Robert Speer, P.E.
Project Manager

Chevron Environmental Management Company
4800 Fournace Place
BOB/E536C
Bellaire, TX 77401
Tel 713-432-2142
Fax 866-677-7255
RSpeer@chevron.com

January 18, 2013

Mr. Andrew Fan
Project Manager
Technical Support Branch (3LC20)
Land and Chemicals Division
United States Environmental Protection Agency, Region III
1650 Arch Street
Philadelphia, PA 19103-2029

RE: Transmittal of Semi-Annual Progress Report: July through December 2012
Former Chevron Facility 122208
5801 Riggs Road, Chillum, Maryland

Dear Mr. Fan:

Pursuant to Section VI, Paragraph E of the Administrative Order (U.S. Environmental Protection Agency [EPA] Docket Number RCRA-03-2008-0355TH), Chevron is submitting one copy of the referenced document for your review.

All data from the July 2012 through December 2012 semi-annual sampling event are provided, including trend analysis figures, groundwater potentiometric surface maps, and groundwater concentration contour maps. In addition, a summary of the remedy construction is also provided.

If you have any questions, please feel free to contact me at 713-432-2142.

Sincerely,

Rob Speer

Robert Speer, P.E.
Project Manager

cc: Mr. Raymond Montero, DDOE
Mr. C. Ralston, MDE
B. Chapman, GF

SEMI-ANNUAL PROGRESS REPORT

FORMER CHEVRON FACILITY NO. 122208
5801 RIGGS ROAD, CHILLUM, MARYLAND
JULY 2012 THROUGH DECEMBER 2012

1.0 INTRODUCTION

Pursuant to the U.S. Environmental Protection Agency (EPA) Administrative Order, Docket Number RCRA-03-2008-0355TH (AO), Chevron U.S.A. Inc. (Chevron) is conducting work at, and adjacent to, the former Chevron Service Station (Facility No. 122208) located at 5801 Riggs Road, Chillum, Maryland (the site). In accordance with Section VI, Paragraph E, subsection 3(c) of the AO, Chevron has prepared this Semi-Annual Progress Report (Report) to describe actions taken by Chevron pursuant to the AO. The reporting period for this report is July through December 2012.

The remainder of the Report is divided into the following eight sections and five appendices:

- Section 2.0 - Work Conducted During the Reporting Period
- Section 3.0 - Summary of Findings
- Section 4.0 - Permit Compliance
- Section 5.0 - Summary of Deviations from Approved Plans, Problems Encountered, and Corrective Actions Taken
- Section 6.0 - Summary of Meetings with Public and Government
- Section 7.0 - Changes in Key Personnel During the Reporting Period
- Section 8.0 - Projected Work for the Next Reporting Period
- Section 9.0 - References
- Tables
  - Table 1: Summary of Soil and Groundwater Monitoring Plan
- Figures
  - Figure 1: Cumulative Total Hydrocarbons Recovered and Groundwater Treated Since 1990
  - Figures 2-7: Groundwater Contour and Iso-Concentration Maps
  - Figures 8-25: Benzene and MTBE Trend Analyses
- Appendix A - Dual-Phase Extraction System-Groundwater Extraction Data
  - Figure: Process and Instrumentation Diagram
  - Table A-1: Total Fluids Extraction System Data
  - Table A-2: Total Fluids Extraction System Influent Analytical Results
  - Table A-3: Total Fluids Extraction System Effluent Analytical Results
  - Table A-4: Air Stripper Vapor Carbon Influent Analytical Results
  - Table A-5: Air Stripper Vapor Carbon Effluent Analytical Results
- Appendix B - Dual-Phase Extraction System-Soil Vapor Extraction Data
  - Figure: Process and Instrumentation Diagram
  - Table B-1: Soil Vapor Extraction System Data
  - Table B-2: Soil Vapor Extraction System Influent Analytical Results
  - Table B-3: Soil Vapor Extraction System Effluent Analytical Results
- Appendix C - Groundwater Monitoring Data
  - Table C-1: Groundwater Elevation Data
  - Table C-2: Groundwater Analytical Results
- Appendix D - Soil Vapor Sampling Data
  - Table D-1: Soil Vapor Monitoring Report
- Appendix E - Vapor Mitigation System Data
  - Table E-1 VMS Monitoring Data
- Appendix F – Mann Kendall Statistical Analysis

2.0 WORK CONDUCTED DURING THE REPORTING PERIOD

This section provides a summary of work conducted at the site during the reporting period.

2.1 Site Monitoring Work Conducted

The EPA-approved Interim Monitoring Sampling Plan calls for monthly gauging of ten monitoring wells, semi-annual gauging of all monitoring wells, semi-annual sampling of 72 monitoring wells, and semi-annual sampling of the four soil vapor wells (Table 1). Monthly groundwater gauging was conducted on July 30, August 20, September 5, October 8, November 19, and December 5, 2012. The semi-annual groundwater sampling event (with groundwater gauging) was conducted on September 5, 2012. Semi-annual soil vapor sampling was conducted on May 10, 2012.

2.2 Corrective Measures Conducted

Corrective measures activities were conducted during the reporting period. These activities are listed below followed by a general description:

- Continued operation and maintenance of the Area A Dual Phase Extraction (DPE) System; and

- Continued operation and maintenance of the vapor mitigation system at one residence.

Overview of the Area A Dual Phase Extraction System

The DPE system consists of total fluids extraction and treatment and soil vapor extraction and treatment. The process and instrumentation diagram (P&ID) for the system (Appendix A) provides specific system information, such as equipment models and sizes, piping sizes, controls, and other technical information.

Total Fluids Recovery and Treatment

Pneumatic total fluids (i.e., groundwater and Liquid Phase Hydrocarbons [LPH], if present) pumps are installed in 11 DPE wells (RW-1, RW-2, RW-3, RW-4, RW-5, MW-7, MW-17, MW-22R, GP-27R, GP-39R and PTW-B). Total fluids are pumped from wells through buried piping to the total fluids manifold located in the treatment system compound, adjacent to the service station. The total fluids manifold leads to a coalescing-type oil/water separator. Level sensors in the oil/water separator control a centrifugal pump that intermittently transfers the water to an air stripper. LPH accumulate in the separator and are periodically skimmed off mechanically (if present). Effluent air from the air stripper is treated using two granular activated carbon (GAC) vessels in series and then discharged to the atmosphere in accordance with Maryland Department of the Environment (MDE) Air Quality General Permit to Construct for Groundwater Air Stripping Identification No. 033-9-1160. Treated water from the air stripper is pumped through two bag filters and then through two GAC vessels in series. The polished effluent flows through a buried pipe to a storm drain inlet located in Riggs Road near the intersection at Eastern Avenue, N.E. in accordance with MDE General Discharge Permit No. 2008 OGR-8514.

Soil Vapor Recovery and Treatment

Soil vapor extraction (SVE) is conducted at 12 wells (i.e., the 11 DPE wells plus MP-7). An individual piping leg runs from each well to a common 3-inch manifold in the remediation system compound. The manifold leads to a moisture knockout tank and then to the blower. The blower is a rotary lobe, positive displacement blower controlled by a variable frequency drive. Soil vapor is blown from the blower to a catalytic oxidizer for treatment. Treated air is discharged to the atmosphere in accordance with MDE Air Quality General Permit to Construct for Soil Vapor Extraction Equipment Identification No. 033-9-1164.

Area A DPE System Monitoring

The DPE System was visited every week during the reporting period. The following activities were conducted during each site visit:

- Recording groundwater and air flow rates;
- Measuring air influent and effluent concentrations using a flame ionization detector;
- Recording the manifold vacuum for the SVE system; and
- Conducting equipment maintenance tasks as needed, including checking the oil level of the SVE blower and air compressor, draining the air compressor, changing the bag filters, and skimming off LPH in the oil/water separator, if present.

The groundwater influent (SP-1) was sampled 6 times and the effluent (SP-3) was sampled 21 times for laboratory analysis during the reporting period (Appendix A). Effluent groundwater samples were analyzed by EPA Method 8260 for benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tert-butyl ether (MTBE), tetrachloroethene, trichloroethene, and 1,2-cis-dichloroethene. The permit limits are 100 µg/L for total BTEX and 5 µg/L for benzene. The discharge permit requires reporting of MTBE, tetrachloroethene, trichloroethene, and 1,2-cis-dichloroethene concentrations without establishing limits.

The air stripper effluent air was sampled four times during the reporting period (Appendix A). Air samples were collected before treatment (SP-50) and after treatment using the vapor carbon vessels (SP-52). The samples were analyzed for BTEX using EPA Method TO-15 and for total recoverable petroleum hydrocarbons (TRPH) in the C_4 to C_{10} range using Method TO-3. The air permit discharge limits are 20 pounds of volatile organic compounds per day and 0.02 pounds of benzene per hour.

The soil vapor extraction system influent (SP-100) and effluent (SP-200) both were sampled six times during the reporting period and submitted for laboratory analysis to document compliance with the air discharge permit (Appendix B). The treated effluent air sampling port (SP-200) is located in the catalytic oxidizer effluent stack before discharge to the atmosphere. Samples were analyzed for BTEX using EPA Method TO-15 and for TRPH in the C_4 to C_{10} range using Method TO-3. The air permit discharge limits are 20 pounds of volatile organic compounds per day and 0.02 pounds of benzene per hour.

Operations and Maintenance of Vapor Mitigation Systems (VMS)

A total of three annual VMS monitoring sampling events and related VMS inspections have been completed at 746 Oglethorpe Street and 5824 Eastern Avenue. There were no exceedances of the EPA Indoor Air Standards with the system on or with the system off during three consecutive years of sampling at these residences. EPA approved discontinuing operation and monitoring of the VMS at both 746 Oglethorpe Street and 5824 Eastern Avenue on August 14, 2012. However, only two monitoring events were conducted at 5818 Eastern Avenue due to site access constraints. Therefore, EPA requested one final round of sampling at this residence, which will be completed during the Spring of 2013.

Mann Kendall Analysis

A Mann Kendall analysis of groundwater monitoring wells data trends is presented in Appendix F. Newer monitoring wells with less than 4 sample results were not analyzed due to insufficient data.

2.3 Corrective Measures Conducted

The following Corrective Measures activities were conducted during this period:

Area A (near the service station) Construction

- Replaced liquid level detector for angle well RW-5 vault sump;
- Started normal operation of angle well RW-5; and
- Replaced broken tray in air stripper.
- Repositioned liquid level detector inside RW-5 vault and installed a large vacuum gauge at the well head legible from outside of the vault.
- Replaced and restarted the oil/water separator transfer pump.
- Repaired fencing in system perimeter security fence that had been damaged during an apparent break in.

Area B (Oglethorpe Street Alley) Construction

- Connection to DC power grid completed by Pepco.
- Performed initial shakedown of ISGR-2 and troubleshooting session of ISGR system.

Area C (Nicholson Street Alley) Construction

- Performed maintenance on the vault containing the oxygen tank to correct difficulties with locking the vault.
- Completed punchlist items.
- Oxygen sensor was determined to be faulty and sent back to the manufacturer for repair.

2.4 Submittal of Deliverables

Chevron submitted the following deliverables to EPA during the reporting period:

- Semi-Annual Progress Report for January 2012 through June 2012 on July 18, 2012;
- Corrective Measures Construction Report for Area A: Dual Phase Extraction System Expansion on July 19, 2012; and
- Annual Vapor Mitigation System Indoor Air Sampling Report – Year 3, 2012 on July 5, 2012.

3.0 SUMMARY OF FINDINGS

This section provides a summary of findings and results for the corrective measures activities described in Section 2.2.

On-going Operation of the DPE System

The operating hours for both the total fluids and SVE portions of the DPE system were logged regularly during the reporting period by collecting measurements from the solenoid and hour meter, respectively. For the period of July 1, 2012 through December 31, 2012, the total fluids extraction portion of the system was operating 90 percent of the time (2,617 hours on and 293 hours off). During the same time period, the SVE portion of the system was operating 78.9 percent of the time (3,427.6 hours on and 915.7 hours off).

Table A-1 in Appendix A contains groundwater extraction system performance data including date and time, on/off status, totalizer reading, cumulative gallons of hydrocarbons recovered, operating extraction points, maintenance information, reasons for system downtime, and types of maintenance performed during this reporting period and the previous period (January 1, 2012 through December 31, 2012). A detailed explanation of the tables is provided on the first page of Appendix A. A P&ID is also included in Appendix A.

The groundwater extraction portion of the DPE system pumped approximately 1,140,536 gallons of groundwater and recovered 6.2 equivalent gallons of dissolved hydrocarbons during the reporting period. The average system flow rate over the entire period was 4.5 gallons per minute (gpm). The total volume of groundwater pumped from this site since remediation began in 1989 is approximately 61,612,780 gallons.

The analytical results for groundwater samples collected at sample point SP-3 (treated groundwater that is discharged to the storm drain) (Table A-3 in Appendix A) indicated concentrations of benzene and BTEX in the treated groundwater were below the permit limits (5 µg/L benzene and 100 µg/L BTEX) during the reporting period.

The laboratory analytical results for monthly air stripper samples collected at sample points SP-50 (air stripper effluent) (Appendix A, Table A-4) and SP-52 (treated vapor that is discharged to the atmosphere) (Appendix A, Table A-5) indicated concentrations of benzene and TRPH in the treated vapor were well below the permit limits. The permit limits are 0.02 pounds per hour of benzene and 20 pounds per day of volatile organic compounds measured as TRPH.

Tables B-1, B-2, and B-3 in Appendix B contain the soil vapor extraction system performance data collected for the reporting period, including date and time, manifold air flow readings, manifold vacuum readings, influent and effluent screening concentrations measured using a flame ionization detector (FID), cumulative gallons of hydrocarbons recovered, and other information. A detailed explanation of the tables is provided on the first page of Appendix B. The P&ID is included in Appendix A.

The soil vapor extraction portion of the DPE system recovered 81.4 equivalent gallons of hydrocarbons in the vapor phase during the reporting period. The average air flow rate was 134.6 standard cubic feet per minute (scfm) when the system was on (excluding down time).

The laboratory analytical results for monthly SVE system samples collected at sample points SP-100 (soil vapor influent) (Appendix B, Table B-2) and SP-200 (treated soil vapor that is

discharged to the atmosphere) (Appendix B, Table B-3) indicated concentrations of benzene and TRPH in the treated soil vapor were well below the permit limits. The permit limits are 0.02 pounds per hour of benzene and 20 pounds per day of volatile organic compounds measured as TRPH.

Hydrocarbon Recovery Summary for Period and Cumulative Total for System

Period	Liquid-Phase Hydrocarbons (gallons)	Dissolved-Phase Hydrocarbons (eq. gallons)	Vapor-Phase Hydrocarbons (eq. gallons)	Cumulative Total Hydrocarbons (eq. gallons)
7/1/12 through 12/31/12	0.00	6.2	81.4	87.6
Cumulative Total for System	856.5	931.3	6,166.2	7,954.0

The volume of groundwater treated and the corresponding volume of hydrocarbons collected for the entire time the system has been operating on a quarter by quarter basis continued to be tracked (Figure 1).

Groundwater Monitoring

The fall semi-annual sampling event for the Maryland and D.C. wells was conducted in October 2012. The analytical results for groundwater sampling events for the past year are provided in Appendix C, Tables C-1, and C-2, respectively. A detailed explanation of the table is provided on the first page of Appendix C.

Groundwater contour maps were created using data from the comprehensive gauging of all wells that was completed on September 5, 2012 (Figures 2 and 3). Groundwater concentration maps were created using analytical results from the October sampling event (Figures 4 through 7).

Passive Sampling Using the HydraSleeve™

The use of HydraSleeve passive samplers was approved by DDOE and EPA for use during the April/May 2012 semi-annual sampling event. Groundwater samples were collected from 14 wells (GP-30A, MW-20, MW-21, MW-24A, MW-24B, MW-26A, MW-6, MW-30R, MW-41B, MW-45, MW-46, MW-49, and MW-55) using the HydraSleeve passive samplers.

Soil Vapor Monitoring

Soil vapor sampling was conducted once during the reporting period in October 2012. Sampling was completed using Summa-type vacuum canisters and flow controllers provided by Air Toxics, Ltd. of Folsom, California. 1,1-Difluoroethane was used as a tracer compound during sampling as an indicator of sample train leakage. Additionally, a calibrated GEM-2000 landfill gas meter was used to measure concentrations of carbon dioxide, methane, and oxygen at each vapor well location immediately following soil vapor sample collection. The soil vapor analytical results for the current reporting period and the preceding year are provided in Table D-1 in Appendix D.

During the October 2012 sampling event, soil vapor samples were collected from vapor wells VW-01, VW-02, and VW-03. In addition, an ambient air sample was collected in the vicinity of

VW-02. No samples could be obtained from soil vapor well VW-04 due to the presence of water in the vapor sampling tubing. Hydrocarbons were detected above laboratory reporting limits in the sample collected from VW-01. Additionally, measurements collected using the GEM-2000 landfill gas meter revealed the presence of depressed oxygen concentrations in soil vapor relative to ambient air (i.e., less than 21 percent oxygen), which indicated that biodegradation was likely occurring in the vadose zone. In sample VW-03, an abundant amount of methane and Carbon Dioxide were recorded by the GEM-2000 with oxygen absent or below detectable levels.

VMS Monitoring

The 2012 annual VMS indoor air sampling event was conducted at 5824 Eastern Avenue, 746 Oglethorpe Road, and 5818 Eastern Avenue during the previous reporting period and the results were included in the Semi-Annual Progress Report submitted July 18, 2012. The VMS monitoring results are provided in Table E-1 in Appendix E. All cross-slab differential pressure readings were sufficiently negative at the residences, indicating that the systems were operating as designed at that time. EPA subsequently approved discontinuing operation of the 5824 Eastern Avenue and 746 Oglethorpe Road systems on August 14, 2012. One final annual sampling event for the 5818 Eastern Avenue residence is scheduled for the Spring of 2013, although access was not obtained during this reporting period.

4.0 PERMIT COMPLIANCE

Permits required for activities during this reporting period are described below.

Permits for Operation of the Area A DPE System

Permit numbers 033-9-1160 Air Quality General Permit for Groundwater Air Stripping effluent and 033-9-1164 Air Quality General Permit for Soil Vapor Extraction Equipment effluent were required. Neither of these permits has an expiration date. Sampling and monitoring requirements include periodic effluent monitoring as described in Sections 2 and 3.

Permit number 2008-OGR-8514 General Discharge Permit was issued for discharge of treated groundwater at the site. This permit became effective on January 31, 2008, and expired on December 12, 2012. A new permit will be issued in 2013 while operation is continued under the existing one. The permit requires weekly effluent sampling, system monitoring, and submission of a quarterly Discharge Monitoring Report.

Permits for Remedy Construction

The various permits required for construction activity were not renewed as construction work is substantially complete.

Permits for Groundwater Monitoring and Operation and Maintenance of Systems

Permit number PA10045396-R1 for Public Space Occupancy was issued to cover traffic control requirements for sampling, gauging, and O&M of Areas B and C and expired on December 7, 2012. A permit renewal package was submitted to DCRA on November 22, 2012 and was approved December 12, 2012.

5.0 SUMMARY OF DEVIATIONS FROM APPROVED PLANS, PROBLEMS ENCOUNTERED, AND CORRECTIVE ACTIONS TAKEN

Applications for power service from the local utility, Pepco, were submitted in February 2011. Pepco completed a design, which included installing new poles to service the systems for Areas B and C. However, at a field meeting conducted at the site on February 13, 2012, Pepco engineers indicated that installing new poles would not be feasible. They decided to run new power supply lines on the existing poles owned by Verizon. Pepco revised their design and required the installation of the system equipment prior to providing the power drop. The electrical installation was completed in June 2012 and inspected by DCRA; copies of the inspection records were sent to Pepco.

6.0 SUMMARY OF MEETINGS WITH PUBLIC AND GOVERNMENT

No meetings were held during the reporting period.

7.0 CHANGES IN KEY PERSONNEL DURING THE REPORTING PERIOD

The following changes in key personnel occurred during the reporting period:

- The DDOE Point of Contact changed from Victoria North to Raymond Montero on July 2, 2012.

8.0 PROJECTED WORK FOR THE NEXT REPORTING PERIOD

The following list identifies projected work to be conducted during the next reporting period, which is January through June 2013:

- Monthly monitoring of the Area A DPE system including influent and effluent sampling;
- Weekly sampling of the Area A DPE system effluent to comply with water discharge permits;
- Monthly gauging of select wells near the service station to check for the presence of LPH and to document drawdown caused by the total fluids extraction system;
- Semi-annual groundwater sampling and gauging event in the fall;
- Routine operations and maintenance activities for the Area A remediation system and the vapor mitigation system at 5818 Eastern Avenue;
- Continue shakedown of the Areas B and C remediation systems;
- Begin operation and maintenance of Area B and Area C;
- Submit Construction Assessment Report for Area A; and
- Submit Construction Completion Reports for Areas B and C.

9.0 REFERENCES

Gannett Fleming, 2008. Interim Measures Work Plan for Vapor Sampling and Mitigation at Residences, Former Chevron Facility 122208, 5801 Riggs Road, Chillum, Maryland. Dated July 2008.

TABLES

Gannett Fleming

Chevron

TABLE 1[(1)] SUMMARY OF GROUNDWATER AND SOIL VAPOR SAMPLING PLAN
FORMER CHEVRON FACILITY NO. 122208
5801 RIGGS ROAD, CHILLUM, MARYLAND

EXISTING WELLS TO BE SAMPLED

Well Identifier	Well Location Category	Petroleum Hydrocarbon Sampling Frequency	Current Sampling Method	Groundwater Gauging Frequency[(2)]	Comment
GP-30A	Dual-Phase Extraction System	Semi-annual	Hydrasleeve	Monthly	
GP-35A	Dual-Phase Extraction System	Semi-annual	Hydrasleeve	Monthly	
MP-7	Dual-Phase Extraction System	None	None	Monthly	Gauge only
MW-5	Dual-Phase Extraction System	Semi-annual	Hydrasleeve	Semi-annual	
MW-7	Dual-Phase Extraction System	Semi-annual	From pump	Monthly	Recovery Well
MW-15	Dual-Phase Extraction System	Semi-annual	Hydrasleeve	Semi-annual	
MW-16	Dual-Phase Extraction System	Semi-annual	Hydrasleeve	Monthly	
MW-17	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Recovery Well
MW-18	Dual-Phase Extraction System	Semi-annual	Bailer	Monthly	
MW-23	Dual-Phase Extraction System	Semi-annual	Hydrasleeve	Semi-annual	
PTW-B	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Recovery Well
RW-1	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Recovery Well
RW-2	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Recovery Well
RW-3	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Recovery Well
RW-4	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Recovery Well
RW-5	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Angled Recovery Well
GP-27R	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Recovery Well
MW-22R	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Recovery Well
GP-39R	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Recovery Well
GP-2E(45-50)	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
GP-2E(55-60)	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
GP-2F(45-50)	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
GP-2F(50-55)	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
GP-7A(30-35)	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
GP-7A(35-40)	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
GP-24A	Dissolved Hydrocarbons	Semi-annual	HydraSleeve	Semi-annual	
GP-41A	Dissolved Hydrocarbons	Semi-annual	HydraSleeve	Semi-annual	
GP-44A	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
MW-24A	Dissolved Hydrocarbons	Semi-annual	Bailer	Monthly	
MW-24B	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	

Gannett Fleming

Chevron

TABLE 1[(1)] SUMMARY OF GROUNDWATER AND SOIL VAPOR SAMPLING PLAN
FORMER CHEVRON FACILITY NO. 122208
5801 RIGGS ROAD, CHILLUM, MARYLAND

Well Identifier	Well Location Category	Petroleum Hydrocarbon Sampling Frequency	Current Sampling Method	Groundwater Gauging Frequency[(2)]	Comment
MW-25A	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
MW-25B	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-26A	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-26B	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-27A	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-27B	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-33A	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	Added at the request of EPA
MW-33B	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-33C	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	Added at the request of EPA
MW-33S	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
MW-38	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-39R	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
MW-40	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-43B	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-44A	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
MW-44B	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-45	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-46	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-47	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
MW-49	Dissolved Hydrocarbons	Semi-annual	Hydrasleeve	Semi-annual	
MW-50	Dissolved Hydrocarbons	Semi-annual	Bailer	Semi-annual	
GP-7A(20-25)	Sentinel	Semi-annual	Bailer	Semi-annual	
GP-9A(20-25)	Sentinel	Semi-annual	Bailer	Semi-annual	
GP-11A(20-25)	Sentinel	Semi-annual	Bailer	Semi-annual	
MW-6	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	
MW-19	Sentinel	Semi-annual	Bailer	Semi-annual	
MW-20	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	Upgradient
MW-21	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	
MW-28A	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	
MW-28B	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	

Gannett Fleming

Chevron

TABLE 1[(1)] SUMMARY OF GROUNDWATER AND SOIL VAPOR SAMPLING PLAN
FORMER CHEVRON FACILITY NO. 122208
5801 RIGGS ROAD, CHILLUM, MARYLAND

Well Identifier	Well Location Category	Petroleum Hydrocarbon Sampling Frequency	Current Sampling Method	Groundwater Gauging Frequency[(2)]	Comment
MW-29A	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	
MW-29B	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	
MW-30R	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	Replacement for MW-30
MW-31B	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	
MW-41A	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	
MW-41B	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	
MW-42	Sentinel	Semi-annual	Bailer	Semi-annual	Upgradient
MW-43A	Sentinel	Semi-annual	Bailer	Semi-annual	
MW-48	Sentinel	Semi-annual	Bailer	Semi-annual	
MW-51	Sentinel	Semi-annual	Bailer	Semi-annual	
MW-53	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	
MW-54	Sentinel	Semi-annual	Bailer	Semi-annual	
MW-55	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	
MW-58	Oxygen Reactive Zone	Semi-annual	Hydrasleeve	Semi-annual	
MW-59	Oxygen Reactive Zone	Semi-annual	Hydrasleeve	Semi-annual	
MW-60	Oxygen Reactive Zone	Semi-annual	Hydrasleeve	Semi-annual	
MW-61A	ISGR System	Semi-annual	Hydrasleeve	Semi-annual	
MW-61B	ISGR System	Semi-annual	Hydrasleeve	Semi-annual	
MW-62A	ISGR System	Semi-annual	Hydrasleeve	Semi-annual	
MW-62B	ISGR System	Semi-annual	Hydrasleeve	Semi-annual	
VW-1	Soil Vapor	Semi-annual	NA	NA	
VW-2	Soil Vapor	Semi-annual	NA	NA	
VW-3	Soil Vapor	Semi-annual	NA	NA	
VW-4	Soil Vapor	Semi-annual	NA	NA	

Footnotes:
(1) This table is adapted from the Interim Measures Sampling Plan, dated April 2006.
(2) All wells will be gauged in the spring and the fall during the Semi-annual sampling events.
(3) Sampling will be conducted in the spring and fall (low and high groundwater conditions).

Gannett Fleming

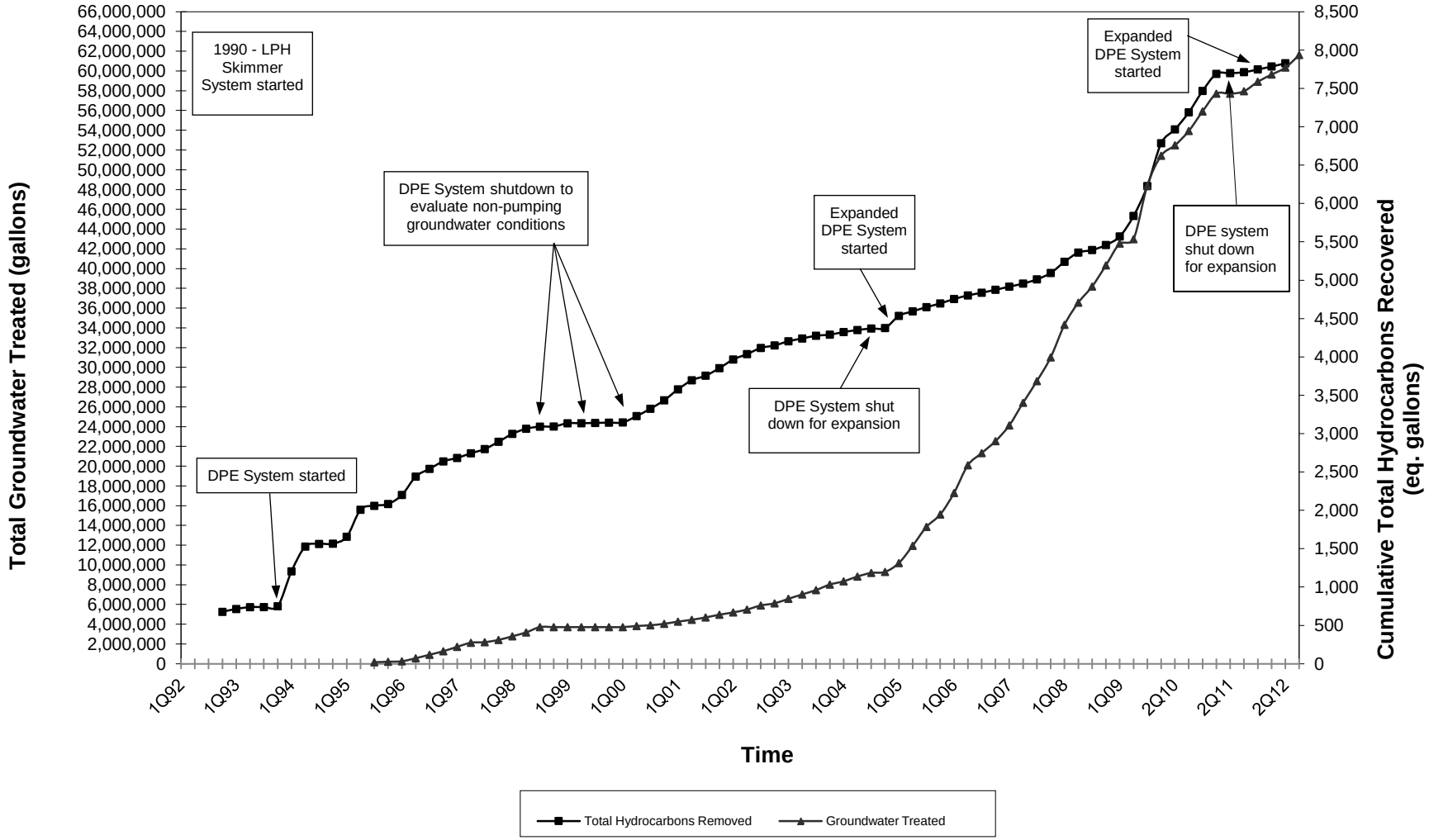
Chevron

TABLE 2: STATUS OF WELLS INSTALLED AS PART OF CONSTRUCTION
FORMER CHEVRON FACILITY NO. 122208
5801 RIGGS ROAD, CHILLUM, MARYLAND

Well Identifier	Well Location Category	Petroleum Hydrocarbon Sampling Frequency	Sampling Method	Groundwater Gauging Frequency[(2)]	Comment
RW-5	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Already sampled.
RW-4	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Already sampled.
GP-27R	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Already sampled.
MW-22R	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Already sampled.
GP-39R	Dual-Phase Extraction System	Semi-annual	From pump	Semi-annual	Already sampled.
MW-30R	Sentinel	Semi-annual	Hydrasleeve	Semi-annual	Already sampled.
ISGR-1	ISGR System	Monthly	As per approved O&M Plan	None	Per approved design plan, ISGR wells are not included in long term monitoring plan. Wells will be monitored as part of O&M.
ISGR-2					
MW-61A	ISGR System	Semi-annual	Hydrasleeve	Semi-annual	Already sampled.
MW-61B	ISGR System	Semi-annual	Hydrasleeve	Semi-annual	Already sampled.
MW-62A	ISGR System	Semi-annual	Hydrasleeve	Semi-annual	Already sampled.
MW-62B	ISGR System	Semi-annual	Hydrasleeve	Semi-annual	Already sampled.
MW-58	Oxygen Reactive Zone	Semi-annual	Hydrasleeve	Semi-annual	Already sampled.
MW-59	Oxygen Reactive Zone	Semi-annual	Hydrasleeve	Semi-annual	Already sampled.
MW-60	Oxygen Reactive Zone	Semi-annual	Hydrasleeve	Semi-annual	Already sampled.
IW-1	Oxygen Reactive Zone	Monthly	As per approved O&M Plan	None	Per approved design plan, oxygen injection wells are not included in long term monitoring plan. Wells will be monitored as part of O&M.
IW-2					
IW-3					
IW-4					
IW-5					

FIGURES

Figure 1
Cumulative Total Hydrocarbons Recovered and Groundwater Treated Since 1990
Semi-Annual Progress Report: JulyThrough December2012
Former Chevron Facility 122208, Chillum, Maryland



N

(139.14)
MW-20

140

138

136

134

132

130

128

126

MW-21
(137.60)

GP-44A
(144.93)

MW-15
(141.38)

VP-4
(NG)

GP-35A
(128.06)

MW-7
(125.40)

RW-3
(123.54)

MW-5
(DRY)

RW-1
(120.63)

MW-13
(135.80)

MW-45
(131.13)

RW-2
(140.96)

RW-4
(121.32)

GP-38A

MP-40

GP-41A
(130.78)

MW-46
(127.18)

MW-6
(136.75)

GP-30A
(130.90)

MW-4
(139.96)

MW-2
(136.92)

PTW-B
(134.38)

MW-12
(132.66)

(134.53)
MP-7 GP-27R
(113.41)

(NG)
GP-39R

MW-47
(125.46)

MW-3
(139.79)

GP-24A
(136.88)

MP-30

PTW-A

MP-20

RW-5

MW-1
(137.33)

MW-16
(130.75)

MW-17
(126.11)

MW-22R
(125.03)

MW-23
(128.18)

Eastern Avenue

MW-18
(135.09)

MW-19
(133.16)

GP-2E(55-60)

GP

Legend

- Former Chevron Facility 122208 Property Line
- Property Lines
- Structures/Sidewalks
- —130— Inferred Groundwater Elevation Contour with General Flow Direction (ft. above mean sea level) Sept. 5, 2012
- (108.0) Shallow Monitoring Well with Groundwater Elevation (ft. above mean sea level) Sept. 5, 2012
- Dual-Phase Extraction Recovery Well
- Soil Vapor Extraction Recovery Well

NOTES:

(1) The system was on during the gauging event.

(2) Recovery Wells were not used to draw groundwater elevation contours.

0 40

SCALE IN FEET

NO.	DESCRIPTION	DATE	BY

REVISIONS

DESIGNED	CADD	SCALE
DKB	DKB	1"=40'
CHECKED	APPROVED	APPROVED
JK	RWS	

Gannett Fleming

BALTIMORE, MARYLAND

2012 SEMI ANNUAL PROGRESS REPORT

FORMER CHEVRON FACILITY NO. 122208
CHILLUM, MARYLAND

Groundwater Potentiometric Surface Map
Remediation System Area
September 5, 2012

JOB NO.	FIGURE
55588	2
DATE: 01/03/13	
CAD FILE: GW CONTOURS 4Q 2012_blrup.dwg	

Eastern Avenue

Oglethorpe Street

Nicholson Street

8th Street

MW-15(141.38)
GP-44A(144.93)
VP-4 (NG)
GP-35A (128.06)
MW-7 (125.40)
RW-3 (123.54)
MW-5 (DRY)
MW-13 (135.80)
RW-1 (120.63)
RW-2 (140.96)
RW-4 (121.32)
MW-4 (139.96)
MW-6 (136.75)
MW-2 (136.92)
MW-3 (139.79)
GP-24A (136.88)
MW-1 (137.35)
GP-30A (130.90)
MW-12 (132.66)
PTW-B (134.38)
RW-5 (NG)
MW-16 (130.75)
MW-17 (126.11)
MW-22R (125.03)
MW-21 (137.60)
MW-45 (131.13)
GP-41A (130.78)
MW-46 (127.18)
MW-47 (125.46)
MW-48 (124.04)
MW-49 (114.06)
MW-50 (118.47)
MW-51 (108.31)
GP-27R (134.53)
MP-7 (113.41)
GP-59R (N6)
MW-23 (128.18)
MW-19 (133.16)
MW-18 (135.09)
GP-2E(50-55)
GP-2E(55-60)
GP-2E(45-50) (124.37)
GP-2F(50-55)
GP-2F(45-50) (110.81)
GP-7A(40-45)
GP-7A(35-40)
GP-7A(30-35)
GP-7A(25-30)
GP-7A(20-25) (137.69)
GP-9A(30-35)
GP-9A(25-30)
GP-9A(20-25) (139.84)
GP-11A(35-40)
GP-11A(30-35)
GP-11A(25-30)
GP-11A(20-25) (140.27)
MW-30R (NG)
MW-24A (136.39)
MW-24B
MW-61A (137.28)
MW-61B
ISGR-1
ISGR-2
MW-25B
MW-25A (123.29)
MW-41A (117.46)
MW-41B
MW-37 (DRY)
MW-62A (NG)
MW-62B
MW-38 (135.86)
MW-39R (128.88)
MW-39
MW-40 (122.16)
MW-42 (131.80)
MW-26B
MW-26A (130.47)
IW-1
IW-2
IW-3
IW-4
IW-5
MW-58 (127.74)
MW-43A (129.44)
MW-43B
MW-44A (117.71)
MW-44B
MW-27A (117.98)
MW-27B
MW-29A (108.09)
MW-29B
MW-53 (109.92)
MW-60 (122.22)
MW-59 (120.01)
MW-31B (129.75)
MW-31A
MW-55 (129.76)
MW-52 (122.62)
MW-33S (119.53)
MW-33A
MW-33B
MW-33C
MW-28B
MW-26A (118.41)
MW-54 (116.17)
130.56
127.67
122.12
119.71
114.85
111.24
110.47
108.35
113.48
110.59
106.86
103.25

Legend

- Former Chevron Facility 122208 Property Line
- Property Lines
- Structures/Sidewalks
- Clay Body
- Inferred Groundwater Elevation Contour (ft. above mean sea level) Sept. 5, 2012
- (108.0) Shallow Monitoring Well with Groundwater Elevation (ft. above mean sea level) Sept. 5, 2012
- Dual-Phase Extraction Recovery Well
- Soil Vapor Extraction Recovery Well
- Oxygen Injection Well
- Sanitary Sewer Manhole
- Storm Drain Manhole
- Storm Drain Inlet
- Sanitary Sewer Pipe
- Storm Drain Pipe
- 102.18 Invert Elevation (Feet) NAVD 88 Sanitary Sewer
- 106.86 Invert Elevation (Feet) NAVD 88 Storm Drain
- The extent of the sanitary sewer & storm drain that likely intercept the water table

NOTES:

(1) MW-50 groundwater elevation not used because the water elevation appears to be perched.

(2) The system was on during the gauging event

(3) MW-20, MW-32, MW-34A, and MW-34B do not appear on this map.

(4) Recovery Wells were not used to draw groundwater elevation contours. MW-12 was not used to draw groundwater elevation contours.

(5) MW-58, MW-59, MW-60, and IW wells are not screened across the water table and were not used to draw groundwater elevation contours.

(6) GP-2F(45-50) was not used to draw groundwater elevation contours.

0 100
SCALE IN FEET

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

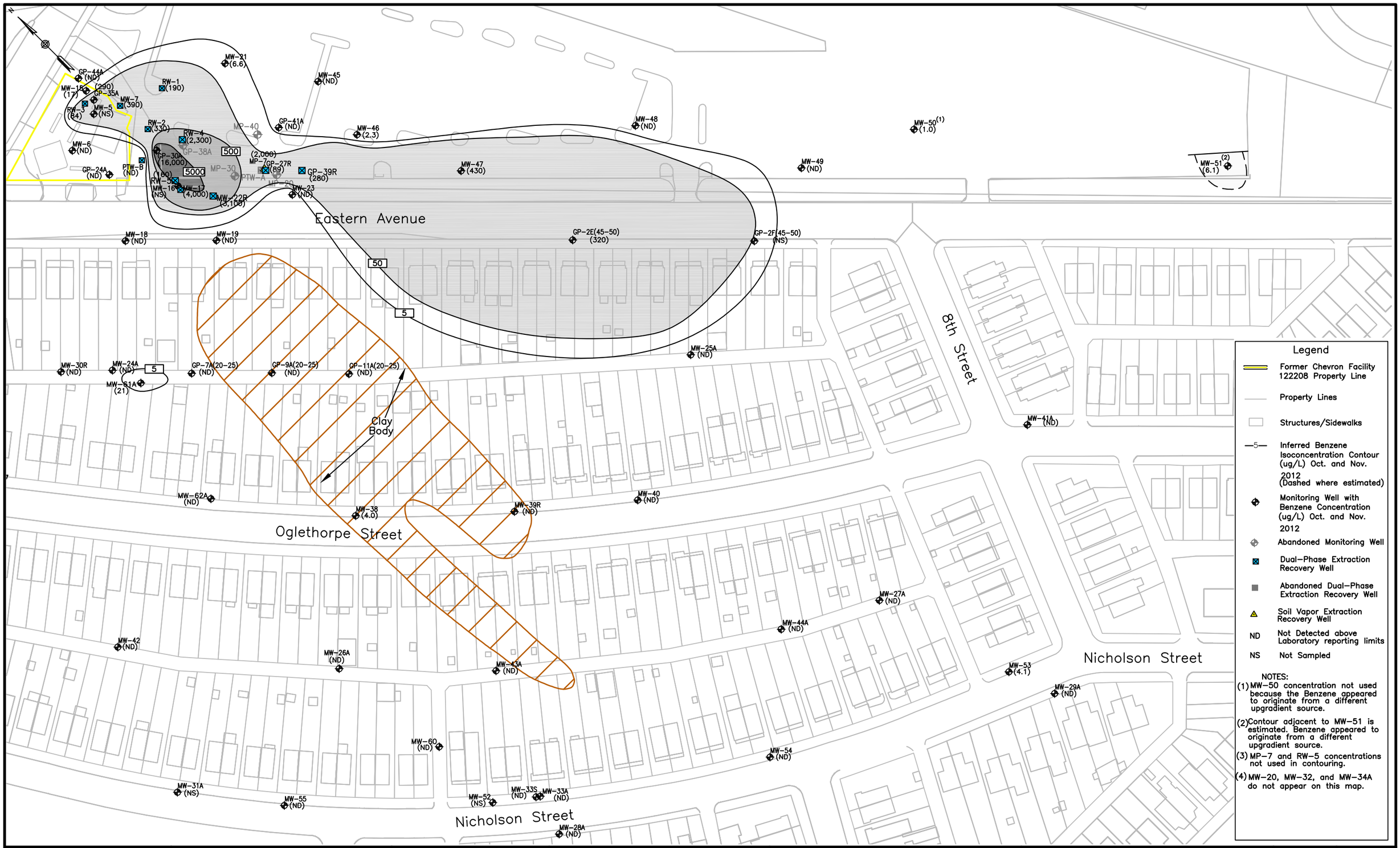
DESIGNED	CADD	SCALE
DKB	DKB	1" = 100'
CHECKED	APPROVED	APPROVED
JK	RWS	

Gannett Fleming
BALTIMORE, MARYLAND

2012 SEMI-ANNUAL PROGRESS REPORT
FORMER CHEVRON FACILITY NO. 122208
CHILLUM, MARYLAND

Groundwater Potentiometric Surface Map
September 5, 2012

JOB NO.	FIGURE
55588	3
DATE	
01/03/13	
CAD FILE	
GW CONTOURS 4Q 2012.dwg	



Legend

- Former Chevron Facility 122208 Property Line
- Property Lines
- Structures/Sidewalks
- —5— Inferred Benzene Isoconcentration Contour (ug/L) Oct. and Nov. 2012 (Dashed where estimated)
- Monitoring Well with Benzene Concentration (ug/L) Oct. and Nov. 2012
- Abandoned Monitoring Well
- Dual-Phase Extraction Recovery Well
- Abandoned Dual-Phase Extraction Recovery Well
- Soil Vapor Extraction Recovery Well
- ND Not Detected above Laboratory reporting limits
- NS Not Sampled

NOTES:

(1) MW-50 concentration not used because the Benzene appeared to originate from a different upgradient source.

(2) Contour adjacent to MW-51 is estimated. Benzene appeared to originate from a different upgradient source.

(3) MP-7 and RW-5 concentrations not used in contouring.

(4) MW-20, MW-32, and MW-34A do not appear on this map.

0 100

SCALE IN FEET

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

DESIGNED	CADD	SCALE
DKB	DKB	1"=100'
CHECKED	APPROVED	APPROVED
JK	RWS	

Gannett Fleming

BALTIMORE, MARYLAND

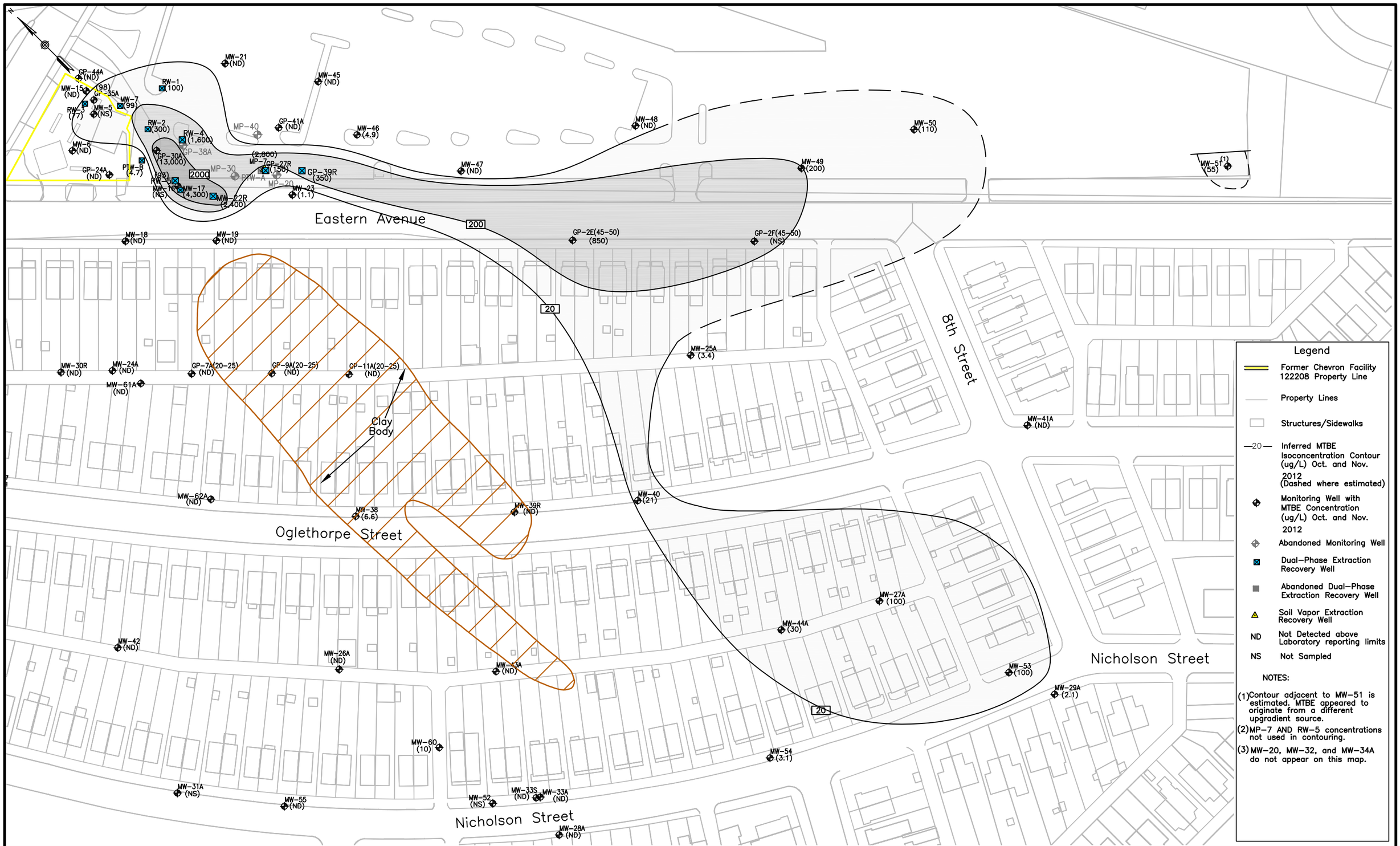
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
HOUSTON, TEXAS

FORMER CHEVRON FACILITY NO. 122208
CHILLUM, MARYLAND

Benzene Concentrations in Shallow Monitoring Wells October and November 2012

JOB NO.	DATE	CAD FILE
55588	01/02/13	Shallow Benzene

SHEET NO. 4



0 100
SCALE IN FEET

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

DESIGNED	CADD	SCALE
DKB	DKB	1"=100'
CHECKED	APPROVED	APPROVED
JK	RWS	

Gannett Fleming
BALTIMORE, MARYLAND

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
HOUSTON, TEXAS

FORMER CHEVRON FACILITY NO. 122208
CHILLUM, MARYLAND

MTBE Concentrations in Shallow Monitoring Wells October and November 2012

JOB NO.	SHEET NO.
55588	5
DATE	
01/02/13	
CAD FILE	
Shallow MTBE	

DEEP WELL DATA NOT AVAILABLE UPGRADIENT OF THIS POINT

Eastern Avenue

8th Street

Nicholson Street

Nicholson Street

Oglethorpe Street

Clay Body

GP-2E(55-60) (180)

GP-2F(50-55) (29)

MW-25B (140)

MW-24B (ND)

GP-7A(35-40) (24)

GP-7A(30-35) (ND)

MW-61B (ND)

MW-41B (ND)

MW-62B (94)

MW-27B (ND)

MW-44B (ND)

MW-26B (720)

MW-58 (380)

IW-1

IW-2

IW-3

IW-4

IW-5

MW-43B (ND)

MW-29B (ND)

MW-59 (240)

MW-31B (ND)

MW-33B (ND)

MW-33C (ND)

MW-28B (ND)

50

5

500

Legend

- Former Chevron Facility 122208 Property Line
- Property Lines
- Structures/Sidewalks
- —5— Inferred Benzene Isoconcentration Contour (ug/L) Oct. and Nov. 2012 (Dashed where estimated)
- Monitoring Well with Benzene Concentration (ug/L) Oct. and Nov. 2012
- Dual-Phase Extraction Recovery Well
- Soil Vapor Extraction Recovery Well
- ND Not Detected above Laboratory reporting limits

NOTES:

(1) MW-33C & GP-7A(30-35) concentrations not used in contouring.

0 100

SCALE IN FEET

NO.	DESCRIPTION	DATE	BY

REVISIONS

DESIGNED	CADD	SCALE
DKB	DKB	1"=100'
CHECKED	APPROVED	APPROVED
JK	RWS	

Gannett Fleming

BALTIMORE, MARYLAND

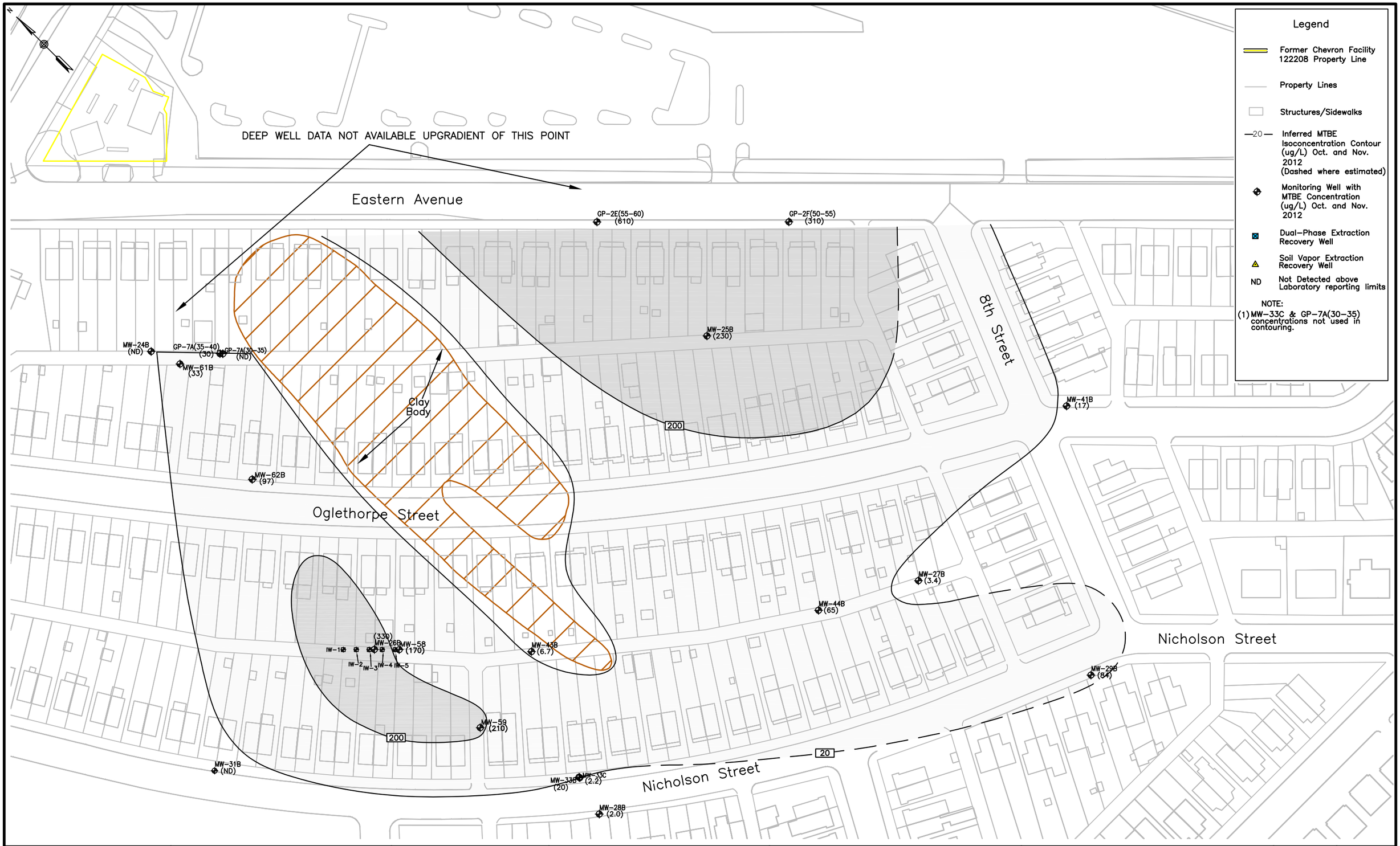
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
HOUSTON, TEXAS

FORMER CHEVRON FACILITY NO. 122208
CHILLUM, MARYLAND

Benzene Concentrations in Deep Monitoring Wells October and November 2012

JOB NO.	DATE	CAD FILE
55588	01/02/13	Deep Benzene

SHEET NO. 6



0 100
SCALE IN FEET

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

DESIGNED	CADD	SCALE
DKB	DKB	1"=100'
CHECKED	APPROVED	APPROVED
JK	RWS	

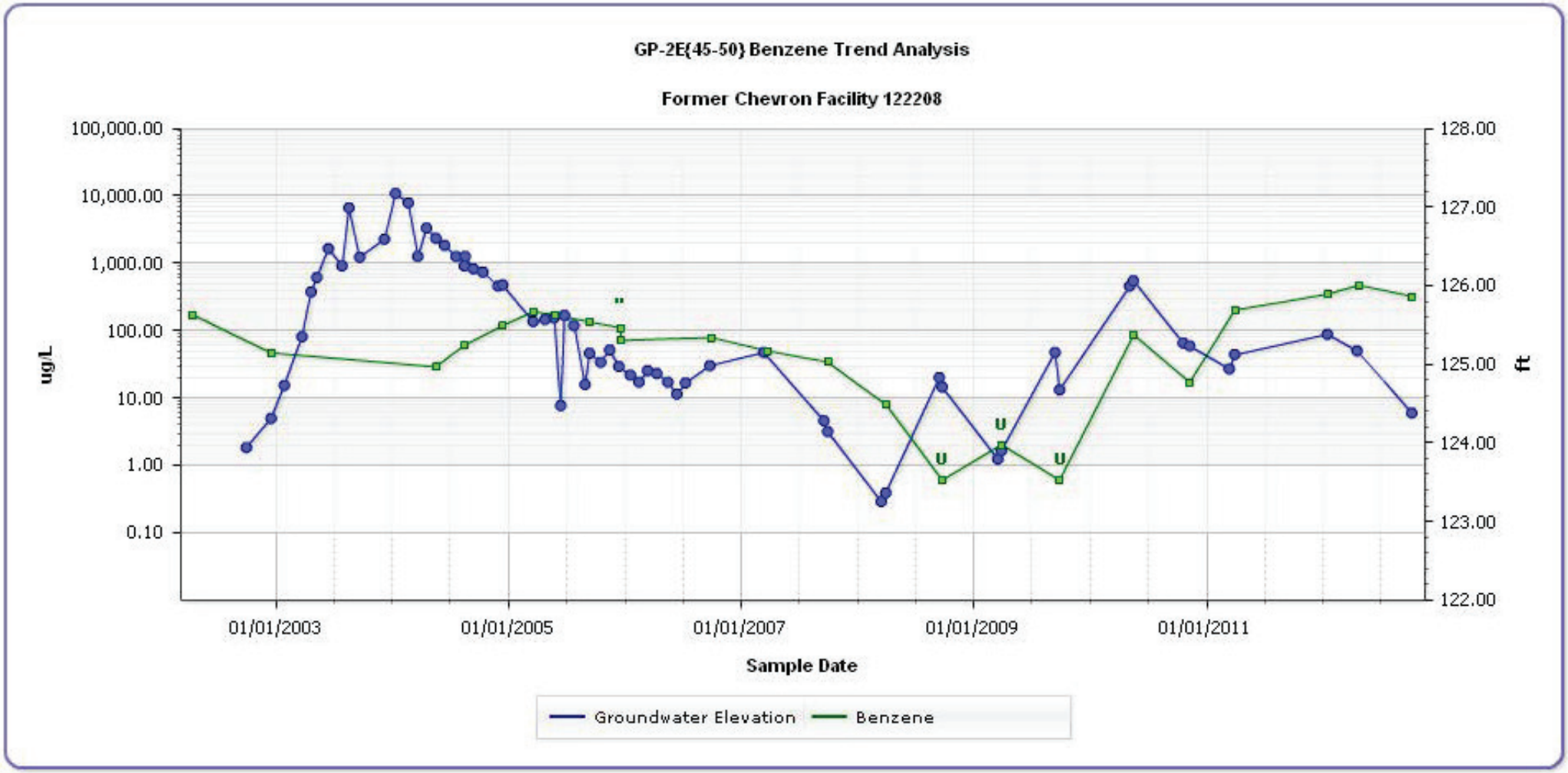
Gannett Fleming
BALTIMORE, MARYLAND

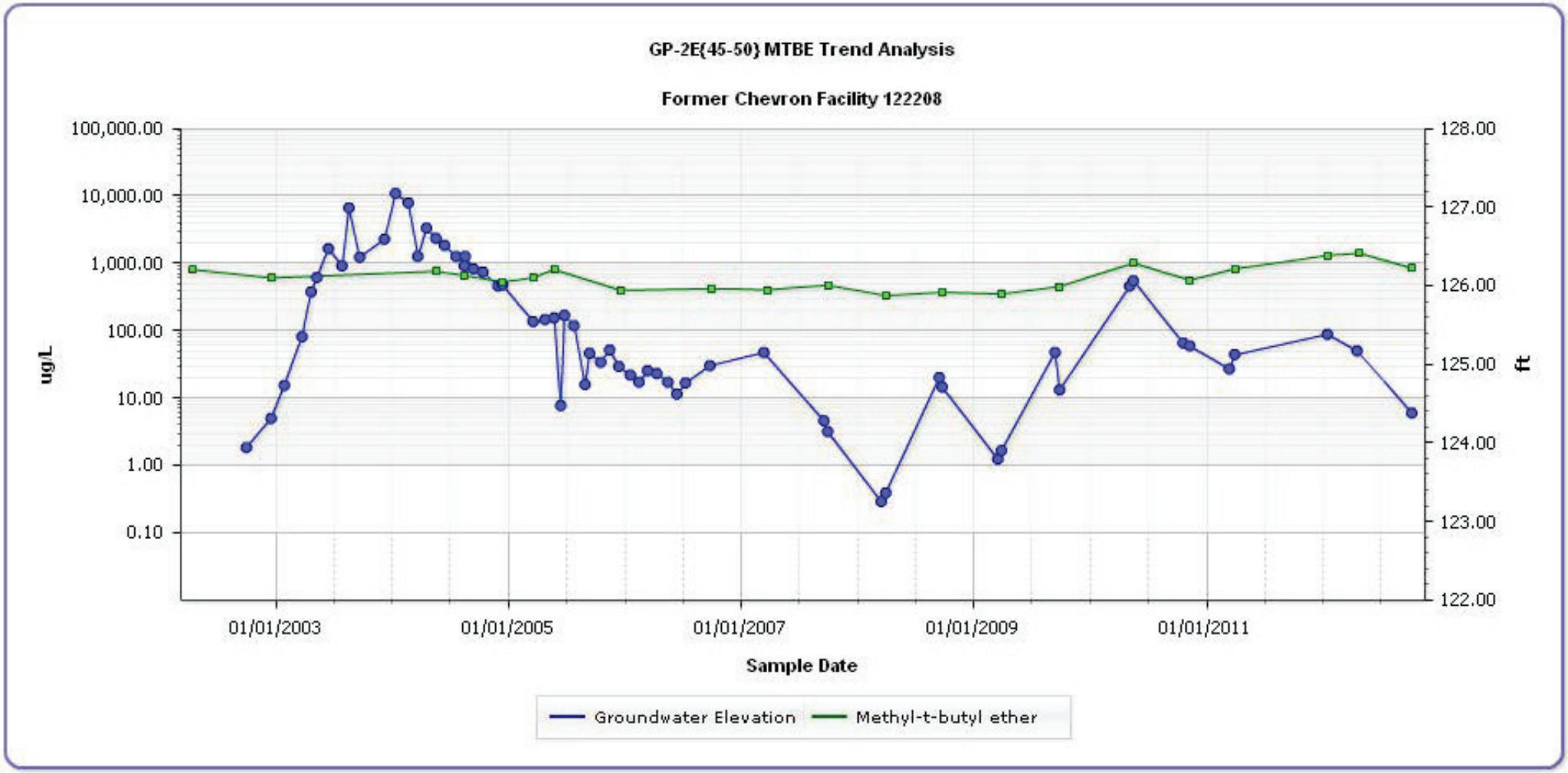
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
HOUSTON, TEXAS

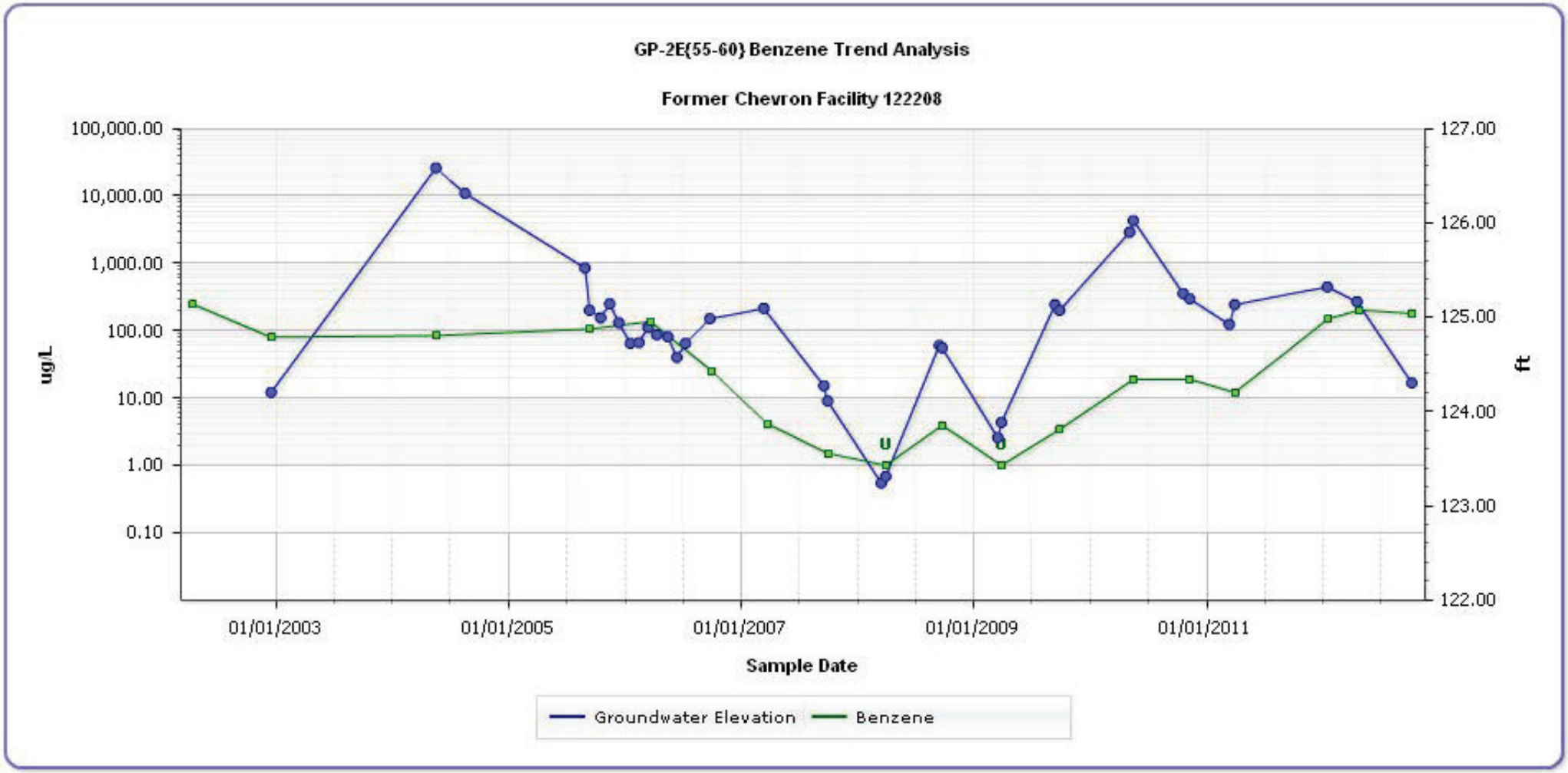
FORMER CHEVRON FACILITY NO. 122208
CHILLUM, MARYLAND

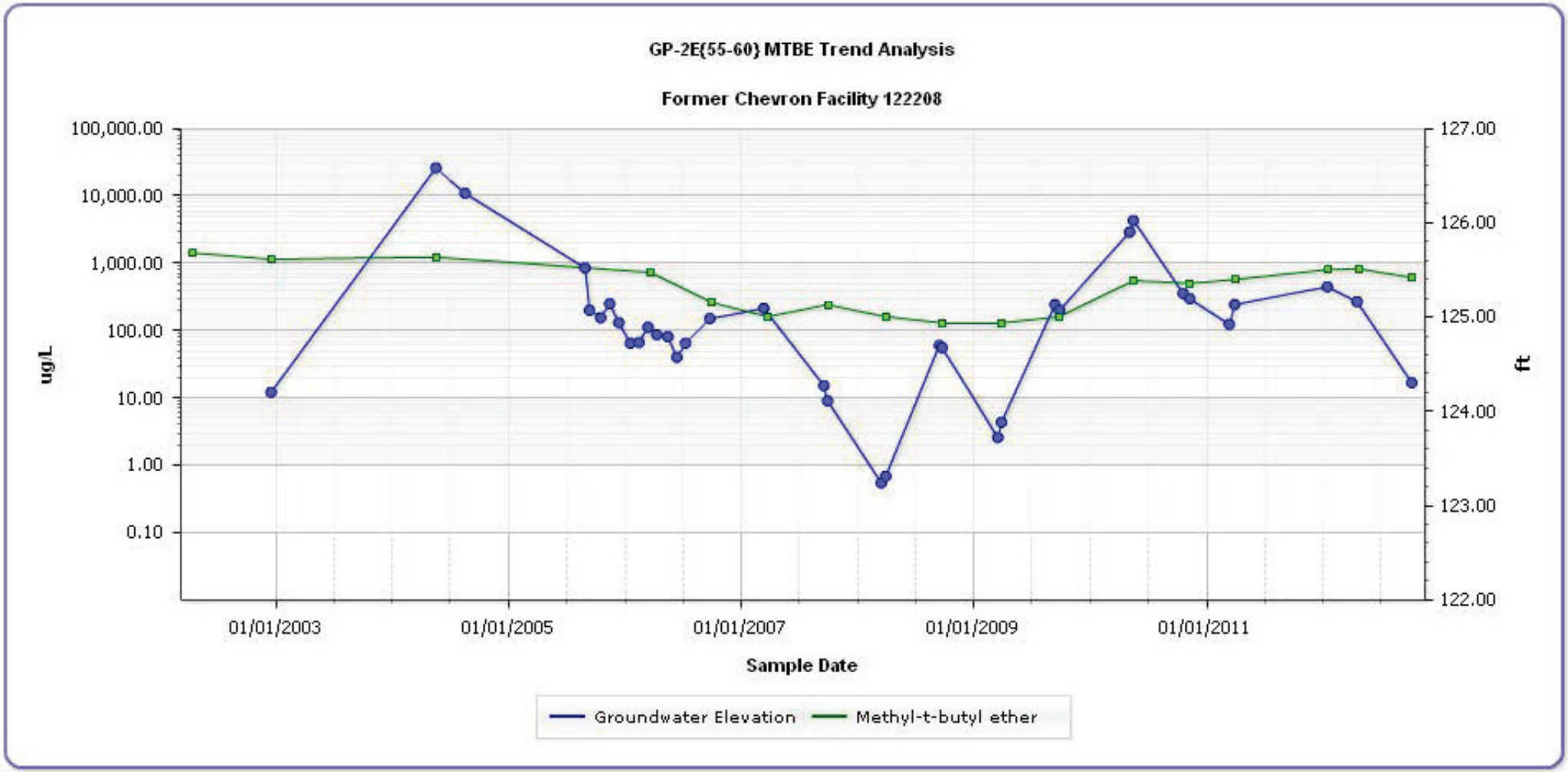
MTBE Concentrations in Deep Monitoring Wells October and November 2012

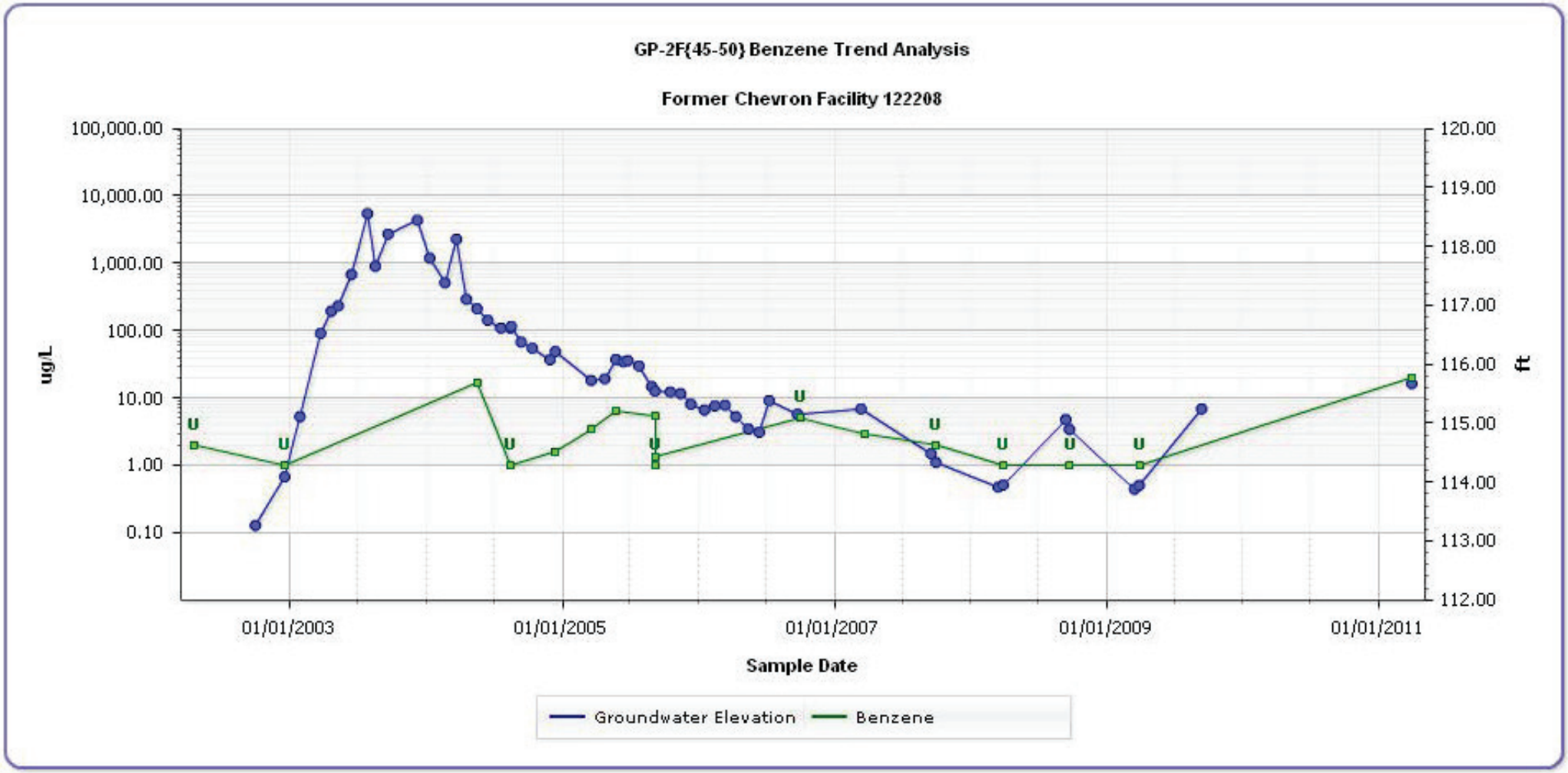
JOB NO.	SHEET NO.
55588	7
DATE	
01/02/13	
CAD FILE	
Deep MTBE	

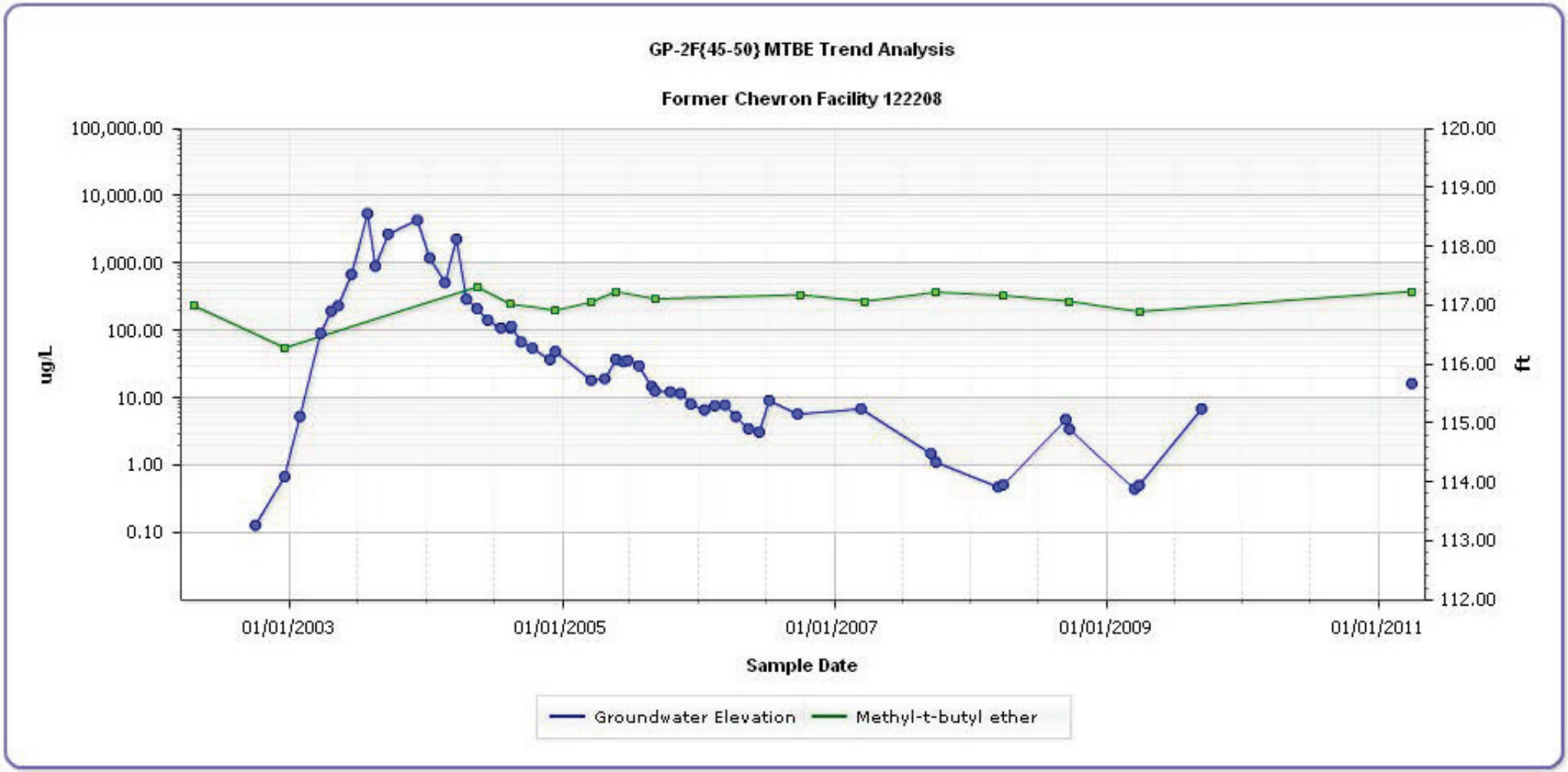

GP-2E(45-50) Benzene Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
128.00
127.00
126.00
125.00
124.00
123.00
122.00
ft
U
U
U
01/01/2003
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Sample Date
Groundwater Elevation
Benzene

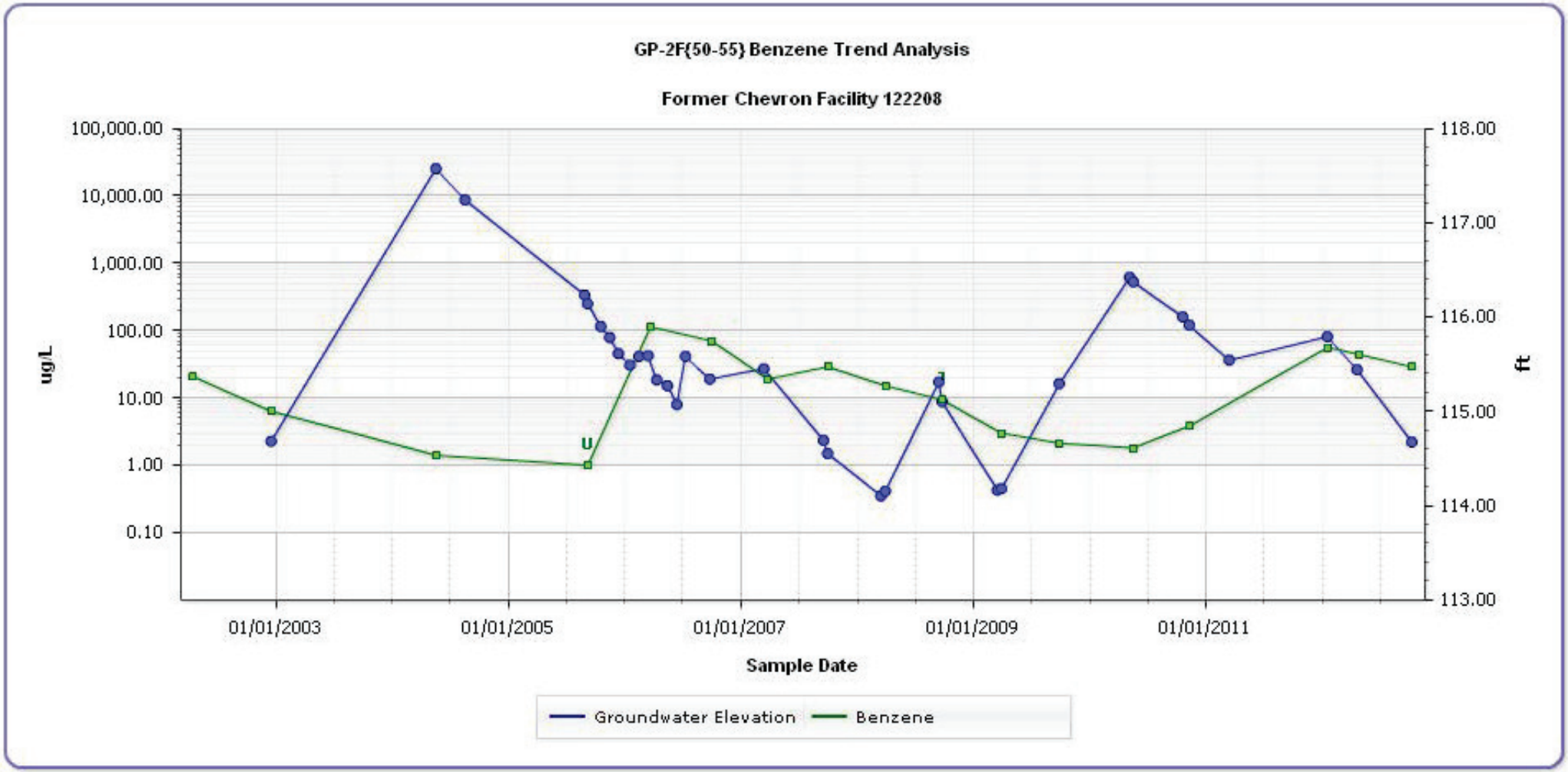

GP-2E(45-50) MTBE Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
128.00
127.00
126.00
125.00
124.00
123.00
122.00
ft
01/01/2003
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Sample Date
Groundwater Elevation
Methyl-t-butyl ether

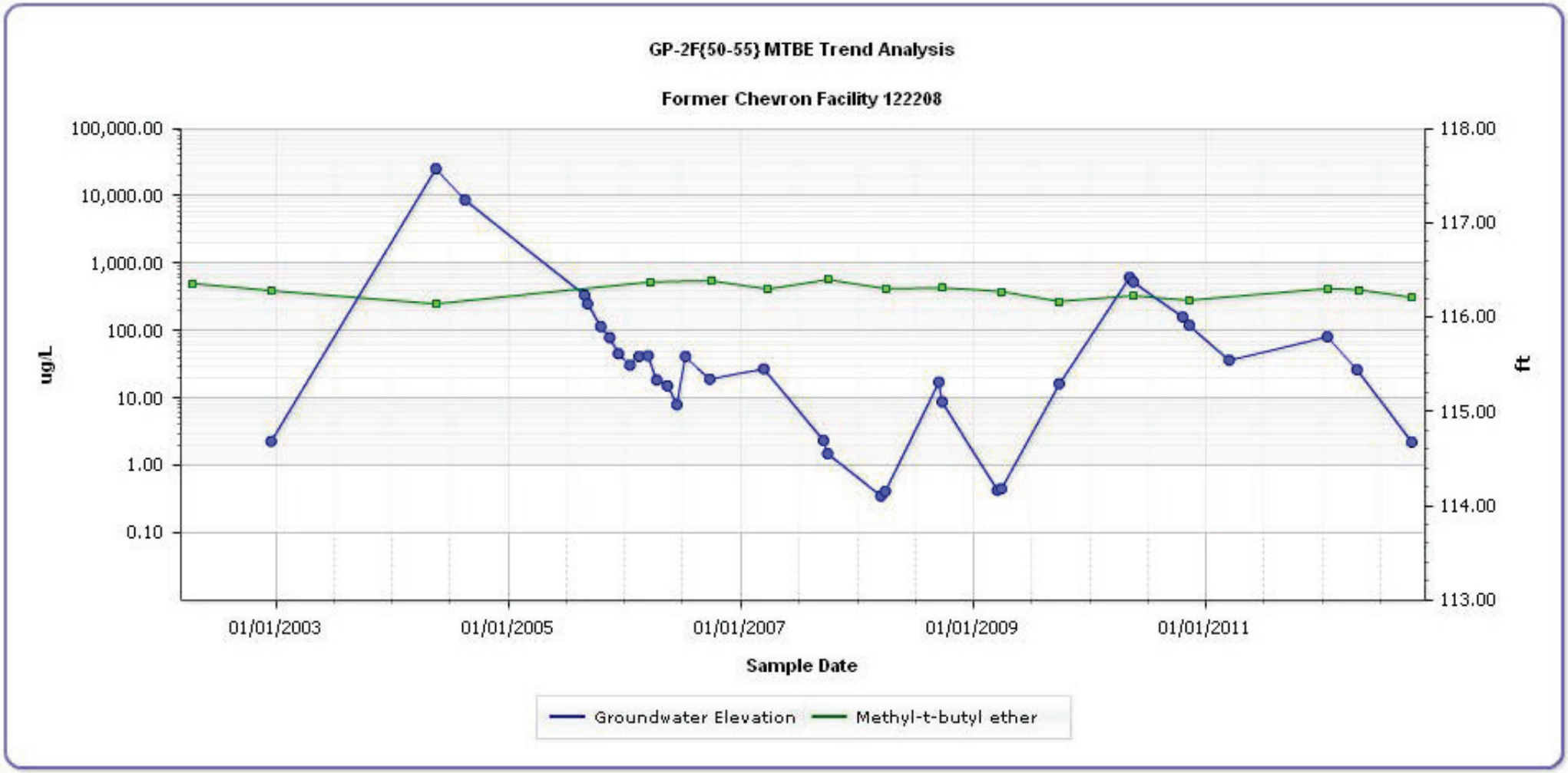

GP-2E(55-60) Benzene Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
127.00
126.00
125.00
124.00
123.00
122.00
ft
U
01/01/2003
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Sample Date
Groundwater Elevation
Benzene

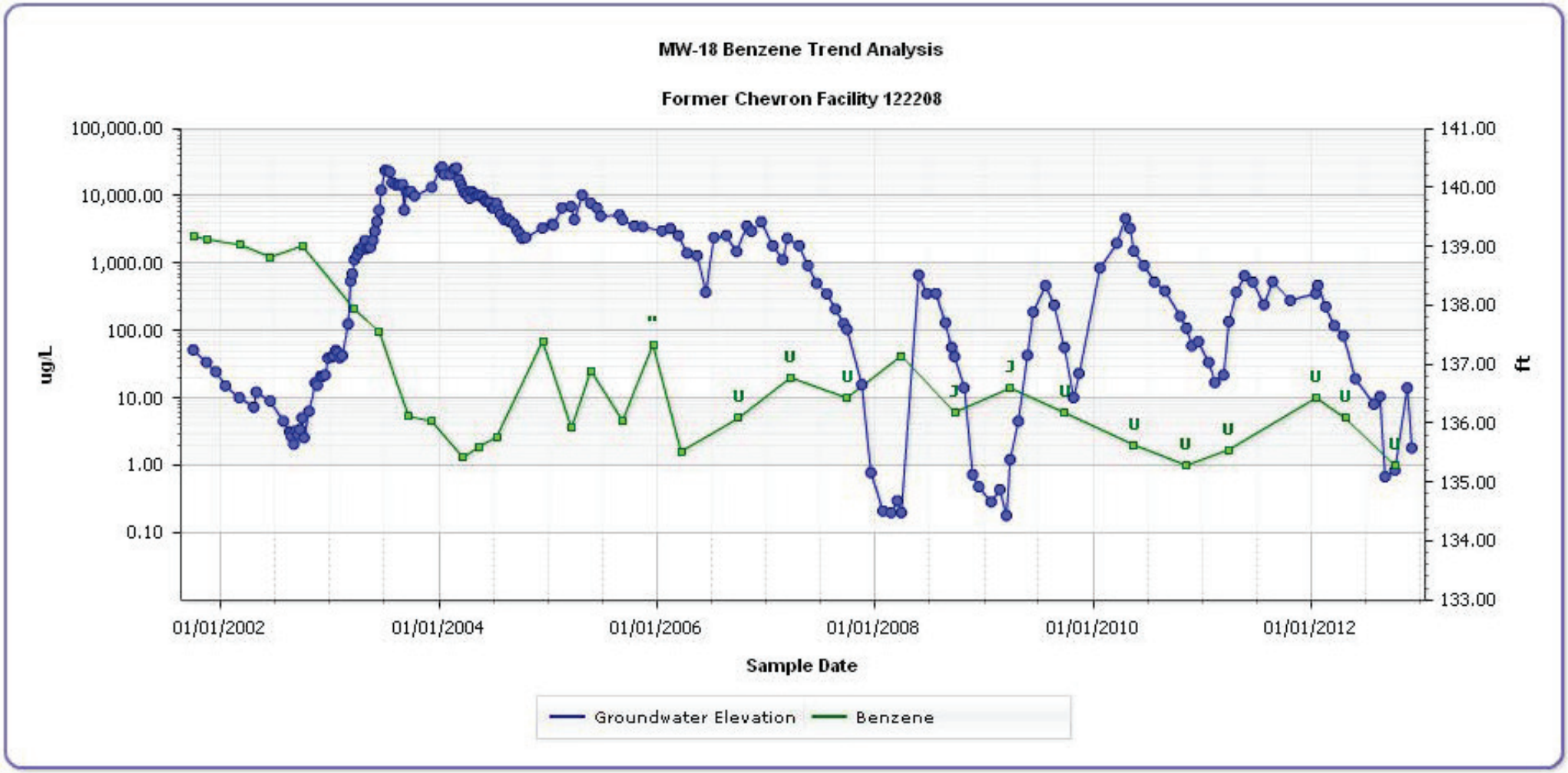

GP-2E(55-60) MTBE Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
127.00
126.00
125.00
124.00
123.00
122.00
ft
01/01/2003
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Sample Date
Groundwater Elevation
Methyl-t-butyl ether

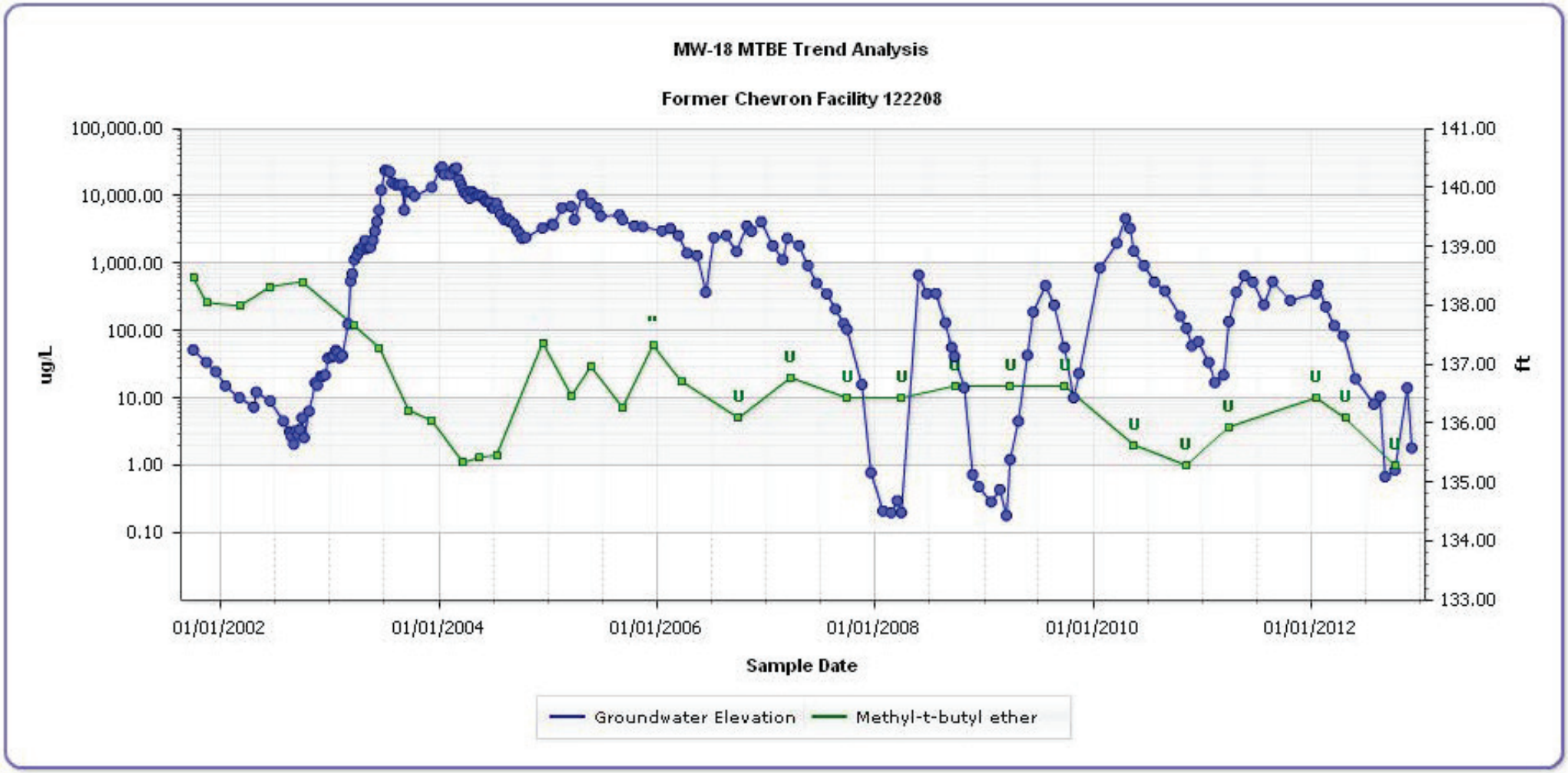

GP-2F{45-50} Benzene Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
120.00
119.00
118.00
117.00
116.00
115.00
114.00
113.00
112.00
ft
U
01/01/2003
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Sample Date
Groundwater Elevation
Benzene

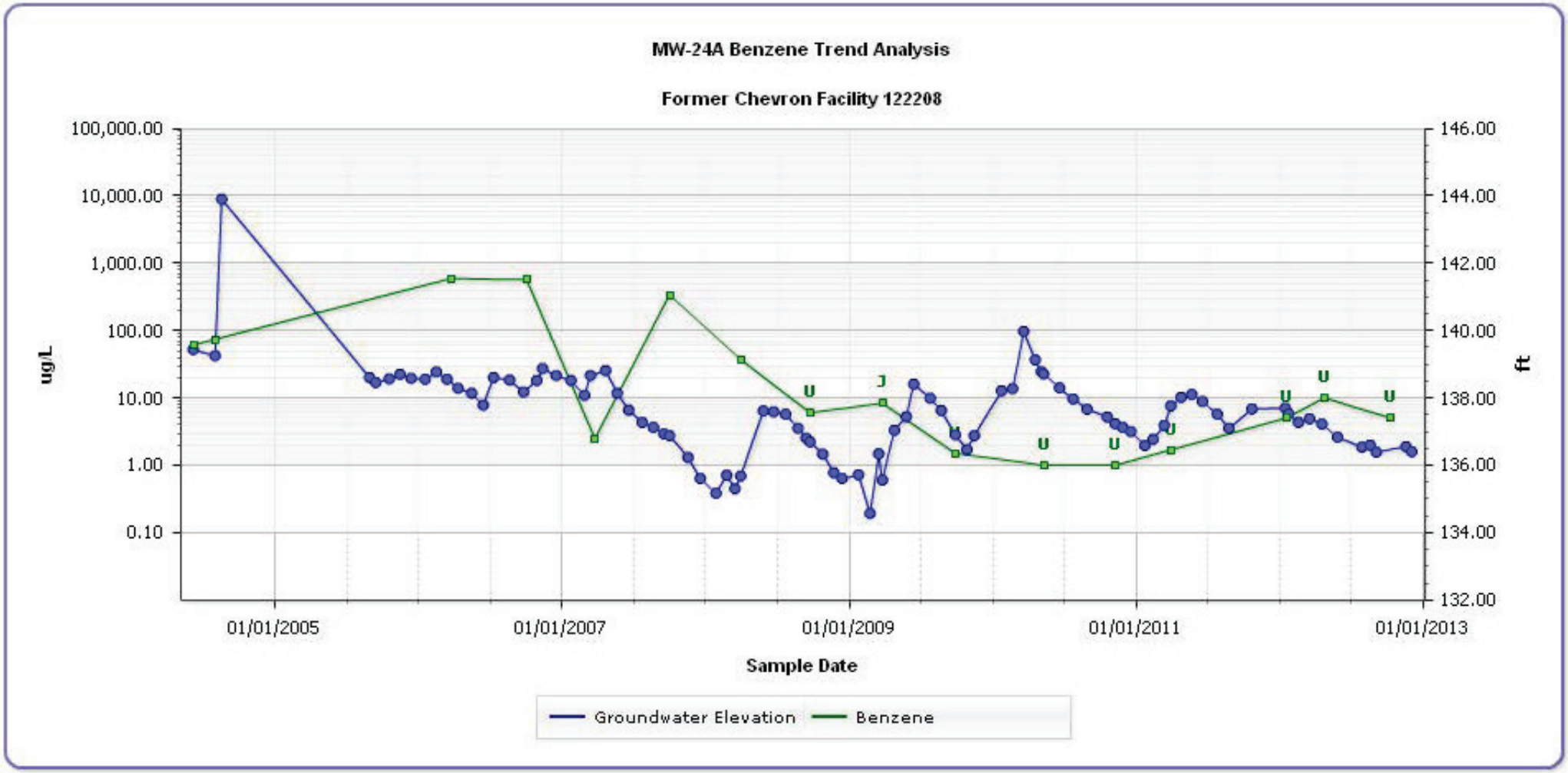

GP-2F(45-50) MTBE Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
120.00
119.00
118.00
117.00
116.00
115.00
114.00
113.00
112.00
ft
01/01/2003
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Sample Date
Groundwater Elevation
Methyl-t-butyl ether

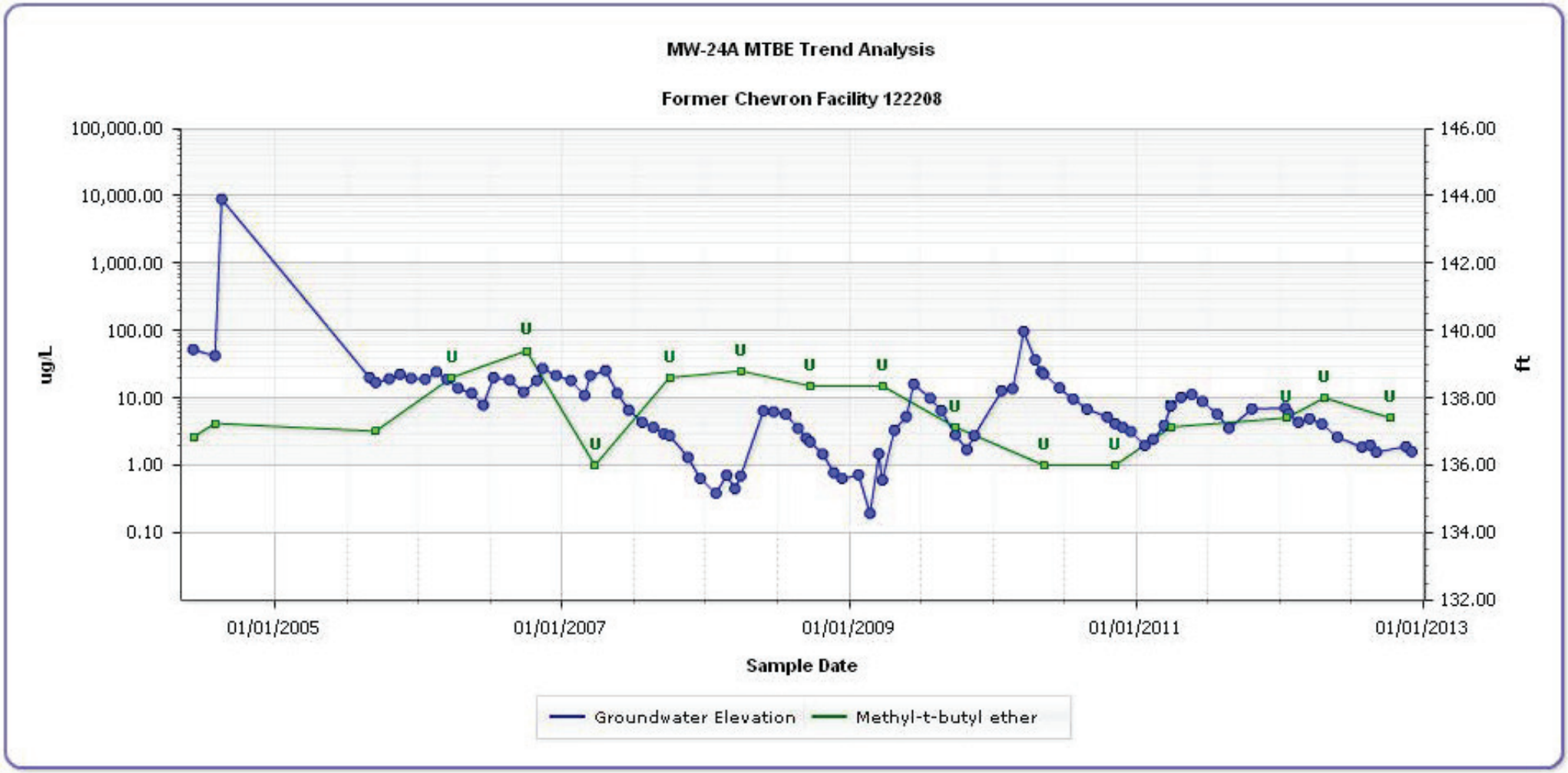

GP-2F{50-55} Benzene Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
118.00
117.00
116.00
115.00
114.00
113.00
ft
U
J
01/01/2003
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Sample Date
Groundwater Elevation
Benzene

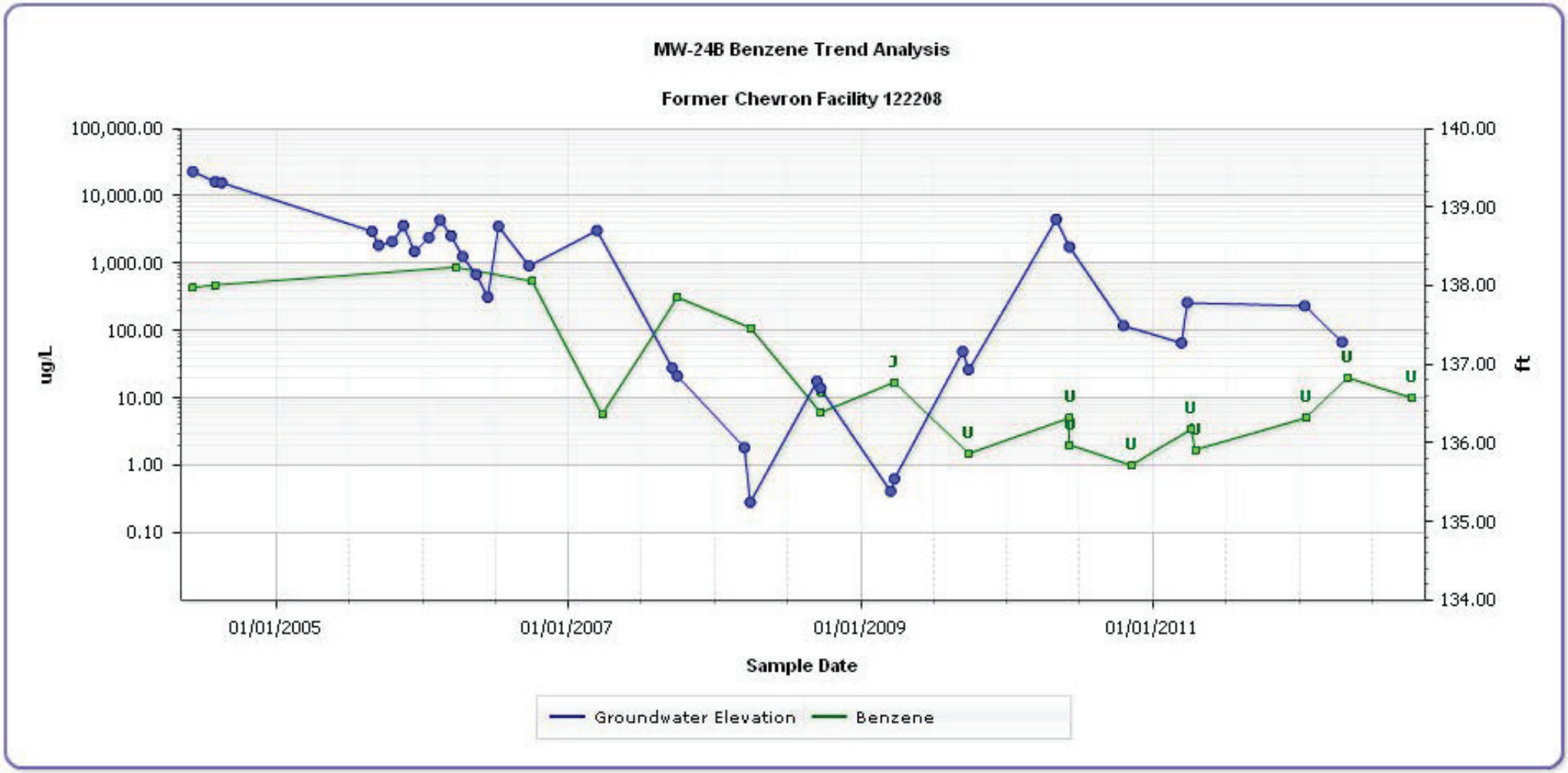

GP-2F(50-55) MTBE Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
118.00
117.00
116.00
115.00
114.00
113.00
ft
01/01/2003
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Sample Date
Groundwater Elevation
Methyl-t-butyl ether

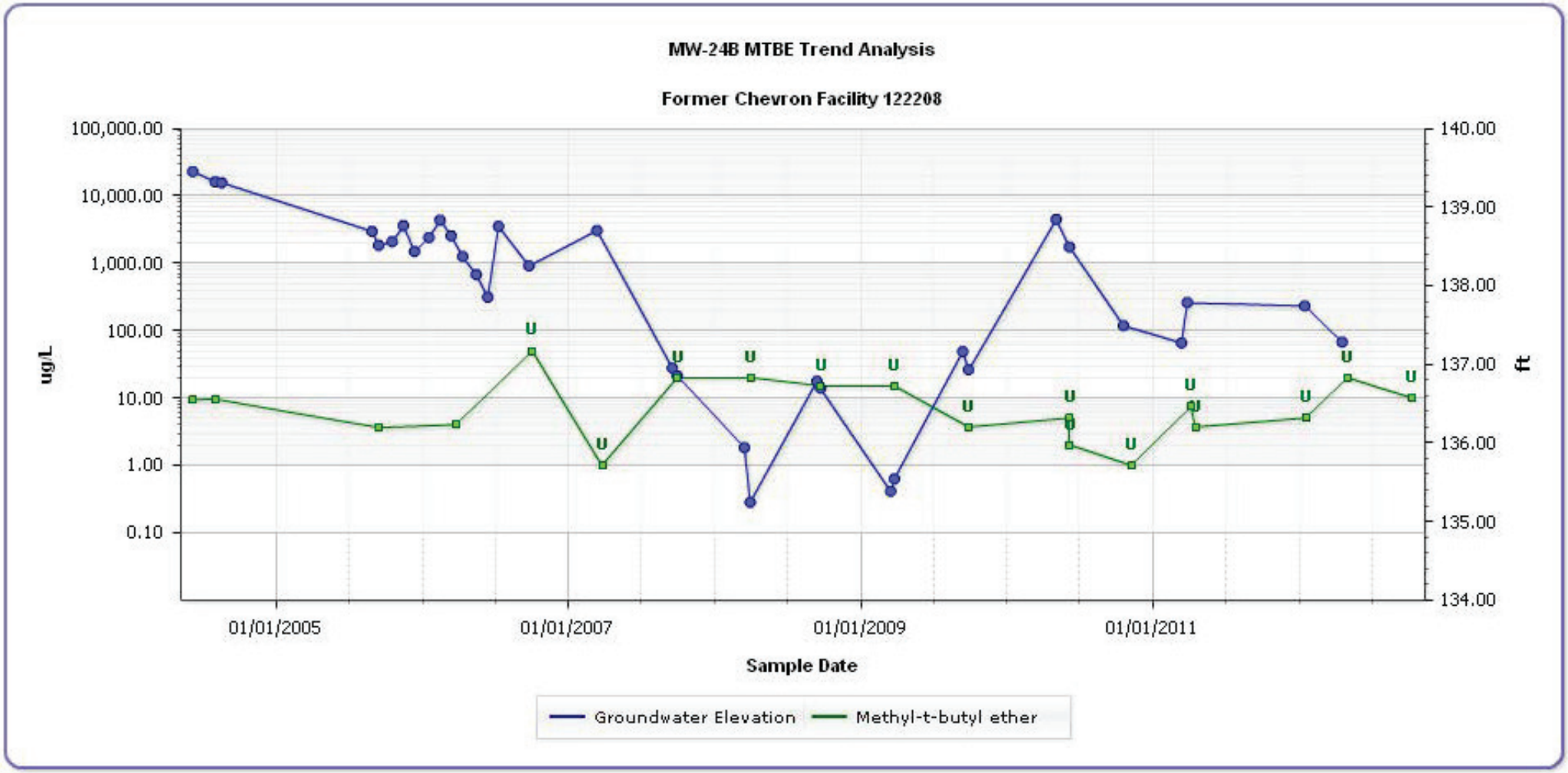

MW-18 Benzene Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
141.00
140.00
139.00
138.00
137.00
136.00
135.00
134.00
133.00
ft
01/01/2002
01/01/2004
01/01/2006
01/01/2008
01/01/2010
01/01/2012
Sample Date
Groundwater Elevation
Benzene

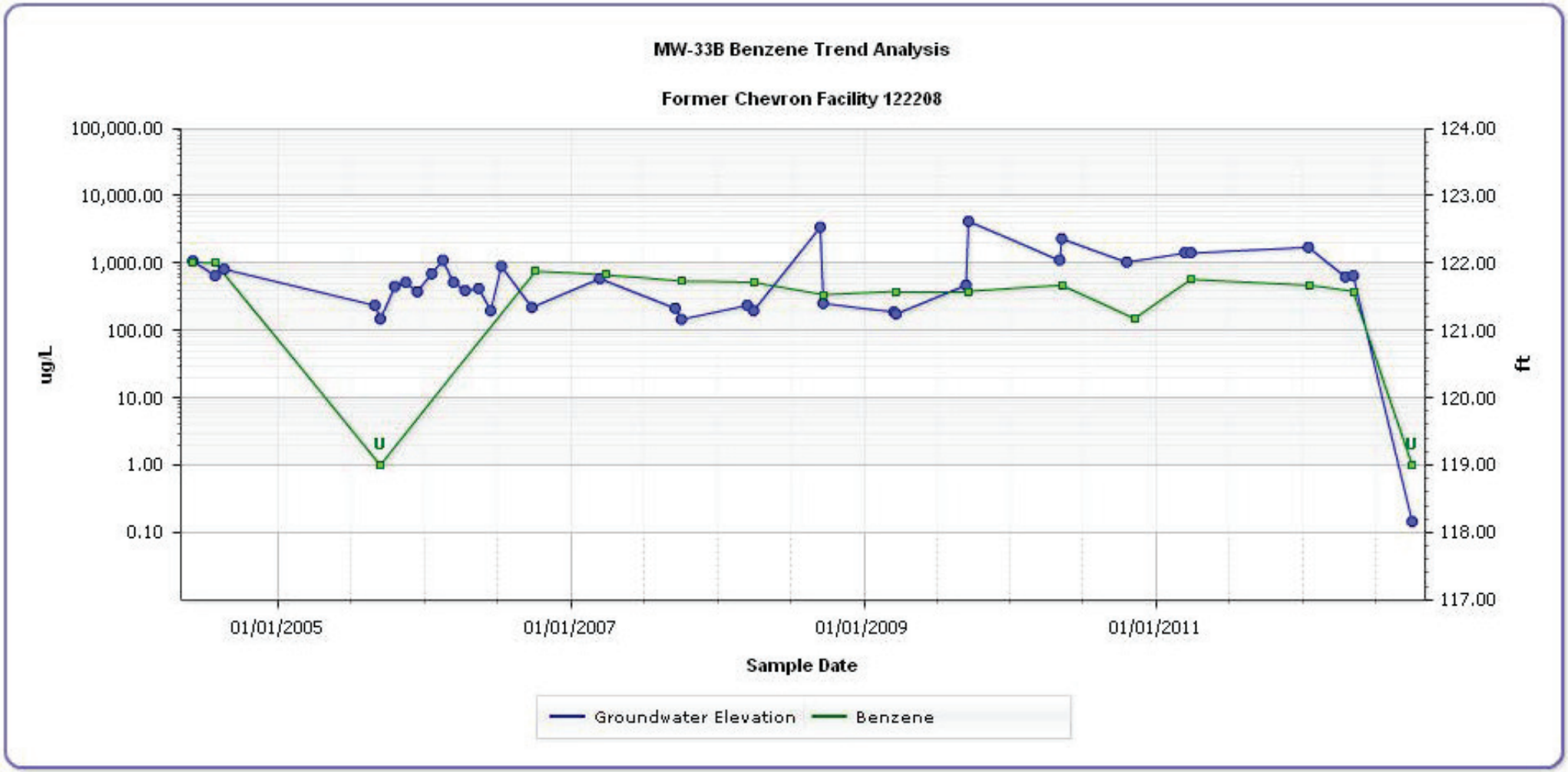

MW-18 MTBE Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
141.00
140.00
139.00
138.00
137.00
136.00
135.00
134.00
133.00
ft
01/01/2002
01/01/2004
01/01/2006
01/01/2008
01/01/2010
01/01/2012
Sample Date
Groundwater Elevation
Methyl-t-butyl ether

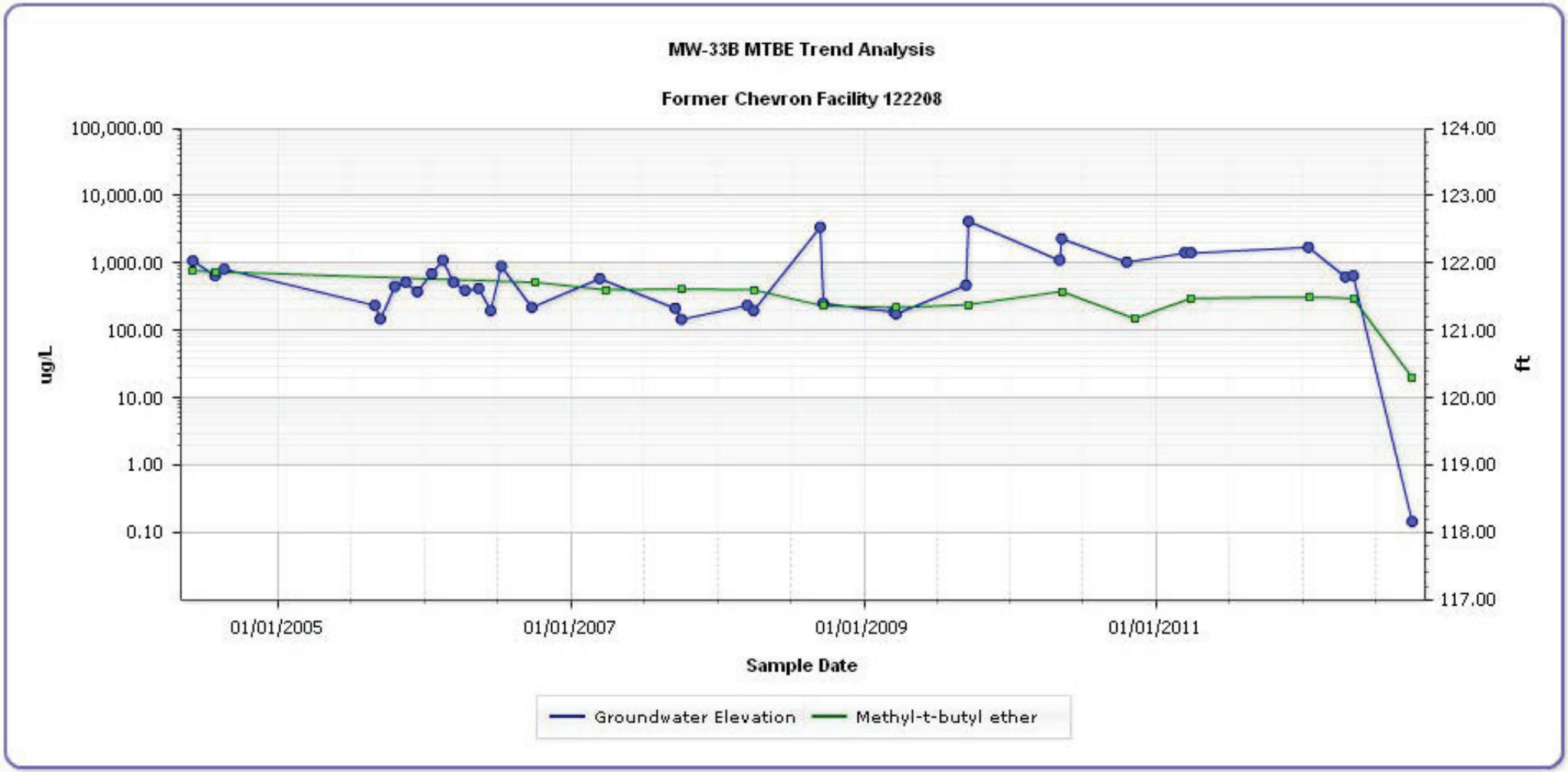

MW-24A Benzene Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
146.00
144.00
142.00
140.00
138.00
136.00
134.00
132.00
ft
U
J
U
U
U
U
U
01/01/2005
01/01/2007
01/01/2009
01/01/2011
01/01/2013
Sample Date
Groundwater Elevation
Benzene

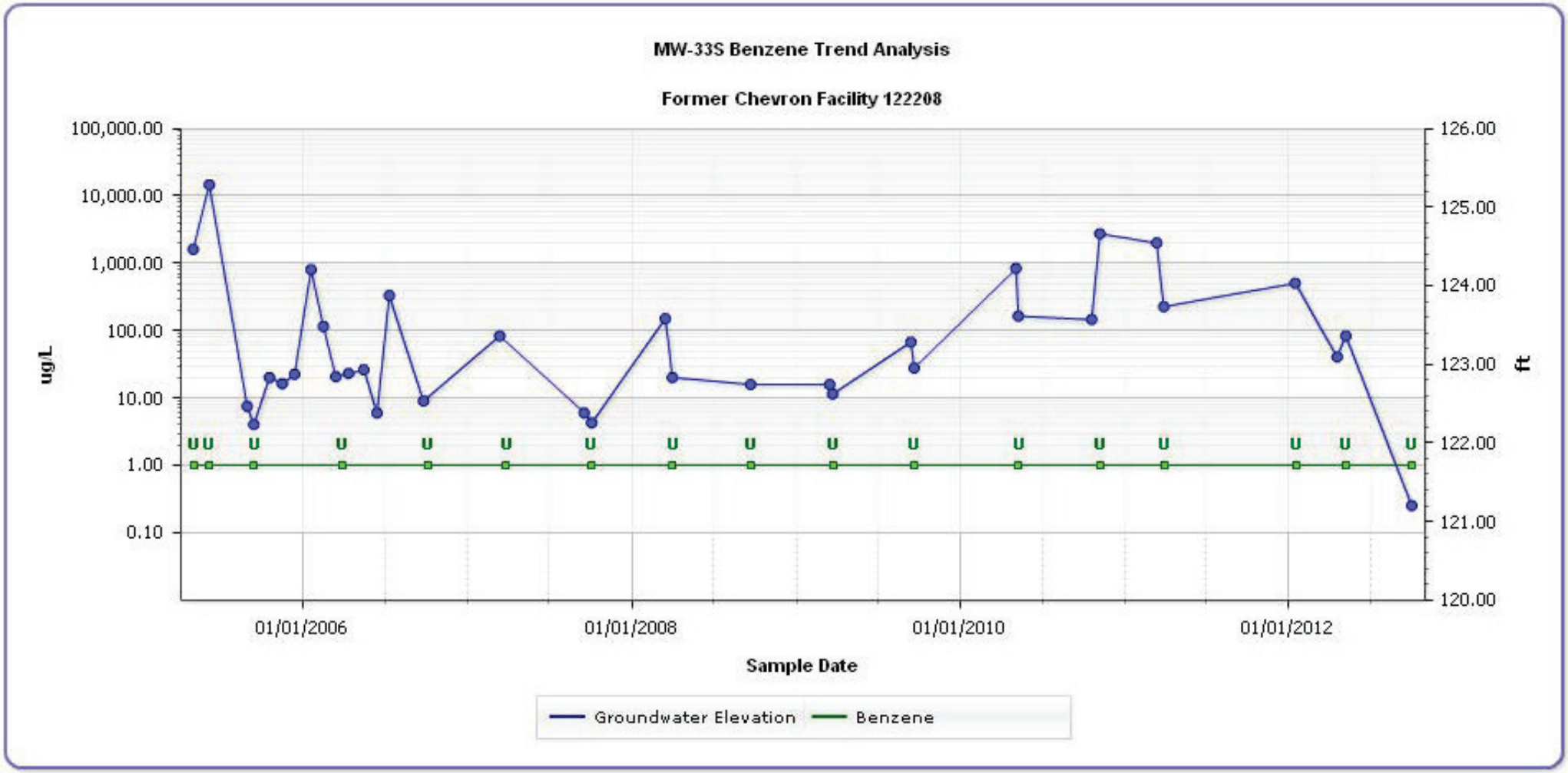

MW-24A MTBE Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
146.00
144.00
142.00
140.00
138.00
136.00
134.00
132.00
ft
U
01/01/2005
01/01/2007
01/01/2009
01/01/2011
01/01/2013
Sample Date
Groundwater Elevation
Methyl-t-butyl ether

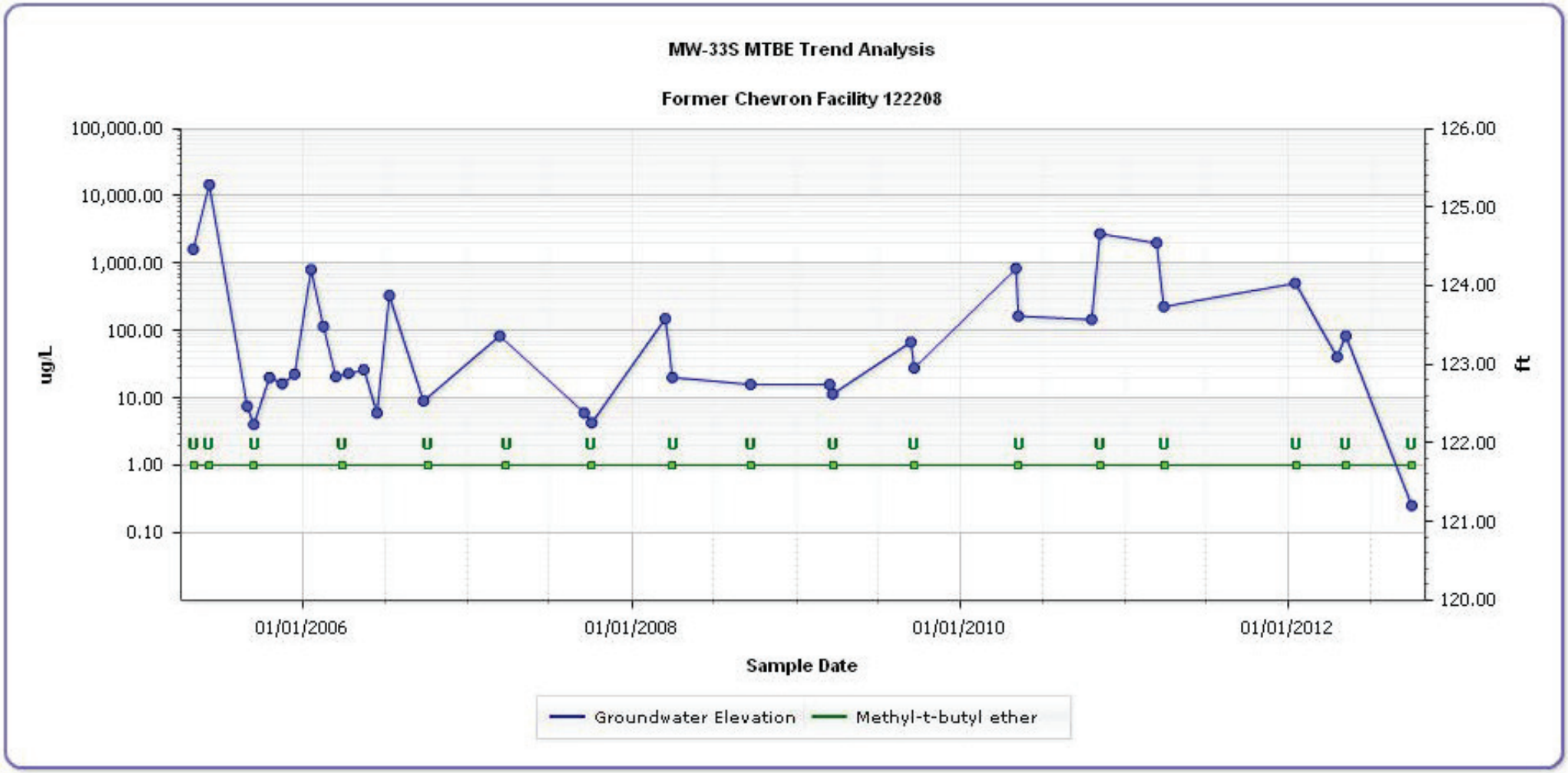

MW-24B Benzene Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
140.00
139.00
138.00
137.00
136.00
135.00
134.00
ft
J
U
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Sample Date
Groundwater Elevation
Benzene


MW-24B MTBE Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
140.00
139.00
138.00
137.00
136.00
135.00
134.00
ft
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Sample Date
U
Groundwater Elevation
Methyl-t-butyl ether


MW-33B Benzene Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
124.00
123.00
122.00
121.00
120.00
119.00
118.00
117.00
ft
U
U
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Sample Date
Groundwater Elevation
Benzene


MW-33B MTBE Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
124.00
123.00
122.00
121.00
120.00
119.00
118.00
117.00
ft
01/01/2005
01/01/2007
01/01/2009
01/01/2011
Sample Date
Groundwater Elevation
Methyl-t-butyl ether


MW-33S Benzene Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
126.00
125.00
124.00
123.00
122.00
121.00
120.00
ft
U U U U U U U U U U U U U U U U
01/01/2006
01/01/2008
01/01/2010
01/01/2012
Sample Date
Groundwater Elevation
Benzene


MW-33S MTBE Trend Analysis
Former Chevron Facility 122208
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
ug/L
126.00
125.00
124.00
123.00
122.00
121.00
120.00
ft
U U U U U U U U U U U U U U U U U
01/01/2006
01/01/2008
01/01/2010
01/01/2012
Sample Date
Groundwater Elevation
Methyl-t-butyl ether

APPENDIX A

DUAL-PHASE EXTRACTION SYSTEM – TOTAL FLUIDS EXTRACTION DATA

APPENDIX A

DUAL-PHASE EXTRACTION SYSTEM – TOTAL FLUIDS EXTRACTION DATA

DESCRIPTION OF DATA TABLES

Chevron uses a central database to store remediation system data and laboratory analytical data. The tabulated data in Tables A-1, A-2, and A-3 is an exported summary of the total fluids extraction system data from the database. These data were recorded by the field technician during site visits. The analytical data for influent samples collected for laboratory analysis (Table A-2) are used to calculate the mass (and to estimate the volume) of hydrocarbons recovered in the dissolved phase. Effluent sample data are included in Table A-3 for comparison with permit limits.

The data table includes all system data collected since July 1, 2011. Data collected prior to this date are available in previous progress reports.

The following table lists the column headings in the table with a brief description of each. Please refer to the Process and Instrumentation Diagram (next page) for a schematic of equipment and sample ports.

Column Heading	Description
Date / Time	Date and time data were recorded.
System Status	System ON or OFF when technician recorded the data.
Influent BTEX (µg/L)	Sum of benzene, toluene, ethylbenzene, and total xylenes from influent sample port SP-1.
Effluent BTEX (µg/L)	Sum of benzene, toluene, ethylbenzene, and total xylenes from effluent sample port SP-3.
Treatment Efficiency (%)	Equation: (Influent-Effluent) / (Influent).
Totalizer Reading (gallons)	Reading on the totalizing flow meter.
Pumped Period (gallons)	Equation: (current totalizer reading) – (previous totalizer reading).
Pumped Total (gallons)	Cumulative total gallons of groundwater recovered.
Period Average (GPM)	Equation: (Gallons Pumped During Period) / (current Date-Time – previous Date-Time)
Hydrocarbons Recovered Period (gallons)[1]	Equation: [Avg. Influent BTEX (ug/L)] * e^6 * (1/0.2) * (3.785 L/gal) * (1 lb/453.6 g) * (gallons pumped) * (1 gal/6.26 lbs). NOTE: Formula assumes BTEX equals 20% of gasoline.
Hydrocarbons Recovered Cumulative (gallons)	Equation: (Hydrocarbons Recovered During Period) + (Previous Cumulative)
Operating Extraction Points	Wells in operation during the reporting period.

Notes

(1) Assumptions: BTEX is 20% of hydrocarbon product by volume; density of hydrocarbon product is 6.26 pounds/gallon. The Average (Avg.) Influent BTEX concentration is defined as the mean of the influent concentration for the current and previous sampling events.

GRS CONTROL PANEL
EOS CONTROLER

CAT OXIDIZER RUNNING (1)
CAT OXIDIZER INLET TEMP T-1 (2)
CAT OXIDIZER OUTLET TEMP T-2 (3)
SVE AIR FLOW (4)
KO TANK VACUUM (5)
RUN/STOP KO PUMP P-1 (HS) (XA) (6)
KO TANK LEVEL HI/HI (7)
KO TANK LEVEL HI (8)
KO TANK LEVEL LO (9)
OIL/WATER SEPERATOR LEVEL HI/HI (10)
OIL/WATER SEPERATOR LEVEL HI (11)
OIL/WATER SEPERATOR LEVEL LO (12)
RUN/STOP OIL/WATER SEPERATOR PUMP P-2 (HS) (XA) (13)
SVE BLOWER RPM (14)
SVE BLOWER SPEED SET POINT (15)
RUN/STOP SVE BLOWER B-1 (HS) (XA) (16)
RUN/STOP AST BLOWER B-2 (HS) (XA) (17)
AST BLOWER DISCHARGE FLOW SWITCH (18)
AST LEVEL HI/HI (19)
AST LEVEL HI (20)
AST LEVEL LO (21)
RUN/STOP AST PUMP P-3 (HS) (XA) (22)
NOT USED (23)
3-WAY COMPRESSED AIR SOLENOID VALVE (XA) (24)
RUN/STOP COMPRESSER C-1 (HS) (XA) (25)
AST EFFLUENT FLOW PULSE (26)
RUN/STOP ANGLE WELL PUMP (27)
ALARM ANGLE WELL PUMP
ALARM LIQUID DETECTOR
RUN/STOP METERING PUMP
ALARM METERING PUMP
ALARM HIGH PRESSURE SWITCH

RTU-02
CONTROL PANEL

NON-CLASSIFIED ATMOSPHERE
CLASSIFIED ATMOSPHERE (CLASS 1, DIV 2)

2" PVC
TUBING
DETAIL A

2" PVC 40 (TYP)
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
GP39-A AND GP27-A
MW-22
MW-7
MP-7
RW-3
RW-4
RW-1
RW-5
RW-2
MW-17
PTW-B
ST
SEE SHEET NOTE 2

FROM ATMOSPHERE
DILUTION VALVE
TO ATMOSPHERE
XA 006
TIT 006A
TIT 006B
PSL
TI
FLAME ARRESTER
M
CATALITIC OXIDIZER- FALCO 300 FALMOUTH PRODUCTS
SP-200
SP-100
3" CS 40
3/4" HOSE (TYP)
TUBING (TYP)
1" PVC BALL VALVE (TYP)
TO WELL RW-1
TO WELL RW-2
TO WELL RW-3
TO WELL MW-7
TO WELL MW-17
TO WELL PTW-B
TO WELL GP-27A
SEE SHEET NOTE 2
WELL PUMPS: QED MOD# AP4T

FT 003
FE 003
PI 003
PIT 003
SILENCER
3" PVC 40
LSHH 003
LSH 003
LSL 003
2" GLOBE VALVE
KO TANK
VFD
STARTER
SVE B-1 BLOWER TUTHILL MOD# 4009-46L3 25 HP
1" HOSE
3/4" CS
P-1 KO PUMP MOYNO MOD #33201 2 HP
DRAIN
3" CS 40
1" PVC 80
2" PVC 80
OIL/WATER SEPARATOR HYDRO QUIP MOD #AGM-2SS-60V 30 GPM
LSHH 001
LSH 001
LSL 001
2" CS 40
P-2 OIL/WATER SEPARATOR PUMP AMT MOD #3694-97 1.5 HP
FSL 002
B-2 AST BLOWER NEW YORK BLOWER CO 5 HP
4" PVC 40
AS-1 AIR STRIPPER QED MOD #E-Z STACKER 4.4 P
LSHH 002
LSH 002
LSL 002
2" PVC 40
SP-1
P-3 AST PUMP GRUNDFOS CR8 5 HP (42 gpm @ 230 FT. TDH)
1 1/2" PVC 80
TO WELL RW-4
TO WELL MW-22
TO WELL GP-39A
TO WELL RW-5
LSH
TRAILER FLOOR SUMP
PSH 005
PSL 005
120 GAL RECEIVING TANK MAX 200 PSI
3/4" CS 40 AIR LINE
C-1 AIR COMPRESSOR SAYLOR BEALL MOD VT-PL-755-120 10 HP 34.4 CFM @ 175 PSI
TSH
CONTROL ROOM

CLASSIFIED ATMOSPHERE (CLASS 1, DIV 2)
NON-CLASSIFIED ATMOSPHERE
ANGLE WELL PUMP EPG MODEL TSP 2-3PT ½ HP
INSIDE ANGLE WELL VAULT RW-5
LIQUID DETECTOR
FUTURE GAC FILTER
VAPOR PHASE GAC FILTERS: TIGG MOD# N-500 400-800 CFM
VAPOR OFF GAS
4" PVC 40
TO ATMOSPHERE
ACTIVATED CARBON
GAC-5
GAC-4
GAC-3 (SPARE)
SP-50
SP-51a
SP-51b
SEE SHEET NOTE 1
SEE SHEET NOTE 3
METERING PUMP LMI ROYTRONICS MODEL A 141 718SI
F-1B BAG FILTER
F-1A BAG FILTER
DRAIN (TYP.)
ROSEDALE PRODUCTS MODEL #L0618112P125CBPB (125 PSI)
FE 004
FQI 004
LIQUID PHASE GAC FILTERS: SIEMENS MOD# LP-612 150 PSIG MAX
GAC FILTER
1" GS
1" PVC
2" PVC 80
SP-2
SP-3
INSIDE CARBON SHED
SHED FLOOR SUMP
TO STORM DRAIN IN RICKS ROAD

SEE SHEET NO. 4 FOR CONTINUATION

SHEET NOTES

1. SEE SHEET NO. 4 FOR MODIFICATION WORK.
2. REMOVE CONNECTIONS FROM WELL PTW-A.
3. METERING PUMP TO BE LOCATED IN THE CARBON SHED ON/ABOVE THE CHEMICAL DRUM.

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

DESIGNED	CADD	SCALE
EL	SJM	NONE
CHECKED	APPROVED	APPROVED
RWS	RWS	X

Gannett Fleming
BALTIMORE, MARYLAND

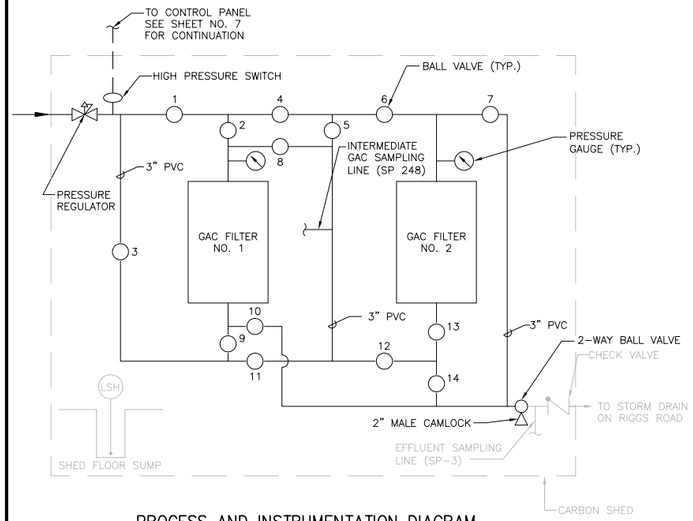
CHEVRON PRODUCTS COMPANY
ATLANTA, GEORGIA

FORMER CHEVRON FACILITY NO. 122208
CHILLUM, MARYLAND

AREA A
PROCESS AND INSTRUMENTATION DIAGRAM

JOB NO. 50641
DATE 12/03/09
CAD FILE 122208AA PID

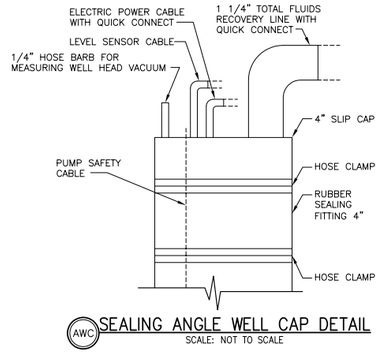
SHEET NO. 7
7 OF 10



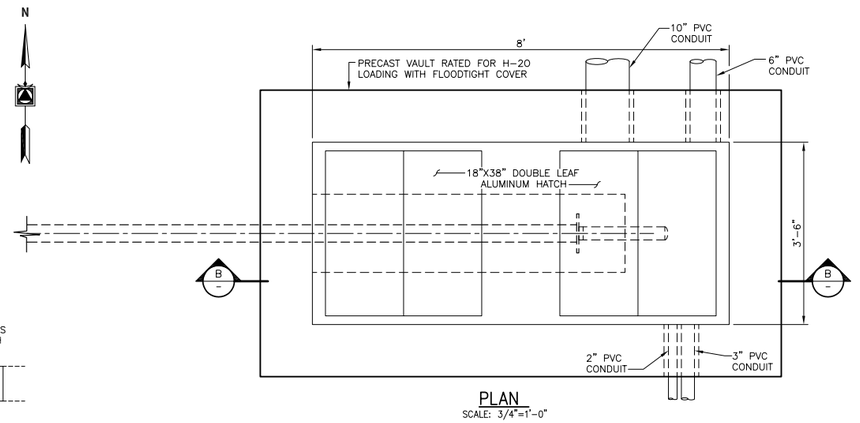
PROCESS AND INSTRUMENTATION DIAGRAM
SCALE: NOT TO SCALE

VALVE	SYSTEM OPERATING MODE						
	SERIES 1→2	SERIES 2→1	GAC 1	GAC 2	BW 1→2	BW 1	BW 2
1	O	O	O	O	C	C	C
2	O	C	O	C	C	C	–
3	C	C	C	C	O	O	O
4	C	O	C	O	–	–	–
5	O	C	–	C	C	C	C
6	O	O	–	O	C	–	C
7	C	C	C	C	O	C	O
8	C	O	C	–	O	O	C
9	O	C	C	–	O	O	C
10	C	O	O	C	C	C	–
11	O	C	–	–	C	C	O
12	C	O	–	C	O	O	O
13	O	O	–	O	O	C	O
14	O	C	C	O	C	O	C

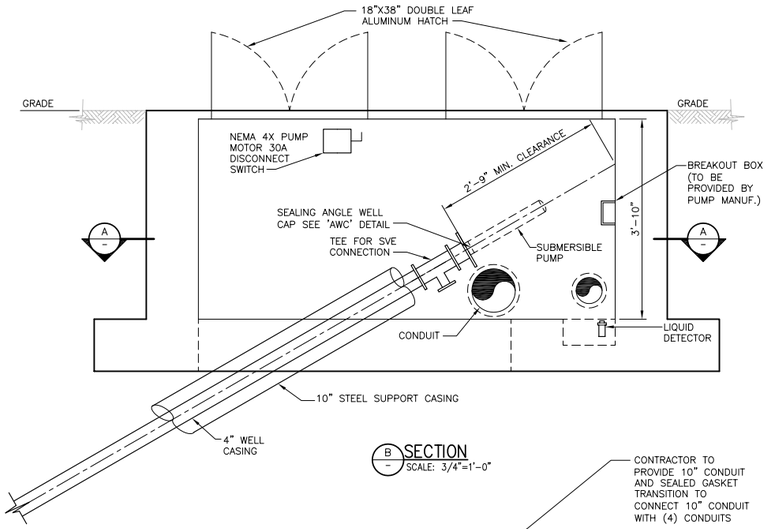
O = OPEN
C = CLOSED
– = IRRELEVANT
BW = BACKWASH



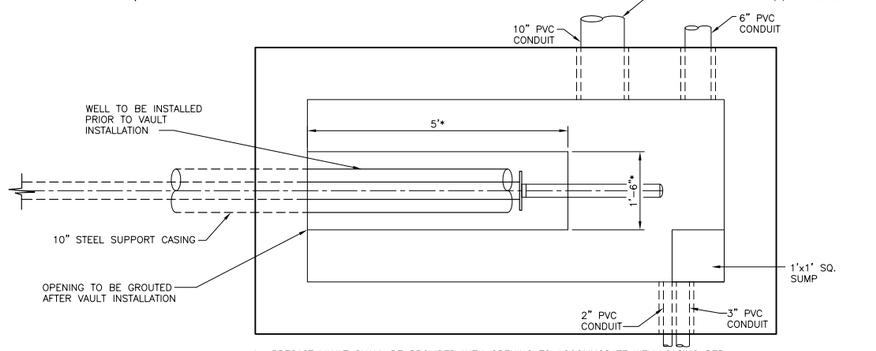
AWC SEALING ANGLE WELL CAP DETAIL
SCALE: NOT TO SCALE



PLAN
SCALE: 3/4"=1'-0"



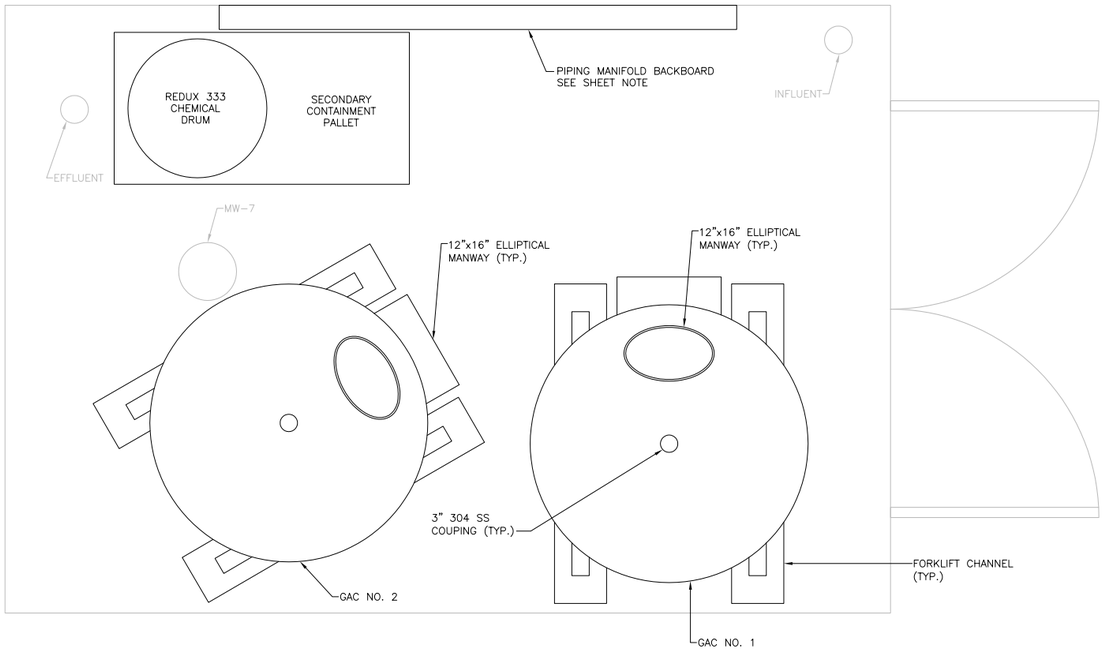
B SECTION
SCALE: 3/4"=1'-0"



* PRECAST VAULT SHALL BE PROVIDED WITH OPENING TO ACCOMMODATE WELL CASING PER THE FOLLOWING NOTES.
1. CONTRACTOR SHALL VERIFY OPENING DIMENSIONS AND LOCATIONS PRIOR TO CASTING THE VAULT.
2. CONTRACTOR SHALL DOWEL BARS, CAST CONCRETE IN PLACE AND CLOSE OPENING WATERTIGHT WITH NON-SHRINK GROUT TO LEVEL WITH BOTTOM OF THE PRECAST VAULT, PER THE PRECAST VAULT MANUFACTURER'S RECOMMENDATIONS.
3. CONTRACTOR SHALL PROTECT WELL CASING FROM CONCRETE IN ALL CONTACT AREAS PER THE PRECAST VAULT MANUFACTURER'S RECOMMENDATIONS.

A SECTION A-A
SCALE: 3/4"=1'-0"

ANGLE WELL VAULT



GAC SHED PLAN VIEW
SCALE: 1" = 1'

SHEET NOTE:
PIPING SHALL NOT BLOCK ACCESS TO GAC MANWAYS OR RUN ACROSS THE FLOOR.

Review Submittal
Not for Construction

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

DESIGNED	CADD	SCALE
EL	SJM	NONE
CHECKED	APPROVED	APPROVED
RWS	RWS	X

Gannett Fleming
BALTIMORE, MARYLAND

CHEVRON PRODUCTS COMPANY
ATLANTA, GEORGIA

FORMER CHEVRON FACILITY NO. 122208
CHILLUM, MARYLAND

AREA A
GAC SYSTEM AND ANGLE WELL VAULT

JOB NO. 50641
DATE 12/03/09
CAD FILE 122208AA GAC

SHEET NO. 4
4 OF 10

Gannett Fleming

TABLE A-1: TOTAL FLUIDS EXTRACTION SYSTEM DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Date/Time	System Status	Influent BTEX (µg/L)	Effluent BTEX (µg/L)	Treatment Efficiency (%)	Totalizer Reading (gallons)	Period Pumped (gallons)	Total Pumped (gallons)	Period Average (GPM)	Hydrocarbons Recovered Period (gallons)	Hydrocarbons Recovered Cumul. (gallons)	Operating Extraction Points
1/3/12 9:06	ON	1,396	0	100.0	46,271,793	68,054	58,976,715	6.86	3.25	903.95	RW1 RW2 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 left off for pump repair)
1/9/12 8:15	ON	NS	0	-	46,326,002	54,209	59,030,924	6.31	-	903.95	RW1 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 and RW-2 left off for pump repair)
1/16/12 8:19	ON	NS	0	-	46,391,552	65,550	59,096,474	6.50	-	903.95	RW1 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 and RW-2 left off for pump repair)
1/23/12 7:56	ON	NS	0	-	46,450,765	59,213	59,155,687	5.89	-	903.95	RW1 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 and RW-2 left off for pump repair)
2/2/12 7:30	OFF	NS	NS	-	46,471,278	20,513	59,176,200	1.43	-	903.95	
2/2/12 9:42	ON	1,381	0	100.0	46,471,278	0	59,176,200	0.00	1.85	905.79	RW1 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 and RW-2 left off for pump repair)
2/13/12 9:00	ON	NS	0	-	46,569,575	98,297	59,274,497	6.22	-	905.79	RW1 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 and RW-2 left off for pump repair)
2/20/12 8:00	ON	NS	0	-	46,638,413	68,838	59,343,335	6.87	-	905.79	RW1 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 and RW-2 left off for pump repair)
2/27/12 7:44	ON	NS	0	-	46,709,309	70,896	59,414,231	7.04	-	905.79	RW1 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 and RW-2 left off for pump repair)
3/5/12 7:38	ON	2,790	0	100.0	46,717,810	8,501	59,422,732	0.84	3.43	909.22	RW1 RW2 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 left off for pump repair)
3/12/12 7:51	ON	NS	0	-	46,790,009	72,199	59,494,931	7.15	-	909.22	RW1 RW2 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 left off for pump repair)
3/19/12 9:10	ON	NS	0	-	46,862,035	72,026	59,566,957	7.09	-	909.22	RW1 RW2 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 left off for pump repair)
3/26/12 7:49	ON	NS	0	-	46,932,540	70,505	59,637,462	7.05	-	909.22	RW1 RW2 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 left off for pump repair)
4/2/12 8:08	OFF	NS	NS	-	46,951,834	19,294	59,656,756	1.91	4.54	913.76	
4/2/12 8:08	ON	3,030	0	100.0	46,951,834	0	59,656,756	#DIV/0!	4.54	918.30	RW1 RW2 RW3 RW-4 MW7 MW17 MW-22 PTWB GP-27R GP-39R (RW-5 left off for pump repair)
4/9/12 9:14	ON	NS	0	-	47,024,967	73,133	59,729,889	7.21	-	918.30	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R (RW-5, MW-7 left off for pump repair)

Gannett Fleming

TABLE A-1: TOTAL FLUIDS EXTRACTION SYSTEM DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Date/Time	System Status	Influent BTEX (µg/L)	Effluent BTEX (µg/L)	Treatment Efficiency (%)	Totalizer Reading (gallons)	Period Pumped (gallons)	Total Pumped (gallons)	Period Average (GPM)	Hydrocarbons Recovered Period (gallons)	Hydrocarbons Recovered Cumul. (gallons)	Operating Extraction Points
4/16/12 10:00	ON	NS	0	-	47,096,309	71,342	59,801,231	7.05	-	918.30	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R (RW-5, MW-7 left off for pump repair)
4/23/12 9:13	ON	NS	0	-	47,167,767	71,458	59,872,689	7.12	-	918.30	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R (RW-5, MW-7 left off for pump repair)
5/2/12 10:11	ON	1,369	0	100.0	47,253,473	85,706	59,958,395	6.58	4.42	922.72	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R (RW-5, MW-7 left off for pump repair)
5/7/12 9:45	ON	NS	0	-	47,299,407	45,934	60,004,329	6.40	-	922.72	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R (RW-5, MW-7 left off for pump repair)
5/14/12 9:42	ON	NS	0	-	47,380,230	80,823	60,085,152	8.02	-	922.72	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW 7 (RW-5 left off for pump repair)
5/23/12 8:25	ON	NS	0	-	47,476,568	96,338	60,181,490	7.48	-	922.72	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
5/29/12 8:52	ON	NS	NS	-	47,527,707	51,139	60,232,629	5.90	-	922.72	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW 7 (RW-5 left off due to bag filter clogging)
6/1/12 13:38	ON	NS	NS	-	47,554,631	26,924	60,259,553	5.85	-	922.72	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW 7
6/5/12 8:50	ON	341	0	100.0	47,587,103	32,472	60,292,025	5.93	1.90	924.62	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
6/11/12 8:33	ON	NS	0	-	47,638,948	51,845	60,343,870	6.01	-	924.62	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
6/25/12 8:21	OFF	NS	NS	-	47,706,635	67,687	60,411,557	3.36	-	924.62	Off due to ASTHH
6/25/12 10:50	ON	NS	0	-	47,706,635	0	60,411,557	0.00	-	924.62	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
7/2/12 8:46	ON	443	0	100.0	47,767,322	60,687	60,472,244	6.10	0.47	925.09	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
7/9/12 9:56	ON	NS	0	-	47,767,819	497	60,472,741	0.05	-	925.09	Totalizer malfunctioning (not counting). Total gallons is incorrect. RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
7/9/12 12:51	OFF	NS	NS	-	47,767,819	0	60,472,741	0.00	-	925.09	Off for cleaning of totalizer paddle. Total gallons is incorrect due to malfunctioning totalizer.
7/9/12 14:50	ON	NS	NS	-	47,767,819	0	60,472,741	0.00	-	925.09	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
7/16/12 11:21	ON	NS	0	-	47,820,897	53,078	60,525,819	5.38	-	925.09	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
7/16/12 12:15	OFF	NS	NS	-	47,821,181	284	60,526,103	5.26	-	925.09	Off for cleaning of view tubes on OWS and AST
7/16/12 13:19	ON	NS	0	-	47,821,181	0	60,526,103	0.00	-	925.09	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5

Gannett Fleming

TABLE A-1: TOTAL FLUIDS EXTRACTION SYSTEM DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Date/Time	System Status	Influent BTEX (µg/L)	Effluent BTEX (µg/L)	Treatment Efficiency (%)	Totalizer Reading (gallons)	Period Pumped (gallons)	Total Pumped (gallons)	Period Average (GPM)	Hydrocarbons Recovered Period (gallons)	Hydrocarbons Recovered Cumul. (gallons)	Operating Extraction Points
7/23/12 12:50	ON	NS	NS	-	47,876,302	55,121	60,581,224	5.48	-	925.09	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
8/1/12 9:12	ON	NS	0	-	47,924,025	47,723	60,628,947	3.75	-	925.09	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
8/1/12 11:23	OFF	NS	NS	-	47,942,748	18,723	60,647,670	142.92	-	925.09	Off for cleaning of oil-water separator
8/6/12 13:16	ON	NS	0	-	47,942,748	0	60,647,670	0.00	-	925.09	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
8/6/12 17:10	OFF	NS	NS	-	47,943,629	881	60,648,551	3.76	-	925.09	System shut down due to malfunctioning float in AST
8/8/12 9:46	ON	NS	NS	-	47,943,629	0	60,648,551	0.00	-	925.09	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
8/15/12 8:42	OFF	NS	NS	-	47,995,950	52,321	60,700,872	5.22	-	925.09	Shut down due to leak in carbon vessel
8/20/12 9:21	ON	3,300	0	100.0	47,995,950	0	60,700,872	0.00	2.85	927.94	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
8/27/12 9:20	ON	NS	0	-	48,055,618	59,668	60,760,540	5.92	-	927.94	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
9/1/12 0:00	ON	NS	NS	-	48,081,292	25,674	60,786,214	3.87	-	927.94	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
9/4/12 8:38	ON	479	0	100.0	48,116,529	35,237	60,821,451	7.28	1.52	929.46	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
9/10/12 9:42	ON	NS	0	-	48,166,689	50,160	60,871,611	5.76	-	929.46	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
9/17/12 9:46	ON	NS	0	-	48,225,321	58,632	60,930,243	5.81	-	929.46	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
9/24/12 13:46	ON	NS	0	-	48,283,905	58,584	60,988,827	5.68	-	929.46	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
10/1/12 9:00	ON	511	0	100.0	48,337,337	53,432	61,042,259	5.46	0.73	930.19	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
10/8/12 9:43	ON	NS	0	-	48,392,693	55,356	61,097,615	5.47	-	930.19	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
10/15/12 13:00	ON	NS	3.7	-	-		61,097,615	0.00	-	930.19	
10/23/12 9:36	ON	NS	NS	-	48,517,289	124,596	61,222,211	11.01	-	930.19	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
10/23/12 10:20	OFF	NS	NS	-	48,517,550	261	61,222,472	5.93	-	930.19	Shut down due to oil/water separator pump leaking, air stripper tray being broken, and carbon being spent
11/9/12 11:10	ON	NS	NS	-	48,517,550	0	61,222,472	0.00	-	930.19	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7
11/9/12 12:45	OFF	NS	NS	-	48,517,889	339	61,222,811	3.57	-	930.19	Shut down due to pressure on carbon units and bag filters being too high
11/12/12 9:50	ON	NS	NS	-	48,517,889	0	61,222,811	0.00	-	930.19	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7
11/19/12 9:04	ON	391	0	100.0	48,576,018	58,129	61,280,940	5.79	0.72	930.91	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7
11/26/12 11:48	ON	NS	0	-	48,637,017	60,999	61,341,939	5.95	-	930.91	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5

Gannett Fleming

TABLE A-1: TOTAL FLUIDS EXTRACTION SYSTEM DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Date/Time	System Status	Influent BTEX (µg/L)	Effluent BTEX (µg/L)	Treatment Efficiency (%)	Totalizer Reading (gallons)	Period Pumped (gallons)	Total Pumped (gallons)	Period Average (GPM)	Hydrocarbons Recovered Period (gallons)	Hydrocarbons Recovered Cumul. (gallons)	Operating Extraction Points
12/3/12 10:18	ON	563	0	100.0	48,695,667	58,650	61,400,589	5.87	0.38	931.29	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
12/4/12 11:59	ON	NS	NS	-	48,704,839	9,172	61,409,761	5.95	-	931.29	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
12/10/12 9:50	ON	NS	0	-	48,758,755	53,916	61,463,677	6.33	-	931.29	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
12/17/12 8:04	ON	NS	0	-	48,820,437	61,682	61,525,359	6.18	-	931.29	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5
12/27/12 9:31	ON	NS	0	-	48,907,858	87,421	61,612,780	6.03	-	931.29	RW1 RW2 RW3 RW-4 MW17 MW-22 PTWB GP-27R GP-39R MW-7 RW-5

Notes:

(1) Hydrocarbons Recovered Period (gallons) = (avg. inf. conc.) x (e-6) x (1/0.2) x (3.785 L/gal) x (1 lb/453.6 g) x (gallons pumped) x (1 gal/6.26 lbs).

(2) Formula assumes BTEX equals 20% of gasoline.

TABLE A-2: TOTAL FLUIDS EXTRACTION SYSTEM INFLUENT ANALYTICAL RESULTS
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Date/Time	Benzene (µg/L)	Toluene (µg/L)	E. Benzene (µg/L)	Xylenes (µg/L)	BTEX (µg/L)	MTBE (µg/L)
1/3/12 8:30	380	560	56	400	1,396	440
2/2/12 13:06	320	580	61	420	1,381	350
3/5/12 12:54	520	1,100	150	1,020	2,790	490
4/2/12 10:35	660	1,400	140	830	3,030	430
5/2/12 10:55	300	600	59	410	1,369	370
6/5/12 8:57	81	140	13	107	341	160
7/2/12 8:55	89	170	20	164	443	170
8/20/12 11:33	780	1,300	170	1,050	3,300	510
9/4/12 10:00	110	190	18	161	479	160
10/1/12 9:00	120	210	19	162	511	190
11/19/12 9:00	100	150	14	127	391	160
12/3/12 9:30	140	220	24	179	563	210

Notes:

(1) ND: Not Detected above reporting limit.

(2) <##: Parameter not detected above the reporting limit.

Gannett Fleming

Chevron

TABLE A-3: TOTAL FLUIDS EXTRACTION SYSTEM EFFLUENT ANALYTICAL RESULTS
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Date/Time	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylene (µg/L)	BTEX (µg/L)	MTBE (µg/L)
1/3/12 8:45	<1	<1	<1	<10	0	2.3
1/9/12 8:19	<1	<1	<1	<10	0	4.1
1/16/12 10:13	<1	<1	<1	<10	0	4.6
1/23/12 8:17	<1	<1	<1	<10	0	2.6
2/2/12 13:14	<1	<1	<1	<10	0	5
2/13/12 11:20	<1	<1	<1	<10	0	8.8
2/20/12 9:38	<1	<1	<1	<10	0	7.6
2/27/12 8:10	<1	<1	<1	<10	0	7.5
3/5/12 13:05	<1	<1	<1	<10	0	6.6
3/12/12 8:20	<1	<1	<1	<10	0	5.2
3/19/12 10:15	<1	<1	<1	<10	0	4.5
3/26/12 8:25	<1	<1	<1	<10	0	4.5
4/2/12 10:15	<1	<1	<1	<10	0	3.2
4/9/12 9:40	<1	<1	<1	<10	0	3.5
4/16/12 9:00	<1	<1	<1	<10	0	3.7
4/23/12 9:15	<1	<1	<1	<10	0	2.1
5/2/12/ 1045	<1	<1	<1	<10	0	2.3
5/7/12 10:30	<1	<1	<1	<10	0	2.3
5/14/12 10:58	<1	<1	<1	<10	0	3.2
5/23/12 9:10	<1	<1	<1	<10	0	2.1
6/5/12 9:10	<1	<1	<1	<10	0	2
6/11/12 9:49	<1	<1	<1	<10	0	2.6
6/25/12 13:50	<1	<1	<1	<10	0	3.4
7/2/12 9:10	<1	<1	<1	<10	0	3.8
7/9/12 11:14	<1	<1	<1	<10	0	2
7/16/12 11:15	<1	<1	<1	<10	0	2.3
7/23/12 13:20	<1	<1	<1	<10	0	1.6
8/1/12 10:45	<1	<1	<1	<10	0	1.5
8/6/12 14:40	<1	<1	<1	<10	0	2.9
8/20/12 11:38	<1	<1	<1	<10	0	3.4
8/27/12 8:30	<1	<1	<1	<10	0	2.3
9/4/12 10:15	<1	<1	<1	<10	0	1.3
9/10/12 10:35	<1	<1	<1	<10	0	1.1
9/17/12 10:00	<1	<1	<1	<10	0	<1
9/24/12 10:00	<1	<1	<1	<10	0	<1
10/1/12 9:10	<1	<1	<1	<10	0	<1
10/8/12 10:00	<1	<1	<1	<10	0	<1
10/15/12 13:00	1.4	2.3	<1	<10	3.7	2.8
11/19/12 9:15	<1	<1	<1	<10	0	<1
11/26/12 11:50	<1	<1	<1	<10	0	<1
12/3/12 9:45	<1	<1	<1	<10	0	<1
12/10/12 14:20	<1	<1	<1	<10	0	<1
12/17/12 8:15	<1	<1	<1	<10	0	<1
12/27/12 9:30	<1	<1	<1	<10	0	<1

Notes:

(1) ND: Not Detected above reporting limit.

(2) <##: Parameter not detected above the reporting limit.

Gannett Fleming

TABLE A-4: AIR STRIPPER INFLUENT AIR ANALYTICAL RESULTS
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

							Extraction Rate	
Date/Time	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylene (µg/L)	TPH (µg/L)	Flow (SCFM)	Benzene (lbs/hr)	TPH (lbs/day)
2/20/12 0:00	1.70	2.40	0.27	1.90	7	181	0.0012	0.12
3/12/12 0:00	0.05	0.14	<0.017	0.11	<4.1	194	0.0000	<0.07
4/9/12 0:00	2.20	2.90	0.20	1.30	18	184	0.0015	0.30
5/23/12 0:00	0.02	0.19	<.0087	0.09	<2	181	0.0000	<0.03
6/5/12 0:00	0.09	0.39	0.07	0.53	4	181	0.0001	0.07
7/2/12 10:15	2.00	2.80	0.29	1.70	<3.300	199	0.0015	<0.06
9/4/12 9:15	<0.0064	0.03	<0.0087	<0.0087	<3.300	194	<0.000005	<0.06
10/1/12 10:45	1.90	2.30	0.15	1.20	15	237	0.0017	0.32
11/26/12 12:25	0.18	0.20	0.02	0.11	<3.300	217	0.0001	<0.06

Notes:

(1) Benzene (lbs/h) = (benzene conc.) x (e-6) x (1 lb/453.6 g) x (flow) x (28.32 L/ft3) x (60 min/hr).

(2) TPH (lbs/day) = (TPH conc.) x (e-6) x (1 lb/453.6 g) x (flow) x (28.32 L/ft3) x (1440 min/day).

(3) µg/L = (ppmv) x (MW g/mol) x (mol/24.45 L), where MW benzene = 78 and MW TPH = 92.

Gannett Fleming

TABLE A-5: AIR STRIPPER EFFLUENT AIR ANALYTICAL RESULTS
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Date/Time	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylene (µg/L)	TPH (µg/L)	Flow (SCFM)	Discharge Rate Benzene (lbs/hr)	Discharge Rate TPH (lbs/day)
2/20/12 0:00	0.52	0.61	0.05	0.38	7	181	0.0004	0.11
3/12/12 0:00	0.90	1.50	0.16	1.00	7	194	0.0007	0.12
4/9/12 0:00	0.83	1.50	0.19	1.10	9	184	0.0006	0.14
5/23/12 0:00	0.86	0.89	0.07	0.40	5	181	0.0006	0.09
6/5/12 0:00	1.00	1.40	0.15	1.30	9	181	0.0007	0.15
7/2/12 10:20	0.83	1.10	0.15	0.99	<3.300	199	0.0006	<0.06
9/4/12 9:20	0.72	0.88	0.06	0.33	<3.300	194	0.0005	<0.06
10/1/12 10:50	0.71	1.20	0.11	0.62	<7.400	237	0.0006	<0.16
11/26/12 12:30	0.91	0.54	0.05	0.25	<3.300	217	0.0007	<0.06

Notes:

(1) Benzene (lbs/h) = (benzene conc.) x (e-6) x (1 lb/453.6 g) x (flow) x (28.32 L/ft3) x (60 min/hr).

(2) TPH (lbs/day) = (TPH conc.) x (e-6) x (1 lb/453.6 g) x (flow) x (28.32 L/ft3) x (1440 min/day).

(3) µg/L = (ppmv) x (MW g/mol) x (mol/24.45 L), where MW benzene = 78 and MW TPH = 92.

APPENDIX B

DUAL-PHASE EXTRACTION SYSTEM – SOIL VAPOR EXTRACTION DATA

APPENDIX B

DUAL-PHASE EXTRACTION SYSTEM – SOIL VAPOR EXTRACTION DATA

DESCRIPTION OF DATA TABLES

Overview

Chevron uses a central database to store remediation system data and laboratory analytical data. The tabulated data in Tables B-1, B-2 and B-3 is an exported summary of soil vapor extraction ("SVE") system data from the database. These data were recorded by the field technician during site visits. Analytical data for influent samples collected for laboratory analysis are included in Table B-2 to calculate the mass recovery rates of total petroleum hydrocarbons and benzene. Effluent sample data are included in Table B-3 for comparison with permit limits.

The data tables include all system data collected since July 1, 2011. Data collected prior to this date are available in previous progress reports.

The following table lists the column headings in the table with a brief description of each. Please refer to the Process and Instrumentation Diagram (Appendix A) for a schematic of equipment and sample ports.

Column Heading	Description
Date / Time	Date and time data were recorded.
System Status	System ON or OFF when technician recorded the data.
Hour Meter (hours)	Field measurement of the hour meter.
Manifold Vacuum (in Hg)	Field measurement of vacuum in manifold.
Influent (ppmv)	Field measurement of vapor concentration prior to treatment using a photoionization detector.
Influent (cfm)	Field measurement of total vapor flow in manifold.
Effluent (ppmv)	Field measurement of vapor concentration after treatment using a photoionization detector.
Treatment Efficiency (%)	Equation: (Influent-Effluent) / (Influent).
Hydrocarbons Recovered (lbs/day) [1]	Equation: [(Influent) / (10^{-6})] * [Manifold Extraction-Flow Rate] * CV1
Hydrocarbons Recovered Period (gal)	Equation: [(Avg. Influent) x (10^{-6})] * [Avg. Manifold Extraction-Flow Rate]
Hydrocarbons Recovered Cumulative (gal)	Equation: (Avg. Influent BTEX) * (1 L / 0.26 gal) * (lb/454x10^{6} µg) * (current Total Gallons Pumped – previous Total Gallons Pumped on last sampling date) * (gal hydrocarbons / 6.48 lbs hydrocarbons) * (0.2 gal BTEX / gal hydrocarbons).
Operating Extraction Points	Wells in operation during the reporting period.

Notes

(1) Assumptions: Hydrocarbon molecular weight is 92 grams/mole; vapor behaves like an ideal gas; Average (Avg.) Influent (ppmv) and flow rate (Manifold Extraction in the table) are averages between the current and last events. Unit conversion factors (CV) equations are:

CV1 = (92 grams/mole) * (1 mol/24.45 L) * (28.32 L/ft^3) * (1440 min/day) * (1 lb/454 grams) = 338 min*lbs/day.

CV2 = (92 grams/mole) * (1 mol/24.45 L) * (28.32 L/ft^3) * (Runtime in minutes) * (1 lb/454 grams) = 0.235 min*lbs.

GRS CONTROL PANEL
EOS CONTROLER

CAT OXIDIZER RUNNING (1)
CAT OXIDIZER INLET TEMP T-1 (2)
CAT OXIDIZER OUTLET TEMP T-2 (3)
SVE AIR FLOW (4)
KO TANK VACUUM (5)
RUN/STOP KO PUMP P-1 (HS) (XA) (6)
KO TANK LEVEL HI/HI (7)
KO TANK LEVEL HI (8)
KO TANK LEVEL LO (9)
OIL/WATER SEPERATOR LEVEL HI/HI (10)
OIL/WATER SEPERATOR LEVEL HI (11)
OIL/WATER SEPERATOR LEVEL LO (12)
RUN/STOP OIL/WATER SEPERATOR PUMP P-2 (HS) (XA) (13)
SVE BLOWER RPM (14)
SVE BLOWER SPEED SET POINT (15)
RUN/STOP SVE BLOWER B-1 (HS) (XA) (16)
RUN/STOP AST BLOWER B-2 (HS) (XA) (17)
AST BLOWER DISCHARGE FLOW SWITCH (18)
AST LEVEL HI/HI (19)
AST LEVEL HI (20)
AST LEVEL LO (21)
RUN/STOP AST PUMP P-3 (HS) (XA) (22)
NOT USED (23)
3-WAY COMPRESSED AIR SOLENOID VALVE (XA) (24)
RUN/STOP COMPRESSER C-1 (HS) (XA) (25)
AST EFFLUENT FLOW PULSE (26)
RUN/STOP ANGLE WELL PUMP (27)
ALARM ANGLE WELL PUMP
ALARM LIQUID DETECTOR
RUN/STOP METERING PUMP
ALARM METERING PUMP
ALARM HIGH PRESSURE SWITCH

RTU-02
CONTROL PANEL

NON-CLASSIFIED ATMOSPHERE
CLASSIFIED ATMOSPHERE (CLASS 1, DIV 2)

2" PVC
TUBING
DETAIL A

2" PVC 40 (TYP)
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
SVE PIPE FROM WELL
GP39-A AND GP27-A
MW-22
MW-7
MP-7
RW-3
RW-4
RW-1
RW-5
RW-2
MW-17
PTW-B
ST
SEE SHEET NOTE 2

FROM ATMOSPHERE
DILUTION VALVE
TO ATMOSPHERE
XA 006
TIT 006A
TIT 006B
PSL
TI
FLAME ARRESTER
M
CATALITIC OXIDIZER- FALCO 300 FALMOUTH PRODUCTS
SP-200
SP-100
3" CS 40
3/4" HOSE (TYP)
TUBING (TYP)
1" PVC BALL VALVE (TYP)
TO WELL RW-1
TO WELL RW-2
TO WELL RW-3
TO WELL MW-7
TO WELL MW-17
TO WELL PTW-B
TO WELL GP-27A
SEE SHEET NOTE 2
WELL PUMPS: QED MOD# AP4T

FT 003
FE 003
PI 003
PIT 003
SILENCER
3" PVC 40
LSHH 003
LSH 003
LSL 003
2" GLOBE VALVE
KO TANK
VFD
STARTER
SVE B-1 BLOWER TUTHILL MOD# 4009-46L3 25 HP
1" HOSE
3/4" CS
P-1 KO PUMP MOYNO MOD #33201 2 HP
DRAIN
3" CS 40
1" PVC 80
2" PVC 80
OIL/WATER SEPARATOR HYDRO QUIP MOD #AGM-2SS-60V 30 GPM
LSHH 001
LSH 001
LSL 001
2" CS 40
P-2 OIL/WATER SEPARATOR PUMP AMT MOD #3694-97 1.5 HP
FSL 002
B-2 AST BLOWER NEW YORK BLOWER CO 5 HP
4" PVC 40
AS-1 AIR STRIPPER QED MOD #E-Z STACKER 4.4 P
LSHH 002
LSH 002
LSL 002
2" PVC 40
SP-1
P-3 AST PUMP GRUNDFOS CR8 5 HP (42 gpm @ 230 FT. TDH)
1 1/2" PVC 80
TO WELL RW-4
TO WELL MW-22
TO WELL GP-39A
TO WELL RW-5
LSH
TRAILER FLOOR SUMP
PSH 005
PSL 005
120 GAL RECEIVING TANK MAX 200 PSI
3/4" CS 40 AIR LINE
C-1 AIR COMPRESSOR SAYLOR BEALL MOD VT-PL-755-120 10 HP 34.4 CFM @ 175 PSI
TSH
CONTROL ROOM

CLASSIFIED ATMOSPHERE (CLASS 1, DIV 2)
NON-CLASSIFIED ATMOSPHERE
ANGLE WELL PUMP EPG MODEL TSP 2-3PT ½ HP
INSIDE ANGLE WELL VAULT RW-5
LIQUID DETECTOR
FUTURE GAC FILTER
VAPOR PHASE GAC FILTERS: TIGG MOD# N-500 400-800 CFM
VAPOR OFF GAS
4" PVC 40
TO ATMOSPHERE
ACTIVATED CARBON
GAC-5
GAC-4
GAC-3 (SPARE)
SP-50
SP-51a
SP-51b
SEE SHEET NOTE 1
SEE SHEET NOTE 3
METERING PUMP LMI ROYTRONICS MODEL A 141 718SI
F-1B BAG FILTER
F-1A BAG FILTER
DRAIN (TYP.)
ROSEDALE PRODUCTS MODEL #L0618112P125CBPB (125 PSI)
FE 004
FQI 004
LIQUID PHASE GAC FILTERS: SIEMENS MOD# LP-612 150 PSIG MAX
GAC FILTER
1" GS
1" PVC
2" PVC 80
SP-2
SP-3
INSIDE CARBON SHED
SHED FLOOR SUMP
TO STORM DRAIN IN RICKS ROAD

SEE SHEET NO. 4 FOR CONTINUATION

SHEET NOTES

1. SEE SHEET NO. 4 FOR MODIFICATION WORK.
2. REMOVE CONNECTIONS FROM WELL PTW-A.
3. METERING PUMP TO BE LOCATED IN THE CARBON SHED ON/ABOVE THE CHEMICAL DRUM.

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

DESIGNED	CADD	SCALE
EL	SJM	NONE
CHECKED	APPROVED	APPROVED
RWS	RWS	X

Gannett Fleming
BALTIMORE, MARYLAND

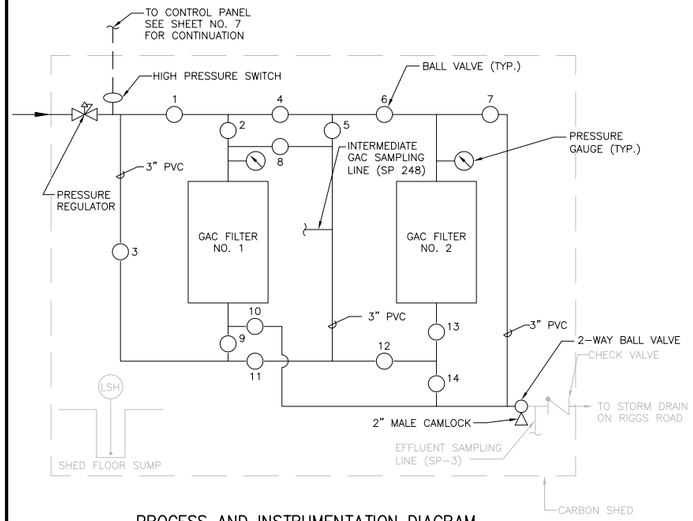
CHEVRON PRODUCTS COMPANY
ATLANTA, GEORGIA

FORMER CHEVRON FACILITY NO. 122208
CHILLUM, MARYLAND

AREA A
PROCESS AND INSTRUMENTATION DIAGRAM

JOB NO. 50641
DATE 12/03/09
CAD FILE 122208AA PID

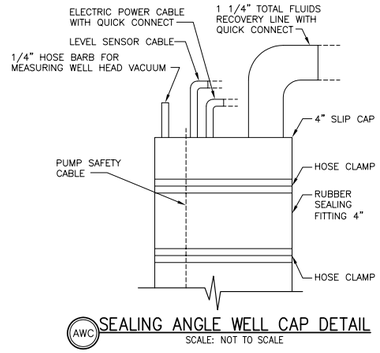
SHEET NO. 7
7 OF 10



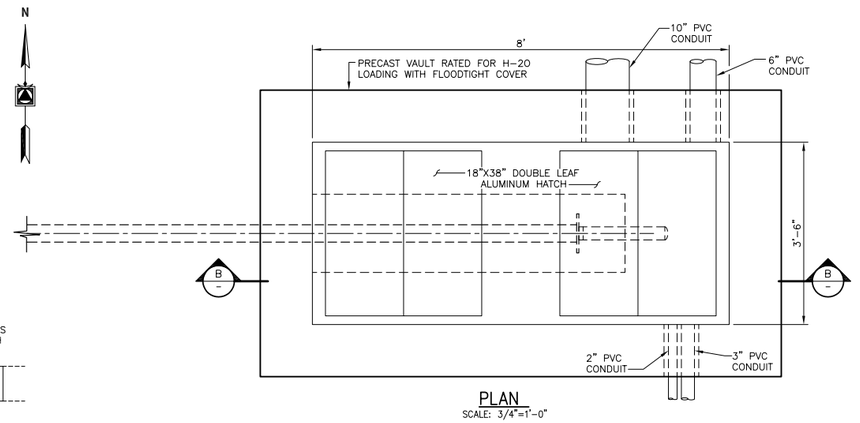
PROCESS AND INSTRUMENTATION DIAGRAM
SCALE: NOT TO SCALE

VALVE	SYSTEM OPERATING MODE						
	SERIES 1→2	SERIES 2→1	GAC 1	GAC 2	BW 1→2	BW 1	BW 2
1	O	O	O	O	C	C	C
2	O	C	O	C	C	C	–
3	C	C	C	C	O	O	O
4	C	O	C	O	–	–	–
5	O	C	–	C	C	C	C
6	O	O	–	O	C	–	C
7	C	C	C	C	O	C	O
8	C	O	C	–	O	O	C
9	O	C	C	–	O	O	C
10	C	O	O	C	C	C	–
11	O	C	–	–	C	C	O
12	C	O	–	C	O	O	O
13	O	O	–	O	O	C	O
14	O	C	C	O	C	O	C

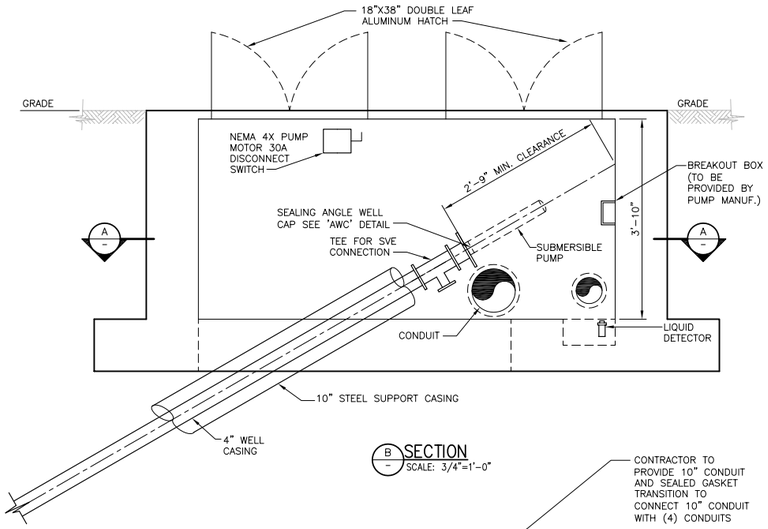
O = OPEN
C = CLOSED
– = IRRELEVANT
BW = BACKWASH



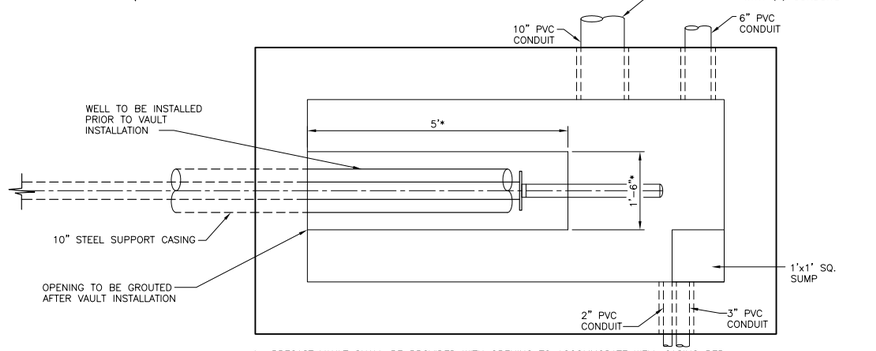
AWC SEALING ANGLE WELL CAP DETAIL
SCALE: NOT TO SCALE



PLAN
SCALE: 3/4"=1'-0"



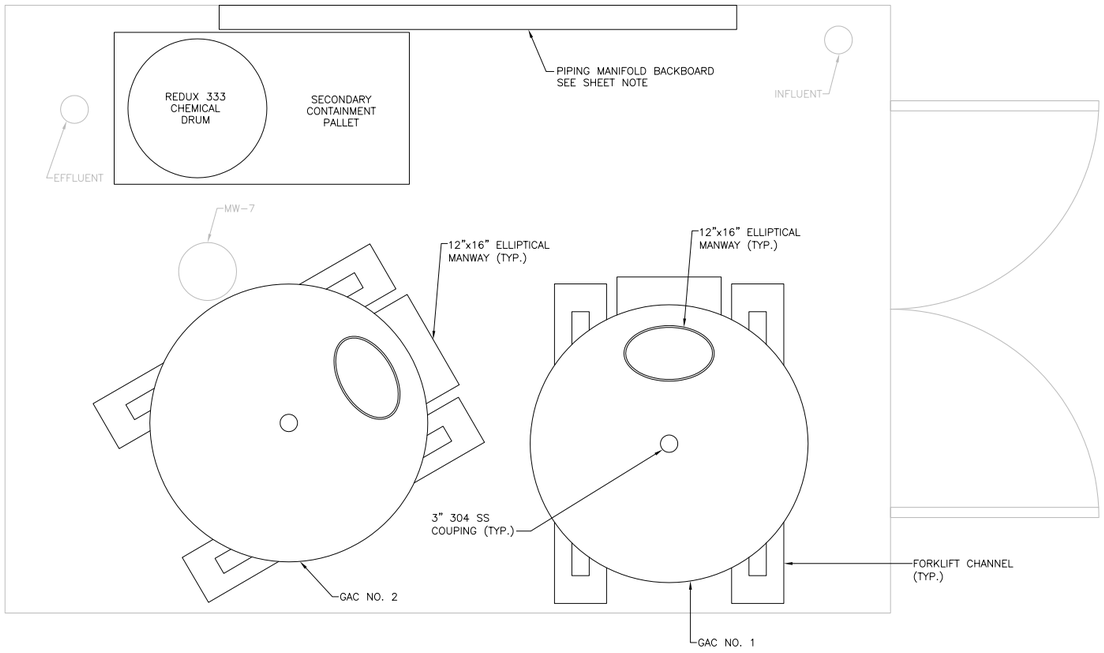
B SECTION
SCALE: 3/4"=1'-0"



* PRECAST VAULT SHALL BE PROVIDED WITH OPENING TO ACCOMMODATE WELL CASING PER THE FOLLOWING NOTES.
1. CONTRACTOR SHALL VERIFY OPENING DIMENSIONS AND LOCATIONS PRIOR TO CASTING THE VAULT.
2. CONTRACTOR SHALL DOWEL BARS, CAST CONCRETE IN PLACE AND CLOSE OPENING WATERTIGHT WITH NON-SHRINK GROUT TO LEVEL WITH BOTTOM OF THE PRECAST VAULT, PER THE PRECAST VAULT MANUFACTURER'S RECOMMENDATIONS.
3. CONTRACTOR SHALL PROTECT WELL CASING FROM CONCRETE IN ALL CONTACT AREAS PER THE PRECAST VAULT MANUFACTURER'S RECOMMENDATIONS.

A SECTION A-A
SCALE: 3/4"=1'-0"

ANGLE WELL VAULT



GAC SHED PLAN VIEW
SCALE: 1" = 1'

SHEET NOTE:
PIPING SHALL NOT BLOCK ACCESS TO GAC MANWAYS OR RUN ACROSS THE FLOOR.

Review Submittal
Not for Construction

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

DESIGNED	CADD	SCALE
EL	SJM	NONE
CHECKED	APPROVED	APPROVED
RWS	RWS	X

Gannett Fleming
BALTIMORE, MARYLAND

CHEVRON PRODUCTS COMPANY
ATLANTA, GEORGIA

FORMER CHEVRON FACILITY NO. 122208
CHILLUM, MARYLAND

AREA A
GAC SYSTEM AND ANGLE WELL VAULT

JOB NO. 50641
DATE 12/03/09
CAD FILE 122208AA GAC

SHEET NO. 4
4 OF 10

Gannett Fleming

TABLE B-1: SOIL VAPOR EXTRACTION SYSTEM DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Date/Time	System Status	Hour Meter (hours)	Manifold Vacuum (in. H2O)	Influent (ppmv)	Influent (SCFM)	Effluent (ppmv)	Treatment Efficiency	Hydrocarbons Recovered (lbs/day)	Period (gallons)	Cumul. (gallons)	Operating Extraction Points
1/3/12 9:04	ON	36,779.7	12	33	168	14.3	56.1	1.9	3.1	5,994.3	RW1 RW3 MW7 MW17 PTW A PTWB MP7 *FID Readings
1/9/12 8:02	ON	36,922.7	11	56	180	23.1	58.8	3.4	2.4	5,996.7	RW3 MW7 MW17 MW22 GP39R GP27R PTWB MP7 *FID Readings
1/16/12 9:07	ON	37,091.8	11	61	180	35.7	41.8	3.7	3.9	6,000.7	RW3 MW7 MW17 MW22 GP39R GP27R PTWB MP7 *FID Readings
1/23/12 8:05	ON	37,258.1	12	31	168	8.8	71.3	1.7	3.0	6,003.6	RW3 MW7 MW17 MW22 GP39R GP27R PTWB MP7 *FID Readings
2/2/12 9:08	OFF	37,262.1	-	-	-	-	-	-	2.8	6,006.4	Off due to surge protectors - need to be replaced
2/13/12 7:40	OFF	372,664.0	10	33	138	5.2	84.3	-	-	6,006.4	RW3 MW7 MW17 MW22 GP39R GP27R PTWB MP7 *FID Readings
2/20/12 9:31	ON	37,434.9	10	26	140	9.8	61.6	1.2	-	6,006.4	RW3 MW7 MW17 MW22 GP39R GP27R PTWB MP7 *FID Readings
2/27/12 7:50	ON	37,647.0	12	93	138	5.2	94.4	4.3	3.0	6,009.4	RW3 MW7 MW17 MW22 GP39R GP27R PTWB MP7 *FID Readings
3/5/12 7:38	OFF	37,764.4	12	43	135	4.8	88.9	-	3.4	6,012.8	RW3 MW7 MW17 MW22 GP39R GP27R PTWB MP7 *FID Readings
3/12/12 7:52	ON	37,930.0	12	85	137	33.5	60.4	3.9	-	6,012.8	RW3 MW7 MW17 MW22 GP39R GP27R PTWB MP7 *FID Readings
3/19/12 9:09	ON	38,099.3	11	96	138	23.1	75.8	4.5	4.6	6,017.4	RW3 MW7 MW17 MW22 GP39R GP27R PTWB MP7 *FID Readings
3/26/12 7:47	ON	38,265.9	11	101	138	36.5	63.8	4.7	5.0	6,022.4	RW3 MW7 MW17 MW22 GP39R GP27R PTWB MP7 *FID Readings
4/2/12 9:21	OFF	38,317.1	12	63	133	16.9	73.2	-	4.2	6,026.6	RW3 MW7 MW17 MW22 GP39R GP27R PTWB MP7 *FID Readings
4/9/12 9:12	ON	38,484.9	11	104	137	35.5	65.7	4.8	-	6,026.6	RW3 MW7 MW17 MW22 GP39R GP27R PTWB MP7 *FID Readings
4/16/12 10:07	ON	38,653.9	11	66	139	20.2	69.5	3.1	4.4	6,030.9	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 *FID Readings
4/23/12 9:17	ON	38,821.0	12	47	117	22.3	52.7	1.9	2.7	6,033.6	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 *FID Readings
4/28/12 20:36	OFF	38,953.4	-	-	-	-	-	-	1.6	6,035.2	Off due to knockout tank HH
5/2/12 10:00	ON	38,953.4	14	47	117	7.3	84.5	1.9	-	6,035.2	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 *FID Readings
5/4/12 22:00	OFF	39,013.3	-	-	-	-	-	-	0.7	6,036.0	Off due to knockout tank HH
5/7/12 9:15	ON	39,013.3	13	60	120	36.8	38.8	2.4	-	6,036.0	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 *FID Readings
5/14/12 9:54	ON	39,181.8	13	68	126	26.5	60.7	2.9	2.9	6,038.9	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings

Gannett Fleming

TABLE B-1: SOIL VAPOR EXTRACTION SYSTEM DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Date/Time	System Status	Hour Meter (hours)	Manifold Vacuum (in. H2O)	Influent (ppmv)	Influent (SCFM)	Effluent (ppmv)	Treatment Efficiency	Hydrocarbons Recovered (lbs/day)	Hydrocarbons Recovered Period (gallons)	Hydrocarbons Recovered Cumul. (gallons)	Operating Extraction Points
5/23/12 8:25	ON	39,396.7	12	122	126	61.8	49.2	5.2	5.6	6,044.5	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
5/29/12 8:54	ON	39,540.8	13	119	126	51.9	56.4	5.1	4.8	6,049.4	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 *FID Readings
6/1/12 13:36	ON	39,548.4	-	-	-	-	-	-	2.5	6,051.9	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
6/5/12 8:47	ON	39,639.6	13	73	119	46.2	36.3	2.9	1.7	6,053.6	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
6/11/12 8:58	ON	39,783.8	12	195	133	104.1	46.6	8.8	5.4	6,059.0	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
6/25/12 8:21	OFF	39,980.1	-	-	-	-	-	-	19.3	6,078.3	Off due to AST HH
6/25/12 10:57	ON	39,980.1	12	140	132	58.3	58.3	6.3	-	6,078.3	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
7/2/12 8:49	ON	40,146.8	12	132	134	66.1	49.9	6.0	6.6	6,084.9	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
7/9/12 9:55	ON	40,315.9	12	149	135	65.6	56.0	6.8	7.0	6,091.9	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
7/9/12 12:51	OFF	40,318.9	-	-	-	-	-	-	0.1	6,092.1	Off for cleaning of totalizer paddle.
7/9/12 14:50	ON	40,318.9	-	-	-	-	-	-	-	6,092.1	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
7/16/12 12:15	OFF	40,484.6	-	-	-	-	-	-	-	6,092.1	Off for cleaning of view tubes
7/16/12 13:19	ON	40,484.6	12	37	131	36.5	1.1	1.6	-	6,092.1	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
7/23/12 12:48	ON	40,652.8	13	75	127	30.0	60.0	3.2	2.7	6,094.7	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
8/1/12 9:09	ON	40,865.1	12	70	127	31.0	55.4	3.0	4.3	6,099.0	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
8/1/12 11:23	OFF	40,867.4	-	-	-	-	-	-	0.0	6,099.1	Off for system cleaning
8/6/12 13:16	ON	40,867.9	13	40	127	30.7	22.9	1.7	-	6,099.1	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
8/6/12 17:10	OFF	40,871.8	-	-	-	-	-	-	0.0	6,099.1	System shut down due to malfunctioning float in AST
8/8/12 9:46	ON	40,871.8	13	-	126	-	-	-	-	6,099.1	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
8/15/12 8:42	OFF	41,038.8	-	-	-	-	-	-	-	6,099.1	Shut down due to leak in carbon vessel
8/20/12 9:21	ON	41,038.8	12	59	127	19.8	66.2	2.5	-	6,099.1	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
8/27/12 9:21	ON	41,206.8	12	64	135	25.8	59.4	2.9	3.0	6,102.1	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
9/4/12 8:35	ON	41,398.1	12	58	131	33.7	41.5	2.6	3.4	6,105.5	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings

Gannett Fleming

TABLE B-1: SOIL VAPOR EXTRACTION SYSTEM DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Date/Time	System Status	Hour Meter (hours)	Manifold Vacuum (in. H2O)	Influent (ppmv)	Influent (SCFM)	Effluent (ppmv)	Treatment Efficiency	Hydrocarbons Recovered (lbs/day)	Hydrocarbons Recovered Period (gallons)	Hydrocarbons Recovered Cumul. (gallons)	Operating Extraction Points
9/10/12 9:42	ON	41,543.2	13	64	127	34.9	45.6	2.8	2.5	6,108.0	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
9/17/12 9:46	ON	41,711.2	12	131	133	53.6	59.2	5.9	4.7	6,112.7	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
9/24/12 13:13	ON	41,882.7	12	126	132	57.3	54.6	5.6	6.5	6,119.2	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
10/1/12 9:00	ON	42,046.5	12	83	127	34.8	57.9	3.5	4.9	6,124.1	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
10/8/12 9:46	ON	42,215.3	12	51	122	22.1	56.8	2.1	3.1	6,127.2	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
10/23/12 9:35	ON	42,575.1	13	80	120	31.6	60.4	3.2	6.3	6,133.5	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
10/23/12 10:20	OFF	42,575.8	-	-	-	-	-	-	0.0	6,133.5	Shut down due to oil/water separator pump leaking, air stripper tray being broken, and carbon being spent
11/9/12 11:45	ON	42,575.8	-	-	-	-	-	-	-	6,133.5	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
11/9/12 12:45	OFF	42,578.5	-	-	-	-	-	-	-	6,133.5	Shut down due to pressure on carbon units and bag filters being too high
11/12/12 10:41	ON	42,578.5	13	37	125	8.1	78.3	1.6	-	6,133.5	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 *FID Readings
11/19/12 9:08	ON	42,745.0	13	27	124	6.9	74.7	1.1	1.5	6,134.9	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
11/26/12 0:00	ON	42,915.6	12	55	135	11.0	80.0	2.5	1.9	6,136.8	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
12/3/12 10:17	ON	43,082.1	12	70	128	14.6	79.2	3.0	3.2	6,140.0	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
12/4/12 12:00	ON	43,107.9	12	125	160	25.6	79.6	6.8	0.8	6,140.8	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
12/10/12 9:53	ON	43,249.7	12	153	168	43.8	71.4	8.7	7.1	6,148.0	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
12/17/12 8:53	ON	43,416.7	12	91	167	5.0	94.5	5.1	7.5	6,155.5	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings
12/27/12 9:29	ON	43,657.3	12	153	166	28.4	81.4	8.6	10.8	6,166.2	GP-27R MP-7 MW-22 MW-17 PTW-B RW-3 MW-7 RW-5 *FID Readings

Notes:

(1) Hydrocarbons recovered are expressed as toluene (MW = 92 g/mol @ 77F).

(2) Hydrocarbons Recovered (lbs/day) = (inf. conc.) x (92 g/mol) x (mol/24.45 L) x (e-6) x (inf. flow) x (28.32 L/ft3) x (1440 min/day) x (1 lb/453.6 g).

(3) Hydrocarbons Recovered Period (gallons) = (avg. inf. conc.) x (92 g/mol) x (mol/24.45 L) x (e-6) x (avg. inf. flow) x (28.32 L/ft3) x (runtime in minutes) x (1 lb/453.6 g) x (gal/6.39 lb).

Gannett Fleming

TABLE B-2: SOIL VAPOR EXTRACTION SYSTEM INFLUENT ANALYTICAL RESULTS
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Date/Time	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylene (µg/L)	TPH (µg/L)	Flow (SCFM)	Extraction Rate Benzene (lbs/hr)	Extraction Rate TPH (lbs/day)
1/3/12 9:30	1.40	6.00	1.60	15.00	300	168	0.0009	4.54
2/20/12 10:00	0.21	0.65	0.20	2.80	170	140	0.0001	2.14
3/12/12 8:30	0.13	0.39	0.07	1.40	200	137	0.0001	2.46
4/9/12 14:00	0.24	0.58	0.09	1.70	200	137	0.0001	2.47
5/14/12 11:05	0.70	2.10	0.34	4.80	270	126	0.0003	3.06
6/5/12 10:15	0.72	2.60	0.44	5.70	210	119	0.0003	2.25
7/2/12 10:15	1.00	11.00	3.00	19.00	350	135	0.0005	4.26
8/27/12 8:34	0.30	1.90	0.40	2.80	180	135	0.0002	2.18
9/4/12 9:15	0.40	2.40	0.58	4.00	180	131	0.0002	2.13
10/1/12 10:45	1.80	6.40	1.30	7.20	320	127	0.0009	3.64
11/26/12 12:25	0.70	3.60	1.30	11.00	190	135	0.0004	2.30
12/3/12 9:50	0.14	0.79	0.30	2.60	230	128	0.0001	2.64

Notes:

(1) Benzene (lbs/h) = (benzene conc.) x (e-6) x (1 lb/453.6 g) x (flow) x (28.32 L/ft3) x (60 min/hr).

(2) TPH (lbs/day) = (TPH conc.) x (e-6) x (1 lb/453.6 g) x (flow) x (28.32 L/ft3) x (1440 min/day).

(3) µg/L = (ppmv) x (MW g/mol) x (mol/24.45 L), where MW benzene = 78 and MW TPH = 92.

Gannett Fleming

TABLE B-3: SOIL VAPOR EXTRACTION SYSTEM EFFLUENT ANALYTICAL RESULTS
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MD
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Date/Time	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylene (µg/L)	TPH (µg/L)	Flow (SCFM)	Discharge Rate Benzene (lbs/hr)	Discharge Rate TPH (lbs/day)
1/3/12 9:45	0.67	2.70	0.65	6.00	160	168.49	0.0004	2.42
2/20/12 10:05	0.12	0.31	0.045	0.55	90	140.26	0.0001	1.13
3/12/12 8:33	0.072	0.19	<35	0.2	110	136.88	0.0000	1.35
4/9/12 14:10	0.13	0.26	0.034	0.53	120	138.16	0.0001	1.49
5/14/12 11:05	0.37	0.94	0.12	1.6	130	126.06	0.0002	1.47
6/5/12 10:10	0.39	1.20	0.16	2.00	120	119.38	0.0002	1.29
7/2/12 10:20	0.51	4.50	0.95	5.60	160	135.32	0.0003	1.95
8/27/12 8:34	0.18	0.89	0.15	0.99	85	134.79	0.0001	1.03
9/4/12 9:20	0.19	1.30	0.24	1.70	97	131.38	0.0001	1.15
10/1/12 10:50	0.76	3.00	0.74	3.90	170	126.53	0.0004	1.93
11/26/12 12:30	0.14	0.43	0.13	1.00	38	134.79	0.0001	0.46
12/3/12 9:55	0.03	0.12	0.04	0.33	39	127.84	0.0000	0.45

Notes:

(1) Benzene (lbs/h) = (benzene conc.) x (e-6) x (1 lb/453.6 g) x (flow) x (28.32 L/ft3) x (60 min/hr).

(2) TPH (lbs/day) = (TPH conc.) x (e-6) x (1 lb/453.6 g) x (flow) x (28.32 L/ft3) x (1440 min/day).

(3) µg/L = (ppmv) x (MW g/mol) x (mol/24.45 L), where MW benzene = 78 and MW TPH = 92.

APPENDIX C

GROUNDWATER MONITORING DATA

APPENDIX C

GROUNDWATER MONITORING DATA

DESCRIPTION OF DATA TABLE

Overview

Chevron uses a central database to store groundwater monitoring data including laboratory analytical data. The tabulated data in Appendix C (Tables C-1 and C-2) are exported summaries of groundwater elevation data and analytical data for the period beginning on July 1, 2011, and ending on June 30, 2012 (reporting period plus previous two quarters). Groundwater elevation data were measured using an interface probe in wells near the Service Station and a water level indicator at all other locations.

The following table lists the column headings in the table with a brief description of each.

Column Heading	Description
Date of Measurement	Date data were recorded.
Depth to Water (feet)	Depth to groundwater (ft)
TOC Elevation (feet)	Top of casing elevation (ft)
Water Table Elevation (feet)	Corrected water table elevation equation: (TOC) – (Depth to Water) + [(0.75)*(LPH Thickness)]
Depth to LPH (feet)	Depth to LPH (feet)
LPH Thickness (feet)	Equation: (Depth to Water-Depth to LPH)
LPH Elevation (feet)	Equation: (TOC-Depth to LPH)
Benzene (µg/L)	Laboratory reported concentration
Toluene (µg/L)	Laboratory reported concentration
Ethylbenzene (µg/L)	Laboratory reported concentration
m,p-Xylene (µg/L)	Laboratory reported concentration
o-Xylene (µg/L)	Laboratory reported concentration
Methyl-t-butyl ether (µg/L)	Laboratory reported concentration
TPH-GRO (µg/L)	Laboratory reported concentration

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
GP-2E(45-50)	01/17/2012	42.79	168.17	125.38				
	04/19/2012	43		125.17				
	10/08/2012	43.79		124.38				
GP-2E(50-55)	01/17/2012	42.93	168.27	125.34				
	04/19/2012	43.1		125.17				
GP-2E(55-60)	01/17/2012	43.21	168.53	125.32				
	04/19/2012	43.37		125.16				
	10/08/2012	44.23		124.3				
GP-2F(45-50)	01/17/2012	-	159.59	-				Dry at 43.11
	04/19/2012	-		-				Dry
	10/09/2012	-		-				Dry at 43.04ft
GP-2F(50-55)	01/17/2012	43.8	159.59	115.79				
	04/19/2012	44.15		115.44				
	10/09/2012	44.92		114.67				
GP-7A(20-25)	01/17/2012	18.75	158.11	139.36				
	04/19/2012	19.42		138.69				
	10/05/2012	21.05		137.06				
GP-7A(25-30)	01/17/2012	18.64	158.08	139.44				
	04/19/2012	19.36		138.72				
GP-7A(30-35)	01/17/2012	20.55	158.09	137.54				
	04/19/2012	20.97		137.12				
	10/05/2012	21.89		136.2				
GP-7A(35-40)	01/17/2012	20.81	158.09	137.28				
	04/19/2012	21.1		136.99				
	10/05/2012	22.1		135.99				
GP-7A(40-45)	01/17/2012	-	158.11	-				Covered by steel plate
	04/19/2012	21.21		136.9				
GP-9A(20-25)	01/17/2012	17.03	158.86	141.83				
	04/19/2012	17.92		140.94				
	10/05/2012	19.19		139.67				
GP-9A(25-30)	01/17/2012	19.28	158.81	139.53				
	04/19/2012	20.75		138.06				

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
GP-9A(30-35)	01/17/2012	20.92	158.76	137.84				
	04/19/2012	21.91		136.85				
GP-11A(20-25)	01/17/2012	17.02	158.28	141.26				
	04/19/2012	17.45		140.83				
	10/05/2012	18.21		140.07				
GP-11A(25-30)	01/17/2012	18.7	158.43	139.73				
	04/19/2012	19.21		139.22				
GP-11A(30-35)	01/17/2012	20.38	158.38	138				
	04/19/2012	21.31		137.07				
GP-11A(35-40)	01/17/2012	27.26	158.38	131.12				
	04/19/2012	27.52		130.86				
GP-24A	01/17/2012	32.37	170.83	138.46				
	04/19/2012	33.47		137.36				
	05/03/2012	-		-				Hydosleeve Installed
	10/01/2012	-		-				Not gauged - hydrasleeve
GP-27A	04/24/2012	-	172.06	-				Abondoned and overdrilled
GP-27R	01/17/2012	44	166.21	122.21				Covered by car
	01/25/2012	49.41		116.8				Pumping
	02/20/2012	-		-				Pumping
	03/19/2012	-		-				Pumping
	04/19/2012	44.55		121.66				Pumping
	04/26/2012	-		-				Pumping
	05/29/2012	49.45		116.76				"Top of pump, Pumping"
	07/30/2012	44.45		121.76				Top of pump
	08/20/2012	44.95		121.26				Pumping
	09/05/2012	52.8		113.41				Pumping
	10/10/2012	-		-				Not gauged - pumping
	11/19/2012	45.1		121.11				Pumping
	12/04/2012	44.39		121.82				Pumping
GP-30A	01/17/2012	-	171.78	-				
	01/25/2012	40.31		131.47				
	02/20/2012	-		-				Pumping

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
GP-30A	03/19/2012	41.64	171.78	130.14				
(Cont)	04/19/2012	41.77		130.01				Recovery Well
	05/03/2012	-		-				Hydosleeve Installed
	05/29/2012	40.78		131				
	07/30/2012	41.13		130.65				
	08/20/2012	37.62		134.16				
	09/05/2012	40.88		130.9				
	10/11/2012	-		-				Not gauged - hydrasleeve
	11/19/2012	41.11		130.67				
	12/04/2012	41.13		130.65				
GP-35A	01/17/2012	33.48	171.96	138.48				
	01/25/2012	34.15		137.81				
	02/20/2012	-		-				Pumping
	03/19/2012	38.35		133.61				
	04/19/2012	39.17		132.79				
	05/03/2012	-		-				Hydosleeve Installed
	05/29/2012	44.22		127.74				
	07/30/2012	44.07		127.89				
	08/20/2012	35.57		136.39				
	09/05/2012	43.9		128.06				
	10/10/2012	42.36		129.6				
	11/19/2012	41.73		130.23				
	12/04/2012	41.88		130.08				
GP-38A	04/24/2012	-	171.22	-				Abondoned and overdrilled
GP-39A	04/24/2012	-	172.46	-				Abondoned and overdrilled
GP-39R	01/17/2012	-	171.81	-				Top of pump
	04/19/2012	51.56		120.25				Pumping
	04/26/2012	-		-				Pumping
	11/10/2012	-		-				Not gauged - pumping
GP-41A	01/17/2012	42.2	172.28	130.08				
	04/19/2012	41.04		131.24				
	05/03/2012	-		-				Hydosleeve Installed

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
GP-41A	10/11/2012	-	172.28	-				Not gauged - pumping
GP-44A	01/17/2012	30.58	176.2	145.62				
	04/19/2012	30.82		145.38				
	04/24/2012	30.73		145.47				
	10/10/2012	31.36		144.84				
IW-1	04/19/2012	4.55	134.83	130.28				
IW-2	04/19/2012	5.13	135	129.87				
IW-3	04/19/2012	5.1	134.93	129.83				
IW-4	04/19/2012	5.2	134.79	129.59				
IW-5	04/19/2012	5.59	134.66	129.07				
MP-7	01/17/2012	39.54	172.17	132.63				
	01/25/2012	42.42		129.75				
	02/20/2012	39.51		132.66				
	03/19/2012	39.68		132.49				
	04/19/2012	51.56		120.61				
	05/02/2012	37.39		134.78				
	05/29/2012	38.17		134				
	07/30/2012	37.79		134.38				
	08/20/2012	37.67		134.5				
	09/05/2012	37.64		134.53				
	10/10/2012	37.9		134.27				
	11/19/2012	37.69		134.48				
	12/04/2012	37.81		134.36				
MP-20	--	--	--	--	--	--	--	--
MP-30	--	--	--	--	--	--	--	--
MP-40	--	--	--	--	--	--	--	--
MW-1	01/17/2012	32.33	170.46	138.13				
	04/19/2012	32.6		137.86				
MW-2	01/17/2012	31.71	171.41	139.7				
	04/19/2012	33.65		137.76				
MW-3	01/17/2012	30.58	170.41	139.83				
	04/19/2012	31.24		139.17				

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
MW-4	01/17/2012	30.1	171.14	141.04				
	04/19/2012	30.71		140.43				
MW-5	01/17/2012	32.14	172.31	140.17				Dry
	04/19/2012	-		-				Dry at 35
	04/24/2012	-		-				Dry @35.31
	10/10/2012	-		-				Dry at 33.65ft
MW-6	01/17/2012	32.8	171.12	138.32				
	04/19/2012	33.68		137.44				
	05/03/2012	-		-				Hydosleeve Installed
	10/11/2012	-		-				Not gauged - hydrasleeve
MW-7	01/17/2012	40.8	177.11	136.31				Dry
	01/25/2012	42.39		134.72				Pumping
	02/20/2012	-		-				Pumping
	03/19/2012	-		-				Pumping
	04/19/2012	41.12		135.99				
	04/26/2012	41.6		135.51				
	05/29/2012	43.91		133.2				"Top of pump, Pumping"
	07/30/2012	43.66		133.45				Top of pump
	08/20/2012	25.52		151.59				Top of Pump
	09/05/2012	51.71		125.4				Pumping
	10/10/2012	-		-				Not gauged - pumping
	11/19/2012	56.8		120.31				Pumping
	12/04/2012	52.19		124.92				Pumping - top of pump
MW-12	01/17/2012	41.58	171.5	129.92				
	04/19/2012	42.1		129.4				
MW-13	01/17/2012	36.5	172.47	135.97				
	04/19/2012	36.95		135.52				
MW-15	01/17/2012	30.46	172.34	141.88				Dry
	04/19/2012	33.8		138.54				Replace Lock
	04/24/2012	30.63		141.71				
	10/10/2012	31.05		141.29				
MW-16	01/17/2012	39.46	171.05	131.59				

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
MW-16	01/25/2012	38.94	171.05	132.11				Pumping
(Cont)	02/20/2012	-		-				Pumping
	03/19/2012	39.05		132				
	04/19/2012	39.85		131.2				
	05/29/2012	40.46		130.59				
	07/30/2012	-		-				Dry - bottom at 40.50
	08/20/2012	38.43		132.62				
	09/05/2012	40.3		130.75				
	10/10/2012	-		-				
	11/19/2012	39.18		131.87				
	12/04/2012	39.9		131.15				
MW-17	01/17/2012	44.35	170.67	126.32				
	04/19/2012	45.39		125.28				
	10/10/2012	-		-				Not gauged - pumping
MW-18	01/17/2012	30.25	168.45	138.2				
	01/25/2012	30.11		138.34				
	02/20/2012	30.48		137.97				
	03/19/2012	30.8		137.65				
	04/19/2012	30.97		137.48				
	05/29/2012	31.7		136.75				
	07/30/2012	32.13		136.32				
	08/20/2012	32		136.45				
	09/05/2012	33.36		135.09				
	10/08/2012	33.25		135.2				
	11/19/2012	31.85		136.6				
	12/04/2012	32.87		135.58				
MW-19	01/17/2012	34.94	169.56	134.62				
	04/19/2012	35.7		133.86				
	10/08/2012	36.43		133.13				
MW-20	01/17/2012	36.81	176.27	139.46				
	04/19/2012	36.7		139.57				
	04/24/2012	36.61		139.66				

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
MW-20	10/11/2012	-	176.27	-				Not gauged - hydrasleeve
MW-21	01/17/2012	35.38	173.37	137.99				
	04/19/2012	35.45		137.92				
	04/24/2012	36.42		136.95				
	10/11/2012	-		-				Not gauged - hydrasleeve
MW-22	01/17/2012	-	171.23	-				
	04/19/2012	-		-				
MW-22R	01/25/2012	44.2	165.08	120.88				Pumping
	02/20/2012	-		-				Pumping
	03/19/2012	-		-				Pumping
	04/19/2012	40.88		124.2				
	05/29/2012	44.51		120.57				Pumping
	07/30/2012	40.57		124.51				
	08/20/2012	40		125.08				Top of Pump
	09/05/2012	40.05		125.03				Pumping
	10/10/2012	-		-				Not gauged - pumping
	11/19/2012	41.98		123.1				Pumping
	12/04/2012	42.2		122.88				Pumping
MW-23	01/17/2012	42.42	171.31	128.89				
	04/19/2012	42.62		128.69				
MW-24A	01/17/2012	19.68	157.38	137.7				
	01/25/2012	19.86		137.52				
	02/20/2012	20.11		137.27				
	03/19/2012	20		137.38				
	04/19/2012	20.16		137.22				
	05/29/2012	20.55		136.83				
	07/30/2012	20.85		136.53				
	08/20/2012	20.78		136.6				
	09/05/2012	20.99		136.39				
	10/11/2012	-		-				Not gauged - hydrasleeve
	11/19/2012	20.83		136.55				
	12/04/2012	20.98		136.4				

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
MW-24B	01/17/2012	19.71	157.45	137.74				
	04/19/2012	20.17		137.28				
	10/11/2012	-		-				Not gauged - hydrasleeve
MW-25A	01/17/2012	26.09	149.99	123.9				
	04/19/2012	26.21		123.78				
	10/04/2012	26.75		123.24				
MW-25B	01/17/2012	26.35	150.95	124.6				
	04/19/2012	26.5		124.45				
	10/04/2012	22.2		128.75				
MW-26A	01/17/2012	2.69	135.62	132.93				
	04/19/2012	4.17		131.45				
	10/11/2012	-		-				Not gauged - hydrasleeve
MW-26B	01/17/2012	6.14	135.74	129.6				
	04/19/2012	7.39		128.35				
	04/30/2012	6.82		128.92				
	10/03/2012	9.35		126.39				
MW-27A	01/17/2012	9.63	128.92	119.29				
	04/19/2012	9.99		118.93				
	10/03/2012	13.55		115.37				
MW-27B	01/17/2012	12.22	128.92	116.7				
	04/19/2012	12.58		116.34				
	10/03/2012	11.02		117.9				
MW-28A	01/17/2012	3.28	126.13	122.85				
	04/19/2012	4.11		122.02				
	05/08/2012	-		-				Hydosleeve Installed
	10/02/2012	7.67		118.46				
MW-28B	01/17/2012	3.74	125.49	121.75				
	04/19/2012	4.18		121.31				
	05/02/2012	4.52		120.97				
	10/02/2012	7.32		118.17				
MW-29A	01/17/2012	7.42	115.7	108.28				
	04/19/2012	7.46		108.24				

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
MW-29A	05/04/2012	7.52	115.7	108.18				
(Cont)	10/02/2012	7.8		107.9				
MW-29B	01/17/2012	6	115.54	109.54				
	04/19/2012	6.21		109.33				
	04/30/2012	6.09		109.45				
	10/02/2012	6.48		109.06				
MW-30	01/17/2012	-	156.87	-				Not yet developed
MW-30R	04/19/2012	19.54	156.75	137.21				
	05/03/2012	-		-				Hydosleeve Installed
	10/11/2012	-		-				Not gauged - hydrasleeve
MW-31A	01/17/2012	4.51	135.19	130.68				
	04/19/2012	4.7		130.49				
MW-31B	01/17/2012	4.5	135.81	131.31				
	04/19/2012	4.72		131.09				
	05/02/2012	4.75		131.06				
	10/03/2012	5.75		130.06				
MW-32	01/17/2012	8.32	128.47	120.15				
	04/19/2012	8.8		119.67				
MW-33A	01/17/2012	2.72	126.35	123.63				
	04/19/2012	3.51		122.84				
	05/08/2012	-		-				Hydosleeve Installed
	10/02/2012	-		-				Dry at 8.83ft
MW-33B	01/17/2012	3.93	126.16	122.23				
	04/19/2012	4.37		121.79				
	05/08/2012	4.35		121.81				
	10/02/2012	8		118.16				
MW-33C	01/17/2012	-	125.84	-				Unable to locate
	04/19/2012	4.33		121.51				
	05/08/2012	4.33		121.51				
	10/02/2012	7.57		118.27				
MW-33S	01/17/2012	2.55	126.58	124.03				
	04/19/2012	3.49		123.09				

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
MW-33S	05/08/2012	3.22	126.58	123.36				
(Cont)	10/02/2012	5.38		121.2				
MW-34A	01/17/2012	8.94	107.41	98.47				
	04/19/2012	8.98		98.43				
MW-34B	01/17/2012	8.71	107.4	98.69				
	04/19/2012	8.82		98.58				
MW-37	01/17/2012	-	152.61	-				Dry at 15.10
	04/19/2012	-		-				Dry at 15.1
MW-38	01/17/2012	9.59	146.91	137.32				
	04/19/2012	10.14		136.77				
	10/04/2012	11.17		135.74				
MW-39	01/17/2012	13.82	146.02	132.2				
	04/19/2012	14.81		131.21				
MW-39R	01/17/2012	15.95	146.01	130.06				
	04/19/2012	-		-				
	04/19/2012	16.23		129.78				
	10/04/2012	17.27		128.74				
MW-40	01/17/2012	21.85	145.18	123.33				
	04/19/2012	22.06		123.12				
	10/04/2012	23.2		121.98				
MW-41A	01/17/2012	18.33	136.96	118.63				
	04/19/2012	18.68		118.28				
	10/04/2012	19.73		117.23				
MW-41B	01/17/2012	19	136.82	117.82				
	04/19/2012	19.3		117.52				
	10/11/2012	-		-				Not gauged - hydrasleeve
MW-42	01/17/2012	6.9	140.03	133.13				
	04/19/2012	-		-				
	04/19/2012	7.35		132.68				
	04/30/2012	7.39		132.64				
	10/03/2012	8.37		131.66				
MW-43A	01/17/2012	2.53	133.98	131.45				

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
MW-43A	04/19/2012	3.95	133.98	130.03				
(Cont)	10/03/2012	4.56		129.42				
MW-43B	01/17/2012	7.89	134.09	126.2				
	04/19/2012	8.39		125.7				
	10/03/2012	10.31		123.78				
MW-44A	01/17/2012	8.78	130.22	121.44				
	04/19/2012	91.13		39.09				
	10/03/2012	10.17		120.05				
MW-44B	01/17/2012	11.55	130.24	118.69				
	04/19/2012	12.26		117.98				
	10/03/2012	12.6		117.64				
MW-45	01/17/2012	42.64	173.89	131.25				
	04/19/2012	42.38		131.51				
	04/24/2012	42.39		131.5				
	10/11/2012	-		-				Not gauged - hydrasleeve
MW-46	01/17/2012	46.34	174.12	127.78				
	04/19/2012	46.36		127.76				
	05/03/2012	-		-				Hydosleeve Installed
	10/11/2012	-		-				Not gauged - hydrasleeve
MW-47	01/17/2012	45.37	171.5	126.13				
	04/19/2012	45.45		126.05				
	04/24/2012	-		-				
	10/09/2012	46.15		125.35				
MW-48	01/17/2012	41.34	165.96	124.62				
	04/19/2012	41.45		124.51				
	04/24/2012	41.43		124.53				
	10/09/2012	42.05		123.91				
MW-49	01/17/2012	44.16	159.15	114.99				
	04/19/2012	44.5		114.65				
	05/03/2012	-		-				Hydosleeve Installed
	10/11/2012	-		-				Not gauged - hydrasleeve
MW-50	01/17/2012	36.77	156.12	119.35				

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
MW-50 (Cont)	04/19/2012	37.15	156.12	118.97				
	04/24/2012	37.11		119.01				
	10/09/2012	37.81		118.31				
MW-51	01/17/2012	48.91	158.12	109.21				
	04/19/2012	49.26		108.86				
	04/24/2012	49.23		108.89				
	10/09/2012	49.97		108.15				
MW-52	01/17/2012	2.8	127.59	124.79				
	04/19/2012	3.59		124				
MW-53	01/17/2012	6.03	116.18	110.15				
	04/19/2012	5.97		110.21				
	05/04/2012	5.96		110.22				
	10/02/2012	6.47		109.71				
MW-54	01/17/2012	4.54	121.76	117.22				
	04/19/2012	4.88		116.88				
	04/30/2012	4.9		116.86				
	10/02/2012	5.64		116.12				
MW-55	01/17/2012	-	131.49	-				Covered by car
	04/19/2012	1.96		129.53				
	05/04/2012	1.7		129.79				
	10/11/2012	-		-				Not gauged - hydrasleeve
MW-58	04/19/2012	6.73	134.97	128.24				
	05/04/2012	6.2		128.77				
	10/03/2012	7.29		127.68				
MW-59	04/19/2012	7.5	131.1	123.6				
	05/04/2012	8.1		123				
	10/03/2012	11.05		120.05				
MW-60	04/19/2012	11.81	131.08	119.27				
	05/04/2012	-		-				Hydosleeve Installed
	10/03/2012	8.82		122.26				
MW-61A	04/19/2012	20.4	158.49	138.09				
	05/03/2012	-		-				Hydosleeve Installed

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
MW-61A	10/05/2012	21.41	158.49	137.08				
MW-61B	10/05/2012	23.15	157.54	134.39				
MW-62A	10/04/2012	14.1	148.58	134.48				
MW-62B	10/04/2012	14.31	148.5	134.19				
PTW-A	01/17/2012	-	172.26	-				Overdrilled
	04/19/2012	-		-				
	04/24/2012	-		-				Abandoned
PTW-B	01/17/2012	44.9	171.75	126.85				Pumping
	04/19/2012	41.5		130.25				Pumping
	04/26/2012	-		-				Pumping
	10/10/2012	-		-				Not gauged - pumping
RW-1	01/17/2012	53.29	173.36	120.07				Top of pump
	04/19/2012	-		-				Dry
	04/26/2012	-		-				Pumping
	10/10/2012	-		-				Not gauged - pumping
RW-2	01/17/2012	38.18	172.21	134.03				Top of pump
	04/19/2012	55.2		117.01				
	04/26/2012	-		-				Pumping
	10/10/2012	-		-				Not gauged - pumping
RW-3	01/17/2012	25.92	171.62	145.7				Pumping
	04/19/2012	48.37		123.25				Replace Lock
	04/26/2012	-		-				Pumping
	10/10/2012	-		-				Not gauged - pumping
RW-4	01/17/2012	50.18	171.62	121.44				Pumping
	01/25/2012	51.25		120.37				Pumping
	02/20/2012	-		-				Pumping
	03/19/2012	-		-				Pumping
	04/19/2012	50.9		120.72				
	04/26/2012	-		-				Pumping
	05/29/2012	50.1		121.52				"Top of pump, Pumping"
	07/30/2012	48		123.62				Top of pump
	08/20/2012	42.62		129				Top of Pump

Gannett Fleming

Table C-1: GROUNDWATER MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JULY THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Well No.	Date of Measurement	Depth to Water (feet below casing)	PVC Casing Elevation (feet MSL)	Water Table Elevation (feet MSL)	NAPL Measurement (feet)	NAPL Thickness (feet)	NAPL Elevation (feet MSL)	Comments
RW-4	09/05/2012	50.3	171.62	121.32				Pumping
(Cont)	10/10/2012	-		-				Not gauged - pumping
	11/19/2012	50.3		121.32				Pumping
	12/04/2012	49		122.62				Pumping - top of pump
RW-5	04/26/2012	-	171.75	-				Off for repair
VP-4	--	--	--	--	--	--	--	--

Gannett Fleming

Table C-2: GROUNDWATER ANALYTICAL RESULTS
SEMI-ANNUAL PROGRESS REPORT: JULY 2012 THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Location	Sample Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m+p-Xylene (µg/L)	o-Xylene (µg/L)	Xylenes, Total (µg/L)	Methyl-t-butyl ether (µg/L)	TPH-GRO (µg/L)
GP-2E(45-50)	01/19/2012	350	<10	<10	<50	52	--	1,300	990
	04/25/2012	470	<5.0	<5.0	<25	74	--	1,400	1,900
	10/08/2012	320	<1.0	<1.0	--	--	45	850	1,500
GP-2E(55-60)	01/19/2012	150	<5.0	<5.0	<25	<25	--	800	760
	04/25/2012	200	<5.0	<5.0	<25	36	--	820	1000
	10/08/2012	180	<1.0	<1.0	--	--	28	610	910
GP-2F(50-55)	01/19/2012	56	<5.0	<5.0	<25	<25	--	420	400
	04/25/2012	44	<2.0	<2.0	<10	<10	--	400	440
	10/09/2012	29	<1.0	<1.0	--	--	<10	310	300
GP-7A(20-25)	01/19/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	04/25/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/05/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
GP-7A(30-35)	01/19/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	04/25/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/05/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
GP-7A(35-40)	01/19/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	04/25/2012	4.2	<1.0	<1.0	<5.0	<5.0	--	6.3	<100
	10/05/2012	24	<1.0	3.6	--	--	<10	30	<100
GP-9A(20-25)	01/19/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	04/25/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/05/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
GP-11A(20-25)	01/19/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	04/25/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/05/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
GP-24A	05/03/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/11/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
GP-27R	04/26/2012	63	25	4.3	17	13	--	140	450
	10/10/2012	89	30	3.8	--	--	24	150	550
GP-30A	05/03/2012	12,000	14,000	750	3,400	2,200	--	18,000	63,000
	10/11/2012	16,000	27,000	2,000	--	--	12,000	13,000	120,000
GP-35A	05/03/2012	2,100	4,800	520	2,100	1,300	--	270	21,000
	10/10/2012	290	96	61	--	--	200	98	1,900
GP-39R	04/26/2012	150	31	2.1	<10	33	--	400	750
	10/10/2012	280	180	19	--	--	120	350	1,500
GP-41A	05/03/2012	4.5	<1.0	<1.0	<5.0	<5.0	--	<1.0	190
	10/11/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100

Gannett Fleming

Table C-2: GROUNDWATER ANALYTICAL RESULTS
SEMI-ANNUAL PROGRESS REPORT: JULY 2012 THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Location	Sample Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m+p-Xylene (µg/L)	o-Xylene (µg/L)	Xylenes, Total (µg/L)	Methyl-t-butyl ether (µg/L)	TPH-GRO (µg/L)
GP-44A	04/24/2012	<2.0	6.3	63	460	170	--	<2.0	6,500
	10/10/2012	<2.0	14	76	--	--	710	<2.0	7,400
MP-7	05/02/2012	6,900	13,000	1,500	6,200	2,900	--	3,400	67,000
	10/10/2012	2,000	820	150	--	--	1000	2,800	17,000
MW-6	05/03/2012	<1.0	22	14	23	32	--	<1.0	620
	10/11/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	110
MW-7	04/26/2012	3,000	4,500	600	1,100	750	--	540	20,000
	10/10/2012	390	590	58	--	--	420	99	3,600
MW-15	04/24/2012	5	33	12	29	19	--	<1.0	470
	10/10/2012	17	100	37	--	--	130	<1.0	1,100
MW-17	04/26/2012	2,800	5,900	490	2,900	1,600	--	4,100	30,000
	10/10/2012	4,000	7,500	830	--	--	5,500	4,300	45,000
MW-18	01/19/2012	<10	<10	39	350	650	--	<10	50,000
	04/25/2012	<5.0	<5.0	11	100	200	--	<5.0	23,000
	10/08/2012	<1.0	24	15	--	--	430	<1.0	190,000
MW-19	01/19/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	04/25/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/08/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
MW-20	04/24/2012	1.7	<1.0	<1.0	<5.0	<5.0	--	<1.0	460
	10/11/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	390
MW-21	04/24/2012	9.2	<1.0	4.1	5.4	<5.0	--	19	370
	10/11/2012	6.6	<1.0	<1.0	--	--	<10	<1.0	420
MW-22	04/26/2012	3,900	7,800	790	3,300	1,700	--	3,600	34,000
	10/10/2012	3,100	6,200	630	--	--	3,900	2,400	32,000
MW-23	01/19/2012	59	4.8	<1.0	<5.0	5.8	--	120	130
	05/03/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	2	<100
	10/11/2012	<1.0	<1.0	<1.0	--	--	<10	1.1	<100
MW-24A	01/19/2012	<5.0	<5.0	110	270	57	--	<5.0	10,000
	04/25/2012	<10	<10	92	170	<50	--	<10	11,000
	10/11/2012	<5.0	<5.0	39	--	--	130	<5.0	9,900
MW-24B	01/19/2012	<5.0	9.9	56	310	110	--	<5.0	11,000
	05/03/2012	<20	<20	59	310	<100	--	<20	11,000
	10/11/2012	<10	<10	39	--	--	160	<10	14,000
MW-25A	01/19/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	3.5	<100
	04/25/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	3.2	<100
	10/04/2012	<1.0	<1.0	<1.0	--	--	<10	3.4	<100

Gannett Fleming

Table C-2: GROUNDWATER ANALYTICAL RESULTS
SEMI-ANNUAL PROGRESS REPORT: JULY 2012 THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Location	Sample Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m+p-Xylene (µg/L)	o-Xylene (µg/L)	Xylenes, Total (µg/L)	Methyl-t-butyl ether (µg/L)	TPH-GRO (µg/L)
MW-25B	01/19/2012	200	<2.0	<2.0	<10	19	--	390	470
	04/25/2012	120	<1.0	<1.0	<5.0	26	--	250	570
	10/04/2012	140	<1.0	<1.0	--	--	40	230	720
MW-26A	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	05/04/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/11/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
MW-26B	01/18/2012	520	<5.0	<5.0	<25	<25	--	290	880
	04/30/2012	850	<5.0	<5.0	26	37	--	510	1,700
	10/03/2012	720	<5.0	13	--	--	<50	330	1,800
MW-27A	05/04/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/03/2012	<1.0	<1.0	<1.0	--	--	<10	100	110
MW-27B	04/30/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	140	110
	10/03/2012	<1.0	<1.0	<1.0	--	--	<10	3.4	<100
MW-28A	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	05/08/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/02/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
MW-28B	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	05/02/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
MW-28B	10/02/2012	<1.0	<1.0	<1.0	--	--	<10	2	<100
MW-29A	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	5.2	<100
	05/04/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	15	<100
	10/02/2012	<1.0	<1.0	<1.0	--	--	<10	2.1	<100
MW-29B	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	100	<100
	04/30/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	95	<100
	10/02/2012	<1.0	<1.0	<1.0	--	--	<10	84	<100
MW-30R	05/03/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/11/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
MW-31B	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	1.1	<100
	05/02/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/03/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
MW-33A	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	05/08/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
MW-33B	01/18/2012	470	<2.0	<2.0	<10	<10	--	310	820
	05/08/2012	380	<2.0	<2.0	<10	<10	--	300	1000
	10/02/2012	<1.0	<1.0	<1.0	--	--	<10	20	<100

Gannett Fleming

Table C-2: GROUNDWATER ANALYTICAL RESULTS
SEMI-ANNUAL PROGRESS REPORT: JULY 2012 THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Location	Sample Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m+p-Xylene (µg/L)	o-Xylene (µg/L)	Xylenes, Total (µg/L)	Methyl-t-butyl ether (µg/L)	TPH-GRO (µg/L)
MW-33C	01/18/2012	17	<1.0	<1.0	<5.0	<5.0	--	34	<100
	05/08/2012	3.4	<1.0	<1.0	<5.0	<5.0	--	20	<100
	10/02/2012	<1.0	<1.0	<1.0	--	--	<10	2.2	<100
MW-33S	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	05/08/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/02/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
MW-38	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	05/03/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/04/2012	4	<1.0	<1.0	--	--	<10	6.6	<100
MW-39R	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	04/26/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/04/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
MW-40	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	6	<100
	05/03/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	5.2	<100
	10/04/2012	<1.0	<1.0	<1.0	--	--	<10	21	<100
MW-41A	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	05/03/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/04/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
MW-41B	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	15	<100
	04/26/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	13	<100
	10/11/2012	<1.0	<1.0	<1.0	--	--	<10	17	<100
MW-42	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	04/30/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/03/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
MW-43A	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	04/30/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/03/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
MW-43B	01/18/2012	4.3	<1.0	<1.0	<5.0	<5.0	--	16	<100
	04/30/2012	2.9	<1.0	<1.0	<5.0	<5.0	--	12	<100
	10/03/2012	<1.0	<1.0	<1.0	--	--	<10	6.7	<100
MW-44A	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	33	<100
	04/30/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	32	<100
	10/03/2012	<1.0	<1.0	<1.0	--	--	<10	30	<100
MW-44B	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	89	<100
	04/30/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	87	<100
	10/03/2012	<1.0	<1.0	<1.0	--	--	<10	65	<100

Gannett Fleming

Table C-2: GROUNDWATER ANALYTICAL RESULTS
SEMI-ANNUAL PROGRESS REPORT: JULY 2012 THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Location	Sample Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m+p-Xylene (µg/L)	o-Xylene (µg/L)	Xylenes, Total (µg/L)	Methyl-t-butyl ether (µg/L)	TPH-GRO (µg/L)
MW-45	04/24/2012	27	<1.0	<1.0	<5.0	23	--	<1.0	380
	10/11/2012	<1.0	<1.0	<1.0	--	--	12	<1.0	310
MW-46	05/03/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	17	<100
	10/11/2012	2.3	<1.0	<1.0	--	--	<10	4.9	110
MW-47	04/24/2012	380	42	<5.0	42	160	--	40	2,000
	10/09/2012	430	110	4.6	--	--	260	<1.0	2,200
MW-48	04/24/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	1.2	<100
MW-48	10/09/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
MW-49	05/03/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	270	320
	10/11/2012	<1.0	<1.0	<1.0	--	--	<10	200	180
MW-50	04/24/2012	1.9	<1.0	<1.0	<5.0	<5.0	--	83	<100
	10/09/2012	1	<1.0	<1.0	--	--	<10	110	120
MW-51	04/24/2012	5.6	<1.0	<1.0	<5.0	<5.0	--	63	110
	10/09/2012	6.1	<1.0	<1.0	--	--	<10	55	150
MW-53	01/18/2012	5.1	<1.0	<1.0	<5.0	<5.0	--	180	130
	05/04/2012	6.5	<1.0	<1.0	<5.0	<5.0	--	140	120
	10/02/2012	4.1	<1.0	<1.0	--	--	<10	100	170
MW-54	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	04/30/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/02/2012	<1.0	<1.0	<1.0	--	--	<10	3.1	<100
MW-55	01/18/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	05/04/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	<1.0	<100
	10/11/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100
MW-58	01/19/2012	390	<2.0	5.9	<10	18	--	220	620
	05/04/2012	240	<1.0	<1.0	8.8	19	--	190	620
	10/03/2012	380	<2.0	5.2	--	--	28	170	980
MW-59	01/19/2012	220	<2.0	<2.0	<10	<10	--	220	630
	05/04/2012	140	<1.0	<1.0	<5.0	<5.0	--	160	440
	10/03/2012	240	<1.0	1.1	--	--	<10	210	720
MW-60	01/19/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	16	<100
	05/04/2012	<1.0	<1.0	<1.0	<5.0	<5.0	--	18	<100
	10/03/2012	<1.0	<1.0	<1.0	--	--	<10	10	<100
MW-61A	05/03/2012	7.4	39	140	200	37	--	4.3	2,100
	10/05/2012	21	170	940	--	--	1,800	<10	19,000
MW-61B	10/05/2012	<1.0	<1.0	<1.0	--	--	<10	33	<100
MW-62A	10/04/2012	<1.0	<1.0	<1.0	--	--	<10	<1.0	<100

Gannett Fleming

Table C-2: GROUNDWATER ANALYTICAL RESULTS
SEMI-ANNUAL PROGRESS REPORT: JULY 2012 THROUGH DECEMBER 2012
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JANUARY THROUGH DECEMBER 2012

Chevron

Location	Sample Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	m+p-Xylene (µg/L)	o-Xylene (µg/L)	Xylenes, Total (µg/L)	Methyl-t-butyl ether (µg/L)	TPH-GRO (µg/L)
MW-62B	10/04/2012	94	1.3	210	--	--	<10	97	1,800
PTW-B	04/26/2012	32	31	4.2	29	20	--	71	480
	10/10/2012	<1.0	4.6	1.6	--	--	39	4.7	250
RW-1	04/26/2012	400	250	37	120	110	--	180	1,900
	10/10/2012	190	140	17	--	--	82	100	1,100
RW-2	04/26/2012	600	600	72	280	230	--	520	3,900
	10/10/2012	330	220	35	--	--	200	300	2,200
RW-3	04/26/2012	190	1,400	150	870	590	--	39	5,000
	10/10/2012	84	210	15	--	--	250	77	1,200
RW-4	04/26/2012	2,200	2,500	270	1,200	690	--	2,100	23,000
	10/10/2012	2,300	3,000	380	--	--	2,300	1,600	29,000
RW-5	01/19/2012	460	1,800	300	1,300	460	--	82	7,600
	10/10/2012	160	1000	380	--	--	2,800	93	16,000

APPENDIX D

SOIL VAPOR SAMPLING DATA

Gannett Fleming

SOIL VAPOR MONITORING DATA
SEMI-ANNUAL PROGRESS REPORT: JANUARY THROUGH JUNE 2010
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND
PERIOD: JULY 2009 THROUGH JUNE 2010
ANALYTICAL RESULTS
122208

Location	Sample Date	DIFLUOROETHANE (µg/m3)	Benzene (µg/m3)	Ethylbenzene (µg/m3)	m+p-Xylene (µg/m3)	Methyl-t-butyl ether (µg/m3)	o-Xylene (µg/m3)	Toluene (µg/m3)
VW-1	03/18/2011	1,900 E	ND 3.7	ND 5.0	ND 5.0	ND 4.2	ND 5.0	ND 4.4
	01/23/2012	23	ND 3.3	ND 4.4	ND 4.4	ND 3.7	ND 4.4	ND 3.9
	05/10/2012	840	ND 3.9	ND 5.4	ND 5.4	ND 4.4	ND 5.4	13
	10/18/2012	3,700 E	ND 3.8	ND 5.1	ND 5.1	ND 4.2	ND 5.1	ND 4.4
VW-2	03/18/2011	17	16	ND 5.2	ND 5.2	18	ND 5.2	ND 4.5
	05/10/2012	96	25	7.9	7.6	25	ND 5.4	5.1
	10/18/2012	ND 12	ND 3.7	ND 5.0	ND 5.0	ND 4.2	ND 5.0	ND 4.4
VW-03	10/18/2012	1,200	ND 6.8	ND 9.2	14	ND 7.6	ND 9.2	ND 8.0
VW-2(AMB)	03/18/2011	--	ND 2.6	ND 3.5	ND 3.5	ND 2.9	ND 3.5	ND 3.0
	10/18/2012	--	ND 2.3	ND 3.1	ND 3.1	ND 2.6	ND 3.1	ND 2.7
VW-04(Ambient)	01/23/2012	--	ND 2.8	ND 3.8	ND 3.8	ND 3.2	ND 3.8	ND 3.3

Notes:
1) J - Estimated value
2) N.D. - Not detected at the minimum reported quantitation limit
3) Well VW-04 was not sampled during the reporting period due to the presence of water.
4) Measurements of oxygen, carbon dioxide, and methane could not be collected from VW-03 on 5/5/2010 due to the presence of water in the vapor well.

APPENDIX E

VAPOR MITIGATION SYSTEM DATA

Gannett Fleming

Chevron

VAPOR MITGATIONSYSTEM DATA
SEMI-ANNUAL PROGRESS REPORT: JANUARY THROUGH JUNE 2010
FORMER CHEVRON FACILITY 122208, 5801 RIGGS ROAD, CHILLUM, MARYLAND

Location	Sample Date	Benzene (µg/m3)	Toluene (µg/m3)	Ethylbenzene (µg/m3)	m+p-Xylene (µg/m3)	o-Xylene (µg/m3)	Methyl-t-butyl ether (µg/m3)	DIFLUOROETHANE (µg/m3)
5824EAST(STA)2012	04/11/2012	<4.0	<4.7	<5.5	<5.5	<5.5	<4.5	<14
746OGLE(STA)2012	04/10/2012	<4.1	<4.9	<5.6	<5.6	<5.6	<4.6	670

APPENDIX F

MANN KENDALL STATISTICAL ANALYSIS

Mann-Kendall Statistical Analysis
Former Chevron Facility 122208
5801 Riggs Road, Chillum, Maryland
December 2012

The Mann-Kendall statistical analysis was used to determine trends in dissolved-phase hydrocarbon concentrations at the Chillum site. These data will be used to support the site-wide groundwater remedial strategy of monitored natural attenuation (MNA).

SITE-WIDE GROUNDWATER REMEDIAL OBJECTIVE

The approved Corrective Measures Study (CMS) (Gannett Fleming, 2007) presented a site-wide groundwater remediation strategy that included MNA. One method to demonstrate that MNA is effective at decreasing hydrocarbon concentrations is the statistical evaluation of sampling results. The Mann-Kendall statistical analysis was selected as an industry-accepted method to provide evidence that dissolved-phase hydrocarbon concentrations are stable and/or decreasing over time.

MANN-KENDALL BACKGROUND

The Mann-Kendall statistical analysis is used to determine if dissolved-phase hydrocarbon concentrations in groundwater are increasing, decreasing, or stable over time. The technique requires that individual wells with the highest concentrations along the centerline of mapped dissolved-phase hydrocarbons in the groundwater be used to identify trends in dissolved-phase hydrocarbon concentrations over time.

The Mann-Kendall statistical analysis compares every data point (e.g., semi-annual sampling event results) in a data set to every other data point (sampling result) for a particular well along the centerline of mapped dissolved-phase hydrocarbons. A value of 1 or -1 is assigned as each data point is compared based on whether it is higher or lower than the previous. As few as 5 and as many as 10 data points may be used in the analysis; however, the greater the number of data points used, the more reliable the trend analysis becomes.

The output of the analysis is a Mann-Kendall S statistic for the data set for each well. The S statistic shows: 1) the confidence level in the data; 2) the strength of the data trend; and 3) the variability in the data (Wiedemeier, 1999). The absolute value of S is then compared to the 95 percent confidence level in the trend. A positive S suggests an increasing trend and a negative S suggests a decreasing tend. AS outside of the 95 percent confidence level is considered to have no trend (e.g., a stable trend).
The 95 percent confidence interval is used as a conservative guide to establishing trends.

The analysis is robust because missing values are allowed and the data set need not conform to any particular distribution. Also, laboratory data reported as below the laboratory detection limit can be used and are reported as half the laboratory detection limit (US EPA, 1998). This approach can be used because the Mann-Kendall methodology uses only the relative magnitudes of the laboratory data rather than actual measured values (Gilbert, 1987).

METHODS

A Geoprobe® was used to obtain an exhaustive profile of groundwater at the site during 2001 and 2002. The Geoprobe groundwater data were used to map the centerline of dissolved-phase hydrocarbon concentrations in groundwater and subsequently install monitoring wells along the centerline of dissolved-phase hydrocarbons (Gannett Fleming, 2006).

The presence of a mappable clay body in the subsurface (as evidenced from the Geoprobe soil investigation) splits the dissolved-phase hydrocarbons in groundwater into two separate centerlines. As a result, these two centerlines are identified as the west centerline and the east centerline (Figure 1). Wells used to define the centerlines are as follows:

West Centerline	East Centerline
MW-22R	MW-22R
MW-24B	GP-39R
MW-26B	MW-47
MW-33B	GP-2E(45-50)
MW-58	MW-25B
MW-59	MW-27B
MW-60	MW-53
MW-62A	
MW-62B	

The Mann-Kendall statistical analysis was performed using benzene and methyl tert butyl ether (MTBE) for each well within the centerlines. Mann-Kendall trend analysis tables for each well along the west and east centerlines are presented in Attachment A and B, respectively. The 10 most recent groundwater sampling results were used in the analysis. Values that were reported as below the laboratory detection limit were assigned a value of half of the detection limit.

RESULTS OF MANN-KENDALL ANALYSES

Tables 1 and 2 provide groundwater sampling results for individual wells along the west and east centerlines. Table 3 provides a general summary of the Mann-Kendall statistical analyses performed for both benzene and MTBE. Several trends were noted that are provided below.

Results of the analysis for the west centerline were as follows:

- Benzene and MTBE concentrations in MW-22R were stable;
- Benzene and MTBE concentrations in MW-24B were stable;
- Benzene and MTBE concentrations in MW-26B showed an increasing trend likely due to the system being offline for portions of 2011 for repair and expansion.
- Benzene and MTBE concentrations in MW-33B were stable.

Results of the analysis for the east centerline were as follows:

- Benzene and MTBE concentrations in MW-22R were stable;
- Benzene concentrations in GP-39R were stable. The range of benzene concentrations since March 2007 has varied from 340 to 4,100 µg/L. This well was over-drilled and included in the expanded Dual Phase Extraction (DPE) system which began operation in August 2011. MTBE concentrations in GP-39R were decreasing;
- Benzene and MTBE concentrations in MW-47 were stable;
- Benzene concentrations in GP-2E(45-50) were stable. Benzene and MTBE concentrations were increasing, which may be a result of an extended period between March 2011 and August 2011 when the remediation system was turned off for construction.
- Benzene and MTBE concentrations in MW-25B were stable;
- Benzene and MTBE concentrations in MW-27B were decreasing; and
- Benzene concentrations are decreasing while MTBE concentrations in MW-53 were stable.

SUMMARY AND CONCLUSIONS

Dissolved-phase hydrocarbon concentrations for centerline wells were either stable or decreasing based on long and short-term sampling data. Therefore, the overall trend for each centerline was stable. Based on this line of evidence, MNA was working to decrease dissolved-phase hydrocarbon concentrations at the site.

Based on ten sampling events conducted since 2007, benzene and MTBE concentrations along the west centerline were stable or decreasing for all wells. The east centerline wells show a similar tendency. All wells were either stable or decreasing except for MTBE in GP-2E(45-50). However, based on short term sampling data from the last 3 years, the trend in these wells was stable.

RECOMMENDATIONS

The following corrective measures were implemented at the site:

- Area A - an expanded DPE system, which included the addition of four vertical recovery wells and one angle recovery well;
- Area B - Construction is nearly complete on two, In-Situ Groundwater Remediation (ISGR) Wells, to be installed in the residential neighborhood (Oglethorpe Alley); and

- Area C - an Oxygen Reactive Zone in the residential neighborhood (Nicholson Alley) was installed, which includes a series of in-situ oxygen emitting probes. It is awaiting final startup and power service.

As part of the corrective measures for Area A, wells MW-22R and GP-39R were over drilled and added to the expanded DPE system in Area A. MW-24B will be near or within the radius of influence of the ISGR Well system in Area B. MW-26B will be adjacent to and down gradient of the Oxygen Reactive Zone in Area C.

The Mann-Kendall statistical analysis will continue to be performed on an annual basis using the semi-annual groundwater monitoring data for wells along the west and east centerlines to confirm that hydrocarbon concentrations are continuing to decrease or remain stable. The next Mann-Kendall update will be submitted in January 2014.

REFERENCES

Gannett Fleming, 2006, *Site Investigation Report*, Former Chevron Facility 122208, 5801 Riggs Road, Chillum Maryland, dated January 2006.

Gannett Fleming, 2007, *Corrective Measures Study (CMS),* Former Chevron Facility 122208, 5801 Riggs Road, Chillum Maryland, dated July 2007.

Gilbert, Richard O., 1987, *Statistical Methods for Environmental Pollution Monitoring*, Van Nostrand Reinhold, NY, NY, 319 pages.

U.S. Environmental Protection Agency (EPA), 1998, *Guidance for Data Quality Assessment*, EPA/600/R-96/084.

Wiedemeier Todd H., et. al., 1999, *Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface*, John Wiley and Sons, Inc. NY, NY, 617 pages.

TABLES

Gannett Fleming

Table 1. Groundwater Monitoring Results - West Centerline
Mann-Kendall Statistical Analysis
Former Chevron Facility 122208
5801 Riggs Road, Chillum, Maryland

Chevron

Location	Sample Date	Benzene (µg/L)	Methyl-t-butyl ether (µg/L)
MW-22	06/08/2004	5,620	866
	08/03/2004	7,960	1,620
	09/07/2005	8,790	1,780
	03/23/2006	6,860	2,020
	10/02/2006	7,900	1,100
	03/26/2007	2,400	570
	10/01/2007	7,000	1000
	03/31/2008	4,900	710
	09/25/2008	1,100	1,100
	03/30/2009	5,900	680
	09/28/2009	4,200	420
	05/10/2010	1,300	200
	11/10/2010	950	120
	03/17/2011	1,200	110
	11/14/2011	5,500	5,700
	04/26/2012	3,900	3,600
	10/10/2012	3,100	2,400
MW-24B	06/08/2004	431	9.3
	08/02/2004	474	9.6
	09/15/2005	497	3.64
	03/27/2006	864	3.99
	10/04/2006	540	ND 50
	03/27/2007	5.6	ND 1.0
	10/02/2007	310	ND 20
	04/01/2008	110	ND 20
	09/24/2008	ND 20	ND 20
	03/27/2009	17 J	ND 20
	09/29/2009	ND 5.0	ND 5.0
	06/08/2010	ND 5.0	ND 5.0
	11/09/2010	ND 1.0	ND 1.0
	04/07/2011	ND 10	ND 10
	04/18/2011	ND 5.0	ND 5.0
	01/19/2012	ND 5.0	ND 5.0
	05/03/2012	ND 20	ND 20
	10/11/2012	ND 10	ND 10
MW-26B	06/07/2004	30.5	112
	07/30/2004	34.4	114
	09/16/2005	24.9	168
	03/28/2006	144	221
	10/05/2006	100	210
	03/28/2007	140	270
	10/04/2007	110	230
	04/02/2008	94	170
	09/23/2008	110	200
	03/25/2009	130	230
	09/22/2009	150	200
	05/11/2010	190	280
	11/09/2010	36	220
	03/03/2011	380	280
	03/30/2011	1,100	560
	01/18/2012	520	290
	04/30/2012	850	510
	10/03/2012	720	330

Gannett Fleming

Table 1. Groundwater Monitoring Results - West Centerline
Mann-Kendall Statistical Analysis
Former Chevron Facility 122208
5801 Riggs Road, Chillum, Maryland

Chevron

Location	Sample Date	Benzene (µg/L)	Methyl-t-butyl ether (µg/L)
MW-33B	06/02/2004	1,040	770
	07/27/2004	1000	744
	09/13/2005	ND 1	698
	03/28/2006	974	653
	10/05/2006	760	520
	03/29/2007	670	400
	10/05/2007	540	410
	04/02/2008	520	400
	09/23/2008	340	230
	03/24/2009	380	220
	09/21/2009	380	240
	05/11/2010	470	380
	11/09/2010	150	150
	03/30/2011	570	300
	01/18/2012	470	310
	05/08/2012	380	300
	10/02/2012	ND 1.0	20
MW-58	04/21/2011	180	110
	01/19/2012	390	220
	05/04/2012	240	190
	10/03/2012	380	170
MW-59	03/02/2011	140	140
	01/19/2012	220	220
	05/04/2012	140	160
	10/03/2012	240	210
MW-60	01/19/2012	ND 1.0	16
	05/04/2012	ND 1.0	18
	10/03/2012	ND 1.0	10
MW-62A	10/04/2012	ND 1.0	ND 1.0
MW-62B	10/04/2012	94	97

Notes:

1) Reporting limit shown beside Not Detected.
2) Analytical results were rounded.
3) ND: Not Detected above reporting limit.
4) BTEX summed before rounding.

Gannett Fleming

Chevron

Table 2. Groundwater Monitoring Results - East Centerline
Mann-Kendall Statistical Analysis
Former Chevron Facility 122208
5801 Riggs Road, Chillum, Maryland

Location	Sample Date	Benzene (µg/L)	Methyl-t-butyl ether (µg/L)
GP-2E(45-50)	08/16/2004	60.2	656
	12/15/2004	117	522
	03/21/2005	189	610
	05/26/2005	172	803
	09/14/2005	134	501
	12/20/2005	110 ""	393 ""
	10/02/2006	78	420
	03/26/2007	50	400
	10/01/2007	34	470
	03/31/2008	8.0	330
	09/25/2008	ND 2.0	370
	03/30/2009	ND 2.0	350
	09/28/2009	ND 2.0	450
	05/18/2010	86	1000
	11/10/2010	17	560
	04/01/2011	200	820
	01/19/2012	350	1,300
	04/25/2012	470	1,400
	10/08/2012	320	850
GP-39A	08/16/2004	476	2,060
	12/16/2004	725	2,520
	03/21/2005	7.10	3,200
	05/26/2005	905	3,550
	09/08/2005	721	2,490
	12/19/2005	995 ""	3,360 ""
	03/22/2006	1,570	5,960
	09/28/2006	2,500	6,500
	03/22/2007	2,600	5,800
	09/24/2007	2,300	5,200
	03/27/2008	2,100	5,400
	09/30/2008	2,100	4,800
	03/31/2009	2,200	4,900
	09/23/2009	3,100	4,600
	05/17/2010	3,100	5,500
	11/10/2010	3,400	4,200
	03/28/2011	4,100	5,100
GP-39R	11/14/2011	340	680
	04/26/2012	150	400
	10/10/2012	280	350

Gannett Fleming

Chevron

Table 2. Groundwater Monitoring Results - East Centerline
Mann-Kendall Statistical Analysis
Former Chevron Facility 122208
5801 Riggs Road, Chillum, Maryland

Location	Sample Date	Benzene (µg/L)	Methyl-t-butyl ether (µg/L)
MW-22	06/08/2004	5,620	866
	08/03/2004	7,960	1,620
	09/07/2005	8,790	1,780
	03/23/2006	6,860	2,020
	10/02/2006	7,900	1,100
	03/26/2007	2,400	570
	10/01/2007	7,000	1000
	03/31/2008	4,900	710
	09/25/2008	1,100	1,100
	03/30/2009	5,900	680
	09/28/2009	4,200	420
	05/10/2010	1,300	200
	11/10/2010	950	120
	03/17/2011	1,200	110
	11/14/2011	5,500	5,700
	04/26/2012	3,900	3,600
	10/10/2012	3,100	2,400
MW-25B	11/22/2004	456	502
	09/15/2005	ND 1	386
	03/24/2006	403	461
	10/04/2006	470	550
	03/27/2007	320	370
	10/03/2007	340	490
	04/01/2008	180	310
	09/24/2008	240	350
	03/27/2009	450	410
	09/22/2009	170	260
	05/18/2010	220	310
	11/09/2010	99	260
	04/01/2011	120	200
	01/19/2012	200	390
	04/25/2012	120	250
	10/04/2012	140	230
MW-27B	06/02/2004	193	534
	07/28/2004	142	507
	09/16/2005	146	417
	03/28/2006	168	451
	10/05/2006	150	370
	03/28/2007	200	530
	10/04/2007	82	310
	04/02/2008	34	240
	09/23/2008	37	240
	03/25/2009	19	240
	09/22/2009	6.5	160

Gannett Fleming

Chevron

Table 2. Groundwater Monitoring Results - East Centerline
Mann-Kendall Statistical Analysis
Former Chevron Facility 122208
5801 Riggs Road, Chillum, Maryland

Location	Sample Date	Benzene (µg/L)	Methyl-t-butyl ether (µg/L)
MW-27B (Cont)	06/08/2010	ND 2.0	200
	11/09/2010	ND 1.0	170
	03/30/2011	ND 5.0	140
	04/30/2012	ND 1.0	140
	10/03/2012	ND 1.0	3.4
MW-47	11/19/2004	116	27.2
	09/06/2005	315	17.6
	03/22/2006	459	13.3
	09/28/2006	380	22
	03/22/2007	240	58
	09/24/2007	260	ND 1.0
	03/27/2008	360	ND 2.0
	09/29/2008	230	15
	03/31/2009	250	19
	09/23/2009	160	16
	05/17/2010	170	59
	11/05/2010	650	15
	03/28/2011	260	50
	11/15/2011	330	52
	04/24/2012	380	40
	10/09/2012	430	ND 1.0
MW-53	05/03/2005	ND 1	66.4
	06/08/2005	ND 1	97
	09/14/2005	ND 1	88.1
	03/28/2006	4.00	103
	10/06/2006	54	240
	03/29/2007	15	110
	10/05/2007	61	270
	04/03/2008	17	160
	09/22/2008	23	160
	03/23/2009	7.8	150
	09/21/2009	11	220
	06/08/2010	28	310
	11/09/2010	16	300
	04/07/2011	6.6	140
	01/18/2012	5.1	180
	05/04/2012	6.5	140
	10/02/2012	4.1	100

Notes:

1) Reporting limit shown beside Not Detected.
2) Analytical results were rounded.
3) ND: Not Detected above reporting limit.
4) BTEX summed before rounding.

Gannett Fleming

Table 3. Mann-Kendall Results Summary
Mann-Kendall Statistical Analysis
Former Chevron Facility 122208
5801 Riggs Road, Chillum, Maryland

West Centerline - Benzene

Well ID	Distance from MW-22 (ft)	Trend	Date Range	Number of Data Points
MW-22R	0	No Trend	03/31/2008-10/10/2012	10
MW-24B	232	No Trend	10/02/2007-01/19/2012	10
MW-26B	666	Increasing	10/04/2007-01/18/2012	10
MW-33B	944	No Trend	03/29/2007-01/18/2012	10
MW-58	573.9875	No Trend	04/21/2011-10/03/2012	4
MW-59	691.2099	No Trend	03/02/2011-10/03/2012	4
MW-60	689.4315	Insufficient Data	01/19/2012-10/03/2012	3
MW-62A	350.6566	Insufficient Data	10/4/2012	1
MW-62B	350.2294	Insufficient Data	10/4/2012	1

West Centerline - MTBE

Well ID	Distance from MW-22 (ft)	Trend	Date Range	Number of Data Points
MW-22R	0	No Trend	03/31/2008-10/10/2012	10
MW-24B	232	No Trend	10/02/2007-01/19/2012	10
MW-26B	666	Increasing	10/04/2007-01/18/2012	10
MW-33B	944	No Trend	03/29/2007-01/18/2012	10
MW-58	573.9875	No Trend	04/21/2011-10/03/2012	4
MW-59	691.2099	No Trend	03/02/2011-10/03/2012	4
MW-60	689.4315	Insufficient Data	01/19/2012-10/03/2012	3
MW-62A	350.6566	Insufficient Data	10/4/2012	1
MW-62B	350.2294	Insufficient Data	10/4/2012	1

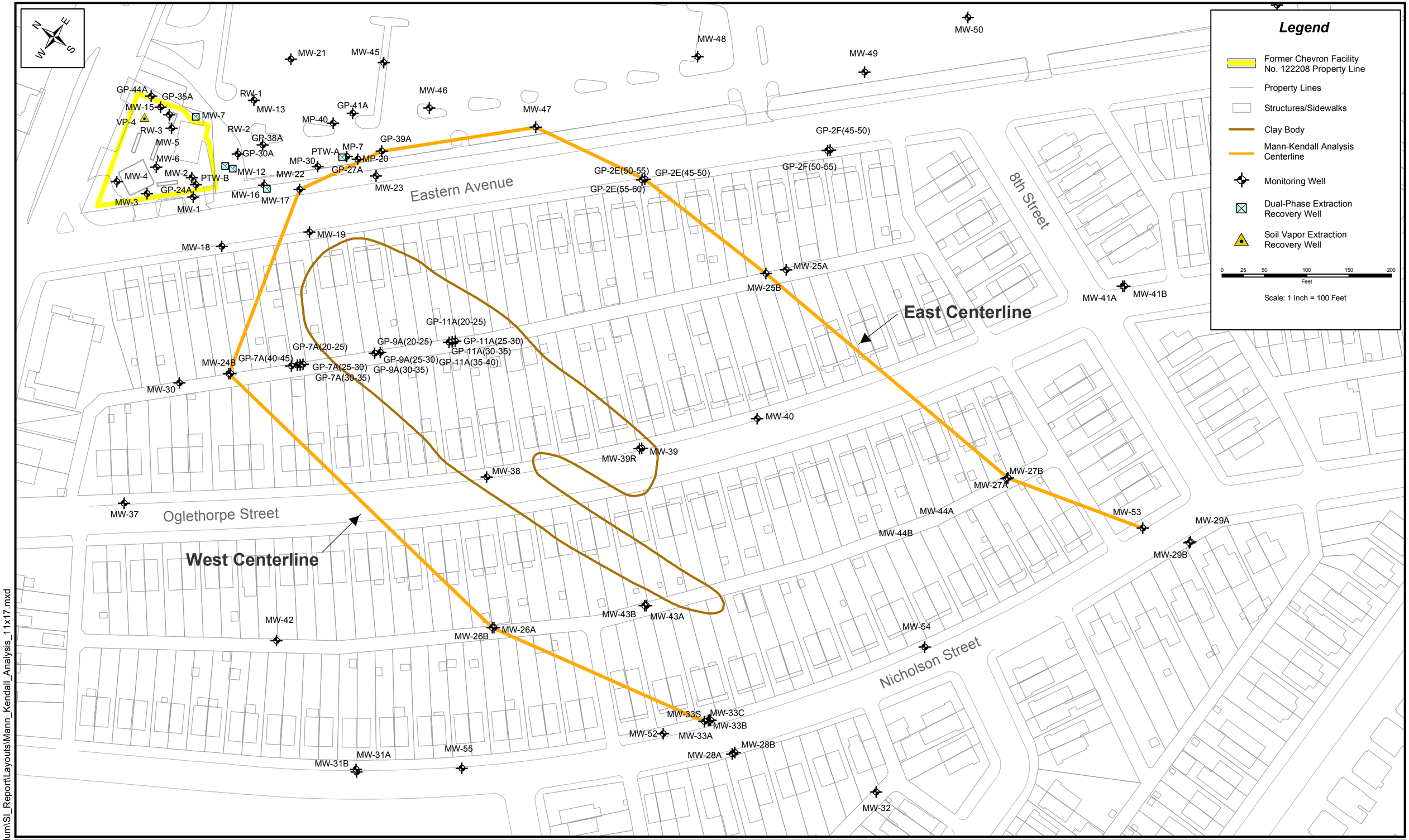
East Centerline - Benzene

Well ID	Distance from MW-22 (ft)	Trend	Date Range	Number of Data Points
MW-22R	0	No Trend	03/31/2008-10/10/2012	10
GP-39R	109	No Trend	11/14/2011-10/10/2012	10
MW-47	292	No Trend	03/27/2008-10/09/2012	10
GP-2E (45-50)	445	Increasing	3/31/2008-10/08/2012	10
MW-25B	618	No Trend	04/01/2008-10/04/2012	10
MW-27B	991	Decreasing	10/04/2007-10/03/2012	10
MW-53	1163	Decreasing	04/03/2008-10/02/2012	10

East Centerline - MTBE

Well ID	Distance from MW-22 (ft)	Trend	Date Range	Number of Data Points
MW-22R	0	No Trend	03/31/2008-10/10/2012	10
GP-39R	109	Decreasing	11/14/2011-10/10/2012	10
MW-47	292	No Trend	03/27/2008-10/09/2012	10
GP-2E (45-50)	445	Increasing	3/31/2008-10/08/2012	10
MW-25B	618	No Trend	04/01/2008-10/04/2012	10
MW-27B	991	Decreasing	10/04/2007-10/03/2012	10
MW-53	1163	No Trend	04/03/2008-10/02/2012	10

FIGURES



J:\44738_Chillum\SI_Report\Layouts\Mann_Kendall_Analysis_11x17.mxd

NO.	REVISIONS	DATE	BY	DESIGNED	GIS	SCALE				
	DESCRIPTION			RWS	CER	AS NOTED	Gannett Fleming	FORMER CHEVRON FACILITY NO. 122208 CHILLUM, MARYLAND	Centerlines for Mann-Kendall Analysis	GF PROJECT NO. 44738
				CHECKED	APPROVED		BALTIMORE, MARYLAND			DATE 07-17-08
				RWS						GIS FILE Mann_Kendall_Analysis_11x17.mxd
										SHEET NO. 1

ATTACHMENT A

Mann-Kendall Analysis Tables – West Centerline

WEST CENTERLINE - MW-22R - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-22R

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	4,900	1,100	5,900	4,200	1,300	950	1,200	5,500	3,900	3,100	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	-1	1	-1	-1	-1	-1	1	-1	-1	-5
Compared to Event 2	*****	*****	1	1	1	-1	1	1	1	1	6
Compared to Event 3	*****	*****	*****	-1	-1	-1	-1	-1	-1	-1	-7
Compared to Event 4	*****	*****	*****	*****	-1	-1	-1	1	-1	-1	-4
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	1	1	1	1
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	1	1	1	4
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	1	1	3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = -5

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result No Trend

>95% Confidence

I S I ≥ 20

Result No Trend

WEST CENTERLINE - MW-22R - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-22R

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	710	1,100	680	390	200	120	110	5,700	3,600	2,400	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	-1	-1	-1	-1	-1	1	1	1	-1
Compared to Event 2	*****	*****	-1	-1	-1	-1	-1	1	1	1	-2
Compared to Event 3	*****	*****	*****	-1	-1	-1	-1	1	1	1	-1
Compared to Event 4	*****	*****	*****	*****	-1	-1	-1	1	1	1	
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	1	1	1	1
Compared to Event 6	*****	*****	*****	*****	*****	*****	-1	1	1	1	2
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	1	1	3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = -1

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result No Trend

>95% Confidence

I S I ≥ 20

Result No Trend

WEST CENTERLINE - MW-24B - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-24B

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	110	3	17	1	3	1	2	3	10	5	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	-1	-1	-1	-1	-1	-1	-1	-1	-1	-9
Compared to Event 2	*****	*****	1	-1	-1	-1	-1	-1	1	1	-2
Compared to Event 3	*****	*****	*****	-1	-1	-1	-1	-1	-1	-1	-7
Compared to Event 4	*****	*****	*****	*****	1	1	1	1	1	1	6
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	0	1	1	
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	1	1	1	4
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	1	1	3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	1	1	2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = -4

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result No Trend

>95% Confidence

I S I ≥ 20

Result No Trend

WEST CENTERLINE - MW-24B - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-24B

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	3	17	1	3	1	2	1	3	10	5	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	-1	-1	-1	-1	-1	-1	1	1	-3
Compared to Event 2	*****	*****	-1	-1	-1	-1	-1	-1	-1	-1	-8
Compared to Event 3	*****	*****	*****	1	-1	1	1	1	1	1	5
Compared to Event 4	*****	*****	*****	*****	-1	-1	-1	0	1	1	-1
Compared to Event 5	*****	*****	*****	*****	*****	1	1	1	1	1	5
Compared to Event 6	*****	*****	*****	*****	*****	*****	-1	1	1	1	2
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	1	1	3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	1	1	2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = 4

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result No Trend

>95% Confidence

I S I ≥ 20

Result No Trend

WEST CENTERLINE - MW-26B - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-26B

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	94	110	130	150	190	36	1,100	520	850	720	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	1	1	1	-1	1	1	1	1	7
Compared to Event 2	*****	*****	1	1	1	-1	1	1	1	1	6
Compared to Event 3	*****	*****	*****	1	1	-1	1	1	1	1	5
Compared to Event 4	*****	*****	*****	*****	1	-1	1	1	1	1	4
Compared to Event 5	*****	*****	*****	*****	*****	-1	1	1	1	1	3
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	1	1	1	4
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	-1	-1	-1	-3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	1	1	2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = 27

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result Increasing Trend

>95% Confidence

I S I ≥ 20

Result Increasing Trend

WEST CENTERLINE - MW-26B - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-26B

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	200	230	200	280	220	280	560	290	510	330	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	0	1	1	1	1	1	1	1	8
Compared to Event 2	*****	*****	-1	1	-1	1	1	1	1	1	4
Compared to Event 3	*****	*****	*****	1	1	1	1	1	1	1	7
Compared to Event 4	*****	*****	*****	*****	-1	0	1	1	1	1	3
Compared to Event 5	*****	*****	*****	*****	*****	1	1	1	1	1	5
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	1	1	1	4
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	-1	-1	-1	-3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	1	1	2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = 29

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result Increasing Trend

>95% Confidence

I S I ≥ 20

Result Increasing Trend

WEST CENTERLINE - MW-33B - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-33B

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	520	340	380	380	470	150	570	470	380	1	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	-1	-1	-1	-1	-1	1	-1	-1	-1	-7
Compared to Event 2	*****	*****	1	1	1	-1	1	1	1	-1	4
Compared to Event 3	*****	*****	*****	0	1	-1	1	1	0	-1	1
Compared to Event 4	*****	*****	*****	*****	1	-1	1	1	0	-1	1
Compared to Event 5	*****	*****	*****	*****	*****	-1	1	0	-1	-1	-2
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	1	1	-1	2
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	-1	-1	-1	-3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = -7

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result No Trend

>95% Confidence

I S I ≥ 20

Result No Trend

WEST CENTERLINE - MW-33B - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-33B

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	400	230	220	240	380	150	300	310	300	20	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	-1	-1	-1	-1	-1	-1	-1	-1	-1	-9
Compared to Event 2	*****	*****	-1	1	1	-1	1	1	1	-1	2
Compared to Event 3	*****	*****	*****	1	1	-1	1	1	1	-1	3
Compared to Event 4	*****	*****	*****	*****	1	-1	1	1	1	-1	2
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	-1	-1	-1	-5
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	1	1	-1	2
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	0	-1	
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = -8

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result No Trend

>95% Confidence

I S I ≥ 20

Result No Trend

WEST CENTERLINE - MW-58 - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-58

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	180	390	240	380							4
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	1	1							3
Compared to Event 2	*****	*****	-1	-1							-2
Compared to Event 3	*****	*****	*****	1							1
Compared to Event 4	*****	*****	*****	*****							
Compared to Event 5	*****	*****	*****	*****	*****						
Compared to Event 6	*****	*****	*****	*****	*****	*****					
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****				
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****			
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Mann-Kendall Statistic 'S' = 2

Statistical Confidence Level

>90% Confidence

I S I ≥ 4

Result No Trend

>95% Confidence

I S I ≥ 6

Result No Trend

WEST CENTERLINE - MW-58 - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-58

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	110	220	190	170							4
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	1	1							3
Compared to Event 2	*****	*****	-1	-1							-2
Compared to Event 3	*****	*****	*****	-1							-1
Compared to Event 4	*****	*****	*****	*****							
Compared to Event 5	*****	*****	*****	*****	*****						
Compared to Event 6	*****	*****	*****	*****	*****	*****					
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****				
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****			
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Mann-Kendall Statistic 'S' = 0

Statistical Confidence Level

>90% Confidence

I S I ≥ 4

Result No Trend

>95% Confidence

I S I ≥ 6

Result No Trend

WEST CENTERLINE - MW- 59 - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-59

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	140	220	140	240							4
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	0	1							2
Compared to Event 2	*****	*****	-1	1							
Compared to Event 3	*****	*****	*****	1							1
Compared to Event 4	*****	*****	*****	*****							
Compared to Event 5	*****	*****	*****	*****	*****						
Compared to Event 6	*****	*****	*****	*****	*****	*****					
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****				
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****			
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Mann-Kendall Statistic 'S' = 3

Statistical Confidence Level

>90% Confidence

I S I ≥ 4

Result No Trend

>95% Confidence

I S I ≥ 6

Result No Trend

WEST CENTERLINE - MW-59 - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-59

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	140	220	160	210							4
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	1	1							3
Compared to Event 2	*****	*****	-1	-1							-2
Compared to Event 3	*****	*****	*****	1							1
Compared to Event 4	*****	*****	*****	*****							
Compared to Event 5	*****	*****	*****	*****	*****						
Compared to Event 6	*****	*****	*****	*****	*****	*****					
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****				
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****			
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Mann-Kendall Statistic 'S' = 2

Statistical Confidence Level

>90% Confidence
I S I ≥ 4

Result No Trend

>95% Confidence
I S I ≥ 6

Result No Trend

WEST CENTERLINE - MW-60 - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-60

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	1	1	1								3
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	0	0								
Compared to Event 2	*****	*****	0								
Compared to Event 3	*****	*****	*****								
Compared to Event 4	*****	*****	*****	*****							
Compared to Event 5	*****	*****	*****	*****	*****						
Compared to Event 6	*****	*****	*****	*****	*****	*****					
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****				
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****			
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Mann-Kendall Statistic 'S' = **0**

Statistical Confidence Level

>90% Confidence

I S I ≥

Result Insufficient Data

>95% Confidence

I S I ≥

Result Insufficient Data

WEST CENTERLINE - MW-60 - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-60

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	16	18	10								3
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	-1								
Compared to Event 2	*****	*****	-1								-1
Compared to Event 3	*****	*****	*****								
Compared to Event 4	*****	*****	*****	*****							
Compared to Event 5	*****	*****	*****	*****	*****						
Compared to Event 6	*****	*****	*****	*****	*****	*****					
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****				
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****			
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Mann-Kendall Statistic 'S' = -1

Statistical Confidence Level

>90% Confidence
I S I ≥
Result Insufficient Data

>95% Confidence
I S I ≥
Result Insufficient Data

WEST CENTERLINE - MW-62A - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-62A

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	1										1
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****										
Compared to Event 2	*****	*****									
Compared to Event 3	*****	*****	*****								
Compared to Event 4	*****	*****	*****	*****							
Compared to Event 5	*****	*****	*****	*****	*****						
Compared to Event 6	*****	*****	*****	*****	*****	*****					
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****				
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****			
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Mann-Kendall Statistic 'S' = 0

Statistical Confidence Level

>90% Confidence

I S I ≥

Result Insufficient Data

>95% Confidence

I S I ≥

Result Insufficient Data

WEST CENTERLINE - MW-62A - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-62A

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	1										1
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****										
Compared to Event 2	*****	*****									
Compared to Event 3	*****	*****	*****								
Compared to Event 4	*****	*****	*****	*****							
Compared to Event 5	*****	*****	*****	*****	*****						
Compared to Event 6	*****	*****	*****	*****	*****	*****					
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****				
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****			
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Mann-Kendall Statistic 'S' = **0**

Statistical Confidence Level

>90% Confidence
I S I ≥

Result Insufficient Data

>95% Confidence
I S I ≥

Result Insufficient Data

WEST CENTERLINE - MW-62B - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-62**B**

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	94										1
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****										
Compared to Event 2	*****	*****									
Compared to Event 3	*****	*****	*****								
Compared to Event 4	*****	*****	*****	*****							
Compared to Event 5	*****	*****	*****	*****	*****						
Compared to Event 6	*****	*****	*****	*****	*****	*****					
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****				
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****			
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Mann-Kendall Statistic 'S' = **0**

Statistical Confidence Level

>90% Confidence

I S I ≥

Result Insufficient Data

>95% Confidence

I S I ≥

Result Insufficient Data

WEST CENTERLINE - MW-62B - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-62**B**

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	97										1
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****										
Compared to Event 2	*****	*****									
Compared to Event 3	*****	*****	*****								
Compared to Event 4	*****	*****	*****	*****							
Compared to Event 5	*****	*****	*****	*****	*****						
Compared to Event 6	*****	*****	*****	*****	*****	*****					
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****				
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****			
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****		

Mann-Kendall Statistic 'S' = **0**

Statistical Confidence Level

>90% Confidence
I S I ≥

Result Insufficient Data

>95% Confidence
I S I ≥

Result Insufficient Data

ATTACHMENT B

Mann-Kendall Analysis Tables – East Centerline

EAST CENTERLINE - MW-22R - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-22R

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	4,900	1,100	5,900	4,200	1,300	950	1,200	5,500	3,900	3,100	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	-1	1	-1	-1	-1	-1	1	-1	-1	-5
Compared to Event 2	*****	*****	1	1	1	-1	1	1	1	1	6
Compared to Event 3	*****	*****	*****	-1	-1	-1	-1	-1	-1	-1	-7
Compared to Event 4	*****	*****	*****	*****	-1	-1	-1	1	-1	-1	-4
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	1	1	1	1
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	1	1	1	4
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	1	1	3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = -5

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result No Trend

>95% Confidence

I S I ≥ 20

Result No Trend

EAST CENTERLINE - MW-22R - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-22R

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	710	1,100	680	420	200	120	110	5,700	3,600	2,400	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	-1	-1	-1	-1	-1	1	1	1	-1
Compared to Event 2	*****	*****	-1	-1	-1	-1	-1	1	1	1	-2
Compared to Event 3	*****	*****	*****	-1	-1	-1	-1	1	1	1	-1
Compared to Event 4	*****	*****	*****	*****	-1	-1	-1	1	1	1	
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	1	1	1	1
Compared to Event 6	*****	*****	*****	*****	*****	*****	-1	1	1	1	2
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	1	1	3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = -1

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result No Trend

>95% Confidence

I S I ≥ 20

Result No Trend

EAST CENTERLINE - GP-39R - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- GP-39R

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	2,100	2,100	2,200	3,100	3,100	3,400	4,100	340	150	280	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	0	1	1	1	1	1	-1	-1	-1	2
Compared to Event 2	*****	*****	1	1	1	1	1	-1	-1	-1	2
Compared to Event 3	*****	*****	*****	1	1	1	1	-1	-1	-1	1
Compared to Event 4	*****	*****	*****	*****	0	1	1	-1	-1	-1	-1
Compared to Event 5	*****	*****	*****	*****	*****	1	1	-1	-1	-1	-1
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	-1	-1	-1	-2
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	-1	-1	-1	-3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	1	1

Mann-Kendall Statistic 'S' = -3

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result No Trend

>95% Confidence

I S I ≥ 20

Result No Trend

EAST CENTERLINE - GP-39R - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- GP-39R

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	5,400	4,800	4,900	4,600	5,500	4,200	5,100	680	400	350	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	-1	-1	-1	1	-1	-1	-1	-1	-1	-7
Compared to Event 2	*****	*****	1	-1	1	-1	1	-1	-1	-1	-2
Compared to Event 3	*****	*****	*****	-1	1	-1	1	-1	-1	-1	-3
Compared to Event 4	*****	*****	*****	*****	1	-1	1	-1	-1	-1	-2
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	-1	-1	-1	-5
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	-1	-1	-1	-2
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	-1	-1	-1	-3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = -27

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result Decreasing Trend

>95% Confidence

I S I ≥ 20

Result Decreasing Trend

EAST CENTERLINE - MW-47 - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-47

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	360	230	250	160	170	650	260	330	380	430	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	-1	-1	-1	-1	1	-1	-1	1	1	-3
Compared to Event 2	*****	*****	1	-1	-1	1	1	1	1	1	4
Compared to Event 3	*****	*****	*****	-1	-1	1	1	1	1	1	3
Compared to Event 4	*****	*****	*****	*****	1	1	1	1	1	1	6
Compared to Event 5	*****	*****	*****	*****	*****	1	1	1	1	1	5
Compared to Event 6	*****	*****	*****	*****	*****	*****	-1	-1	-1	-1	-4
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	1	1	3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	1	1	2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	1	1

Mann-Kendall Statistic 'S' = 17

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result Increasing Trend

>95% Confidence

I S I ≥ 20

Result No Trend

EAST CENTERLINE - MW-47 - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-47

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	1	15	19	16	59	15	50	52	40	1	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	1	1	1	1	1	1	1	-1	7
Compared to Event 2	*****	*****	1	1	1	0	1	1	1	-1	5
Compared to Event 3	*****	*****	*****	-1	1	-1	1	1	1	-1	1
Compared to Event 4	*****	*****	*****	*****	1	-1	1	1	1	-1	2
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	-1	-1	-1	-5
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	1	1	-1	2
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	-1	-1	-1
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = 8

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result No Trend

>95% Confidence

I S I ≥ 20

Result No Trend

EAST CENTERLINE - GP-2E(45-50) - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- GP-2E(45-50)

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	8	1	1	1	86	17	200	350	470	320	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	-1	-1	-1	1	1	1	1	1	1	3
Compared to Event 2	*****	*****	0	0	1	1	1	1	1	1	6
Compared to Event 3	*****	*****	*****	0	1	1	1	1	1	1	6
Compared to Event 4	*****	*****	*****	*****	1	1	1	1	1	1	6
Compared to Event 5	*****	*****	*****	*****	*****	-1	1	1	1	1	3
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	1	1	1	4
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	1	1	3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	1	-1	
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = 30

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result Increasing Trend

>95% Confidence

I S I ≥ 20

Result Increasing Trend

EAST CENTERLINE - GP-2E(45-50) - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- GP-2E(45-50)

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	330	370	350	450	1000	560	820	1300	1400	850	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	1	1	1	1	1	1	1	1	9
Compared to Event 2	*****	*****	-1	1	1	1	1	1	1	1	6
Compared to Event 3	*****	*****	*****	1	1	1	1	1	1	1	7
Compared to Event 4	*****	*****	*****	*****	1	1	1	1	1	1	6
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	1	1	-1	-1
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	1	1	1	4
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	1	1	3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	1	-1	
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = 33

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result Increasing Trend

>95% Confidence

I S I ≥ 20

Result Increasing Trend

EAST CENTERLINE - MW-25B - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-25B

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	180	240	450	170	220	99	120	200	120	140	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	1	-1	1	-1	-1	1	-1	-1	-1
Compared to Event 2	*****	*****	1	-1	-1	-1	-1	-1	-1	-1	-6
Compared to Event 3	*****	*****	*****	-1	-1	-1	-1	-1	-1	-1	-7
Compared to Event 4	*****	*****	*****	*****	1	-1	-1	1	-1	-1	-2
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	-1	-1	-1	-5
Compared to Event 6	*****	*****	*****	*****	*****	*****	1	1	1	1	4
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	0	1	2
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	1	1

Mann-Kendall Statistic 'S' = -16

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result Decreasing Trend

>95% Confidence

I S I ≥ 20

Result No Trend

EAST CENTERLINE - MW-25B - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-25B

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	310	350	410	260	310	260	200	390	250	230	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	1	-1	0	-1	-1	1	-1	-1	-2
Compared to Event 2	*****	*****	1	-1	-1	-1	-1	1	-1	-1	-4
Compared to Event 3	*****	*****	*****	-1	-1	-1	-1	-1	-1	-1	-7
Compared to Event 4	*****	*****	*****	*****	1	0	-1	1	-1	-1	-1
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	1	-1	-1	-3
Compared to Event 6	*****	*****	*****	*****	*****	*****	-1	1	-1	-1	-2
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	1	1	3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = -19

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result Decreasing Trend

>95% Confidence

I S I ≥ 20

Result No Trend

EAST CENTERLINE - MW-27B - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-27B

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	82	34	37	19	7	1	1	3	1	1	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	-1	-1	-1	-1	-1	-1	-1	-1	-1	-9
Compared to Event 2	*****	*****	1	-1	-1	-1	-1	-1	-1	-1	-6
Compared to Event 3	*****	*****	*****	-1	-1	-1	-1	-1	-1	-1	-7
Compared to Event 4	*****	*****	*****	*****	-1	-1	-1	-1	-1	-1	-6
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	-1	-1	-1	-5
Compared to Event 6	*****	*****	*****	*****	*****	*****	-1	1	-1	-1	-2
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	0	0	1
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	0	

Mann-Kendall Statistic 'S' = -36

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result Decreasing Trend

>95% Confidence

I S I ≥ 20

Result Decreasing Trend

EAST CENTERLINE - MW-27B - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-27B

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	310	240	240	240	160	200	170	140	140	3	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	-1	-1	-1	-1	-1	-1	-1	-1	-1	-9
Compared to Event 2	*****	*****	0	0	-1	-1	-1	-1	-1	-1	-6
Compared to Event 3	*****	*****	*****	0	-1	-1	-1	-1	-1	-1	-6
Compared to Event 4	*****	*****	*****	*****	-1	-1	-1	-1	-1	-1	-6
Compared to Event 5	*****	*****	*****	*****	*****	1	1	-1	-1	-1	-1
Compared to Event 6	*****	*****	*****	*****	*****	*****	-1	-1	-1	-1	-4
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	-1	-1	-1	-3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	0	-1	-1
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = -37

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result Decreasing Trend

>95% Confidence

I S I ≥ 20

Result Decreasing Trend

EAST CENTERLINE - MW-53 - BENZENE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- Benzene
Well-- MW-53

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	17	23	8	11	28	16	7	5	7	4	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	1	-1	-1	1	-1	-1	-1	-1	-1	-5
Compared to Event 2	*****	*****	-1	-1	1	-1	-1	-1	-1	-1	-6
Compared to Event 3	*****	*****	*****	1	1	1	-1	-1	-1	-1	-1
Compared to Event 4	*****	*****	*****	*****	1	1	-1	-1	-1	-1	-2
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	-1	-1	-1	-5
Compared to Event 6	*****	*****	*****	*****	*****	*****	-1	-1	-1	-1	-4
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	-1	-1	-1	-3
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	1	-1	
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = -27

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result Decreasing Trend

>95% Confidence

I S I ≥ 20

Result Decreasing Trend

EAST CENTERLINE - MW-53 - MTBE

Mann-Kendall Statistical Method Worksheet

Site-- Chillum
Compound-- MTBE
Well-- MW-53

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Events
Concentration	160	160	150	220	310	300	140	180	140	100	10
	--	--	--	--	--	--	--	--	--	--	**Sum**
Compared to Event 1	*****	0	-1	1	1	1	-1	1	-1	-1	
Compared to Event 2	*****	*****	-1	1	1	1	-1	1	-1	-1	
Compared to Event 3	*****	*****	*****	1	1	1	-1	1	-1	-1	1
Compared to Event 4	*****	*****	*****	*****	1	1	-1	-1	-1	-1	-2
Compared to Event 5	*****	*****	*****	*****	*****	-1	-1	-1	-1	-1	-5
Compared to Event 6	*****	*****	*****	*****	*****	*****	-1	-1	-1	-1	-4
Compared to Event 7	*****	*****	*****	*****	*****	*****	*****	1	0	-1	
Compared to Event 8	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1	-2
Compared to Event 9	*****	*****	*****	*****	*****	*****	*****	*****	*****	-1	-1

Mann-Kendall Statistic 'S' = -13

Statistical Confidence Level

>90% Confidence

I S I ≥ 15

Result No Trend

>95% Confidence

I S I ≥ 20

Result No Trend