMARY

As summarized on Table 4-5, during the 2012 high-grade event the HSVE system utilized Lines No. 2 and No. 3 simultaneously for 179 days between July 10, 2012 and January 14, 2013. Approximately 35,120 pounds of volatile constituents were recovered via operation of the HSVE system during the high-grade event. The estimated hydrocarbon mass removed from the system is calculated based upon the concentration of total petroleum hydrocarbons and CH_4 reported in the influent vapor samples, average flow rate recorded at the wellhead, and hours of operation over the reporting period.

Operational data is collected at each of the process lines during operation of the HSVE system including the rate of airflow, vacuum, total organic vapors, lower explosive limit, as well as the fixed gas concentrations including O_2, CO_2, and CH_4. Table 4-6 presents a summary of the operational monitoring data recorded at each of the extraction lines. In general, during operation of the extraction lines, O_2 concentrations would increase over time within the influent, with a corresponding slight decrease in CO_2 and CH_4. Total organic vapors gradually increased with the highest concentrations occurring on September 7, 2012 (520 ppm) and October 5, 2012 (370 ppm) within Line No. 2 and Line No. 3, respectively. Following the peak concentration, total organic vapors generally decreased over the remaining operational period.

Influent and effluent vapor samples were collected monthly to demonstrate compliance with the Hamilton County Permit to Operate. The compliance monitoring data is compared to permitted operational limits on a quarterly and semiannual basis. Table 4-7 presents a summary of compliance monitoring data collected from the system during operation in the second half of 2012, as well as a summary of the calculated volatile hydrocarbon extraction and emission rates (reported in pounds per hour, pounds per day, and tons per year). Monthly emission rates were below the allowable limits of 6.25 pounds per hour. The average emission rate was approximately 1.3 pounds per hour during operation of the system in late 2012.

Figure 4-2 presents the estimated organic carbon removed beneath Hooven via operation of the HSVE system since November 1999. More than 635,227 pounds of petroleum hydrocarbons have been removed from the smear zone beneath Hooven since 1999. The HSVE system ran a total of 179 days during 2012 and into early January 2013 with an average mass removal rate of 196 pounds per day (lbs/day). In comparison, the system was operated for 183 days in 2010 with an average mass removal rate of 344 lbs/day. There has been an overall decline in mass removal rates using the HSVE system since 2010. The HSVE system was designed to remove volatile petroleum hydrocarbons at a high rate initially, with an expectation that the mass removal rate would gradually diminish as the volatile petroleum hydrocarbons within the smear zone were depleted, at which time the system would be operated intermittently and ultimately shut down.

Influent concentrations have been reduced to a point that the oxidizer can now operate in catalytic oxidation mode versus a thermal oxidation mode resulting in a 75% reduction in natural gas usage. It is anticipated that when the system is ready to be permanently shut down, the remaining hydrocarbon mass within the influence of the system would diminish to a level where continued operation does not result in reduction of soil vapor concentrations beyond those observed via aerobic biodegradation alone, as can be observed in the vapor source concentration trends for nested soil vapor monitoring well VW-93 (Figure 3-2). However, in some portions of Hooven, volatile petroleum hydrocarbon concentrations have persisted in the smear zone, despite operation of the HSVE system. This may be explained by alternate sources of petroleum hydrocarbons identified in the shallow and intermediate portions of the vadose zone near these locations, as discussed in the *Hooven Vapor SCM Update* (Trihydro 2010a). Aerobic biodegradation of these alternate petroleum hydrocarbon sources preferentially utilizes O_2. As such, O_2 transport to deeper depths where hydrocarbons from the former refinery are present at the water table is limited; therefore decreasing natural attenuation within the smear zone. This can be observed in the vapor source trends for wells VW-96 and VW-99 (Figures 3-3 and 3-4). In portions of Hooven where alternate sources of hydrocarbons are present at shallower depths, the HSVE system not only removes volatile petroleum hydrocarbons, but also advectively transports O_2 to the deepest portions of the vadose zone where it would otherwise not be present. Aerobic biodegradation, and not source removal, may be the primary mechanism degrading the volatile petroleum hydrocarbons present in the smear zone, hence the difference in vapor source concentrations observed in vapor well VW-93 compared to wells VW-96 and VW-99 since 1999.

5.0 GULF PARK

A former products transfer pipeline corridor, consisting of five 6-inch diameter lines that connected the former refinery with a loading terminal on the Ohio River, was located beneath the Gulf Park property. The pipelines carried three grades of gasoline, kerosene, aviation fuel, diesel, and fuel oil during use between 1930 and the mid-1980s. Hydrocarbon-stained soil was discovered in Gulf Park in January 1993 at approximately 10 to 14 feet below grade. Several subsurface investigations to define soil and groundwater conditions and the extent of petroleum hydrocarbons were conducted between 1993 and 1994.

Based upon the findings of these investigations, a bioventing system was installed in the area that is now the westernmost soccer field at Gulf Park in 1996. It consisted of a blower that provided approximately 30 to 35 standard cubic feet per minute (scfm) to 14 injection wells. Valve controls for the air injection wells installed in the soccer field area are located in a nearby Valve Control Shed (VCS No. 1). The first bioventing system expansion was installed between August and October 2000, consisting of an additional 38 bioventing wells constructed of 2-inch diameter PVC casing and 0.010-inch slotted screen. These bioventing wells were completed below grade and connected to a separate Valve Control Shed (VCS No. 2). The second bioventing system expansion was completed in 2012, and consists of 14 bioventing wells, which are connected to the existing VCS No. 1. Figure 5-1 shows the layout of the complete bioventing system installed at Gulf Park.

There are two primary lines of evidence used to evaluate the remedy performance at Gulf Park. First, soil vapor data is collected from selected nested wells installed in the shallow and deep portions of the vadose zone to evaluate fixed gas concentrations during times when the bioventing system is active and inactive. Second, dissolved phase monitoring is conducted annually in Gulf Park to evaluate temporal and spatial trends in the dissolved phase constituents of concern, as well as natural attenuation indicators.

5.1 BIOVENT SYSTEM OPERATION

Bioventing stimulates intrinsic biodegradation of petroleum hydrocarbons in the vadose zone by injecting air at low flow rates to provide sufficient O_2 to sustain aerobic microbial activity. Airflow is injected at rates designed to maximize O_2 delivery to the subsurface while minimizing volatilization of hydrocarbon constituents, thus eliminating the necessity for vapor intrusion or ambient air pollution control measures.

Startup and shutdown criteria for the biovent system are related to groundwater trigger levels beneath Gulf Park. Historic soil vapor monitoring data indicate that higher respiration rates occur within the lower portions of the smear zone. However, this portion of the smear zone is only exposed during low water table conditions. The groundwater level is typically above the trigger level elevation from January through June and below the trigger level intermittently from July through December. The period of low water table conditions is considered the seasonal bioventing operation period. Figure 5-2 presents the hydrographs from the trigger monitoring wells for 2006 through 2012. As shown, groundwater elevations were generally below the trigger levels within wells GPW-5S and TH-2 from early June through early December 2012.

5.2 BIOVENT SYSTEM MODIFICATIONS

The overarching goal of the biovent system modifications was to redirect air flow from areas in which biodegradation is currently not rate limited by diffusion of O_2 from the atmosphere to the smear zone into areas where aerobic degradation of petroleum hydrocarbons is rate limited by the availability of O_2. These modifications to the biovent system included (1) constructing new biovent wells within portions of the smear zone that are currently outside the influence of the system and (2) increasing the rate of flow into existing biovent wells as discussed below.

5.2.1 BIOVENT SYSTEM EXPANSION

As discussed in the *Five-Year Groundwater CMI Review* (Trihydro 2011), elevated petroleum related constituents and methane have been observed in soil, groundwater, and soil vapor immediately south of the historical limits of the biovent system near monitoring wells TH-1 and TH-2. Therefore, 14 additional biovent wells were installed (biovent wells BVW-39 through BVW-52) between March and July 2012 within this portion of the smear zone, as shown on Figure 5-1. These wells are constructed of 2-inch, Schedule 40 PVC and were installed with 15-feet of factory slotted 0.02-inch screen. The screen intervals were generally set between 451 and 467 ft-amsl.

These new wells were connected to VCS No. 1 by installing an approximately 2-foot deep trench and installing 3-inch diameter, Schedule 40 PVC transmission lines to each injection well. The new injection lines were connected to the existing balancing valves and flow meters within VCS No.1 by installing a wye valve on lines connected to the original 14 injection wells.

In addition, the transmission line that extends to biovent well BVW-3 was exposed to evaluate reduced flow historically observed within this well. There were not any blockages or breaks observed within the transmission line. There biovent well BVW-3 was abandoned, re-drilled, and installed in proximity to soil boring GPSA-43 where petroleum hydrocarbon concentrations in soil remain elevated (Trihydro 2011).

5.2.2 AUGMENTATION OF AIR DELIVERY RATES

Based on the results of respirometry testing conducted in 2010, biodegradation within the smear zone is not rate limited by the availability of O_2 beneath the southeast portion of the biovent system. Therefore, air injection into the 12 biovent wells located near this portion of the system (wells BVW-11, BVW-12, BVW-20, BVW-21, BVW-22, BVW-23, BVW-24, BVW-25, BVW-35, BVW-36, BVW-37, and BVW-38) was terminated. This allowed for increasing the injection rate into the remaining 26 existing and 14 new biovent wells, resulting in an approximate 30% increase in air injection rates (or an increase from 35 scfm to approximately 45 scfm within each well).

5.3 BIOVENT SYSTEM PERFORMANCE MONITORING

The bioventing system at Gulf Park was operated from April 18, 2012 through January 11, 2013 with a shutdown during the month of May due to flooding along the Great Miami River and again in October to perform respirometry testing. Each bioventing well has a valve to regulate air flow and a port used for monitoring temperature, pressure, and air flow. The system monitoring activities performed during this biovent system operational period in 2012 and early 2013 consisted of:

- Recording operational parameters (pressure, flow rate, and temperature) periodically at the process blower in order to document the blower performance.
- Measuring air flow parameters in each of the biovent wells weekly in order to document the amount of air delivered to the subsurface through each injection well.
- Gauging fluid levels within the system trigger wells (GPW-5S and TH-2) on a weekly basis to determine the schedule for system startup and shutdown.
- Collecting field measurements of soil vapor composition including total organic vapor, pressure, and fixed gas concentrations (O_2, CO_2, and CH_4) to evaluate system effectiveness.

5.3.1 BIOVENT SYSTEM PERFORMANCE RESULTS

During system inspections and each time air flow adjustments were made, performance parameters for active (i.e., valve not closed) injection wells were monitored within VCS No. 1 (Lines BVW-39 through BVW-52) and VCS No. 2 (BVW-1 through BVW-10, BVW-13 through BVW-19 and, BVW-26 through BVW-34). Biovent wells in VCS No. 1 contain analog, vane-style flow meters, which allow for measuring instantaneous flow rates; whereas the lines located in VCS No. 2 were installed with sensor ports to allow for measurement of pressure, temperature, and differential pressure in order to calculate standard air flow rate.

Pressure in the individual biovent wells was measured using a digital manometer and injection air temperature measured using a dedicated dial gauge thermometers installed on each vent line. Flow rates measured at individual biovent well lines were measured using a Dwyer flow sensor manufactured to measure differential pressure in a 2-inch diameter pipe. The flow sensor was connected to a digital manometer, and differential pressure values provided by the manometer were recorded. The recorded values were later converted to volumetric flow rates and corrected to standard conditions.

During the 2012 operational period, biovent system control valves were periodically adjusted to deliver a target 35 to 45 scfm of air to each biovent well. Based upon average flow rates measured at the biovent wells and recorded operation times, approximately 437,297,515 standard cubic feet of process air was injected into the expanded biovent system area. Biovent well performance measurements, including dates and time of operation, are presented in Appendix H.

Soil vapor conditions including fixed gases, total organic vapor, and pressure were measured prior to system startup within selected vapor monitoring probes including VP1-25S, VP1-25D, VP1-50S, VP2-25S, VP2-50S, VP3-35S, VP3-35D, VP4-25S, VP4-25D, VP6-35S, and VP7-50S, as well as newly installed soil vapor probes VP-9S, VP-9D, VP-10S, VP-10D, VP-11S, VP-11D, VP-12S, VP-12D, VP-13S, and VP-14S.

Soil vapor field measurements were also collected from selected vapor monitoring probes following temporary shut-down of the vapor system on October 1, 2012 as part of respirometry testing until October 19, 2012. Field measurements were collected more frequently during the early periods of system inactivity. Following resumption of bioventing in Gulf Park on October 19, 2012, another round of fixed gas measurements was collected on October 22, 2012.

A tabulated and graphical summary of the field measurements collected prior to system start up and as part of respirometry testing are included in Appendix H. Comparison of the fixed gas concentrations measured during system operation and following shutdown indicates that bioventing has a measurable impact on portions of the vadose zone situated within the smear zone. At each of the vapor monitoring points indicated above, a decreasing trend in O_2 concentration was observed during the period of system inactivity. Normally during past events, this decrease in O_2 concentration was accompanied by an increase in CO_2 and a rebound (i.e., O_2 increased and CO_2 decreased) upon reactivation of the biovent system. During this event, the CO_2 concentrations remained relatively stable with no distinguishable rebound observed within the majority of the vapor probes with the exception of those probes installed along the southwest portions of the system.

The rate of decline in O_2 concentrations following shutdown of the biovent system is proportional to the rate of subsurface microbial respiration, providing a quantitative indicator of the rate of hydrocarbon consumption by petrophyllic bacteria. While O_2 concentration was observed to go down upon system deactivation at all monitoring points, the rate of decrease varies considerably. Respirometry testing results are plotted on Table 5-1 and show oxygen depletion and biodegradation rates as measured from the vapor monitoring probes during the shutdown period. Compared to previous years, oxygen depletion rates seem to be decreasing overall as the hydrocarbon mass decreases within the smear zone beneath Gulf Park. Respirometry results from 2012 will be used to further optimize air flow to the system during future operational periods.

5.3.2 GROUNDWATER MONITORING RESULTS

Groundwater samples were collected from the shallow monitoring wells (GPW-1S through GPW-5S, TH-1S, TH-2, and TH-3) and intermediate groundwater monitoring wells (GPW-1I, GPW-2I, GPW-3I and TH-1I) in September 2012 for analysis of the dissolved phase constituents of concern. Monitored natural attenuation parameters were also analyzed in groundwater samples collected from each of the shallow monitoring wells. The field forms for groundwater samples collected in Gulf Park are provided in Appendix C. Groundwater analytical and data validation reports for samples collected in the second half of 2012 are included in Appendix D.

Table 5-2 presents a summary of the constituents of concern measured in groundwater samples collected between 2006 and 2012. Concentrations of the volatile constituents of concern were detected in samples collected from TH-1S and TH-2 in September 2012. Dissolved phase concentrations of benzene exceeded the remedial goals (i.e., MCLs) in the sample collected from TH-2. Toluene and total xylenes were also reported at low concentrations in the groundwater samples collected from wells GPW-1I and GPW-4S, respectively. The reported dissolved phase concentrations were below remedial goals (i.e., MCLs) within the groundwater samples collected from these two wells during the second half of 2012.

A comparison of total BTEX versus time for groundwater samples collected from shallow monitoring wells GPW-1S through GPW-5S is provided on Figure 5-3. For these wells, the last significant detection of total BTEX in groundwater was reported in November 2005. The overall decrease in total BTEX concentrations observed in these wells installed across Gulf Park is attributable to a combination of intrinsic biodegradation and historic biovent system operations.

The total dissolved phase BTEX concentration compared to the groundwater elevation over time for monitoring wells TH-1S and TH-2 is provided on Figures 5-4 and 5-5, respectively. BTEX concentrations within groundwater samples collected from these wells were lower than concentrations reported in the second half of 2011; however, significant variability has been noted in the dissolved phase analytical results for these two wells since 1995. It is expected that BTEX concentrations will decrease over time within groundwater collected from wells TH-1S and TH-2 due to the addition of the 14 new biovent wells in conjunction with the augmentation of injection flow rates within the portion of the biovent system near these wells.

Dissolved phase natural attenuation indicators were analyzed in the shallow wells during the September 2012 monitoring event and are summarized on Table 5-3. In addition, the spatial distribution of oxidizers and attenuation by-products measured during the second 2012 semiannual monitoring period is displayed on Figure 5-6. The electron acceptor nitrate was detected in groundwater samples collected in the up-gradient well TH-3 and down-gradient well GPW-2S and was not detected within the smear zone, as expected. However sulfate was detected throughout the Park, with the highest concentrations measured in TH-1S (280 mg/L) and TH-2 (190 mg/L). The elevated sulfate concentrations in these two wells is not consistent with anaerobic biodegradation of the smear zone beneath this portion of the Park and may be explained by the addition of fertilizers near these wells following installation of the biovent system wells and transmission lines during the spring and summer of 2012. These sulfate analytical results are not consistent with previously reported results collected between 2007 and 2011. In general, the spatial distribution of reduced species including dissolved iron, manganese, and CH_4 show a direct relationship with total BTEX in groundwater beneath Gulf Park, with low concentrations measured in up-gradient well TH-3 and an increase of these attenuation by-products measured across the distribution of petroleum hydrocarbons present beneath the Park. These attenuation by-products generally decrease down-gradient of the smear zone in samples collected from monitoring well GPW-2S.

Figure 5-7 shows the concentration of total BTEX versus distance through the centerline of the smear zone with a comparison to oxidizer (nitrate and sulfate) and attenuation by-product (ferrous iron, manganese, and CH_4) concentrations. It should be noted that only monitoring wells GPW-2S, GPW-5S, TH-1S, TH-2, and TH-3 were utilized for this centerline analysis, with monitoring well TH-1S located approximately 180 feet from the centerline depicted on Figure 5-6. Anaerobic degradation of the preferred electron acceptor nitrate is occurring across the smear zone with the generation of reduced species of manganese, ferrous iron, and CH_4 across the distribution of petroleum hydrocarbons associated with the historic pipeline release. The nitrate concentrations rebound, and the ferrous iron, manganese, and CH_4 concentrations decline down-gradient of the distribution of petroleum hydrocarbons associated with the release.

5.4 BARRIER WALL MONITORING NETWORK

In order to isolate petroleum hydrocarbons present in the smear zone along the east bank of the Great Miami River in Gulf Park, a partially penetrating sheet pile barrier and river bank stabilization measures were installed along the northern portion of the smear zone during the second half of 2009. A second section of the sheet pile wall and bank stabilization measures were completed along the southern transect in the Park in the second half of 2011. The sheet pile barrier placement was selected based on smear zone morphology with the objective of eliminating potential petroleum hydrocarbon flux towards the river. A summary of the sheet pile installation and river bank stabilization measures performed along the northern and southern transects were presented in previous semiannual reports.

The barrier wall construction work plan (Trihydro 2008C) detailed the installation of two groundwater wells along each section of the barrier wall in Gulf Park to monitor the effectiveness of the bank stabilization measures. The barrier monitoring wells were constructed near the center of the wall, with one well on the inboard and one on the outboard side of the wall (Figure 5-1). The inboard and outboard wells were installed along the northern section of the barrier wall in March 2010. A description of the well installation and development activities for the southern barrier wall monitoring wells as well as the dissolved phase analytical results are summarized in the following subsections.

5.4.1 MONITORING WELL CONSTRUCTION DETAILS

On March 6, 2012, monitoring well GPBW-3 was installed inboard of the southern barrier and on March 15, 2012 the monitoring well GPBW-4 was installed outboard of the southern section of the barrier wall in Gulf Park. The inboard groundwater monitoring well was installed approximately 30 feet from the barrier wall while the out-board well was installed adjacent to and connected to the wall. The two wells were constructed using ten feet of pre-packed 2-inch diameter, 0.010-inch factory-slotted PVC with a sand pack encased in a fine stainless steel mesh around the PVC screen. The screen interval within the well was installed between 425 and 435 ft-amsl with the top of screen installed at approximately the same elevation as the bottom of the wall.

Schedule 40 flush-threaded blank PVC casing was installed from the top of the screen to approximately 0.5 foot below the ground surface. Approximately 7.5 feet of pre-packed granular bentonite was emplaced above the filter pack and the borehole was allowed to collapse to approximately two feet below ground surface. Inboard monitoring well GPBW-3 was completed at the surface with a 6-inch diameter steel flush mounted protective casing with a locking cap. The protective casing was backfilled with concrete and supported by a 2-foot by 2-foot square concrete pad. Outboard well GPBW-4 was completed at the surface with a 6-inch diameter steel outer protective casing driven 12 feet into the river bank with a locking lid. The protective casing was installed flush with the top within a scallop of the wall to prevent damage during flooding. The steel protective casing was also welded to the wall to provide additional stability and protection over time.

5.4.2 MONITORING WELL DEVELOPMENT

On April 3 and 4, 2012 the new barrier performance monitoring wells were developed to remove accumulated sediments from the boring and well casing potentially introduced during drilling and well construction activities. The newly installed wells were developed by an initial pumping to prevent sand lock then by mechanically surging the well followed by over-pumping using an electric, submersible pump, until stabilization of water quality parameters, or a minimum of ten casing volumes of water had been removed. Purge water recovered from each well during development was containerized and discharged to the on-site wastewater treatment facility.

5.4.3 NORTHERN AND SOUTHERN BARRIER WALL GROUNDWATER MONITORING RESULTS

The barrier monitoring wells were monitored in accordance with the procedures identified for Gulf Park in the OMM Plan (Trihydro 2007b). Groundwater monitoring was conducted along the barrier wall between September 18 and 19, 2012. Groundwater analytical results for the dissolved phase constituents of concern are provided on Table 5-4. No constituents of concern were detected in either of the inboard (GPBW-1 and GPBW-3) or outboard (GPBW-2 and GPBW-4) monitoring wells installed along the northern or southern barrier. These results indicate that dissolved phase petroleum hydrocarbons present in the smear zone beneath the Park have not encroached upon the northern or southern transects of the barrier wall and there is no dissolved phase flux into the Great Miami River.

6.0 REFERENCES

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TABLES

TABLE 2-1. SOUTHWEST QUAD DISSOLVED PHASE ANALYTICAL RESULTS SUMMARY (NOVEMBER 2008 TO DECEMBER 2012)
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID		Date Sampled	Benzene (mg/L)	Chlorobenzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
MW-26R		11/25/08	0.0030 J	ND(0.00080)	ND(0.00080)	ND(0.0007)	0.00080 J	ND(0.010)	ND(0.0069)
		3/27/09	0.0070	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
		11/12/09	ND(0.00050)	ND(0.00080) J	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		5/11/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		10/21/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		5/18/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012) J
		12/2/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		5/8/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	Dup	5/8/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		11/1/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
MW-35		11/19/08	0.13	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	Dup	11/19/08	0.13	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
		2/17/09	0.021	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
		4/3/09	0.021	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	Dup	4/3/09	0.021	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
		4/28/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
		5/27/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
		6/29/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		7/21/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		8/11/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		9/14/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		10/12/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	Dup	10/12/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		11/17/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
		12/11/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
		1/12/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--

TABLE 2-1. SOUTHWEST QUAD DISSOLVED PHASE ANALYTICAL RESULTS SUMMARY (NOVEMBER 2008 TO DECEMBER 2012)
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID		Date Sampled	Benzene (mg/L)	Chlorobenzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
MW-35		2/23/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		3/29/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		4/21/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		5/4/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	Dup	5/4/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		6/15/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		7/14/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		8/25/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		9/28/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		10/20/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		3/22/11	ND(0.00051)	ND(0.00051)	0.0012	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		5/11/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		8/23/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		11/15/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		5/2/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.014 JB	ND(0.0012)
		5/23/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.0085	ND(0.0012)
		10/18/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	Dup	10/18/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
MW-37		11/18/08	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
		4/2/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
		10/20/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.0030 JB	ND(0.0069)
		5/5/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.0086 J	ND(0.0069)
		10/20/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		5/16/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		6/2/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	Dup	6/2/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		11/17/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)

TABLE 2-1. SOUTHWEST QUAD DISSOLVED PHASE ANALYTICAL RESULTS SUMMARY (NOVEMBER 2008 TO DECEMBER 2012)
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Benzene (mg/L)	Chlorobenzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
MW-37	5/7/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	10/25/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
MW-94S	12/8/08	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
Dup	12/8/08	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	4/2/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	5/6/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.017J/ND(0.017)U*	ND(0.0069)
	10/19/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	5/17/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	12/1/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	0.0070 J
Dup	12/1/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	0.0085
	5/8/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	10/24/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	0.0083
MW-115S	12/9/08	ND(0.00050)	ND(0.00080)	0.00080 J	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	4/3/09	0.0090	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	10/12/09	0.00080 J	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.011 J	ND(0.0069)
	5/5/10	0.011	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.018 J	ND(0.0069)
	10/20/10	0.0030 J	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.014 J	ND(0.0069)
	5/11/11	0.010	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.011 JB	ND(0.0012)
	11/17/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.0078	ND(0.0012)
	5/10/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.010	ND(0.0012)
	10/18/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.014	ND(0.0012)
MW-120	11/18/08	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	4/1/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	10/7/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)

TABLE 2-1. SOUTHWEST QUAD DISSOLVED PHASE ANALYTICAL RESULTS SUMMARY (NOVEMBER 2008 TO DECEMBER 2012)
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID		Date Sampled	Benzene (mg/L)	Chlorobenzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
MW-120		3/29/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	Dup	3/29/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		4/20/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		5/5/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		6/14/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	Dup	6/14/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		7/13/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		8/24/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		9/29/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		10/19/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		3/22/11	ND(0.00051)	ND(0.00051)	0.0016	ND(0.00048)	0.0014	ND(0.00024)	ND(0.0012)
		5/17/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		8/22/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		11/14/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		5/10/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		10/18/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
MW-131		11/21/08	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.016 J	0.022
		2/18/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.014 J	ND(0.0069)
		4/2/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
		7/23/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.010 J	ND(0.0069)
		10/20/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.027/ND(0.027)U*	ND(0.0069)
		5/6/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.025 JB	ND(0.0069)
	Dup	5/6/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.017J/ND(0.017)U*	ND(0.0069)
		10/20/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.015 J	ND(0.0069)
		5/16/11	0.0078	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		6/1/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.020 JB	ND(0.0012)
		11/17/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)

TABLE 2-1. SOUTHWEST QUAD DISSOLVED PHASE ANALYTICAL RESULTS SUMMARY (NOVEMBER 2008 TO DECEMBER 2012)
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Benzene (mg/L)	Chlorobenzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
MW-131	5/15/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.0084	ND(0.0012)
	10/25/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.010	ND(0.0012)
MW-132	11/17/08	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	2/19/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	3/30/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	7/20/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
Dup	7/20/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	10/5/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	5/5/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
Dup	5/5/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	10/19/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	5/17/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	11/14/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	5/3/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	10/17/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
MW-133	11/18/08	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	2/17/09	0.0030 J	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	4/1/09	0.11	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	4/28/09	0.036	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	5/26/09	0.032	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	6/29/09	0.11	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	7/21/09	0.051	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	8/11/09	0.031	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	9/14/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	10/8/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	11/17/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--

TABLE 2-1. SOUTHWEST QUAD DISSOLVED PHASE ANALYTICAL RESULTS SUMMARY (NOVEMBER 2008 TO DECEMBER 2012)
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Benzene (mg/L)	Chlorobenzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
MW-133	12/11/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	1/12/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	2/23/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	3/29/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	4/20/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	5/4/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	6/14/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	7/13/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
Dup	7/13/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	8/24/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	9/27/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	10/20/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
Dup	10/20/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	3/22/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	5/17/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	8/22/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
Dup	8/22/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	11/14/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	5/2/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.012 JB	ND(0.0012)
	5/23/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.0088	ND(0.0012)
	10/18/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
MW-134	11/17/08	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	2/19/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	3/30/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	7/20/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	10/5/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	5/5/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.010 J	ND(0.0069)

TABLE 2-1. SOUTHWEST QUAD DISSOLVED PHASE ANALYTICAL RESULTS SUMMARY (NOVEMBER 2008 TO DECEMBER 2012)
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Benzene (mg/L)	Chlorobenzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
MW-134	10/19/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	5/17/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	11/15/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	5/3/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	10/17/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
MW-138	3/31/09	0.0050 J	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.010)	ND(0.0069)
	4/28/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	5/28/09	0.0020 J	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	6/29/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	7/21/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	8/12/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	9/15/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	10/7/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	11/18/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	12/14/09	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	1/13/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	2/23/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	3/30/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	4/21/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	5/4/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	6/14/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	7/14/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	8/25/10	0.0010 J	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	9/28/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	10/20/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	3/23/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	5/18/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012) J

TABLE 2-1. SOUTHWEST QUAD DISSOLVED PHASE ANALYTICAL RESULTS SUMMARY (NOVEMBER 2008 TO DECEMBER 2012)
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Benzene (mg/L)	Chlorobenzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
MW-138	8/23/11	0.0056	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.0076 JB	ND(0.0012)
	11/15/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	5/2/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	10/18/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	0.014
MW-139	3/31/09	0.15	ND(0.00080)	ND(0.00080)	0.0050 J	0.0050 J	0.012 J	ND(0.0069)
	4/28/09	0.019	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	4/28/09	0.098	ND(0.00080)	ND(0.00080)	0.0030 J	0.0030 J	--	--
	5/28/09	0.085	ND(0.00080)	ND(0.00080)	0.0030 J	0.0030 J	--	--
	6/30/09	0.11	ND(0.00080)	0.0009 J	0.0050 J	0.0040 J	0.013 J	ND(0.0069)
	7/21/09	0.12	ND(0.00080)	0.0010 J	0.0060	0.0050 J	0.018 J	ND(0.0069)
	8/12/09	0.12	ND(0.00080)	ND(0.00080)	0.0060	0.0050 J	0.016 J	ND(0.0069)
	9/15/09	0.048	ND(0.00080)	ND(0.00080)	0.0020 J	0.0009 J	0.0097 J	ND(0.0069)
	10/7/09	0.017	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.013 J	ND(0.0069)
	11/18/09	0.0020 J	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	12/14/09	0.0040 J	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	1/13/10	0.0009 J	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	--	--
	2/24/10	ND(0.00050)	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.0095 J	ND(0.0069)
	3/30/10	0.0040 J	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	4/21/10	0.0070	ND(0.00080)	0.0010 J	ND(0.0007)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	5/4/10	0.0090	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.012 J	ND(0.0069)
	6/14/10	0.0020 J	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	7/14/10	0.026	ND(0.00080)	0.0030 J	0.0020 J	0.0040 J	0.010 J	ND(0.0069)
	8/25/10	0.050	ND(0.00080)	ND(0.00080)	0.0030 J	0.0030 J	0.018 J	ND(0.0069)
	9/28/10	0.023	ND(0.00080)	ND(0.00080)	0.0010 J	0.0010 J	0.024	ND(0.0069)
Dup	9/28/10	0.024	ND(0.00080)	ND(0.00080)	0.0010 J	0.0010 J	0.024	ND(0.0069)
	10/20/10	0.0090	ND(0.00080)	ND(0.00080)	ND(0.0007)	ND(0.00080)	0.021	ND(0.0069)

TABLE 2-1. SOUTHWEST QUAD DISSOLVED PHASE ANALYTICAL RESULTS SUMMARY (NOVEMBER 2008 TO DECEMBER 2012)
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID		Date Sampled	Benzene (mg/L)	Chlorobenzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
MW-139		3/23/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
	Dup	3/23/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	ND(0.0012)
		5/18/11	0.013	ND(0.00051)	0.0031	0.0017	0.0037	0.010 J	0.0085 J
		8/23/11	0.039	ND(0.00051)	0.0019	0.0054	0.011	0.025 JB	ND(0.0012)
		11/15/11	0.0011	ND(0.00051)	ND(0.00068)	ND(0.00048)	0.0010	0.011	ND(0.0012)
	Dup	11/15/11	0.0012	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.012	ND(0.0012)
		5/2/12	0.014	ND(0.00051)	ND(0.00068)	0.0022	0.0026	0.022 JB	ND(0.0012)
		10/18/12	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	0.012	ND(0.0012)
MW-140		3/27/09	0.35	ND(0.0020)	0.43	0.041	0.55	ND(0.010)	ND(0.0069)
		6/15/10	0.12	ND(0.00080)	0.013	0.0040 J	0.033	ND(0.0098)	ND(0.0069)
		3/23/11	0.033	ND(0.00051)	0.016	0.0054	0.024	0.0070	ND(0.0012) J
MW-141		4/1/09	0.51	ND(0.0020)	0.060	0.013	0.039	ND(0.010)	ND(0.0069)
	Dup	4/1/09	0.52	ND(0.0020)	0.062	0.013	0.042	ND(0.010)	ND(0.0069)
		7/23/09	0.40	ND(0.00080)	0.017	0.011	0.016	ND(0.0072)	ND(0.0069)
		10/13/09	0.29	ND(0.00080)	0.045	0.010	0.032	0.013 J	ND(0.0069)
		2/24/10	0.19	ND(0.00080)	0.014	0.0060	0.015	ND(0.0072)	ND(0.0069)
	Dup	2/24/10	0.18	ND(0.00080)	0.014	0.0060	0.015	ND(0.0072)	ND(0.0069)
		5/5/10	0.14	ND(0.00080)	0.019	0.0080	0.024	0.0094 J	ND(0.0069)
		8/26/10	0.13	ND(0.0020)	0.009 J	0.0050 J	0.0080 J	ND(0.0098)	ND(0.0069)
		3/23/11	0.0071	ND(0.00051)	ND(0.00068)	ND(0.00048)	0.0018	ND(0.00024)	ND(0.0012)
		5/19/11	ND(0.00051)	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00024)	0.0072 J
		8/24/11	0.028	ND(0.00051)	0.0060	0.0024	0.0013	0.010 JB	ND(0.0012)
		11/17/11	0.047	ND(0.00051)	0.014	0.0040	0.0032	0.0099	ND(0.0012)
		5/3/12	0.024	ND(0.00051)	0.0079	0.0028	0.0021	0.0052 JB	ND(0.0012)
		10/25/12	0.021	ND(0.00051)	0.0040	0.0022	0.0022	0.0070	ND(0.0012)

TABLE 2-1. SOUTHWEST QUAD DISSOLVED PHASE ANALYTICAL RESULTS SUMMARY (NOVEMBER 2008 TO DECEMBER 2012)
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Benzene (mg/L)	Chlorobenzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
MW-142	3/31/09	0.13	ND(0.0020)	0.39	0.028	0.35	0.017 J	ND(0.0069)
	5/28/09	0.12	ND(0.00080)	0.53	0.025	0.31	--	--
	6/30/09	0.31	ND(0.00080)	0.023	0.014	0.056	0.021	ND(0.0069)
	7/23/09	0.27	ND(0.00080)	0.045	0.015	0.061	0.025	ND(0.0069)
	8/12/09	0.21	ND(0.0020)	0.31	0.022	0.21	0.017 J	ND(0.0069)
	9/15/09	0.15	ND(0.00080)	0.15	0.019	0.13	0.022	ND(0.0069)
	10/13/09	0.11	ND(0.00080)	0.19	0.021	0.17	0.021	ND(0.0069)
	11/18/09	0.043	ND(0.0020)	0.052	0.011 JB	0.058	--	--
	12/14/09	0.035	ND(0.00080)	0.12	0.013	0.13	--	--
	1/13/10	0.084	ND(0.0020)	0.023	0.0060 J	0.027	--	--
Dup	1/13/10	0.085	ND(0.0020)	0.023	0.0060 J	0.027	--	--
	2/24/10	0.090	ND(0.00080)	0.20	0.017	0.11	0.021	ND(0.0069)
	3/30/10	0.066	ND(0.00080)	0.039	0.0090	0.042	0.019 J	ND(0.0069)
	4/20/10	0.13	ND(0.00080)	0.061	0.014	0.073	0.027	ND(0.0069)
Dup	4/20/10	0.13	ND(0.00080)	0.061	0.013	0.074	0.025	ND(0.0069)
	5/4/10	0.12	ND(0.0020)	0.18	0.016	0.15	0.020	ND(0.0069)
	6/15/10	0.16	ND(0.00080)	0.036	0.013	0.062	0.019 J	ND(0.0069)
	7/13/10	0.16	ND(0.00080)	0.037	0.011	0.061	0.023	ND(0.0069)
	8/26/10	0.10	ND(0.0020)	0.0040 J	0.0080 J	0.031	0.021	ND(0.0069)
Dup	8/26/10	0.10	ND(0.0020)	0.0040 J	0.0080 J	0.031	0.020	ND(0.0069)
	9/28/10	0.11	ND(0.00080)	0.024	0.012	0.047	0.021	ND(0.0069)
	10/20/10	0.15	ND(0.00080)	0.072	0.014	0.070	0.023	ND(0.0069)
Dup	10/20/10	0.16	ND(0.00080)	0.074	0.015	0.073	0.024	ND(0.0069)
	3/23/11	0.020	ND(0.00051)	0.052	0.0053	0.033	0.012	ND(0.0012)
	5/18/11	0.067	ND(0.00051)	0.11	0.0098	0.048	0.013	0.012 J
Dup	5/18/11	0.067	ND(0.00051)	0.11	0.0098	0.047	0.014	0.012 J
	8/24/11	0.055	ND(0.00051)	0.076	0.0079	0.051	0.016 JB	ND(0.0012)
	11/17/11	0.068	ND(0.00051)	0.21	0.010	0.12	0.016	ND(0.0012)

TABLE 2-1. SOUTHWEST QUAD DISSOLVED PHASE ANALYTICAL RESULTS SUMMARY (NOVEMBER 2008 TO DECEMBER 2012)
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Benzene (mg/L)	Chlorobenzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
MW-142	5/3/12	0.033	ND(0.00051)	0.042	0.0046	0.024	0.018 JB	ND(0.0012)
	10/18/12	0.0046	ND(0.00051)	0.0077	0.0030	0.017	0.017	ND(0.0012)
Dup	10/18/12	0.0057	ND(0.00051)	0.010	0.0039	0.023	0.018	ND(0.0012)

Notes:

The method detection limit was used as the reporting limit.

-- - Not analyzed

Dup - Duplicate sample

J - Estimated concentration

JB - Estimated concentration due to detection of analyte within the method blank.

mg/L - milligram per liter

ND - Not detected at the indicated laboratory reporting limit or the method detection limit.

U* - The first result represents the laboratory reported concentration. The second result was evaluated to be undetected at the reported concentration during validation due to detection of the analyte within the method blank.

TABLE 2-2. PERIMETER, INTERIOR, AND SUPPLEMENTAL WELL GROUNDWATER ANALYTICAL RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Benzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Chlorobenzene (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
MW-26R	11/1/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
MW-33	10/30/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	0.0051	ND(0.0012)
MW-48S	11/1/12	0.0011	0.011	ND(0.00048)	0.17	ND(0.00051)	0.041	ND(0.0012)
MW-48S Dup	11/1/12	0.001	0.011	ND(0.00048)	0.17	ND(0.00051)	0.042	ND(0.0012)
MW-85S	12/12/12	0.1	0.044	0.015	0.07	ND(0.00051)	0.027	ND(0.0012)
MW-94S	10/24/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	0.0083
MW-95S	10/24/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
MW-100S	10/24/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
MW-104S	10/30/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
MW-115S	10/18/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	0.014	ND(0.0012)

Notes:
The method detection limit was used as the reporting limit.
mg/L - milligram per liter
ND - Not detected at the indicated laboratory method detection limit.
Dup - Duplicate Sample

TABLE 2-3. NESTED VAPOR MONITORING WELL FIELD SCREENING RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Well Location and Depth	Date	Depth (ft-bgs)	Static Pressure/ Vacuum (in-H_2O)	Estimated Soil Gas Permeability (cm^2)	Probe Specific Capacity ($cm^3/s \cdot in\ H_2O$)	Total Organic Vapors (ppm)	Oxygen Concentration (%)	Carbon Dioxide Concentration (%)	Estimated Volume of Ambient Air In Soil Gas Sample (%)	Difference Between Field and Lab Reported Vacuums (in-Hg)
VW-93	Jul 2012	5	0.02	1.04E-07	-21.35	0.6	18.7	2.4	0.0	1.78
		10	-0.22	7.23E-08	-14.86	2.4	18.4	2.0	0.0	1.90
		20	-0.06	5.95E-08	-12.23	2.3	18.3	1.7	0.0	1.84
		30	0.00	5.32E-08	-10.94	2.2	18.5	1.9	0.0	2.35
		40	-0.10	4.35E-08	-8.94	2.2	17.7	1.5	0.0	2.12
		50	0.00	7.10E-08	-14.60	2.2	18.2	1.9	0.0	0.87
		60	0.04	3.34E-08	-6.87	0.8	10.7	2.9	0.0	0.76
VW-96	Jul 2012	5	0.03	1.13E-07	-23.13	4.0	16.9	3.8	0.0	0.70
		10	0.14	7.23E-08	-14.86	2.6	16.7	3.1	0.0	0.53
		20	-0.18	3.51E-08	-7.23	1.9	15.6	1.8	0.0	0.47
		30	-0.12	5.25E-08	-10.80	0.9	4.5	2.4	0.0	0.73
		40	0.04	4.30E-08	-8.84	2.4	3.6	3.7	0.0	0.61
		50	0.04	4.12E-08	-8.48	2.8	0.8	5.3	0.0	0.64
		55	0.00	--	--	6.1	0.3	6.8	0.0	0.80
	Aug 2012	10	-0.01	9.88E-08	-20.30	4.8	20.0	1.0	0.0	0.27
		20	0.15	3.88E-08	-7.99	4.7	19.60	1.5	0.0	0.61
		30	0.15	5.54E-08	-11.39	2.9	20.0	1.5	0.0	0.69
		40	0.09	4.25E-08	-8.75	2.1	19.6	1.8	0.0	0.48
	Sep 2012	10	-0.01	1.07E-07	-21.91	1.1	19.0	2.0	0.0	0.17
		20	-0.10	4.21E-08	-8.66	0.9	18.6	1.5	0.0	0.10
		30	-0.10	5.54E-08	-11.39	1.0	18.4	1.6	0.0	-0.23
		40	-0.05	4.00E-08	-8.23	1.1	18.3	2.0	0.0	-0.07
	Oct 2012	10	0.40	6.74E-08	-13.86	0.2	20.1	1.6	0.0	-0.53
		20	0.00	1.76E-07	-36.21	0.0	19.7	2.0	0.0	-0.19
		30	0.10	8.10E-08	-16.65	0.0	19.8	2.1	0.0	-0.34
		40	0.00	1.84E-07	-37.86	0.0	19.6	2.0	0.0	-0.36
	Nov 2012	10	-0.04	1.16E-07	-23.79	1.3	19.7	0.8	0.0	0.61
		20	-0.02	5.62E-08	-11.55	0.5	19.4	1.5	0.0	0.29
		30	0.03	5.12E-08	-10.53	0.5	19.3	1.7	0.0	0.21
		40	0.03	4.08E-08	-8.40	0.7	18.1	1.9	0.0	0.23
	Dec 2012	10	0.05	9.88E-08	-20.30	0.0	20.5	0.8	0.0	-1.88
		20	-0.40	3.81E-08	-7.84	0.0	20.1	1.3	0.0	-1.29
		30	-0.13	5.18E-08	-10.66	0.0	19.2	1.7	0.0	-1.49
		40	-0.24	4.59E-08	-9.45	0.1	16.8	2.4	0.0	-1.97

TABLE 2-3. NESTED VAPOR MONITORING WELL FIELD SCREENING RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Well Location and Depth	Date	Depth (ft-bgs)	Static Pressure/ Vacuum (in-H_2O)	Estimated Soil Gas Permeability (cm^2)	Probe Specific Capacity ($cm^3/s \cdot in\ H_2O$)	Total Organic Vapors (ppm)	Oxygen Concentration (%)	Carbon Dioxide Concentration (%)	Estimated Volume of Ambient Air In Soil Gas Sample (%)	Difference Between Field and Lab Reported Vacuums (in-Hg)
VW-99	Jul 2012	10	-0.07	6.22E-08	-12.80	21.8	17.4	1.9	0.0	0.54
		20	-0.07	6.63E-08	-13.64	2.8	17.4	1.8	0.0	0.24
		30	0.03	6.42E-08	-13.21	1.5	14.3	1.2	0.0	0.53
		40	0.13	5.62E-08	-11.55	2.8	3.8	6.4	0.0	0.59
		50	0.12	4.44E-08	-9.14	6.9	0.0	7.6	0.0	0.35
		60	0.04	1.23E-07	-25.23	350.0	8.3	6.0	0.0	0.52
	Aug 2012	10	0.01	1.09E-07	-22.50	2.8	19.5	0.6	0.0	0.40
		20	0.00	8.43E-08	-17.34	4.1	19.1	0.8	0.0	0.61
		30	-0.10	6.53E-08	-13.42	2.5	17.8	2.1	0.0	0.07
		40	-0.20	4.49E-08	-9.24	2.0	17.8	2.1	0.0	-0.08
	Sep 2012	10	0.04	9.42E-08	-19.36	3.0	18.9	0.7	0.0	-0.23
		20	0.05	7.64E-08	-15.70	1.2	18.8	1.2	0.0	-0.05
		30	0.02	6.32E-08	-13.00	1.4	18.6	1.8	0.0	-0.10
		40	0.01	4.81E-08	-9.90	0.7	18.9	2.1	0.0	0.32
	Oct 2012	10	0.00	2.25E-07	-46.28	0.6	19.8	0.8	0.0	-0.41
		20	0.00	5.78E-08	-11.88	1.2	19.0	1.0	0.0	-2.17
		30	0.00	8.10E-08	-16.65	0.2	18.2	1.8	0.0	-0.96
		40	0.10	7.36E-08	-15.13	0.2	18.3	2.1	0.0	-3.28
	Nov 2012	10	0.00	1.19E-07	-24.49	0.7	19.0	0.9	0.0	-0.11
		20	0.00	9.42E-08	-19.36	0.7	17.9	1.5	0.0	-0.34
		30	0.00	7.50E-08	-15.41	0.6	16.8	1.7	0.0	1.58
		40	0.00	5.62E-08	-11.55	0.6	13.4	2.7	0.0	0.05
	Dec 2012	10	0.03	5.47E-08	-11.24	0.0	19.1	1.0	0.0	-0.67
		20	0.08	8.26E-08	-16.99	0.0	16.2	1.6	0.0	-0.83
		30	-0.03	6.53E-08	-13.42	0.0	13.8	2.1	0.0	-3.13
		40	-0.11	4.59E-08	-9.45	0.0	10.3	4.6	0.0	-0.69
VW-128	Jul 2012	5	0.01	6.42E-08	-13.21	2.0	17.6	2.9	0.0	2.38
		10	0.01	1.32E-08	-2.72	13.2	17.9	1.6	0.0	2.26
		20	0.09	1.31E-08	-2.70	11.2	16.4	1.1	0.0	2.35
		30	-0.02	5.78E-08	-11.88	1.0	16.3	1.9	0.0	1.88
		40	-0.19	3.96E-08	-8.15	2.7	15.6	2.7	0.0	1.73
		50	-0.26	3.92E-08	-8.07	0.8	13.6	3.8	0.0	2.06

TABLE 2-3. NESTED VAPOR MONITORING WELL FIELD SCREENING RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Well Location and Depth	Date	Depth (ft-bgs)	Static Pressure/ Vacuum (in-H_2O)	Estimated Soil Gas Permeability (cm^2)	Probe Specific Capacity (cm^3/s·in H_2O)	Total Organic Vapors (ppm)	Oxygen Concentration (%)	Carbon Dioxide Concentration (%)	Estimated Volume of Ambient Air In Soil Gas Sample (%)	Difference Between Field and Lab Reported Vacuums (in-Hg)
VW-129	Jul 2012	5	0.00	9.42E-08	-19.36	1.4	15.8	3.2	0.0	2.62
		10	-0.23	8.10E-08	-16.65	2.5	15.7	2.6	0.0	2.96
		20	-0.07	6.04E-08	-12.42	3.0	15.8	2.1	0.0	2.67
		30	0.30	5.39E-08	-11.09	1.7	15.4	2.3	0.0	2.19
		40	-0.69	4.12E-08	-8.48	2.6	15.7	2.4	0.0	2.10
		50	-0.16	4.21E-08	-8.66	0.7	15.3	2.7	0.0	1.83

Notes:

cm^2 - square centimeters

cm^2/s - square centimeters per second

cm^3/s·in H2O - cubic centimeters per second per inch of water

ft-bgs - feet below ground surface

in-H_2O - inches of water

ppm - parts per million

TABLE 2-4A. NESTED VAPOR MONITORING WELL ANALYTICAL RESULTS SUMMARY, PETROLEUM RELATED CONSTITUENTS
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Well	Date	Depth ft-bgs	Dilution Factor	n-Butyl-benzene mg/m^3	sec-Butyl-benzene mg/m^3	Isopropyl-benzene mg/m^3	n-Propyl-benzene mg/m^3	1,2-Dichloro-ethane mg/m^3	1,2-Dibromo-ethane mg/m^3	MTBE mg/m^3	Naphthalene mg/m^3	Benzene mg/m^3	Toluene mg/m^3	Ethyl-benzene mg/m^3	m,p-Xylene mg/m^3	o-Xylene mg/m^3	Cyclo-hexane mg/m^3	Hexane mg/m^3	Heptane mg/m^3	Styrene mg/m^3	2,2,4-Trimethyl-pentane mg/m^3	1,3,5-Trimethyl-benzene mg/m^3	1,2,4-Trimethyl-benzene mg/m^3	1,3-Butadiene mg/m^3	4-Ethyl-toluene mg/m^3	Butane mg/m^3	Isopentane mg/m^3	Methyl cyclohexane mg/m^3	TVPH as gasoline mg/m^3
VW-93A	Jul 2012	5	1.68	ND(0.018)	ND(0.018)	ND(0.0041)	ND(0.0041)	ND(0.0034)	ND(0.0064)	ND(0.0030)	ND(0.018)	ND(0.0027)	ND(0.0032)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0029)	ND(0.0030)	ND(0.0034)	ND(0.0036)	ND(0.0039)	ND(0.0041)	ND(0.0041)	ND(0.0018)	ND(0.0041)	ND(0.0080)	0.013	ND(0.013)	ND(0.0848)
VW-93	Jul 2012	10	2.11	ND(0.023)	ND(0.023)	ND(0.0052)	ND(0.0052)	ND(0.0043)	ND(0.0081)	ND(0.0038)	ND(0.022)	ND(0.0034)	ND(0.0040)	ND(0.0046)	ND(0.0046)	ND(0.0046)	ND(0.0036)	ND(0.0037)	ND(0.0043)	ND(0.0045)	ND(0.0049)	ND(0.0052)	ND(0.0052)	ND(0.0023)	ND(0.0052)	ND(0.010)	ND(0.012)	ND(0.017)	ND(0.0969)
		20	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	ND(0.0062)	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0076)	ND(0.0095)	ND(0.013)	ND(0.0747)
		30	1.68	ND(0.018)	ND(0.018)	ND(0.0041)	ND(0.0041)	ND(0.0034)	ND(0.0064)	ND(0.0030)	ND(0.018)	ND(0.0027)	ND(0.0032)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0029)	ND(0.0030)	ND(0.0034)	ND(0.0036)	ND(0.0039)	ND(0.0041)	ND(0.0041)	ND(0.0018)	ND(0.0041)	ND(0.0080)	ND(0.0099)	ND(0.013)	ND(0.0768)
		30-Dup	1.68	ND(0.018)	ND(0.018)	ND(0.0041)	ND(0.0041)	ND(0.0034)	ND(0.0064)	ND(0.0030)	ND(0.018)	ND(0.0027)	ND(0.0032)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0029)	ND(0.0030)	ND(0.0034)	ND(0.0036)	ND(0.0039)	ND(0.0041)	ND(0.0041)	ND(0.0018)	ND(0.0041)	ND(0.0080)	ND(0.0099)	ND(0.013)	ND(0.0768)
		40	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	ND(0.0062)	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	0.0086	ND(0.0095)	ND(0.013)	0.0795
		50	1.64	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	ND(0.0063)	ND(0.0030)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0028)	ND(0.0029)	ND(0.0034)	ND(0.0035)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0078)	ND(0.0097)	ND(0.013)	ND(0.0754)
		60	1.58	ND(0.017)	ND(0.017)	ND(0.0039)	ND(0.0039)	ND(0.0032)	ND(0.0061)	ND(0.0028)	ND(0.016)	ND(0.0025)	ND(0.0030)	ND(0.0034)	ND(0.0034)	ND(0.0034)	ND(0.0027)	ND(0.0028)	ND(0.0032)	ND(0.0034)	ND(0.0037)	ND(0.0039)	ND(0.0039)	ND(0.0017)	ND(0.0039)	ND(0.0075)	ND(0.0093)	ND(0.013)	ND(0.0723)
VW-96A	Jul 2012	5	1.58	ND(0.017)	ND(0.017)	ND(0.0039)	ND(0.0039)	ND(0.0032)	ND(0.0061)	ND(0.0028)	ND(0.016)	ND(0.0025)	ND(0.0030)	ND(0.0034)	ND(0.0034)	ND(0.0034)	ND(0.0027)	ND(0.0028)	ND(0.0032)	ND(0.0034)	ND(0.0037)	ND(0.0039)	ND(0.0039)	ND(0.0017)	ND(0.0039)	ND(0.0075)	ND(0.0093)	ND(0.013)	ND(0.0723)
VW-96	Jul 2012	10	1.58	ND(0.017)	ND(0.017)	ND(0.0039)	ND(0.0039)	ND(0.0032)	ND(0.0061)	ND(0.0028)	ND(0.016)	ND(0.0025)	ND(0.0030)	ND(0.0034)	ND(0.0034)	ND(0.0034)	ND(0.0027)	ND(0.0028)	ND(0.0032)	ND(0.0034)	ND(0.0037)	ND(0.0039)	ND(0.0039)	ND(0.0017)	ND(0.0039)	ND(0.0075)	ND(0.0093)	ND(0.013)	ND(0.0723)
		20	1.63	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	ND(0.0063)	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0029)	ND(0.0033)	ND(0.0035)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0077)	ND(0.0096)	ND(0.013)	ND(0.0751)
		30	1.56	ND(0.017)	ND(0.017)	ND(0.0038)	ND(0.0038)	ND(0.0032)	ND(0.0060)	ND(0.0028)	ND(0.016)	ND(0.0025)	ND(0.0029)	ND(0.0034)	ND(0.0034)	ND(0.0034)	ND(0.0027)	ND(0.0027)	ND(0.0032)	ND(0.0033)	ND(0.0036)	0.012	ND(0.0038)	ND(0.0017)	ND(0.0038)	ND(0.0074)	ND(0.0092)	ND(0.012)	0.0813
		40	2.46	ND(0.027)	ND(0.027)	ND(0.0060)	ND(0.0060)	ND(0.0050)	ND(0.0094)	ND(0.0044)	ND(0.026)	ND(0.0039)	ND(0.0046)	ND(0.0053)	ND(0.0053)	ND(0.0053)	ND(0.0042)	ND(0.0043)	ND(0.0050)	ND(0.0052)	ND(0.0057)	0.030 J	ND(0.0060)	ND(0.0027)	ND(0.0060)	ND(0.012)	ND(0.014)	ND(0.020)	0.1402
		40-Dup	1.65	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	ND(0.0063)	ND(0.0030)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0028)	ND(0.0029)	ND(0.0034)	ND(0.0035)	0.0052	0.044 J	ND(0.0040)	ND(0.0018)	ND(0.0040)	0.0088	ND(0.0097)	ND(0.013)	0.1256
		50	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	ND(0.0062)	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	0.0051	ND(0.0040)	ND(0.0018)	ND(0.0040)	0.0096	ND(0.0095)	ND(0.013)	0.0836
		55	32.2	ND(0.35)	ND(0.35)	ND(0.079)	ND(0.079)	ND(0.065)	ND(0.12)	ND(0.058)	ND(0.34)	ND(0.051)	ND(0.061)	ND(0.070)	ND(0.070)	ND(0.070)	ND(0.055)	0.12	ND(0.066)	ND(0.068)	36	ND(0.079)	ND(0.079)	ND(0.036)	ND(0.079)	4.1	5.7	ND(0.26)	47.1625
	Aug 2012	10	2.33	ND(0.026)	ND(0.026)	ND(0.0057)	ND(0.0057)	ND(0.0047)	ND(0.009)	ND(0.0042)	ND(0.024)	ND(0.0037)	ND(0.0044)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0040)	0.0072	0.0094	ND(0.0050)	ND(0.0054)	ND(0.0057)	ND(0.0057)	ND(0.0026)	ND(0.0057)	ND(0.011)	ND(0.014)	ND(0.019)	0.1199
		20	5.28	ND(0.058)	ND(0.058)	ND(0.013)	ND(0.013)	ND(0.011)	ND(0.020)	ND(0.0095)	ND(0.055)	ND(0.0084)	ND(0.0099)	ND(0.011)	ND(0.011)	ND(0.011)	ND(0.0091)	ND(0.0093)	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.0058)	ND(0.013)	ND(0.025)	ND(0.031)	ND(0.042)	ND(0.2420)
		30	2.29	ND(0.025)	ND(0.025)	ND(0.0056)	ND(0.0056)	ND(0.0046)	ND(0.0088)	ND(0.0041)	ND(0.024)	ND(0.0036)	ND(0.0043)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0039)	ND(0.0040)	ND(0.0047)	ND(0.0049)	ND(0.0053)	0.0058	ND(0.0056)	ND(0.0025)	ND(0.0056)	ND(0.011)	ND(0.014)	ND(0.018)	0.1084
		40	2.42	ND(0.026)	ND(0.026)	ND(0.0059)	ND(0.0059)	ND(0.0049)	ND(0.0093)	ND(0.0044)	ND(0.025)	ND(0.0039)	ND(0.0046)	ND(0.0052)	ND(0.0052)	ND(0.0052)	ND(0.0042)	ND(0.0043)	ND(0.0050)	ND(0.0052)	ND(0.0056)	0.0073	ND(0.0059)	ND(0.0027)	ND(0.0059)	ND(0.012)	ND(0.014)	ND(0.019)	0.1150
	Sep 2012	10	2.20	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0044)	ND(0.0084)	ND(0.0040)	ND(0.023)	ND(0.0035)	ND(0.0041)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0051)	ND(0.0054)	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)	ND(0.1011)
		20	2.29	ND(0.025)	ND(0.025)	ND(0.0056)	ND(0.0056)	ND(0.0046)	ND(0.0088)	ND(0.0041)	ND(0.024)	ND(0.0036)	ND(0.0043)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0039)	ND(0.0040)	ND(0.0047)	ND(0.0049)	ND(0.0053)	ND(0.0056)	ND(0.0056)	ND(0.0025)	ND(0.0056)	ND(0.011)	ND(0.014)	ND(0.018)	ND(0.1054)
		30	2.20	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0044)	ND(0.0084)	ND(0.0040)	ND(0.023)	ND(0.0035)	ND(0.0041)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0051)	0.0078	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)	0.1062
		40	2.29	ND(0.025)	ND(0.025)	ND(0.0056)	ND(0.0056)	ND(0.0046)	ND(0.0088)	ND(0.0041)	ND(0.024)	ND(0.0036)	ND(0.0043)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0039)	ND(0.0040)	ND(0.0047)	ND(0.0049)	ND(0.0053)	0.012	ND(0.0056)	ND(0.0025)	0.0080	ND(0.011)	ND(0.014)	ND(0.018)	0.1198
	Oct 2012	10	2.05	ND(0.022)	ND(0.022)	ND(0.0050)	ND(0.0050)	ND(0.0041)	ND(0.0079)	ND(0.0037)	ND(0.021) UJ	ND(0.0033)	ND(0.0039)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.0035)	ND(0.0036)	ND(0.0042)	ND(0.0044)	ND(0.0048)	ND(0.0050)	ND(0.0050)	ND(0.0023)	ND(0.0050)	ND(0.0097)	ND(0.012)	ND(0.016)	ND(0.0933)
		20	2.20	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0044)	ND(0.0084)	ND(0.0040)	ND(0.023) UJ	ND(0.0035)	ND(0.0041)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0051)	ND(0.0054)	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)	ND(0.1011)
		30	2.24	ND(0.024)	ND(0.024)	ND(0.0055)	ND(0.0055)	ND(0.0045)	ND(0.0086)	ND(0.0040)	ND(0.023) UJ	ND(0.0036)	0.0082	ND(0.0049)	0.057	0.021	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0048)	ND(0.0052)	0.028	0.049	ND(0.0025)	0.033	ND(0.011)	ND(0.013)	ND(0.018)	0.2834
		40	2.24	ND(0.024)	ND(0.024)	ND(0.0055)	ND(0.0055)	ND(0.0045)	ND(0.0086)	ND(0.0040)	ND(0.023) UJ	ND(0.0036)	ND(0.0042)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0048)	ND(0.0052)	ND(0.0055)	ND(0.0055)	ND(0.0025)	0.018	ND(0.011)	ND(0.013)	ND(0.018)	0.1177
	Nov 2012	10	2.05	ND(0.025)	ND(0.025)	ND(0.0056)	ND(0.0056)	ND(0.0046)	ND(0.0088)	ND(0.0041)	ND(0.024) UJ	ND(0.0036)	ND(0.0043)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0039)	ND(0.0040)	ND(0.0047)	ND(0.0049)	ND(0.0053)	ND(0.0056)	ND(0.0056)	ND(0.0025)	ND(0.0056)	ND(0.011)	ND(0.014)	ND(0.018)	ND(0.1054)
		20	2.20	ND(0.024)	ND(0.024)	ND(0.0055)	ND(0.0055)	ND(0.0045)	ND(0.0086)	ND(0.0040)	ND(0.023) UJ	ND(0.0036)	ND(0.0042)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0048)	ND(0.0052)	ND(0.0055)	ND(0.0055)	ND(0.0025)	ND(0.0055)	ND(0.011)	ND(0.013)	ND(0.018)	ND(0.1025)
		30	2.24	ND(0.026)	ND(0.026)	ND(0.0057)	ND(0.0057)	ND(0.0047)	ND(0.009)	ND(0.0042)	ND(0.024) UJ	ND(0.0037)	ND(0.0044)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0040)	ND(0.0041)	ND(0.0048)	ND(0.0050)	ND(0.0054)	0.0087	ND(0.0057)	ND(0.0026)	ND(0.0057)	ND(0.011)	ND(0.014)	ND(0.019)	0.1136
		40	2.24	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0045)	ND(0.0085)	ND(0.0040)	ND(0.023) UJ	ND(0.0035)	ND(0.0042)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0052)	0.0062	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)	0.1048
	Dec 2012	10	2.29	ND(0.023) UJ	ND(0.023)	ND(0.0052)	ND(0.0052)	ND(0.0042)	ND(0.0081)	ND(0.0038)	ND(0.022) UJ	ND(0.0034)	ND(0.0040)	ND(0.0046)	ND(0.0046)	ND(0.0046)	ND(0.0036)	ND(0.0037)	ND(0.0043)	ND(0.0045)	ND(0.0049)	ND(0.0052)	ND(0.0052)	ND(0.0023)	ND(0.0052)	ND(0.010)	ND(0.012)	ND(0.017)	ND(0.0968)
		20	2.24	ND(0.024) UJ	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0044)	ND(0.0084)	ND(0.0040)	ND(0.023) UJ	ND(0.0035)	ND(0.0041)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0051)	ND(0.0054)	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)	ND(0.1011)
		30	2.33	ND(0.023) UJ	ND(0.023)	ND(0.0051)	ND(0.0051)	ND(0.0042)	ND(0.0080)	ND(0.0038)	ND(0.022) UJ	ND(0.0033)	ND(0.0039)	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.0036)	ND(0.0037)	ND(0.0043)	ND(0.0044)	ND(0.0049)	0.0054	ND(0.0051)	ND(0.0023)	ND(0.0051)	ND(0.0099)	ND(0.012)	ND(0.017)	0.0990
		40	2.21	ND(0.023) UJ	ND(0.023)	ND(0.0052)	ND(0.0052)	ND(0.0042)	ND(0.0081)	ND(0.0038)	ND(0.022) UJ	ND(0.0034)	ND(0.0040)	ND(0.0046)	ND(0.0046)	ND(0.0046)	ND(0.0036)	0.0039	0.0082	ND(0.0045)	ND(0.0049)	0.0064	ND(0.0052)	ND(0.0023)	ND(0.0052)	ND(0.010)	ND(0.012)	ND(0.017)	0.1087
VW-99	Jul 2012	10	1.58	ND(0.017)	ND(0.017)	ND(0.0039)	ND(0.0039)	ND(0.0032)	ND(0.0061)	ND(0.0028)	ND(0.016)	ND(0.0025)	ND(0.0030)	ND(0.0034)	ND(0.0034)	ND(0.0034)	ND(0.0027)	0.009	0.0083	ND(0.0034)	ND(0.0037)	ND(0.0039)	ND(0.0039)	ND(0.0017)	ND(0.0039)	0.015	0.015	ND(0.013)	0.1082
		20	1.63	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	ND(0.0063)	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	0.004	ND(0.0033)	ND(0.0035)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0077)	ND(0.0096)	ND(0.013)	0.0776
		30	1.64	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	ND(0.0063)	ND(0.0030)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0028)	ND(0.0029)	ND(0.0034)	ND(0.0035)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	0.0081	ND(0.0097)	ND(0.013)	0.0796
		30-Dup	1.65	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	ND(0.0063)	ND(0.0030)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0036)	0.0069	ND(0.0036)	ND(0.0028)	ND(0.0029)	ND(0.0034)	ND(0.0035)	ND(0.0038)	ND(0.0040)	0.0058	ND(0.0018)	ND(0.0040)	ND(0.0078)	ND(0.0097)	ND(0.013)	0.0843
		40	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	ND(0.0062)	ND(0.0029)	ND(0.017)	ND(0.0026)	0.0032	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	0.058	0.013	ND(0.013)	0.1389
		50	5.53	ND(0.061)	ND(0.061)	ND(0.014)	ND(0.014)	ND(0.011)	ND(0.021)	ND(0.010)	ND(0.058)	0.029 J	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.0095)	ND(0.0097)	ND(0.011)	ND(0.012)	16 J	ND(0.014)	ND(0.014)	ND(0.0061)	ND(0.014)	ND(0.026)	2.6 J	ND(0.044)	18.86

TABLE 2-4A. NESTED VAPOR MONITORING WELL ANALYTICAL RESULTS SUMMARY, PETROLEUM RELATED CONSTITUENTS
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Well	Date	Depth ft-bgs	Dilution Factor	n-Butyl-benzene mg/m³	sec-Butyl-benzene mg/m³	Isopropyl-benzene mg/m³	n-Propyl-benzene mg/m³	1,2-Dichloro-ethane mg/m³	1,2-Dibromo-ethane mg/m³	MTBE mg/m³	Naphthalene mg/m³	Benzene mg/m³	Toluene mg/m³	Ethyl-benzene mg/m³	m,p-Xylene mg/m³	o-Xylene mg/m³	Cyclo-hexane mg/m³	Hexane mg/m³	Heptane mg/m³	Styrene mg/m³	2,2,4-Trimethyl-pentane mg/m³	1,3,5-Trimethyl-benzene mg/m³	1,2,4-Trimethyl-benzene mg/m³	1,3-Butadiene mg/m³	4-Ethyl-toluene mg/m³	Butane mg/m³	Isopentane mg/m³	Methyl cyclohexane mg/m³	TVPH as gasoline mg/m³
VW-99	Jul 2012	60	163	ND(1.8)	ND(1.8)	0.57	0.76	ND(0.33)	ND(0.63)	ND(0.29)	ND(1.7)	ND(0.26)	ND(0.31)	ND(0.35)	ND(0.35)	ND(0.35)	6.2	4.4	2.5	ND(0.35)	95	ND(0.40)	ND(0.40)	ND(0.18)	ND(0.40)	2.1	44	29	189.5
		60-Dup	157	ND(1.7)	ND(1.7)	0.46	0.74	ND(0.32)	ND(0.60)	ND(0.28)	ND(1.6)	ND(0.25)	ND(0.30)	ND(0.34)	ND(0.34)	ND(0.34)	5.3	3.8	2.3	ND(0.33)	83	ND(0.38)	ND(0.38)	ND(0.17)	ND(0.38)	1.9	39	26	167.2
	Aug 2012	10	2.58	ND(0.028)	ND(0.028)	ND(0.0063)	ND(0.0063)	ND(0.0052)	ND(0.0099)	ND(0.0046)	ND(0.027)	ND(0.0041)	ND(0.0049)	ND(0.0056)	ND(0.0056)	ND(0.0056)	ND(0.0044)	ND(0.0045)	ND(0.0053)	ND(0.0055)	0.0087	ND(0.0063)	ND(0.0063)	ND(0.0028)	ND(0.0063)	0.015	ND(0.015)	ND(0.021)	0.1330
		20	2.2	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0044)	ND(0.0084)	ND(0.0040)	ND(0.023)	ND(0.0035)	ND(0.0041)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0051)	ND(0.0054)	ND(0.0054)	ND(0.0024)	ND(0.0054)	0.022	ND(0.013)	ND(0.018)	0.1181
		30	2.38	ND(0.026)	ND(0.026)	ND(0.0058)	ND(0.0058)	ND(0.0048)	ND(0.0091)	ND(0.0043)	ND(0.025)	ND(0.0038)	ND(0.0045)	ND(0.0052)	ND(0.0052)	ND(0.0052)	ND(0.0041)	ND(0.0042)	ND(0.0049)	ND(0.0051)	ND(0.0056)	ND(0.0058)	ND(0.0058)	ND(0.0026)	ND(0.0058)	ND(0.011)	ND(0.014)	ND(0.019)	ND(0.1093)
		30-Dup	2.42	ND(0.026)	ND(0.026)	ND(0.0059)	ND(0.0059)	ND(0.0049)	ND(0.0093)	ND(0.0044)	ND(0.025)	ND(0.0039)	ND(0.0046)	ND(0.0052)	ND(0.0052)	ND(0.0052)	ND(0.0042)	ND(0.0043)	ND(0.0050)	ND(0.0052)	ND(0.0056)	ND(0.0059)	ND(0.0059)	ND(0.0027)	ND(0.0059)	ND(0.012)	ND(0.014)	ND(0.019)	ND(0.1106)
		40	2.52	ND(0.028)	ND(0.028)	ND(0.0062)	ND(0.0062)	ND(0.0051)	ND(0.0097)	ND(0.0045)	ND(0.026)	ND(0.0040)	ND(0.0047)	ND(0.0055)	ND(0.0055)	ND(0.0055)	ND(0.0043)	ND(0.0044)	0.0052	ND(0.0054)	ND(0.0059)	ND(0.0062)	ND(0.0062)	ND(0.0028)	ND(0.0062)	0.014	ND(0.015)	ND(0.020)	0.1269
	Sep 2012	10	2.2	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0044)	ND(0.0084)	ND(0.0040)	ND(0.023)	ND(0.0035)	ND(0.0041)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	0.0061	ND(0.0054)	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)	0.1047
		20	2.33	ND(0.026)	ND(0.026)	ND(0.0057)	ND(0.0057)	ND(0.0047)	ND(0.009)	ND(0.0042)	ND(0.024)	ND(0.0037)	ND(0.0044)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0040)	ND(0.0041)	ND(0.0048)	ND(0.0050)	ND(0.0054)	ND(0.0057)	ND(0.0057)	ND(0.0026)	ND(0.0057)	ND(0.011)	ND(0.014)	ND(0.019)	ND(0.1077)
		30	2.13	ND(0.023)	ND(0.023)	ND(0.0052)	ND(0.0052)	ND(0.0043)	ND(0.0082)	ND(0.0038)	ND(0.022)	ND(0.0034)	ND(0.0040)	ND(0.0046)	ND(0.0046)	ND(0.0046)	ND(0.0037)	ND(0.0038)	ND(0.0044)	ND(0.0045)	ND(0.0050)	ND(0.0052)	ND(0.0052)	ND(0.0024)	ND(0.0052)	ND(0.010)	ND(0.012)	ND(0.017)	ND(0.0972)
		30-Dup	2.16	ND(0.024)	ND(0.024)	ND(0.0053)	ND(0.0053)	ND(0.0044)	ND(0.0083)	ND(0.0039)	ND(0.023)	ND(0.0034)	ND(0.0041)	ND(0.0047)	ND(0.0047)	ND(0.0047)	ND(0.0037)	ND(0.0038)	ND(0.0044)	ND(0.0046)	ND(0.0050)	ND(0.0053)	ND(0.0053)	ND(0.0024)	ND(0.0053)	ND(0.010)	ND(0.013)	ND(0.017)	ND(0.0998)
		40	2.24	ND(0.024)	ND(0.024)	ND(0.0055)	0.026	ND(0.0045)	ND(0.0086)	ND(0.0040)	ND(0.023)	ND(0.0036)	ND(0.0042)	0.029	ND(0.0049)	ND(0.0049)	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0048)	ND(0.0052)	0.024	0.015	ND(0.0025)	0.058	ND(0.011)	ND(0.013)	ND(0.018)	0.2410
	Oct 2012	10	2.24	ND(0.024)	ND(0.024)	ND(0.0055)	ND(0.0055)	ND(0.0045)	ND(0.0086)	ND(0.0040)	ND(0.023) UJ	ND(0.0036)	ND(0.0042)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0048)	ND(0.0052)	ND(0.0055)	ND(0.0055)	ND(0.0025)	ND(0.0055)	ND(0.011)	ND(0.013)	ND(0.018)	ND(0.1025)
		20	2.09	ND(0.023)	ND(0.023)	ND(0.0051)	ND(0.0051)	ND(0.0042)	ND(0.0080)	ND(0.0038)	ND(0.022) UJ	ND(0.0033)	0.0080	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.0036)	ND(0.0037)	ND(0.0043)	ND(0.0044)	ND(0.0049)	ND(0.0051)	ND(0.0051)	ND(0.0023)	ND(0.0051)	ND(0.0099)	0.015	ND(0.017)	0.1112
		30	2.24	ND(0.024)	ND(0.024)	ND(0.0055)	ND(0.0055)	ND(0.0045)	ND(0.0086)	ND(0.0040)	ND(0.023) UJ	ND(0.0036)	ND(0.0042)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0048)	ND(0.0052)	ND(0.0055)	ND(0.0055)	ND(0.0025)	ND(0.0055)	ND(0.011)	ND(0.013)	ND(0.018)	ND(0.1025)
		30-Dup	2.2	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0044)	ND(0.0084)	ND(0.0040)	ND(0.023) UJ	ND(0.0035)	ND(0.0041)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0051)	ND(0.0054)	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)	ND(0.1011)
	Nov 2012	10	2.21	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0045)	ND(0.0085)	ND(0.0040)	ND(0.023) UJ	ND(0.0035)	ND(0.0042)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0052)	ND(0.0054)	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)	ND(0.1013)
		20	2.26	ND(0.025)	ND(0.025)	ND(0.0056)	ND(0.0056)	ND(0.0046)	ND(0.0087)	ND(0.0041)	ND(0.024) UJ	ND(0.0036)	ND(0.0042)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.0039)	ND(0.0040)	ND(0.0046)	ND(0.0048)	ND(0.0053)	ND(0.0056)	ND(0.0056)	ND(0.0025)	ND(0.0056)	ND(0.011)	ND(0.013)	ND(0.018)	ND(0.1045)
		30	2.26	ND(0.025)	ND(0.025)	ND(0.0056)	ND(0.0056)	ND(0.0046)	ND(0.0087)	ND(0.0041)	ND(0.024) UJ	ND(0.0036)	0.0090 J	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.0039)	ND(0.0040)	ND(0.0046)	ND(0.0048)	ND(0.0053)	ND(0.0056)	ND(0.0056)	ND(0.0025)	ND(0.0056)	0.011	0.016	ND(0.018)	0.1264
		30-Dup	2.23	ND(0.024)	ND(0.024)	ND(0.0055)	ND(0.0055)	ND(0.0045)	ND(0.0086)	ND(0.0040)	ND(0.023) UJ	ND(0.0036)	0.0045 J	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0047)	ND(0.0052)	ND(0.0055)	ND(0.0055)	ND(0.0025)	ND(0.0055)	ND(0.011)	0.017	ND(0.018)	0.1152
		40	2.4	ND(0.026)	ND(0.026)	ND(0.0059)	ND(0.0059)	ND(0.0048)	ND(0.0092)	ND(0.0043)	ND(0.025) UJ	ND(0.0038)	ND(0.0045)	ND(0.0052)	ND(0.0052)	ND(0.0052)	ND(0.0041)	ND(0.0042)	ND(0.0049)	ND(0.0051)	ND(0.0056)	ND(0.0059)	ND(0.0059)	ND(0.0026)	ND(0.0059)	ND(0.011)	ND(0.014)	ND(0.019)	ND(0.1096)
	Dec 2012	10	2.28	ND(0.025) UJ	ND(0.025)	ND(0.0056)	ND(0.0056)	ND(0.0046)	ND(0.0088)	ND(0.0041)	ND(0.024) UJ	ND(0.0036)	ND(0.0043)	ND(0.0049)	ND(0.0050)	ND(0.0050)	ND(0.0039)	ND(0.0040)	ND(0.0047)	ND(0.0048)	ND(0.0053)	ND(0.0056)	ND(0.0056)	ND(0.0025)	ND(0.0056)	ND(0.011)	ND(0.013)	ND(0.018)	ND(0.1048)
		20	2.16	ND(0.024) UJ	ND(0.024)	ND(0.0053)	ND(0.0053)	ND(0.0044)	ND(0.0083)	ND(0.0039)	ND(0.023) UJ	ND(0.0034)	ND(0.0041)	ND(0.0047)	ND(0.0047)	ND(0.0047)	ND(0.0037)	ND(0.0038)	ND(0.0044)	ND(0.0046)	ND(0.0050)	ND(0.0053)	ND(0.0053)	ND(0.0024)	ND(0.0053)	ND(0.010)	ND(0.013)	ND(0.017)	ND(0.0998)
		30	2.34	ND(0.026) UJ	ND(0.026)	ND(0.0058)	ND(0.0058)	ND(0.0047)	ND(0.009)	ND(0.0042)	ND(0.024) UJ	ND(0.0037)	0.017 J	ND(0.0051)	ND(0.0051)	ND(0.0051)	ND(0.0040)	ND(0.0041)	ND(0.0048)	ND(0.0050)	ND(0.0055)	ND(0.0058)	ND(0.0058)	ND(0.0026)	ND(0.0058)	ND(0.011)	0.11 J	ND(0.019)	0.2260
		30-Dup	2.09	ND(0.023) UJ	ND(0.023)	ND(0.0051)	ND(0.0051)	ND(0.0042)	ND(0.0080)	ND(0.0038)	ND(0.022) UJ	ND(0.0033)	0.0073 J	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.0036)	ND(0.0037)	ND(0.0043)	ND(0.0044)	ND(0.0049)	ND(0.0051)	ND(0.0051)	ND(0.0023)	ND(0.0051)	ND(0.0099)	0.056 J	ND(0.017)	0.1515
		40	2.06	ND(0.023) UJ	ND(0.023)	ND(0.0051)	ND(0.0051)	ND(0.0042)	ND(0.0079)	ND(0.0037)	ND(0.022) UJ	ND(0.0033)	ND(0.0039)	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.0035)	ND(0.0036)	ND(0.0042)	ND(0.0044)	ND(0.0048)	ND(0.0051)	ND(0.0051)	ND(0.0023)	ND(0.0051)	ND(0.0098)	ND(0.012)	ND(0.016)	ND(0.0953)
VW-128	Jul 2012	5	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	ND(0.0062)	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0076)	ND(0.0095)	ND(0.013)	ND(0.0747)
		10	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	ND(0.0062)	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0076)	ND(0.0095)	ND(0.013)	ND(0.0747)
		20	1.68	ND(0.018)	ND(0.018)	ND(0.0041)	ND(0.0041)	ND(0.0034)	ND(0.0064)	ND(0.0030)	ND(0.018)	ND(0.0027)	ND(0.0032)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0029)	ND(0.0030)	ND(0.0034)	ND(0.0036)	ND(0.0039)	ND(0.0041)	ND(0.0041)	ND(0.0018)	ND(0.0041)	ND(0.0080)	ND(0.0099)	ND(0.013)	ND(0.0768)
		30	1.58	ND(0.017)	ND(0.017)	ND(0.0039)	ND(0.0039)	ND(0.0032)	ND(0.0061)	ND(0.0028)	ND(0.016)	ND(0.0025)	ND(0.0030)	ND(0.0034)	ND(0.0034)	ND(0.0034)	ND(0.0027)	ND(0.0028)	ND(0.0032)	ND(0.0034)	ND(0.0037)	ND(0.0039)	ND(0.0039)	ND(0.0017)	ND(0.0039)	ND(0.0075)	ND(0.0093)	ND(0.013)	ND(0.0723)
		40	1.65	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	ND(0.0063)	ND(0.0030)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0028)	ND(0.0029)	ND(0.0034)	ND(0.0035)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0078)	ND(0.0097)	ND(0.013)	ND(0.0754)
		50	1.55	ND(0.017)	ND(0.017)	ND(0.0038)	ND(0.0038)	ND(0.0031)	ND(0.0060)	ND(0.0028)	ND(0.016)	ND(0.0025)	ND(0.0029)	ND(0.0034)	ND(0.0034)	ND(0.0034)	ND(0.0027)	ND(0.0027)	ND(0.0032)	ND(0.0033)	ND(0.0036)	ND(0.0038)	ND(0.0038)	ND(0.0017)	ND(0.0038)	ND(0.0074)	ND(0.0091)	ND(0.012)	ND(0.0711)
VW-129	Jul 2012	5	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	ND(0.0062)	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0076)	ND(0.0095)	ND(0.013)	ND(0.0747)
		10	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	ND(0.0062)	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0076)	ND(0.0095)	ND(0.013)	ND(0.0747)
		20	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	ND(0.0062)	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0076)	ND(0.0095)	ND(0.013)	ND(0.0747)
		30	1.68	ND(0.018)	ND(0.018)	ND(0.0041)	ND(0.0041)	ND(0.0034)	ND(0.0064)	ND(0.0030)	ND(0.018)	ND(0.0027)	ND(0.0032)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0029)	ND(0.0030)	0.0038	ND(0.0036)	ND(0.0039)	ND(0.0041)	ND(0.0041)	ND(0.0018)	ND(0.0041)	ND(0.0080)	ND(0.0099)	ND(0.013)	0.0789
		40	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	ND(0.0062)	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0076)	ND(0.0095)	ND(0.013)	ND(0.0747)
		50	1.83	ND(0.020)	ND(0.020)	ND(0.0045)	ND(0.0045)	ND(0.0037)	ND(0.0070)	ND(0.0033)	ND(0.019)	ND(0.0029)	ND(0.0034)	ND(0.0040)	ND(0.0040)	ND(0.0040)	ND(0.0031)	ND(0.0032)	ND(0.0037)	ND(0.0039)	ND(0.0043)	ND(0.0045)	ND(0.0045)	ND(0.0020)	ND(0.0045)	0.041	ND(0.011)	ND(0.015)	0.1210

Notes:

ft-bgs - Feet below ground surface

mg/m^3 - Milligram per cubic meter

ND - Not detected

Dup - Blind Duplicate Sample

J - Estimated concentration

UJ - Estimated concentration below detection limit

TABLE 2-4B. NESTED VAPOR MONITORING WELL ANALYTICAL RESULTS SUMMARY, SOLVENT RELATED CONSTITUENTS
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Well	Date	Depth ft-bgs	Dilution Factor	Acetone mg/m^3	2-Butanone mg/m^3	Carbon tetrachloride mg/m^3	Chloro-benzene mg/m^3	1,1-Dichloro-ethane mg/m^3	1,1-Dichloro-ethene mg/m^3	cis-1,2-Dichloro-ethene mg/m^3	trans-1,2- Dichloro-ethene mg/m^3	1,4-Dioxane mg/m^3	Hexachloro-butadiene mg/m^3	2-Hexanone mg/m^3	Isopropanol mg/m^3	4-Methyl-2-Pentanone mg/m^3	Methylene Chloride mg/m^3	1,1,2,2-Tetrachloro-ethane mg/m^3	Tetrachloro-ethene mg/m^3	Tetrahydro-furan mg/m^3	1,1,1-Trichloro-ethane mg/m^3	1,1,2-Trichloro-ethane mg/m^3	Trichloro-ethene mg/m^3	Vinyl Chloride mg/m^3
VW-93A	Jul 2012	5	1.68	0.088	ND(0.0099)	ND(0.0053)	ND(0.0039)	ND(0.0034)	ND(0.0033)	ND(0.0033)	ND(0.0033)	ND(0.012)	ND(0.036)	ND(0.014)	ND(0.0082)	ND(0.0034)	ND(0.029)	ND(0.0058)	ND(0.0057)	ND(0.0025)	ND(0.0046)	ND(0.0046)	ND(0.0045)	ND(0.0021)
VW-93	Jul 2012	10	2.11	0.06	ND(0.012)	ND(0.0066)	ND(0.0048)	ND(0.0043)	ND(0.0042)	ND(0.0042)	ND(0.0042)	ND(0.015)	ND(0.045)	ND(0.017)	ND(0.010)	ND(0.0043)	ND(0.037)	ND(0.0072)	ND(0.0072)	ND(0.0031)	ND(0.0058)	ND(0.0058)	ND(0.0057)	ND(0.0027)
		20	1.61	0.11	0.011	ND(0.0051)	ND(0.0037)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.034)	ND(0.013)	ND(0.0079)	ND(0.0033)	ND(0.028)	ND(0.0055)	ND(0.0055)	ND(0.0024)	ND(0.0044)	ND(0.0044)	ND(0.0043)	ND(0.0020)
		30	1.68	0.057	ND(0.0099)	ND(0.0053)	ND(0.0039)	ND(0.0034)	ND(0.0033)	ND(0.0033)	ND(0.0033)	ND(0.012)	ND(0.036)	ND(0.014)	ND(0.0082)	ND(0.0034)	ND(0.029)	ND(0.0058)	ND(0.0057)	ND(0.0025)	ND(0.0046)	ND(0.0046)	ND(0.0045)	ND(0.0021)
		30-Dup	1.68	0.080 J	ND(0.0099)	ND(0.0053)	ND(0.0039)	ND(0.0034)	ND(0.0033)	ND(0.0033)	ND(0.0033)	ND(0.012)	ND(0.036)	ND(0.014)	ND(0.0082)	ND(0.0034)	ND(0.029)	ND(0.0058)	ND(0.0057)	ND(0.0025)	ND(0.0046)	ND(0.0046)	ND(0.0045)	ND(0.0021)
		40	1.61	0.042	ND(0.0095)	ND(0.0051)	ND(0.0037)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.034)	ND(0.013)	ND(0.0079)	ND(0.0033)	ND(0.028)	ND(0.0055)	ND(0.0055)	ND(0.0024)	ND(0.0044)	ND(0.0044)	ND(0.0043)	ND(0.0020)
		50	1.64	0.07	ND(0.0097)	ND(0.0052)	ND(0.0038)	ND(0.0033)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.035)	ND(0.013)	ND(0.0081)	ND(0.0034)	ND(0.028)	ND(0.0056)	ND(0.0056)	ND(0.0024)	ND(0.0045)	ND(0.0045)	ND(0.0044)	ND(0.0021)
		60	1.58	0.2	0.034	ND(0.0050)	ND(0.0036)	ND(0.0032)	ND(0.0031)	ND(0.0031)	ND(0.0031)	ND(0.011)	ND(0.034)	ND(0.013)	ND(0.0078)	ND(0.0032)	ND(0.027)	ND(0.0054)	ND(0.0054)	ND(0.0023)	ND(0.0043)	ND(0.0043)	ND(0.0042)	ND(0.0020)
VW-96A	Jul 2012	5	1.58	0.12	0.017	ND(0.0050)	ND(0.0036)	ND(0.0032)	ND(0.0031)	ND(0.0031)	ND(0.0031)	ND(0.011)	ND(0.034)	ND(0.013)	ND(0.0078)	ND(0.0032)	ND(0.027)	ND(0.0054)	ND(0.0054)	ND(0.0023)	ND(0.0043)	ND(0.0043)	ND(0.0042)	ND(0.0020)
VW-96	Jul 2012	10	1.58	0.049	ND(0.0093)	ND(0.0050)	ND(0.0036)	ND(0.0032)	ND(0.0031)	ND(0.0031)	ND(0.0031)	ND(0.011)	ND(0.034)	ND(0.013)	ND(0.0078)	ND(0.0032)	ND(0.027)	ND(0.0054)	ND(0.0054)	ND(0.0023)	ND(0.0043)	ND(0.0043)	ND(0.0042)	ND(0.0020)
		20	1.63	0.047	ND(0.0096)	ND(0.0051)	ND(0.0038)	ND(0.0033)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.035)	ND(0.013)	ND(0.0080)	ND(0.0033)	ND(0.028)	ND(0.0056)	ND(0.0055)	ND(0.0024)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.0021)
		30	1.56	0.048	ND(0.0092)	ND(0.0049)	ND(0.0036)	ND(0.0032)	ND(0.0031)	ND(0.0031)	ND(0.0031)	ND(0.011)	ND(0.033)	ND(0.013)	ND(0.0077)	ND(0.0032)	ND(0.027)	ND(0.0054)	ND(0.0053)	ND(0.0023)	ND(0.0042)	ND(0.0042)	ND(0.0042)	ND(0.0020)
		40	2.46	0.11	ND(0.014)	ND(0.0077)	ND(0.0057)	ND(0.0050)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.018)	ND(0.052)	ND(0.020)	ND(0.012)	ND(0.0050)	ND(0.043)	ND(0.0084)	ND(0.0083)	ND(0.0036)	ND(0.0067)	ND(0.0067)	ND(0.0066)	ND(0.0031)
		40-Dup	1.65	0.080 J	ND(0.0097)	ND(0.0052)	ND(0.0038)	ND(0.0033)	ND(0.0033)	ND(0.0033)	ND(0.0033)	ND(0.012)	ND(0.035)	ND(0.014)	ND(0.0081)	ND(0.0034)	ND(0.029)	ND(0.0057)	ND(0.0056)	ND(0.0024)	ND(0.0045)	ND(0.0045)	ND(0.0044)	ND(0.0021)
		50	1.61	0.057	ND(0.0095)	ND(0.0051)	ND(0.0037)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.034)	ND(0.013)	ND(0.0079)	ND(0.0033)	ND(0.028)	ND(0.0055)	ND(0.0055)	ND(0.0024)	ND(0.0044)	ND(0.0044)	ND(0.0043)	ND(0.0020)
		55	32.2	ND(0.38)	ND(0.19)	ND(0.10)	ND(0.074)	ND(0.065)	ND(0.064)	ND(0.064)	ND(0.064)	ND(0.23)	ND(0.69)	ND(0.26)	ND(0.16)	ND(0.066)	ND(0.56)	ND(0.11)	ND(0.11)	ND(0.047)	ND(0.088)	ND(0.088)	ND(0.086)	ND(0.041)
	Aug 2012	10	2.33	0.28	0.018	ND(0.0073)	ND(0.0054)	ND(0.0047)	ND(0.0046)	ND(0.0046)	ND(0.0046)	ND(0.017)	ND(0.050)	ND(0.019)	ND(0.011)	ND(0.0048)	ND(0.040)	ND(0.0080)	ND(0.0079)	ND(0.0034)	ND(0.0064)	ND(0.0064)	ND(0.0063)	ND(0.0030)
		20	5.28	0.079	ND(0.031)	ND(0.017)	ND(0.012)	ND(0.011)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.038)	ND(0.11)	ND(0.043)	ND(0.026)	ND(0.011)	ND(0.092)	ND(0.018)	ND(0.018)	ND(0.0078)	ND(0.014)	ND(0.014)	ND(0.014)	ND(0.0067)
		30	2.29	0.14	ND(0.014)	ND(0.0072)	ND(0.0053)	ND(0.0046)	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.016)	ND(0.049)	ND(0.019)	ND(0.011)	ND(0.0047)	ND(0.040)	ND(0.0079)	ND(0.0078)	ND(0.0034)	ND(0.0062)	ND(0.0062)	ND(0.0062)	ND(0.0029)
		40	2.42	0.046	ND(0.014)	ND(0.0076)	ND(0.0056)	ND(0.0049)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.017)	ND(0.052)	ND(0.020)	ND(0.012)	ND(0.0050)	ND(0.042)	ND(0.0083)	ND(0.0082)	ND(0.0036)	ND(0.0066)	ND(0.0066)	ND(0.0065)	ND(0.0031)
	Sep 2012	10	2.20	ND(0.026)	ND(0.013)	ND(0.0069)	ND(0.0051) UJ	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.047)	ND(0.018)	ND(0.011)	ND(0.0045)	ND(0.038)	ND(0.0076)	ND(0.0075)	ND(0.0032)	ND(0.0060)	ND(0.0060)	ND(0.0059)	ND(0.0028)
		20	2.29	ND(0.027)	ND(0.014)	ND(0.0072)	ND(0.0053) UJ	ND(0.0046)	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.016)	ND(0.049)	ND(0.019)	ND(0.011)	ND(0.0047)	ND(0.040)	ND(0.0079)	ND(0.0078)	ND(0.0034)	ND(0.0062)	ND(0.0062)	ND(0.0062)	ND(0.0029)
		30	2.20	0.030	ND(0.013)	ND(0.0069)	ND(0.0051) UJ	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.047)	ND(0.018)	ND(0.011)	ND(0.0045)	ND(0.038)	ND(0.0076)	ND(0.0075)	ND(0.0032)	ND(0.0060)	ND(0.0060)	ND(0.0059)	ND(0.0028)
		40	2.29	0.037	ND(0.014)	ND(0.0072)	ND(0.0053) UJ	ND(0.0046)	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.016)	ND(0.049)	ND(0.019)	ND(0.011)	ND(0.0047)	ND(0.040)	ND(0.0079)	ND(0.0078)	ND(0.0034)	ND(0.0062)	ND(0.0062)	ND(0.0062)	ND(0.0029)
	Oct 2012	10	2.05	ND(0.024)	ND(0.012)	ND(0.0064)	ND(0.0047)	ND(0.0041)	ND(0.0041)	ND(0.0041)	ND(0.0041)	ND(0.015)	ND(0.044)	ND(0.017)	ND(0.010)	ND(0.0042) UJ	ND(0.036)	ND(0.0070)	ND(0.0070)	ND(0.0030)	ND(0.0056)	ND(0.0056)	ND(0.0055)	ND(0.0026)
		20	2.20	ND(0.026)	ND(0.013)	ND(0.0069)	ND(0.0051)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.047)	ND(0.018)	ND(0.011)	ND(0.0045) UJ	ND(0.038)	ND(0.0076)	ND(0.0075)	ND(0.0032)	ND(0.0060)	ND(0.0060)	ND(0.0059)	ND(0.0028)
		30	2.24	ND(0.027)	ND(0.013)	ND(0.0070)	ND(0.0052)	ND(0.0045)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.048)	ND(0.018)	ND(0.011)	ND(0.0046) UJ	ND(0.039)	ND(0.0077)	ND(0.0076)	ND(0.0033)	ND(0.0061)	ND(0.0061)	ND(0.0060)	ND(0.0029)
		40	2.24	ND(0.027)	ND(0.013)	ND(0.0070)	ND(0.0052)	ND(0.0045)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.048)	ND(0.018)	ND(0.011)	ND(0.0046) UJ	ND(0.039)	ND(0.0077)	ND(0.0076)	ND(0.0033)	ND(0.0061)	ND(0.0061)	ND(0.0060)	ND(0.0029)
	Nov 2012	10	2.05	ND(0.027)	ND(0.014)	ND(0.0072)	ND(0.0053) UJ	ND(0.0046)	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.016)	ND(0.049)	ND(0.019)	ND(0.011)	ND(0.0047) UJ	ND(0.040)	ND(0.0079)	ND(0.0078)	ND(0.0034)	ND(0.0062)	ND(0.0062)	ND(0.0062)	ND(0.0029)
		20	2.20	0.032	ND(0.013)	ND(0.0070)	ND(0.0052) UJ	ND(0.0045)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.048)	ND(0.018)	ND(0.011)	ND(0.0046) UJ	ND(0.039)	ND(0.0077)	ND(0.0076)	0.0058	ND(0.0061)	ND(0.0061)	ND(0.0060)	ND(0.0029)
		30	2.24	0.041	ND(0.014)	ND(0.0073)	ND(0.0054) UJ	ND(0.0047)	ND(0.0046)	ND(0.0046)	ND(0.0046)	ND(0.017)	ND(0.050)	ND(0.019)	ND(0.011)	ND(0.0048) UJ	ND(0.040)	ND(0.0080)	ND(0.0079)	ND(0.0034)	ND(0.0064)	ND(0.0064)	ND(0.0063)	ND(0.0030)
		40	2.24	0.038	ND(0.013)	ND(0.0070)	ND(0.0051) UJ	ND(0.0045)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.047)	ND(0.018)	ND(0.011)	ND(0.0045) UJ	ND(0.038)	ND(0.0076)	ND(0.0075)	ND(0.0032)	ND(0.0060)	ND(0.0060)	ND(0.0059)	ND(0.0028)
	Dec 2012	10	2.29	ND(0.025)	ND(0.012)	ND(0.0066)	0.014 JB	ND(0.0042)	ND(0.0042)	ND(0.0042)	ND(0.0042)	ND(0.015)	ND(0.045)	ND(0.017)	ND(0.010)	ND(0.0043) UJ	ND(0.036)	ND(0.0072)	ND(0.0071)	ND(0.0031)	ND(0.0057)	ND(0.0057)	ND(0.0056)	ND(0.0027)
		20	2.24	0.026	ND(0.013)	ND(0.0069)	0.019 JB	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.047)	ND(0.018)	ND(0.011)	ND(0.0045) UJ	ND(0.038)	ND(0.0076)	ND(0.0075)	ND(0.0032)	ND(0.0060)	ND(0.0060)	ND(0.0059)	ND(0.0028)
		30	2.33	ND(0.025)	ND(0.012)	ND(0.0066)	0.017 JB	ND(0.0042)	ND(0.0041)	ND(0.0041)	ND(0.0041)	ND(0.015)	ND(0.044)	ND(0.017)	ND(0.010)	ND(0.0043) UJ	ND(0.036)	ND(0.0072)	ND(0.0071)	ND(0.0031)	ND(0.0057)	ND(0.0057)	ND(0.0056)	ND(0.0027)
		40	2.21	ND(0.025)	ND(0.012)	ND(0.0066)	0.0067 JB	ND(0.0042)	ND(0.0042)	ND(0.0042)	ND(0.0042)	ND(0.015)	ND(0.045)	ND(0.017)	ND(0.010)	ND(0.0043) UJ	ND(0.036)	ND(0.0072)	ND(0.0071)	ND(0.0031)	ND(0.0057)	ND(0.0057)	ND(0.0056)	ND(0.0027)
VW-99	Jul 2012	10	1.58	0.071	ND(0.0093)	ND(0.0050)	ND(0.0036)	ND(0.0032)	ND(0.0031)	ND(0.0031)	ND(0.0031)	ND(0.011)	ND(0.034)	ND(0.013)	ND(0.0078)	ND(0.0032)	ND(0.027)	ND(0.0054)	ND(0.0054)	ND(0.0023)	ND(0.0043)	ND(0.0043)	0.015	ND(0.0020)
		20	1.63	0.046	ND(0.0096)	ND(0.0051)	ND(0.0038)	ND(0.0033)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.035)	ND(0.013)	ND(0.0080)	ND(0.0033)	ND(0.028)	ND(0.0056)	0.014	ND(0.0024)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.0021)
		30	1.64	0.13 J	0.0098	ND(0.0052)	ND(0.0038)	ND(0.0033)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.035)	ND(0.013)	ND(0.0081)	ND(0.0034)	ND(0.028)	ND(0.0056)	0.022	ND(0.0024)	ND(0.0045)	ND(0.0045)	ND(0.0044)	ND(0.0021)
		30-Dup	1.65	0.073 J	ND(0.0097)	ND(0.0052)	ND(0.0038)	ND(0.0033)	ND(0.0033)	ND(0.0033)	ND(0.0033)	ND(0.012)	ND(0.035)	ND(0.014)	ND(0.0081)	ND(0.0034)	ND(0.029)	ND(0.0057)	0.023	ND(0.0024)	ND(0.0045)	ND(0.0045)	ND(0.0044)	ND(0.0021)
		40	1.61	0.12	0.014	ND(0.0051)	ND(0.0037)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.034)	ND(0.013)	ND(0.0079)	ND(0.0033)	ND(0.028)	ND(0.0055)	0.018	ND(0.0024)	ND(0.0044)	ND(0.0044)	ND(0.0043)	ND(0.0020)
		50	5.53	0.081	ND(0.033)	ND(0.017)	ND(0.013)	ND(0.011)	ND(0.011)	ND(0.011)	ND(0.011)	ND(0.040)	ND(0.12)	ND(0.045)	ND(0.027)	ND(0.011)	ND(0.096)	ND(0.019)	0.036	ND(0.0082)	ND(0.015)	ND(0.015)	ND(0.015)	ND(0.0071)
		60	163.00	ND(1.9)	ND(0.96)	ND(0.51)	ND(0.38)	ND(0.33)	ND(0.32)	ND(0.32)	ND(0.32)	ND(1.2)	ND(3.5)	ND(1.3)	ND(0.80)	ND(0.33)	ND(2.8)	ND(0.56)	ND(0.55)	ND(0.24)	ND(0.44)	ND(0.44)	ND(0.44)	ND(0.21)
		60-Dup	157	ND(1.9)	ND(0.92)	ND(0.49)	ND(0.36)	ND(0.32)	ND(0.31)	ND(0.31)	ND(0.31)	ND(1.1)	ND(3.3)	ND(1.3)	ND(0.77)	ND(0.32)	ND(2.7)	ND(0.54)	ND(0.53)	ND(0.23)	ND(0.43)	ND(0.43)	ND(0.42)	ND(0.20)
VW-99	Aug 2012	10	2.58	0.097	ND(0.015)	ND(0.0081)	ND(0.0059)	ND(0.0052)	ND(0.0051)	ND(0.0051)	ND(0.0051)	ND(0.018)	ND(0.055)	ND(0.021)	ND(0.013)	ND(0.0053)	ND(0.045)	ND(0.0088)	ND(0.0088)	ND(0.0038)	ND(0.0070)	ND(0.0070)	ND(0.0069)	ND(0.0033)
		20	2.20	0.078	ND(0.013)	ND(0.0069)	ND(0.0051)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.047)	ND(0.018)	ND(0.011)	ND(0.0045)	ND(0.038)	ND(0.0076)	ND(0.0075)	0.0064	ND(0.0060)	ND(0.0060)	ND(0.0059)	ND(0.0028)
		30	2.38	0.066 J	ND(0.014)	ND(0.0075)	ND(0.0055)	ND(0.0048)	ND(0.0047)	ND(0.0047)	ND(0.0047)	ND(0.017)	ND(0.051)	ND(0.019)	ND(0.012)	ND(0.0049)	ND(0.041)	ND(0.0082)	0.5	ND(0.0035)	ND(0.0065)	ND(0.0065)	ND(0.0064)	ND(0.0030)

TABLE 2-4B. NESTED VAPOR MONITORING WELL ANALYTICAL RESULTS SUMMARY, SOLVENT RELATED CONSTITUENTS
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Well	Date	Depth ft-bgs	Dilution Factor	Acetone mg/m^3	2-Butanone mg/m^3	Carbon tetrachloride mg/m^3	Chloro-benzene mg/m^3	1,1-Dichloro-ethane mg/m^3	1,1-Dichloro-ethene mg/m^3	cis-1,2-Dichloro-ethene mg/m^3	trans-1,2- Dichloro-ethene mg/m^3	1,4-Dioxane mg/m^3	Hexachloro-butadiene mg/m^3	2-Hexanone mg/m^3	Isopropanol mg/m^3	4-Methyl-2-Pentanone mg/m^3	Methylene Chloride mg/m^3	1,1,2,2-Tetrachloro-ethane mg/m^3	Tetrachloro-ethene mg/m^3	Tetrahydro-furan mg/m^3	1,1,1-Trichloro-ethane mg/m^3	1,1,2-Trichloro-ethane mg/m^3	Trichloro-ethene mg/m^3	Vinyl Chloride mg/m^3
VW-99	Aug 2012	30-Dup	2.42	0.044 J	ND(0.014)	ND(0.0076)	ND(0.0056)	ND(0.0049)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.017)	ND(0.052)	ND(0.020)	ND(0.012)	ND(0.0050)	ND(0.042)	ND(0.0083)	0.5	ND(0.0036)	ND(0.0066)	ND(0.0066)	ND(0.0065)	ND(0.0031)
		40	2.52	0.14	0.015	ND(0.0079)	ND(0.0058)	ND(0.0051)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.018)	ND(0.054)	ND(0.021)	ND(0.012)	ND(0.0052)	ND(0.044)	ND(0.0086)	0.018	ND(0.0037)	ND(0.0069)	ND(0.0069)	ND(0.0068)	ND(0.0032)
	Sep 2012	10	2.20	0.028	ND(0.013)	ND(0.0069)	ND(0.0051) UJ	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.047)	ND(0.018)	ND(0.011)	ND(0.0045)	ND(0.038)	ND(0.0076)	ND(0.0075)	ND(0.0032)	ND(0.0060)	ND(0.0060)	ND(0.0059)	ND(0.0028)
		20	2.30	0.038	ND(0.014)	ND(0.0073)	ND(0.0054) UJ	ND(0.0047)	ND(0.0046)	ND(0.0046)	ND(0.0046)	ND(0.017)	ND(0.050)	ND(0.019)	ND(0.011)	ND(0.0048)	ND(0.040)	ND(0.0080)	0.0094	ND(0.0034)	ND(0.0064)	ND(0.0064)	ND(0.0063)	ND(0.0030)
		30	2.13	ND(0.025)	ND(0.012)	ND(0.0067)	ND(0.0049) UJ	ND(0.0043)	ND(0.0042)	ND(0.0042)	ND(0.0042)	ND(0.015)	ND(0.045)	ND(0.017)	ND(0.010)	ND(0.0044)	ND(0.037)	ND(0.0073)	0.41	ND(0.0031)	ND(0.0058)	ND(0.0058)	ND(0.0057)	ND(0.0027)
		30-Dup	2.16	ND(0.026)	ND(0.013)	ND(0.0068)	ND(0.0050) UJ	ND(0.0044)	ND(0.0043)	ND(0.0043)	ND(0.0043)	ND(0.016)	ND(0.046)	ND(0.018)	ND(0.011)	ND(0.0044)	ND(0.038)	ND(0.0074)	0.42	ND(0.0032)	ND(0.0059)	ND(0.0059)	ND(0.0058)	ND(0.0028)
		40	2.24	ND(0.027)	ND(0.013)	ND(0.0070)	0.0053 J	ND(0.0045)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.048)	ND(0.018)	ND(0.011)	ND(0.0046)	ND(0.039)	ND(0.0077)	0.018	ND(0.0033)	ND(0.0061)	ND(0.0061)	ND(0.0060)	ND(0.0029)
	Oct 2012	10	2.24	0.039	ND(0.013)	ND(0.0070)	ND(0.0052)	ND(0.0045)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.048)	ND(0.018)	ND(0.011)	ND(0.0046) UJ	ND(0.039)	ND(0.0077)	ND(0.0076)	ND(0.0033)	ND(0.0061)	ND(0.0061)	ND(0.0060)	ND(0.0029)
		20	2.09	ND(0.025)	ND(0.012)	ND(0.0066)	ND(0.0048)	ND(0.0042)	ND(0.0041)	ND(0.0041)	ND(0.0041)	ND(0.015)	ND(0.044)	ND(0.017)	ND(0.010)	ND(0.0043) UJ	ND(0.036)	ND(0.0072)	0.018	ND(0.0031)	ND(0.0057)	ND(0.0057)	ND(0.0056)	ND(0.0027)
		30	2.24	ND(0.027)	ND(0.013)	ND(0.0070)	ND(0.0052)	ND(0.0045)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.048)	ND(0.018)	ND(0.011)	ND(0.0046) UJ	ND(0.039)	ND(0.0077)	0.38	ND(0.0033)	ND(0.0061)	ND(0.0061)	ND(0.0060)	ND(0.0029)
		30-Dup	2.20	ND(0.026)	ND(0.013)	ND(0.0069)	ND(0.0051)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.047)	ND(0.018)	ND(0.011)	ND(0.0045) UJ	ND(0.038)	ND(0.0076)	0.41	ND(0.0032)	ND(0.0060)	ND(0.0060)	ND(0.0059)	ND(0.0028)
	Nov 2012	10	2.21	ND(0.026)	ND(0.013)	ND(0.0070)	ND(0.0051) UJ	ND(0.0045)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.047)	ND(0.018)	ND(0.011)	ND(0.0045) UJ	ND(0.038)	ND(0.0076)	ND(0.0075)	ND(0.0032)	ND(0.0060)	ND(0.0060)	ND(0.0059)	ND(0.0028)
		20	2.26	0.036	ND(0.013)	ND(0.0071)	ND(0.0052) UJ	ND(0.0046)	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.016)	ND(0.048)	ND(0.018)	ND(0.011)	ND(0.0046) UJ	ND(0.039)	ND(0.0078)	0.028	ND(0.0033)	ND(0.0062)	ND(0.0062)	ND(0.0061)	ND(0.0029)
		30	2.26	0.075 J	ND(0.013)	ND(0.0071)	ND(0.0052) UJ	ND(0.0046)	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.016)	ND(0.048)	ND(0.018)	ND(0.011)	ND(0.0046) UJ	ND(0.039)	ND(0.0078)	0.2	0.0085	ND(0.0062)	ND(0.0062)	ND(0.0061)	ND(0.0029)
		30-Dup	2.23	0.030 J	ND(0.013)	ND(0.0070)	ND(0.0051) UJ	ND(0.0045)	ND(0.0044)	ND(0.0044)	ND(0.0044)	ND(0.016)	ND(0.048)	ND(0.018)	ND(0.011)	ND(0.0046) UJ	ND(0.039)	ND(0.0076)	0.19	0.011	ND(0.0061)	ND(0.0061)	ND(0.0060)	ND(0.0028)
		40	2.40	ND(0.028)	ND(0.014)	ND(0.0076)	ND(0.0055) UJ	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.017)	ND(0.051)	ND(0.020)	ND(0.012)	ND(0.0049) UJ	ND(0.042)	ND(0.0082)	0.017	ND(0.0035)	ND(0.0065)	ND(0.0065)	ND(0.0064)	ND(0.0031)
	Dec 2012	10	2.28	ND(0.027)	ND(0.013)	ND(0.0072)	0.0064 JB	ND(0.0046)	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.016)	ND(0.049)	ND(0.019)	ND(0.011)	ND(0.0047) UJ	ND(0.040)	ND(0.0078)	ND(0.0077)	ND(0.0034)	ND(0.0062)	ND(0.0062)	ND(0.0061)	ND(0.0029)
		20	2.16	ND(0.026)	ND(0.013)	ND(0.0068)	0.0052 JB	ND(0.0044)	ND(0.0043)	ND(0.0043)	ND(0.0043)	ND(0.016)	ND(0.046)	ND(0.018)	ND(0.011)	ND(0.0044) UJ	ND(0.038)	ND(0.0074)	0.03	ND(0.0032)	ND(0.0059)	ND(0.0059)	ND(0.0058)	ND(0.0028)
		30	2.34	ND(0.028)	ND(0.014)	ND(0.0074)	0.0061 JB	ND(0.0047)	ND(0.0046)	ND(0.0046)	ND(0.0046)	ND(0.017)	ND(0.050)	ND(0.019)	ND(0.012)	ND(0.0048) UJ	ND(0.041)	ND(0.0080)	0.35	ND(0.0034)	ND(0.0064)	ND(0.0064)	ND(0.0063)	ND(0.0030)
		30-Dup	2.09	0.041	ND(0.012)	ND(0.0066)	0.0049 JB	ND(0.0042)	ND(0.0041)	ND(0.0041)	ND(0.0041)	ND(0.015)	ND(0.044)	ND(0.017)	ND(0.010)	ND(0.0043) UJ	ND(0.036)	ND(0.0072)	0.38	ND(0.0031)	ND(0.0057)	ND(0.0057)	ND(0.0056)	ND(0.0027)
		40	2.06	0.025	ND(0.012)	ND(0.0065)	ND(0.0047) UJ	ND(0.0042)	ND(0.0041)	ND(0.0041)	ND(0.0041)	ND(0.015)	ND(0.044)	ND(0.017)	ND(0.010)	ND(0.0042) UJ	ND(0.036)	ND(0.0071)	0.025	ND(0.0030)	ND(0.0056)	ND(0.0056)	ND(0.0055)	ND(0.0026)
VW-128	Jul 2012	5	1.61	0.078	ND(0.0095)	ND(0.0051)	ND(0.0037)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.034)	ND(0.013)	ND(0.0079)	ND(0.0033)	ND(0.028)	ND(0.0055)	0.0056	ND(0.0024)	ND(0.0044)	ND(0.0044)	ND(0.0043)	ND(0.0020)
		10	1.61	0.06	ND(0.0095)	ND(0.0051)	ND(0.0037)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.034)	ND(0.013)	ND(0.0079)	ND(0.0033)	ND(0.028)	ND(0.0055)	ND(0.0055)	ND(0.0024)	ND(0.0044)	ND(0.0044)	ND(0.0043)	ND(0.0020)
		20	1.68	0.083	ND(0.0099)	ND(0.0053)	ND(0.0039)	ND(0.0034)	ND(0.0033)	ND(0.0033)	ND(0.0033)	ND(0.012)	ND(0.036)	ND(0.014)	0.4	ND(0.0034)	ND(0.029)	ND(0.0058)	0.008	ND(0.0025)	ND(0.0046)	ND(0.0046)	ND(0.0045)	ND(0.0021)
		30	1.58	0.53	0.035	ND(0.0050)	ND(0.0036)	ND(0.0032)	ND(0.0031)	ND(0.0031)	ND(0.0031)	ND(0.011)	ND(0.034)	ND(0.013)	0.03	ND(0.0032)	ND(0.027)	ND(0.0054)	ND(0.0054)	ND(0.0023)	ND(0.0043)	ND(0.0043)	ND(0.0042)	ND(0.0020)
		40	1.65	0.15	0.015	ND(0.0052)	ND(0.0038)	ND(0.0033)	ND(0.0033)	ND(0.0033)	ND(0.0033)	ND(0.012)	ND(0.035)	ND(0.014)	ND(0.0081)	ND(0.0034)	ND(0.029)	ND(0.0057)	ND(0.0056)	ND(0.0024)	ND(0.0045)	ND(0.0045)	ND(0.0044)	ND(0.0021)
		50	1.55	0.058	ND(0.0091)	ND(0.0049)	ND(0.0036)	ND(0.0031)	ND(0.0031)	ND(0.0031)	ND(0.0031)	ND(0.011)	ND(0.033)	ND(0.013)	ND(0.0076)	ND(0.0032)	ND(0.027)	ND(0.0053)	ND(0.0052)	ND(0.0023)	ND(0.0042)	ND(0.0042)	ND(0.0042)	ND(0.0020)
VW-129	Jul 2012	5	1.61	0.072	ND(0.0095)	ND(0.0051)	ND(0.0037)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.034)	ND(0.013)	ND(0.0079)	ND(0.0033)	ND(0.028)	ND(0.0055)	ND(0.0055)	ND(0.0024)	ND(0.0044)	ND(0.0044)	ND(0.0043)	ND(0.0020)
		10	1.61	0.15	ND(0.0095)	ND(0.0051)	ND(0.0037)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.034)	ND(0.013)	ND(0.0079)	ND(0.0033)	ND(0.028)	ND(0.0055)	ND(0.0055)	ND(0.0024)	ND(0.0044)	ND(0.0044)	ND(0.0043)	ND(0.0020)
		20	1.61	0.1	ND(0.0095)	ND(0.0051)	ND(0.0037)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.034)	ND(0.013)	ND(0.0079)	ND(0.0033)	ND(0.028)	ND(0.0055)	ND(0.0055)	ND(0.0024)	ND(0.0044)	ND(0.0044)	ND(0.0043)	ND(0.0020)
		30	1.68	0.19	0.032	ND(0.0053)	ND(0.0039)	ND(0.0034)	ND(0.0033)	ND(0.0033)	ND(0.0033)	ND(0.012)	ND(0.036)	ND(0.014)	ND(0.0082)	ND(0.0034)	ND(0.029)	ND(0.0058)	ND(0.0057)	ND(0.0025)	ND(0.0046)	ND(0.0046)	ND(0.0045)	ND(0.0021)
		40	1.61	0.068	ND(0.0095)	0.0072	ND(0.0037)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.0032)	ND(0.012)	ND(0.034)	ND(0.013)	ND(0.0079)	ND(0.0033)	ND(0.028)	ND(0.0055)	ND(0.0055)	ND(0.0024)	0.0059	ND(0.0044)	ND(0.0043)	ND(0.0020)
		50	1.83	0.068	ND(0.011)	0.0071	ND(0.0042)	ND(0.0037)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.013)	ND(0.039)	ND(0.015)	ND(0.009)	ND(0.0037)	ND(0.032)	ND(0.0063)	ND(0.0062)	0.0027	0.0071	ND(0.0050)	ND(0.0049)	ND(0.0023)

Notes:

ft-bgs - Feet below ground surface

mg/m^3 - Milligram per cubic meter

ND - Not detected

Dup - Blind Duplicate Sample

J - Estimated concentration

UJ - Estimated concentration below detection limit

JB - Estimated concentration due to blank contamination

TABLE 2-4C. NESTED VAPOR MONITORING WELL ANALYTICAL RESULTS SUMMARY, WATER TREATMENT RELATED AND OTHER CONSTITUENTS
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Well	Date	Depth ft-bgs	Dilution Factor	Allyl Chloride mg/m^3	Benzyl chloride mg/m^3	Bromo-methane mg/m^3	Carbon Disulfide mg/m^3	Chloro-ethane mg/m^3	Chloro-methane mg/m^3	1,2-Dichloro-benzene mg/m^3	1,3-Dichloro-benzene mg/m^3	1,4-Dichloro-benzene mg/m^3	Dichloro-difluoro-methane mg/m^3	1,2-Dichloro-propane mg/m^3	cis-1,3-dichloro- propene mg/m^3	trans-1,3-Dichloro- propene mg/m^3	1,2-Dichloro-1,1,2,2-tetrafluoro-ethane mg/m^3	Ethanol mg/m^3	1,2,4-Trichloro-benzene mg/m^3	Trichloro-fluoromethane mg/m^3	1,1,2-Trichloro-trifluoroethane mg/m^3	Bromo-dichloro-methane mg/m^3	Bromoform mg/m^3	Chloroform mg/m^3	Dibromo-chloro-methane mg/m^3
VW-93A	Jul 2012	5	1.68	ND(0.01)	ND(0.0043)	ND(0.033)	ND(0.01)	ND(0.0089)	ND(0.017)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.0042)	0.043	ND(0.0038)	ND(0.0038)	ND(0.0059)	ND(0.0063) UJ	ND(0.025)	ND(0.0047)	ND(0.0064)	ND(0.0056)	ND(0.0087)	ND(0.0041)	ND(0.0072)
VW-93	Jul 2011	10	2.11	ND(0.013)	ND(0.0055)	ND(0.041)	ND(0.013)	ND(0.011)	ND(0.022)	ND(0.0063)	ND(0.0063)	ND(0.0063)	ND(0.0052)	ND(0.0049)	ND(0.0048)	ND(0.0048)	ND(0.0074)	0.01 J	ND(0.031)	ND(0.0059)	ND(0.0081)	ND(0.0071)	ND(0.011)	ND(0.0052)	ND(0.009)
		20	1.61	ND(0.01)	ND(0.0042)	ND(0.031)	ND(0.01)	ND(0.0085)	ND(0.017)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.004)	ND(0.0037)	ND(0.0036)	ND(0.0036)	ND(0.0056)	ND(0.0061) UJ	ND(0.024)	ND(0.0045)	ND(0.0062)	ND(0.0054)	ND(0.0083)	ND(0.0039)	ND(0.0068)
		30	1.68	ND(0.01)	ND(0.0043)	ND(0.033)	ND(0.01)	ND(0.0089)	ND(0.017)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.0042)	ND(0.0039)	ND(0.0038)	ND(0.0038)	ND(0.0059)	0.0084 J	ND(0.025)	ND(0.0047)	ND(0.0064)	ND(0.0056)	ND(0.0087)	ND(0.0041)	ND(0.0072)
		30-Dup	1.68	ND(0.01)	ND(0.0043)	ND(0.033)	ND(0.01)	ND(0.0089)	ND(0.017)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.0042)	ND(0.0039)	ND(0.0038)	ND(0.0038)	ND(0.0059)	ND(0.0063) UJ	ND(0.025)	ND(0.0047)	ND(0.0064)	ND(0.0056)	ND(0.0087)	ND(0.0041)	ND(0.0072)
		40	1.61	ND(0.01)	ND(0.0042)	ND(0.031)	ND(0.01)	ND(0.0085)	ND(0.017)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.004)	ND(0.0037)	ND(0.0036)	ND(0.0036)	ND(0.0056)	ND(0.0061) UJ	ND(0.024)	ND(0.0045)	ND(0.0062)	ND(0.0054)	ND(0.0083)	ND(0.0039)	ND(0.0068)
		50	1.64	ND(0.01)	ND(0.0042)	ND(0.032)	ND(0.01)	ND(0.0086)	ND(0.017)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.004)	ND(0.0038)	ND(0.0037)	ND(0.0037)	ND(0.0057)	0.0063 J	ND(0.024)	ND(0.0046)	ND(0.0063)	ND(0.0055)	ND(0.0085)	ND(0.004)	ND(0.007)
		60	1.58	ND(0.0099)	ND(0.0041)	ND(0.031)	ND(0.0098)	ND(0.0083)	ND(0.016)	ND(0.0047)	ND(0.0048)	ND(0.0048)	0.0072	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0055)	0.0072 J	ND(0.023)	ND(0.0044)	ND(0.006)	ND(0.0053)	ND(0.0082)	0.006	ND(0.0067)
VW-96A	Jul 2012	5	1.58	ND(0.0099)	ND(0.0041)	ND(0.031)	ND(0.0098)	ND(0.0083)	ND(0.016)	ND(0.0047)	ND(0.0048)	ND(0.0048)	ND(0.0039)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0055)	ND(0.006) UJ	ND(0.023)	ND(0.0044)	ND(0.006)	ND(0.0053)	ND(0.0082)	ND(0.0038)	ND(0.0067)
VW-96	Jul 2012	10	1.58	ND(0.0099)	ND(0.0041)	ND(0.031)	ND(0.0098)	ND(0.0083)	ND(0.016)	ND(0.0047)	ND(0.0048)	ND(0.0048)	ND(0.0039)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0055)	ND(0.006) UJ	ND(0.023)	ND(0.0044)	ND(0.006)	ND(0.0053)	ND(0.0082)	ND(0.0038)	ND(0.0067)
		20	1.63	ND(0.01)	ND(0.0042)	ND(0.032)	ND(0.01)	ND(0.0086)	ND(0.017)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.004)	ND(0.0038)	ND(0.0037)	ND(0.0037)	ND(0.0057)	ND(0.0061) UJ	ND(0.024)	ND(0.0046)	ND(0.0062)	ND(0.0055)	ND(0.0084)	ND(0.004)	ND(0.0069)
		30	1.56	ND(0.0098)	ND(0.004)	ND(0.03)	ND(0.0097)	ND(0.0082)	ND(0.016)	ND(0.0047)	ND(0.0047)	ND(0.0047)	0.008	ND(0.0036)	ND(0.0035)	ND(0.0035)	ND(0.0054)	ND(0.0059) UJ	ND(0.023)	ND(0.0044)	ND(0.006)	ND(0.0052)	ND(0.0081)	ND(0.0038)	ND(0.0066)
		40	2.46	ND(0.015)	ND(0.0064)	ND(0.048)	ND(0.015)	ND(0.013)	ND(0.025)	ND(0.0074)	ND(0.0074)	ND(0.0074)	0.0073	ND(0.0057)	ND(0.0056)	ND(0.0056)	ND(0.0086)	ND(0.0093) UJ	ND(0.036)	ND(0.0069)	ND(0.0094)	ND(0.0082)	ND(0.013)	ND(0.006)	ND(0.01)
		40-Dup	1.65	ND(0.01)	ND(0.0043)	ND(0.032)	ND(0.01)	ND(0.0087)	ND(0.017)	ND(0.005)	ND(0.005)	ND(0.005)	0.0061	ND(0.0038)	ND(0.0037)	ND(0.0037)	ND(0.0058)	ND(0.0062) UJ	ND(0.024)	ND(0.0046)	ND(0.0063)	ND(0.0055)	ND(0.0085)	ND(0.004)	ND(0.007)
		50	1.61	ND(0.01)	ND(0.0042)	ND(0.031)	ND(0.01)	ND(0.0085)	ND(0.017)	ND(0.0048)	ND(0.0048)	ND(0.0048)	0.0066	ND(0.0037)	ND(0.0036)	ND(0.0036)	ND(0.0056)	ND(0.0061) UJ	ND(0.024)	ND(0.0045)	ND(0.0062)	ND(0.0054)	ND(0.0083)	0.0053	ND(0.0068)
		55	32.2	ND(0.2)	ND(0.083)	ND(0.62)	ND(0.2)	ND(0.17)	ND(0.33)	ND(0.097)	ND(0.097)	ND(0.097)	ND(0.08)	ND(0.074)	ND(0.073)	ND(0.073)	ND(0.11)	ND(0.12) UJ	ND(0.48)	ND(0.09)	ND(0.12)	ND(0.11)	ND(0.17)	ND(0.079)	ND(0.14)
	Aug 2012	10	2.33	ND(0.014)	ND(0.0060)	ND(0.045)	0.029	ND(0.012)	ND(0.024)	ND(0.0070)	ND(0.0070)	ND(0.0070)	ND(0.0058)	ND(0.0054)	ND(0.0053)	ND(0.0053)	ND(0.0081)	0.0092 J	ND(0.034)	ND(0.0065)	ND(0.0089)	ND(0.0078)	ND(0.012)	ND(0.0057)	ND(0.0099)
		20	5.28	ND(0.033)	ND(0.014)	ND(0.10)	ND(0.033)	ND(0.028)	ND(0.054)	ND(0.016)	ND(0.016)	ND(0.016)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.018)	ND(0.020) UJ	ND(0.078)	ND(0.015)	ND(0.020)	ND(0.018)	ND(0.027)	ND(0.013)	ND(0.022)
		30	2.29	ND(0.014)	ND(0.0059)	ND(0.044)	ND(0.014)	ND(0.012)	ND(0.024)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0057)	ND(0.0053)	ND(0.0052)	ND(0.0052)	ND(0.0080)	0.0091 J	ND(0.034)	ND(0.0064)	ND(0.0088)	ND(0.0077)	ND(0.012)	ND(0.0056)	ND(0.0098)
		40	2.42	ND(0.015)	ND(0.0063)	ND(0.047)	ND(0.015)	ND(0.013)	ND(0.025)	ND(0.0073)	ND(0.0073)	ND(0.0073)	ND(0.0060)	ND(0.0056)	ND(0.0055)	ND(0.0055)	ND(0.0084)	ND(0.0091) UJ	ND(0.036)	ND(0.0068)	ND(0.0093)	ND(0.0081)	ND(0.012)	ND(0.0059)	ND(0.010)
	Sep 2012	10	2.20	ND(0.014)	ND(0.0057)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0066)	ND(0.0066)	ND(0.0066)	ND(0.0054)	ND(0.0051)	ND(0.0050)	ND(0.0050)	ND(0.0077)	ND(0.0083)	ND(0.033)	ND(0.0062)	ND(0.0084)	ND(0.0074)	ND(0.011)	ND(0.0054)	ND(0.0094)
		20	2.29	ND(0.014)	ND(0.0059)	ND(0.044)	ND(0.014)	ND(0.012)	ND(0.024)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0057)	ND(0.0053)	ND(0.0052)	ND(0.0052)	ND(0.0080)	ND(0.0086)	ND(0.034)	ND(0.0064)	ND(0.0088)	ND(0.0077)	ND(0.012)	ND(0.0056)	ND(0.0098)
		30	2.20	ND(0.014)	ND(0.0057)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0066)	ND(0.0066)	ND(0.0066)	ND(0.0054)	ND(0.0051)	ND(0.0050)	ND(0.0050)	ND(0.0077)	ND(0.0083)	ND(0.033)	ND(0.0062)	ND(0.0084)	ND(0.0074)	ND(0.011)	ND(0.0054)	ND(0.0094)
		40	2.29	ND(0.014)	ND(0.0059)	ND(0.044)	ND(0.014)	ND(0.012)	ND(0.024)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0057)	ND(0.0053)	ND(0.0052)	ND(0.0052)	ND(0.0080)	0.013	ND(0.034)	ND(0.0064)	ND(0.0088)	ND(0.0077)	ND(0.012)	ND(0.0056)	ND(0.0098)
	Oct 2012	10	2.05	ND(0.013)	ND(0.0053)	ND(0.040)	ND(0.013)	ND(0.011)	ND(0.021)	ND(0.0062)	ND(0.0062)	ND(0.0062)	ND(0.0051)	ND(0.0047)	ND(0.0046)	ND(0.0046)	ND(0.0072)	ND(0.0077)	ND(0.030)	ND(0.0058)	ND(0.0078)	ND(0.0069)	ND(0.010)	ND(0.0050)	ND(0.0087)
		20	2.20	ND(0.014)	ND(0.0057)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0066)	ND(0.0066)	ND(0.0066)	ND(0.0054)	ND(0.0051)	ND(0.0050)	ND(0.0050)	ND(0.0077)	ND(0.0083)	ND(0.033)	ND(0.0062)	ND(0.0084)	ND(0.0074)	ND(0.011)	ND(0.0054)	ND(0.0094)
		30	2.24	ND(0.014)	ND(0.0058)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0067)	ND(0.0067)	ND(0.0067)	ND(0.0055)	ND(0.0052)	ND(0.0051)	ND(0.0051)	ND(0.0078)	ND(0.0084)	ND(0.033)	ND(0.0063)	ND(0.0086)	ND(0.0075)	ND(0.012)	ND(0.0055)	ND(0.0095)
		40	2.24	ND(0.014)	ND(0.0058)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0067)	ND(0.0067)	ND(0.0067)	ND(0.0055)	ND(0.0052)	ND(0.0051)	ND(0.0051)	ND(0.0078)	ND(0.0084)	ND(0.033)	ND(0.0063)	ND(0.0086)	ND(0.0075)	ND(0.012)	ND(0.0055)	ND(0.0095)
	Nov 2012	10	2.05	ND(0.014)	ND(0.0059)	ND(0.044)	ND(0.014)	ND(0.012)	ND(0.024)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0057)	ND(0.0053)	ND(0.0052)	ND(0.0052)	ND(0.0080)	ND(0.0086)	ND(0.034)	ND(0.0064)	ND(0.0088)	ND(0.0077)	ND(0.012)	ND(0.0056)	ND(0.0098)
		20	2.20	ND(0.014)	ND(0.0058)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0067)	ND(0.0067)	ND(0.0067)	ND(0.0055)	ND(0.0052)	ND(0.0051)	ND(0.0051)	ND(0.0078)	0.0082	ND(0.033)	ND(0.0063)	ND(0.0086)	ND(0.0075)	ND(0.012)	ND(0.0055)	ND(0.0095)
		30	2.24	ND(0.014)	ND(0.0060)	ND(0.045)	ND(0.014)	ND(0.012)	ND(0.024)	ND(0.0070)	ND(0.0070)	ND(0.0070)	ND(0.0058)	ND(0.0054)	ND(0.0053)	ND(0.0053)	ND(0.0081)	ND(0.0088)	ND(0.034)	ND(0.0065)	ND(0.0089)	ND(0.0078)	ND(0.012)	ND(0.0057)	ND(0.0099)
		40	2.24	ND(0.014)	ND(0.0057)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0066)	ND(0.0066)	ND(0.0066)	ND(0.0055)	ND(0.0051)	ND(0.0050)	ND(0.0050)	ND(0.0077)	0.011	ND(0.033)	ND(0.0062)	ND(0.0085)	ND(0.0074)	ND(0.011)	ND(0.0054)	ND(0.0094)
	Dec 2012	10	2.29	ND(0.013)	ND(0.0054)	ND(0.041)	ND(0.013)	ND(0.011)	ND(0.022)	ND(0.0063)	ND(0.0063)	ND(0.0063)	ND(0.0052)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0073)	ND(0.0079)	ND(0.031)	ND(0.0059)	ND(0.0080)	ND(0.0070)	ND(0.011)	ND(0.0051)	ND(0.0089)
		20	2.24	ND(0.014)	ND(0.0057)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0066)	ND(0.0066)	ND(0.0066)	ND(0.0054)	ND(0.0051)	ND(0.0050)	ND(0.0050)	ND(0.0077)	ND(0.0083)	ND(0.033)	ND(0.0062)	ND(0.0084)	ND(0.0074)	ND(0.011)	ND(0.0054)	ND(0.0094)
		30	2.33	ND(0.013)	ND(0.0054)	ND(0.040)	ND(0.013)	ND(0.011)	ND(0.022)	ND(0.0063)	ND(0.0063)	ND(0.0063)	ND(0.0052)	ND(0.0048)	ND(0.0047)	ND(0.0047)	ND(0.0073)	ND(0.0079)	ND(0.031)	ND(0.0059)	ND(0.0080)	ND(0.0070)	ND(0.011)	ND(0.0051)	ND(0.0089)
		40	2.21	ND(0.013)	ND(0.0054)	ND(0.041)	ND(0.013)	ND(0.011)	ND(0.022)	ND(0.0063)	ND(0.0063)	ND(0.0063)	ND(0.0052)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0073)	ND(0.0079)	ND(0.031)	ND(0.0059)	ND(0.0080)	ND(0.0070)	ND(0.011)	ND(0.0051)	ND(0.0089)
VW-99	Jul 2012	10	1.58	ND(0.0099)	ND(0.0041)	ND(0.031)	ND(0.0098)	ND(0.0083)	ND(0.016)	ND(0.0047)	ND(0.0048)	ND(0.0048)	ND(0.0039)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0055)	ND(0.006) UJ	ND(0.023)	ND(0.0044)	ND(0.006)	ND(0.0053)	ND(0.0082)	ND(0.0038)	ND(0.0067)
		20	1.63	ND(0.01)	ND(0.0042)	ND(0.032)	ND(0.01)	ND(0.0086)	ND(0.017)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.004)	ND(0.0038)	ND(0.0037)	ND(0.0037)	ND(0.0057)	ND(0.0061) UJ	ND(0.024)	ND(0.0046)	ND(0.0062)	ND(0.0055)	ND(0.0084)	0.0068	ND(0.0069)
		30	1.64	ND(0.01)	ND(0.0042)	ND(0.032)	ND(0.01)	ND(0.0086)	ND(0.017)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.004)	ND(0.0038)	ND(0.0037)	ND(0.0037)	ND(0.0057)	ND(0.0062) UJ	ND(0.024)	ND(0.0046)	ND(0.0063)	ND(0.0055)	ND(0.0085)	ND(0.004)	ND(0.007)
		30-Dup	1.65	ND(0.01)	ND(0.0043)	ND(0.032)	ND(0.01)	ND(0.0087)	ND(0.017)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.0041)	ND(0.0038)	ND(0.0037)	ND(0.0037)	ND(0.0058)	0.0064 J	ND(0.024)	ND(0.0046)	ND(0.0063)	ND(0.0055)	ND(0.0085)	ND(0.004)	ND(0.007)
		40	1.61	ND(0.01)	ND(0.0042)	ND(0.031)	ND(0.01)	ND(0.0085)	ND(0.017)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.004)	ND(0.0037)	ND(0.0036)	ND(0.0036)	ND(0.0056)	ND(0.0061) UJ	ND(0.024)	ND(0.0045)	ND(0.0062)	ND(0.0054)	ND(0.0083)	0.0055	ND(0.0068)
		50	5.53	ND(0.035)	ND(0.014)	ND(0.11)	ND(0.034)	ND(0.029)	ND(0.057)	ND(0.017)	ND(0.017)	ND(0.017)	ND(0.014)	ND(0.013)	ND(0.012)	ND(0.012)	ND(0.019)	ND(0.021) UJ	ND(0.082)	ND(0.016)	ND(0.021)	ND(0.018)	ND(0.028)	ND(0.014)	ND(0.024)
		60	163	ND(1)	ND(0.42)	ND(3.2)	ND(1)	ND(0.86)	ND(1.7)	ND(0.49)	ND(0.49)	ND(0.49)	ND(0.4)	ND(0.38)	ND(0.37)	ND(0.37)	ND(0.57)	ND(0.61) UJ	ND(2.4)	ND(0.46)	ND(0.62)	ND(0.55)	ND(0.84)	ND(0.4)	ND(0.69)
		60-Dup	157	ND(0.98)	ND(0.41)	ND(3)	ND(0.98)	ND(0.83)	ND(1.6)	ND(0.47)	ND(0.47)	ND(0.47)	ND(0.39)	ND(0.36)	ND(0.36)	ND(0.36)	ND(0.55)	ND(0.59) UJ	ND(2.3)	ND(0.44)	ND(0.6)	ND(0.52)	ND(0.81)	ND(0.38)	ND(0.67)

TABLE 2-4C. NESTED VAPOR MONITORING WELL ANALYTICAL RESULTS SUMMARY, WATER TREATMENT RELATED AND OTHER CONSTITUENTS
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Well	Date	Depth ft-bgs	Dilution Factor	Allyl Chloride mg/m^3	Benzyl chloride mg/m^3	Bromo- methane mg/m^3	Carbon Disulfide mg/m^3	Chloro- ethane mg/m^3	Chloro- methane mg/m^3	1,2-Dichloro- benzene mg/m^3	1,3-Dichloro- benzene mg/m^3	1,4-Dichloro- benzene mg/m^3	Dichloro- difluoro- methane mg/m^3	1,2-Dichloro- propane mg/m^3	cis-1,3- dichloro- propene mg/m^3	trans-1,3- Dichloro- propene mg/m^3	1,2-Dichloro- 1,1,2,2- tetrafluoro- ethane mg/m^3	Ethanol mg/m^3	1,2,4-Trichloro- benzene mg/m^3	Trichloro- fluoromethane mg/m^3	1,1,2-Trichloro- trifluoroethane mg/m^3	Bromo- dichloro- methane mg/m^3	Bromoform mg/m^3	Chloroform mg/m^3	Dibromo- chloro- methane mg/m^3
VW-99	Aug 2012	10	2.58	ND(0.016)	ND(0.0067)	ND(0.050)	ND(0.016)	ND(0.014)	ND(0.027)	ND(0.0078)	ND(0.0078)	ND(0.0078)	ND(0.0064)	ND(0.0060)	ND(0.0058)	ND(0.0058)	ND(0.009)	0.012 J	ND(0.038)	ND(0.0072)	ND(0.0099)	ND(0.0086)	ND(0.013)	ND(0.0063)	ND(0.011)
		20	2.20	ND(0.014)	ND(0.0057)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0066)	ND(0.0066)	ND(0.0066)	ND(0.0054)	ND(0.0051)	ND(0.0050)	ND(0.0050)	ND(0.0077)	0.020 J	ND(0.033)	ND(0.0062)	ND(0.0084)	ND(0.0074)	ND(0.011)	ND(0.0054)	ND(0.0094)
		30	2.38	ND(0.015)	ND(0.0062)	ND(0.046)	ND(0.015)	ND(0.012)	ND(0.024)	ND(0.0072)	ND(0.0072)	ND(0.0072)	ND(0.0059)	ND(0.0055)	ND(0.0054)	ND(0.0054)	ND(0.0083)	ND(0.009) UJ	ND(0.035)	ND(0.0067)	ND(0.0091)	ND(0.0080)	ND(0.012)	ND(0.0058)	ND(0.010)
		30-Dup	2.42	ND(0.015)	ND(0.0063)	ND(0.047)	ND(0.015)	ND(0.013)	ND(0.025)	ND(0.0073)	ND(0.0073)	ND(0.0073)	ND(0.0060)	ND(0.0056)	ND(0.0055)	ND(0.0055)	ND(0.0084)	ND(0.0091) UJ	ND(0.036)	ND(0.0068)	ND(0.0093)	ND(0.0081)	ND(0.012)	ND(0.0059)	ND(0.010)
		40	2.52	ND(0.016)	ND(0.0065)	ND(0.049)	ND(0.016)	ND(0.013)	ND(0.026)	ND(0.0076)	ND(0.0076)	ND(0.0076)	ND(0.0062)	ND(0.0058)	ND(0.0057)	ND(0.0057)	ND(0.0088)	0.011 J	ND(0.037)	ND(0.0071)	ND(0.0096)	ND(0.0084)	ND(0.013)	ND(0.0062)	ND(0.011)
	Sep 2012	10	2.20	ND(0.014)	ND(0.0057)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0066)	ND(0.0066)	ND(0.0066)	ND(0.0054)	ND(0.0051)	ND(0.0050)	ND(0.0050)	ND(0.0077)	ND(0.0083)	ND(0.033)	ND(0.0062)	ND(0.0084)	ND(0.0074)	ND(0.011)	ND(0.0054)	ND(0.0094)
		20	2.30	ND(0.014)	ND(0.0060)	ND(0.045)	ND(0.014)	ND(0.012)	ND(0.024)	ND(0.0070)	ND(0.0070)	ND(0.0070)	ND(0.0058)	ND(0.0054)	ND(0.0053)	ND(0.0053)	ND(0.0081)	ND(0.0088)	ND(0.034)	ND(0.0065)	ND(0.0089)	ND(0.0078)	ND(0.012)	0.0072	ND(0.0099)
		30	2.13	ND(0.013)	ND(0.0055)	ND(0.041)	ND(0.013)	ND(0.011)	ND(0.022)	ND(0.0064)	ND(0.0064)	ND(0.0064)	ND(0.0053)	ND(0.0049)	ND(0.0048)	ND(0.0048)	ND(0.0074)	ND(0.0080)	ND(0.032)	ND(0.0060)	ND(0.0082)	ND(0.0071)	ND(0.011)	ND(0.0052)	ND(0.0091)
		30-Dup	2.16	ND(0.014)	ND(0.0056)	ND(0.042)	ND(0.013)	ND(0.011)	ND(0.022)	ND(0.0065)	ND(0.0065)	ND(0.0065)	ND(0.0053)	ND(0.0050)	ND(0.0049)	ND(0.0049)	ND(0.0076)	ND(0.0081)	ND(0.032)	ND(0.0061)	ND(0.0083)	ND(0.0072)	ND(0.011)	ND(0.0053)	ND(0.0092)
		40	2.24	ND(0.014)	ND(0.0058)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0067)	ND(0.0067)	0.0067	ND(0.0055)	ND(0.0052)	ND(0.0051)	ND(0.0051)	ND(0.0078)	ND(0.0084)	ND(0.033)	ND(0.0063)	ND(0.0086)	ND(0.0075)	ND(0.012)	ND(0.0055)	ND(0.0095)
	Oct 2012	10	2.24	ND(0.014)	ND(0.0058)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0067)	ND(0.0067)	ND(0.0067)	ND(0.0055)	ND(0.0052)	ND(0.0051)	ND(0.0051)	ND(0.0078)	ND(0.0084)	ND(0.033)	ND(0.0063)	ND(0.0086)	ND(0.0075)	ND(0.012)	ND(0.0055)	ND(0.0095)
		20	2.09	ND(0.013)	ND(0.0054)	ND(0.040)	ND(0.013)	ND(0.011)	ND(0.022)	ND(0.0063)	ND(0.0063)	ND(0.0063)	ND(0.0052)	ND(0.0048)	ND(0.0047)	ND(0.0047)	ND(0.0073)	ND(0.0079)	ND(0.031)	ND(0.0059)	ND(0.0080)	ND(0.0070)	ND(0.011)	0.0076	ND(0.0089)
		30	2.24	ND(0.014)	ND(0.0058)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0067)	ND(0.0067)	ND(0.0067)	ND(0.0055)	ND(0.0052)	ND(0.0051)	ND(0.0051)	ND(0.0078)	ND(0.0084)	ND(0.033)	ND(0.0063)	ND(0.0086)	ND(0.0075)	ND(0.012)	ND(0.0055)	ND(0.0095)
		30-Dup	2.20	ND(0.014)	ND(0.0057)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0066)	ND(0.0066)	ND(0.0066)	ND(0.0054)	ND(0.0051)	ND(0.0050)	ND(0.0050)	ND(0.0077)	ND(0.0083)	ND(0.033)	ND(0.0062)	ND(0.0084)	ND(0.0074)	ND(0.011)	ND(0.0054)	ND(0.0094)
	Nov 2012	10	2.21	ND(0.014)	ND(0.0057)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0066)	ND(0.0066)	ND(0.0066)	ND(0.0055)	ND(0.0051)	ND(0.0050)	ND(0.0050)	ND(0.0077)	ND(0.0083)	ND(0.033)	ND(0.0062)	ND(0.0085)	ND(0.0074)	ND(0.011)	ND(0.0054)	ND(0.0094)
		20	2.26	ND(0.014)	ND(0.0058)	ND(0.044)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0068)	ND(0.0068)	ND(0.0068)	ND(0.0056)	ND(0.0052)	ND(0.0051)	ND(0.0051)	ND(0.0079)	ND(0.0085)	ND(0.034)	ND(0.0063)	ND(0.0087)	ND(0.0076)	ND(0.012)	0.013	ND(0.0096)
		30	2.26	ND(0.014)	ND(0.0058)	ND(0.044)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0068)	ND(0.0068)	ND(0.0068)	ND(0.0056)	ND(0.0052)	ND(0.0051)	ND(0.0051)	ND(0.0079)	0.014	ND(0.034)	ND(0.0063)	ND(0.0087)	ND(0.0076)	ND(0.012)	ND(0.0055)	ND(0.0096)
		30-Dup	2.23	ND(0.014)	ND(0.0058)	ND(0.043)	ND(0.014)	ND(0.012)	ND(0.023)	ND(0.0067)	ND(0.0067)	ND(0.0067)	ND(0.0055)	ND(0.0052)	ND(0.0051)	ND(0.0051)	ND(0.0078)	0.011	ND(0.033)	ND(0.0063)	ND(0.0085)	ND(0.0075)	ND(0.012)	ND(0.0054)	ND(0.0095)
		40	2.40	ND(0.015)	ND(0.0062)	ND(0.047)	ND(0.015)	ND(0.013)	ND(0.025)	ND(0.0072)	ND(0.0072)	ND(0.0072)	ND(0.0059)	ND(0.0055)	ND(0.0054)	ND(0.0054)	ND(0.0084)	ND(0.009)	ND(0.036)	ND(0.0067)	ND(0.0092)	ND(0.0080)	ND(0.012)	0.0073	ND(0.010)
	Dec 2012	10	2.28	ND(0.014)	ND(0.0059)	ND(0.044)	ND(0.014)	ND(0.012)	ND(0.024)	ND(0.0068)	ND(0.0068)	ND(0.0068)	ND(0.0056)	ND(0.0053)	ND(0.0052)	ND(0.0052)	ND(0.0080)	ND(0.0086)	ND(0.034)	ND(0.0064)	ND(0.0087)	ND(0.0076)	ND(0.012)	ND(0.0056)	ND(0.0097)
		20	2.16	ND(0.014)	ND(0.0056)	ND(0.042)	ND(0.013)	ND(0.011)	ND(0.022)	ND(0.0065)	ND(0.0065)	ND(0.0065)	ND(0.0053)	ND(0.0050)	ND(0.0049)	ND(0.0049)	ND(0.0076)	ND(0.0081)	ND(0.032)	ND(0.0061)	ND(0.0083)	ND(0.0072)	ND(0.011)	0.011	ND(0.0092)
		30	2.34	ND(0.015)	ND(0.0060)	ND(0.045)	ND(0.014)	ND(0.012)	ND(0.024)	ND(0.0070)	ND(0.0070)	ND(0.0070)	ND(0.0058)	ND(0.0054)	ND(0.0053)	ND(0.0053)	ND(0.0082)	ND(0.0088)	ND(0.035)	ND(0.0066)	ND(0.009)	ND(0.0078)	ND(0.012)	ND(0.0057)	ND(0.010)
		30-Dup	2.09	ND(0.013)	ND(0.0054)	ND(0.040)	ND(0.013)	ND(0.011)	ND(0.022)	ND(0.0063)	ND(0.0063)	ND(0.0063)	ND(0.0052)	ND(0.0048)	ND(0.0047)	ND(0.0047)	ND(0.0073)	0.013	ND(0.031)	ND(0.0059)	ND(0.0080)	ND(0.0070)	ND(0.011)	ND(0.0051)	ND(0.0089)
		40	2.06	ND(0.013)	ND(0.0053)	ND(0.040)	ND(0.013)	ND(0.011)	ND(0.021)	ND(0.0062)	ND(0.0062)	ND(0.0062)	ND(0.0051)	ND(0.0048)	ND(0.0047)	ND(0.0047)	ND(0.0072)	ND(0.0078)	ND(0.030)	ND(0.0058)	ND(0.0079)	ND(0.0069)	ND(0.011)	0.0065	ND(0.0088)
VW-128	Jul 2012	5	1.61	ND(0.01)	ND(0.0042)	ND(0.031)	ND(0.01)	ND(0.0085)	ND(0.017)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.004)	ND(0.0037)	ND(0.0036)	ND(0.0036)	ND(0.0056)	0.0062 J	ND(0.024)	ND(0.0045)	ND(0.0062)	ND(0.0054)	ND(0.0083)	ND(0.0039)	ND(0.0068)
		10	1.61	ND(0.01)	ND(0.0042)	ND(0.031)	ND(0.01)	ND(0.0085)	ND(0.017)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.004)	ND(0.0037)	ND(0.0036)	ND(0.0036)	ND(0.0056)	ND(0.0061) UJ	ND(0.024)	ND(0.0045)	ND(0.0062)	ND(0.0054)	ND(0.0083)	ND(0.0039)	ND(0.0068)
		20	1.68	ND(0.01)	ND(0.0043)	ND(0.033)	ND(0.01)	ND(0.0089)	ND(0.017)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.0042)	ND(0.0039)	ND(0.0038)	ND(0.0038)	ND(0.0059)	0.0064 J	ND(0.025)	ND(0.0047)	ND(0.0064)	ND(0.0056)	ND(0.0087)	0.0076	ND(0.0072)
		30	1.58	ND(0.0099)	ND(0.0041)	ND(0.031)	ND(0.0098)	ND(0.0083)	0.026	ND(0.0047)	ND(0.0048)	ND(0.0048)	0.0048	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0055)	0.015 J	ND(0.023)	ND(0.0044)	ND(0.006)	ND(0.0053)	ND(0.0082)	ND(0.0038)	ND(0.0067)
		40	1.65	ND(0.01)	ND(0.0043)	ND(0.032)	ND(0.01)	ND(0.0087)	ND(0.017)	ND(0.005)	ND(0.005)	ND(0.005)	0.0043	ND(0.0038)	ND(0.0037)	ND(0.0037)	ND(0.0058)	0.0076 J	ND(0.024)	ND(0.0046)	ND(0.0063)	ND(0.0055)	ND(0.0085)	ND(0.004)	ND(0.007)
		50	1.55	ND(0.0097)	ND(0.004)	ND(0.03)	ND(0.0096)	ND(0.0082)	ND(0.016)	ND(0.0046)	ND(0.0046)	ND(0.0046)	0.0053	ND(0.0036)	ND(0.0035)	ND(0.0035)	ND(0.0054)	ND(0.0058) UJ	ND(0.023)	0.0054	ND(0.0059)	ND(0.0052)	ND(0.008)	ND(0.0038)	ND(0.0066)
VW-129	Jul 2012	5	1.61	ND(0.01)	ND(0.0042)	ND(0.031)	ND(0.01)	ND(0.0085)	ND(0.017)	ND(0.0048)	ND(0.0048)	ND(0.0048)	0.012	ND(0.0037)	ND(0.0036)	ND(0.0036)	ND(0.0056)	0.0083 J	ND(0.024)	0.0078	ND(0.0062)	ND(0.0054)	ND(0.0083)	ND(0.0039)	ND(0.0068)
		10	1.61	ND(0.01)	ND(0.0042)	ND(0.031)	ND(0.01)	ND(0.0085)	ND(0.017)	ND(0.0048)	ND(0.0048)	ND(0.0048)	0.016	ND(0.0037)	ND(0.0036)	ND(0.0036)	ND(0.0056)	ND(0.0061) UJ	ND(0.024)	0.0088	ND(0.0062)	ND(0.0054)	ND(0.0083)	ND(0.0039)	ND(0.0068)
		20	1.61	ND(0.01)	ND(0.0042)	ND(0.031)	ND(0.01)	ND(0.0085)	ND(0.017)	ND(0.0048)	ND(0.0048)	ND(0.0048)	0.019	ND(0.0037)	ND(0.0036)	ND(0.0036)	ND(0.0056)	ND(0.0061) UJ	ND(0.024)	0.01	ND(0.0062)	ND(0.0054)	ND(0.0083)	ND(0.0039)	ND(0.0068)
		30	1.68	ND(0.01)	ND(0.0043)	ND(0.033)	ND(0.01)	ND(0.0089)	ND(0.017)	ND(0.005)	ND(0.005)	ND(0.005)	0.019	ND(0.0039)	ND(0.0038)	ND(0.0038)	ND(0.0059)	0.011 J	ND(0.025)	0.0094	ND(0.0064)	ND(0.0056)	ND(0.0087)	ND(0.0041)	ND(0.0072)
		40	1.61	ND(0.01)	ND(0.0042)	ND(0.031)	ND(0.01)	ND(0.0085)	ND(0.017)	ND(0.0048)	ND(0.0048)	ND(0.0048)	0.023	ND(0.0037)	ND(0.0036)	ND(0.0036)	ND(0.0056)	ND(0.0061) UJ	ND(0.024)	0.011	ND(0.0062)	ND(0.0054)	ND(0.0083)	ND(0.0039)	ND(0.0068)
		50	1.83	ND(0.011)	ND(0.0047)	ND(0.036)	ND(0.011)	ND(0.0096)	ND(0.019)	ND(0.0055)	ND(0.0055)	ND(0.0055)	0.025	ND(0.0042)	ND(0.0042)	ND(0.0042)	ND(0.0064)	0.011 J	ND(0.027)	0.012	ND(0.007)	ND(0.0061)	ND(0.0094)	ND(0.0045)	ND(0.0078)

Notes:

ft-bgs - Feet below ground surface

mg/m^3 - Milligram per cubic meter

ND - Not detected

Dup - Blind Duplicate Sample

J - Estimated concentration

UJ - Estimated concentration below detection limit

TABLE 2-4D. NESTED VAPOR MONITORING WELL ANALYTICAL RESULTS SUMMARY, FIXED GASES
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Well Location	Date	Depth ft-bgs	ASTM Method	Dilution Factor	Oxygen %	Carbon Dioxide %	Methane %
VW-93A	Jul 2012	5	ASTM-D 1946	1.68	19	2.1	ND(0.00017)
VW-93	Jul 2012	10	ASTM-D 1946	2.11	19	2.0	ND(0.00021)
		20	ASTM-D 1946	1.61	19	1.7	ND(0.00016)
		30	ASTM-D 1946	1.68	19	2.0	ND(0.00017)
		30-Dup	ASTM-D 1946	1.68	19	2.0	ND(0.00017)
		40	ASTM-D 1946	1.61	18	1.8	ND(0.00016)
		50	ASTM-D 1946	1.64	19	2.1	ND(0.00016)
		60	ASTM-D 1946	1.58	12	3.1	ND(0.00016)
VW-96A	Jul 2012	5	ASTM-D 1946	1.58	18	3.9	ND(0.00016)
VW-96	Jul 2012	10	ASTM-D 1946	1.58	17	3.1	ND(0.00016)
		20	ASTM-D 1946	1.63	17	1.8	ND(0.00016)
		30	ASTM-D 1946	1.56	6.7	2.5	ND(0.00016)
		40	ASTM-D 1946	2.46	6.7	3.5	ND(0.00017)
		40-Dup	ASTM-D 1946	1.65	5.9	3.8	ND(0.00016)
		50	ASTM-D 1946	1.61	3.0	5.2	0.015
		55	ASTM-D 1946	32.2	1.4	7.2	4.7
	Aug 2012	10	ASTM-D 1946	2.33	19	1.1	ND(0.00023)
		20	ASTM-D 1946	5.28	20	0.93	ND(0.00026)
		30	ASTM-D 1946	2.29	20	1.5	ND(0.00023)
		40	ASTM-D 1946	2.42	19	2	ND(0.00024)
	Sep 2012	10	ASTM-D 1946	2.20	19	1.9	ND(0.00022)
		20	ASTM-D 1946	2.29	18	1.5	ND(0.00023)
		30	ASTM-D 1946	2.20	18	1.5	ND(0.00022)
		40	ASTM-D 1946	2.29	18	1.8	ND(0.00023)
	Oct 2012	10	ASTM-D 1946	2.05	20	1.4	ND(0.00020)
		20	ASTM-D 1946	2.20	20	1.8	ND(0.00022)
		30	ASTM-D 1946	2.24	20	1.9	ND(0.00022)
		40	ASTM-D 1946	2.24	20	1.9	ND(0.00022)

TABLE 2-4D. NESTED VAPOR MONITORING WELL ANALYTICAL RESULTS SUMMARY, FIXED GASES
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Well Location	Date	Depth ft-bgs	ASTM Method	Dilution Factor	Oxygen %	Carbon Dioxide %	Methane %
VW-96	Nov 2012	10	ASTM-D 1946	2.05	21	0.84	ND(0.00023)
		20	ASTM-D 1946	2.20	20	1.4	ND(0.00022)
		30	ASTM-D 1946	2.24	20	1.7	ND(0.00023)
		40	ASTM-D 1946	2.24	19	1.9	ND(0.00022)
	Dec 2012	10	ASTM-D 1946	2.29	20	0.72	ND(0.00021)
		20	ASTM-D 1946	2.24	20	1.2	ND(0.00022)
		30	ASTM-D 1946	2.33	19	1.7	ND(0.00021)
		40	ASTM-D 1946	2.21	16	2.4	ND(0.00021)
VW-99	Jul 2012	10	ASTM-D 1946	1.58	18	1.9	ND(0.00016)
		20	ASTM-D 1946	1.63	18	2.0	ND(0.00016)
		30	ASTM-D 1946	1.64	15	3.2	ND(0.00016)
		30-Dup	ASTM-D 1946	1.65	15	3.0	ND(0.00016)
		40	ASTM-D 1946	1.61	6.1	6.3	ND(0.00016)
		50	ASTM-D 1946	5.53	1.6	7.8	3.8
		60	ASTM-D 1946	163	10	6.1	1.4
		60-Dup	ASTM-D 1946	157	11	5.7	1.3
	Aug 2012	10	ASTM-D 1946	2.58	20	0.62	ND(0.00026)
		20	ASTM-D 1946	2.20	20	1.3	ND(0.00022)
		30	ASTM-D 1946	2.38	19	2.4	ND(0.00024)
		30-Dup	ASTM-D 1946	2.42	19	2.4	ND(0.00024)
		40	ASTM-D 1946	2.52	18	2.5	ND(0.00025)
	Sep 2012	10	ASTM-D 1946	2.20	19	0.67	ND(0.00022)
		20	ASTM-D 1946	2.30	19	1.1	ND(0.00023)
		30	ASTM-D 1946	2.13	19	1.7	ND(0.00021)
		30-Dup	ASTM-D 1946	2.16	19	1.7	ND(0.00022)
		40	ASTM-D 1946	2.24	19	2	ND(0.00022)
	Oct 2012	10	ASTM-D 1946	2.24	20	0.69	ND(0.00022)
		20	ASTM-D 1946	2.09	19	1.1	ND(0.00021)
		30	ASTM-D 1946	2.24	18	1.6	ND(0.00022)
		30-Dup	ASTM-D 1946	2.20	18	1.6	ND(0.00022)

TABLE 2-4D. NESTED VAPOR MONITORING WELL ANALYTICAL RESULTS SUMMARY, FIXED GASES
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Well Location	Date	Depth ft-bgs	ASTM Method	Dilution Factor	Oxygen %	Carbon Dioxide %	Methane %
VW-99	Nov 2012	10	ASTM-D 1946	2.21	20	0.87	ND(0.00022)
		20	ASTM-D 1946	2.26	18	1.4	ND(0.00023)
		30	ASTM-D 1946	2.26	19	1.0	ND(0.00023)
		30-Dup	ASTM-D 1946	2.23	19	0.94	ND(0.00022)
		40	ASTM-D 1946	2.40	14	2.8	ND(0.00024)
	Dec 2012	10	ASTM-D 1946	2.28	18	0.93	ND(0.00023)
		20	ASTM-D 1946	2.16	15	1.7	ND(0.00022)
		30	ASTM-D 1946	2.34	15	1.6	ND(0.00021)
		30-Dup	ASTM-D 1946	2.09	14	1.7	ND(0.00021)
		40	ASTM-D 1946	2.06	8.7	4.9	ND(0.00021)
VW-128	Jul 2012	5	ASTM-D 1946	1.61	18	3.0	ND(0.00016)
		10	ASTM-D 1946	1.61	18	1.8	ND(0.00016)
		20	ASTM-D 1946	1.68	17	1.3	ND(0.00017)
		30	ASTM-D 1946	1.58	18	1.9	ND(0.00016)
		40	ASTM-D 1946	1.65	17	2.9	ND(0.00016)
		50	ASTM-D 1946	1.55	15	4.2	ND(0.00016)
VW-129	Jul 2012	5	ASTM-D 1946	1.61	17	3.3	ND(0.00016)
		10	ASTM-D 1946	1.61	16	2.7	ND(0.00016)
		20	ASTM-D 1946	1.61	17	2.2	ND(0.00016)
		30	ASTM-D 1946	1.68	17	2.4	ND(0.00017)
		40	ASTM-D 1946	1.61	16	2.7	ND(0.00016)
		50	ASTM-D 1946	1.83	16	2.8	ND(0.00018)

Notes:

ft-bgs - Feet below ground surface

% - Percent

ND - Not detected

Dup - Blind Duplicate Sample

TABLE 2-5. BARRIER WALL PERFORMANCE MONITORING CONSTITUENTS OF CONCERN ANALYTICAL RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Benzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Chlorobenzene (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
BSW-1S	11/15/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
Dup	11/15/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
BSW-1D	11/15/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
BMW-1S	11/02/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	0.00072 J	0.0012 J
BMW-1I	11/02/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	0.0015 J	0.0018 J
BMW-1D	11/02/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	0.0017 J
BSW-2S	11/14/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
BSW-2D	11/14/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
BMW-2S	11/14/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
BMW-2I	11/13/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
BMW-2D	11/13/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
BSW-3S	11/15/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
BSW-3D	11/15/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
BMW-3S	11/08/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	0.0017 J
BMW-3I	11/08/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	0.00026 J	0.0015 J
BMW-3D	11/08/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	0.00088 J	0.0018 J
MW-135S	11/07/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	0.0047 J	0.0023 J
MW-135I	11/07/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
MW-135D	11/02/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	0.0020 J
MW-136S	11/07/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	0.039	0.0074
MW-136S	11/13/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	0.033	0.0074
MW-136I	11/07/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	0.00056 J	0.0013 J
MW-136I	11/13/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
MW-136D	11/13/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
Dup	11/13/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
MW-137I	11/08/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	0.0027 J	0.0019 J
MW-137D	11/08/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	0.0020 J

Notes:
The method detection limit was used as the reporting limit.
Dup - Duplicate sample
J - Estimated concentration
mg/L - milligram per liter
ND - Not detected at the indicated laboratory reporting limit or the method detection limit.

TABLE 3-1. SCREENING EVALUATION FOR DEEP NESTED SOIL VAPOR RESULTS, GASOLINE RELATED CONSTITUENTS
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Vapor Monitoring Well	Date	Depth	Dilution Factor	n-Butylbenzene mg/m^3	sec-Butylbenzene mg/m^3	Isopropylbenzene mg/m^3	n-Propylbenzene mg/m^3	1,2-Dichloroethane mg/m^3	1,2-Dibromoethane mg/m^3	MTBE mg/m^3	Naphthalene mg/m^3	Benzene mg/m^3	Toluene mg/m^3	Ethylbenzene mg/m^3	m,p-Xylene mg/m^3	o-Xylene mg/m^3	Cyclohexane mg/m^3	Hexane mg/m^3	Heptane mg/m^3	Styrene mg/m^3	2,2,4-Trimethylpentane mg/m^3	1,3,5-Trimethylbenzene mg/m^3	1,2,4-Trimethylbenzene mg/m^3	1,3-Butadiene mg/m^3	4-Ethyltoluene mg/m^3	Butane mg/m^3	Isopentane mg/m^3	Methyl cyclohexane mg/m^3
VW-93A	Jul 2012	20	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	**ND(0.0062)**	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0076)	ND(0.0095)	ND(0.013)
		30	1.68	ND(0.018)	ND(0.018)	ND(0.0041)	ND(0.0041)	ND(0.0034)	**ND(0.0064)**	ND(0.0030)	ND(0.018)	ND(0.0027)	ND(0.0032)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0029)	ND(0.0030)	ND(0.0034)	ND(0.0036)	ND(0.0039)	ND(0.0041)	ND(0.0041)	ND(0.0018)	ND(0.0041)	ND(0.0080)	ND(0.0099)	ND(0.013)
		30-Dup	1.68	ND(0.018)	ND(0.018)	ND(0.0041)	ND(0.0041)	ND(0.0034)	**ND(0.0064)**	ND(0.0030)	ND(0.018)	ND(0.0027)	ND(0.0032)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0029)	ND(0.0030)	ND(0.0034)	ND(0.0036)	ND(0.0039)	ND(0.0041)	ND(0.0041)	ND(0.0018)	ND(0.0041)	ND(0.0080)	ND(0.0099)	ND(0.013)
		40	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	**ND(0.0062)**	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	0.0086	ND(0.0095)	ND(0.013)
		50	1.64	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	**ND(0.0063)**	ND(0.0030)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0028)	ND(0.0029)	ND(0.0034)	ND(0.0035)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0078)	ND(0.0097)	ND(0.013)
		60	1.58	ND(0.017)	ND(0.017)	ND(0.0039)	ND(0.0039)	ND(0.0032)	**ND(0.0061)**	ND(0.0028)	ND(0.016)	ND(0.0025)	ND(0.0030)	ND(0.0034)	ND(0.0034)	ND(0.0034)	ND(0.0027)	ND(0.0028)	ND(0.0032)	ND(0.0034)	ND(0.0037)	ND(0.0039)	ND(0.0039)	ND(0.0017)	ND(0.0039)	ND(0.0075)	ND(0.0093)	ND(0.013)
VW-96	Jul 2012	20	1.63	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	**ND(0.0063)**	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0029)	ND(0.0033)	ND(0.0035)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0077)	ND(0.0096)	ND(0.013)
		30	1.56	ND(0.017)	ND(0.017)	ND(0.0038)	ND(0.0038)	ND(0.0032)	**ND(0.0060)**	ND(0.0028)	ND(0.016)	ND(0.0025)	ND(0.0029)	ND(0.0034)	ND(0.0034)	ND(0.0034)	ND(0.0027)	ND(0.0027)	ND(0.0032)	ND(0.0033)	ND(0.0036)	0.012	ND(0.0038)	ND(0.0017)	ND(0.0038)	ND(0.0074)	ND(0.0092)	ND(0.012)
		40	2.46	ND(0.027)	ND(0.027)	ND(0.0060)	ND(0.0060)	ND(0.0050)	**ND(0.0094)**	ND(0.0044)	ND(0.026)	ND(0.0039)	ND(0.0046)	ND(0.0053)	ND(0.0053)	ND(0.0053)	ND(0.0042)	ND(0.0043)	ND(0.0050)	ND(0.0052)	ND(0.0057)	0.030 J	ND(0.0060)	ND(0.0027)	ND(0.0060)	ND(0.012)	ND(0.014)	ND(0.020)
		40-Dup	1.65	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	**ND(0.0063)**	ND(0.0030)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0028)	ND(0.0029)	ND(0.0034)	ND(0.0035)	0.0052	0.044 J	ND(0.0040)	ND(0.0018)	ND(0.0040)	0.0088	ND(0.0097)	ND(0.013)
		50	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	**ND(0.0062)**	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	0.0051	ND(0.0040)	ND(0.0018)	ND(0.0040)	0.0096	ND(0.0095)	ND(0.013)
		55	32.2	ND(0.35)	ND(0.35)	ND(0.079)	ND(0.079)	ND(0.065)	**ND(0.12)**	ND(0.058)	**ND(0.34)**	ND(0.051)	ND(0.061)	ND(0.070)	ND(0.070)	ND(0.070)	ND(0.055)	0.12	ND(0.066)	ND(0.068)	36	ND(0.079)	ND(0.079)	ND(0.036)	ND(0.079)	4.1	5.7	ND(0.26)
	Aug 2012	20	5.28	ND(0.058)	ND(0.058)	ND(0.013)	ND(0.013)	ND(0.011)	**ND(0.020)**	ND(0.0095)	**ND(0.055)**	ND(0.0084)	ND(0.0099)	ND(0.011)	ND(0.011)	ND(0.011)	ND(0.0091)	ND(0.0093)	ND(0.011)	ND(0.011)	ND(0.012)	ND(0.013)	ND(0.013)	ND(0.0058)	ND(0.013)	ND(0.025)	ND(0.031)	ND(0.042)
		30	2.29	ND(0.025)	ND(0.025)	ND(0.0056)	ND(0.0056)	ND(0.0046)	**ND(0.0088)**	ND(0.0041)	ND(0.024)	ND(0.0036)	ND(0.0043)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0039)	ND(0.0040)	ND(0.0047)	ND(0.0049)	ND(0.0053)	0.0058	ND(0.0056)	ND(0.0025)	ND(0.0056)	ND(0.011)	ND(0.014)	ND(0.018)
		40	2.42	ND(0.026)	ND(0.026)	ND(0.0059)	ND(0.0059)	ND(0.0049)	**ND(0.0093)**	ND(0.0044)	ND(0.025)	ND(0.0039)	ND(0.0046)	ND(0.0052)	ND(0.0052)	ND(0.0052)	ND(0.0042)	ND(0.0043)	ND(0.0050)	ND(0.0052)	ND(0.0056)	0.0073	ND(0.0059)	ND(0.0027)	ND(0.0059)	ND(0.012)	ND(0.014)	ND(0.019)
	Sep 2012	20	2.29	ND(0.025)	ND(0.025)	ND(0.0056)	ND(0.0056)	ND(0.0046)	**ND(0.0088)**	ND(0.0041)	ND(0.024)	ND(0.0036)	ND(0.0043)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0039)	ND(0.0040)	ND(0.0047)	ND(0.0049)	ND(0.0053)	ND(0.0056)	ND(0.0056)	ND(0.0025)	ND(0.0056)	ND(0.011)	ND(0.014)	ND(0.018)
		30	2.20	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0044)	**ND(0.0084)**	ND(0.0040)	ND(0.023)	ND(0.0035)	ND(0.0041)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0051)	0.0078	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)
		40	2.29	ND(0.025)	ND(0.025)	ND(0.0056)	ND(0.0056)	ND(0.0046)	**ND(0.0088)**	ND(0.0041)	ND(0.024)	ND(0.0036)	ND(0.0043)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0039)	ND(0.0040)	ND(0.0047)	ND(0.0049)	ND(0.0053)	0.012	ND(0.0056)	ND(0.0025)	0.0080	ND(0.011)	ND(0.014)	ND(0.018)
	Oct 2012	20	2.20	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0044)	**ND(0.0084)**	ND(0.0040)	ND(0.023) UJ	ND(0.0035)	ND(0.0041)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0051)	ND(0.0054)	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)
		30	2.24	ND(0.024)	ND(0.024)	ND(0.0055)	ND(0.0055)	ND(0.0045)	**ND(0.0086)**	ND(0.0040)	ND(0.023) UJ	ND(0.0036)	0.0082	ND(0.0049)	0.057	0.021	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0048)	ND(0.0052)	0.028	0.049	ND(0.0025)	0.033	ND(0.011)	ND(0.013)	ND(0.018)
		40	2.24	ND(0.024)	ND(0.024)	ND(0.0055)	ND(0.0055)	ND(0.0045)	**ND(0.0086)**	ND(0.0040)	ND(0.023) UJ	ND(0.0036)	ND(0.0042)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0048)	ND(0.0052)	ND(0.0055)	ND(0.0055)	ND(0.0025)	0.018	ND(0.011)	ND(0.013)	ND(0.018)
	Nov 2012	20	2.20	ND(0.024)	ND(0.024)	ND(0.0055)	ND(0.0055)	ND(0.0045)	**ND(0.0086)**	ND(0.0040)	ND(0.023) UJ	ND(0.0036)	ND(0.0042)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0048)	ND(0.0052)	ND(0.0055)	ND(0.0055)	ND(0.0025)	ND(0.0055)	ND(0.011)	ND(0.013)	ND(0.018)
		30	2.24	ND(0.026)	ND(0.026)	ND(0.0057)	ND(0.0057)	ND(0.0047)	**ND(0.009)**	ND(0.0042)	ND(0.024) UJ	ND(0.0037)	ND(0.0044)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0040)	ND(0.0041)	ND(0.0048)	ND(0.0050)	ND(0.0054)	0.0087	ND(0.0057)	ND(0.0026)	ND(0.0057)	ND(0.011)	ND(0.014)	ND(0.019)
		40	2.24	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0045)	**ND(0.0085)**	ND(0.0040)	ND(0.023) UJ	ND(0.0035)	ND(0.0042)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0052)	0.0062	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)
	Dec 2012	20	2.24	ND(0.024) UJ	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0044)	**ND(0.0084)**	ND(0.0040)	ND(0.023) UJ	ND(0.0035)	ND(0.0041)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0051)	ND(0.0054)	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)
		30	2.33	ND(0.023) UJ	ND(0.023)	ND(0.0051)	ND(0.0051)	ND(0.0042)	**ND(0.0080)**	ND(0.0038)	ND(0.022) UJ	ND(0.0033)	ND(0.0039)	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.0036)	ND(0.0037)	ND(0.0043)	ND(0.0044)	ND(0.0049)	0.0054	ND(0.0051)	ND(0.0023)	ND(0.0051)	ND(0.0099)	ND(0.012)	ND(0.017)
		40	2.21	ND(0.023) UJ	ND(0.023)	ND(0.0052)	ND(0.0052)	ND(0.0042)	**ND(0.0081)**	ND(0.0038)	ND(0.022) UJ	ND(0.0034)	ND(0.0040)	ND(0.0046)	ND(0.0046)	ND(0.0046)	ND(0.0036)	0.0039	0.0082	ND(0.0045)	ND(0.0049)	0.0064	ND(0.0052)	ND(0.0023)	ND(0.0052)	ND(0.010)	ND(0.012)	ND(0.017)
VW-99	Jul 2012	20	1.63	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	**ND(0.0063)**	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	0.0040	ND(0.0033)	ND(0.0035)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0077)	ND(0.0096)	ND(0.013)
		30	1.64	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	**ND(0.0063)**	ND(0.0030)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0036)	ND(0.0036)	ND(0.0036)	ND(0.0028)	ND(0.0029)	ND(0.0034)	ND(0.0035)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	0.0081	ND(0.0097)	ND(0.013)
		30-Dup	1.65	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	**ND(0.0063)**	ND(0.0030)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0036)	0.0069	ND(0.0036)	ND(0.0028)	ND(0.0029)	ND(0.0034)	ND(0.0035)	ND(0.0038)	ND(0.0040)	0.0058	ND(0.0018)	ND(0.0040)	ND(0.0078)	ND(0.0097)	ND(0.013)
		40	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	**ND(0.0062)**	ND(0.0029)	ND(0.017)	ND(0.0026)	0.0032	ND(0.0035)	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	0.058	0.013	ND(0.013)
		50	5.53	ND(0.061)	ND(0.061)	ND(0.014)	ND(0.014)	ND(0.011)	**ND(0.021)**	ND(0.010)	ND(0.058)	0.029 J	ND(0.010)	ND(0.012)	ND(0.012)	ND(0.012)	ND(0.0095)	ND(0.0097)	ND(0.011)	ND(0.012)	16 J	ND(0.014)	ND(0.014)	ND(0.0061)	ND(0.014)	ND(0.026)	2.6 J	ND(0.044)
		60	163	ND(1.8)	ND(1.8)	0.57	0.76	**ND(0.33)**	**ND(0.63)**	ND(0.29)	**ND(1.7)**	ND(0.26)	ND(0.31)	ND(0.35)	ND(0.35)	ND(0.35)	6.2	4.4	2.5	ND(0.35)	95	ND(0.40)	ND(0.40)	**ND(0.18)**	ND(0.40)	2.1	44	29
		60-Dup	157	ND(1.7)	ND(1.7)	0.46	0.74	**ND(0.32)**	**ND(0.60)**	ND(0.28)	**ND(1.6)**	ND(0.25)	ND(0.30)	ND(0.34)	ND(0.34)	ND(0.34)	5.3	3.8	2.3	ND(0.33)	83	ND(0.38)	ND(0.38)	**ND(0.17)**	ND(0.38)	1.9	39	26
	Aug 2012	20	2.20	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0044)	**ND(0.0084)**	ND(0.0040)	ND(0.023)	ND(0.0035)	ND(0.0041)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0051)	ND(0.0054)	ND(0.0054)	ND(0.0024)	ND(0.0054)	0.022	ND(0.013)	ND(0.018)
		30	2.38	ND(0.026)	ND(0.026)	ND(0.0058)	ND(0.0058)	ND(0.0048)	**ND(0.0091)**	ND(0.0043)	ND(0.025)	ND(0.0038)	ND(0.0045)	ND(0.0052)	ND(0.0052)	ND(0.0052)	ND(0.0041)	ND(0.0042)	ND(0.0049)	ND(0.0051)	ND(0.0056)	ND(0.0058)	ND(0.0058)	ND(0.0026)	ND(0.0058)	ND(0.011)	ND(0.014)	ND(0.019)
		30-Dup	2.42	ND(0.026)	ND(0.026)	ND(0.0059)	ND(0.0059)	ND(0.0049)	**ND(0.0093)**	ND(0.0044)	ND(0.025)	ND(0.0039)	ND(0.0046)	ND(0.0052)	ND(0.0052)	ND(0.0052)	ND(0.0042)	ND(0.0043)	ND(0.0050)	ND(0.0052)	ND(0.0056)	ND(0.0059)	ND(0.0059)	ND(0.0027)	ND(0.0059)	ND(0.012)	ND(0.014)	ND(0.019)
		40	2.52	ND(0.028)	ND(0.028)	ND(0.0062)	ND(0.0062)	ND(0.0051)	**ND(0.0097)**	ND(0.0045)	ND(0.026)	ND(0.0040)	ND(0.0047)	ND(0.0055)	ND(0.0055)	ND(0.0055)	ND(0.0043)	ND(0.0044)	0.0052	ND(0.0054)	ND(0.0059)	ND(0.0062)	ND(0.0062)	ND(0.0028)	ND(0.0062)	0.014	ND(0.015)	ND(0.020)
	Sep 2012	20	2.33	ND(0.026)	ND(0.026)	ND(0.0057)	ND(0.0057)	ND(0.0047)	**ND(0.009)**	ND(0.0042)	ND(0.024)	ND(0.0037)	ND(0.0044)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0040)	ND(0.0041)	ND(0.0048)	ND(0.0050)	ND(0.0054)	ND(0.0057)	ND(0.0057)	ND(0.0026)	ND(0.0057)	ND(0.011)	ND(0.014)	ND(0.019)
		30	2.13	ND(0.023)	ND(0.023)	ND(0.0052)	ND(0.0052)	ND(0.0043)	**ND(0.0082)**	ND(0.0038)	ND(0.022)	ND(0.0034)	ND(0.0040)	ND(0.0046)	ND(0.0046)	ND(0.0046)	ND(0.0037)	ND(0.0038)	ND(0.0044)	ND(0.0045)	ND(0.0050)	ND(0.0052)	ND(0.0052)	ND(0.0024)	ND(0.0052)	ND(0.010)	ND(0.012)	ND(0.017)
		30-Dup	2.16	ND(0.024)	ND(0.024)	ND(0.0053)	ND(0.0053)	ND(0.0044)	**ND(0.0083)**	ND(0.0039)	ND(0.023)	ND(0.0034)	ND(0.0041)	ND(0.0047)	ND(0.0047)	ND(0.0047)	ND(0.0037)	ND(0.0038)	ND(0.0044)	ND(0.0046)	ND(0.0050)	ND(0.0053)	ND(0.0053)	ND(0.0024)	ND(0.0053)	ND(0.010)	ND(0.013)	ND(0.017)
		40	2.24	ND(0.024)	ND(0.024)	ND(0.0055)	0.026	ND(0.0045)	**ND(0.0086)**	ND(0.0040)	ND(0.023)	ND(0.0036)	ND(0.0042)	0.029	ND(0.0049)	ND(0.0049)	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0048)	ND(0.0052)	0.024	0.015	ND(0.0025)	0.058	ND(0.011)	ND(0.013)	ND(0.018)
	Oct 2012	20	2.09	ND(0.023)	ND(0.023)	ND(0.0051)	ND(0.0051)	ND(0.0042)	**ND(0.0080)**	ND(0.0038)	ND(0.022) UJ	ND(0.0033)	0.0080	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.0036)	ND(0.0037)	ND(0.0043)	ND(0.0044)	ND(0.0049)	ND(0.0051)	ND(0.0051)	ND(0.0023)	ND(0.0051)	ND(0.0099)	0.015	ND(0.017)
		30	2.24	ND(0.024)	ND(0.024)	ND(0.0055)	ND(0.0055)	ND(0.0045)	**ND(0.0086)**	ND(0.0040)	ND(0.023) UJ	ND(0.0036)	ND(0.0042)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0048)	ND(0.0052)	ND(0.0055)	ND(0.0055)	ND(0.0025)	ND(0.0055)	ND(0.011)	ND(0.013)	ND(0.018)
		30-Dup	2.20	ND(0.024)	ND(0.024)	ND(0.0054)	ND(0.0054)	ND(0.0044)	**ND(0.0084)**	ND(0.0040)	ND(0.023) UJ	ND(0.0035)	ND(0.0041)	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0045)	ND(0.0047)	ND(0.0051)	ND(0.0054)	ND(0.0054)	ND(0.0024)	ND(0.0054)	ND(0.010)	ND(0.013)	ND(0.018)
	Nov 2012	20	2.26	ND(0.025)	ND(0.025)	ND(0.0056)	ND(0.0056)	ND(0.0046)	**ND(0.0087)**	ND(0.0041)	ND(0.024) UJ	ND(0.0036)	ND(0.0042)	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.0039)	ND(0.0040)	ND(0.0046)	ND(0.0048)	ND(0.0053)	ND(0.0056)	ND(0.0056)	ND(0.0025)	ND(0.0056)	ND(0.011)	ND(0.013)	ND(0.018)
		30	2.26	ND(0.025)	ND(0.025)	ND(0.0056)	ND(0.0056)	ND(0.0046)	**ND(0.0087)**	ND(0.0041)	ND(0.024) UJ	ND(0.0036)	0.009 J	ND(0.0049)	ND(0.0049)	ND(0.0049)	ND(0.0039)	ND(0.0040)	ND(0.0046)	ND(0.0048)	ND(0.0053)	ND(0.0056)	ND(0.0056)	ND(0.0025)	ND(0.0056)	0.011	0.016	ND(0.018)
		30-Dup	2.23	ND(0.024)	ND(0.024)	ND(0.0055)	ND(0.0055)	ND(0.0045)	**ND(0.0086)**	ND(0.0040)	ND(0.023) UJ	ND(0.0036)	0.0045 J	ND(0.0048)	ND(0.0048)	ND(0.0048)	ND(0.0038)	ND(0.0039)	ND(0.0046)	ND(0.0047)	ND(0.0052)	ND(0.0055)	ND(0.0055)	ND(0.0025)	ND(0.0055)	ND(0.011)	0.017	ND(0.018)
		40	2.40	ND(0.026)	ND(0.026)	ND(0.0059)	ND(0.0059)	ND(0.0048)	**ND(0.0092)**	ND(0.0043)	ND(0.025) UJ	ND(0.0038)	ND(0.0045)	ND(0.0052)	ND(0.0052)	ND(0.0052)	ND(0.0041)	ND(0.0042)	ND(0.0049)	ND(0.0051)	ND(0.0056)	ND(0.0059)	ND(0.0059)	ND(0.0026)	ND(0.0059)	ND(0.011)	ND(0.014)	ND(0.019)
	Dec 2012	20	2.16	ND(0.024) UJ	ND(0.024)	ND(0.0053)	ND(0.0053)	ND(0.0044)	**ND(0.0083)**	ND(0.0039)	ND(0.023) UJ	ND(0.0034)	ND(0.0041)	ND(0.0047)	ND(0.0047)	ND(0.0047)	ND(0.0037)	ND(0.0038)	ND(0.0044)	ND(0.0046)	ND(0.0050)	ND(0.0053)	ND(0.0053)	ND(0.0024)	ND(0.0053)	ND(0.010)	ND(0.013)	ND(0.017)
		30	2.34	ND(0.026) UJ	ND(0.026)	ND(0.0058)	ND(0.0058)	ND(0.0047)	**ND(0.009)**	ND(0.0042)	ND(0.024) UJ	ND(0.0037)	0.017 J	ND(0.0051)	ND(0.0051)	ND(0.0051)	ND(0.0040)	ND(0.0041)	ND(0.0048)	ND(0.0050)	ND(0.0055)	ND(0.0058)	ND(0.0058)	ND(0.0026)	ND(0.0058)	ND(0.011)	0.11 J	ND(0.019)
		30-Dup	2.09	ND(0.023) UJ	ND(0.023)	ND(0.0051)	ND(0.0051)	ND(0.0042)	**ND(0.0080)**	ND(0.0038)	ND(0.022) UJ	ND(0.0033)	0.0073 J	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.0036)	ND(0.0037)	ND(0.0043)	ND(0.0044)	ND(0.0049)	ND(0.0051)	ND(0.0051)	ND(0.0023)	ND(0.0051)	ND(0.0099)	0.056 J	ND(0.017)
		40	2.06	ND(0.023) UJ	ND(0.023)	ND(0.0051)	ND(0.0051)	ND(0.0042)	**ND(0.0079)**	ND(0.0037)	ND(0.022) UJ	ND(0.0033)	ND(0.0039)	ND(0.0045)	ND(0.0045)	ND(0.0045)	ND(0.0035)	ND(0.0036)	ND(0.0042)	ND(0.0044)	ND(0.0048)	ND(0.0051)	ND(0.0051)	ND(0.0023)	ND(0.0051)	ND(0.0098)	ND(0.012)	ND(0.016)

TABLE 3-1. SCREENING EVALUATION FOR DEEP NESTED SOIL VAPOR RESULTS, GASOLINE RELATED CONSTITUENTS
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Nested Vapor Monitoring Well	Date	Depth	Dilution Factor	n-Butyl-benzene mg/m^3	sec-Butyl-benzene mg/m^3	Isopropyl-benzene mg/m^3	n-Propyl-benzene mg/m^3	1,2-Dichloro-ethane mg/m^3	1,2-Dibromo-ethane mg/m^3	MTBE mg/m^3	Naphthalene mg/m^3	Benzene mg/m^3	Toluene mg/m^3	Ethyl-benzene mg/m^3
VW-128	Jul 2012	20	1.68	ND(0.018)	ND(0.018)	ND(0.0041)	ND(0.0041)	ND(0.0034)	**ND(0.0064)**	ND(0.0030)	ND(0.018)	ND(0.0027)	ND(0.0032)	ND(0.0036)
		30	1.58	ND(0.017)	ND(0.017)	ND(0.0039)	ND(0.0039)	ND(0.0032)	**ND(0.0061)**	ND(0.0028)	ND(0.016)	ND(0.0025)	ND(0.0030)	ND(0.0034)
		40	1.65	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0033)	**ND(0.0063)**	ND(0.0030)	ND(0.017)	ND(0.0026)	ND(0.0031)	ND(0.0036)
		50	1.55	ND(0.017)	ND(0.017)	ND(0.0038)	ND(0.0038)	ND(0.0031)	**ND(0.0060)**	ND(0.0028)	ND(0.016)	ND(0.0025)	ND(0.0029)	ND(0.0034)
VW-129	Jul 2012	20	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	**ND(0.0062)**	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)
		30	1.68	ND(0.018)	ND(0.018)	ND(0.0041)	ND(0.0041)	ND(0.0034)	**ND(0.0064)**	ND(0.0030)	ND(0.018)	ND(0.0027)	ND(0.0032)	ND(0.0036)
		40	1.61	ND(0.018)	ND(0.018)	ND(0.0040)	ND(0.0040)	ND(0.0032)	**ND(0.0062)**	ND(0.0029)	ND(0.017)	ND(0.0026)	ND(0.0030)	ND(0.0035)
		50	1.83	ND(0.020)	ND(0.020)	ND(0.0045)	ND(0.0045)	ND(0.0037)	**ND(0.0070)**	ND(0.0033)	ND(0.019)	ND(0.0029)	ND(0.0034)	ND(0.0040)
USEPA RSL for Depths of 20 ft-bgs				NA	NA	210	500	0.047	0.002	4.7	0.036	0.155	2600	0.49
USEPA RSL for Depths between 20 - 35 ft-bgs				NA	NA	420	1000	0.094	0.004	9.4	0.072	0.310	5200	0.97
USEPA RSL for Depths Greater than 35 ft-bgs				NA	NA	600	1429	0.134	0.006	13.4	0.103	0.443	7429	1.39

Nested Vapor Monitoring Well	Date	Depth	m,p-Xylene mg/m^3	o-Xylene mg/m^3	Cyclo-hexane mg/m^3	Hexane mg/m^3	Heptane mg/m^3	Styrene mg/m^3	2,2,4-Trimethyl-pentane mg/m^3	1,3,5-Trimethyl-benzene mg/m^3	1,2,4-Trimethyl-benzene mg/m^3	1,3-Butadiene mg/m^3	4-Ethyl-toluene mg/m^3	Butane mg/m^3	Isopentane mg/m^3	Methyl cyclohexane mg/m^3
VW-128	Jul 2012	20	ND(0.0036)	ND(0.0036)	ND(0.0029)	ND(0.0030)	ND(0.0034)	ND(0.0036)	ND(0.0039)	ND(0.0041)	ND(0.0041)	ND(0.0018)	ND(0.0041)	ND(0.0080)	ND(0.0099)	ND(0.013)
		30	ND(0.0034)	ND(0.0034)	ND(0.0027)	ND(0.0028)	ND(0.0032)	ND(0.0034)	ND(0.0037)	ND(0.0039)	ND(0.0039)	ND(0.0017)	ND(0.0039)	ND(0.0075)	ND(0.0093)	ND(0.013)
		40	ND(0.0036)	ND(0.0036)	ND(0.0028)	ND(0.0029)	ND(0.0034)	ND(0.0035)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0078)	ND(0.0097)	ND(0.013)
		50	ND(0.0034)	ND(0.0034)	ND(0.0027)	ND(0.0027)	ND(0.0032)	ND(0.0033)	ND(0.0036)	ND(0.0038)	ND(0.0038)	ND(0.0017)	ND(0.0038)	ND(0.0074)	ND(0.0091)	ND(0.012)
VW-129	Jul 2012	20	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0076)	ND(0.0095)	ND(0.013)
		30	ND(0.0036)	ND(0.0036)	ND(0.0029)	ND(0.0030)	0.0038	ND(0.0036)	ND(0.0039)	ND(0.0041)	ND(0.0041)	ND(0.0018)	ND(0.0041)	ND(0.0080)	ND(0.0099)	ND(0.013)
		40	ND(0.0035)	ND(0.0035)	ND(0.0028)	ND(0.0028)	ND(0.0033)	ND(0.0034)	ND(0.0038)	ND(0.0040)	ND(0.0040)	ND(0.0018)	ND(0.0040)	ND(0.0076)	ND(0.0095)	ND(0.013)
		50	ND(0.0040)	ND(0.0040)	ND(0.0031)	ND(0.0032)	ND(0.0037)	ND(0.0039)	ND(0.0043)	ND(0.0045)	ND(0.0045)	ND(0.0020)	ND(0.0045)	0.041	ND(0.011)	ND(0.015)
USEPA RSL for Depths of 20 ft-bgs			50	50	3150	365	NA	500	NA	NA	3.7	0.041	NA	NA	NA	NA
USEPA RSL for Depths between 20 - 35 ft-bgs			100	100	6300	730	NA	1000	NA	NA	7.3	0.081	NA	NA	NA	NA
USEPA RSL for Depths Greater than 35 ft-bgs			143	143	9000	1043	NA	1429	NA	NA	10.4	0.116	NA	NA	NA	NA

Notes:

Screening levels for Hooven calculated using the Regional Screening Levels for Residential Air and semi-site specific attenuation factors from Figure 3a of the *OSWER Draft VI Guidance*. For depths of 20 ft-bgs an attenuation factor of 0.002 was used, for depths of greater than 20 ft-bgs to 35 ft-bgs an attenuation factor of 0.001 was used, and for depths greater than 35 ft-bgs an attenuation factor of 0.0007 was used.

BOLD - Reported value is above the adjusted USEPA November 2012 RSL screening standard at the specified depth

Dup - Duplicate sample

J – Estimated concentration

UJ - Estimated concentration below detection limit

R - Rejected, data not usable

mg/m^3 - Milligram per cubic meter

MTBE - Methyl tert butyl ether

NA - Not available

ND - Not detected

TABLE 4-1. WEEKLY LNAPL RECOVERY BY PRODUCTION WELL
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Week	Date	PROD_19		PROD_21		PROD_25		**All Production Wells**		
		Weekly Recovery	Subtotal	Weekly Recovery	Subtotal	Weekly Recovery	Subtotal	**Weekly Recovery**	**Daily Average**	**Total LNAPL**
1	6/23/2012					0	0	**0**	**0**	**0**
2	6/30/2012					0	0	**0**	**0**	**0**
3	7/7/2012					881	881	**881**	**126**	**881**
4	7/14/2012					1,942	2,823	**1,942**	**277**	**2,823**
5	7/21/2012					662	3,485	**662**	**95**	**3,485**
6	7/28/2012							**0**	**0**	**3,485**
7	8/4/2012	9	9					**9**	**1**	**3,494**
8	8/11/2012	49	58					**49**	**7**	**3,543**
9	8/18/2012	428	486					**428**	**61**	**3,971**
10	8/25/2012	2,680	3,166					**2,680**	**383**	**6,651**
11	9/1/2012	4,451	7,617	1,012	1,012			**5,463**	**780**	**12,114**
12	9/8/2012	2,104	9,721	338	1,350	0	3,485	**2,442**	**349**	**14,556**
13	9/15/2012			0	1,350			**0**	**0**	**14,556**
14	9/22/2012	100	9,821	0	1,350			**100**	**14**	**14,656**
15	9/29/2012	206	10,027	41	1,391			**247**	**35**	**14,903**
16	10/6/2012	156	10,183	58	1,449	0	3,485	**214**	**31**	**15,117**
17	10/13/2012	35	10,218	1	1,450	34	3,519	**70**	**10**	**15,187**
18	10/20/2012	5	10,223			616	4,135	**621**	**89**	**15,808**
19	10/27/2012					1753	5,888	**1,753**	**250**	**17,561**
20	11/3/2012			0	1,450	3225	9,113	**3,225**	**461**	**20,786**
21	11/10/2012			0	1,450	3569	12,682	**3,569**	**510**	**24,355**
22	11/17/2012			0	1,450	2954	15,636	**2,954**	**422**	**27,309**
23	11/24/2012					2900	18,536	**2,900**	**414**	**30,209**
24	12/1/2012					4368	22,904	**4,368**	**624**	**34,577**
25	12/8/2012					6166	29,070	**6,166**	**881**	**40,743**
26	12/15/2012					1191	30,261	**1,191**	**170**	**41,934**
27	12/22/2012					134	30,395	**134**	**19**	**42,068**
28	12/29/2012					26	30,421	**26**	**4**	**42,094**
29	1/5/2013					2	30,423	**2**	**0**	**42,096**

Note:
All quantities are reported in gallons

TABLE 4-2. GROUNDWATER EXTRACTION RATE AND PRODUCTION WELL FLUID LEVELS
SECOND 2012 SEMIANNUAL MONITORING EVENT
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Date	PROD_19			PROD_20			PROD_21			PROD_24			PROD_25		
	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)
6/20/2012															
6/21/2012													25.90	25.91	1,800
6/22/2012															2,100
6/23/2012															2,100
6/24/2012															2,100
6/25/2012													ND	33.59	2,450
6/26/2012															2,450
6/27/2012															2,542
6/28/2012															2,600
6/29/2012													ND	36.40	2,600
6/30/2012															2,600
7/1/2012															2,600
7/2/2012													36.57	36.77	2,600
7/3/2012															2,600
7/4/2012															2,600
7/5/2012															2,600
7/6/2012													36.74	36.90	2,470
7/7/2012															2,600
7/8/2012															2,600
7/9/2012															2,405
7/10/2012															2,410
7/11/2012													36.90	37.20	2,385
7/12/2012													36.96	37.36	2,400
7/13/2012													37.05	37.28	2,385
7/14/2012															2,390
7/15/2012															2,390
7/16/2012													37.21	37.44	2,370
7/17/2012	39.41	39.42								ND	59.62	760	37.29	37.35	2,370
7/18/2012										ND	66.40	750			
7/19/2012										ND	66.00	750			
7/20/2012	ND	39.28								ND	66.00	750			
7/21/2012												750			
7/22/2012												750			
7/23/2012	ND	38.99								ND	65.56	750			
7/24/2012	ND	38.91								ND	65.92	750			
7/25/2012	ND	38.86								ND	64.41	750			
7/26/2012			1,650									750			
7/27/2012	41.33	41.35	1,662							ND	60.11				
7/28/2012			1,670												
7/29/2012			1,670												
7/30/2012	41.46	42.56	1,900	ND	40.19		ND	42.52		ND	60.44		27.91	27.92	
7/31/2012			1,900												

TABLE 4-2. GROUNDWATER EXTRACTION RATE AND PRODUCTION WELL FLUID LEVELS
SECOND 2012 SEMIANNUAL MONITORING EVENT
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Date	PROD_19			PROD_20			PROD_21			PROD_24			PROD_25		
	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)
8/1/2012			2,135												
8/2/2012			2,135												
8/3/2012	42.41	43.34	2,470							ND	61.12				
8/4/2012			2,470												
8/5/2012			2,470												
8/6/2012			2,470												
8/7/2012	ND	42.52	2,470	ND	40.93										
8/8/2012			2,470												
8/9/2012			2,470												
8/10/2012	43.15	43.33	2,470							ND	61.51				
8/11/2012			2,470												
8/12/2012			2,470												
8/13/2012	43.47	43.55	2,515							ND	61.80				
8/14/2012			2,520												
8/15/2012			2,650												
8/16/2012			2,650												
8/17/2012	44.26	44.80	2,790							ND	62.44				
8/18/2012			2,790												
8/19/2012			2,790												
8/20/2012	44.48	45.01	2,790							ND	62.66				
8/21/2012			2,790												
8/22/2012			2,790												
8/23/2012			2,790												
8/24/2012	44.66	44.97	2,790							62.84	62.90				
8/25/2012			2,790												
8/26/2012			2,790												
8/27/2012	44.76	44.96	2,700							63.05	63.09	300			
8/28/2012	44.68	45.04	2,675							66.83	66.85	400			
8/29/2012			2,930						200			400			
8/30/2012			2,830						200						
8/31/2012	44.99	46.67	2,890				46.24	46.54	200	ND	63.51				
9/1/2012			2,620						200						
9/2/2012			2,620						200						
9/3/2012			2,620						200						
9/4/2012			2,800						200						
9/5/2012	44.91	46.06	2,800						200	ND	63.31				
9/6/2012			2,800						200						
9/7/2012	44.96	45.86	2,800						200	ND	63.29				
9/8/2012									200						2,640
9/9/2012									200						2,640
9/10/2012									200						2,640
9/11/2012									200						2,640

TABLE 4-2. GROUNDWATER EXTRACTION RATE AND PRODUCTION WELL FLUID LEVELS
SECOND 2012 SEMIANNUAL MONITORING EVENT
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Date	PROD_19			PROD_20			PROD_21			PROD_24			PROD_25		
	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)
9/12/2012						2,500									2,640
9/13/2012						2,750									
9/14/2012	40.60	40.64		ND	43.85	2,750				ND	61.44				
9/15/2012						2,750									
9/16/2012						2,750			220						
9/17/2012	41.20	42.12	2,640						220				ND	28.35	
9/18/2012			2,640						220						
9/19/2012			2,640						220						
9/20/2012			2,640						220						
9/21/2012	44.75	44.91	2,640				45.76	45.90	220						
9/22/2012			2,640						220						
9/23/2012			2,640						220						
9/24/2012	ND	44.70	2,640				45.71	45.96	220	ND	62.99				
9/25/2012			2,640						220						
9/26/2012	44.64	45.13	2,640	42.27	42.37		46.04	46.15	220	ND	62.96		ND	28.95	
9/27/2012			2,640						220						
9/28/2012			2,640						220						
9/29/2012			2,640						220						
9/30/2012			2,640						220						
10/1/2012	44.62	44.68	2,640				45.65	45.86		ND	62.91				
10/2/2012			2,640												
10/3/2012			2,640												
10/4/2012			2,640												
10/5/2012	44.33	44.61	2,818						220	ND	62.59				
10/6/2012			2,818												
10/7/2012			2,818												
10/8/2012	44.11	44.30	2,818				ND	45.21	220	ND	62.48				
10/9/2012			2,820												
10/10/2012			2,820						220						
10/11/2012															2,750
10/12/2012													35.79	35.81	2,750
10/13/2012															2,530
10/14/2012															2,530
10/15/2012															2,530
10/16/2012															2,530
10/17/2012													36.59	36.70	2,530
10/18/2012															2,530
10/19/2012													ND	36.68	2,530
10/20/2012															2,750
10/21/2012															2,530
10/22/2012															2,530
10/23/2012													36.81	36.94	2,530
10/24/2012															2,530
10/25/2012															2,530
10/26/2012													37.05	37.25	2,750

TABLE 4-2. GROUNDWATER EXTRACTION RATE AND PRODUCTION WELL FLUID LEVELS
SECOND 2012 SEMIANNUAL MONITORING EVENT
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Date	PROD_19			PROD_20			PROD_21			PROD_24			PROD_25		
	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)
10/27/2012															2,530
10/28/2012															2,530
10/29/2012													37.20	37.27	2,850
10/30/2012															2,850
10/31/2012															2,530
11/1/2012															2,850
11/2/2012													ND	37.15	2,875
11/3/2012															2,875
11/4/2012															2,875
11/5/2012													ND	36.87	2,875
11/6/2012															2,875
11/7/2012															2,875
11/8/2012															2,875
11/9/2012													ND	37.25	2,875
11/10/2012															2,875
11/11/2012															2,875
11/12/2012													ND	37.50	2,875
11/13/2012															2,875
11/14/2012															2,875
11/15/2012															2,850
11/16/2012													ND	37.45	2,875
11/17/2012															2,875
11/18/2012															2,875
11/19/2012															2,875
11/20/2012															2,875
11/21/2012													ND	37.65	2,850
11/22/2012															2,875
11/23/2012															2,875
11/24/2012															2,875
11/25/2012															2,875
11/26/2012															2,875
11/27/2012	39.41	39.52		ND	39.67		ND	41.89		ND	59.60		38.56	38.69	2,875
11/28/2012															2,875
11/29/2012															2,875
11/30/2012													38.67	38.69	2,850
12/1/2012															2,875
12/2/2012															2,875
12/3/2012															2,875
12/4/2012															2,875
12/5/2012													ND	38.28	2,850
12/6/2012															2,875
12/7/2012													ND	38.26	2,875
12/8/2012															2,875
12/9/2012															2,875

TABLE 4-2. GROUNDWATER EXTRACTION RATE AND PRODUCTION WELL FLUID LEVELS
SECOND 2012 SEMIANNUAL MONITORING EVENT
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Date	PROD_19			PROD_20			PROD_21			PROD_24			PROD_25		
	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)	Depth to LNAPL (feet)	Depth to Water (feet)	Extraction Rate (gpm)
12/10/2012															2,850
12/11/2012													37.77	37.80	2,875
12/12/2012															2,875
12/13/2012															2,875
12/14/2012													ND	37.16	2,875
12/15/2012															2,875
12/16/2012															2,875
12/17/2012															2,875
12/18/2012													37.82	37.85	2,875
12/19/2012															2,875
12/20/2012															2,875
12/21/2012													37.10	37.28	2,850
12/22/2012															2,875
12/23/2012															2,875
12/24/2012															2,875
12/25/2012															2,875
12/26/2012															2,875
12/27/2012															2,875
12/28/2012													36.51	36.72	2,875
12/29/2012															2,875
12/30/2012															2,875
12/31/2012															2,875
1/1/2013															2,850
1/2/2013													ND	36.78	2,850
1/3/2013															2,850
1/4/2013													36.87	37.05	2,850
1/5/2013															2,850
1/6/2013															2,850
1/7/2013															2,850
1/8/2013															1,900
1/9/2013															1,900
1/10/2013															
1/11/2013													ND	27.30	
1/12/2013															
1/13/2013															

Notes:
gpm - gallons per minute
ND - Not detected
NR - Not recordable due to field conditions

TABLE 4-3. LNAPL RECOVERY EFFICIENCY COMPARISON
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Production Well	High-Grade Recovery Area	High-Grade Pumping Start Date	High-Grade Pumping End Date	Cumulative LNAPL Recovered (gallons)	Average Daily LNAPL Recovery Rate (gpd)	Average Daily Groundwater Extraction Rate (gpd)	LNAPL Removal Efficiency (gallons/mega-gallon)
PROD_19	Southwest	7/11/07	12/14/07	67,808	435	2,667,720	163
PROD_20	Southwest	8/19/09	11/30/09	24,015	233	4,108,065	57
PROD_24	Southwest	11/29/10	1/24/11	354	9.3	1,420,295	6.6
PROD_25	Central	8/10/10	2/28/11	143,677	855	3,060,094	279
PROD_25	Central	8/18/11	10/30/11	1,065	15	3,067,890	4.8
PROD_25	Central	6/21/12 , 10/1/12	7/17/12 , 1/9/13	30,423	229	3,802,738	60
PROD_19	Southwest	7/17/12	10/1/12	11,673	188	3,879,522	48

Notes:
gpd - gallons per day
gpm - gallons per minute
LNAPL Removal Efficiency - gallons of LNAPL recovered per million gallons of groundwater extracted.

TABLE 4-4. CENTRAL AND SOUTHWEST REVISED HIGH GRADE TRIGGER LEVELS
SECOND 2012 SEMIANNUAL MONITORING EVENT
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

CENTRAL HIGH-GRADE AREA TRIGGER LEVELS AFTER 2012 HIGH-GRADE – PRODUCTION WELL PROD_25

Monitoring Well (i)	Historical Low Groundwater Elevation (Pt_i) (ft-amsl)	Date of Historical Low Groundwater Elevation	2010 Drawdown ($s_{i,j}$) (feet)	2012 Drawdown ($s_{i,j}$) (feet)	Previous High-Grade Trigger (ft-amsl)	Revised Pumping Trigger[1] (ft-amsl)
MW-18R	461.42	11/12/2010	4.84	4.6	468.25	466.02
MW-40	461.60	11/12/2010	4.66	4.31	468.06	465.91
MW-56	459.43	11/12/2004	4.58	4.33	467.14	463.76
MW-57	461.53	10/25/2010	3.98	3.62	466.98	465.15
MW-79	459.77	7/29/2005	5.17	4.88	468.71	464.65

SOUTHWEST HIGH-GRADE AREA TRIGGER LEVELS AFTER 2012 HIGH-GRADE EVENT – PRODUCTION WELLS PROD_19 (2006, 2007, and 2012) and PROD_20 (2005 and 2009)

Monitoring Well (i)	Historical Low Groundwater Elevation (Pt_i) (ft-amsl)	Date of Historical Low Groundwater Elevation	2005 Drawdown ($s_{i,j}$) (feet)	2006 Drawdown ($s_{i,j}$) (feet)	2007 Drawdown ($s_{i,j}$) (feet)	2009 Drawdown ($s_{i,j}$) (feet)	2012 Drawdown ($s_{i,j}$) (feet)	Initial High-Grade Trigger (ft-amsl)	Revised Pumping Trigger[1] (ft-amsl)
MW-20S	458.12	8/31/2012	3.6	4.2	4.21	5.24	6.90	464.8	465.02
MW-93S	460.48	8/31/2012	3.9	1.3	2.47	2.55	4.53	466.2	465.01
MW-96S	459.38	12/30/2010	3.6	2.4	3.47	3.21	5.43	465.9	464.81
MW-99S	459.03	5/12/2005	3.4	3.5	3.59	2.31	6.08	465.5	465.11

Notes:

[1] - Pumping Trigger based on historic low groundwater elevation plus maximum observed drawdown (corrected for ambient groundwater conditions) during the 2012 high grade period.

ft-amsl - feet above mean sea level

TABLE 4-5. SUMMARY OF HSVE OPERATION AND ORGANIC CARBON RECOVERY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

	Days of Operation					
Year	Line No. 1	Line No. 2	Line No. 3	Cumulative Days of Operation[1]	Organic Carbon Recovered (lbs)	Average Mass Removal Rate (lbs/day)
1999	38	0	0	38	120,000	3,158
2000	218	0	0	218	135,000	619
2001	30	29	198	253	42,500	168
2002	27	20	87	122	58,000	475
2003	0	0	9	9	2,200	244
2004	0	44	0	44	22,200	505
2005	33	42	40	55	14,500	264
2006	1	3	34	35	24,300	694
2007	70	17	85	164	78,850	481
2008	0	0	0	0	0	0
2009	23	43	28	63	34,000	540
2010	50	25	112	183	62,990	344
2011	0	37	29	37	5,567	150
2012	0	179	179	179	35,120	196
Total	490	439	801	1,400	635,227	454

Notes:

[1] - Multiple lines may be operated simultaneously during HSVE system operation. The cumulative days of operation represents the number of days the system was operating and not the total operation summed from operation of each individual line

lbs - pounds

lbs/day - pounds per day

TABLE 4-6. 2012 HSVE OPERATIONAL MONITORING DATA
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

			HSVE LINE 1							HSVE LINE 2							HSVE LINE 3							
Date	Time	Flow (scfm)	Vacuum (in-H_2O)	CH_4 (%)	CO_2 (%)	O_2 (%)	LEL (%)	Total Organic Vapor (ppm)	Lab Samples Collected (Yes/No)	Vacuum (in-H_2O)	CH_4 (%)	CO_2 (%)	O_2 (%)	LEL (%)	Total Organic Vapor (ppm)	Lab Samples Collected (Yes/No)	Vacuum (in-H_2O)	CH_4 (%)	CO_2 (%)	O_2 (%)	LEL (%)	Total Organic Vapor (ppm)	Lab Samples Collected (Yes/No)	Comments
7/10/12	2:00 PM	1375																						HSVE on in thermal mode 2:00PM-4:00PM Lines 2&3
7/11/12	8:00 AM	1375									0.3	1.8	19.1	4.0	42	N	60.00	0.6	1.9	15.5	4.0	87	N	Total flow from both lines 1375SCFM
7/12/12	2:00 PM	1375								60.00	0.5	2.3	17.7	19.0	46	Y								
7/13/12	2:00 PM	1375								55.00	0.3	1.8	18.8	7.0	67	N								
7/16/12	1:30 PM	1375								55.00	0.2	1.2	19.4	4.0	59	N								
7/18/12	3:10 PM	1375									0.5	2.0	17.5	11.0	-	N		2.3	4.6	9.5	48.0	-	N	
7/20/12	4:30 PM	1375									0.4	1.9	18.7	9.0	-	N		1.9	4.6	11.9	39.0	-	N	
7/24/02	3:20 PM	1145								53.00	0.4	1.9	18.7	8.0	-	N		1.0	3.6	14.9	21.0	-	N	
7/25/12	10:45 AM	1190								56.00	0.3	1.6	18.7	6.0	-	N		0.9	3.5	15.4	19.0	-	N	
7/31/12	8:00 AM	1260								57.00	0.2	1.2	19.6	4.0	147	Y		0.5	2.2	18.4	10.0	173	Y	
8/7/12	2:00 PM	1260									0.4	0.9	19.7	7.0	207	N		0.4	1.7	18.6	9.0	207	N	
8/13/12	2:05 PM	1265								53.00	0.4	0.9	19.9	8.0	217	N		0.4	1.6	19.0	7.0	225	N	
8/15/12	2:10 PM	1380								55.00	0.4	1.1	19.1	8.0	193	N		0.3	1.6	18.5	6.0	144	N	Unit on in Catalytic Mode @12:00N
8/24/12	3:00 PM	1380																0.0	0.0	0.0	0.0			
8/31/12	7:45 AM	1300								53.00	0.5	0.5	20.7	10.0	335	Y		0.8	2.5	18.3	17.0	360	Y	
9/7/12	7:00 AM	1300								57.00	1.2	1.4	18.5	26.0	520	N		0.5	1.8	17.9	10.0	223	N	
9/13/12	1:30 PM	1300								58.00	0.6	1.1	19.3	13.0	340	N		0.4	1.9	17.6	9.0	169	N	
9/21/12	9:00 AM	1330								58.00	0.8	1.4	19.6	18.0	194	N		0.2	1.8	18.7	5.0	70	N	
9/25/12	9:45 AM	1330								58.00	0.8	1.3	19.6	17.0	202			0.3	2.1	18.1	7.0	76		
10/4/12	11:20 AM	1315								58.00	0.7	1.2	18.9	15.0	350	N		0.3	2.2	17.1	7.0	200	N	
10/5/12	10:45 AM	1315								58.00	0.9	1.5	19.0	20.0	370	N		0.3	2.2	17.4	7.0	166	N	
10/9/12	12:00 PM	1315								60.00	0.7	1.5	19.5	16.0	360	N		0.3	2.4	17.4	6.0	133	N	
10/12/12	9:30 AM	1325								60.00	0.5	1.3	19.8	11.0	265	N		0.4	2.7	17.2	9.0	148	N	
10/16/12	10:30 AM	1340								60.00	0.2	1.1	19.9	6.0	154	N		0.3	2.8	16.6	8.0	148	N	
10/22/12	10:30 AM	1360								58.00	0.3	1.3	19.2	7.0	206	N		0.4	2.6	16.8	8.0	207	N	
10/29/12	11:15 AM	1345								60.00	0.2	1.7	18.7	7.0	267	N		0.3	2.4	17.5	8.0	242	N	
11/2/12	2:25 PM	1350								58.00	0.3	1.4	18.7	6.0	269	N		0.2	1.9	17.7	6.0	193	N	
11/9/12	1:50 PM	1310								60.00	0.2	1.4	18.5	4.0	225	N		0.1	3.0	16.0	1.0	94	N	
11/19/12	10:30 AM	1335								58.00	0.2	1.5	19.4	4.0	225	N		0.0	4.6	14.5	1.0	42	N	
11/29/12	1:00 PM	1350								58.00	0.2	1.4	19.3	4.0	95	N		0.1	3.5	16.9	2.0	43	N	
12/11/12	11:30 AM	1400								58.00	0.1	1.2	19.4	3.0	65	N		0.0	4.0	16.5	1.0	20	N	
12/14/12	10:40 AM	1420								58.00	0.1	1.3	19.3	3.0	60	N		0.0	4.1	16.7	1.0	23	N	
12/17/12	8:30 AM	1410								58.00	0.1	1.2	19.6	3.0	63	N		0.1	4.2	16.1	1.0	38	N	
12/27/12	9:15 AM	1420								58.00	0.0	1.0	19.9	1.0	35	N		0.0	3.4	17.1	1.0	26	N	
1/11/13	1:15 PM	1420								58.00	0.0	1.1	19.5	1.0	24	N		0.0	3.5	16.4	1.0	25	N	
1/14/13	9:15 AM																							System Shut Down

Notes:
CH_4 - methane
CO_2 - carbon dioxide
in-H_2O- inches of water
LEL - lower explosive limit
O_2 - oxygen
ppm - parts per million
scfm - standard cubic feet per minute

TABLE 4-7. 2012 HSVE INFLUENT AND EFFLUENT MONITORING SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

		July		August		September		October		November		December		January		Average		2012 Totals	
		Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
Benzene	$\mu g/m^3$	140	6	865	32	985	41	210	16.5	ND	9.7	ND	10.1	ND	ND	314	16		
Toluene	$\mu g/m^3$	270	ND	1200	29	2300	37	180	11.2	ND	5.9	ND	4.1	ND	ND	564	12		
Ethylbenzene	$\mu g/m^3$	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
m,p-Xylene	$\mu g/m^3$	46	ND	430	9.65	720	12.5	365	5.2	ND	ND	ND	ND	ND	ND	223	3.9		
o-Xylene	$\mu g/m^3$	ND	ND	ND	ND	ND	4.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6		
NMOC	$\mu g/m^3$	850,000	785	2,600,000	9,850	2,700,000	7,600	1,115,000	4,650	655,000	3,300	255,000	2,040	140,000	660	1,187,857	4,126		
Methane	%	0.22	0.0003	0.12	0.087	0.0285	0.040	0.0084	0.03200	0.0037	0.02850	0.0175	0.03450	0.0019	0.02400	0.057	0.035		
Flow Rate	cfm	1,320		1,292		1,330		1343		1343		1415		1420		1,352			
Organic	lbs/hr	12	0.014	16.7	3.1	14.5	1.5	5.9	1.2	3.4	1.0	2.0	1.3	0.8	0.92	7.9	1.3	--	--
Compound	lbs/day	287	0.33	402	73	347	35	142	28	82	25	48	32	20	22	190	31	--	--
	total lbs	5,604	6.4	11,246	2,053	9,724	982	4,398	873	2,467	749	1,426	932	255	286	--	--	35,120	5,881
	total tons	2.8	0.003	5.6	1.0	4.9	0.49	2.2	0.44	1.2	0.37	0.71	0.47	0.13	0.14	--	--	18	2.9

Notes:
NMOC - Non-methane organic carbon.
ND - Analyte not detected at laboratory detection limit
For purposes of calculating NMOC and Methane operational averages, the laboratory detection limit was used when the analyte was not detected (ND).

TABLE 5-1. SUMMARY OF GULF PARK BIOVENT SYSTEM RESPIROMETRY TESTING
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Vapor Well	Oxygen Depletion Rate (% per day)	Biodegradation Rate (mg/kg-day)
VP1-25S	0.108	0.09
VP1-25D	0.112	0.09
VP1-50S	0.251	0.20
VP2-25S	0.622	0.49
VP2-50S	0.616	0.49
VP4-25S	0.384	0.30
VP4-25D	0.368	0.29
VP6-35S	0.547	0.43
VP-9S	0.444	0.35
VP-9D	0.408	0.32
VP-10S	0.083	0.07
VP-10D	0.107	0.08
VP-11S	0.142	0.11
VP-11D	0.180	0.14
VP-12S	0.447	0.35
VP-12D	0.258	0.20
VP-13S	0.543	0.43
VP-14S	0.212	0.17

Notes:

% - percent

mg/kg - milligrams per kilogram

TABLE 5-2. GULF PARK GROUNDWATER ANALYTICAL RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID		Date Sampled	Benzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Chlorobenzene (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
GPW-1I		12/14/06	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
	Dup	12/14/06	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
		12/18/07	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
		6/23/08	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.010)	ND(0.0069)
		6/25/09	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	Dup	6/25/09	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		6/08/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072) J	ND(0.0069)
		7/13/11	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
		9/18/12	ND(0.00051)	ND(0.00068)	0.023	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
	Dup	9/18/12	ND(0.00051)	ND(0.00068)	0.022	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
GPW-1S		12/14/06	0.0009 J	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
		6/23/08	0.0010 J	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.010)	ND(0.0069)
		6/25/09	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		6/08/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072) J	ND(0.0069)
	Dup	6/08/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072) J	ND(0.0069)
		7/13/11	ND(0.00051)	ND(0.00068)	ND(0.00048)	0.0011	ND(0.00051)	ND(0.00024)	ND(0.0012)
		9/18/12	ND(0.00051) J	ND(0.00068) J	ND(0.00048) J	ND(0.00073) J	ND(0.00051) J	ND(0.00024)	ND(0.0012)
GPW-2I		12/18/06	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	0.016
		12/19/07	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
		6/23/08	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.010)	ND(0.0069)
		6/23/09	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		6/09/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	Dup	6/09/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		7/06/11	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
		9/20/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
GPW-2S		12/18/06	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	0.017
		12/19/07	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
		6/23/08	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.010)	ND(0.0069)
		6/23/09	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		6/08/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072) J	ND(0.0069)
		7/06/11	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
		9/18/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)

Location ID	Date Sampled	Benzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Chlorobenzene (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
GPW-3I	12/13/06	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
	12/20/07	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
	6/25/08	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.010)	ND(0.0069)
	6/25/09	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	6/10/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	7/06/11	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
	9/19/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
GPW-3S	12/13/06	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
	12/20/07	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
	6/25/08	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.010)	ND(0.0069)
Dup	6/25/08	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.010)	ND(0.0069)
	6/25/09	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	6/10/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	7/05/11	--	--	--	--	--	ND(0.00024)	ND(0.0012)
	7/06/11	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	--	--
	9/19/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
GPW-4S	12/14/06	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
	12/19/07	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
	6/25/08	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.010)	ND(0.0069)
	6/24/09	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072)	ND(0.0069)
Dup	6/24/09	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	6/08/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072) J	ND(0.0069)
	7/07/11	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
	9/20/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	0.0014	ND(0.00051)	ND(0.00024)	ND(0.0012)
Dup	9/20/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	0.0010	ND(0.00051)	ND(0.00024)	ND(0.0012)
GPW-5S	12/12/06	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
	12/21/07	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
	6/25/08	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.010)	ND(0.0069)
	6/24/09	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072)	ND(0.0069)
	6/08/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072) J	ND(0.0069)
	7/07/11	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
	9/19/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)

TABLE 5-2. GULF PARK GROUNDWATER ANALYTICAL RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID		Date Sampled	Benzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Chlorobenzene (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
TH-1I		12/15/06	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
		12/20/07	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
		6/26/08	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.010)	ND(0.0069)
		6/23/09	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072)	ND(0.0069)
		6/10/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0098)	ND(0.0069)
		7/07/11	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
		9/20/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
TH-1S		12/15/06	0.022	0.29	0.0080	0.28	ND(0.00080)	--	ND(0.0069)
		4/09/07	0.061	0.62	0.028	1.0	ND(0.0020)	--	0.018
		12/20/07	0.012	0.048	0.0020	0.012	ND(0.00080)	--	ND(0.0069)
	Dup	12/20/07	0.012	0.045	0.0020	0.011	ND(0.00080)	--	--
		6/26/08	0.074	1.0	0.045	1.6	ND(0.00080)	0.012	ND(0.0069)
		6/23/09	0.027	0.40	0.015	0.32	ND(0.00080)	ND(0.0072)	ND(0.0069)
		6/10/10	0.023	0.44	0.015	0.41	ND(0.00080)	ND(0.0098)	ND(0.0069)
		7/07/11	0.054	1.1	0.034	0.84	ND(0.00051)	ND(0.00024)	ND(0.0012)
	Dup	7/07/11	0.056	1.1	0.035	0.83	ND(0.00051)	ND(0.00024)	ND(0.0012)
		9/20/12	0.0033	0.015	0.0012	0.0062	ND(0.00051)	0.0078	ND(0.0012)
TH-2		12/12/06	0.0030 J	0.16	0.029	0.21	ND(0.00080)	--	ND(0.0069)
		4/09/07	0.0040 J	0.15	0.019	0.44	ND(0.00080)	--	0.014 J
		12/18/07	0.012	0.0020	0.0050	0.046	ND(0.00080)	--	ND(0.0069)
		6/26/08	0.0030 J	0.30	0.021	0.89	ND(0.00080)	ND(0.010)	ND(0.0069)
		6/24/09	0.021	0.066	0.012	0.34	ND(0.00080)	0.013 J	ND(0.0069)
	Dup	6/24/09	--	--	--	--	--	0.013 J	ND(0.0069)
		6/08/10	0.0020 J	0.043	0.010	0.33	ND(0.00080)	0.0080 J	ND(0.0069)
		7/13/11	ND(0.00051)	0.53	0.021	1.9	ND(0.00051)	ND(0.00024)	ND(0.0012)
		9/19/12	0.024	0.0016	0.0030	0.0074	ND(0.00051)	ND(0.00024)	ND(0.0012)
TH-3		12/12/06	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
		12/21/07	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	--	ND(0.0069)
		6/27/08	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.010)	ND(0.0069)
		6/23/09	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072)	ND(0.0069)

TABLE 5-2. GULF PARK GROUNDWATER ANALYTICAL RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Benzene (mg/L)	Ethylbenzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Chlorobenzene (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
TH-3	6/08/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0072) J	ND(0.0069)
	7/07/11	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
	9/18/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)

Notes:

The method detection limit was used as the reporting limit.

-- - Not analyzed

Dup - Duplicate sample

J - Estimated concentration

JB - Estimated concentration due to detection of analyte within the method blank.

mg/L - milligram per liter

ND - Not detected at the indicated laboratory reporting limit or the method detection limit.

TABLE 5-3. GULF PARK DISSOLVED PHASE MONITORED NATURAL ATTENUATION ANALYTICAL RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Oxygen Demand (mg/L)	Methane (mg/L)	Nitrogen (mg/L)	Nitrogen, Ammonia (mg/L)	Nitrogen, Nitrate (mg/L)	Nitrogen, Nitrite (mg/L)	Sulfate (mg/L)	Total Sulfide (mg/L)	Total Organic Carbon (mg/L)	Iron, Total (mg/L)	Iron, Ferrous Total (mg/L)	Iron, Ferric Total (mg/L)	Manganese, Dissolved (mg/L)	Manganese, Total (mg/L)
GPW-1I	4/28/98	ND	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/02	--	--	--	--	--	--	--	--	--	--	--	--	0.0048	--
	11/21/03	--	--	--	--	--	--	--	--	--	--	1.0	--	--	--
	11/17/04	ND(2.1)	ND(0.0020)	--	--	1.6	0.016	49	ND(0.022)	1.8	ND(0.050)	ND(0.0080)	ND(0.050)	0.0017	0.0025
	11/17/05	2.4	0.030	--	ND(0.11)	1.4	0.021	51	ND(0.022)	1.2	ND(0.038)	ND(0.0080)	ND(0.038)	0.0045	0.0032
	12/14/06	ND(2.6)	0.030	ND(0.50)	ND(0.20)	1.1	ND(0.015)	49	ND(0.054)	ND(1.0)	0.12 J	0.060 J	0.063 J	--	0.0068
	12/18/07	ND(13)	0.0028	ND(0.50)	ND(0.20)	1.1	ND(0.015)	46	ND(0.054)	ND(1.0)	0.20	0.15	ND(0.052)	0.0076	0.012
GPW-1S	4/25/95	41	--	--	--	3.0	--	60	--	--	4.9	--	--	0.39	0.48
	2/22/96	ND	--	--	--	0.020	--	6.0	--	--	13	--	--	0.64	0.60
	10/30/96	55	--	--	--	ND	--	ND	--	--	32	--	--	0.63	1.00
	5/06/97	--	--	--	--	2.7	--	48	--	--	1.2	--	--	0.34	0.34
	11/13/97	--	--	--	--	0.020	--	ND	--	--	15	--	--	0.48	0.54
	4/29/98	ND	--	--	--	0.75	--	34	--	--	12	--	--	0.56	0.59
	11/03/98	--	--	--	--	ND	--	8.8	--	--	12	--	--	0.50	0.46
	4/21/99	--	--	--	--	0.11	--	61	--	--	10	--	--	0.58	0.60
	11/04/99	--	--	--	--	ND	--	18	--	--	11	--	--	0.49	0.50
	4/26/00	--	--	--	--	0.60	--	29	--	--	0.25	--	--	1.1	1.1
	4/26/00	--	--	--	--	ND	--	150	--	--	7.0	--	--	0.86	0.90
	11/15/01	--	--	--	--	ND	--	18	--	--	3.7	--	--	0.85	0.92
	5/22/02	--	--	--	--	ND	--	ND	--	--	4.1	--	--	0.89	0.94
	11/19/02	--	--	--	--	ND	0.0088	60	--	--	5.9	--	--	1.0	0.97
	11/21/03	--	--	--	--	--	--	--	--	--	--	10	--	--	--
	11/17/04	12	1.8	--	--	ND(0.040)	ND(0.015)	1.8	ND(0.022)	4.9	13	14	ND(0.40)	0.76	1.0
	11/17/05	4.0	0.11	--	ND(0.11)	3.2	ND(0.015)	40	ND(0.022)	2.4	0.051	0.046	ND(0.038)	0.40	0.43
	12/14/06	9.8	0.25	ND(0.50)	0.32 J	ND(0.040)	ND(0.015)	32	ND(0.054)	2.9	4.0	4.1	ND(0.16)	--	0.68
	6/25/09	ND(13)	0.24	--	0.72	ND(0.040)	ND(0.015)	10 J	--	2.4	1.3	1.2 J	0.13 J	0.53	0.53
	6/08/10	--	0.30	--	ND(0.40)	ND(0.040)	ND(0.015)	4.6 J	ND(0.054)	2.7	2.3	2.2 J	0.11 J	0.61	0.61
	7/13/11	5.0	0.25	--	--	ND(0.0045)	ND(0.0061)	26	ND(0.78)	3.4	--	1.5	ND(0.00097)	0.47	0.48
	9/18/12	ND(5.0)	0.48 J	--	--	ND(0.0045)	ND(0.0061)	ND(0.020)	70	2.0	--	4.0	0.34	0.52	0.54
GPW-2I	4/29/98	ND	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/02	--	--	--	--	--	--	--	--	--	--	--	--	ND	--
	11/19/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/04	3.2	ND(0.0020)	--	--	5.4	ND(0.015)	42	ND(0.022)	2.3	ND(0.050)	0.012	ND(0.050)	0.015	0.0016
	11/16/05	8.3	0.067	--	ND(0.11)	2.1	ND(0.015)	42	ND(0.022)	1.5	ND(0.038)	0.012	ND(0.038)	ND(0.00096)	0.0032
	12/18/06	17	0.0049 J	ND(0.50) UJ	ND(0.20)	5.4	ND(0.015)	48	ND(0.054)	1.2 J	ND(0.052)	ND(0.0080)	ND(0.052)	--	0.0011 J
	12/19/07	16	ND(0.0020)	ND(0.50)	ND(0.20)	4.4	ND(0.015)	47	ND(0.054)	ND(1.0)	ND(0.052)	0.065	ND(0.052)	0.0033	0.0042
GPW-2S	4/25/95	27	--	--	--	0.95	--	50	--	--	3.6	--	--	0.55	0.59
	2/22/96	ND	--	--	--	1.4	--	41	--	--	24	--	--	1.0	1.1
	10/30/96	21	--	--	--	0.060	--	21	--	--	12	--	--	0.67	0.78
	5/06/97	--	--	--	--	2.0	--	75	--	--	0.70	--	--	0.66	0.75
	11/14/97	--	--	--	--	0.030	--	4.0	--	--	11	--	--	0.77	0.81
	4/29/98	ND	--	--	--	0.017	--	35	--	--	2.3	--	--	0.98	1.0
	11/02/98	--	--	--	--	0.041	--	50	--	--	4.8	--	--	0.81	0.81

TABLE 5-3. GULF PARK DISSOLVED PHASE MONITORED NATURAL ATTENUATION ANALYTICAL RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Oxygen Demand (mg/L)	Methane (mg/L)	Nitrogen (mg/L)	Nitrogen, Ammonia (mg/L)	Nitrogen, Nitrate (mg/L)	Nitrogen, Nitrite (mg/L)	Sulfate (mg/L)	Total Sulfide (mg/L)	Total Organic Carbon (mg/L)	Iron, Total (mg/L)	Iron, Ferrous Total (mg/L)	Iron, Ferric Total (mg/L)	Manganese, Dissolved (mg/L)	Manganese, Total (mg/L)
GPW-2S	4/20/99	--	--	--	--	2.3	--	58	--	--	0.74	--	--	0.71	0.67
	11/04/99	--	--	--	--	0.090	--	41	--	--	6.4	--	--	0.84	0.95
	11/15/01	--	--	--	--	0.20	--	17	--	--	0.78	--	--	1.1	1.0
	5/22/02	--	--	--	--	1.2	--	37	--	--	0.12	--	--	1.0	1.1
	11/19/02	--	--	--	--	1.6	0.030	41	--	--	0.99	--	--	1.00	1.1
	11/19/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/04	20	0.23	--	--	0.98	ND(0.015)	32	ND(0.022)	2.6	16	2.0	14	0.90	1.2
	11/16/05	ND(2.1)	0.0046	--	ND(0.11)	2.6	0.034	36	ND(0.022)	1.8	0.52	0.59	ND(0.038)	0.92	0.94
	12/18/06	3.2 J	0.0027 J	ND(0.50) UJ	ND(0.20)	1.9	ND(0.015)	45	ND(0.054)	1.3 J	0.20	0.031 J	0.17 J	--	0.93
	12/19/07	ND(13)	ND(0.0020)	ND(0.50)	ND(0.20)	5.2	ND(0.015)	54	ND(0.054)	1.5	ND(0.052)	ND(0.0080)	ND(0.052)	0.012	0.030
	6/23/09	15 J	0.078	--	ND(0.20)	1.4	ND(0.015)	34 J	--	4.1	0.053 J	0.026 J	ND(0.052)	0.51	0.56
	6/08/10	--	0.26	--	ND(0.20)	0.90	ND(0.015)	34	ND(0.054)	1.2	0.59	0.056 J	0.53	0.55	0.84
	7/06/11	ND(5.0)	ND(0.00083)	--	--	2.3	ND(0.0061)	43	ND(0.78)	0.81	--	ND(0.00097)	ND(0.00097)	0.81	1.1
	9/18/12	ND(5.0)	ND(0.00083) UJ	--	--	2.3	ND(0.0061)	34	52	1.5	--	ND(0.00097)	ND(0.00097)	0.22	0.69
GPW-3I	4/24/95	14	--	--	--	3.2	--	56	--	--	1.8	--	--	0.011	0.048
	2/21/96	ND	--	--	--	4.5	--	50	--	--	7.8	--	--	ND	0.12
	10/28/96	13	--	--	--	4.4	--	56	--	--	0.14	--	--	ND	0.0070
	5/05/97	--	--	--	--	3.6	--	44	--	--	0.88	--	--	ND	0.019
	11/13/97	--	--	--	--	4.5	--	15	--	--	ND	--	--	ND	0.0050
	4/28/98	ND	--	--	--	5.3	--	31	--	--	0.65	--	--	ND	0.014
	11/03/98	--	--	--	--	5.9	--	61	--	--	0.51	--	--	ND	0.011
	4/21/99	--	--	--	--	3.1	--	45	--	--	0.68	--	--	ND	0.012
	11/04/99	--	--	--	--	5.2	--	44	--	--	0.26	--	--	ND	0.0086
	4/25/00	--	--	--	--	5.5	--	65	--	--	4.1	--	--	0.011	0.062
	11/14/01	--	--	--	--	1.3	--	31	--	--	--	--	--	--	--
	5/21/02	--	--	--	--	--	--	--	--	--	--	--	--	0.00066	--
	11/21/03	--	--	--	--	--	--	--	--	--	--	4.0	--	--	--
	11/18/04	ND(2.1)	ND(0.0020)	--	--	3.6	ND(0.015)	46	ND(0.022)	1.8	ND(0.050)	ND(0.0080)	ND(0.050)	0.0042	0.0015
	11/17/05	ND(2.1)	0.026	--	ND(0.11)	3.1	ND(0.015)	44	ND(0.022)	1.4	ND(0.038)	ND(0.0080)	ND(0.038)	ND(0.00096)	ND(0.00096)
	12/13/06	3.1 J	0.024	ND(0.50)	ND(0.20)	2.4	ND(0.015)	44	ND(0.054)	ND(1.0)	ND(0.052)	0.018 J	ND(0.052)	--	0.0013 J
	12/20/07	ND(13)	ND(0.0020)	ND(0.50)	ND(0.20)	2.2	ND(0.015)	44	ND(0.054)	ND(1.0)	ND(0.052)	ND(0.0080)	ND(0.052)	ND(0.00084)	ND(0.00084)
GPW-3S	4/24/95	73	--	--	--	0.060	--	56	--	--	13	--	--	1.1	1.6
	2/21/96	19	--	--	--	0.10	--	48	--	--	33	--	--	0.53	1.1
	10/29/96	ND	--	--	--	0.99	--	64	--	--	2.3	--	--	0.86	1.0
	5/05/97	--	--	--	--	0.020	--	44	--	--	11	--	--	1.1	1.2
	11/13/97	--	--	--	--	0.13	--	22	--	--	3.0	--	--	0.96	1.1
	4/28/98	22	--	--	--	18	--	63	--	--	0.70	--	--	0.72	0.33
	11/03/98	--	--	--	--	0.45	--	68	--	--	2.8	--	--	0.89	0.90
	4/21/99	--	--	--	--	0.87	--	110	--	--	1.5	--	--	1.2	1.2
	11/04/99	--	--	--	--	0.20	--	380	--	--	13	--	--	3.3	3.5
	4/25/00	--	--	--	--	6.9	--	81	--	--	3.8	--	--	1.1	1.0
	11/14/01	--	--	--	--	1.5	--	40	--	--	0.87	--	--	0.54	0.55
	5/20/02	--	--	--	--	6.2	--	39	--	--	0.36	--	--	0.27	0.29

TABLE 5-3. GULF PARK DISSOLVED PHASE MONITORED NATURAL ATTENUATION ANALYTICAL RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Oxygen Demand (mg/L)	Methane (mg/L)	Nitrogen (mg/L)	Nitrogen, Ammonia (mg/L)	Nitrogen, Nitrate (mg/L)	Nitrogen, Nitrite (mg/L)	Sulfate (mg/L)	Total Sulfide (mg/L)	Total Organic Carbon (mg/L)	Iron, Total (mg/L)	Iron, Ferrous Total (mg/L)	Iron, Ferric Total (mg/L)	Manganese, Dissolved (mg/L)	Manganese, Total (mg/L)
GPW-3S	11/19/02	--	--	--	--	1.4	0.020	40	--	--	0.67	--	--	0.96	0.96
	11/21/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/18/04	ND(2.1)	0.023	--	--	0.66	0.019	37	ND(0.022)	1.9	0.24	0.20	ND(0.050)	0.91	0.91
.	11/17/05	5.1	0.039	--	ND(0.11)	1.8	ND(0.015)	30	ND(0.022)	2.2	0.36	0.30	0.064	0.19	0.21
	12/13/06	3.5 J	0.045	ND(0.50)	ND(0.20)	7.1	ND(0.015)	37	ND(0.054)	1.2 J	ND(0.052)	0.076 J	ND(0.052)	--	0.36
	12/20/07	46	0.050	ND(0.50)	ND(0.20)	1.0	ND(0.015)	51	ND(0.054)	1.5	ND(0.052)	ND(0.0080)	ND(0.052)	0.20	0.26
	6/25/09	ND(13)	0.035	--	ND(0.20)	0.66	ND(0.015)	30 J	--	1.0	0.36	0.30 J	0.053 J	0.49	0.49
	6/10/10	--	0.021	--	ND(0.40)	0.24	ND(0.015)	29	ND(0.054)	1.0	0.22	0.20 J	ND(0.052)	0.36	0.37
	7/05/11	ND(5.0)	0.032	--	--	3.1	ND(0.0061)	ND(0.020)	ND(0.78)	0.74	--	ND(0.00097)	0.37	0.36	0.47
	9/19/12	ND(5.0)	0.040	--	--	ND(0.0045)	ND(0.0061)	28	55	1.2	--	0.57	ND(0.00097)	0.89	0.85
GPW-4S	10/29/96	49	--	--	--	ND	--	29	--	--	11	--	--	0.72	1.6
	5/06/97	--	--	--	--	1.0	--	66	--	--	5.3	--	--	0.46	0.52
	11/13/97	--	--	--	--	0.020	--	6.0	--	--	11	--	--	0.50	0.87
	4/28/98	ND	--	--	--	5.1	--	39	--	--	0.71	--	--	0.18	0.18
	11/03/98	--	--	--	--	ND	--	20	--	--	7.7	--	--	0.45	0.58
	4/20/99	--	--	--	--	0.039	--	110	--	--	6.3	--	--	0.72	0.84
	11/04/99	--	--	--	--	0.049	--	14	--	--	7.8	--	--	0.38	0.49
	4/26/00	--	--	--	--	2.1	--	96	--	--	1.4	--	--	0.47	0.34
	11/15/01	--	--	--	--	0.24	--	12	--	--	5.0	--	--	0.55	0.56
	5/20/02	--	--	--	--	3.7	--	21	--	--	0.87	--	--	0.22	0.23
	11/18/02	--	--	--	--	0.38	0.0088	6.3	--	--	3.4	--	--	0.65	0.65
	11/20/03	--	--	--	--	--	--	--	--	--	--	6.0	--	--	--
	11/17/04	6.8	2.3	--	--	ND(0.040)	ND(0.015)	6.6	0.031	2.7	5.3	4.7	0.53	0.71	0.70
	11/17/05	6.3	2.1	--	ND(0.11)	ND(0.040)	ND(0.015)	5.0	ND(0.022)	2.6	5.6	5.2	0.48	0.83	0.87
	12/14/06	5.1 J	1.5	ND(0.50)	ND(0.20)	2.0	ND(0.015)	30	ND(0.054)	1.6 J	0.57	0.57	ND(0.052)	--	0.39
	12/19/07	ND(13)	0.76	ND(0.50)	ND(0.20)	3.4	0.021	37	ND(0.054)	1.0	0.090	0.12	ND(0.052)	0.095	0.10
	6/24/09	15 J	2.5	--	0.27 J	0.078 J	ND(0.015)	9.4	--	1.3	0.80	0.78 J	ND(0.052)	0.53	0.54
	6/08/10	--	0.39	--	0.30 J	ND(0.040)	ND(0.015)	16	ND(0.054)	1.3	3.5	3.6 J	ND(0.20)	0.75	0.75
	7/07/11	ND(5.0)	0.91	--	--	4.9	ND(0.0061)	23	ND(0.78)	1.2	--	ND(0.00097)	ND(0.00097)	0.17	0.17
	9/20/12	5.2	0.84	--	--	ND(0.0045)	ND(0.0061)	16	75	1.8	--	0.72	ND(0.00097)	0.31	0.31
GPW-5S	2/21/96	16	--	--	--	ND	--	43	--	--	78	--	--	0.78	2.8
	10/29/96	57	--	--	--	0.030	--	270	--	--	5.9	--	--	0.79	1.9
	5/05/97	--	--	--	--	0.19	--	52	--	--	2.3	--	--	1.1	1.1
	11/13/97	--	--	--	--	0.030	--	78	--	--	1.9	--	--	0.98	1.2
	4/28/98	ND	--	--	--	6.9	--	94	--	--	0.059	--	--	0.16	0.065
	11/03/98	--	--	--	--	0.15	--	180	--	--	0.49	--	--	1.2	1.3
	4/20/99	--	--	--	--	0.14	--	78	--	--	1.2	--	--	1.5	1.2
	11/04/99	--	--	--	--	0.022	--	16	--	--	1.9	--	--	1.6	2.1
	4/25/00	--	--	--	--	0.38	--	200	--	--	1.1	--	--	1.7	1.6
	11/15/01	--	--	--	--	0.68	--	27	--	--	0.44	--	--	0.96	1.0
	5/20/02	--	--	--	--	0.62	--	39	--	--	1.2	--	--	0.99	1.0
	11/18/02	--	--	--	--	0.070	ND	14	--	--	0.74	--	--	0.83	0.83
	11/20/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/04	4.0	0.047	--	--	0.087	ND(0.015)	14	0.58	2.5	0.32	0.36	ND(0.050)	0.79	0.79

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SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Oxygen Demand (mg/L)	Methane (mg/L)	Nitrogen (mg/L)	Nitrogen, Ammonia (mg/L)	Nitrogen, Nitrate (mg/L)	Nitrogen, Nitrite (mg/L)	Sulfate (mg/L)	Total Sulfide (mg/L)	Total Organic Carbon (mg/L)	Iron, Total (mg/L)	Iron, Ferrous Total (mg/L)	Iron, Ferric Total (mg/L)	Manganese, Dissolved (mg/L)	Manganese, Total (mg/L)
GPW-5S	11/16/05	5.5	0.22	--	ND(0.11)	ND(0.040)	ND(0.015)	8.8	0.039	2.5	0.72	0.73	ND(0.038)	0.69	0.76
	12/12/06	2.8 J	0.0043 J	ND(0.50) UJ	ND(0.20)	0.58	ND(0.015)	52 J	0.14 J	1.3 J	--	0.11	--	--	--
	12/21/07	ND(13)	ND(0.0020)	ND(0.50) UJ	ND(0.20)	4.2	ND(0.015)	92	ND(0.054)	ND(1.0)	ND(0.052)	ND(0.0080)	ND(0.052)	ND(0.00084)	ND(0.00084)
	6/24/09	20 J	0.011 J	--	0.21 J	0.44	ND(0.015)	30	--	1.0	0.17 J	0.15 J	ND(0.052)	0.45	0.47
	6/08/10	--	0.0079 J	--	ND(0.20)	0.041 J	ND(0.015)	32	0.077 J	1.1	0.19 J	0.21 J	ND(0.052)	0.75	0.76
	7/07/11	ND(5.0)	ND(0.00083)	--	--	3.0	ND(0.0061)	52	ND(0.78)	1.0	--	ND(0.00097)	ND(0.00097)	0.51	0.52
	9/19/12	ND(5.0)	0.027	--	--	ND(0.0045)	ND(0.0061)	39	2.3	1.3	--	ND(0.00097)	ND(0.00097)	0.61	0.62
TH-1I	4/28/98	ND	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/21/02	--	--	--	--	--	--	--	--	--	--	--	--	0.00071	--
	11/20/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/04	ND(2.1)	ND(0.0020)	--	--	3.9	ND(0.015)	46	0.035	2.0	ND(0.050)	ND(0.0080)	ND(0.050)	ND(0.00084)	ND(0.00084)
	11/17/05	ND(2.1)	ND(0.0020)	--	ND(0.11)	3.6	ND(0.015)	47	ND(0.022)	1.2	ND(0.038)	ND(0.0080)	ND(0.038)	ND(0.00096)	ND(0.00096)
	12/15/06	4.4 J	ND(0.0020)	ND(0.50)	ND(0.20) UJ	4.0	ND(0.015) R	50	ND(0.054)	1.0 J	ND(0.052)	ND(0.0080)	ND(0.052)	--	ND(0.00036)
	12/20/07	ND(13)	ND(0.0020)	ND(0.50)	ND(0.20)	4.3	ND(0.015)	49	ND(0.054)	ND(1.0)	ND(0.052)	0.0095	ND(0.052)	ND(0.00084)	ND(0.00084)
TH-1S	4/24/95	75	--	--	--	ND	--	3.0	--	--	6.8	--	--	0.46	0.48
	2/22/96	ND	--	--	--	0.010	--	65	--	--	16	--	--	0.43	0.50
	10/29/96	23	--	--	--	ND	--	2.1	--	--	2.7	--	--	0.43	0.48
	5/06/97	--	--	--	--	0.090	--	16	--	--	5.6	--	--	0.38	0.41
	11/14/97	--	--	--	--	0.020	--	4.0	--	--	1.9	--	--	0.44	0.51
	4/29/98	ND	--	--	--	0.024	--	12	--	--	20	--	--	0.66	0.69
	4/20/99	--	--	--	--	ND	--	11	--	--	5.4	--	--	0.51	0.50
	11/04/99	--	--	--	--	ND	--	9.8	--	--	2.0	--	--	0.58	0.63
	4/26/00	--	--	--	--	ND	--	25	--	--	17	--	--	0.71	0.75
	11/14/01	--	--	--	--	ND	--	7.4	--	--	13	--	--	0.72	0.76
	5/21/02	--	--	--	--	ND	--	30	--	--	10	--	--	0.63	0.69
	11/19/02	--	--	--	--	ND	0.0088	ND	--	--	26	--	--	0.93	0.97
	11/20/03	--	--	--	--	--	--	--	--	--	--	9.0	--	--	--
	11/17/04	6.4	0.26	--	--	ND(0.040)	ND(0.015)	13	0.13	2.5	2.8	2.8	ND(0.050)	0.44	0.45
	11/17/05	4.8	0.39	--	0.24	ND(0.040)	ND(0.015)	15	0.089	2.2	1.7	1.8	ND(0.040)	0.50	0.52
	12/15/06	19	0.43	0.76 J	0.46 J	ND(0.040)	ND(0.015) R	35	0.083 J	4.7	11	12	ND(0.40)	--	0.63
	12/20/07	26	0.55	ND(0.50)	ND(0.20)	ND(0.040)	ND(0.015)	240	0.16	3.8	6.3	6.4	ND(0.20)	1.2	1.3
	6/23/09	41 J	0.54	--	ND(0.20)	ND(0.040)	0.052	14 J	--	3.6	21	22 J	ND(1.0)	0.54	0.56
	6/10/10	--	1.2	--	0.78 J	ND(0.040)	ND(0.015)	17	0.12 J	2.9	24	23 J	1.0 J	0.55	0.56
	7/07/11	58	3.9	--	--	ND(0.0045)	ND(0.0061)	7.1	ND(0.78)	5.6	--	45	ND(0.00097)	0.76	0.75
	9/20/12	44	0.35	--	--	ND(0.0045)	ND(0.0061)	280	56	16	--	5.9	0.32	1.1	1.1
TH-2	4/25/95	100	--	--	--	0.040	--	8.0	--	--	31	--	--	0.64	1.2
	2/22/96	41	--	--	--	0.010	--	5.0	--	--	22	--	--	0.39	0.74
	10/30/96	64	--	--	--	0.030	--	ND	--	--	33	--	--	0.34	1.4
	5/06/97	--	--	--	--	0.030	--	16	--	--	33	--	--	0.65	0.85
	11/14/97	--	--	--	--	0.080	--	ND	--	--	16	--	--	0.36	0.51
	4/29/98	ND	--	--	--	0.028	--	7.5	--	--	14	--	--	0.45	0.46
	11/02/98	--	--	--	--	ND	--	14	--	--	18	--	--	0.42	0.49
	4/20/99	--	--	--	--	ND	--	4.1	--	--	19	--	--	0.50	0.52

TABLE 5-3. GULF PARK DISSOLVED PHASE MONITORED NATURAL ATTENUATION ANALYTICAL RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Oxygen Demand (mg/L)	Methane (mg/L)	Nitrogen (mg/L)	Nitrogen, Ammonia (mg/L)	Nitrogen, Nitrate (mg/L)	Nitrogen, Nitrite (mg/L)	Sulfate (mg/L)	Total Sulfide (mg/L)	Total Organic Carbon (mg/L)	Iron, Total (mg/L)	Iron, Ferrous Total (mg/L)	Iron, Ferric Total (mg/L)	Manganese, Dissolved (mg/L)	Manganese, Total (mg/L)
TH-2	11/04/99	--	--	--	--	0.024	--	7.4	--	--	18	--	--	0.38	0.63
	4/26/00	--	--	--	--	0.057	--	7.0	--	--	18	--	--	0.48	0.49
	11/14/01	--	--	--	--	ND	--	ND	--	--	15	--	--	0.41	0.46
	5/21/02	--	--	--	--	ND	--	ND	--	--	10	--	--	0.31	0.34
	11/19/02	--	--	--	--	ND	0.0088	ND	--	--	20	--	--	0.78	0.89
	11/20/03	--	--	--	--	--	--	--	--	--	--	10	--	--	--
	11/17/04	81	8.6	--	--	ND(0.040)	ND(0.015)	18	0.26	22	19	19	ND(0.40)	1.5	1.0
	11/16/05	16	1.1	--	0.71	ND(0.040)	ND(0.015)	ND(1.5)	0.060	3.8	9.3	10	ND(0.20)	0.35	0.37
	12/12/06	24	13	ND(0.50) UJ	ND(0.20)	ND(0.040)	ND(0.015)	13 J	ND(0.054)	4.5	9.1	9.3	ND(0.20)	--	0.32
	12/18/07	39	6.5	1.2	ND(0.20)	7.0	0.097	300	ND(0.054)	12	0.32	0.20	0.12	1.2	1.2
	6/24/09	38 J	7.7	--	0.72	ND(0.040)	ND(0.015)	80	--	6.2	5.5	5.5 J	ND(0.25)	0.83	0.85
	6/08/10	--	7.1	--	0.34 J	ND(0.040)	ND(0.015)	ND(1.5)	0.066 J	2.5	3.7	3.7 J	ND(0.20)	0.26	0.26
	7/13/11	18	4.1	--	--	ND(0.0045)	ND(0.0061)	3.9	ND(0.78)	3.7	--	2.1	ND(0.00097)	0.27	0.27
	9/19/12	23	2.5	--	--	ND(0.0045)	ND(0.0061)	190	56	8.0	--	3.1	ND(0.00097)	1.2	1.2
TH-3	4/24/95	86	--	--	--	5.1	--	62	--	--	7.0	--	--	ND	0.32
	2/21/96	ND	--	--	--	6.8	--	55	--	--	23	--	--	0.017	0.84
	10/30/96	17	--	--	--	4.4	--	44	--	--	4.2	--	--	0.046	0.32
	5/05/97	--	--	--	--	5.3	--	63	--	--	8.3	--	--	0.11	0.18
	11/13/97	--	--	--	--	8.1	--	11	--	--	0.36	--	--	0.10	0.17
	4/28/98	ND	--	--	--	0.45	--	25	--	--	1.7	--	--	0.00050	0.034
	11/02/98	--	--	--	--	4.4	--	46	--	--	0.18	--	--	0.11	0.14
	4/20/99	--	--	--	--	4.3	--	42	--	--	1.5	--	--	0.0034	0.042
	11/04/99	--	--	--	--	3.0	--	46	--	--	0.12	--	--	0.017	0.034
	4/25/00	--	--	--	--	9.0	--	41	--	--	4.3	--	--	0.023	0.084
	11/14/01	--	--	--	--	3.8	--	34	--	--	0.19	--	--	0.0055	0.0059
	5/21/02	--	--	--	--	2.7	--	38	--	--	0.10	--	--	0.022	0.022
	11/18/02	--	--	--	--	4.0	ND	42	--	--	0.12	--	--	0.0027	0.0036
	11/19/03	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/18/04	5.2	ND(0.0020)	--	--	4.2	ND(0.015)	41	ND(0.022)	2.7	2.0	0.20	1.8	0.035	0.058
	11/17/05	2.4	ND(0.0020)	--	0.24	2.3	ND(0.015)	38	ND(0.022)	1.9	ND(0.038)	0.015	ND(0.038)	0.0036	0.0018
	12/12/06	5.9 J	0.0063	ND(0.50) UJ	ND(0.20)	2.1	0.018 J	150 J	ND(0.054)	2.5	0.15 J	0.021 J	0.13 J	--	0.0048 J
	12/21/07	ND(13)	ND(0.0020)	ND(0.50) UJ	ND(0.20)	1.4	ND(0.015)	36	ND(0.054)	1.3	0.068	0.019	ND(0.052)	0.0068	0.022
	6/23/09	15 J	ND(0.0050)	--	ND(0.20)	2.8	ND(0.015)	34 J	--	1.4	0.50	0.075 J	0.43	0.0043 J	0.0082
	6/08/10	--	ND(0.0050)	--	ND(0.20)	1.7	ND(0.015)	34	ND(0.054)	1.1	0.062 J	0.064 J	ND(0.010)	0.0047 J	0.0080
	7/07/11	ND(5.0)	ND(0.00083)	--	--	5.1	ND(0.0061)	48	ND(0.78)	1.4	--	ND(0.00097)	ND(0.00097)	ND(0.00023)	ND(0.00023)
	9/18/12	5.2	ND(0.00083) UJ	--	--	1.8	ND(0.0061)	24	3.2	1.2	--	ND(0.00097)	ND(0.00097)	ND(0.00023)	ND(0.00023)

Notes:
The method detection limit was used as the reporting limit.
-- - Not analyzed
J - Estimated concentration
UJ - Estimated reporting limit
mg/L - milligram per liter
ND - Not detected at the indicated laboratory reporting limit or the method detection limit.
U* - The first result represents the laboratory reported concentration. The second result was evaluated to be undetected at the reported concentration during validation due to detection of the analyte within the method blank.

TABLE 5-4. GULF PARK BARRIER WALL GROUNDWATER ANALYTICAL RESULTS SUMMARY
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

Location ID	Date Sampled	Benzene (mg/L)	Ethyl-benzene (mg/L)	Toluene (mg/L)	Xylenes, Total (mg/L)	Chlorobenzene (mg/L)	Arsenic, Dissolved (mg/L)	Lead, Dissolved (mg/L)
GPBW-1	6/10/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	7/13/11	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
	9/19/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
GPBW-2	6/09/10	ND(0.00050)	ND(0.00080)	ND(0.0007)	ND(0.00080)	ND(0.00080)	ND(0.0098)	ND(0.0069)
	7/05/11	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
	9/19/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
GPBW-3	9/18/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)
GPBW-4	9/18/12	ND(0.00051)	ND(0.00068)	ND(0.00048)	ND(0.00073)	ND(0.00051)	ND(0.00024)	ND(0.0012)

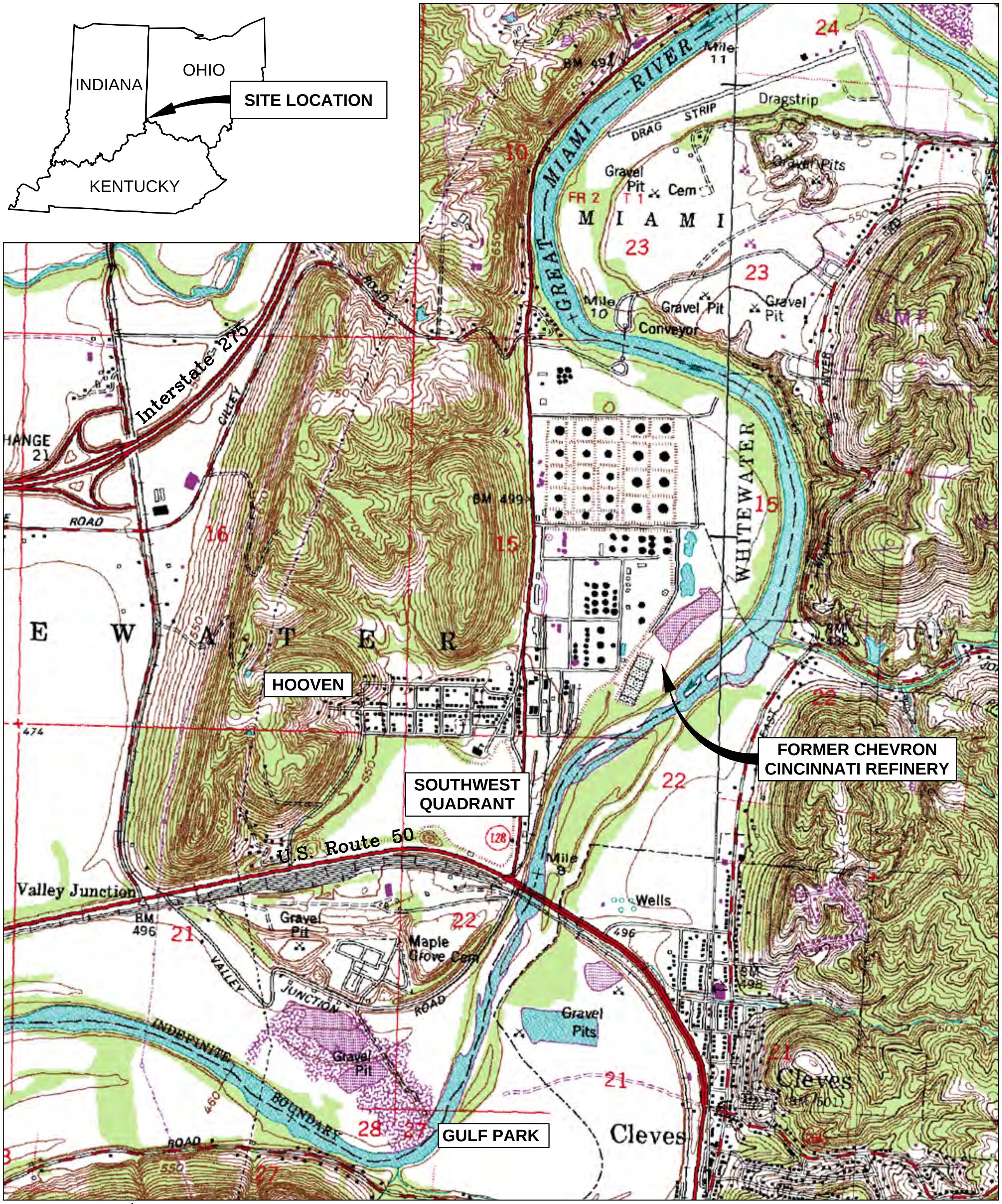
Notes:

The method detection limit was used as the reporting limit.

mg/L - milligram per liter

ND - Not detected at the indicated laboratory reporting limit or the method detection limit.

FIGURES



Basemap: U.S.G.S 7.5' Quadrangles, Hooven and Addyston, Ohio, 1996

N

0 2,000'

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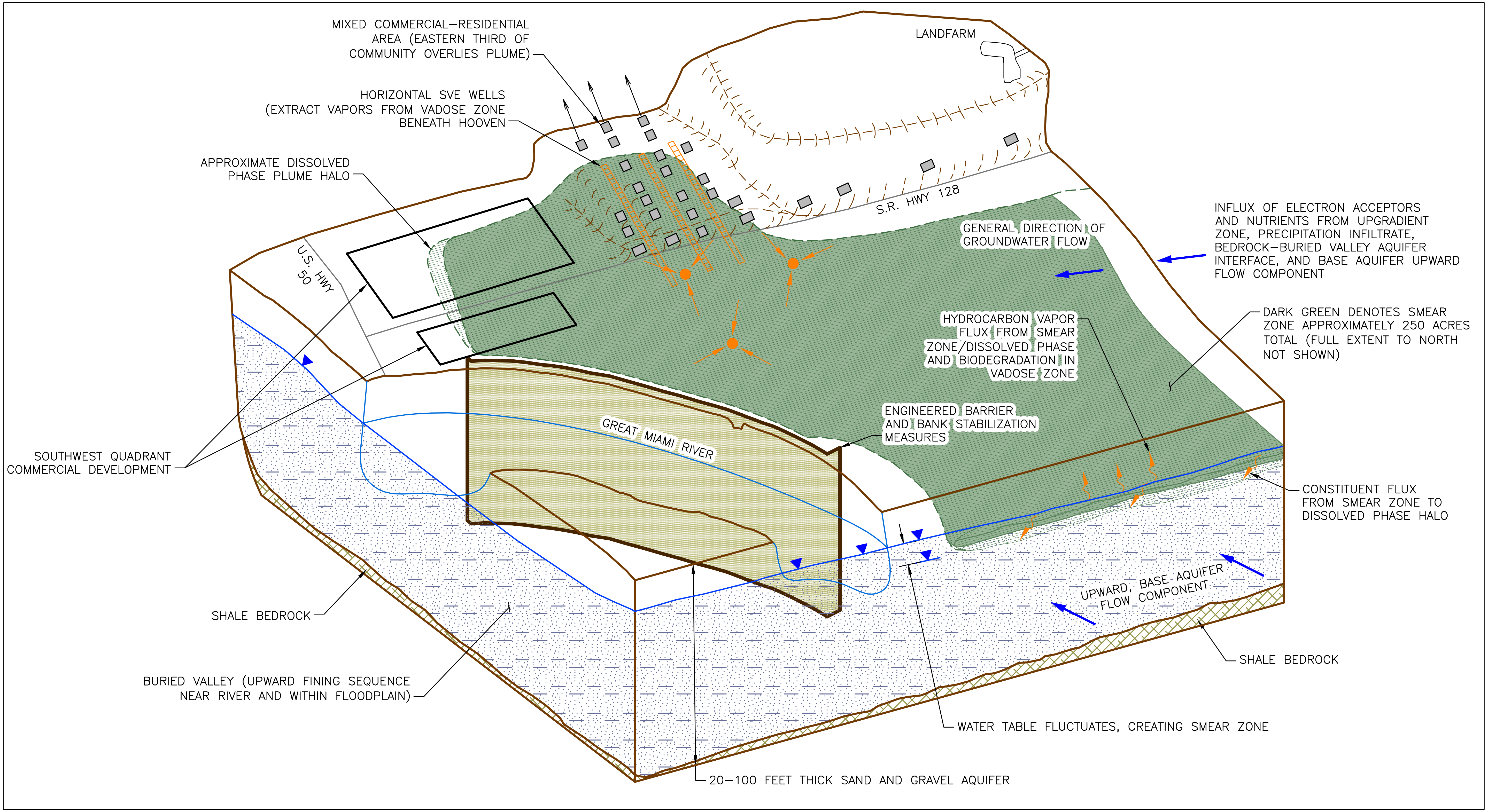
FIGURE 1-1

SITE LOCATION MAP

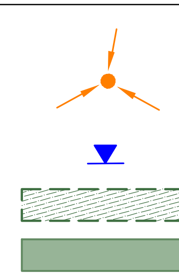
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JGP	Scale: 1" = 2,000'	Date:5/29/13	File: 500USGSSITE201305



Source: Provided by Chevron Cincinnati.

EXPLANATION



HIGH-GRADE PUMPING TARGETED AREAS WITH HIGHEST RESIDUAL LNAPL SATURATION.

WATER LEVEL

DISSOLVED PHASE PLUME EXTENT

SMEAR ZONE EXTENT

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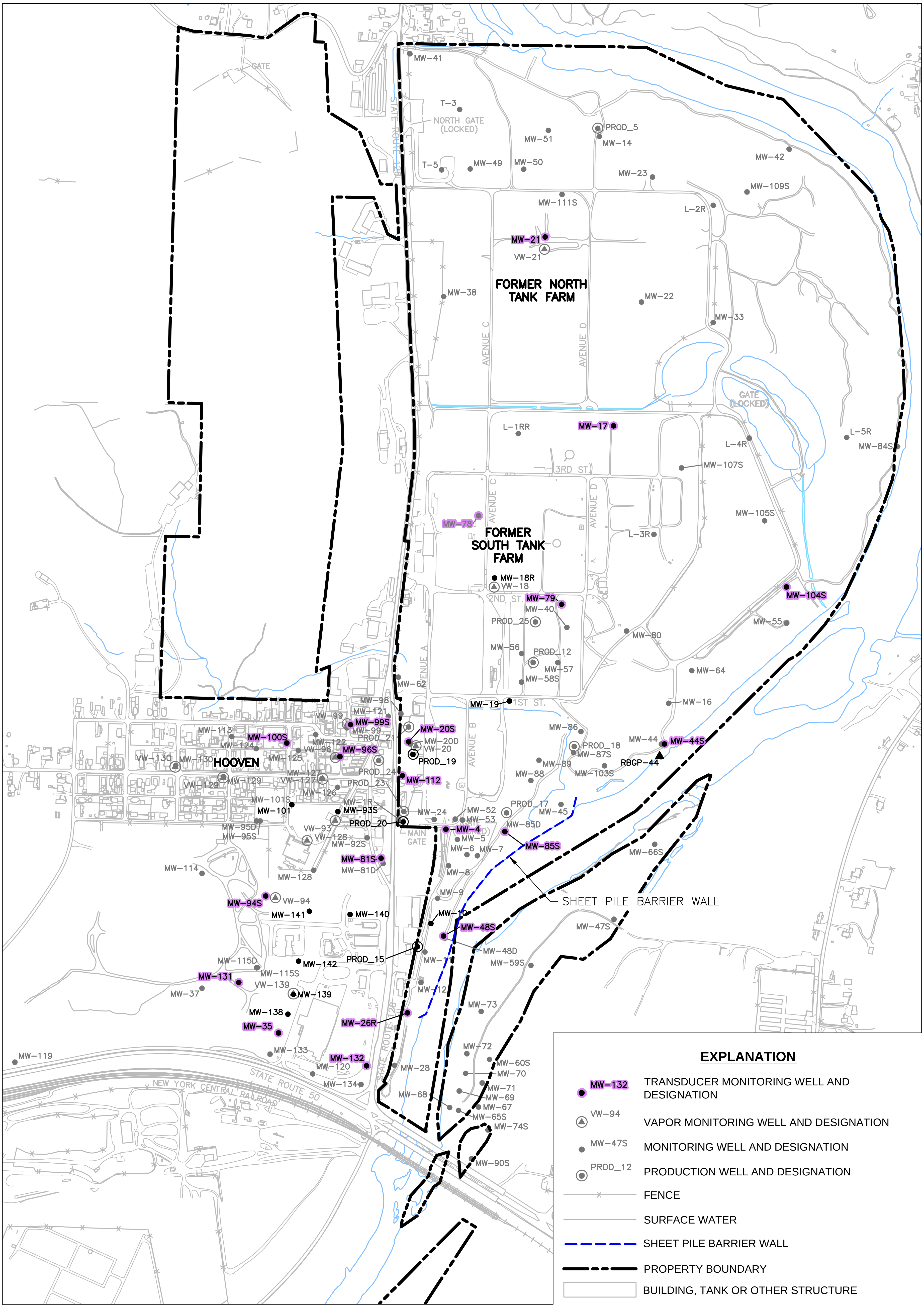
FIGURE 1-2

GROUNDWATER CONCEPTUAL SITE MODEL

SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JGP	Scale: NONE	Date: 5/29/13	File: 500GWCONCMODEL-201305



EXPLANATION

MW-132	TRANSDUCER MONITORING WELL AND DESIGNATION
VW-94	VAPOR MONITORING WELL AND DESIGNATION
MW-47S	MONITORING WELL AND DESIGNATION
PROD_12	PRODUCTION WELL AND DESIGNATION
	FENCE
	SURFACE WATER
	SHEET PILE BARRIER WALL
	PROPERTY BOUNDARY
	BUILDING, TANK OR OTHER STRUCTURE

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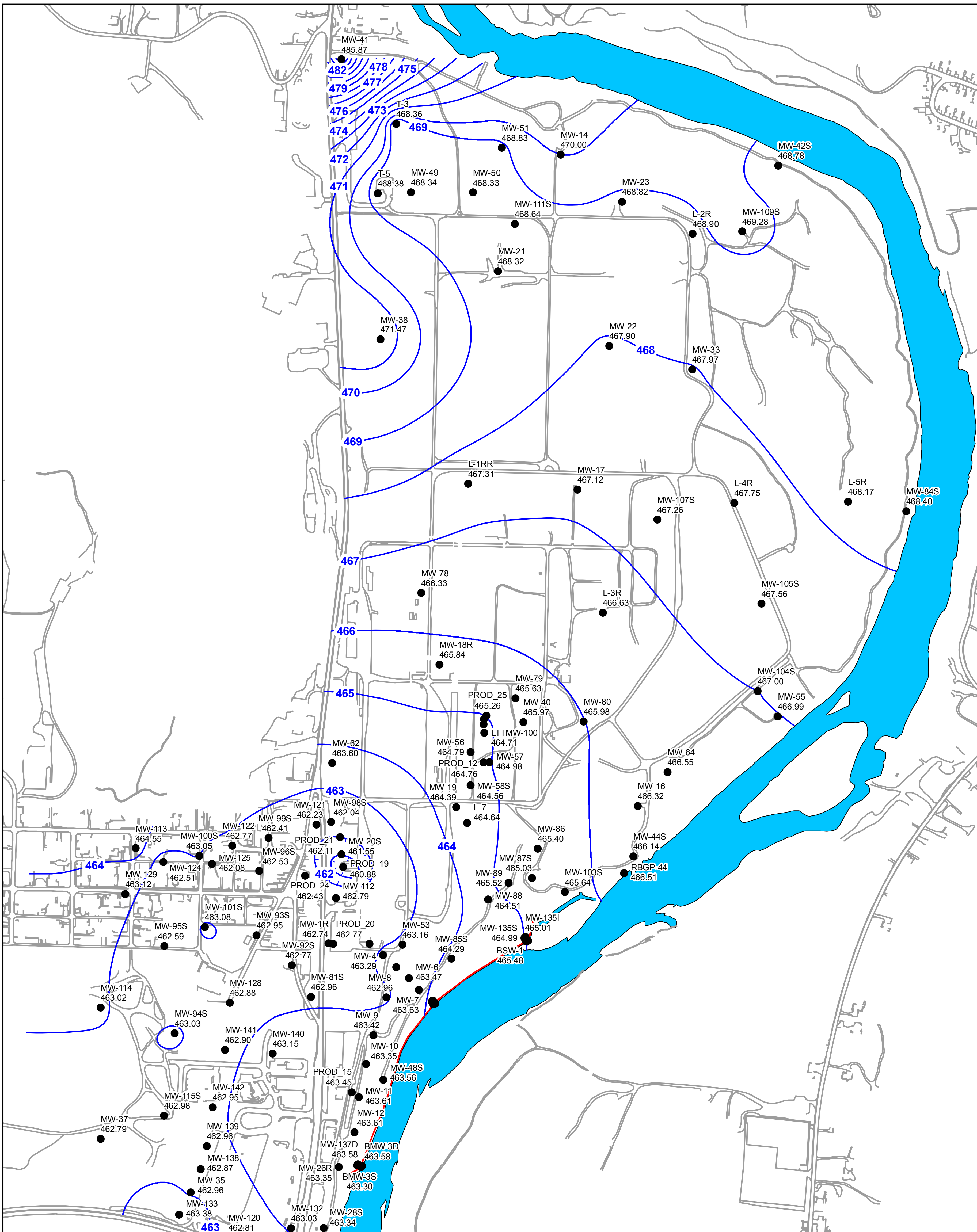
FIGURE 2-1

TRANSDUCER MONITORING WELLS

SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JGP	Scale: 1" = 650'	Date: 5/29/13	File: 500TRANMONWELLS201305



EXPLANATION

EQUIPOTENTIAL CONTOUR LINE
Elevation In Feet Above Mean Sea Level
Contour Interval is 1.0 feet
(Line dashed where approximate)

N

0 600'

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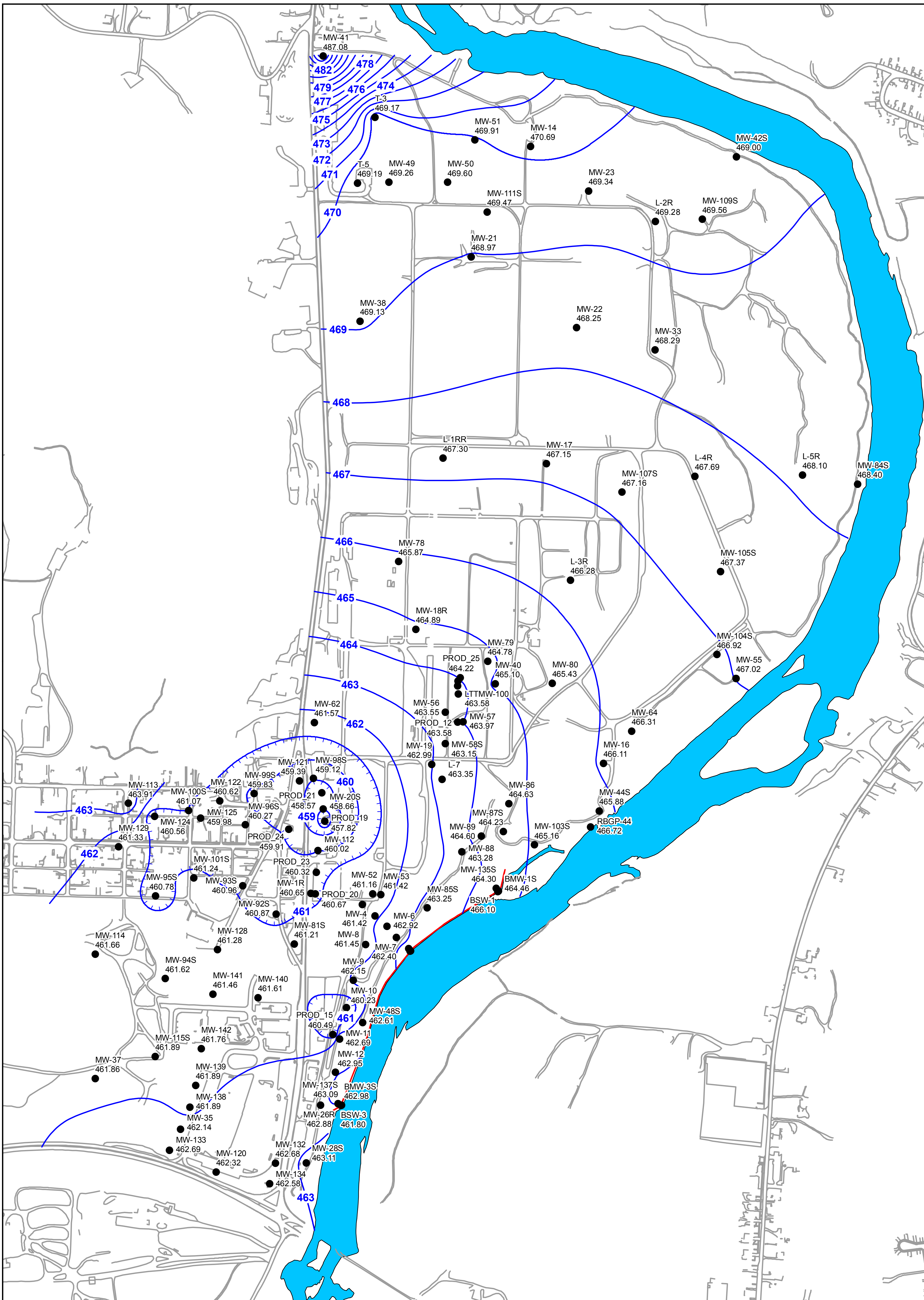
FIGURE 2-2

**POTENTIOMETRIC SURFACE MAP
JULY 30, 2012**

**SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO**

Drawn By: BR	Checked By: PM	Scale: 1" = 600'	Date: 5/30/13	File: Fig2-2_PotSurf_20120730.mxd



EXPLANATION

EQUIPOTENTIAL CONTOUR LINE
Elevation In Feet Above Mean Sea Level
Contour Interval is 1.0 feet
(Line dashed where approximate)

N

0 600 '

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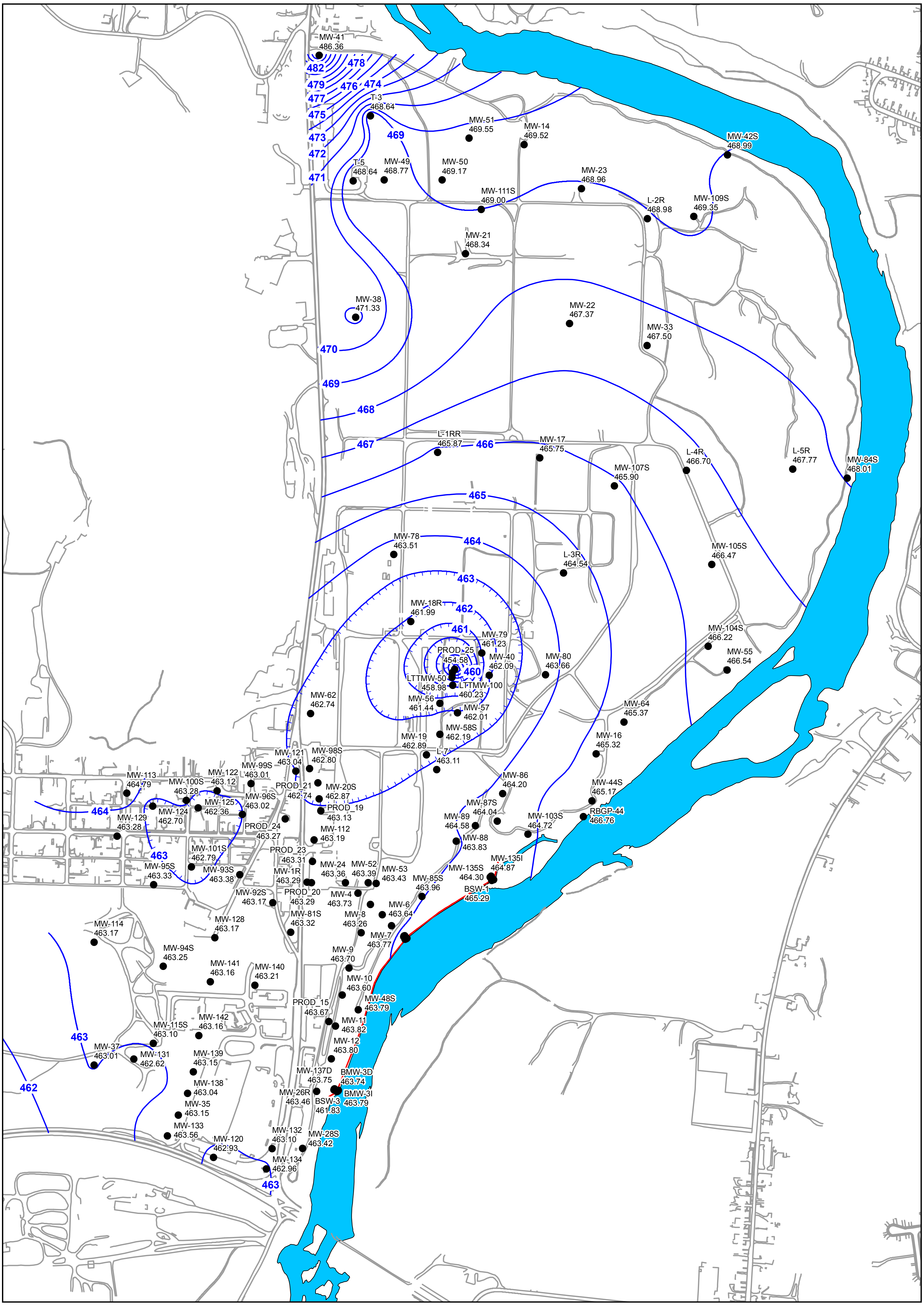
FIGURE 2-3

POTENTIOMETRIC SURFACE MAP
SEPTEMBER 26, 2012

SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: BR	Checked By: PM	Scale: 1" = 600'	Date: 5/30/13	File: Fig2-3_PotSurf_20120926.mxd



EXPLANATION

EQUIPOTENTIAL CONTOUR LINE
Elevation In Feet Above Mean Sea Level
Contour Interval is 1.0 feet
(Line dashed where approximate)

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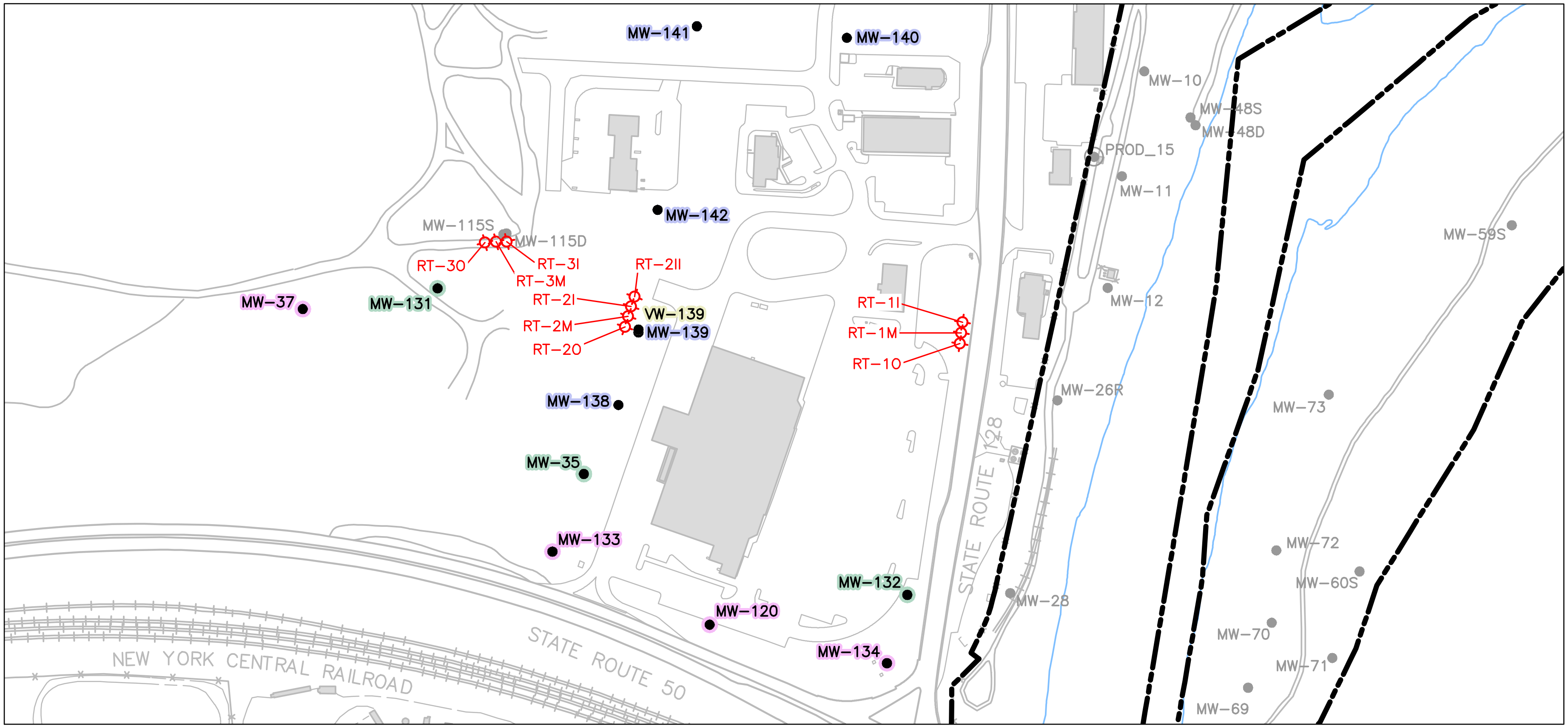
FIGURE 2-4

POTENTIOMETRIC SURFACE MAP
NOVEMBER 27, 2012

SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: JDF	Checked By: PM	Scale: 1" = 600'	Date: 5/30/13	File: Fig2-4_PotSurf_20121127.mxd



EXPLANATION

RT–2O RT–2M RT–2I	PERMANENT ROST TRANSECT AND DESIGNATION (I-INNER, M-MIDDLE, O-OUTER)
MW–138	MONITORING WELL AND DESIGNATION (INSTALLED MARCH 2009)
MW–35	SENTINEL MONITORING WELL AND DESIGNATION
MW–37	POINT OF COMPLIANCE MONITORING WELL AND DESIGNATION
VW–139	NESTED VAPOR WELL AND DESIGNATION
MW–47S	MONITORING WELL AND DESIGNATION
PROD_12	PRODUCTION WELL AND DESIGNATION
	SURFACE WATER
	PROPERTY BOUNDARY
	BUILDING, TANK OR OTHER STRUCTURE

N

0 300'

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FIGURE 2-5

SENTINEL, POINT OF COMPLIANCE, AND ROST MONITORING NETWORK

SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JGP	Scale: 1"=300'	Date: 5/29/13	File: 500ROST-TRANSECTS201305

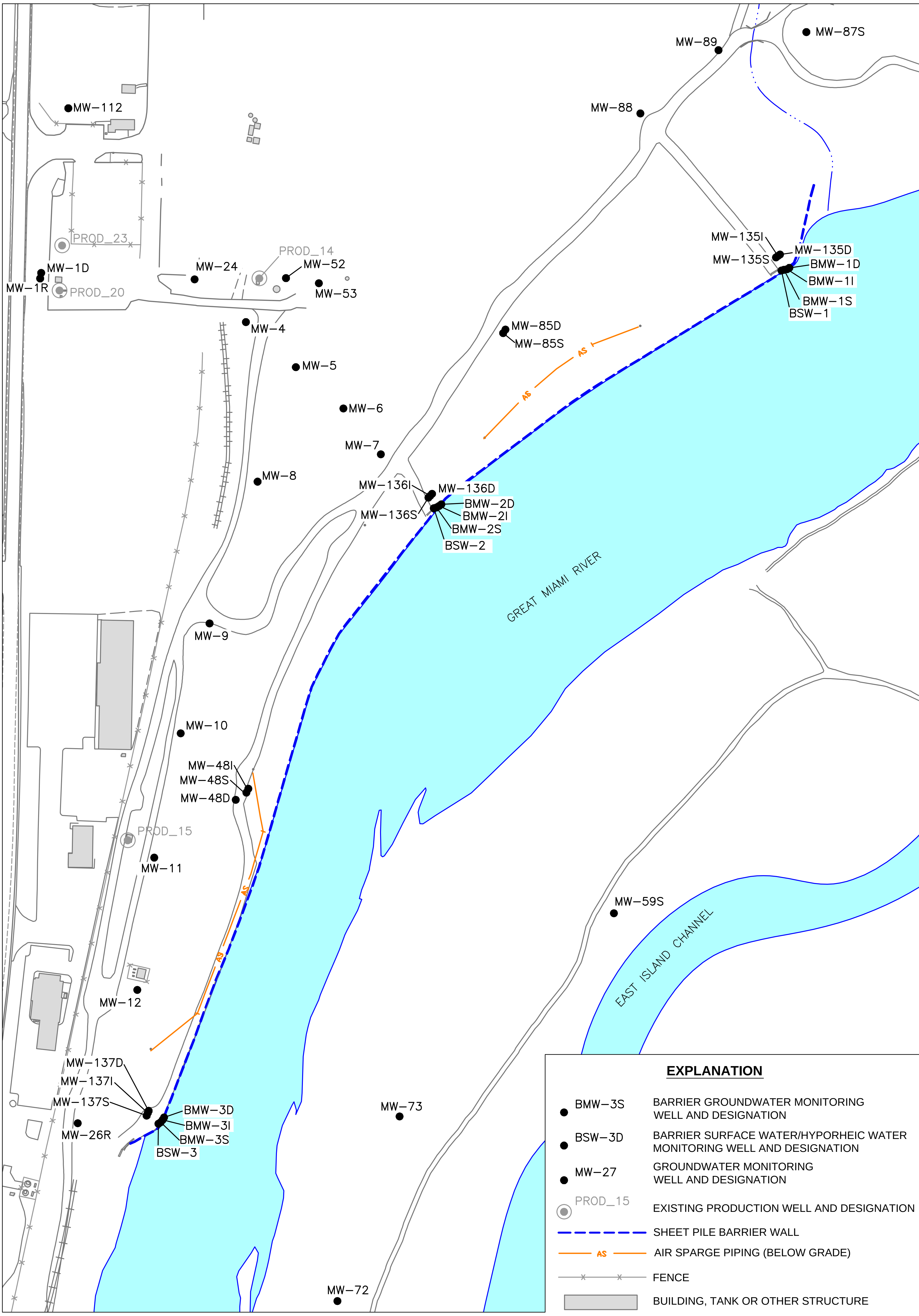

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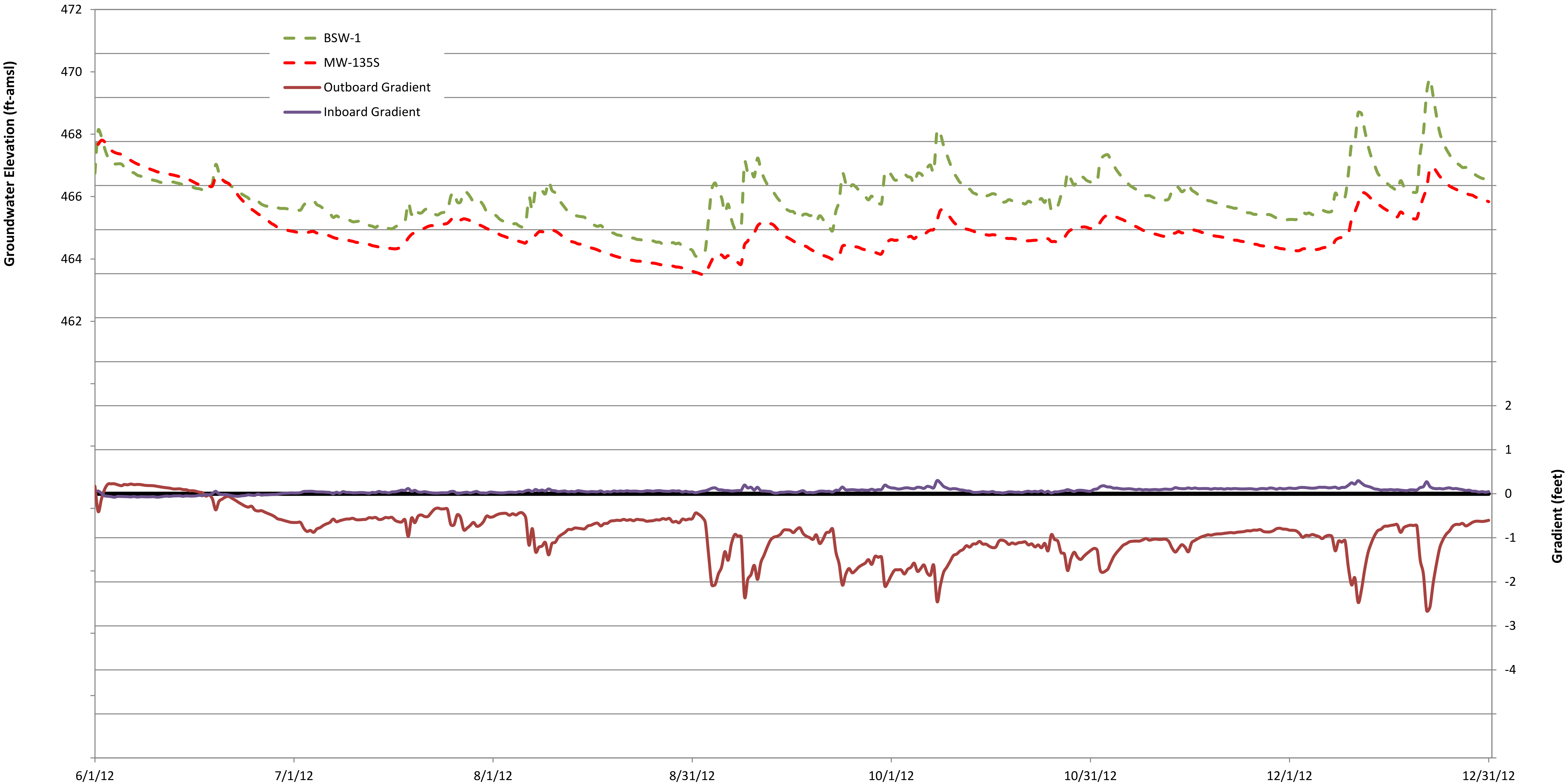
FIGURE 2-6

BARRIER PERFORMANCE AIR SPARGE AND MONITORING WELL NETWORK

SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

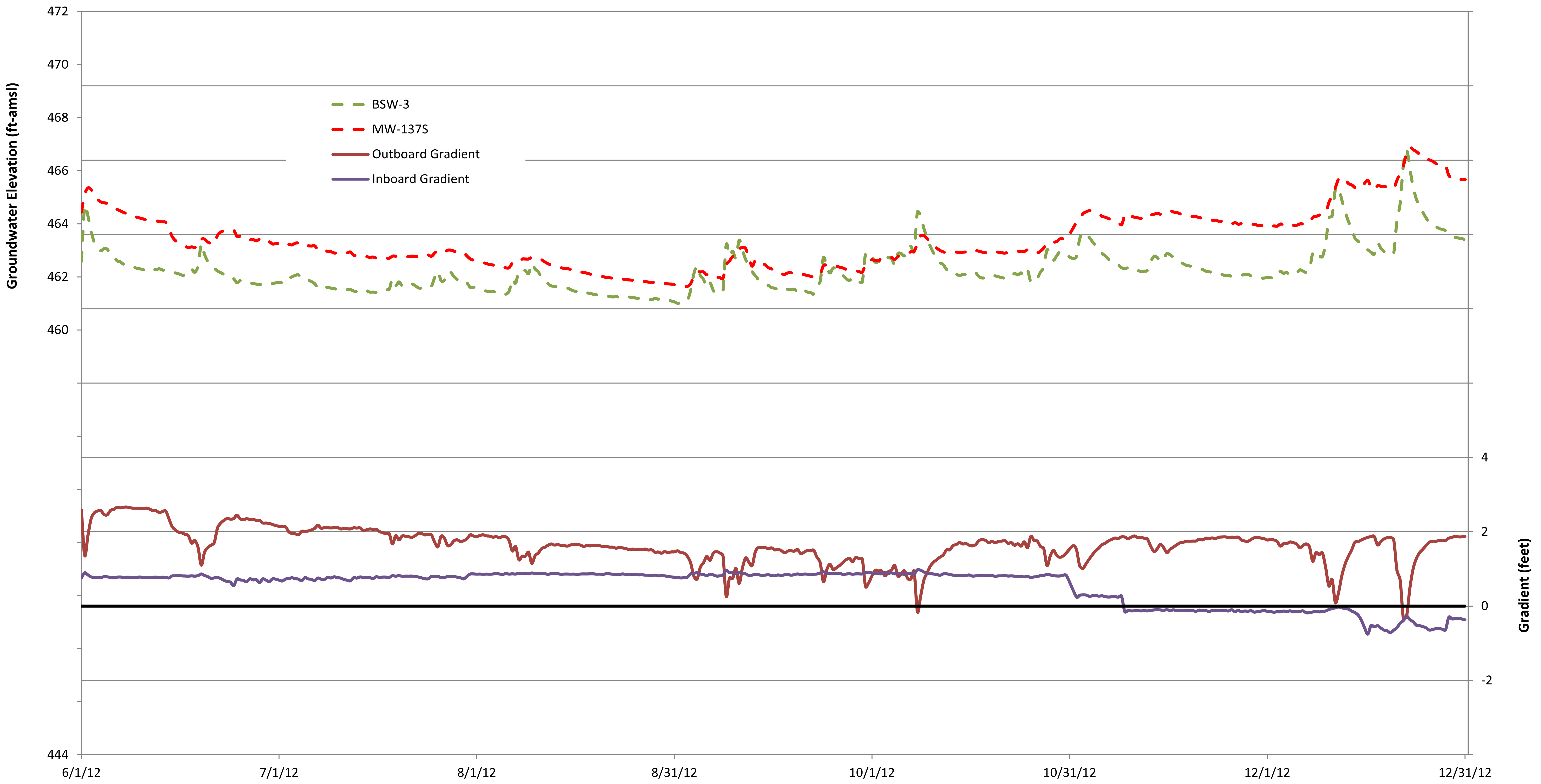
Drawn By: REP	Checked By: JGP	Scale: 1" = 150'	Date:5/29/13	File: 500ASBUILTMONNET-201305

FIGURE 2-7. BARRIER WALL NORTH TRANSECT VERTICAL GRADIENTS
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



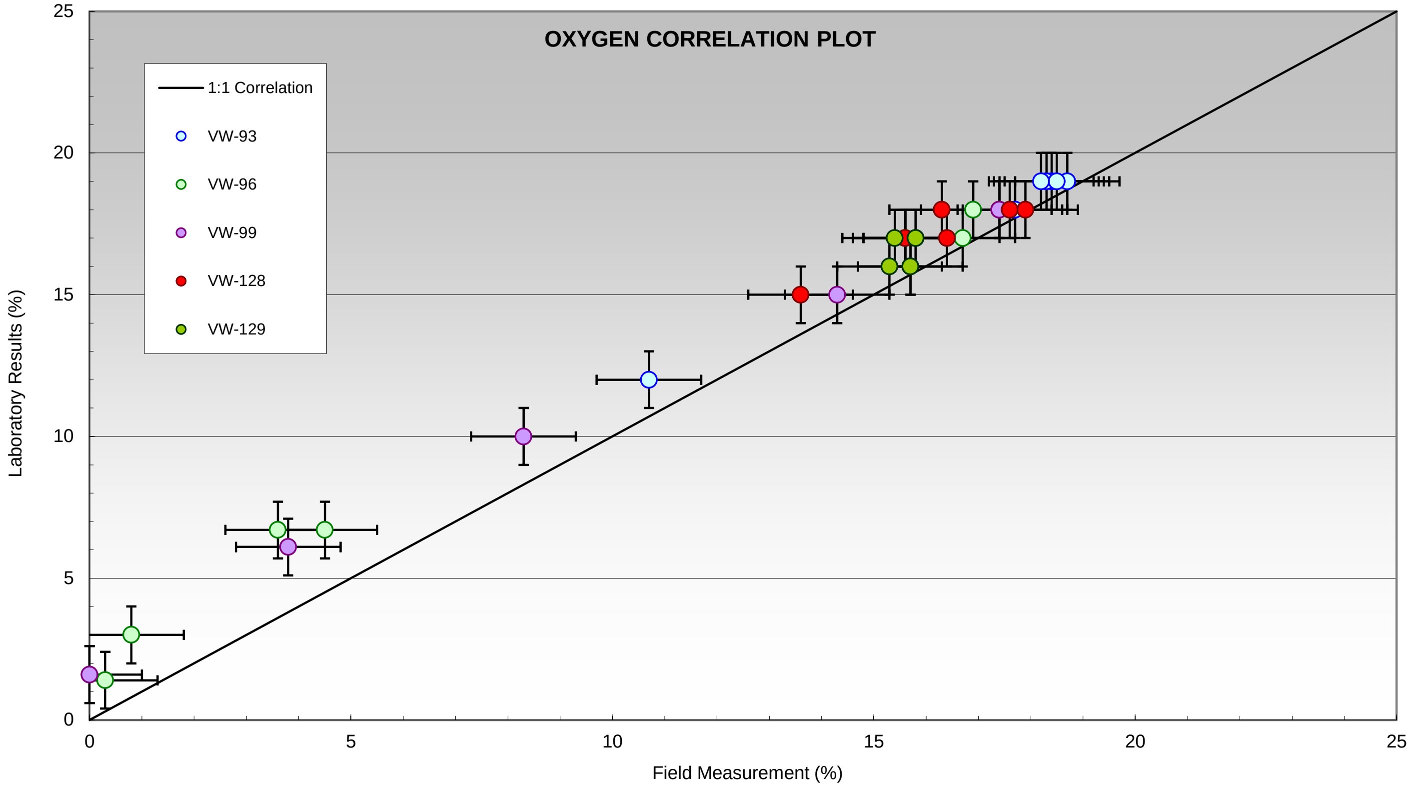
EXPLANATION
Outboard Gradient - Groundwater elevation at BMW-1D minus the surface water elevation at BSW-1
Inboard Gradient - Groundwater elevation at MW-135D minus the groundwater elevation at MW-135S
Upward vertical gradient shown as positive values, downward vertical gradient shown as negative values

FIGURE 2-8. BARRIER WALL SOUTH TRANSECT VERTICAL GRADIENTS
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



EXPLANATION
Outboard Gradient - Groundwater elevation at BMW-3D minus the surface water elevation at BSW-3
Inboard Gradient - Groundwater elevation at MW-137D minus the groundwater elevation at MW-137S
Upward vertical gradient shown as positive values, downward vertical gradient shown as negative values

FIGURE 2-9. SOIL VAPOR OXYGEN AND CARBON DIOXIDE CORRELATION PLOTS, JULY 2012
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



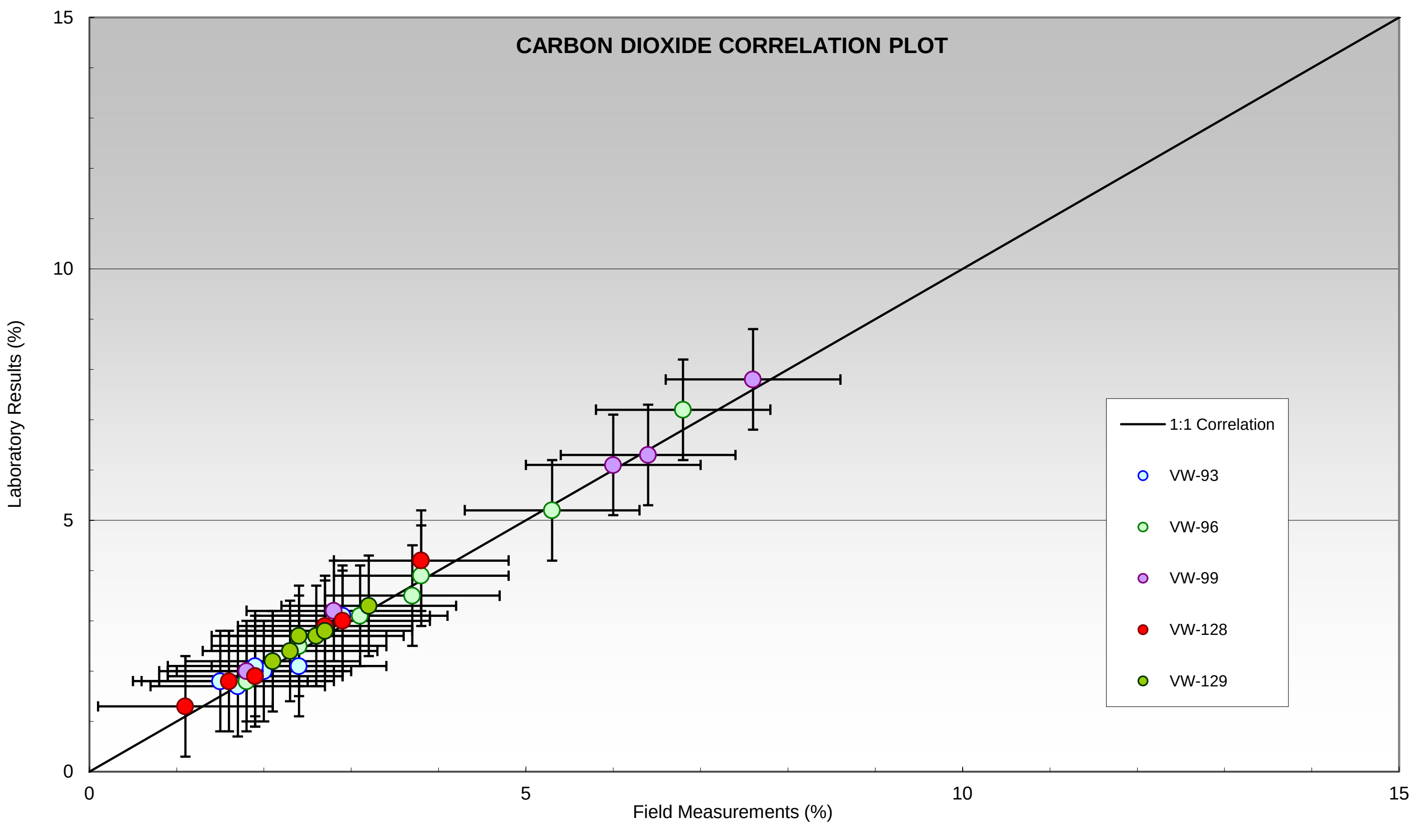
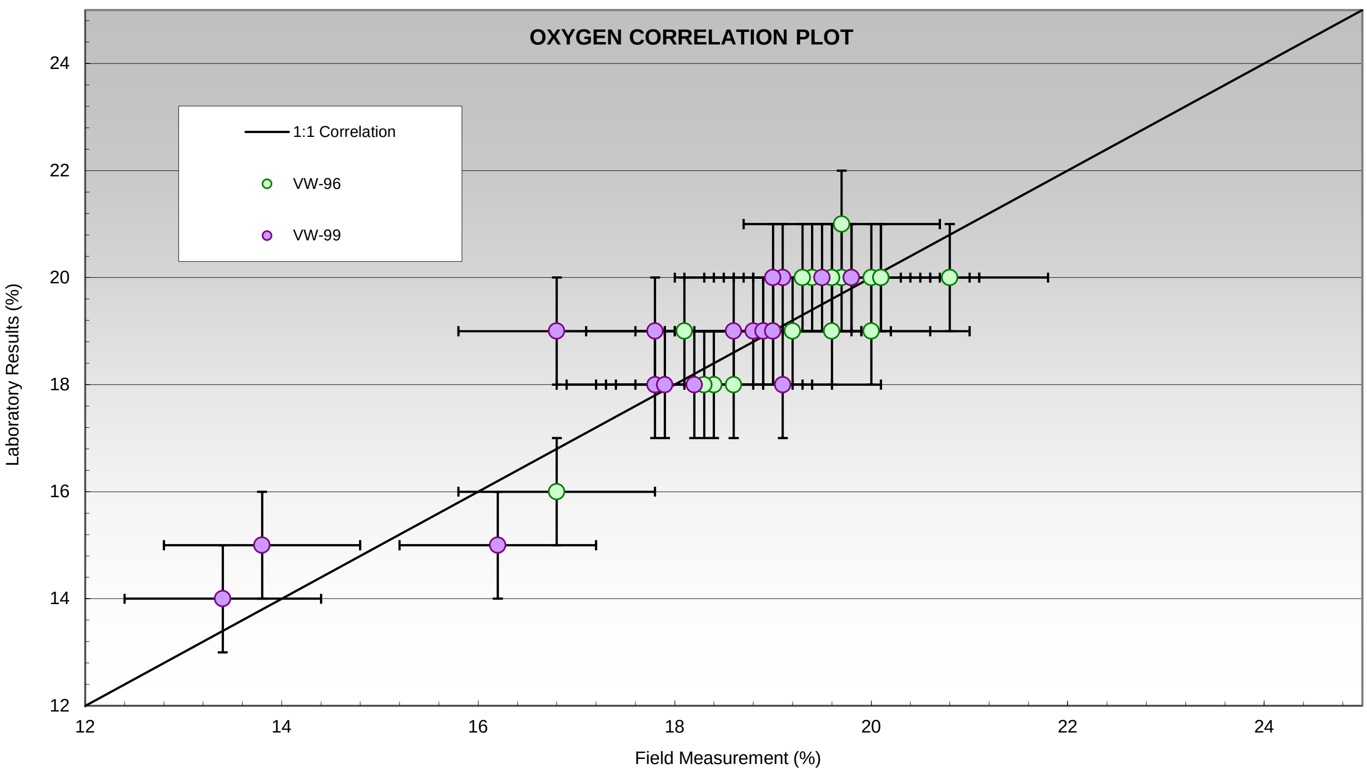
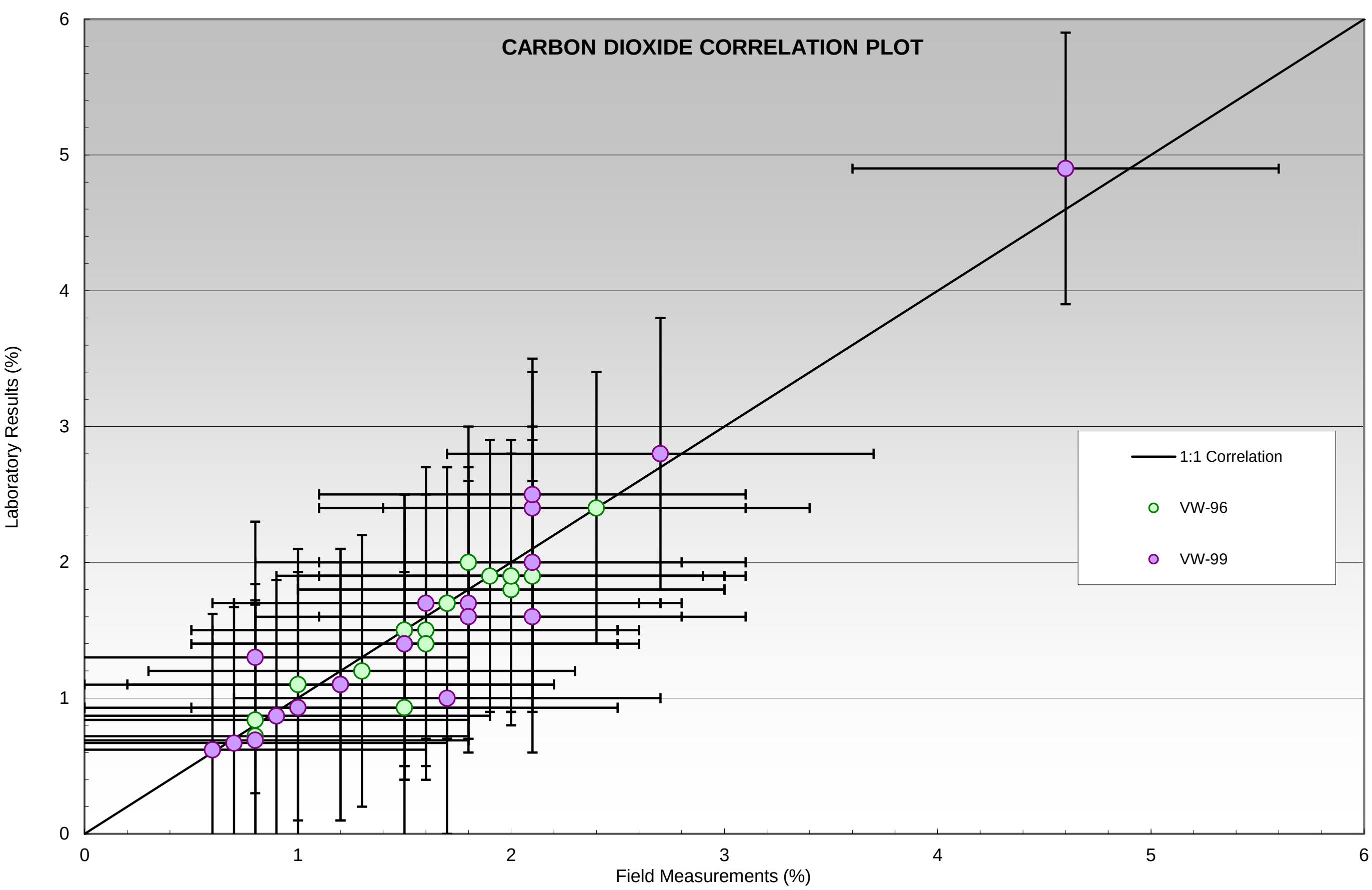
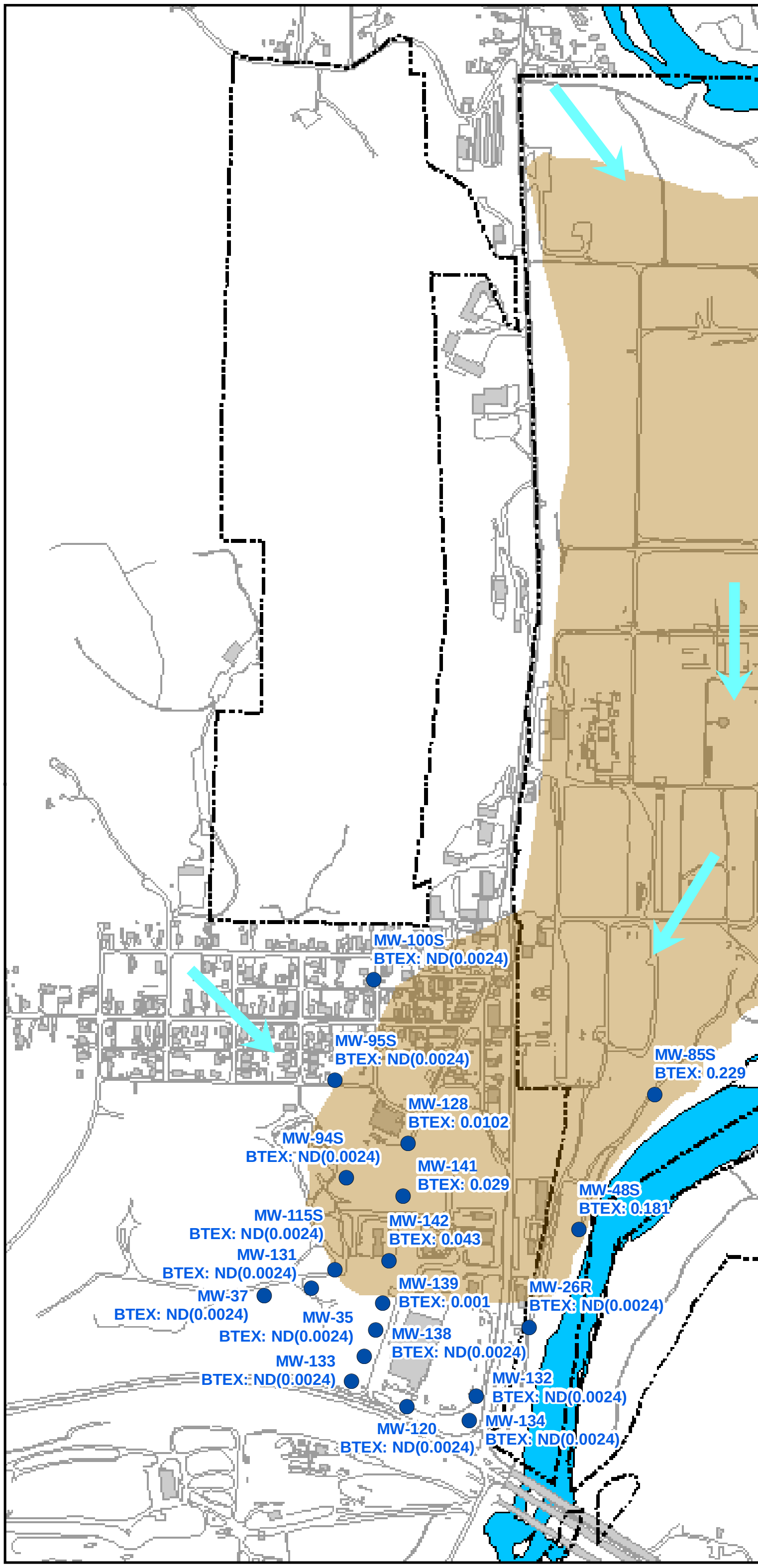


FIGURE 2-10. SOIL VAPOR OXYGEN AND CARBON DIOXIDE CORRELATION PLOTS, AUGUST 2012 TO DECEMBER 2012
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO







EXPLANATION

- GROUNDWATER MONITORING WELL AND DESIGNATION
- GENERAL GROUNDWATER FLOW DIRECTION
- ESTIMATED SMEAR ZONE EXTENT
- BUILDING, TANK, OR OTHER STRUCTURE
- GREAT MIAMI RIVER
- PROPERTY BOUNDARY

BTEX - BENZENE, TOLUENE, ETHYLBENZENE, AND TOTAL XYLENE CONCENTRATIONS REPORTED IN MILLIGRAMS PER LITER (mg/L).
ND(0.0024) - NOT DETECTED AT THE INDICATED DETECTION LIMITS.

N

0 1,000'

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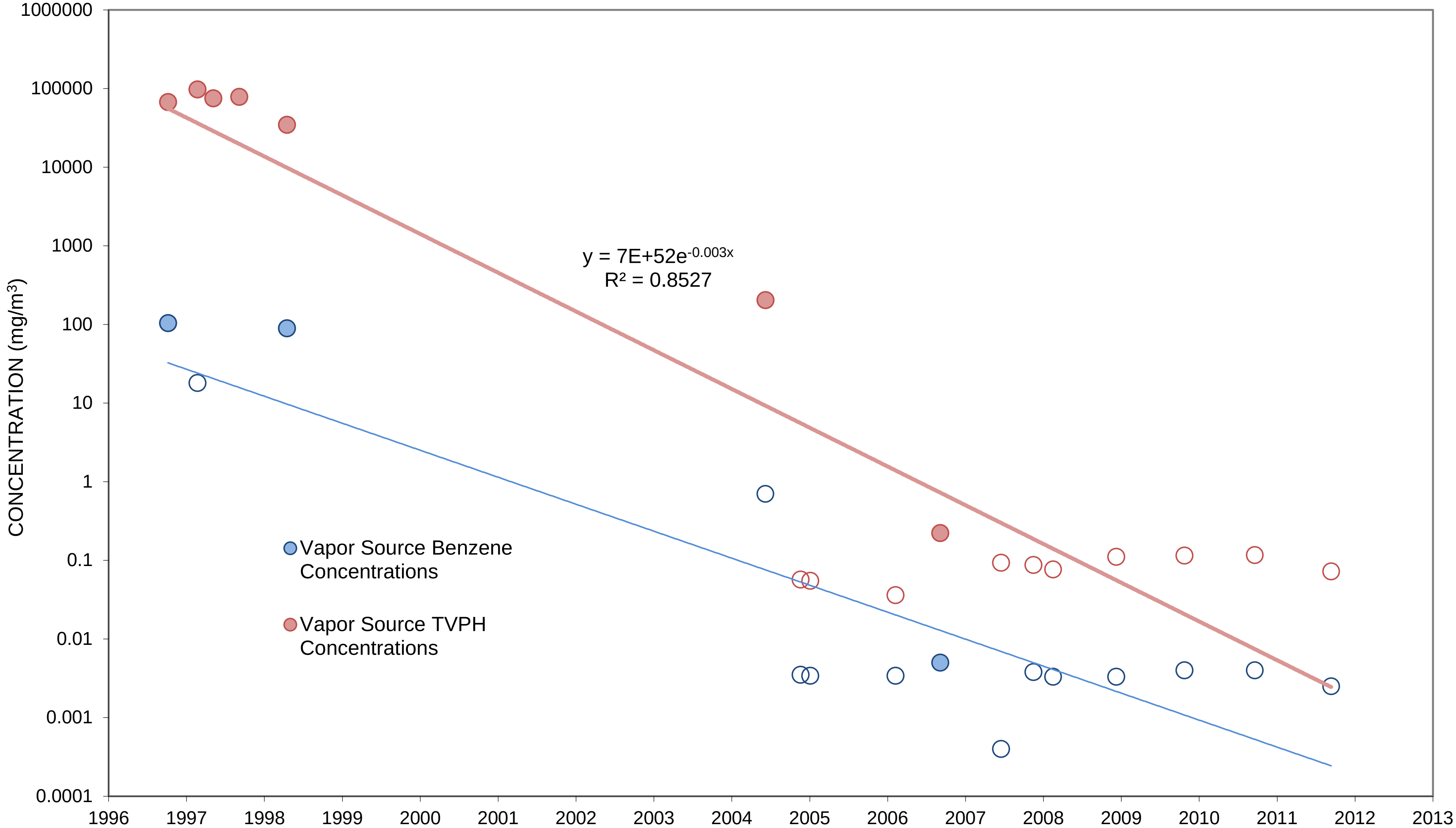
FIGURE 3-1

DISSOLVED PHASE CONSTITUENT CONCENTRATIONS

SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

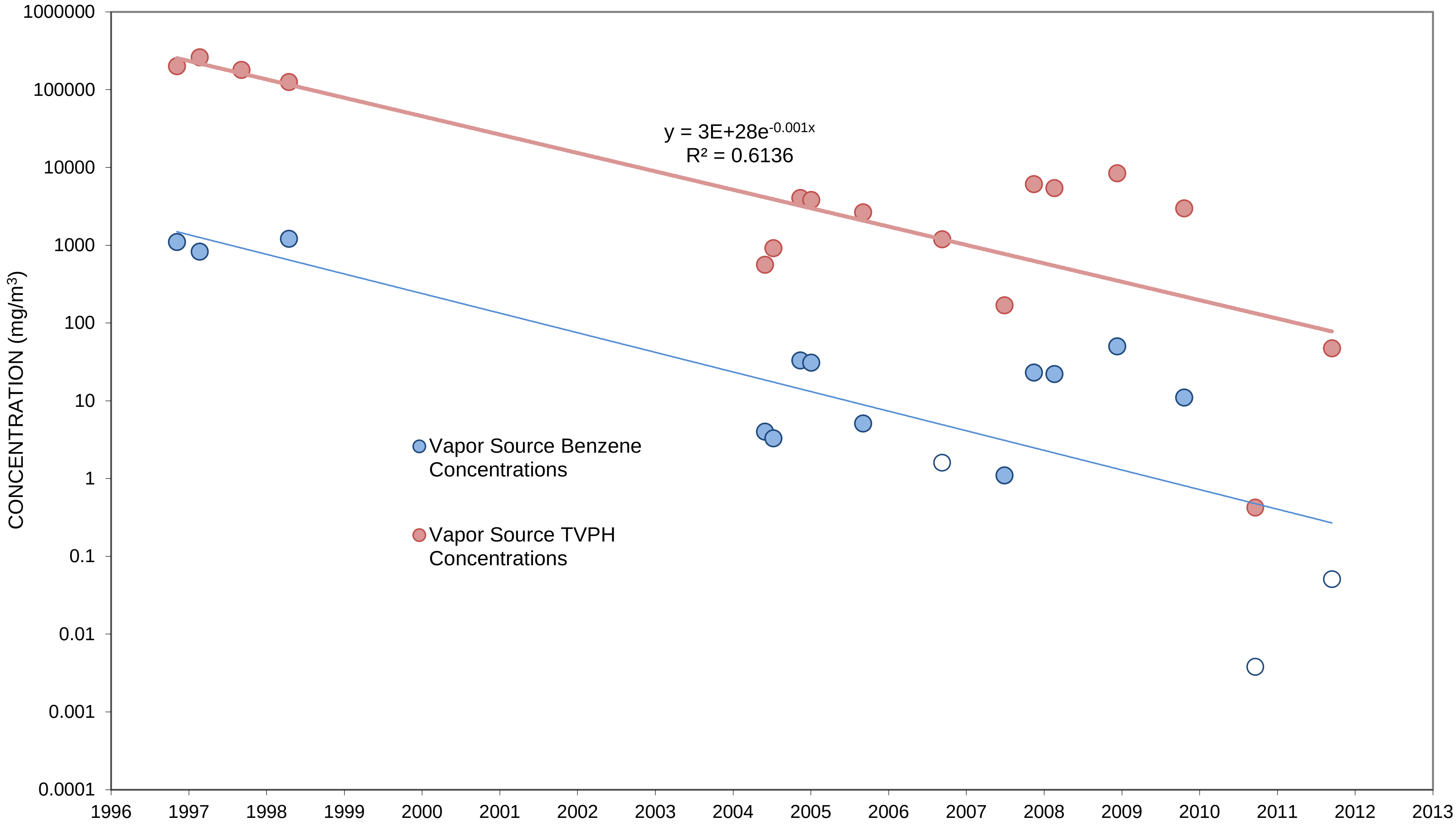
Drawn By: BR | Checked By: TA | Scale: 1" = 1000' | Date: 5/30/13 | File: Fig3-1_BTEX_201210.mxd

FIGURE 3-2. VAPOR SOURCE CONCENTRATIONS, NESTED VAPOR MONITORING WELL VW-93
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



EXPLANATION
OPEN SYMBOL DESIGNATES A NON-DETECT VALUE

FIGURE 3-3. VAPOR SOURCE CONCENTRATIONS, NESTED VAPOR MONITORING WELL VW-96
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

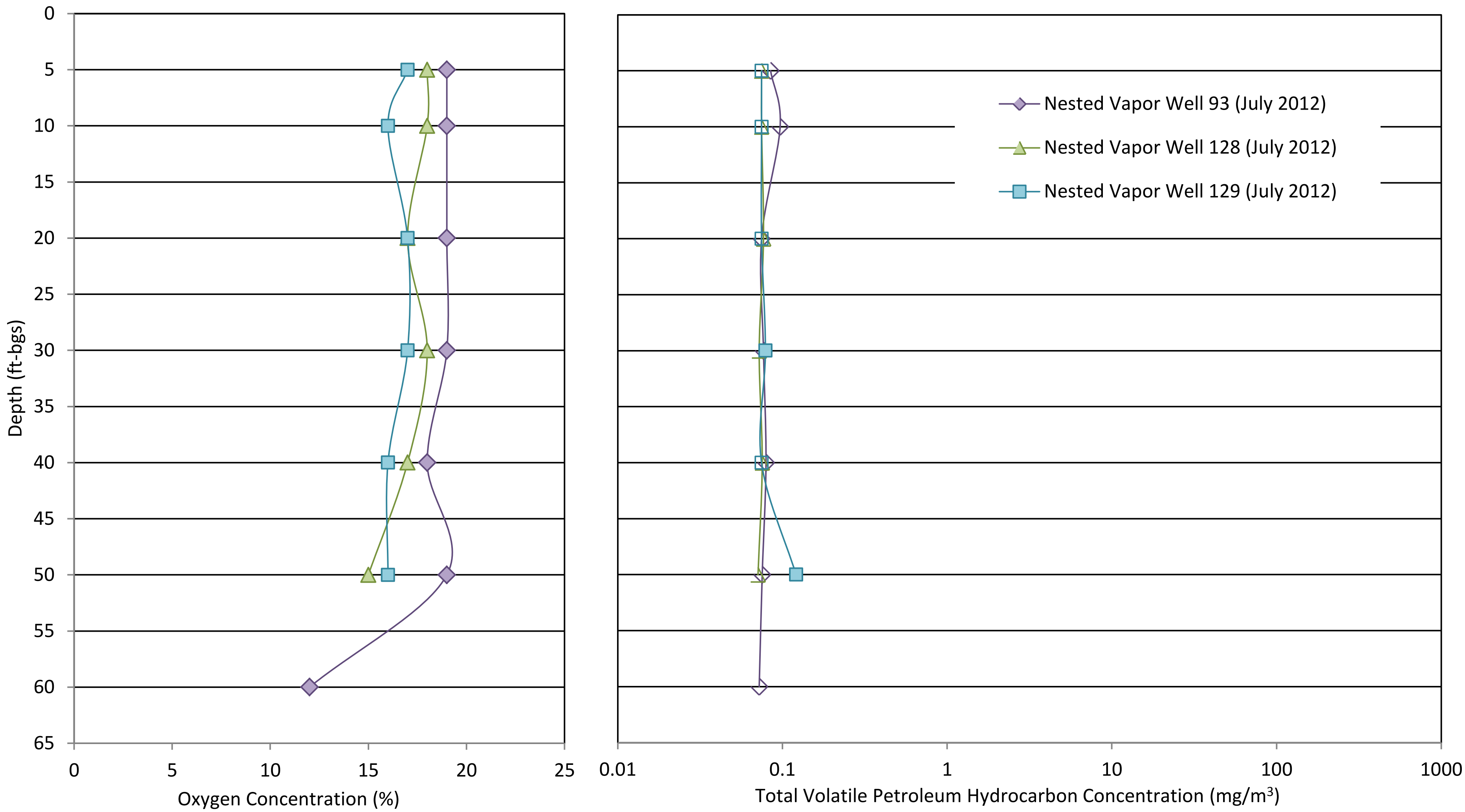


EXPLANATION
OPEN SYMBOL DESIGNATES A NON-DETECT VALUE

FIGURE 3-4. VAPOR SOURCE CONCENTRATIONS, NESTED VAPOR MONITORING WELL VW-99
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

EXPLANATION
OPEN SYMBOL DESIGNATES A NON-DETECT VALUE

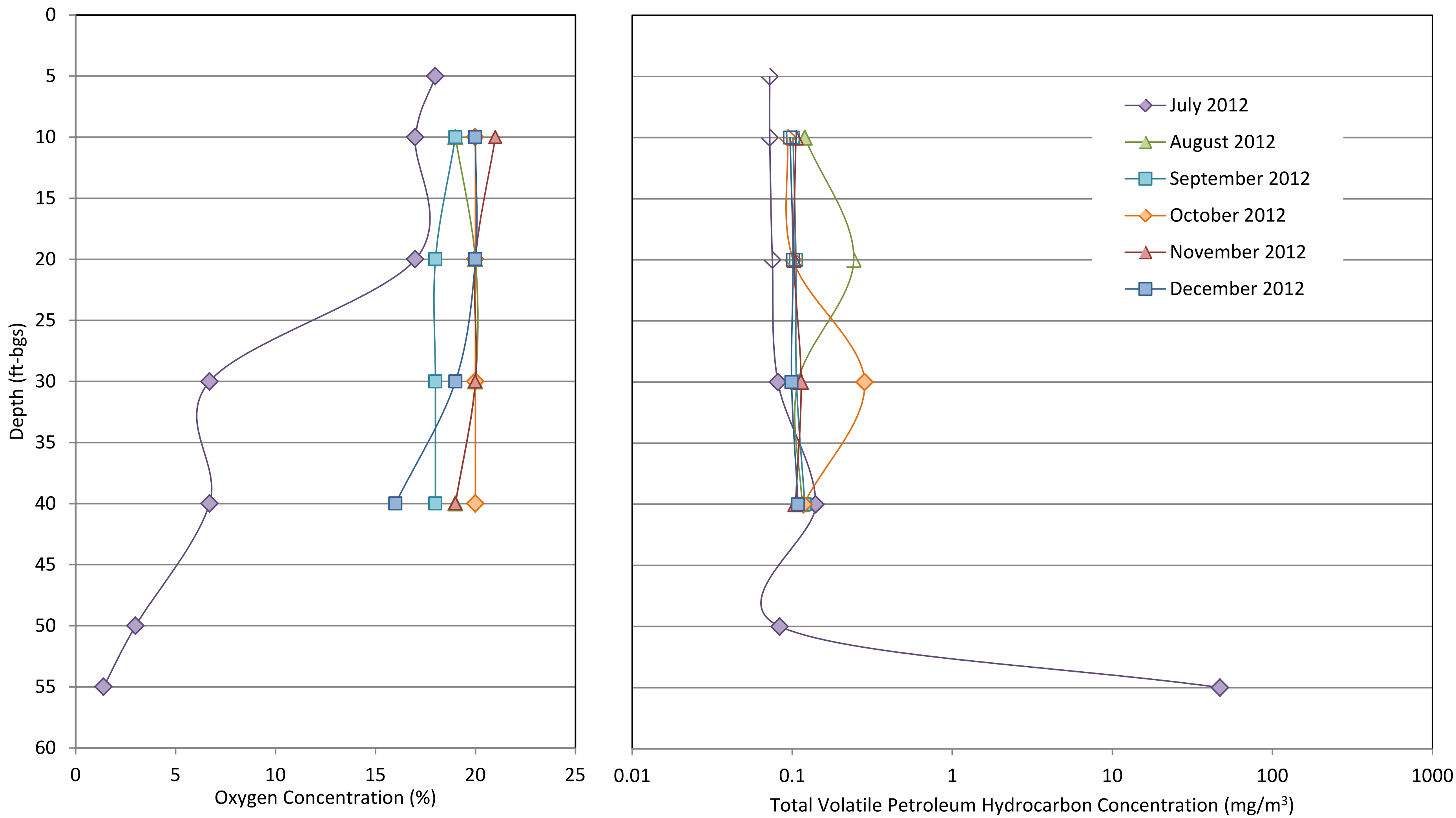
FIGURE 3-5 TVPH AND FIXED GAS PROFILES, NESTED VAPOR MONITORING WELLS VW-93, VW-128, AND VW-129
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



Note:

- Open symbols indicate concentration reported below the laboratory detection limit

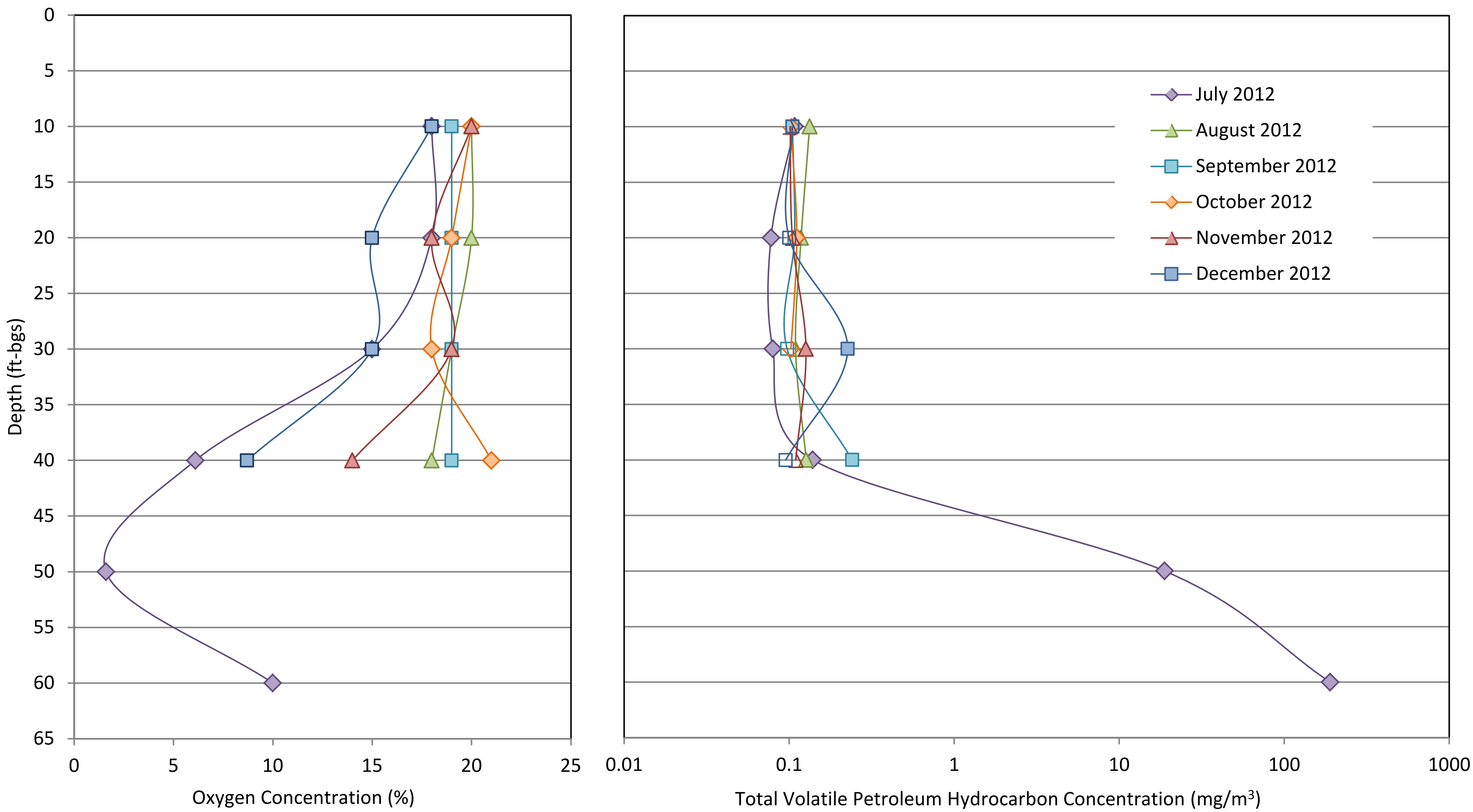
FIGURE 3-6. TVPH AND FIXED GAS PROFILES, NESTED VAPOR MONITORING WELL VW-96
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



Note:

- Open symbols indicate concentration reported below the laboratory detection limit

FIGURE 3-7. TVPH AND FIXED GAS PROFILES, NESTED VAPOR MONITORING WELL VW-99
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



Note:

- Open symbols indicate concentration reported below the laboratory detection limit

FIGURE 4-1. LNAPL RECOVERY VS. AMBIENT GROUNDWATER ELEVATION
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

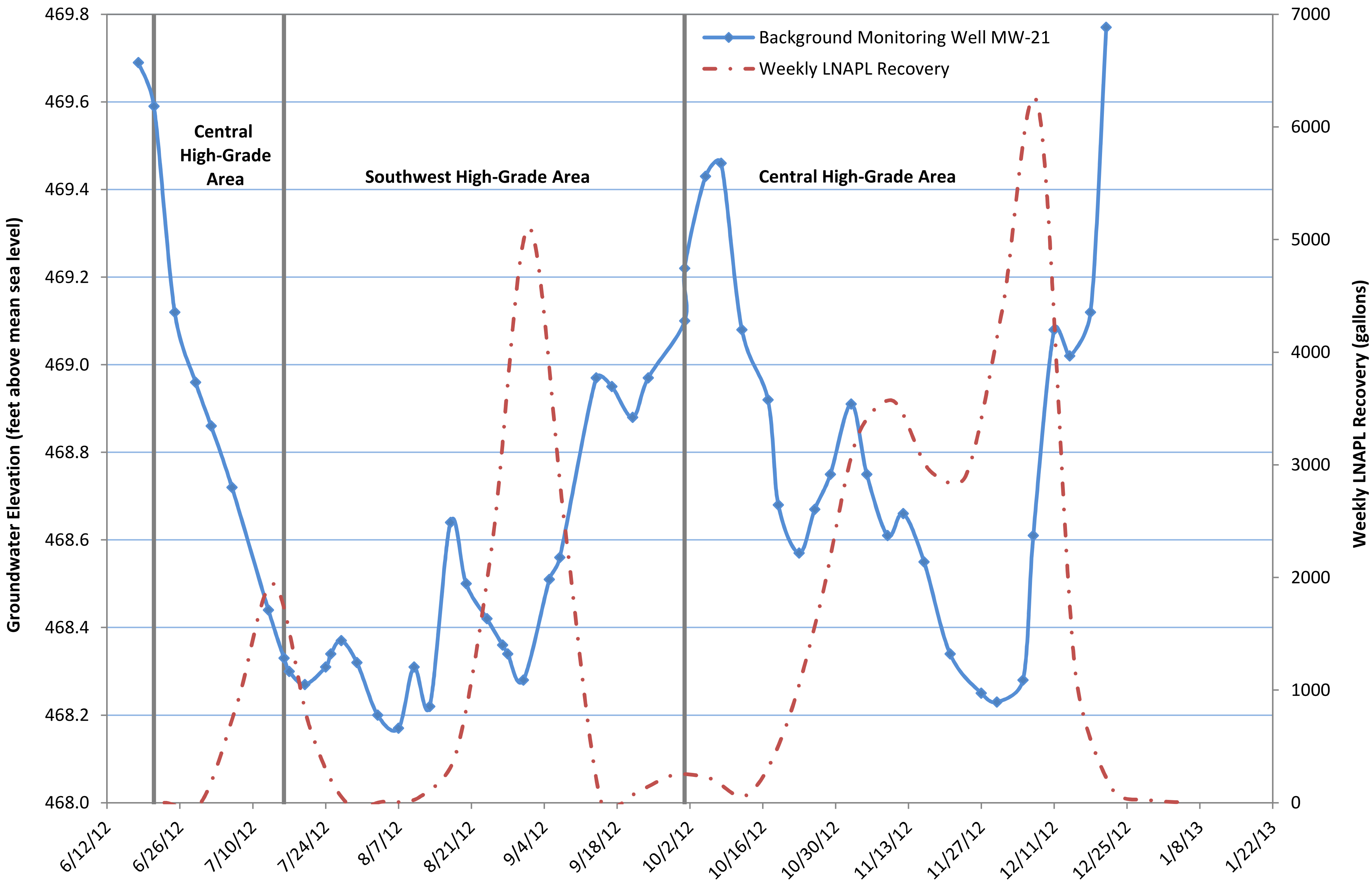
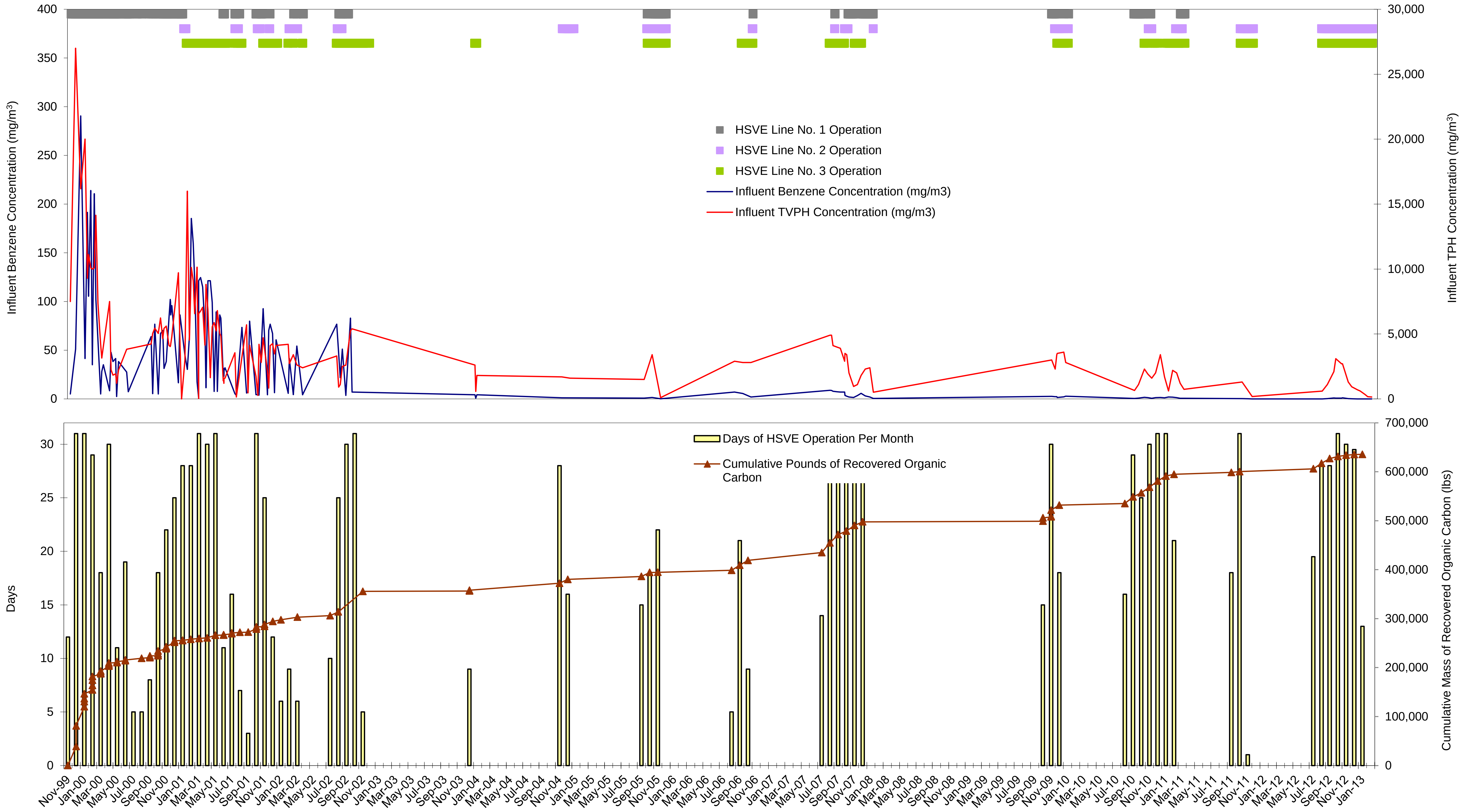
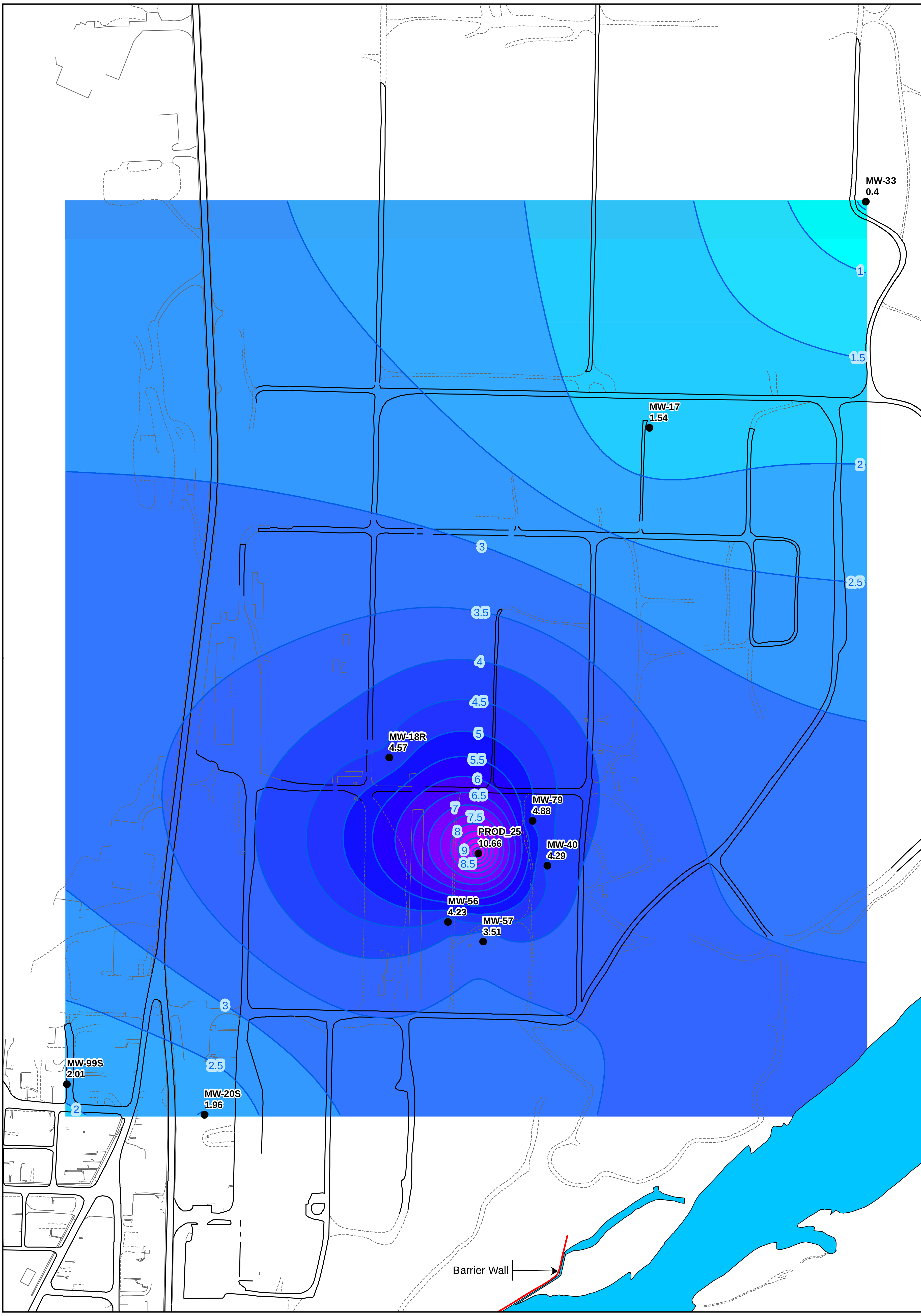


FIGURE 4-2. HSVE OPERATION, INFLUENT CONCENTRATION, AND CUMULATIVE POUNDS OF RECOVERED ORGANIC CARBON
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO





EXPLANATION

CONTOUR LINE OF EQUAL DRAWDOWN, CONTOUR INTERVAL IS 0.5 FEET

AREA OF EQUAL DRAWDOWN IN FEET

0.4 — 10.66

N

0 — 300 '

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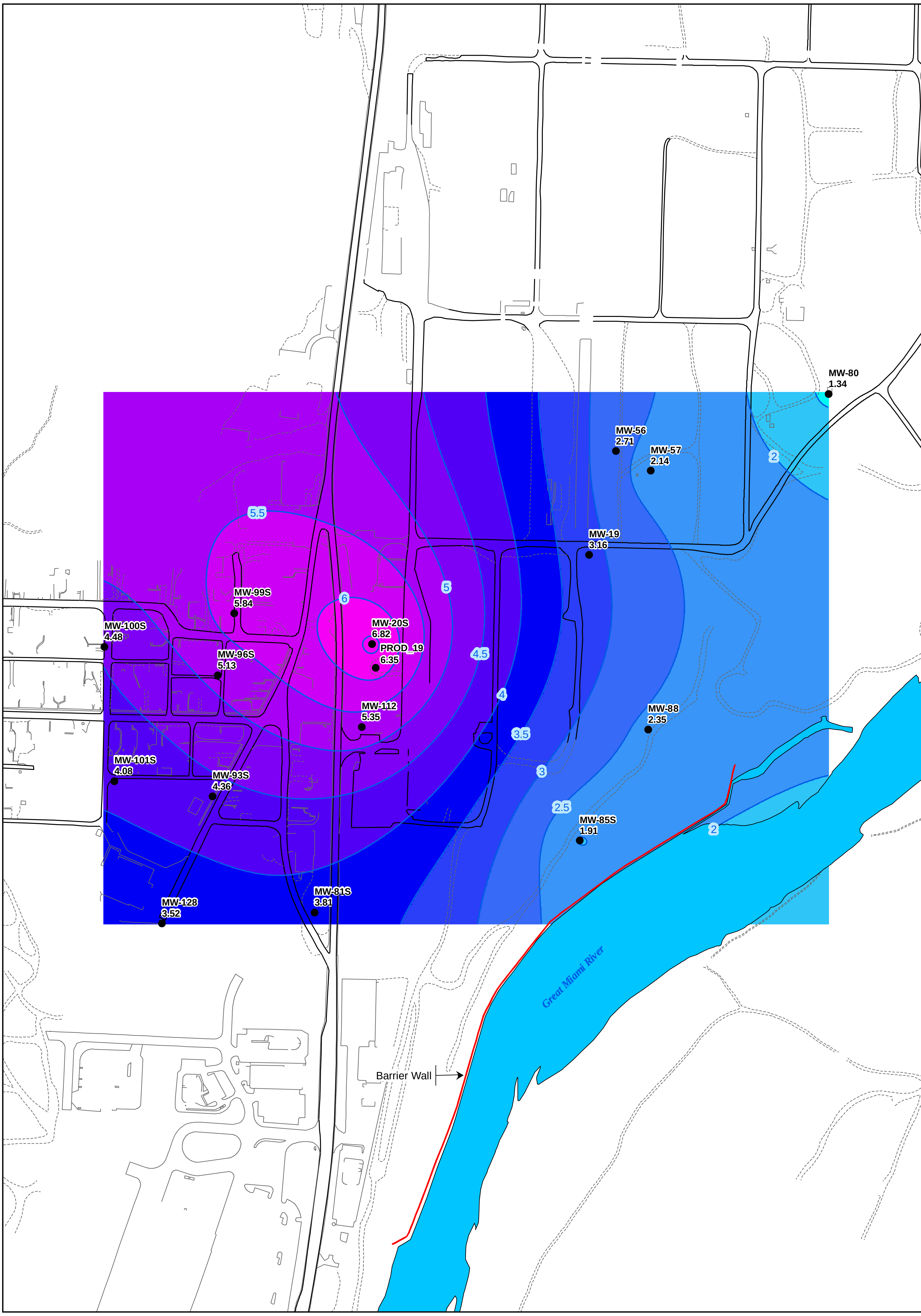
FIGURE 4-3

HIGH-GRADE EFFECTIVE DRAWDOWN MAP
NOVEMBER 27, 2012

SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: BR	Checked By: TA	Scale: 1" = 300'	Date: 5/31/13	File: Fig4-3_DrawDown_PROD25.mxd



EXPLANATION

CONTOUR LINE OF EQUAL DRAWDOWN, CONTOUR INTERVAL IS 0.5 FEET

AREA OF EQUAL DRAWDOWN IN FEET

1.34 6.82

N

0 300 '

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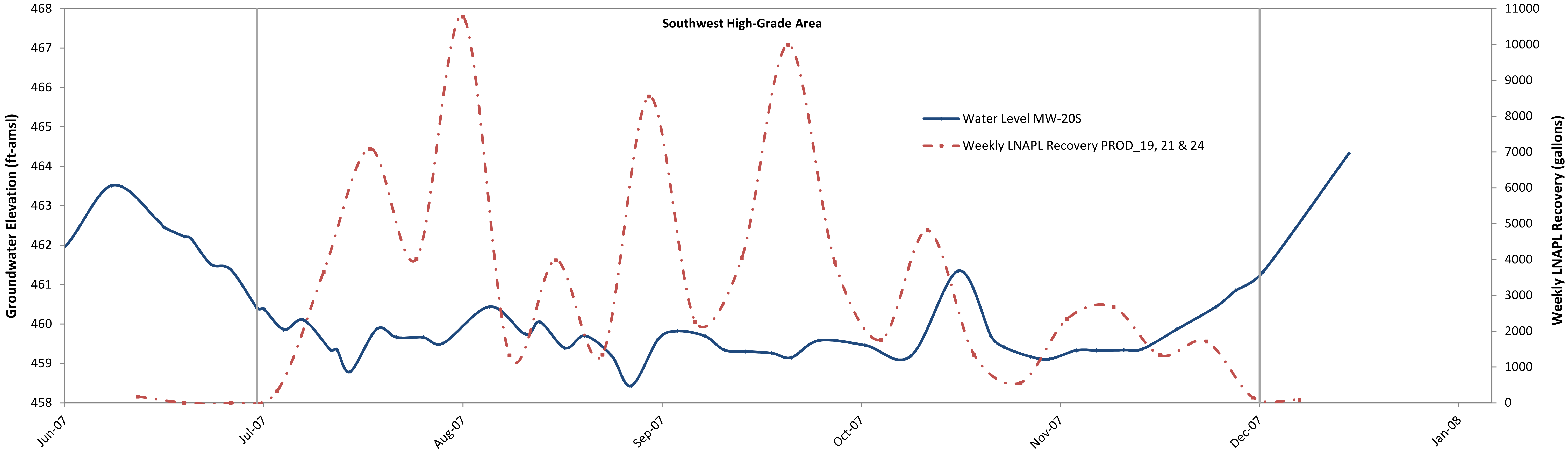
FIGURE 4-4

HIGH-GRADE EFFECTIVE DRAWDOWN MAP
SEPTEMBER 26, 2012

SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: BR	Checked By: TA	Scale: 1" = 300'	Date: 6/5/13	File: Fig4-4_DrawDown_PROD19.mxd

FIGURE 4-5. MW-20S 2007 vs. 2012 SOUTHWEST HIGH-GRADE COMPARISON
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



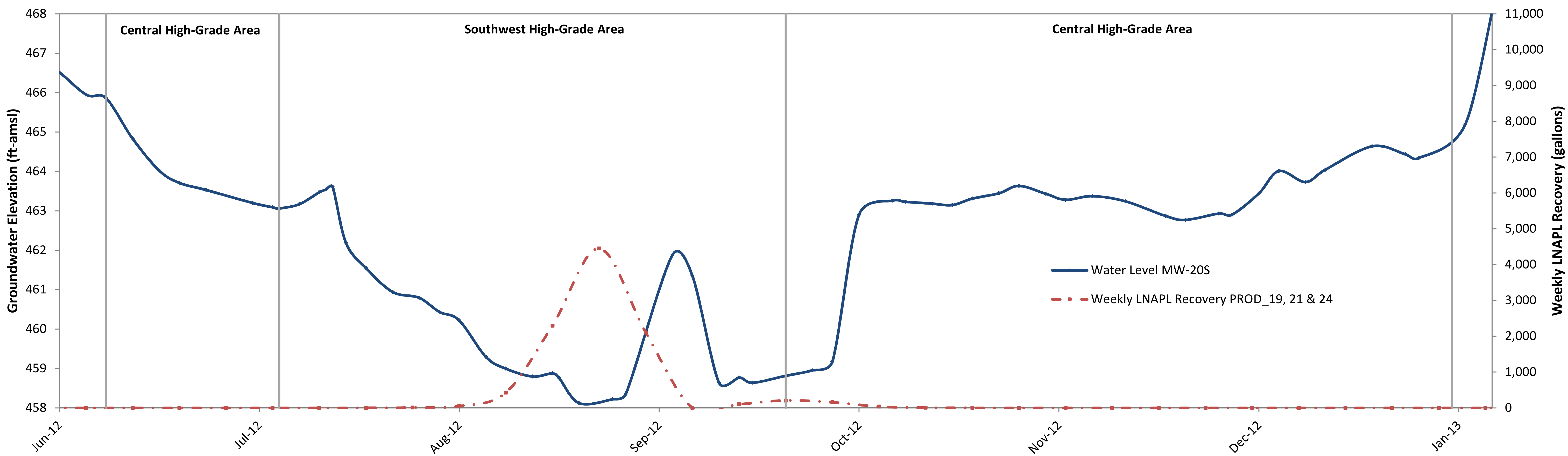
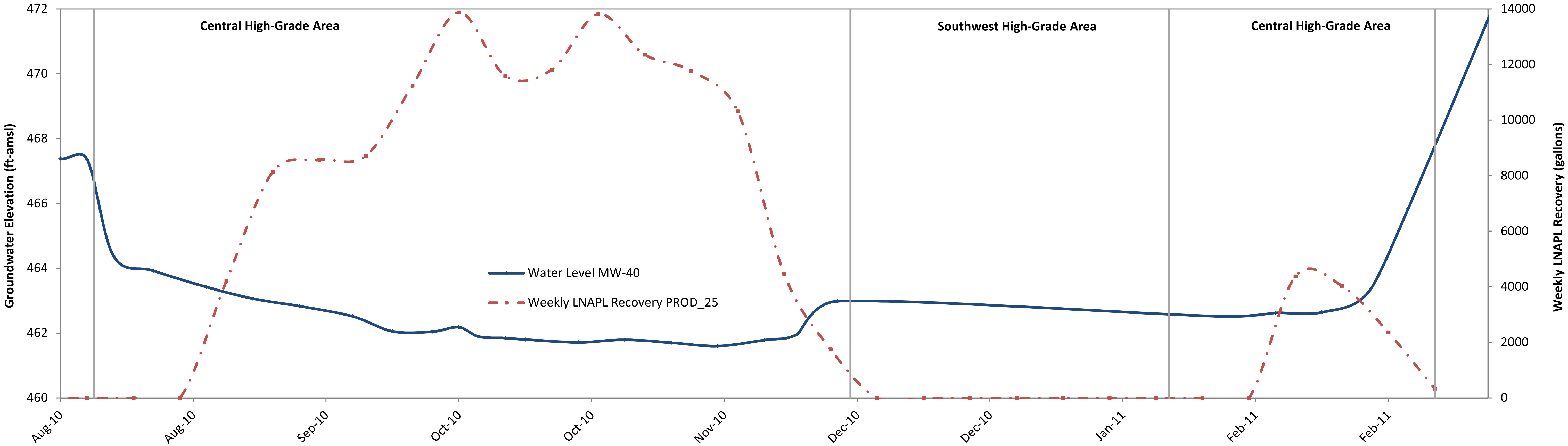
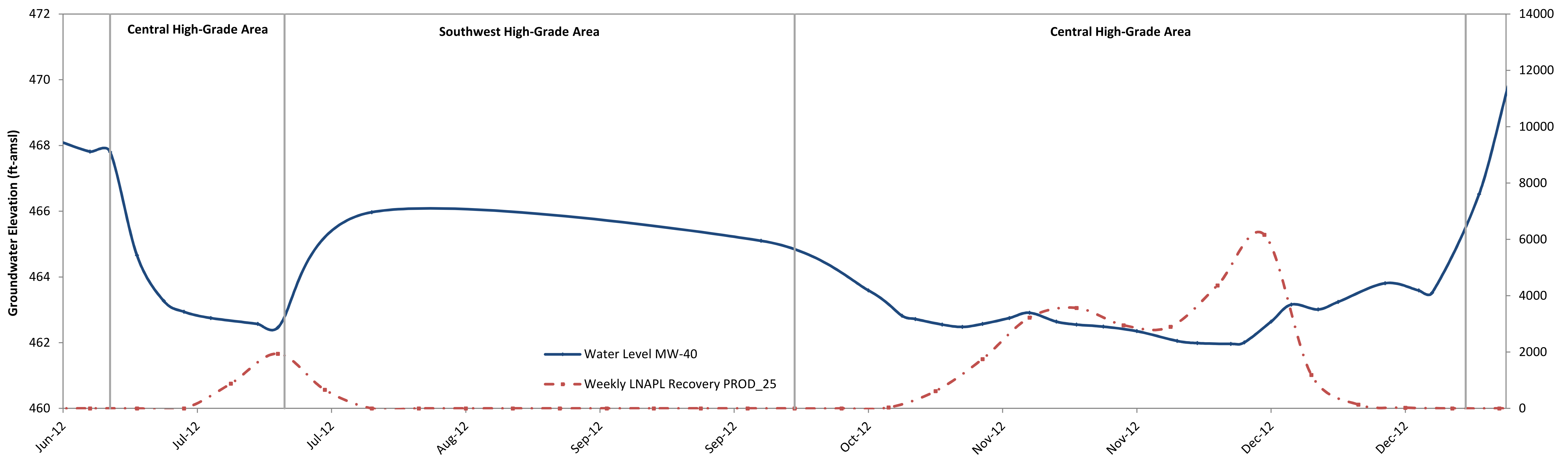
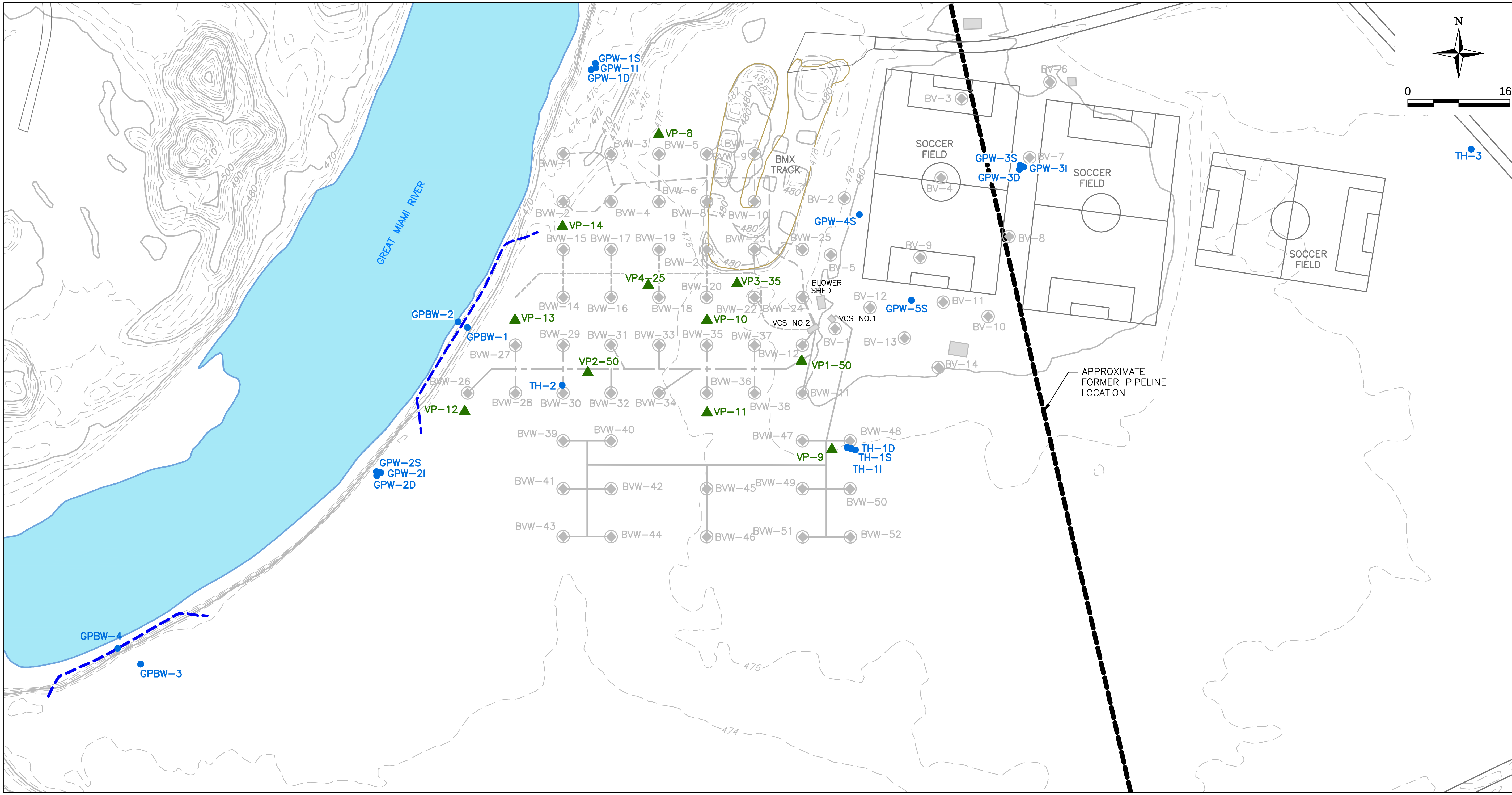


FIGURE 4-6 MW-40 2010 vs. 2012 CENTRAL AREA HIGH-GRADE COMPARISON
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO







EXPLANATION

GPW–2D	GROUNDWATER MONITORING WELL AND DESIGNATION
VP2–25	SOIL VAPOR MONITORING PROBE AND DESIGNATION
BVW–26	BIOVENT WELL AND DESIGNATION
	EXPANDED BIOVENTING SYSTEM PIPE RUN #1
	EXPANDED BIOVENTING SYSTEM PIPE RUN #2
	EXPANDED BIOVENTING SYSTEM PIPE RUN #3
	EXPANDED BIOVENTING SYSTEM PIPE RUN #4
	SHEET PILE BARRIER WALL
480	GENERAL TOPOGRAPHIC CONTOUR (FT-AMSL, INTERVAL 2 FEET, DASHED WHERE INFERRED)
	BUILDING, TANK OR OTHER STRUCTURE
	ROAD
VCS	VALVE CONTROL SHED
FT AMSL	FEET ABOVE MEAN SEA LEVEL

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FIGURE 5-1

GULF PARK LAYOUT

SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP | Checked By: JGP | Scale: 1"=160' | Date: 5/29/13 | File: 500GP_LAYOUT201305

TABLE 5-2. HYDROGRAPHS AND TRIGGER LEVELS FOR WELLS TH-2 AND GPW-5S (2006-2012)
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

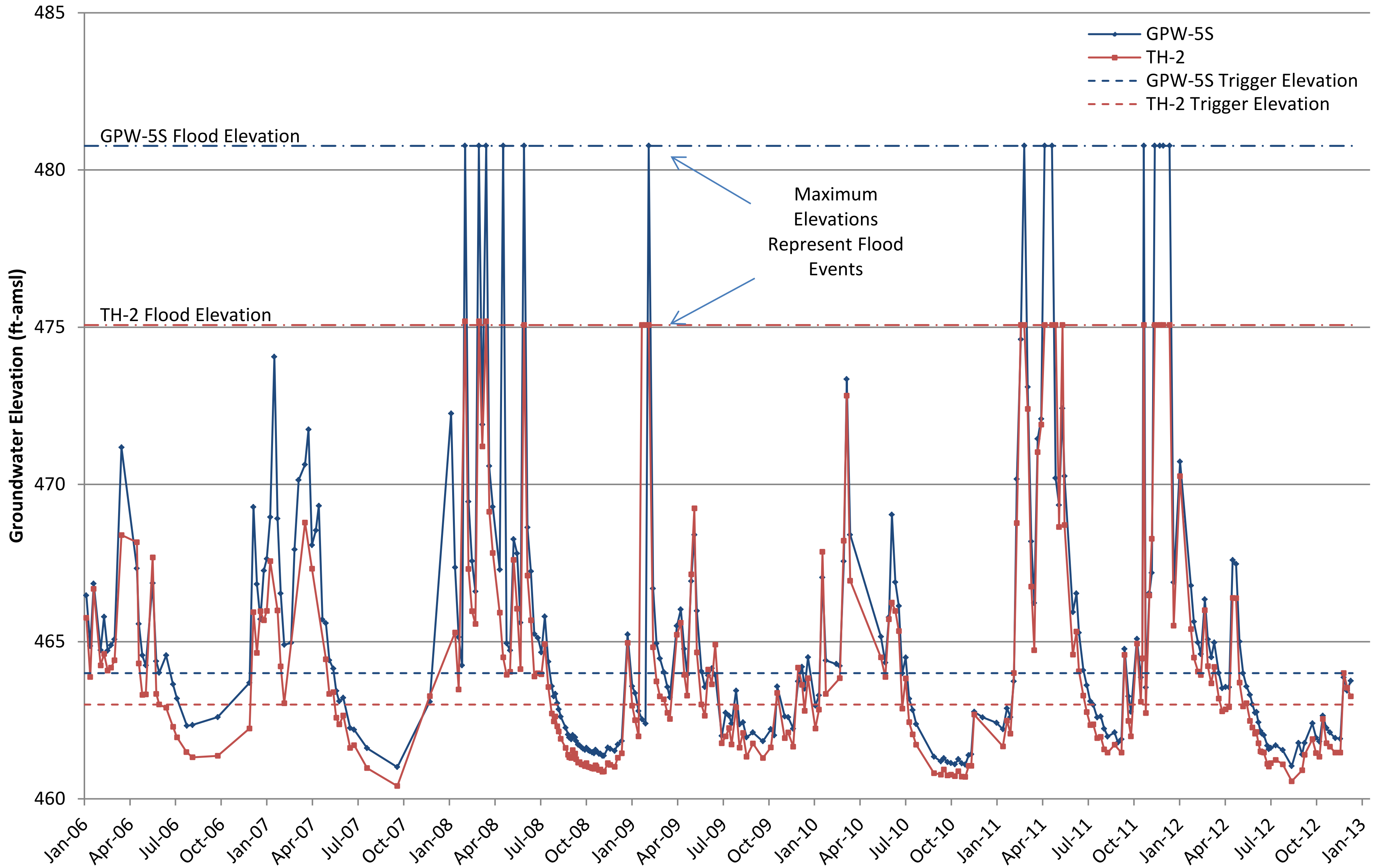


FIGURE 5-3. TOTAL BTEX CONCENTRATION VERSUS TIME FOR MONITORING WELLS GPW-1S THROUGH GPW-5S
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

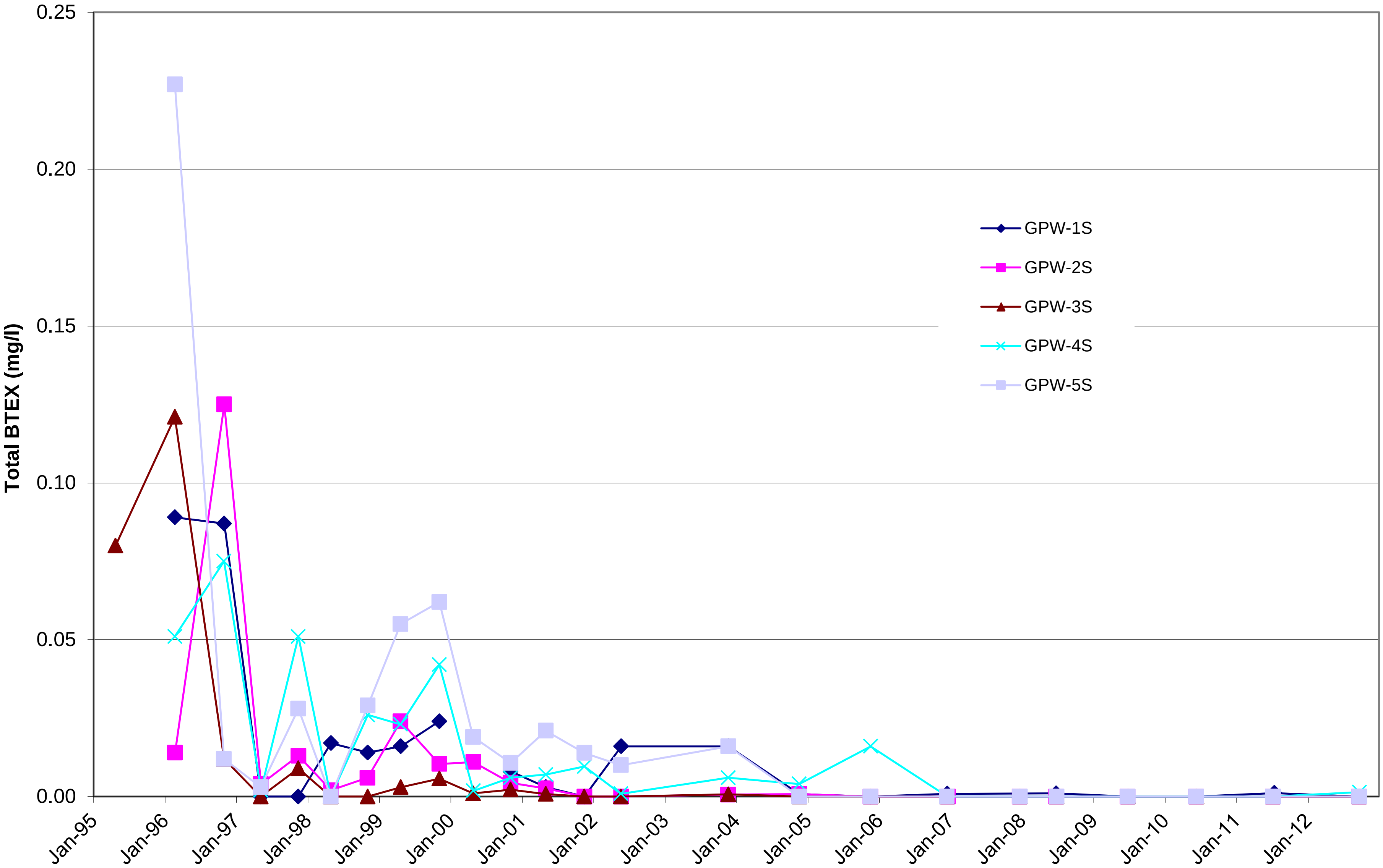


FIGURE 5-4. TOTAL BTEX CONCENTRATION VERSUS TIME FOR MONITORING WELL TH-1S
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

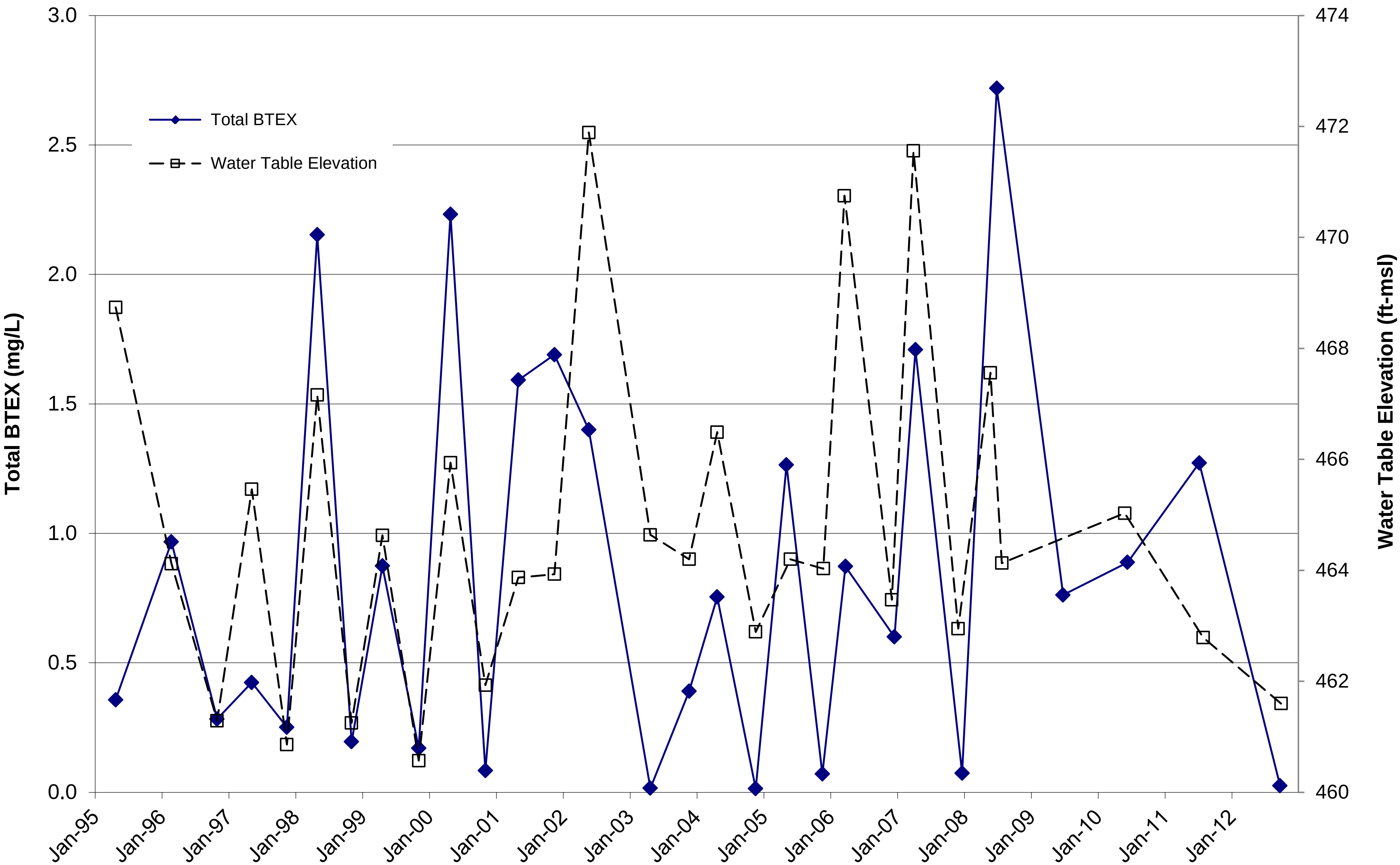
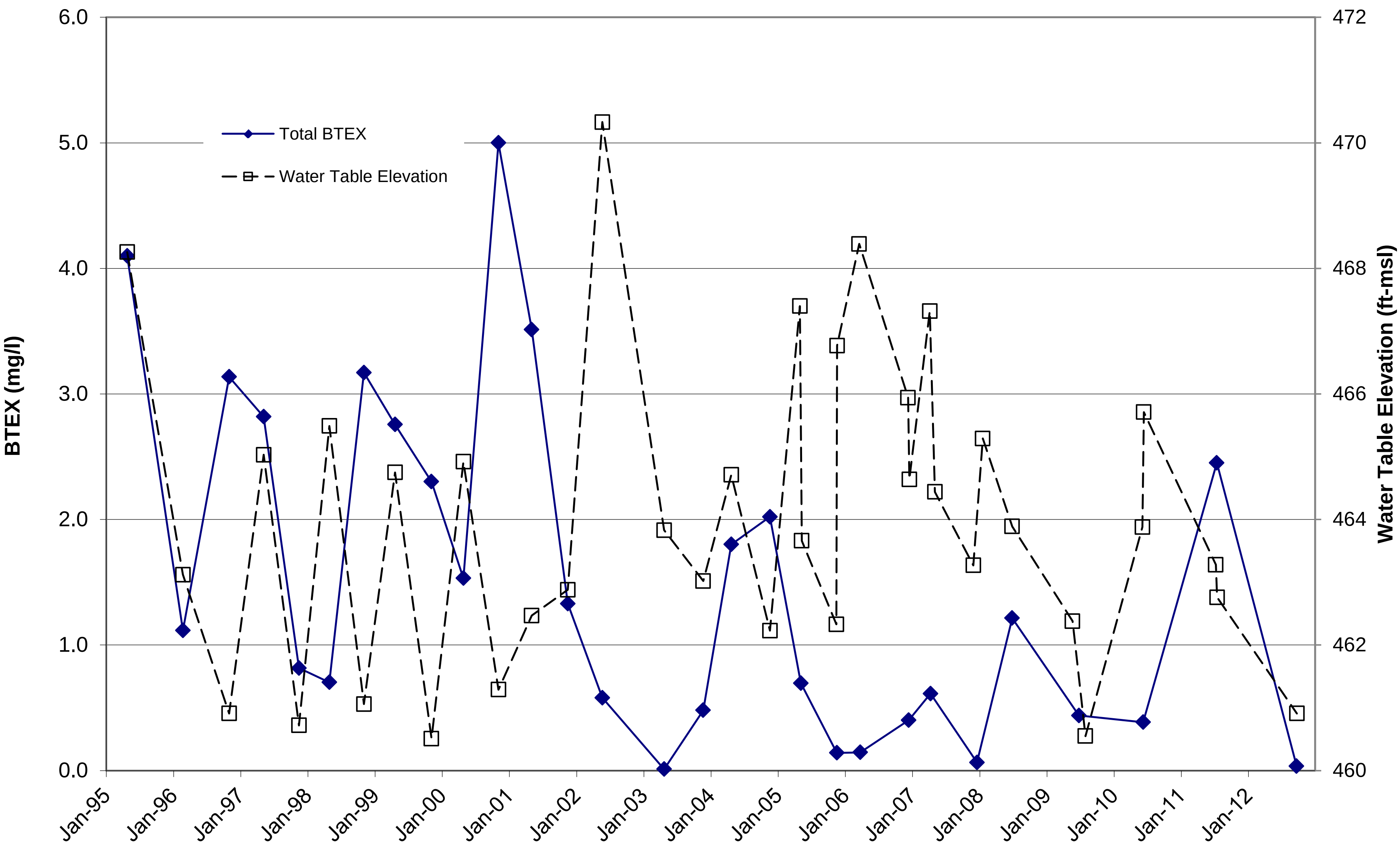
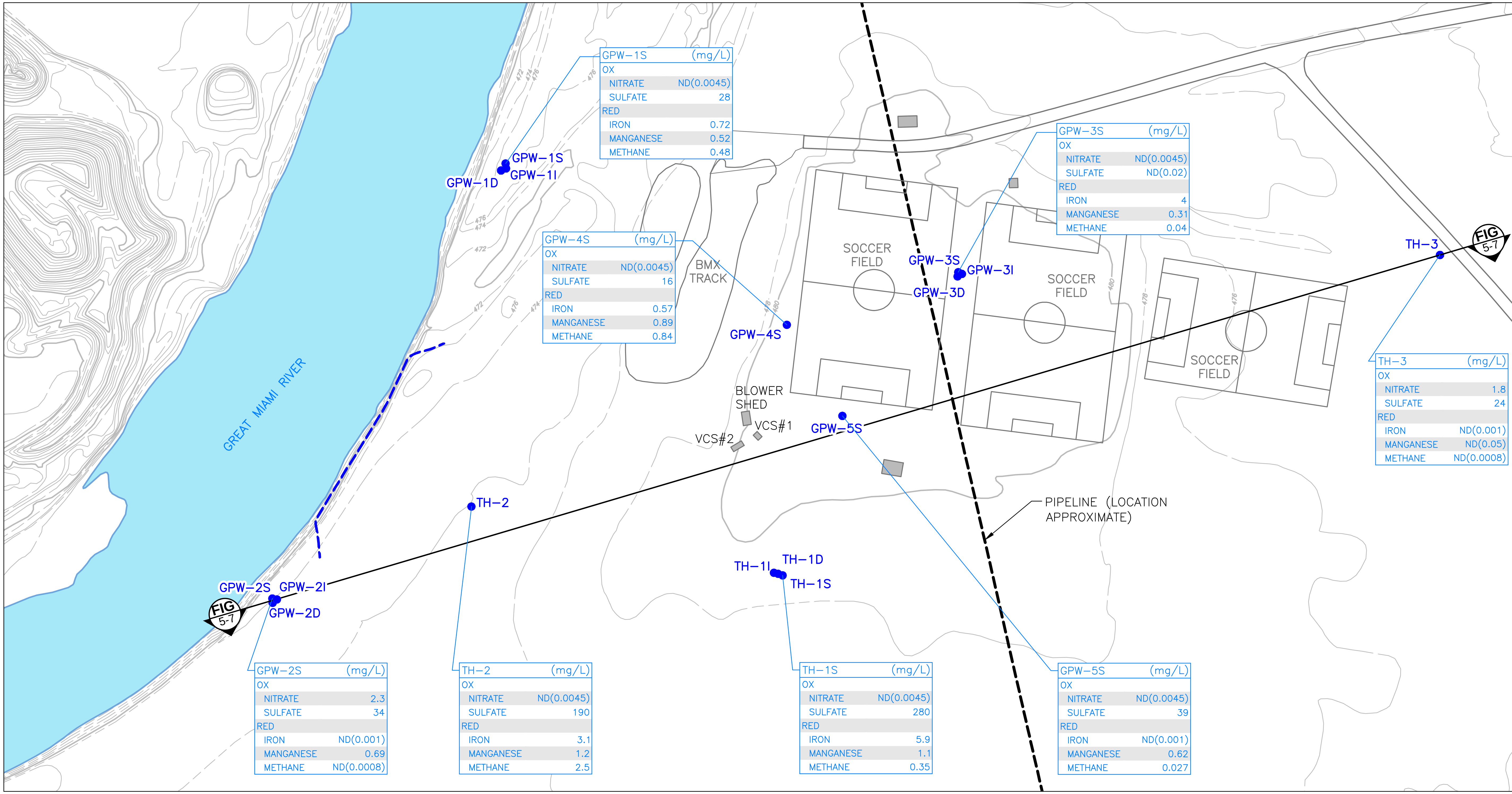


FIGURE 5-5. TOTAL BTEX CONCENTRATION VERSUS TIME FOR MONITORING WELL TH-2
SECOND 2012 SEMIANNUAL MONITORING PERIOD
GULF PARK, CLEVES, OHIO





EXPLANATION

● GPW–2S	SHALLOW GROUNDWATER MONITORING WELL AND DESIGNATION	FT AMSL	FEET ABOVE MEAN SEA LEVEL
(grey box)	STRUCTURE	mg/L	MILLIGRAMS PER LITER
(solid line)	ROAD	VCS	VALVE CONTROL SHED
(dashed blue line)	SHEET PILE BARRIER WALL		
—480—	GENERAL TOPOGRAPHIC CONTOUR (FT AMSL, INTERVAL 2', DASHED WHERE INFERRED)		

N

0 150'

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FIGURE 5-6

SUMMARY OF GROUNDWATER OXIDATION AND REDUCTION SPECIES

SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP | Checked By: JGP | Scale: 1" = 150' | Date: 5/29/13 | File: 500GP_OXRED201305

FIGURE 5-7. GULF PARK TOTAL BTEX AND NATURAL ATTENUATION INDICATOR CONCENTRATION VS. DISTANCE
SECOND 2012 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO