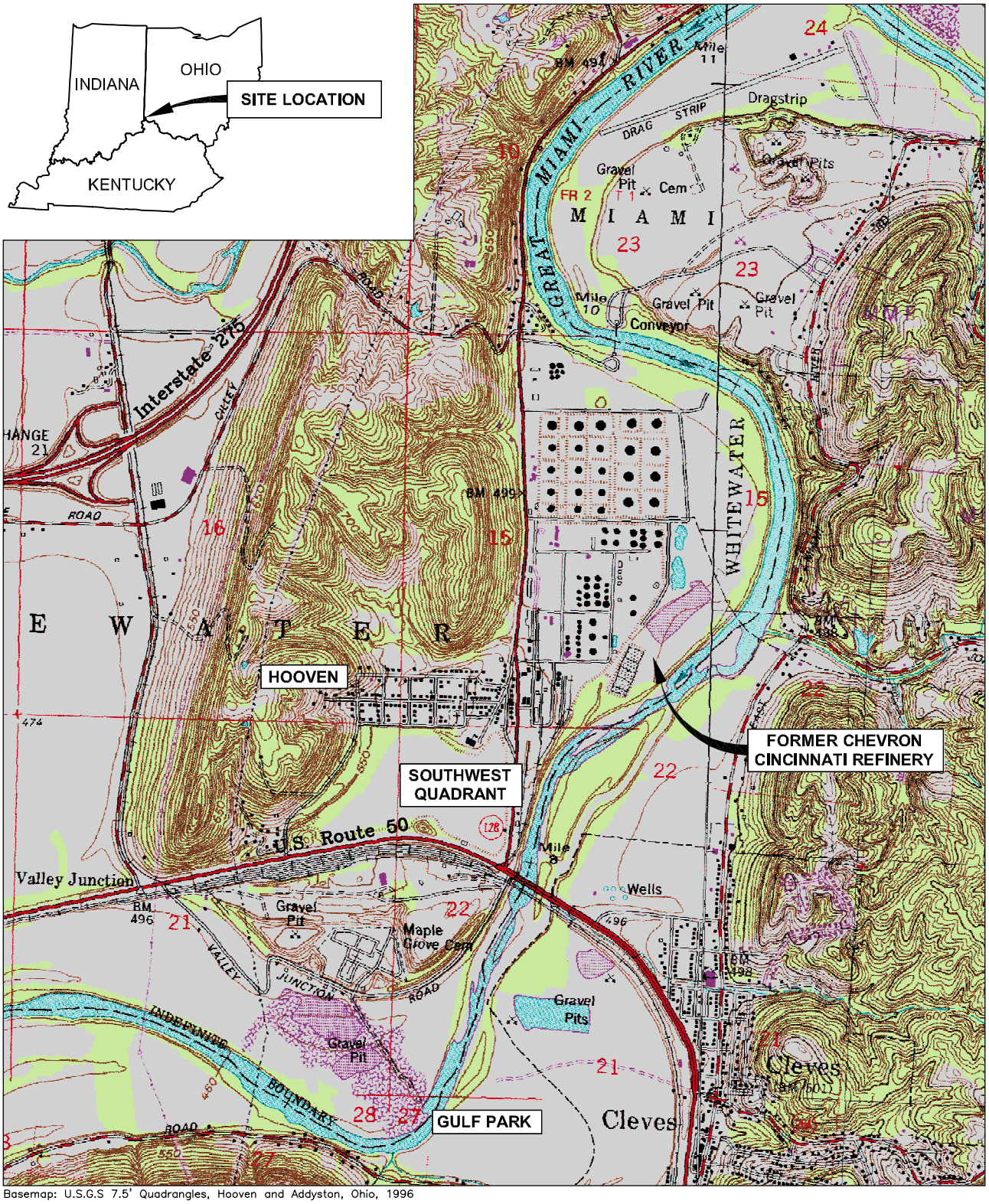
US EPA ARCHIVE DOCUMENT



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

N

0 2,000'

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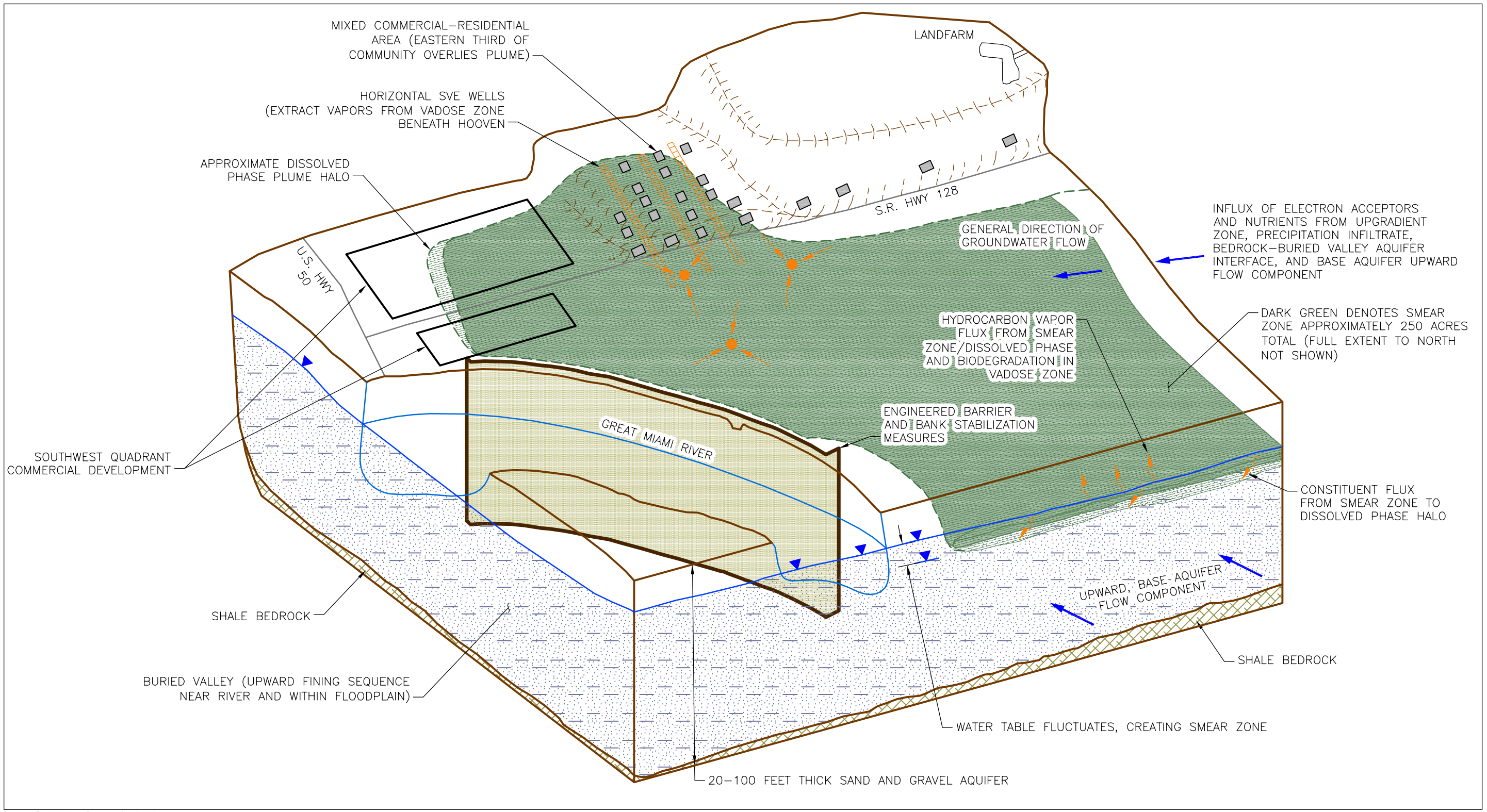
FIGURE 1-1

SITE LOCATION MAP

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JP	Scale: 1" = 2,000'	Date: 1/13/2011	File: 500USGSSITE201201



Source: Provided by Chevron Cincinnati.

EXPLANATION

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

WATER LEVEL

DISSOLVED PHASE PLUME EXTENT

SMEAR ZONE EXTENT

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FIGURE 1-2

GROUNDWATER CONCEPTUAL SITE MODEL

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JP	Scale: NONE	Date: 11/19/2010	File: 500GWCONCMODEL-201201

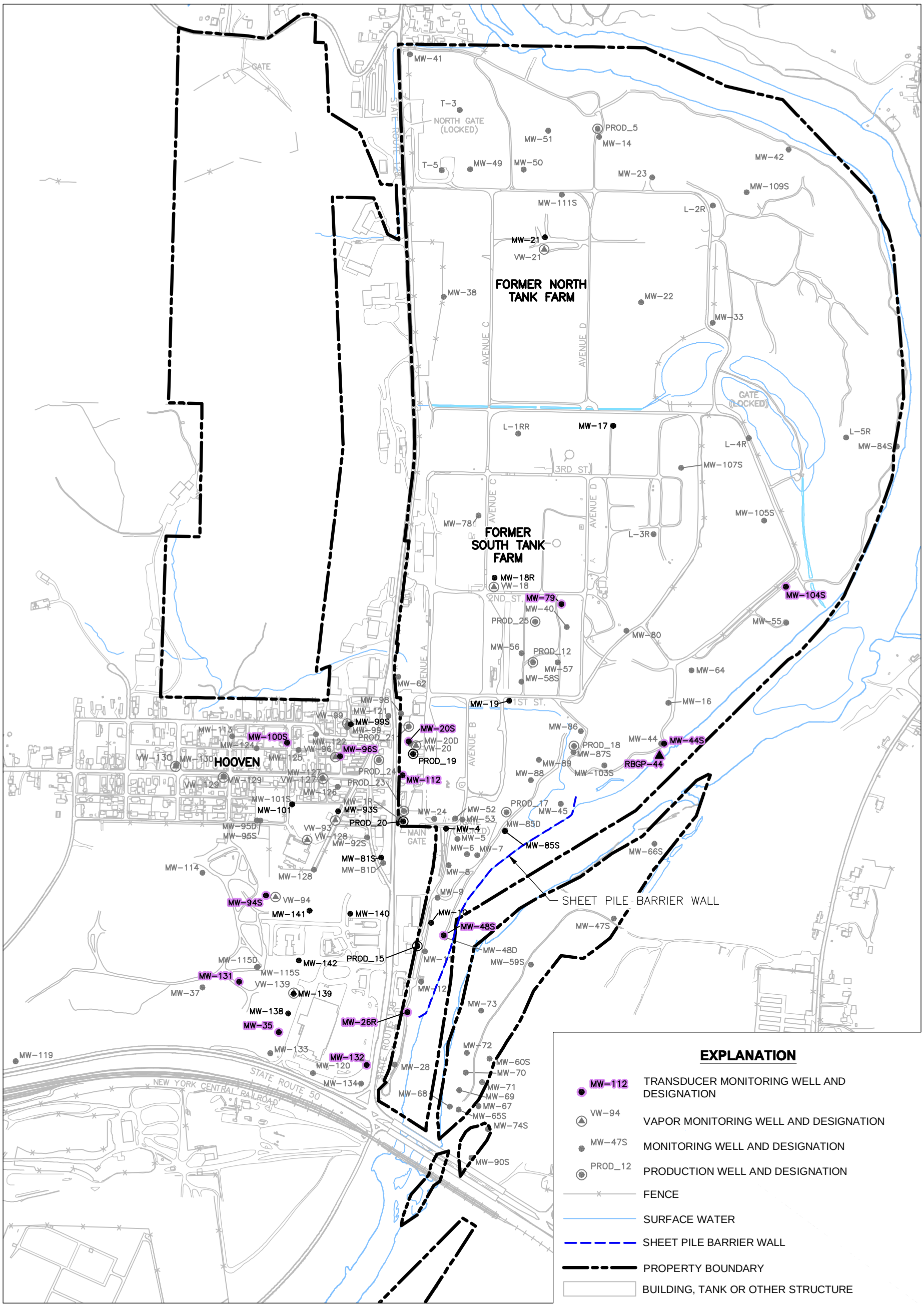

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FIGURE 2-1

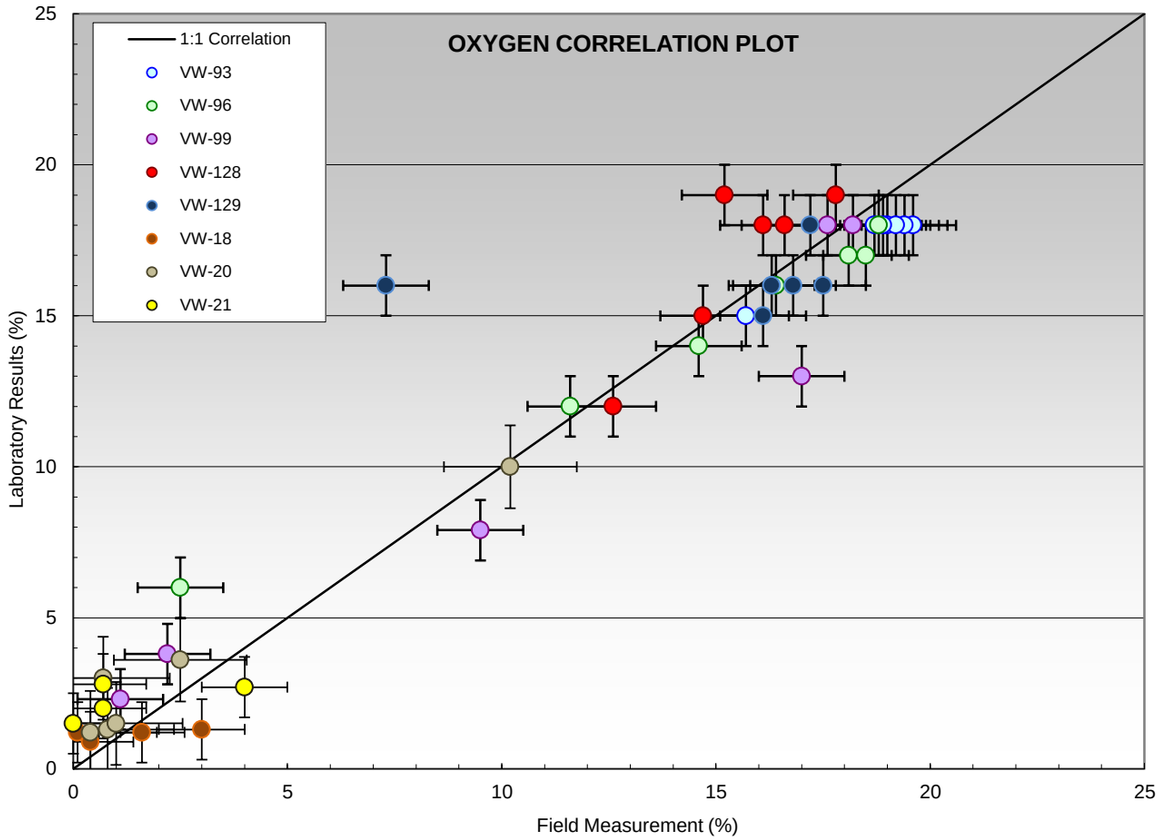
TRANSDUCER MONITORING WELLS

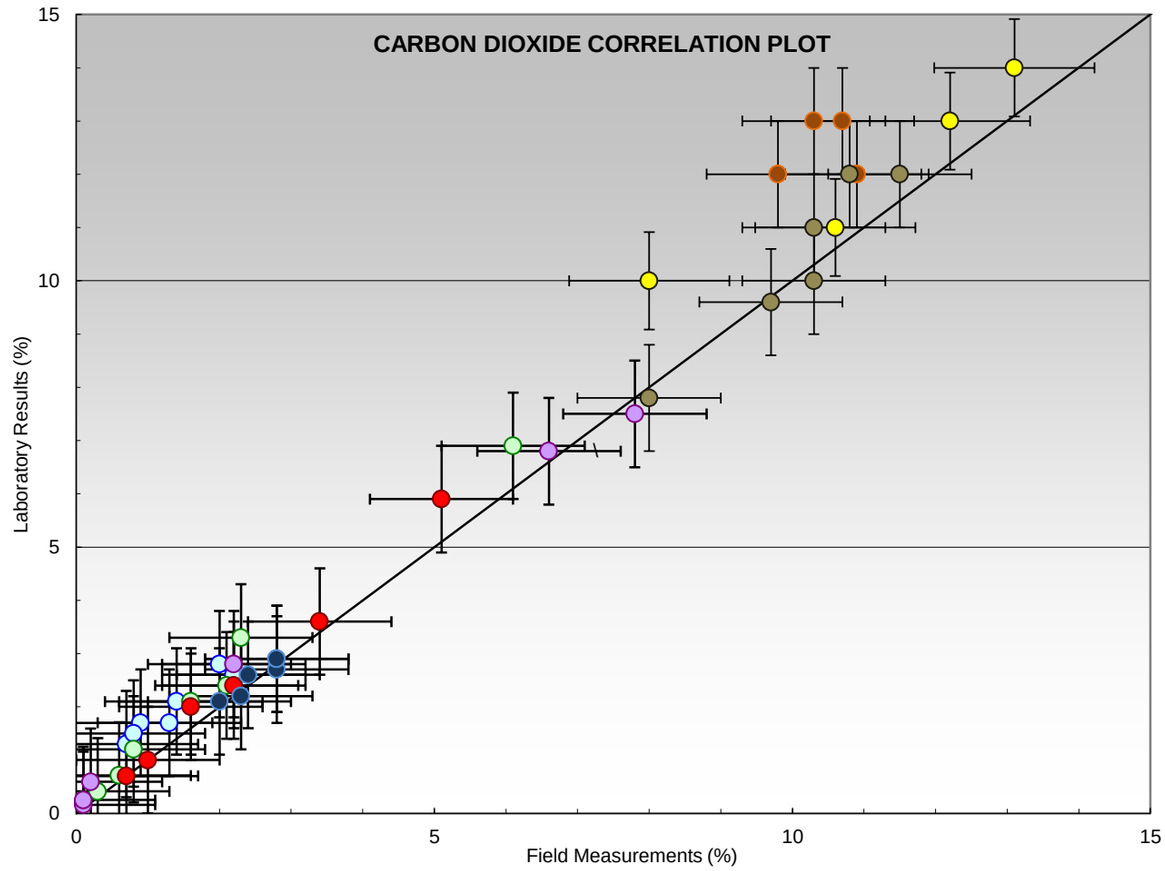
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JP	Scale: 1" = 650'	Date: 11/19/2010	File: 500TRANMONWELLS201204

US EPA ARCHIVE DOCUMENT

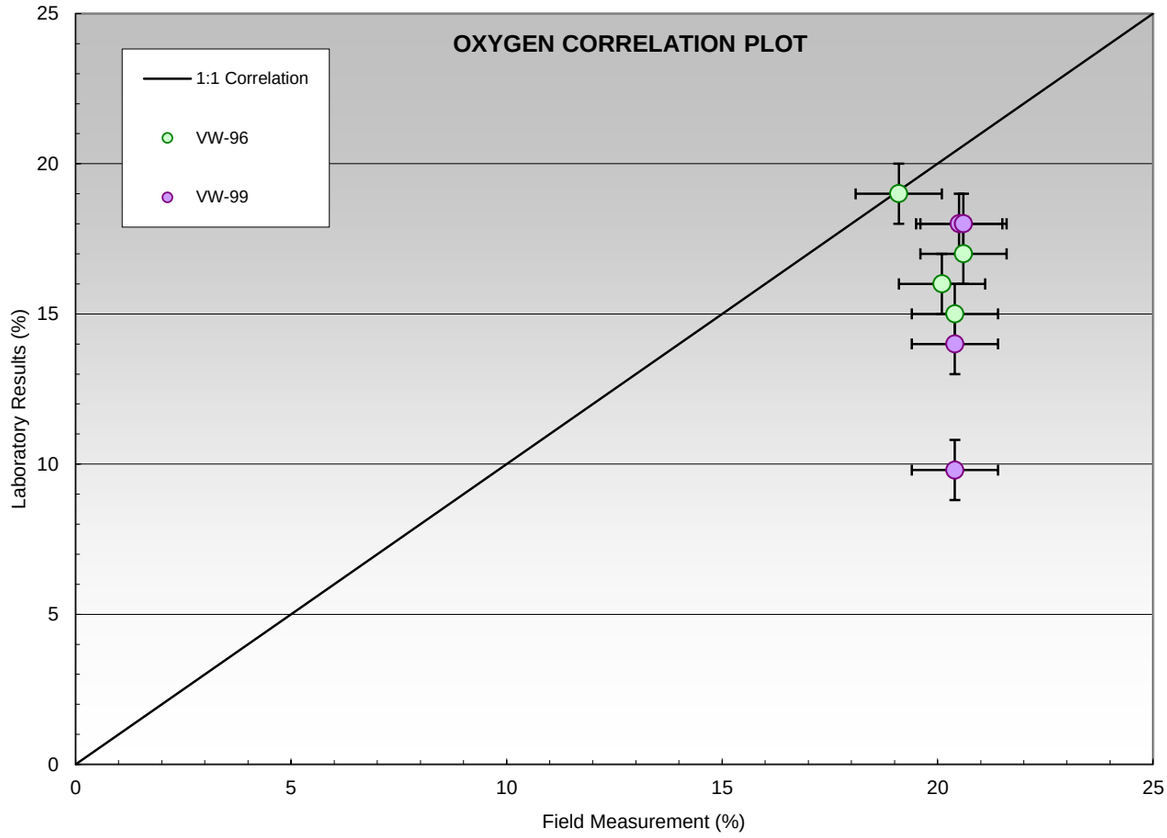
FIGURE 2-10. SOIL VAPOR OXYGEN AND CARBON DIOXIDE CORRELATION PLOTS, JULY 2011
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

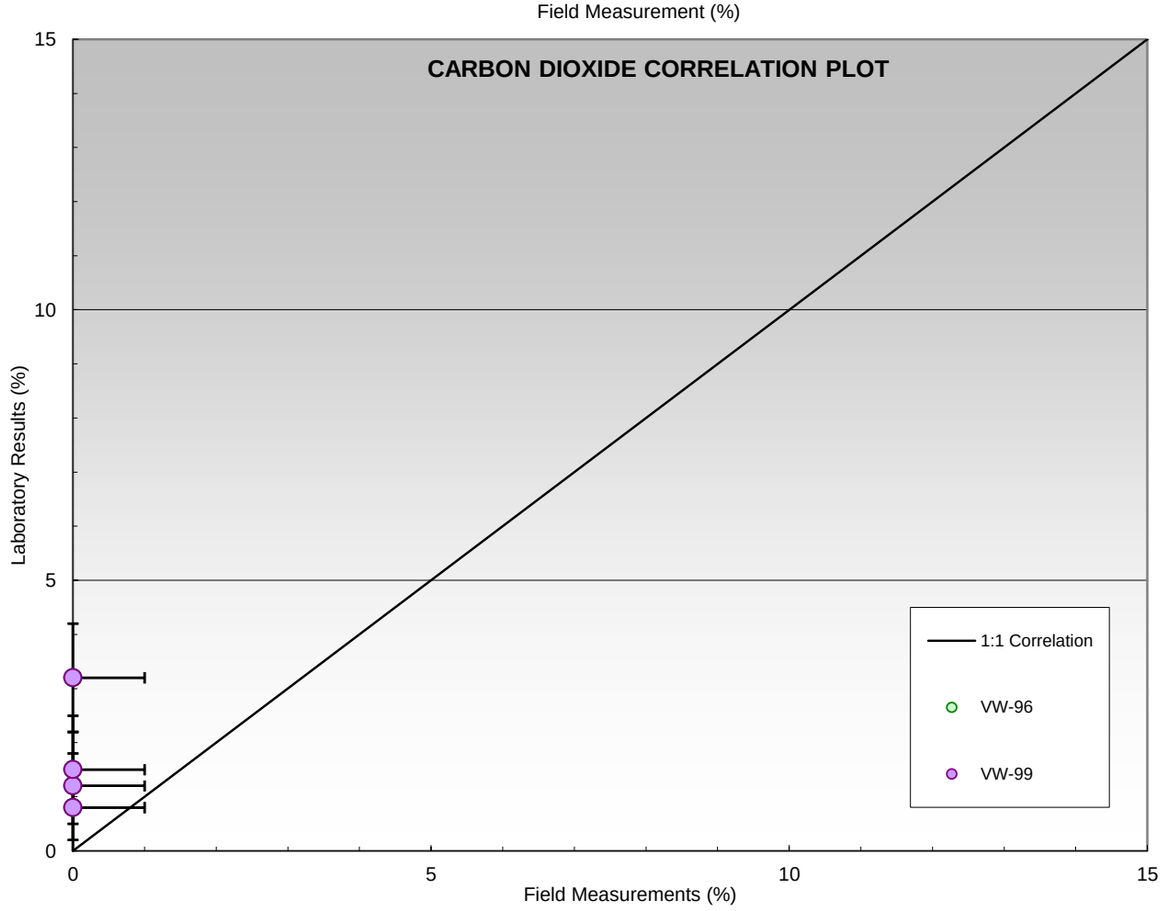




US EPA ARCHIVE DOCUMENT

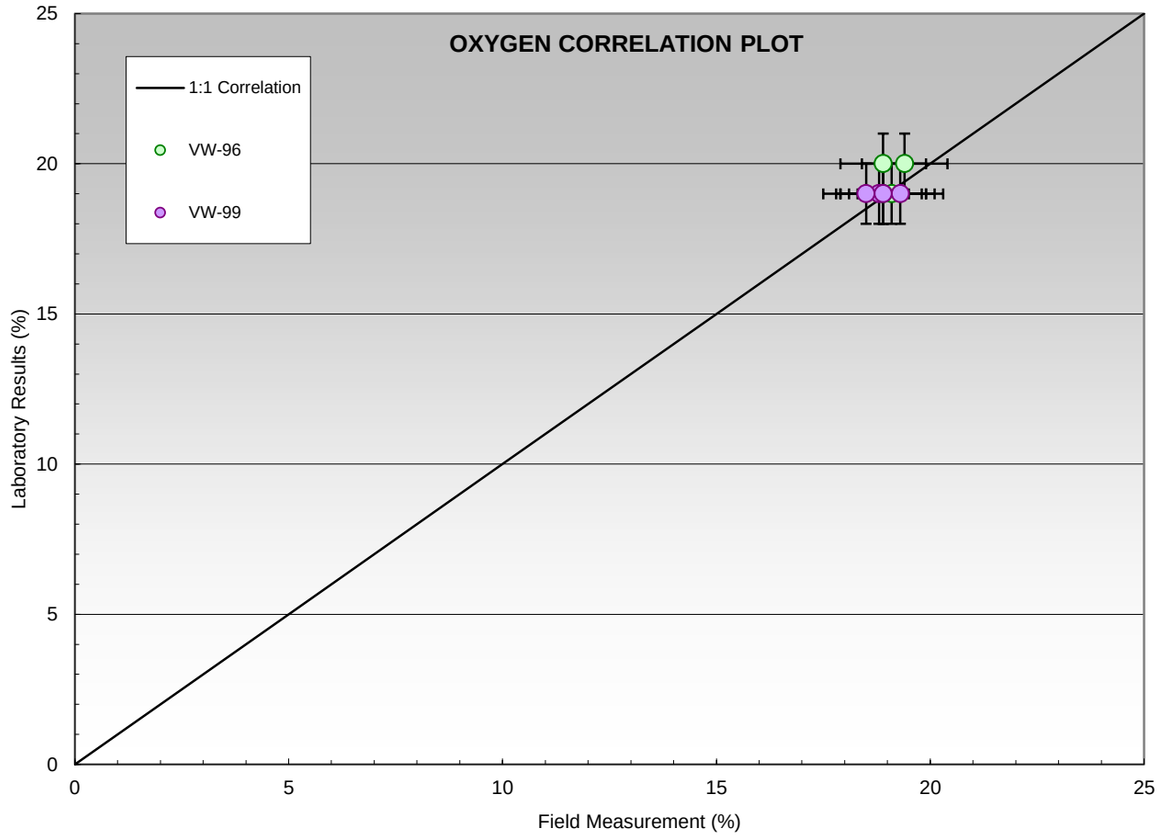
FIGURE 2-11. SOIL VAPOR OXYGEN AND CARBON DIOXIDE CORRELATION PLOTS, SEPTEMBER 2011
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

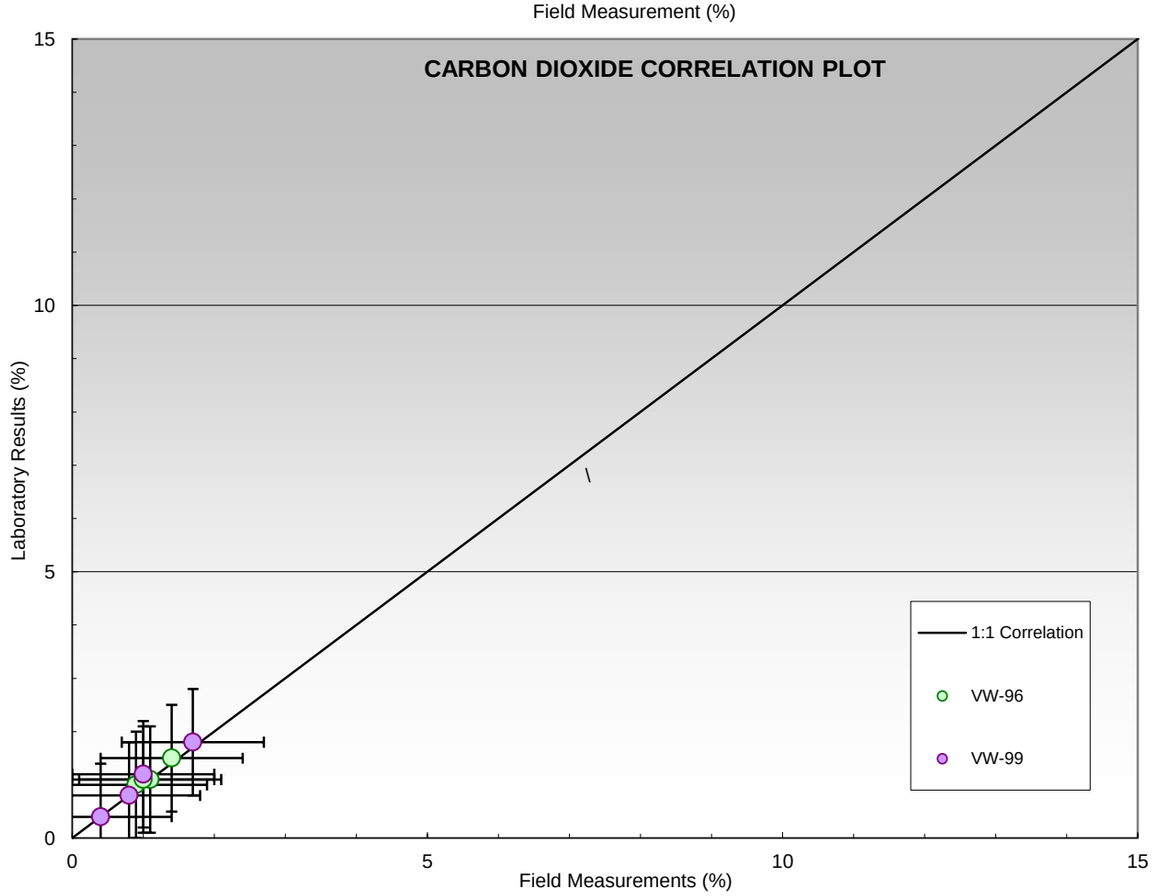




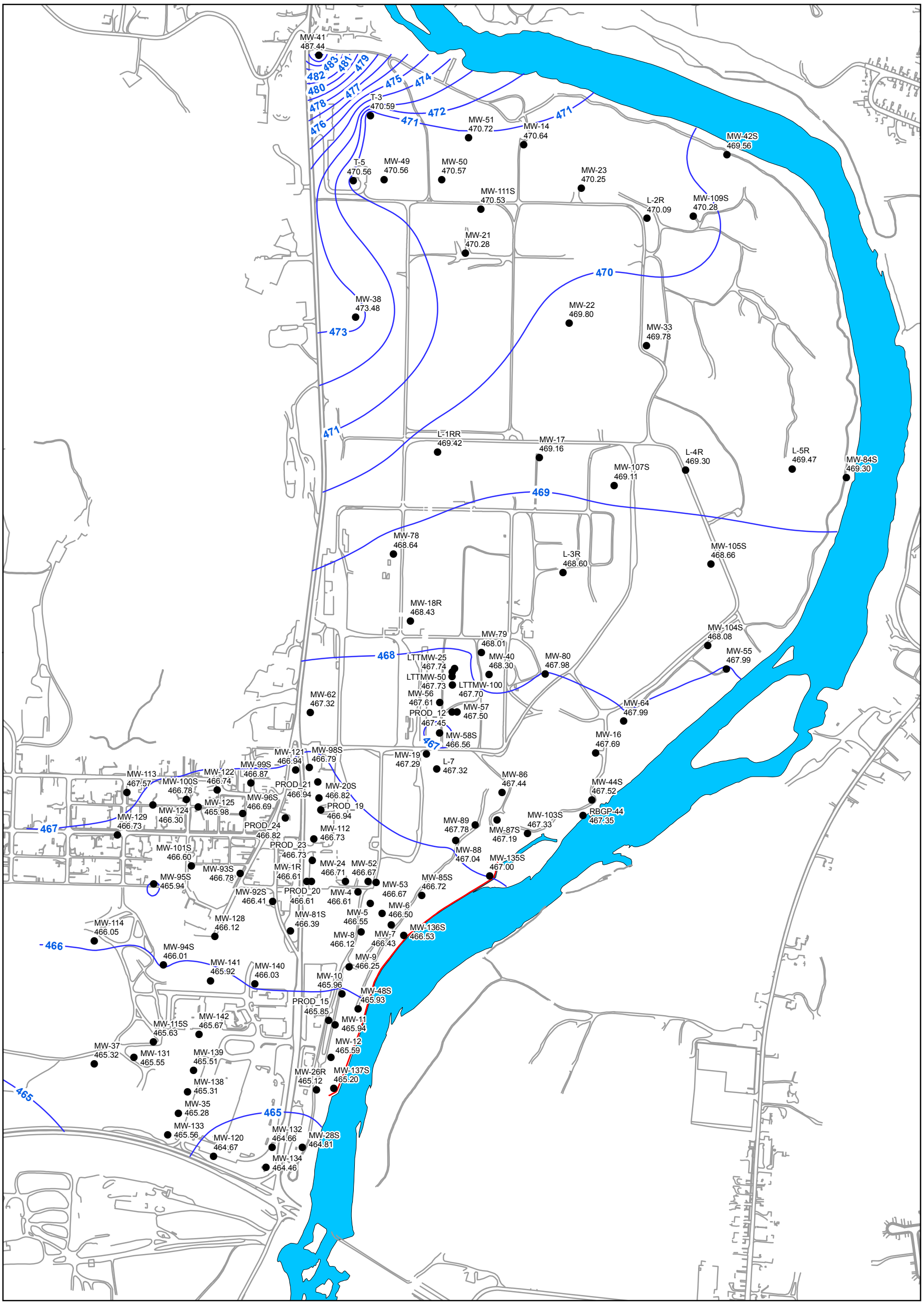
US EPA ARCHIVE DOCUMENT

FIGURE 2-12. SOIL VAPOR OXYGEN AND CARBON DIOXIDE CORRELATION PLOTS, OCTOBER 2011
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO





US EPA ARCHIVE DOCUMENT



EXPLANATION

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

NOTE: RBGP-44 (RIVER ELEVATION) WAS NOT USED FOR CONTOURING.

N

0 600'

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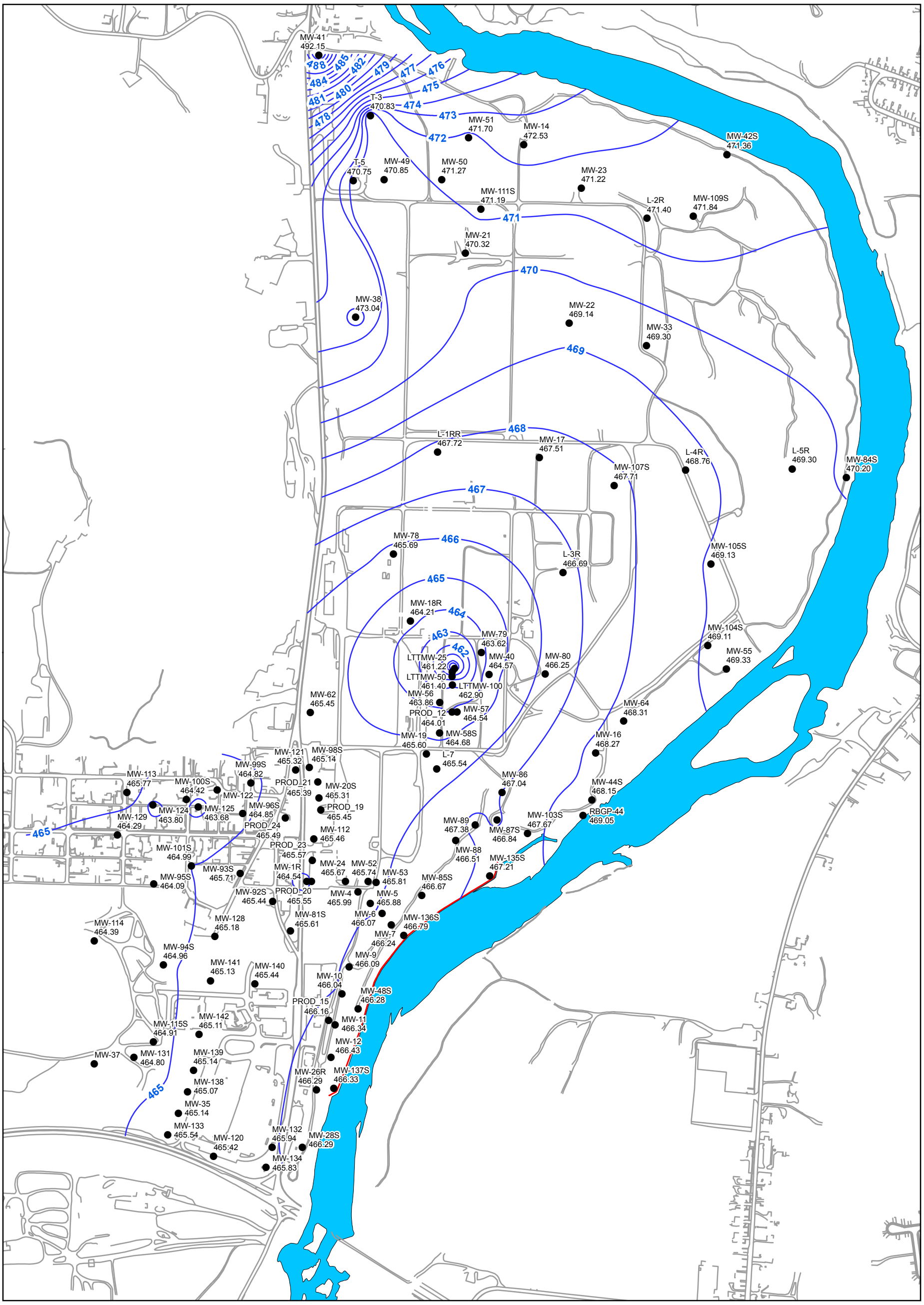
FIGURE 2-2

POTENTIOMETRIC SURFACE MAP
JULY 28, 2011

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: BR	Checked By: PM	Scale: 1" = 600'	Date: 9/25/12	File: July_28_2011_Potsurface.mxd

US EPA ARCHIVE DOCUMENT



EXPLANATION

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

NOTE: RBGP-44 (RIVER ELEVATION) WAS NOT USED FOR CONTOURING.

N

0 600'

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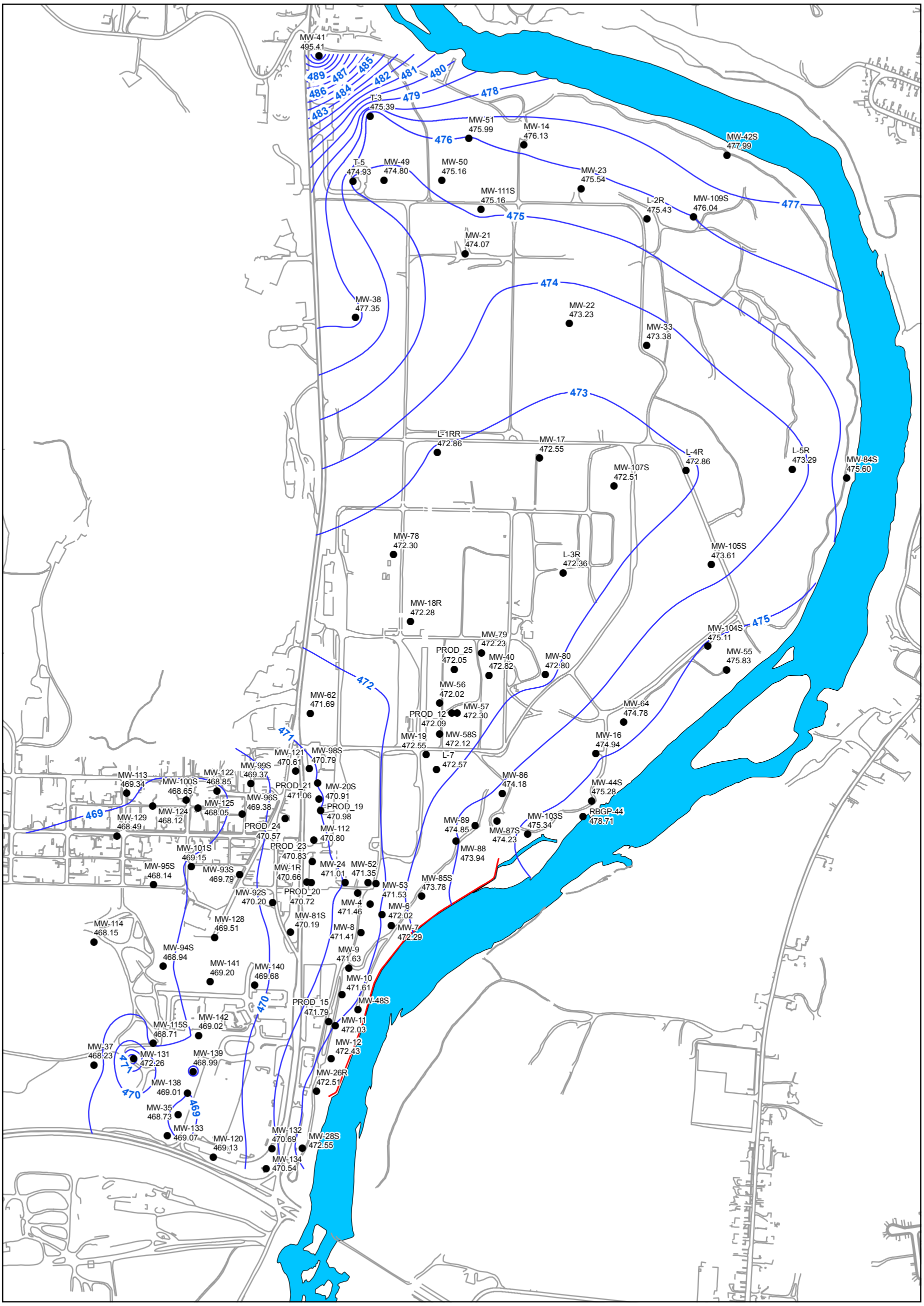
FIGURE 2-3

POTENTIOMETRIC SURFACE MAP
SEPTEMBER 29, 2011

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: BR	Checked By: PM	Scale: 1" = 600'	Date: 9/25/12	File: Sept_29_2011_Potsurface.mxd

US EPA ARCHIVE DOCUMENT



EXPLANATION

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

NOTE: RBGP-44 (RIVER ELEVATION) WAS NOT USED FOR CONTOURING.

N

0 600'

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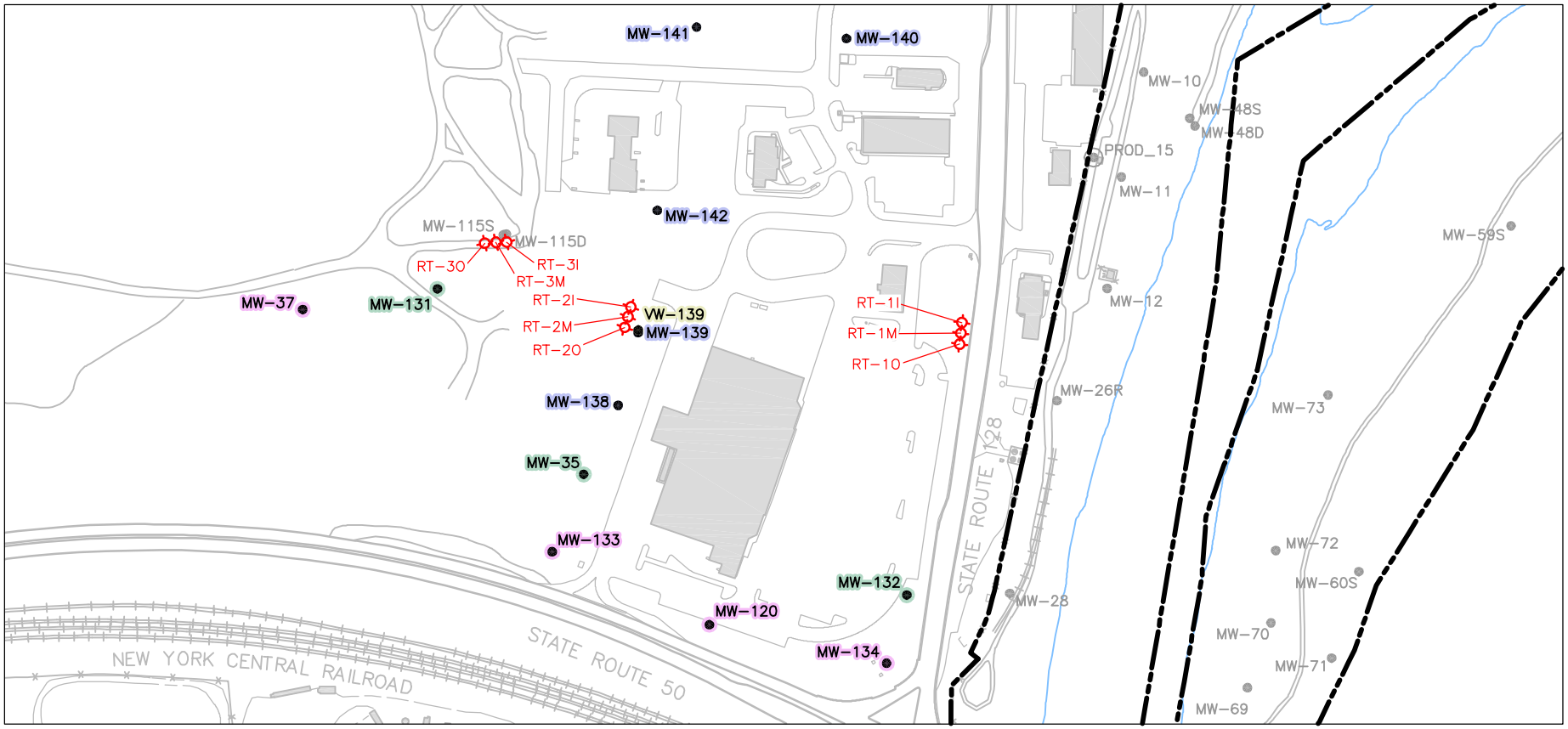
FIGURE 2-4

POTENTIOMETRIC SURFACE MAP
NOVEMBER 29, 2011

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: BR	Checked By: PM	Scale: 1" = 600'	Date: 4/11/12	File: Nov_29_2011_Potsurface.mxd

US EPA ARCHIVE DOCUMENT



EXPLANATION

RT-2O, RT-2M, RT-2I — PERMANENT ROST TRANSECT AND DESIGNATION (I-INNER, M-MIDDLE, O-OUTER)

MW-138 — MONITORING WELL AND DESIGNATION (INSTALLED MARCH 2009)

MW-35 — SENTINEL MONITORING WELL AND DESIGNATION

MW-37 — POINT OF COMPLIANCE MONITORING WELL AND DESIGNATION

VW-139 — NESTED VAPOR WELL AND DESIGNATION

MW-47S — MONITORING WELL AND DESIGNATION

PROD_12 — PRODUCTION WELL AND DESIGNATION

SURFACE WATER

PROPERTY BOUNDARY

BUILDING, TANK OR OTHER STRUCTURE

N

0 300'

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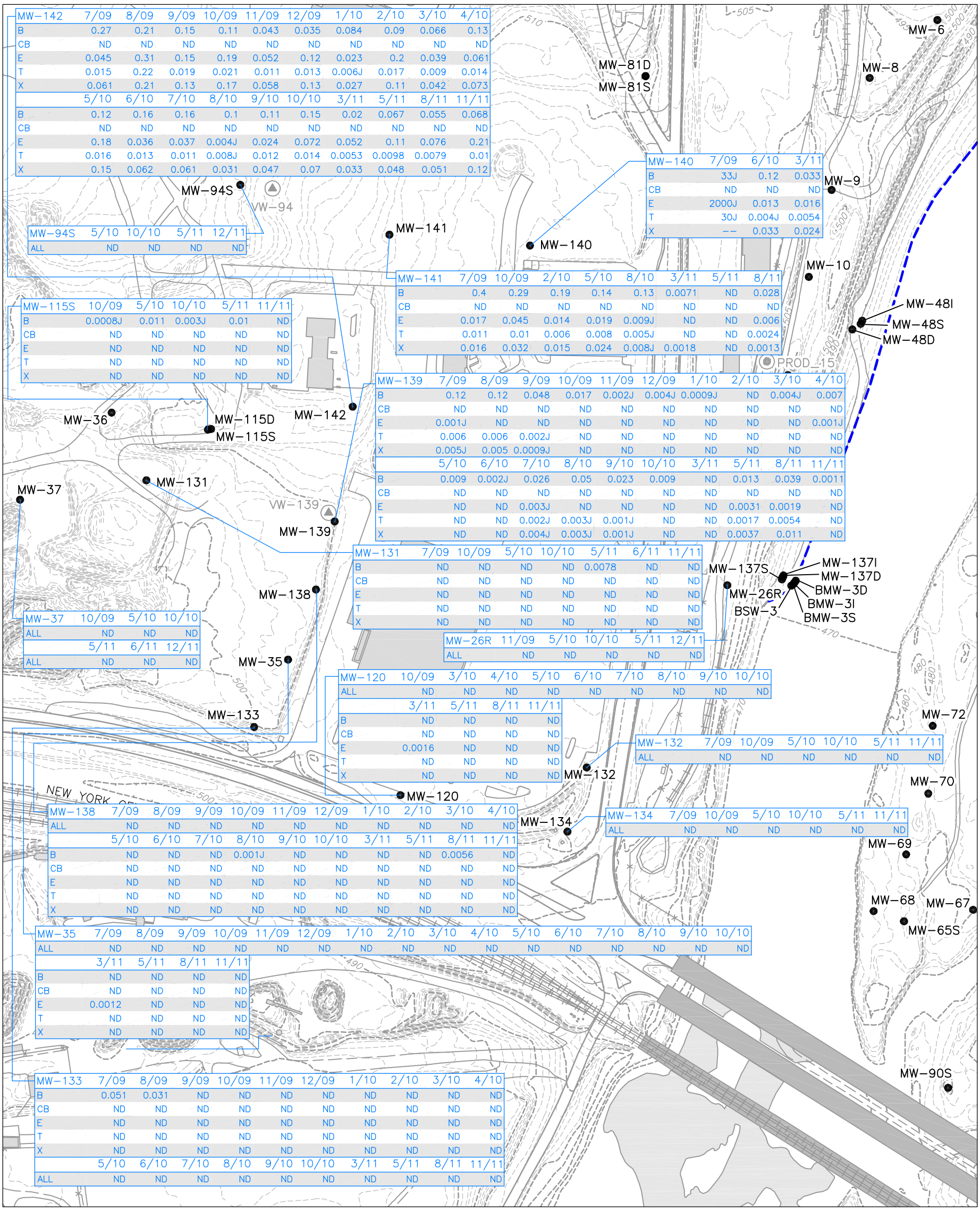
FIGURE 2-5

SENTINEL, POINT OF COMPLIANCE, AND ROST MONITORING NETWORK

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JP	Scale: 1"=300'	Date: 11/19/2010	File: 500ROST-TRANSECTS201201



MW-142	7/09	8/09	9/09	10/09	11/09	12/09	1/10	2/10	3/10	4/10
B	0.27	0.21	0.15	0.11	0.043	0.035	0.084	0.09	0.066	0.13
CB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E	0.045	0.31	0.15	0.19	0.052	0.12	0.023	0.2	0.039	0.061
T	0.015	0.22	0.019	0.021	0.011	0.013	0.006J	0.017	0.009	0.014
X	0.061	0.21	0.13	0.17	0.058	0.13	0.027	0.11	0.042	0.073

	5/10	6/10	7/10	8/10	9/10	10/10	3/11	5/11	8/11	11/11
B	0.12	0.16	0.16	0.1	0.11	0.15	0.02	0.067	0.055	0.068
CB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E	0.18	0.036	0.037	0.004J	0.024	0.072	0.052	0.11	0.076	0.21
T	0.016	0.013	0.011	0.008J	0.012	0.014	0.0053	0.0098	0.0079	0.01
X	0.15	0.062	0.061	0.031	0.047	0.07	0.033	0.048	0.051	0.12

MW-140	7/09	6/10	3/11
B	33J	0.12	0.033
CB	ND	ND	ND
E	2000J	0.013	0.016
T	30J	0.004J	0.0054
X	--	0.033	0.024

MW-94S	5/10	10/10	5/11	12/11
ALL	ND	ND	ND	ND

MW-141	7/09	10/09	2/10	5/10	8/10	3/11	5/11	8/11
B	0.4	0.29	0.19	0.14	0.13	0.0071	ND	0.028
CB	ND	ND	ND	ND	ND	ND	ND	ND
E	0.017	0.045	0.014	0.019	0.009J	ND	ND	0.006
T	0.011	0.01	0.006	0.008	0.005J	ND	ND	0.0024
X	0.016	0.032	0.015	0.024	0.008J	0.0018	ND	0.0013

MW-115S	10/09	5/10	10/10	5/11	11/11
B	0.0008J	0.011	0.003J	0.01	ND
CB	ND	ND	ND	ND	ND
E	ND	ND	ND	ND	ND
T	ND	ND	ND	ND	ND
X	ND	ND	ND	ND	ND

MW-139	7/09	8/09	9/09	10/09	11/09	12/09	1/10	2/10	3/10	4/10
B	0.12	0.12	0.048	0.017	0.002J	0.004J	0.0009J	ND	0.004J	0.007
CB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E	0.001J	ND	ND	ND	ND	ND	ND	ND	ND	0.001J
T	0.006	0.006	0.002J	ND	ND	ND	ND	ND	ND	ND
X	0.005J	0.005	0.0009J	ND	ND	ND	ND	ND	ND	ND

	5/10	6/10	7/10	8/10	9/10	10/10	3/11	5/11	8/11	11/11
B	0.009	0.002J	0.026	0.05	0.023	0.009	ND	0.013	0.039	0.0011
CB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E	ND	ND	0.003J	ND	ND	ND	ND	0.0031	0.0019	ND
T	ND	ND	0.002J	0.003J	0.001J	ND	ND	0.0017	0.0054	ND
X	ND	ND	0.004J	0.003J	0.001J	ND	ND	0.0037	0.011	ND

MW-131	7/09	10/09	5/10	10/10	5/11	6/11	11/11
B	ND	ND	ND	ND	0.0078	ND	ND
CB	ND	ND	ND	ND	ND	ND	ND
E	ND	ND	ND	ND	ND	ND	ND
T	ND	ND	ND	ND	ND	ND	ND
X	ND	ND	ND	ND	ND	ND	ND

MW-37	10/09	5/10	10/10
ALL	ND	ND	ND

	5/11	6/11	12/11
ALL	ND	ND	ND

MW-26R	11/09	5/10	10/10	5/11	12/11
ALL	ND	ND	ND	ND	ND

MW-120	10/09	3/10	4/10	5/10	6/10	7/10	8/10	9/10	10/10
ALL	ND	ND	ND	ND	ND	ND	ND	ND	ND

	3/11	5/11	8/11	11/11
B	ND	ND	ND	ND
CB	ND	ND	ND	ND
E	0.0016	ND	ND	ND
T	ND	ND	ND	ND
X	ND	ND	ND	ND

MW-132	7/09	10/09	5/10	10/10	5/11	11/11
ALL	ND	ND	ND	ND	ND	ND

MW-138	7/09	8/09	9/09	10/09	11/09	12/09	1/10	2/10	3/10	4/10
ALL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

	5/10	6/10	7/10	8/10	9/10	10/10	3/11	5/11	8/11	11/11
B	ND	ND	ND	0.001J	ND	ND	ND	ND	0.0056	ND
CB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

MW-134	7/09	10/09	5/10	10/10	5/11	11/11
ALL	ND	ND	ND	ND	ND	ND

MW-35	7/09	8/09	9/09	10/09	11/09	12/09	1/10	2/10	3/10	4/10	5/10	6/10	7/10	8/10	9/10	10/10
ALL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

	3/11	5/11	8/11	11/11
B	ND	ND	ND	ND
CB	ND	ND	ND	ND
E	0.0012	ND	ND	ND
T	ND	ND	ND	ND
X	ND	ND	ND	ND

MW-133	7/09	8/09	9/09	10/09	11/09	12/09	1/10	2/10	3/10	4/10
B	0.051	0.031	ND	ND	ND	ND	ND	ND	ND	ND
CB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

	5/10	6/10	7/10	8/10	9/10	10/10	3/11	5/11	8/11	11/11
ALL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

EXPLANATION

- BSW-3D — BARRIER MONITORING WELL AND DESIGNATION
- MW-27 — MONITORING WELL AND DESIGNATION
- VW-94 — NESTED SOIL VAPOR MONITORING WELL AND DESIGNATION
- PROD_15 — PRODUCTION WELL AND DESIGNATION
- SHEET PILE BARRIER WALL
- FENCE
- BUILDING, TANK OR OTHER STRUCTURE
- 480 — GROUND SURFACE CONTOURS (INTERVAL= 5')

CONSTITUENT TABLE EXPLANATION

WELL DESIGNATION	MW-133	3/10	← SAMPLE DATE
Benzene	B	0.5	
Chlorobenzene	CB	0.8	
Ethylbenzene	E	0.8	
Toluene	T	0.7	
Xylenes, Total	X	0.8	

N

0 200'

NOTES:

1. ALL VALUES ARE IN MILLIGRAMS PER LITER (mg/L)
2. J = ESTIMATED CONCENTRATION
3. -- = NOT MEASURED

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FIGURE 2-6

SOUTHWEST QUAD DISSOLVED PHASE RESULTS SUMMARY (JULY 2009 THROUGH DECEMBER 2011)

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JGP	Scale: 1" = 200'	Date: 5/23/11	File: 500-SW-BTEX-201204

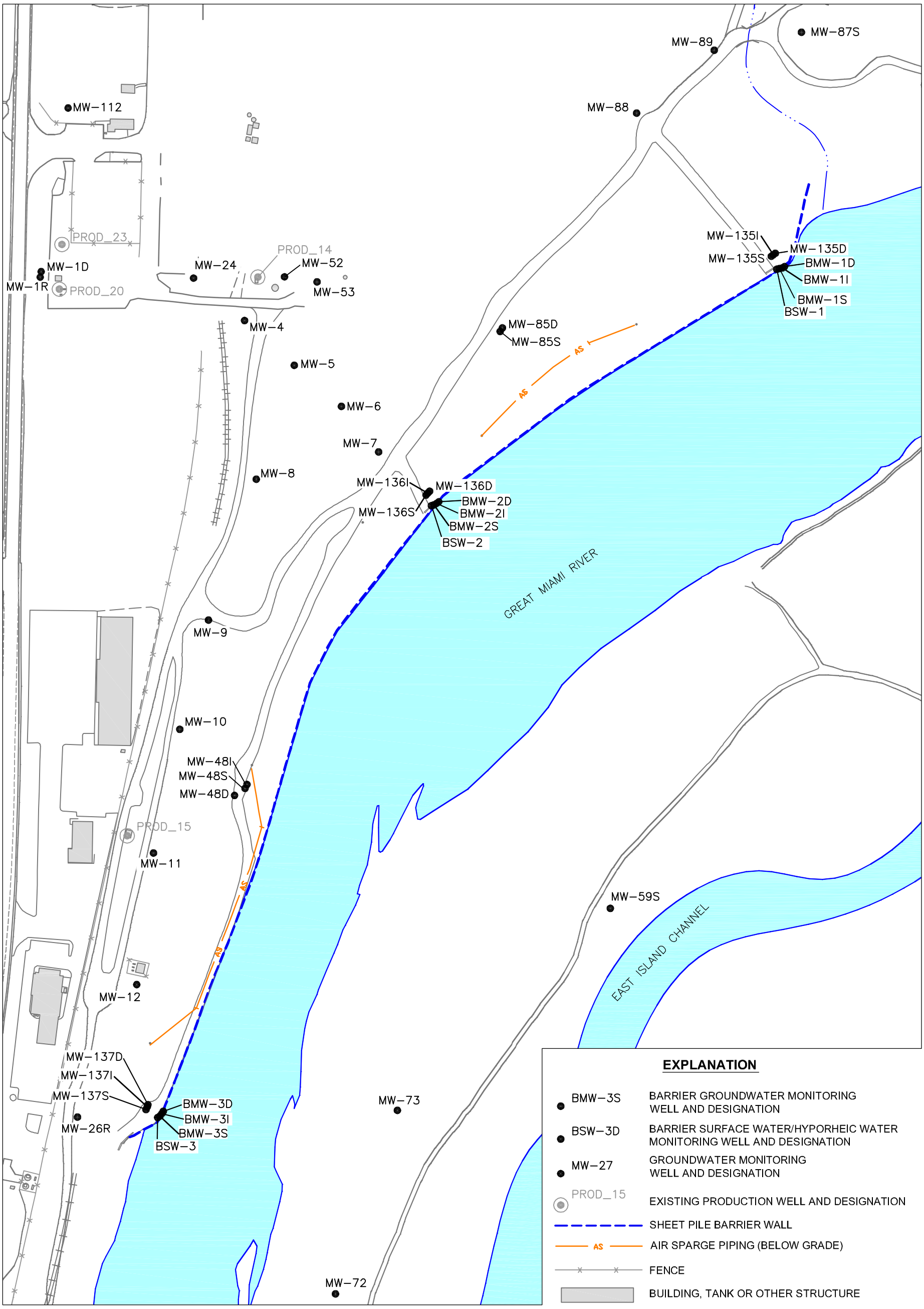

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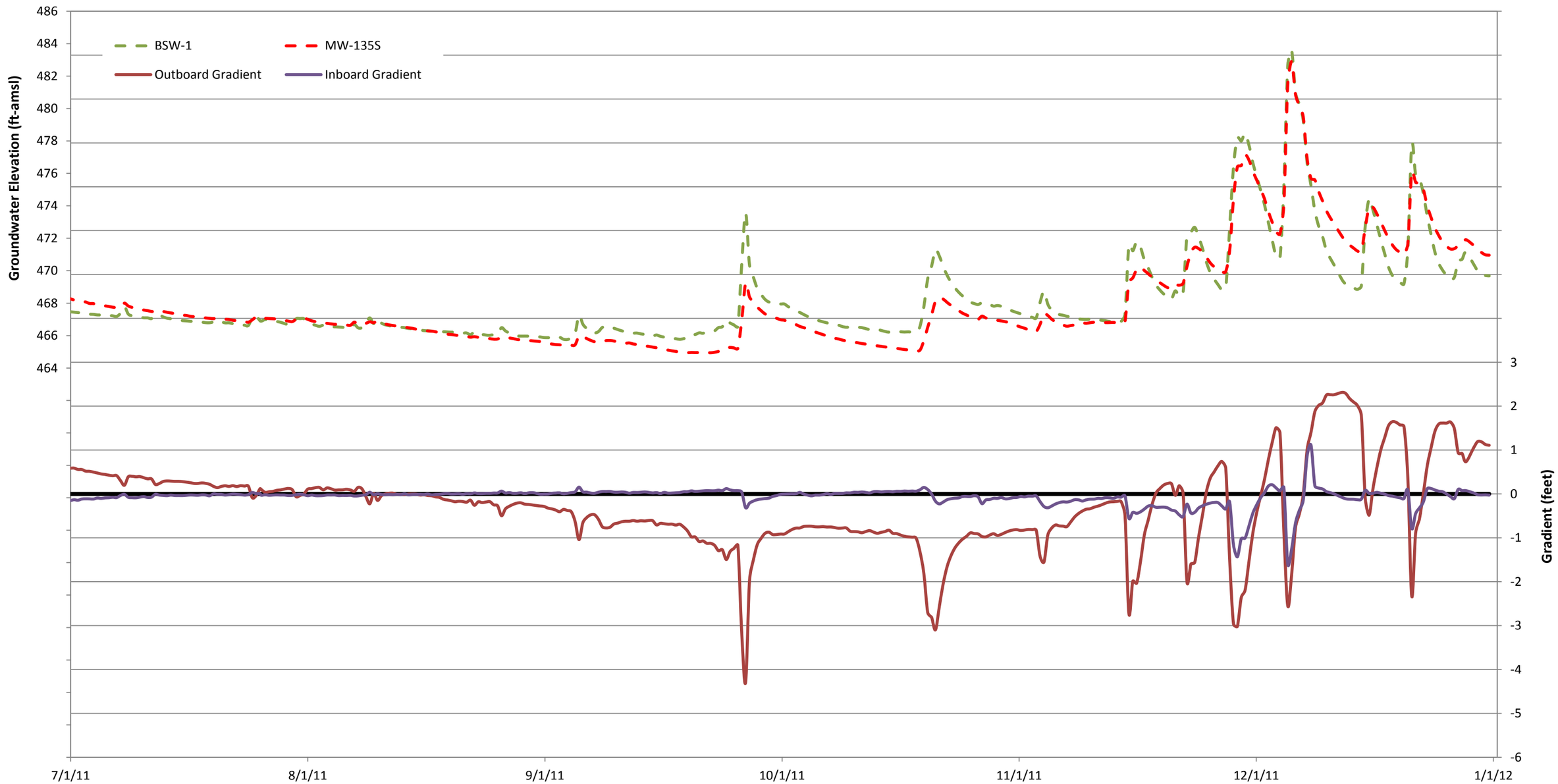
FIGURE 2-7

BARRIER PERFORMANCE AIR SPARGE AND MONITORING WELL NETWORK

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JP	Scale: 1" = 150'	Date:1/13/11	File: 500ASBUILTMONNET-201201

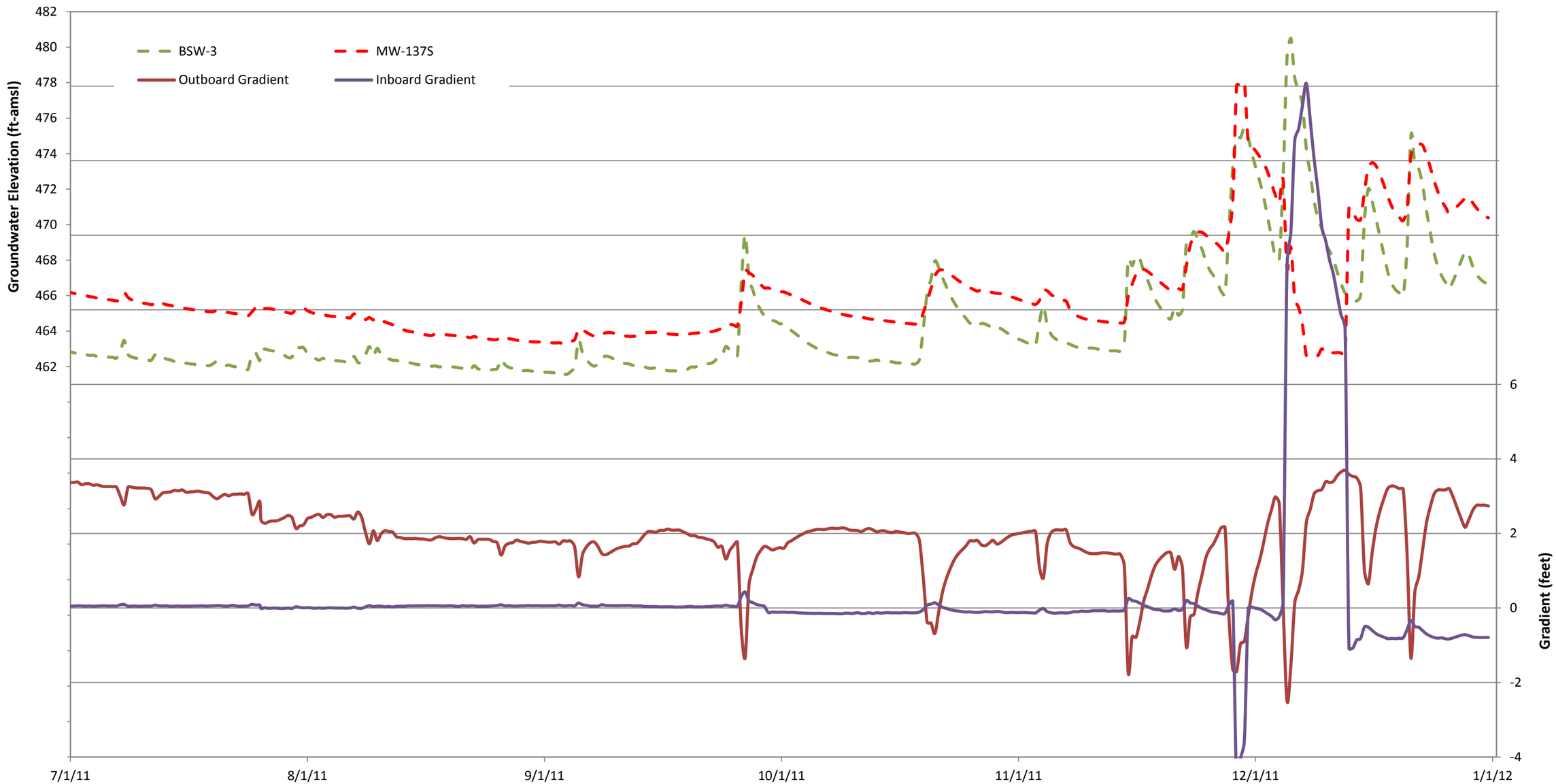
FIGURE 2-8. BARRIER WALL NORTH TRANSECT VERTICAL GRADIENTS
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



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

US EPA ARCHIVE DOCUMENT

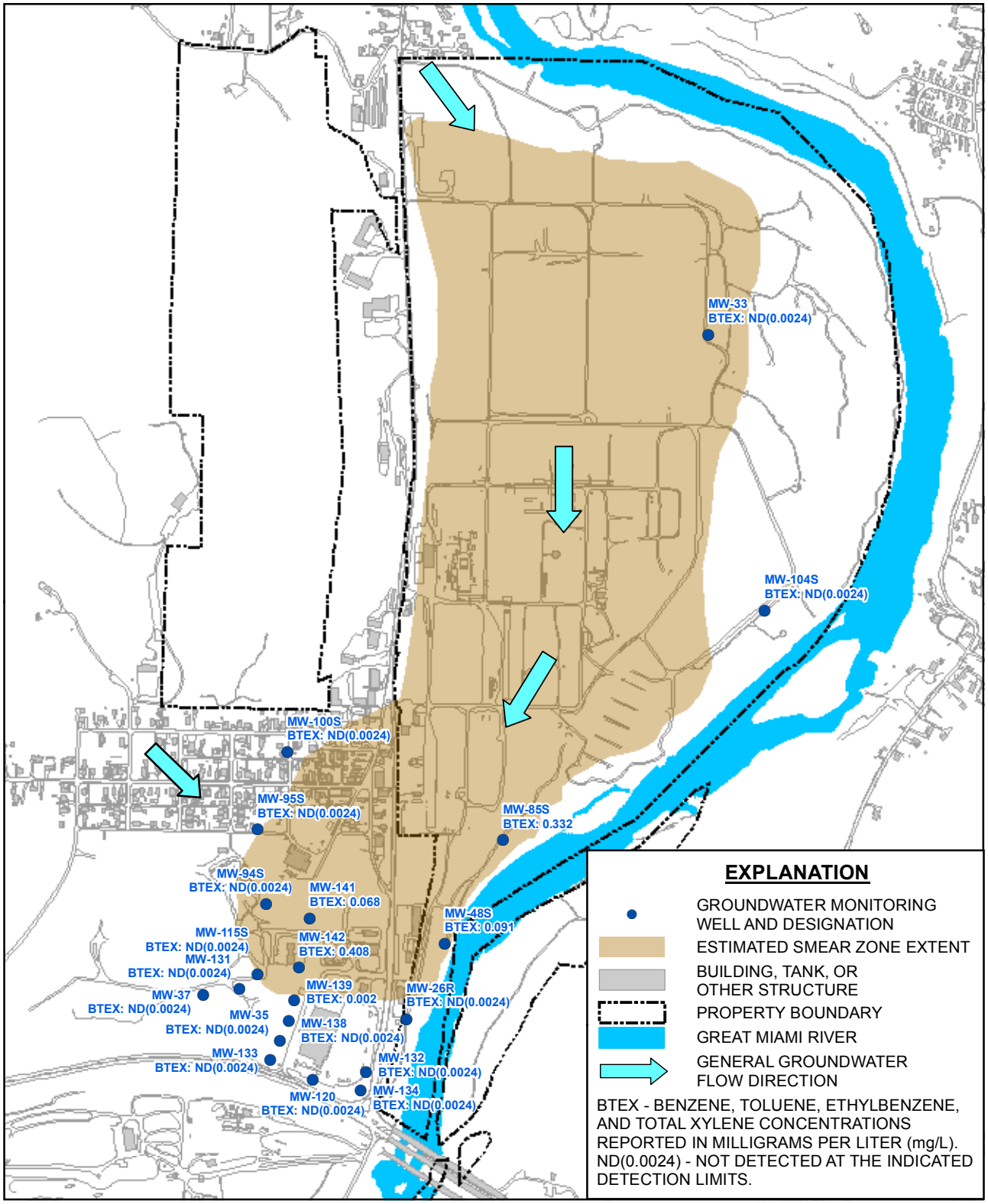
FIGURE 2-9. BARRIER WALL SOUTH TRANSECT VERTICAL GRADIENTS
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



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

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT



N

0 1,000'

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FIGURE 3-1

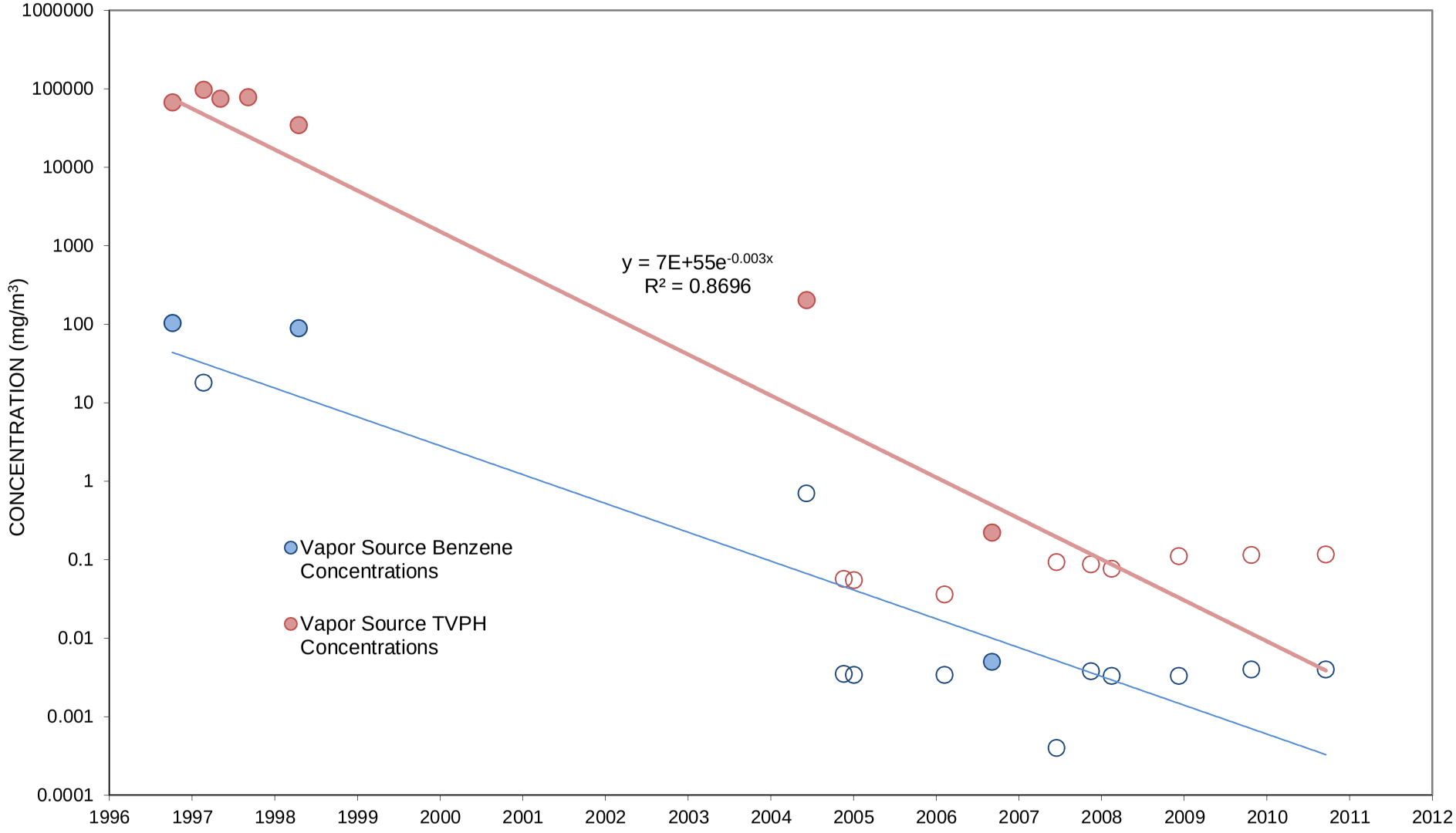
DISSOLVED PHASE CONSTITUENT CONCENTRATIONS

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: BR	Checked By: JP	Scale: 1" = 1000'	Date: 4/11/12	File: 201204_QI_TPHTrends.mxd

US EPA ARCHIVE DOCUMENT

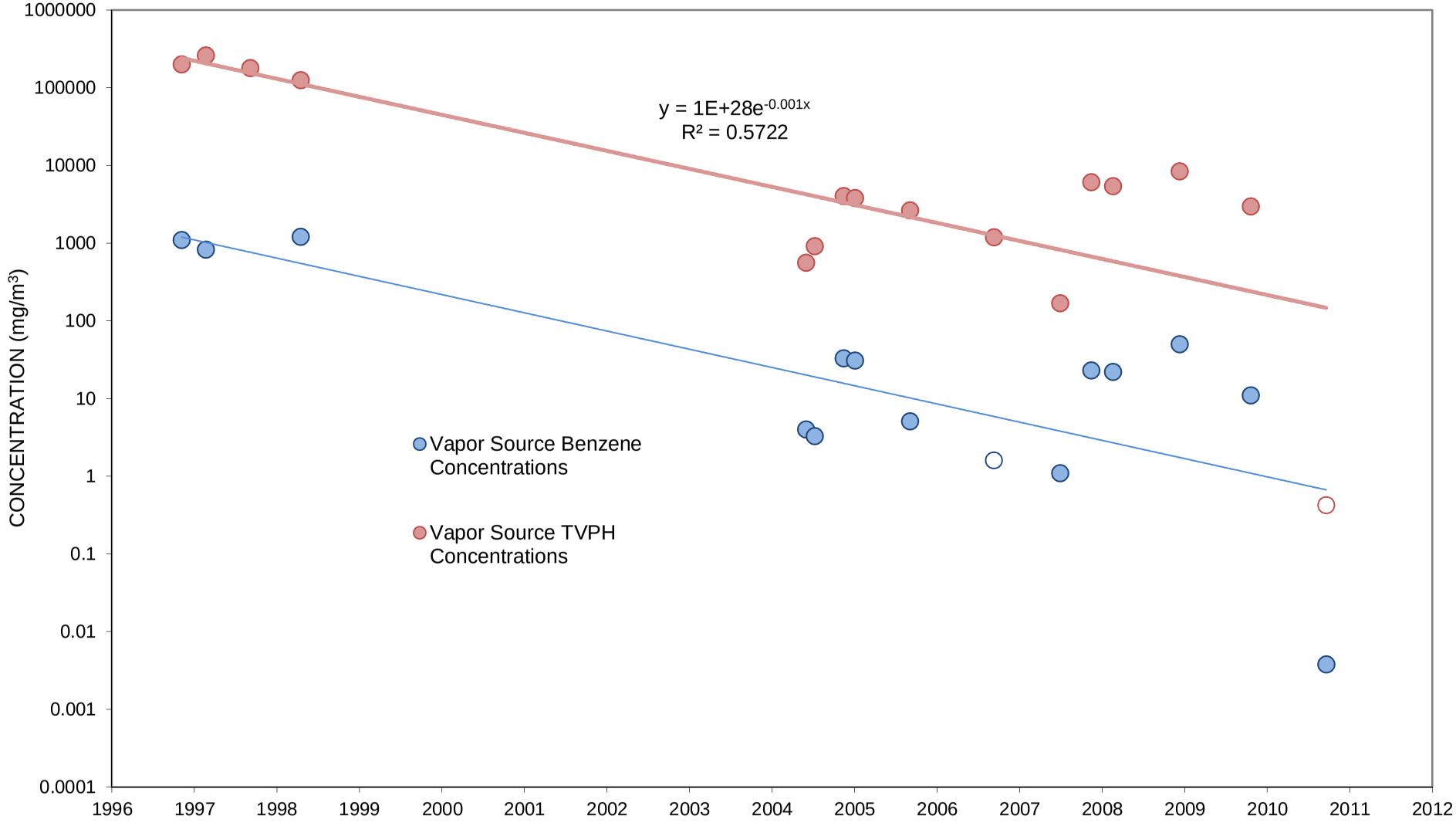
FIGURE 3-2. VAPOR SOURCE CONCENTRATIONS, NESTED VAPOR MONITORING WELL VW-93
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



EXPLANATION
OPEN SYMBOL DESIGNATES A NON-DETECT VALUE

US EPA ARCHIVE DOCUMENT

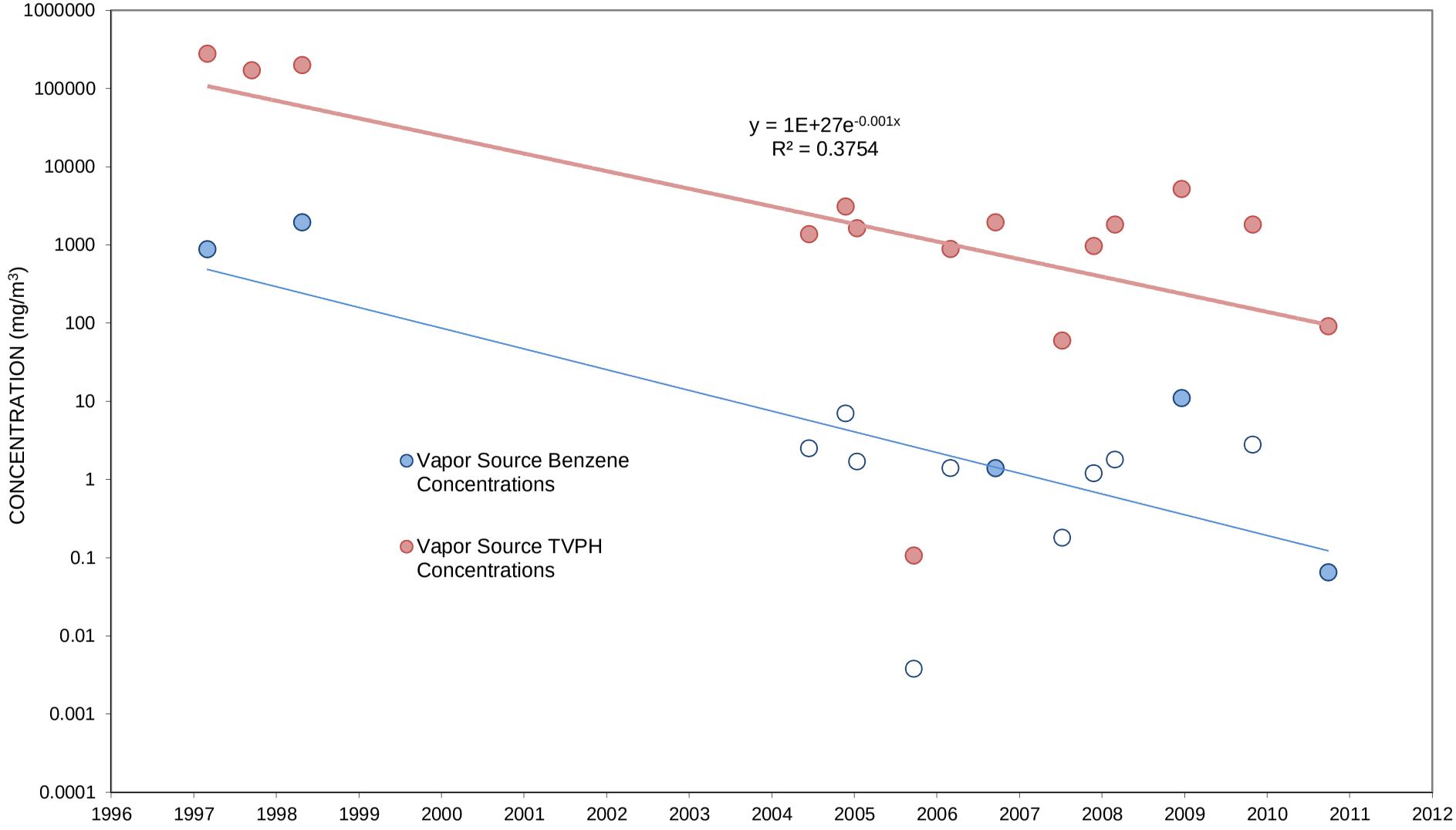
FIGURE 3-3. VAPOR SOURCE CONCENTRATIONS, NESTED VAPOR MONITORING WELL VW-96
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



EXPLANATION
OPEN SYMBOL DESIGNATES A NON-DETECT VALUE

US EPA ARCHIVE DOCUMENT

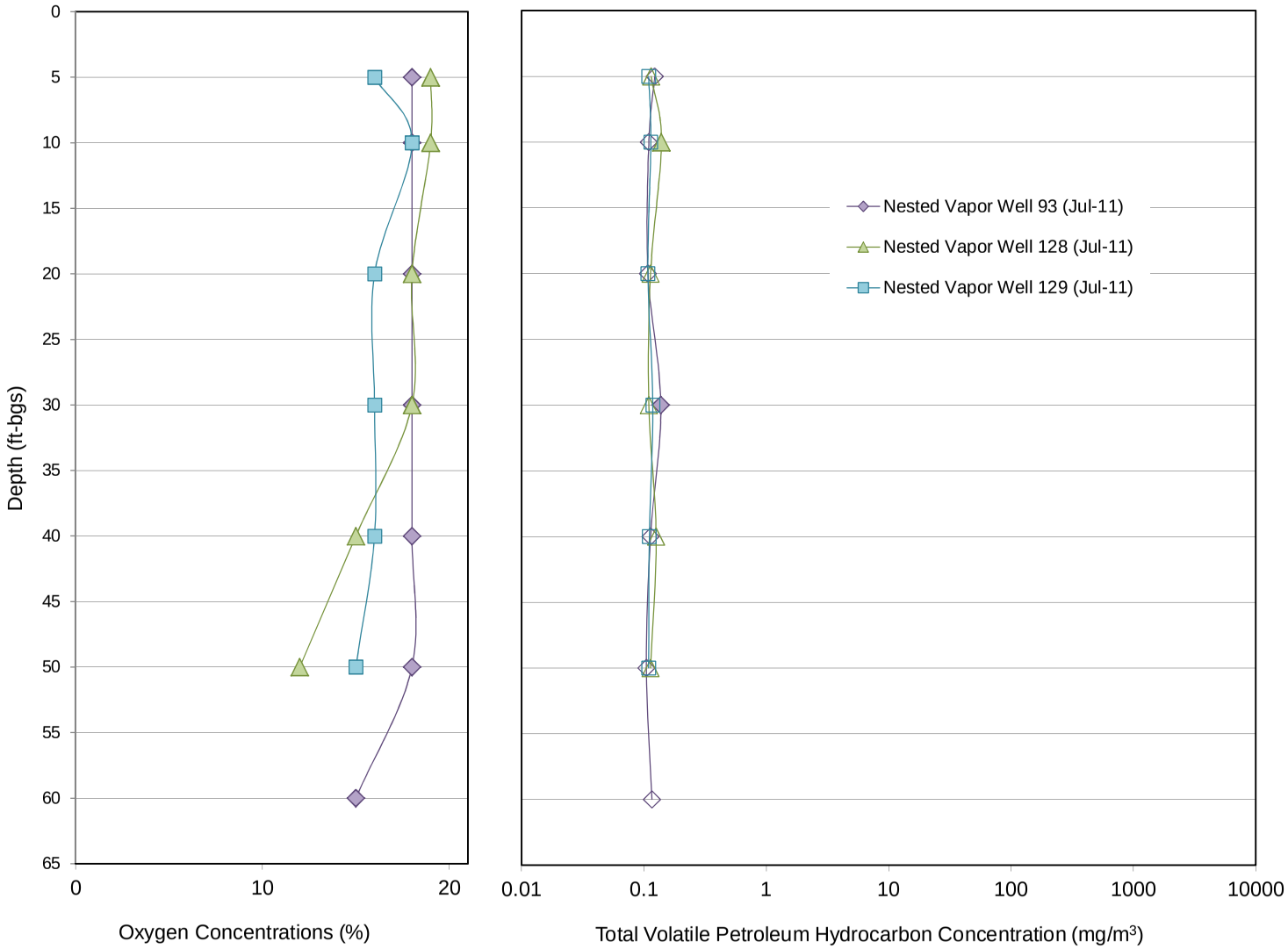
FIGURE 3-4. VAPOR SOURCE CONCENTRATIONS, NESTED VAPOR MONITORING WELL VW-99
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



EXPLANATION
OPEN SYMBOL DESIGNATES A NON-DETECT VALUE

US EPA ARCHIVE DOCUMENT

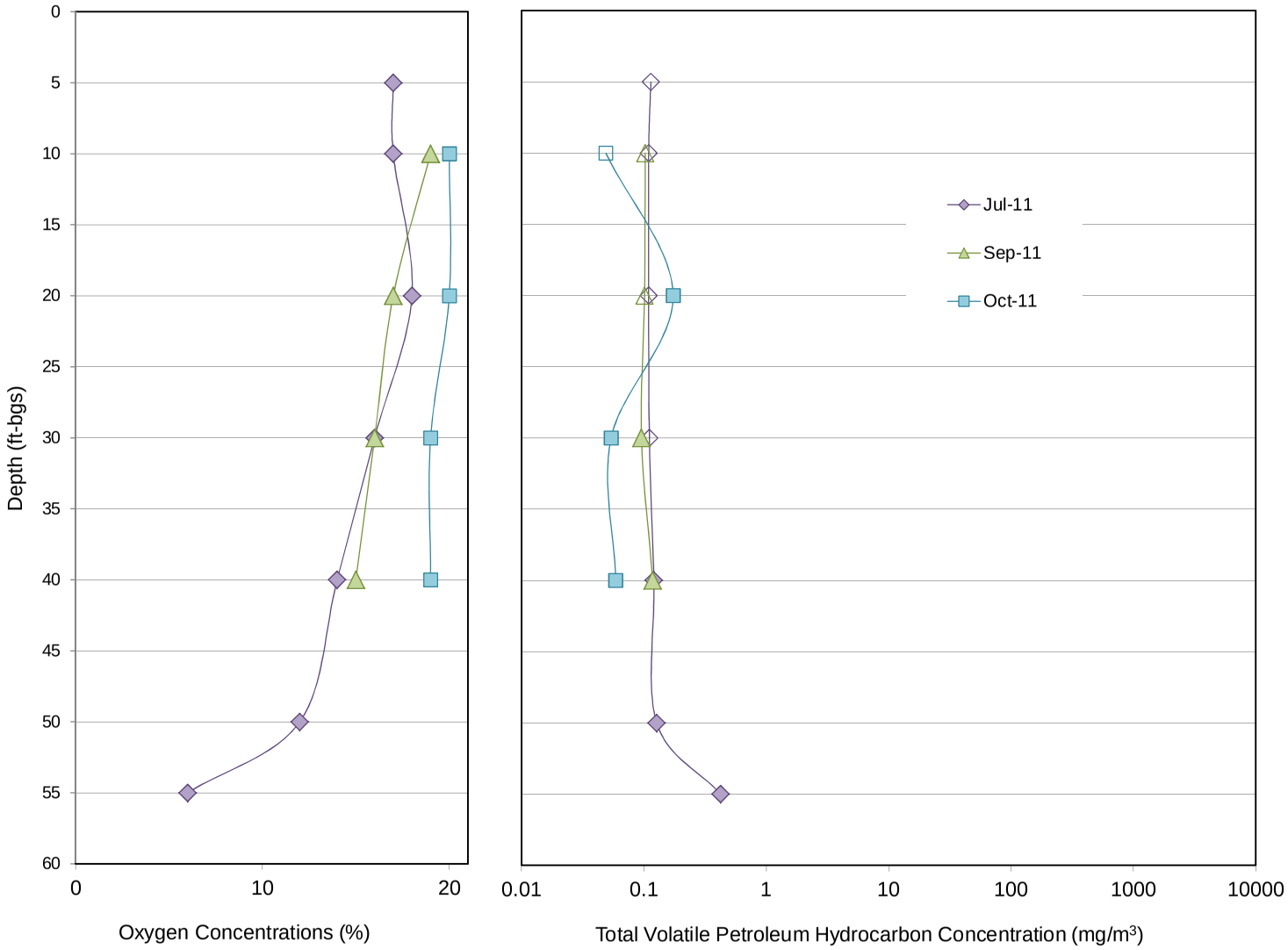
FIGURE 3-5. TVPH AND FIXED GAS PROFILES, NESTED VAPOR MONITORING WELL VW-93, VW-128, AND VW-129
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



NOTE:
- Open symbols indicate concentration reported below the laboratory detection limit

US EPA ARCHIVE DOCUMENT

FIGURE 3-6. TVPH AND FIXED GAS PROFILES, NESTED VAPOR MONITORING WELL VW-96
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



NOTE:
- Open symbols indicate concentration reported below the laboratory detection limit

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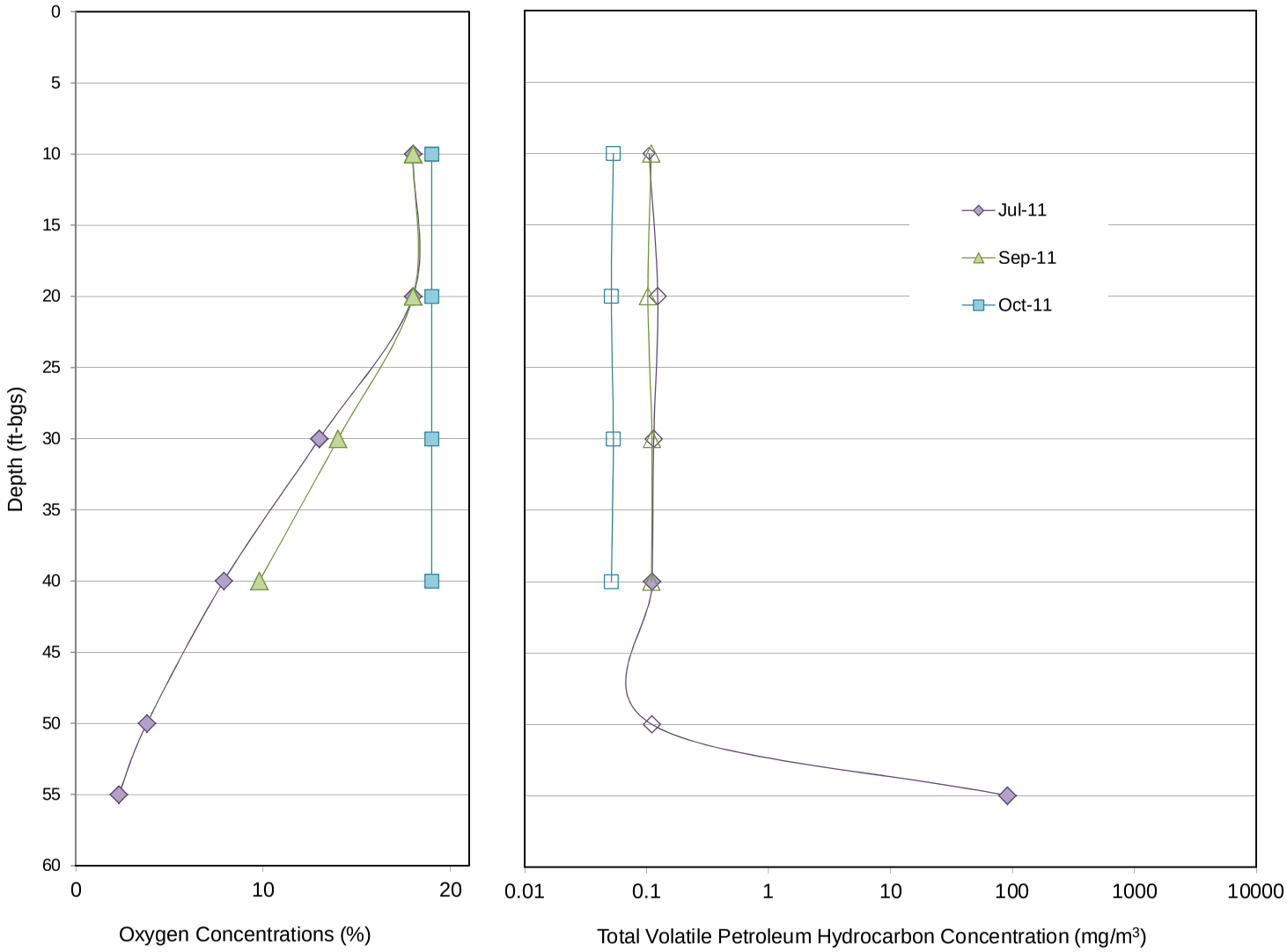
FIGURE 3-7. TVPH AND FIXED GAS PROFILES, NESTED VAPOR MONITORING WELL VW-99
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



NOTE:
- Open symbols indicate concentration reported below the laboratory detection limit

FIGURE 4-1. LNAPL RECOVERY, DRAWDOWN, AND FLUID LEVEL SUMMARY (2011 HIGH-GRADE EVENT)
SECOND 2010 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

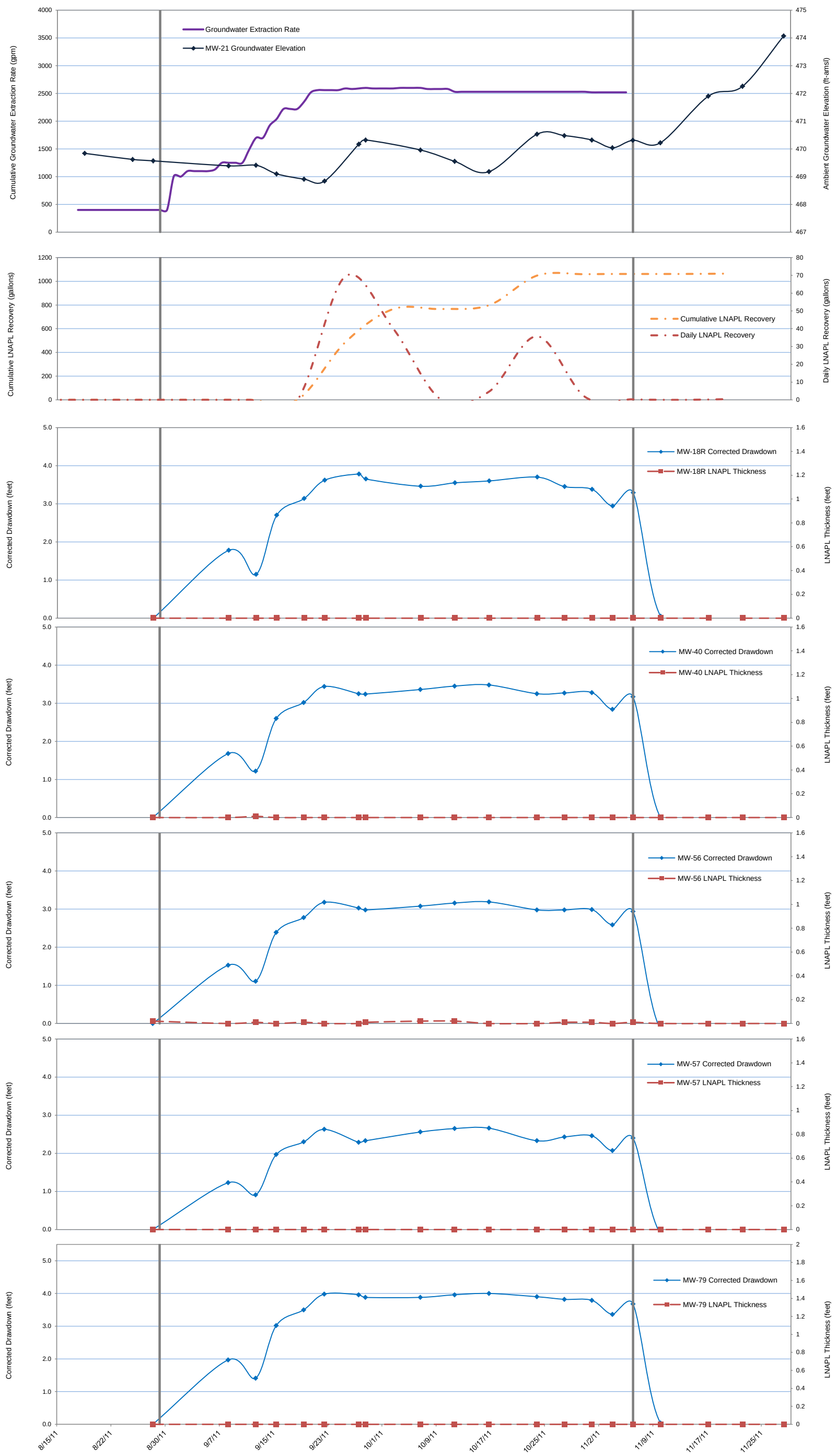
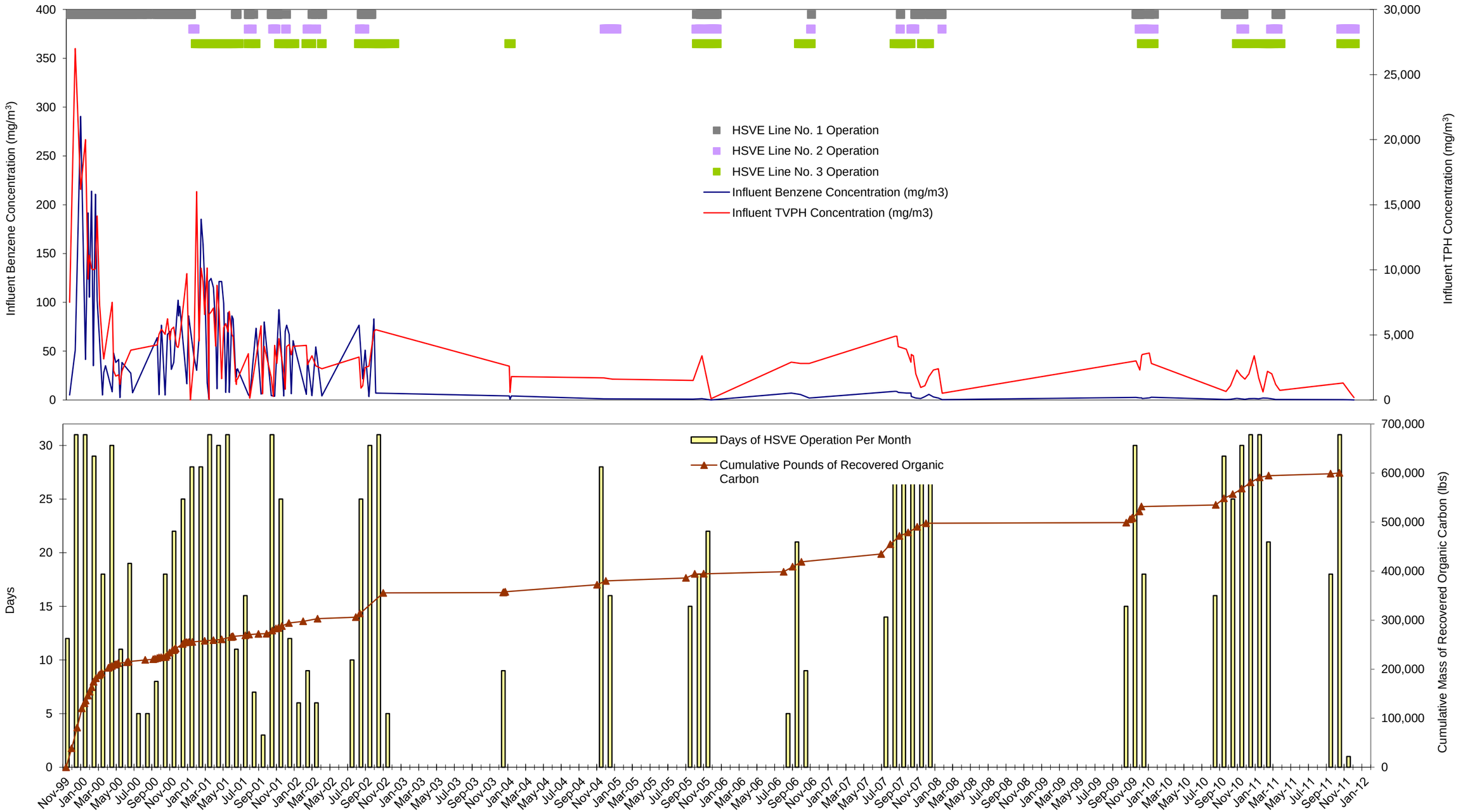


FIGURE 4-2. HSVE OPERATION, INFLUENT CONCENTRATION, AND CUMULATIVE POUNDS OF RECOVERED ORGANIC CARBON
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



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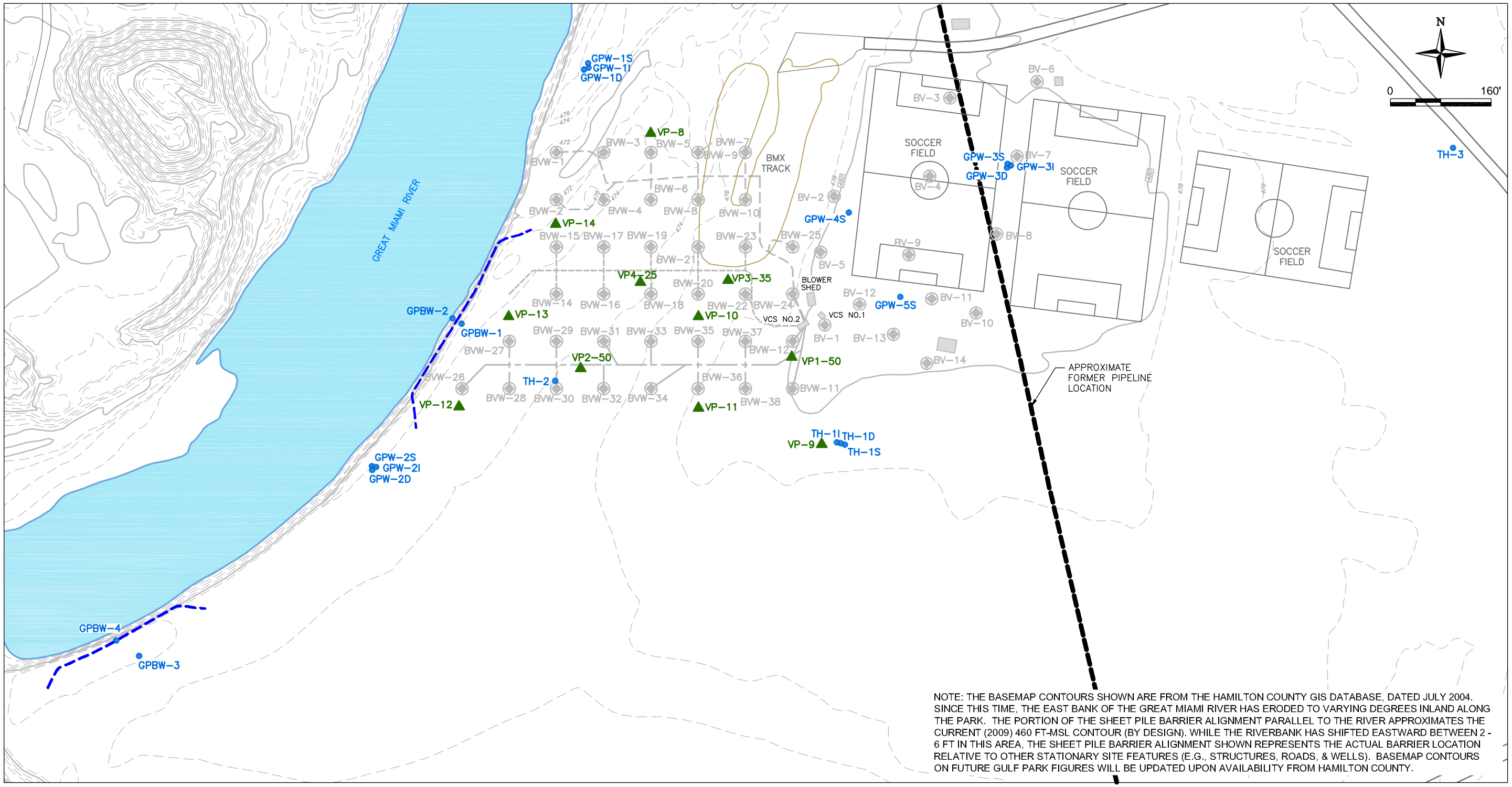

NOTE: THE BASEMAP CONTOURS SHOWN ARE FROM THE HAMILTON COUNTY GIS DATABASE, DATED JULY 2004. SINCE THIS TIME, THE EAST BANK OF THE GREAT MIAMI RIVER HAS ERODED TO VARYING DEGREES INLAND ALONG THE PARK. THE PORTION OF THE SHEET PILE BARRIER ALIGNMENT PARALLEL TO THE RIVER APPROXIMATES THE CURRENT (2009) 460 FT-MSL CONTOUR (BY DESIGN). WHILE THE RIVERBANK HAS SHIFTED EASTWARD BETWEEN 2 - 6 FT IN THIS AREA, THE SHEET PILE BARRIER ALIGNMENT SHOWN REPRESENTS THE ACTUAL BARRIER LOCATION RELATIVE TO OTHER STATIONARY SITE FEATURES (E.G., STRUCTURES, ROADS, & WELLS). BASEMAP CONTOURS ON FUTURE GULF PARK FIGURES WILL BE UPDATED UPON AVAILABILITY FROM HAMILTON COUNTY.

EXPLANATION

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

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FIGURE 5-1

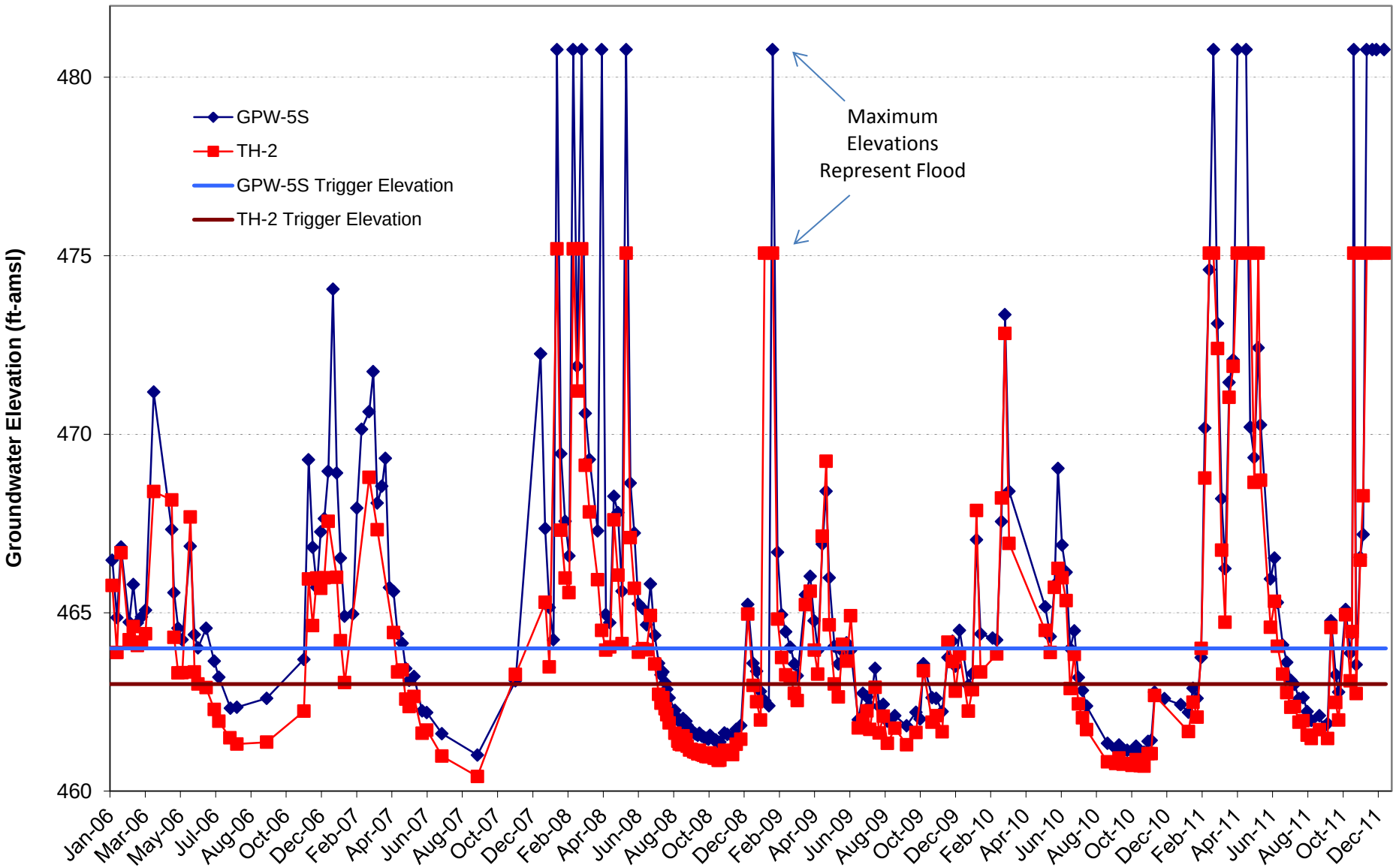
GULF PARK LAYOUT

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: MM	Scale: 1"=160'	Date: 11/4/11	File: 500GP_LAYOUT201204

US EPA ARCHIVE DOCUMENT

FIGURE 5-2. HYDROGRAPHS AND TRIGGER LEVELS FOR WELLS TH-2 AND GPW-5S (2006-2011)
SECOND 2011 SEMIANNUAL MONITORING PERIOD
GULF PARK, CLEVES, OHIO



US EPA ARCHIVE DOCUMENT

FIGURE 5-3. TOTAL BTEX CONCENTRATION VERSUS TIME FOR MONITORING WELLS GPW-1S, GPW-2S, GPW-3S, GPW-4S, GPW-5S
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

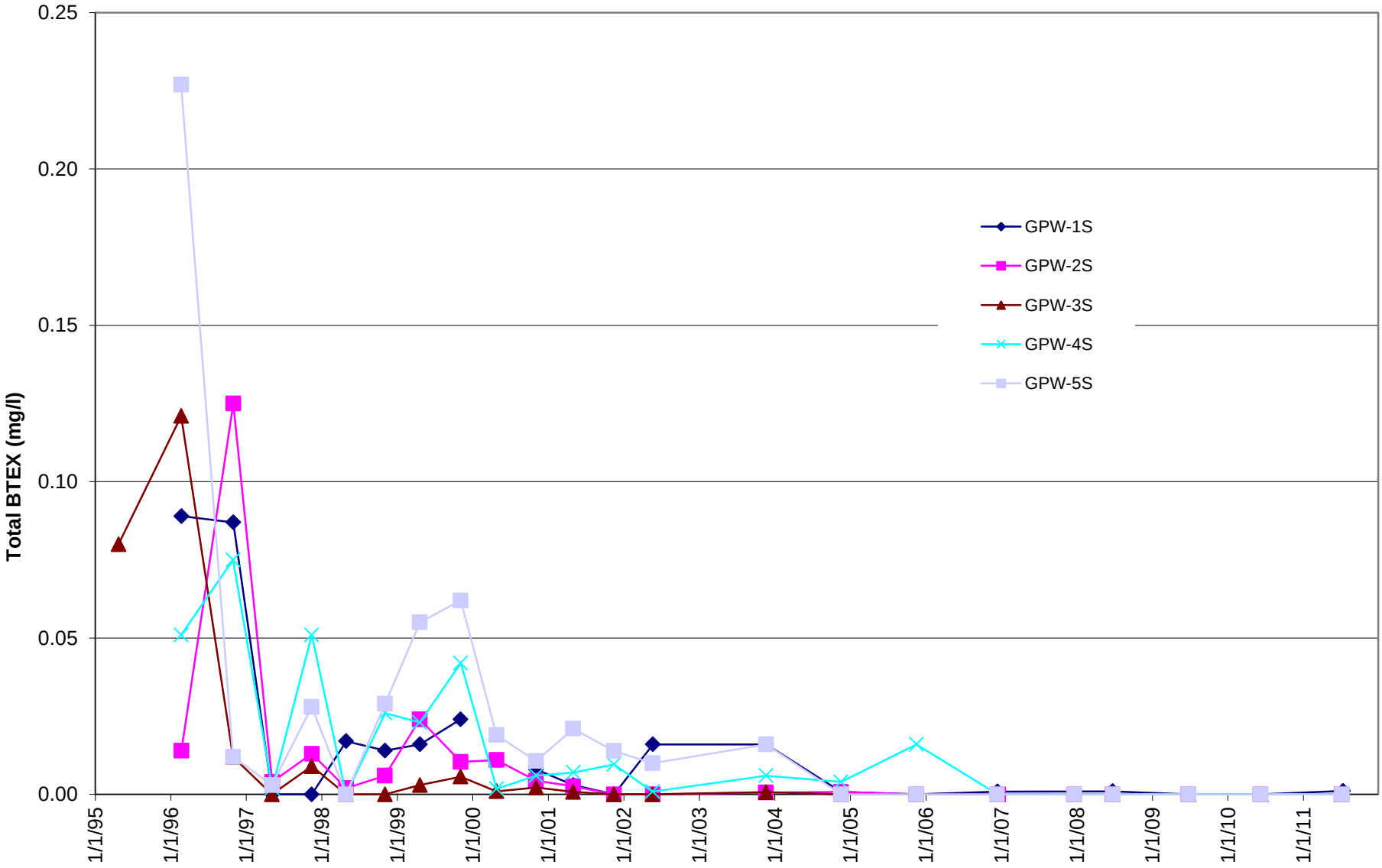


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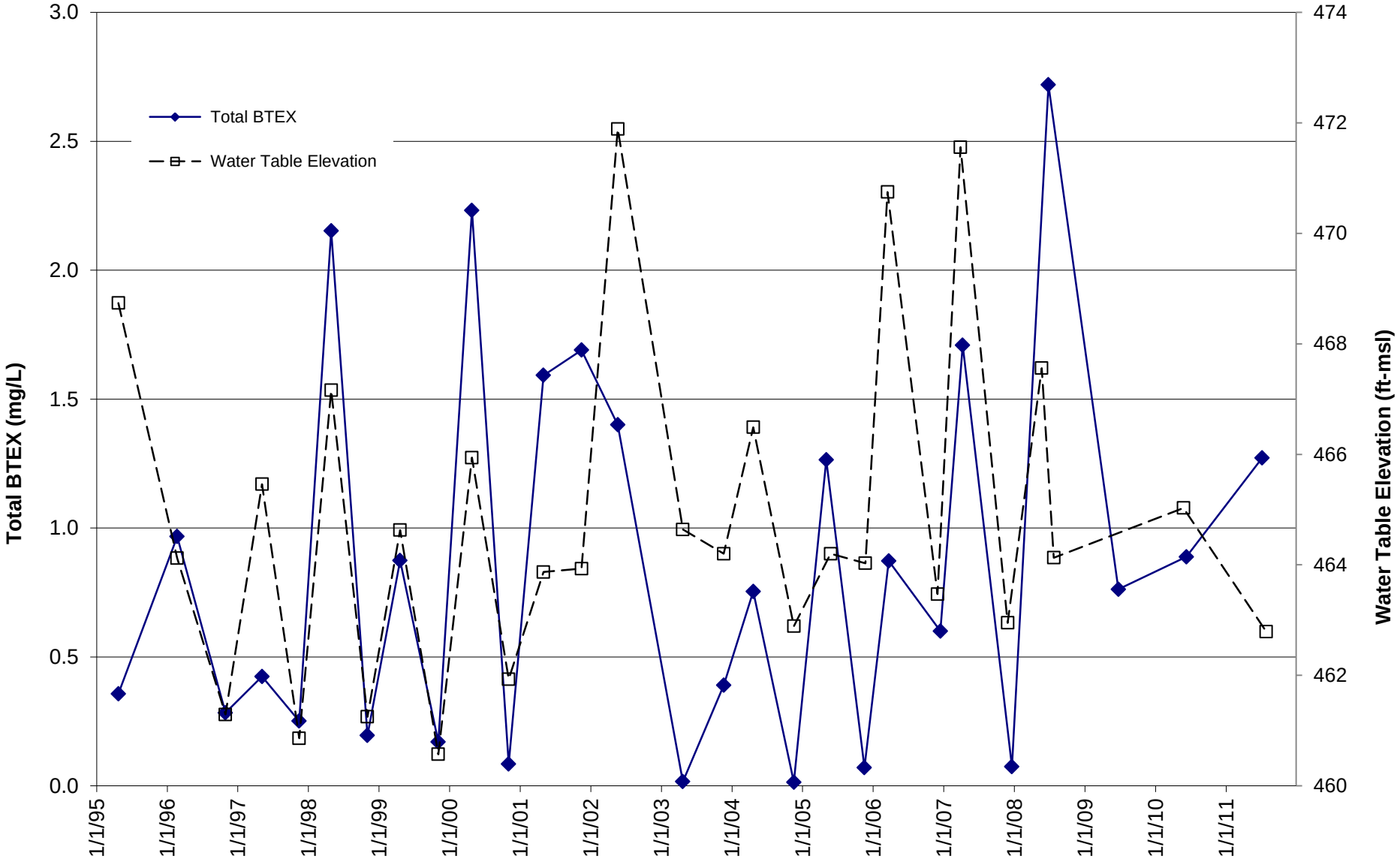
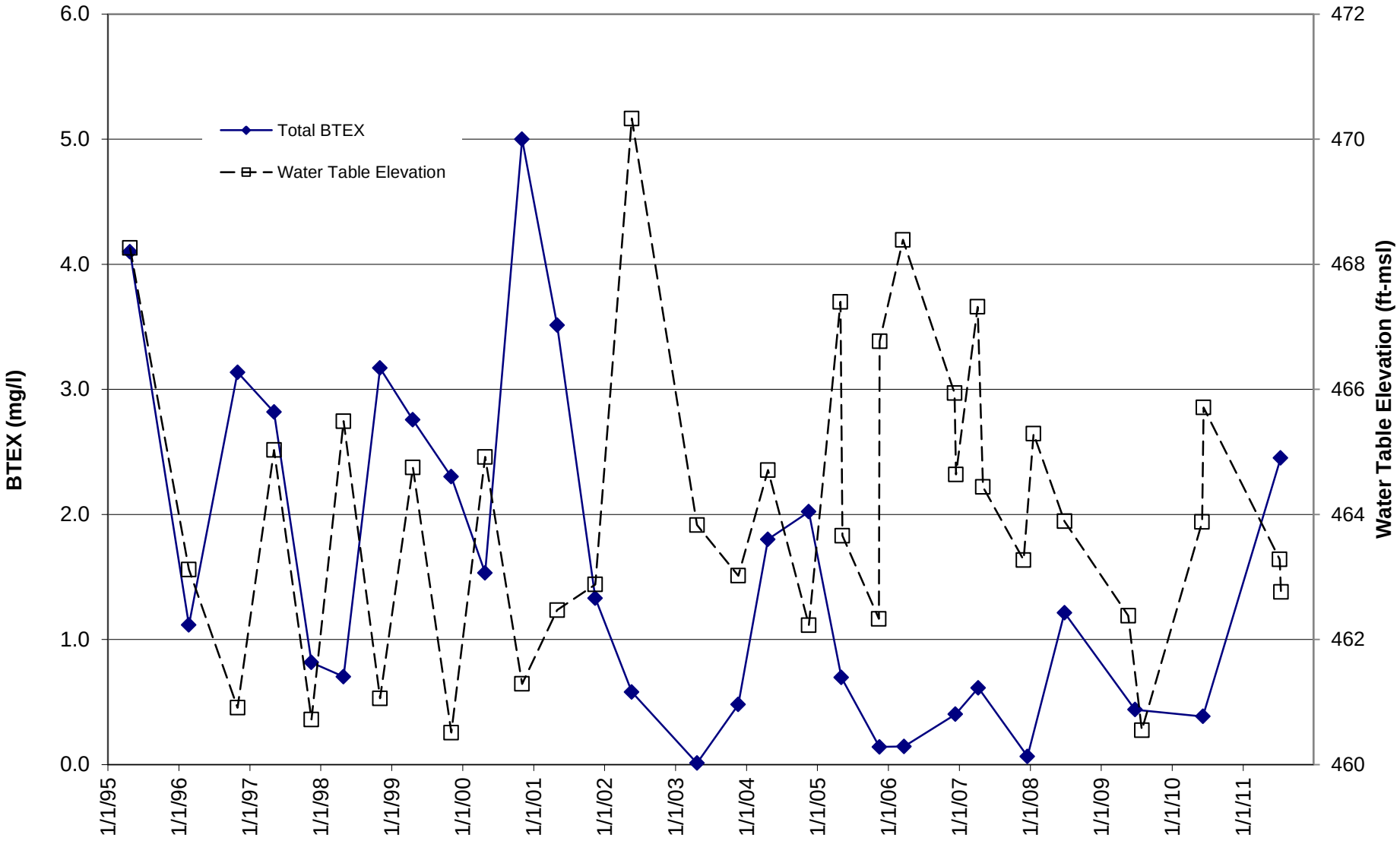
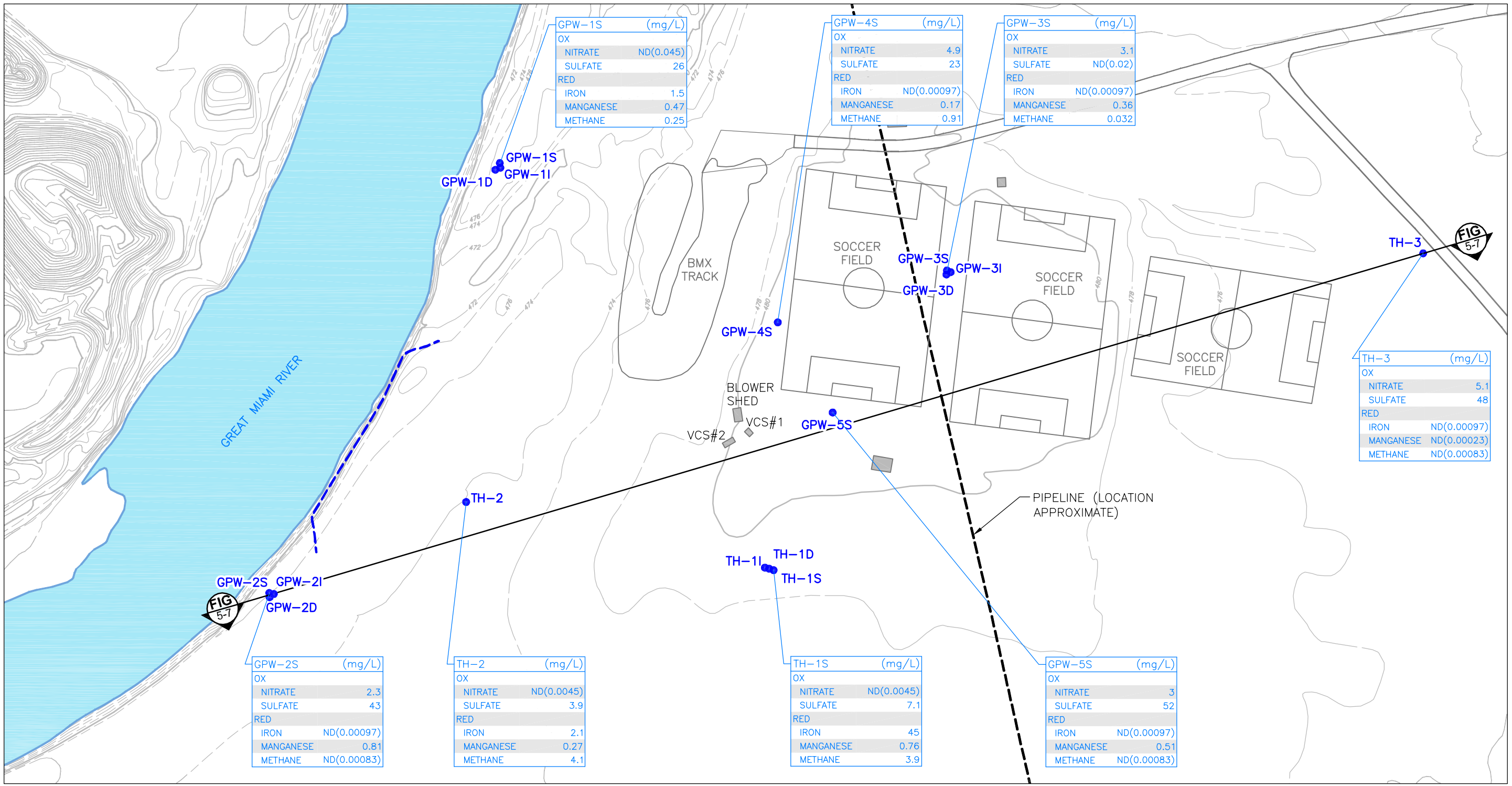
FIGURE 5-4. TOTAL BTEX CONCENTRATION VERSUS TIME FOR MONITORING WELL TH-1S
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



US EPA ARCHIVE DOCUMENT

FIGURE 5-5. TOTAL BTEX CONCENTRATION VERSUS TIME FOR MONITORING WELL TH-2
SECOND 2011 SEMIANNUAL MONITORING PERIOD
GULF PARK, CLEVES, OHIO





EXPLANATION

GPW-2S	SHALLOW GROUNDWATER MONITORING WELL AND DESIGNATION
	STRUCTURE
	ROAD
	SHEET PILE BARRIER WALL
480	GENERAL TOPOGRAPHIC CONTOUR (FT AMSL, INTERVAL 2', DASHED WHERE INFERRED)

FT AMSL	FEET ABOVE MEAN SEA LEVEL
mg/L	MILLIGRAMS PER LITER
VCS	VALVE CONTROL SHED

N

0 150'

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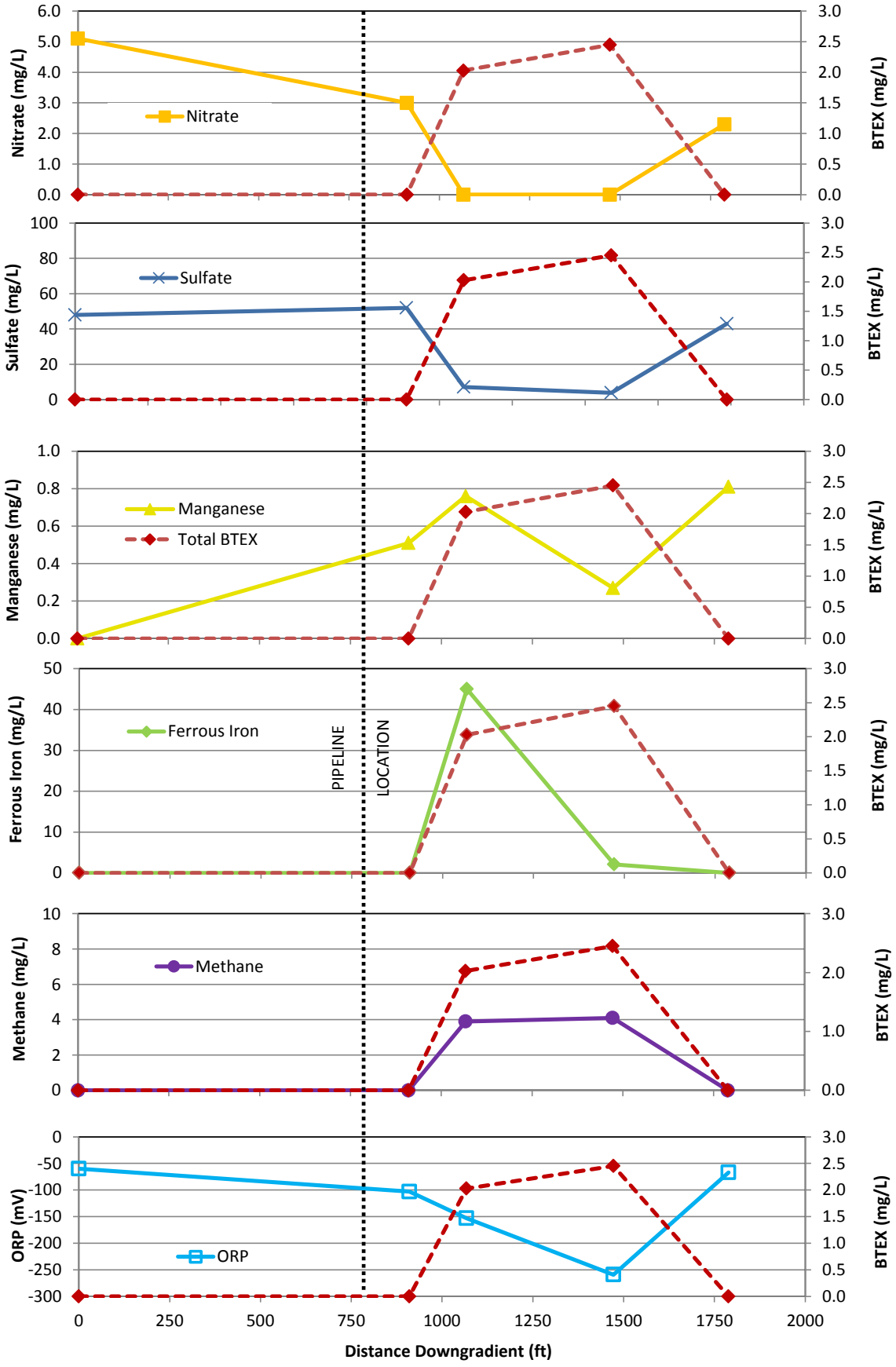
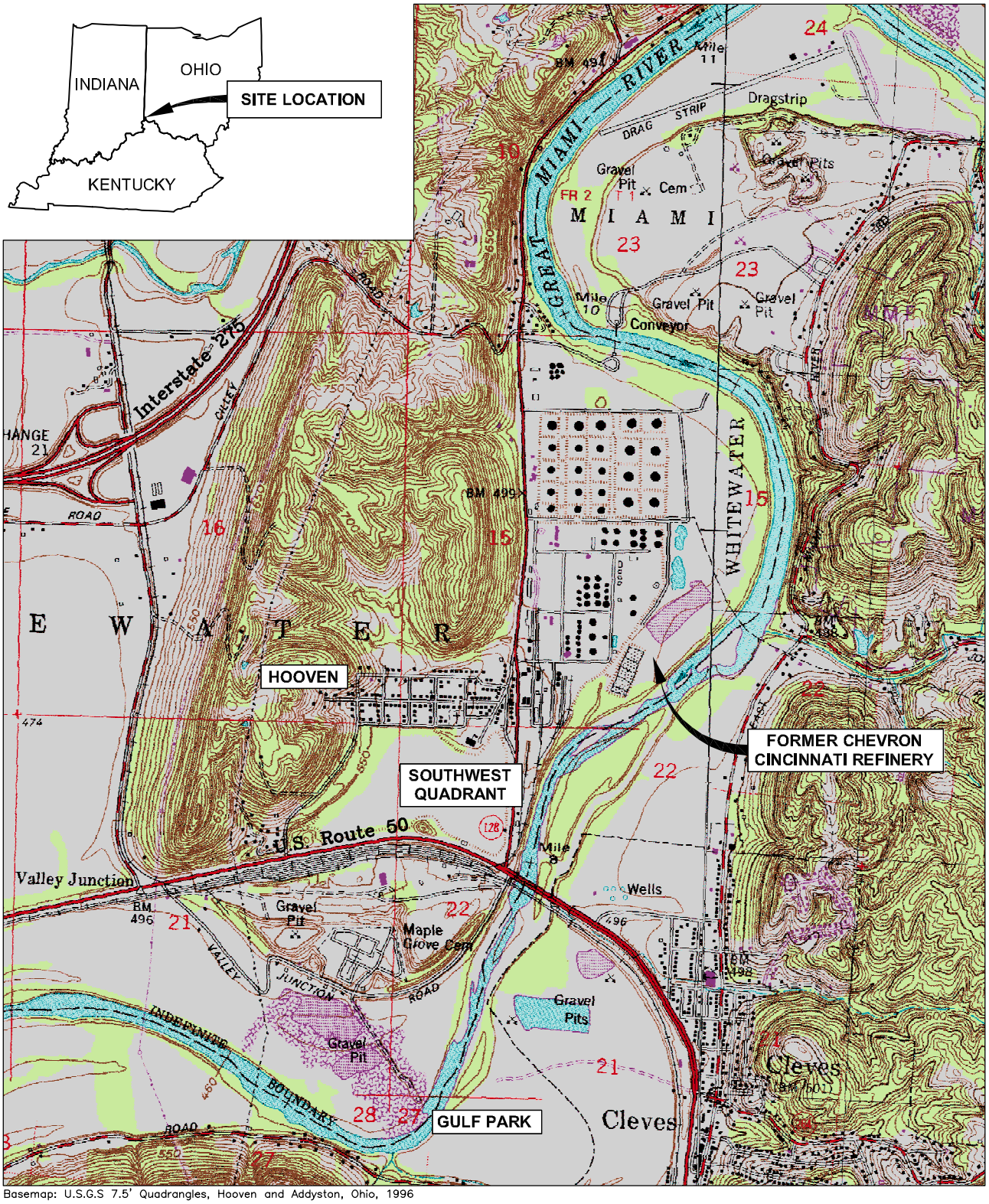
FIGURE 5-6
SUMMARY OF GROUNDWATER OXIDATION AND REDUCTION SPECIES (JULY 2011)
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP | Checked By: JP | Scale: 1" = 150' | Date:4/15/2012 | File: 500GP_OXRED201104

FIGURE 5-7. GULF PARK TOTAL BTEX AND NATURAL ATTENUATION INDICATOR CONCENTRATION VS. DISTANCE
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



US EPA ARCHIVE DOCUMENT



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

N

0 2,000'

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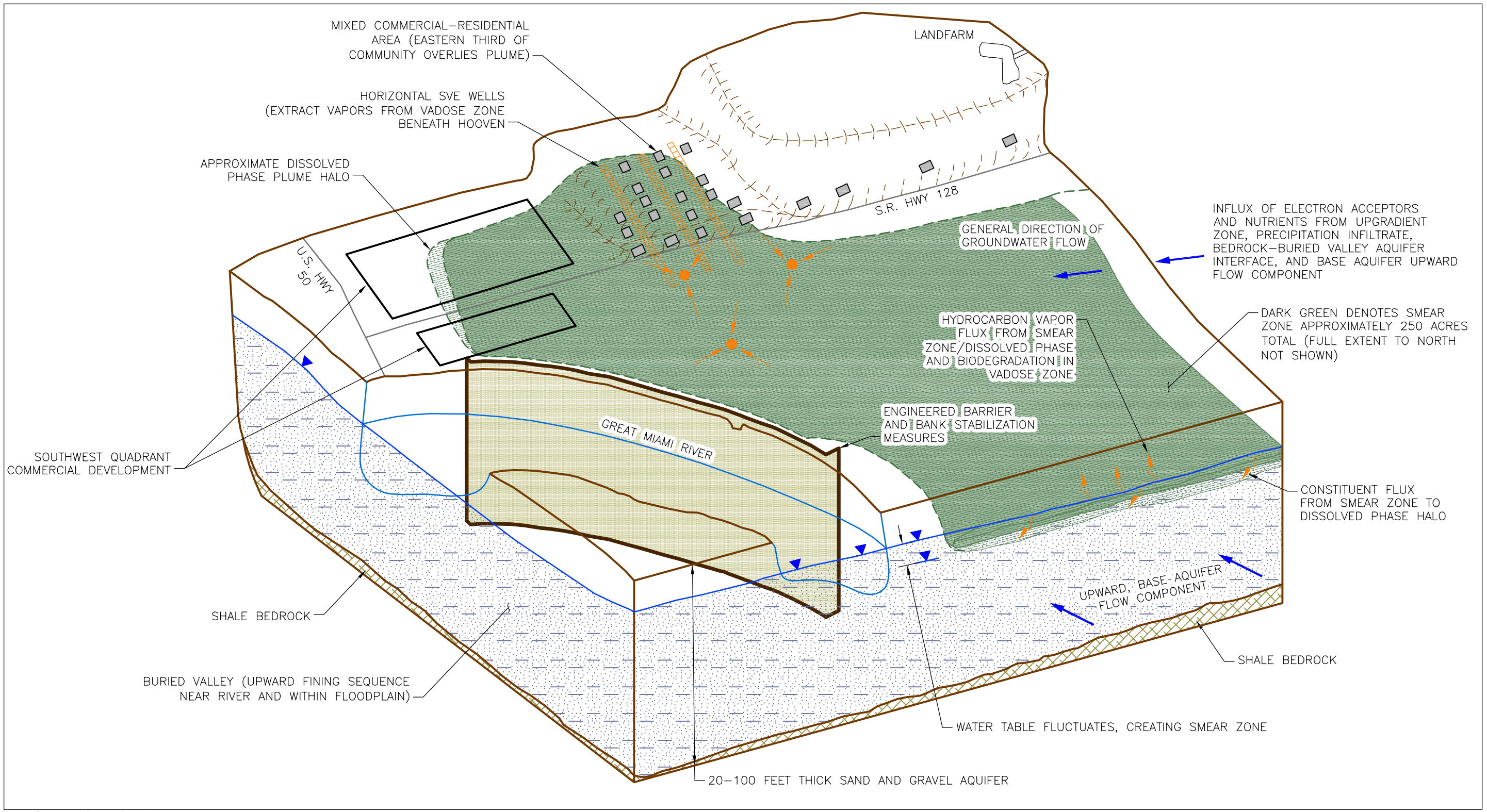
FIGURE 1-1

SITE LOCATION MAP

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JP	Scale: 1" = 2,000'	Date: 1/13/2011	File: 500USGSSITE201201



Source: Provided by Chevron Cincinnati.

EXPLANATION

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

WATER LEVEL

DISSOLVED PHASE PLUME EXTENT

SMEAR ZONE EXTENT

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FIGURE 1-2

GROUNDWATER CONCEPTUAL SITE MODEL

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JP	Scale: NONE	Date: 11/19/2010	File: 500GWCONCMODEL-201201

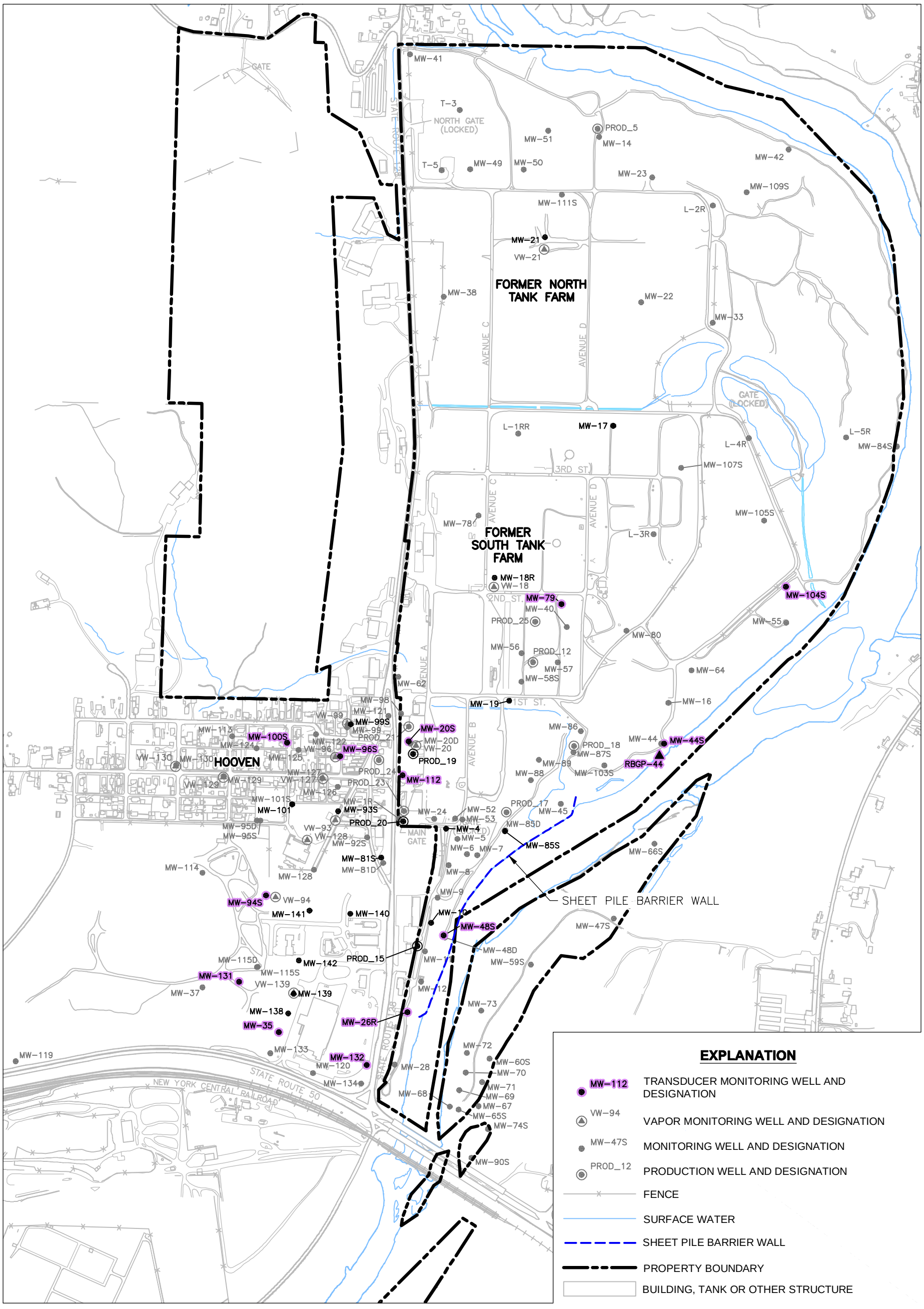

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FIGURE 2-1

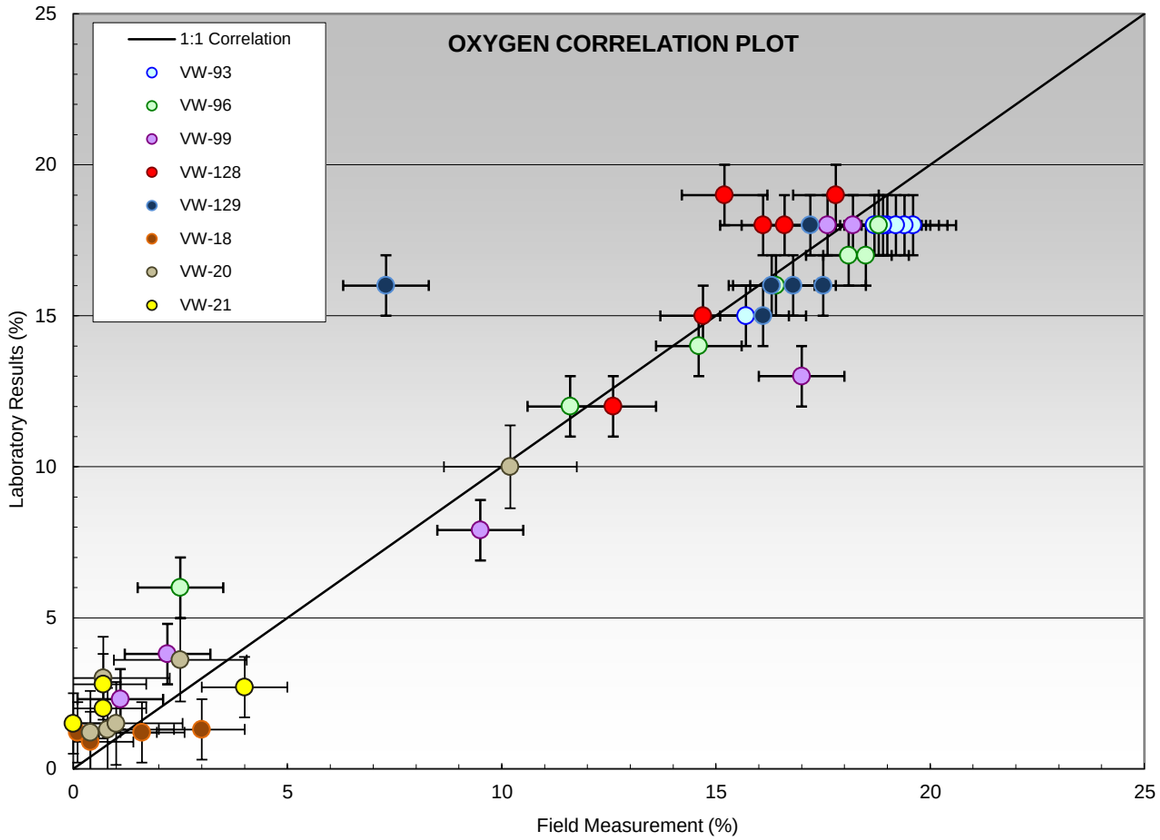
TRANSDUCER MONITORING WELLS

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JP	Scale: 1" = 650'	Date: 11/19/2010	File: 500TRANMONWELLS201204

US EPA ARCHIVE DOCUMENT

FIGURE 2-10. SOIL VAPOR OXYGEN AND CARBON DIOXIDE CORRELATION PLOTS, JULY 2011
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



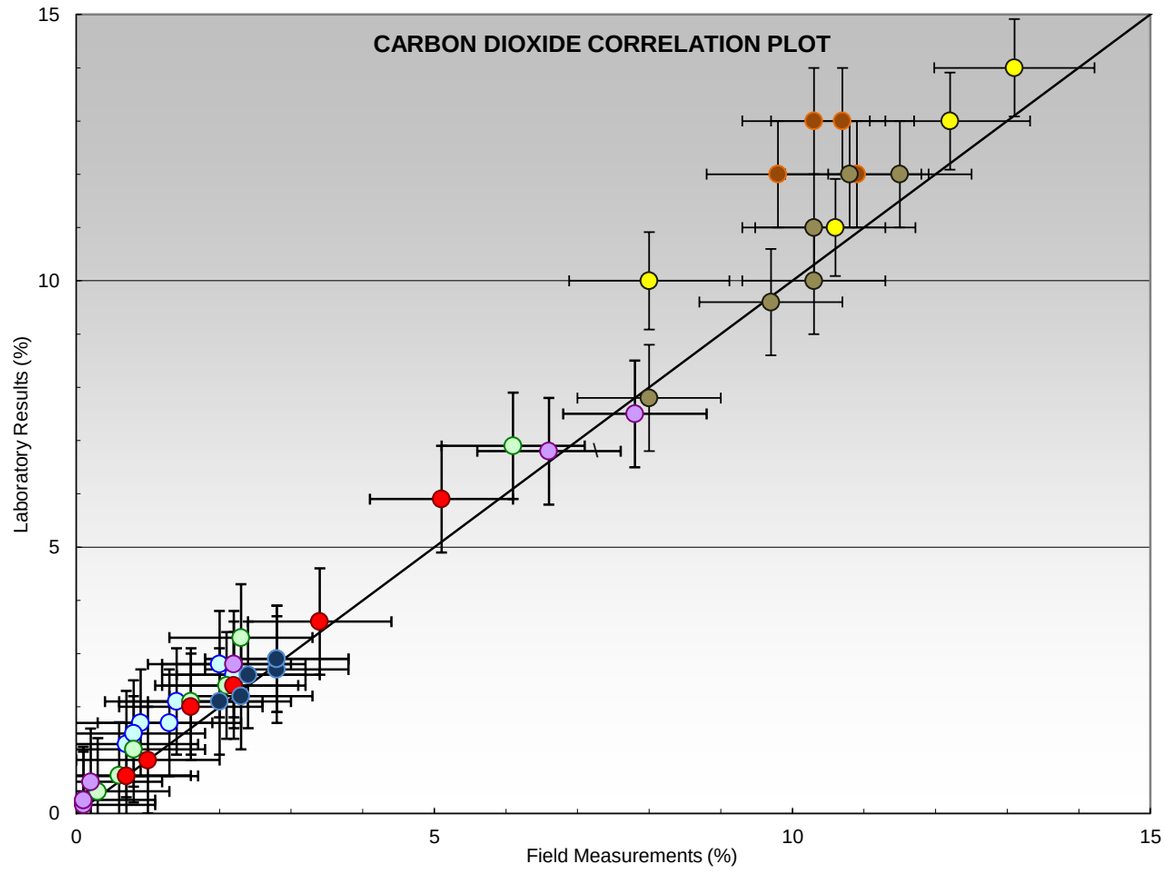


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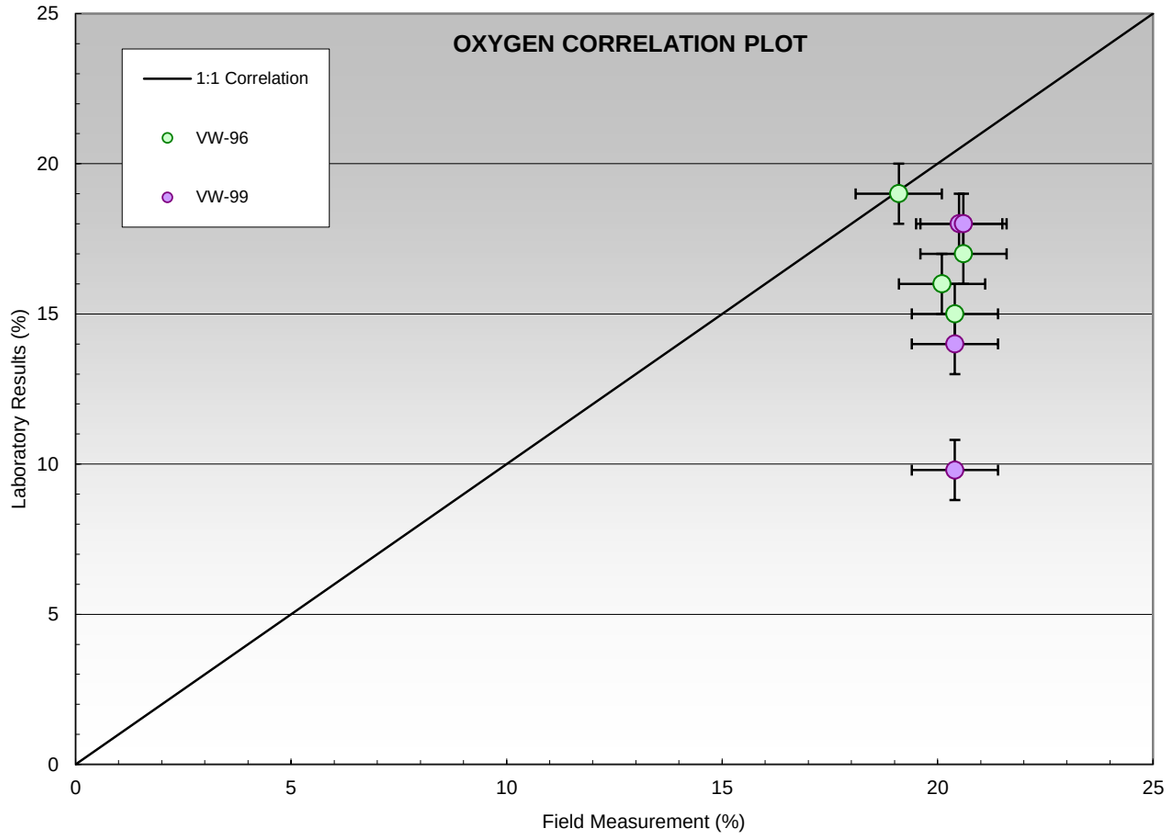
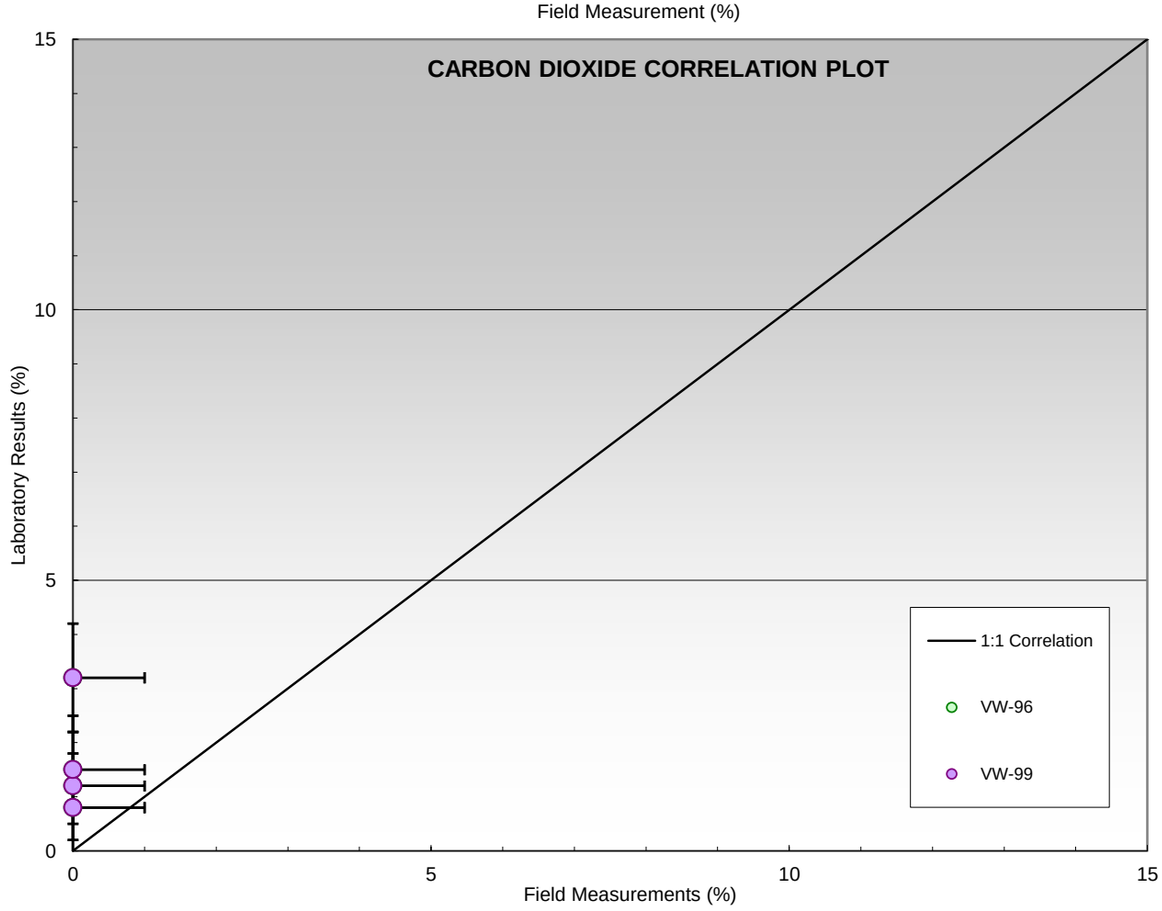
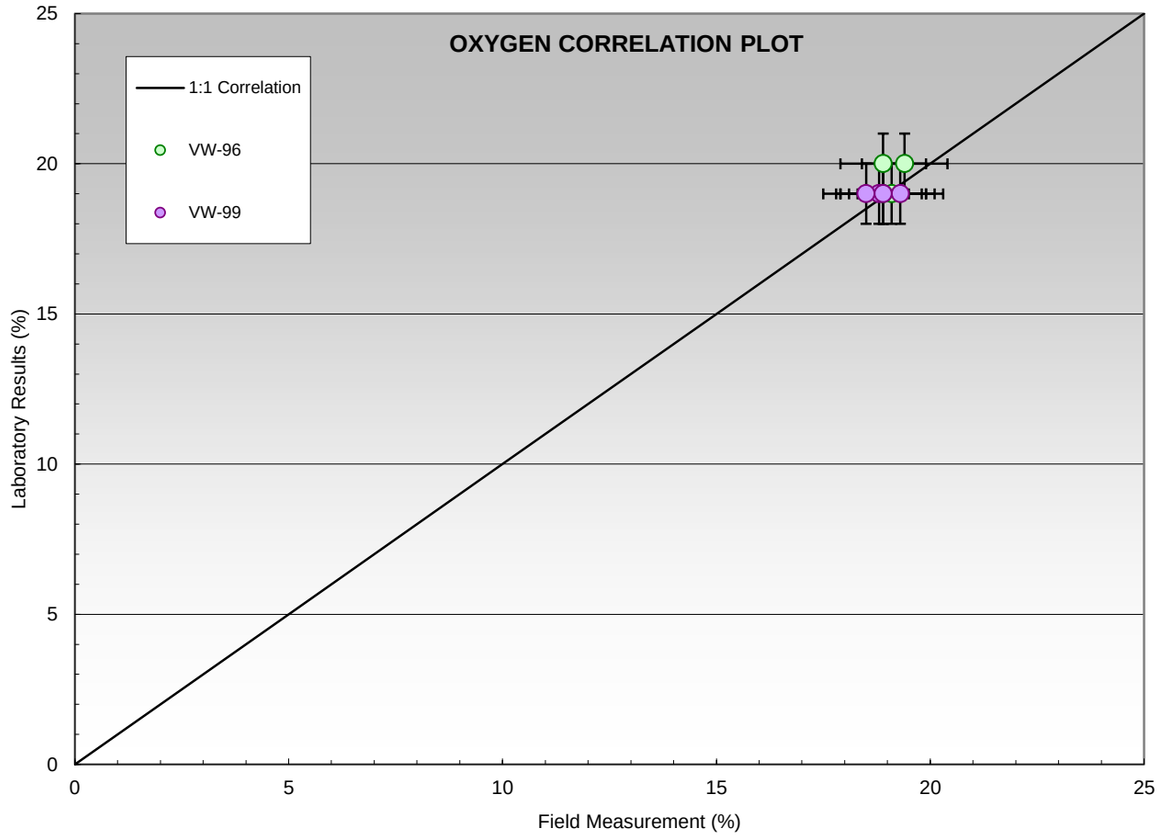
FIGURE 2-11. SOIL VAPOR OXYGEN AND CARBON DIOXIDE CORRELATION PLOTS, SEPTEMBER 2011
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

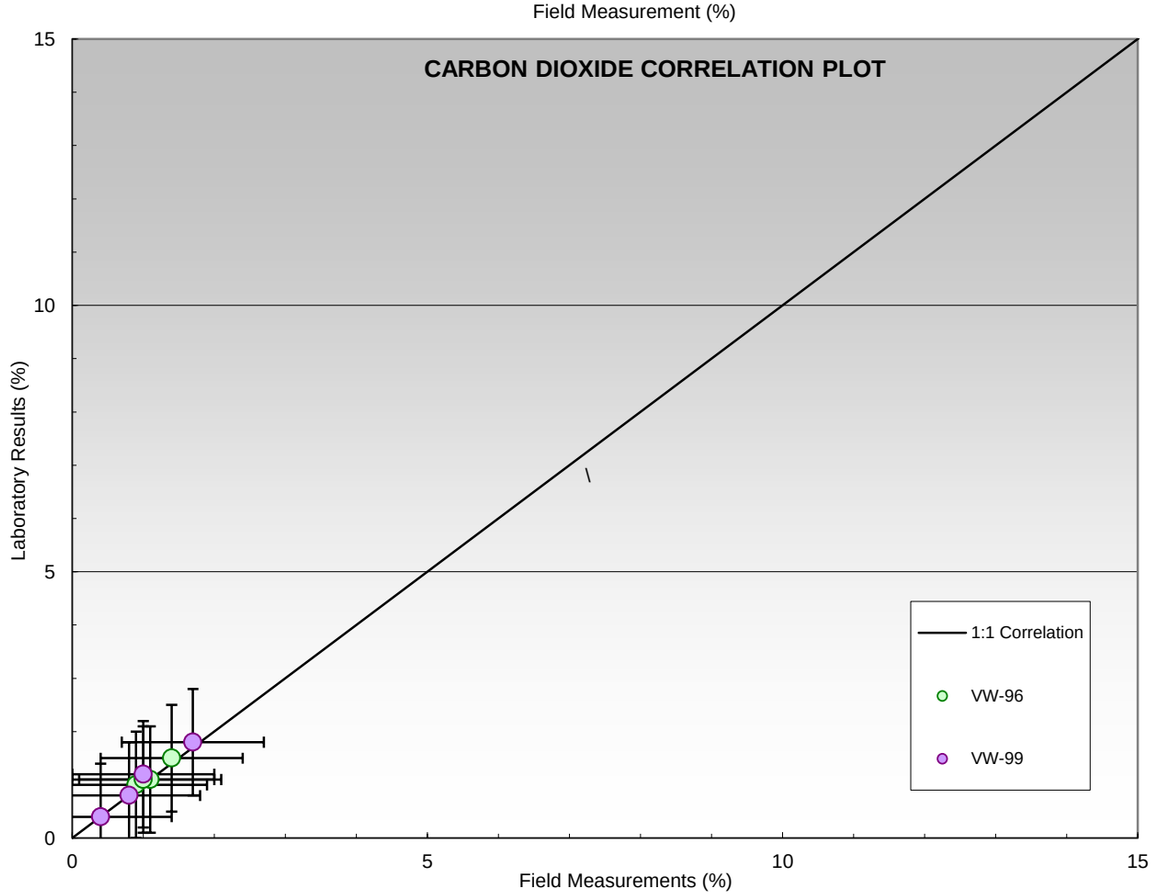




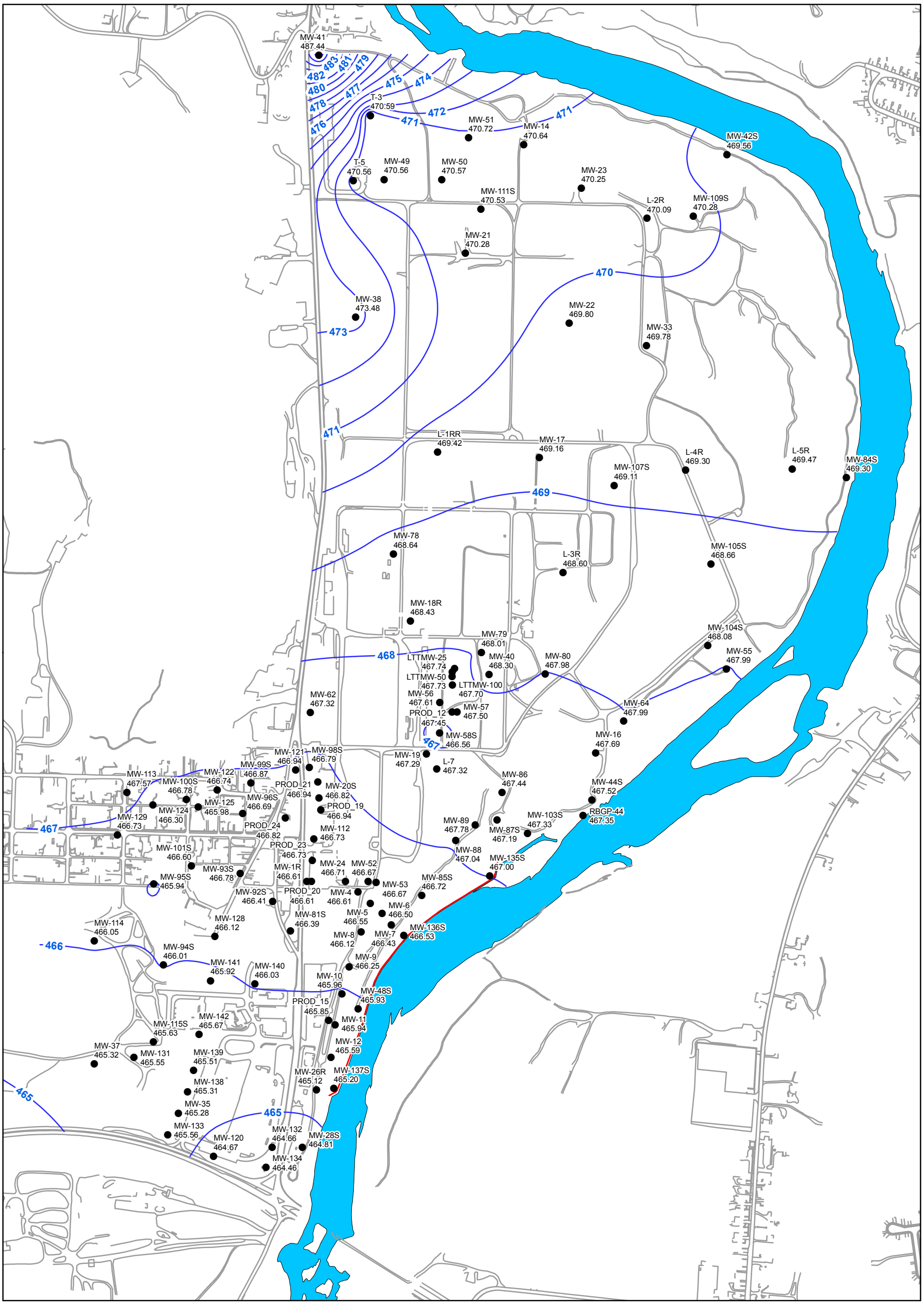
US EPA ARCHIVE DOCUMENT

FIGURE 2-12. SOIL VAPOR OXYGEN AND CARBON DIOXIDE CORRELATION PLOTS, OCTOBER 2011
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO





US EPA ARCHIVE DOCUMENT



EXPLANATION

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

NOTE: RBGP-44 (RIVER ELEVATION) WAS NOT USED FOR CONTOURING.

N

0 600'

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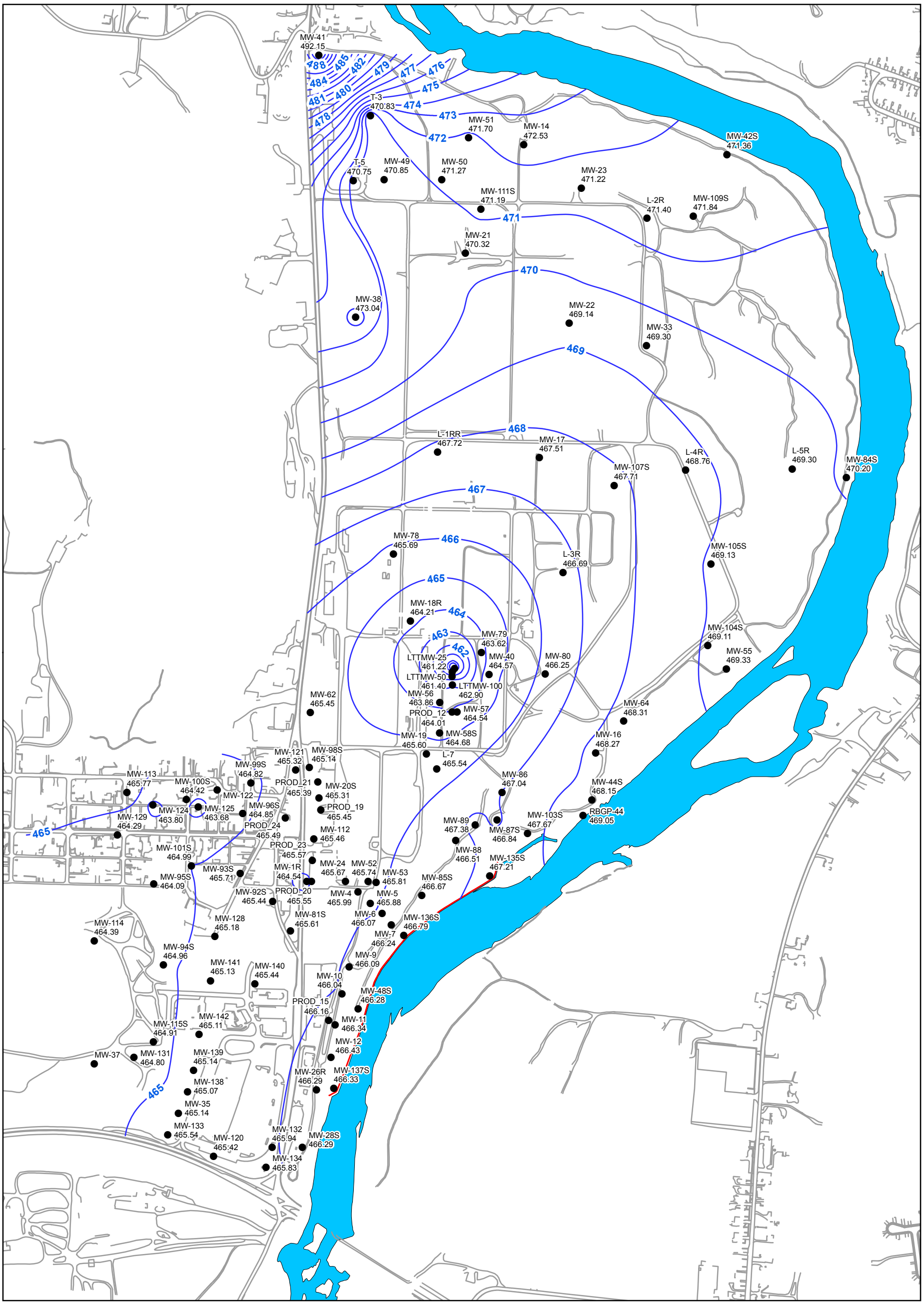
FIGURE 2-2

POTENTIOMETRIC SURFACE MAP
JULY 28, 2011

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: BR	Checked By: PM	Scale: 1" = 600'	Date: 9/25/12	File: July_28_2011_Potsurface.mxd

US EPA ARCHIVE DOCUMENT



EXPLANATION

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

NOTE: RBGP-44 (RIVER ELEVATION) WAS NOT USED FOR CONTOURING.

N

0 600'

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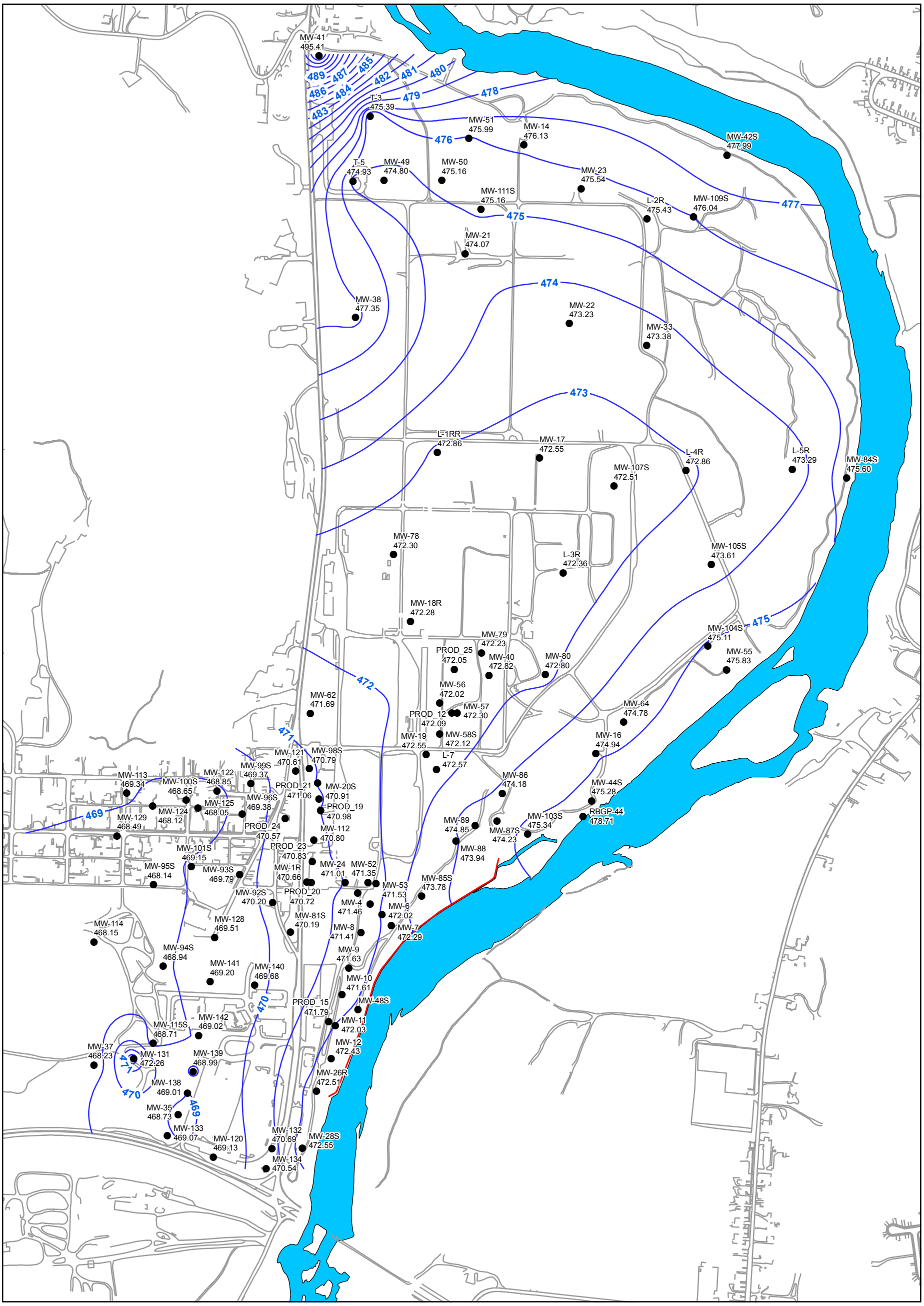
FIGURE 2-3

POTENTIOMETRIC SURFACE MAP
SEPTEMBER 29, 2011

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: BR	Checked By: PM	Scale: 1" = 600'	Date: 9/25/12	File: Sept_29_2011_Potsurface.mxd

US EPA ARCHIVE DOCUMENT



EXPLANATION

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

NOTE: RBGP-44 (RIVER ELEVATION) WAS NOT USED FOR CONTOURING.

N

0 600'

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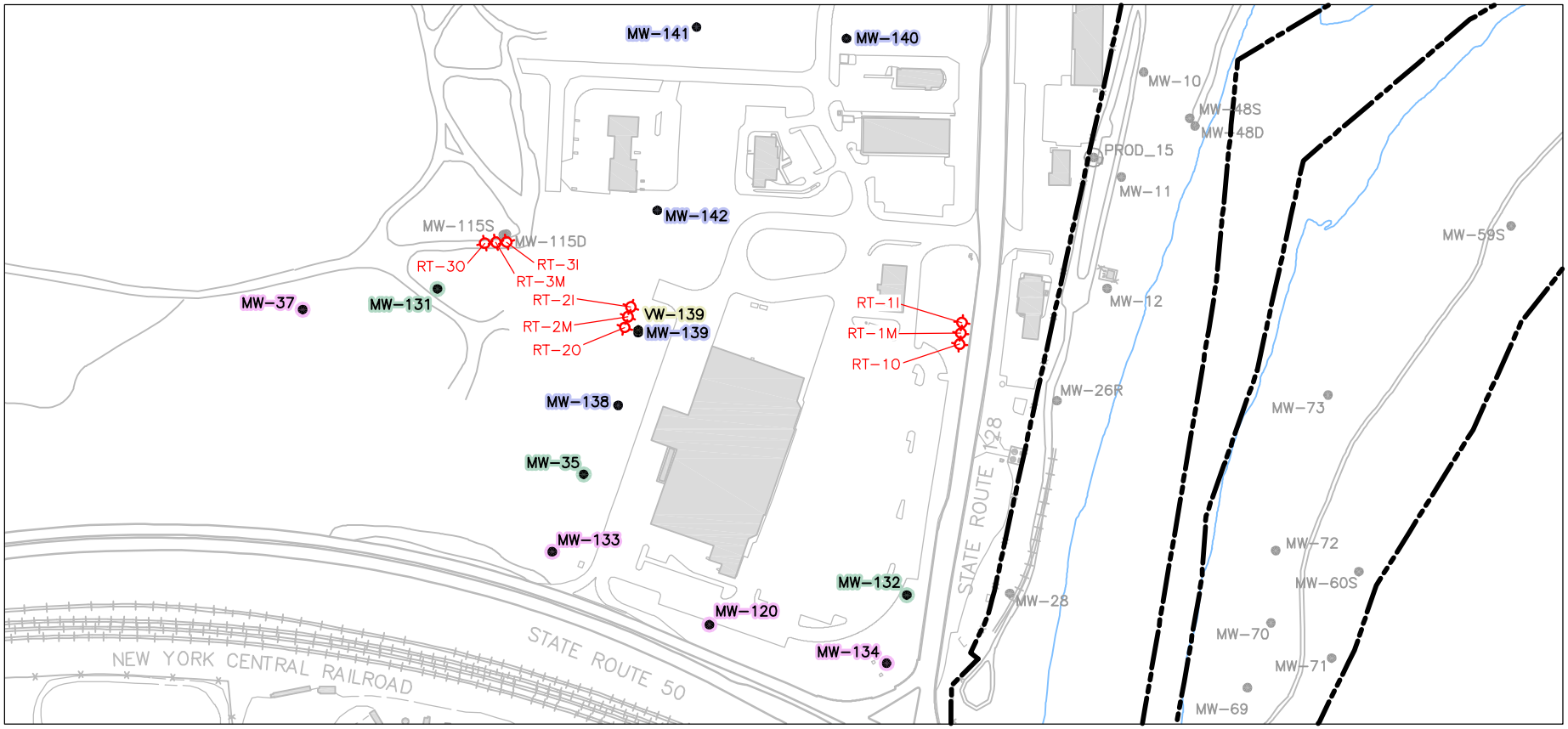
FIGURE 2-4

POTENTIOMETRIC SURFACE MAP
NOVEMBER 29, 2011

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: BR	Checked By: PM	Scale: 1" = 600'	Date: 4/11/12	File: Nov_29_2011_Potsurface.mxd

US EPA ARCHIVE DOCUMENT



EXPLANATION

RT-2O, RT-2M, RT-2I — PERMANENT ROST TRANSECT AND DESIGNATION (I-INNER, M-MIDDLE, O-OUTER)

MW-138 — MONITORING WELL AND DESIGNATION (INSTALLED MARCH 2009)

MW-35 — SENTINEL MONITORING WELL AND DESIGNATION

MW-37 — POINT OF COMPLIANCE MONITORING WELL AND DESIGNATION

VW-139 — NESTED VAPOR WELL AND DESIGNATION

MW-47S — MONITORING WELL AND DESIGNATION

PROD_12 — PRODUCTION WELL AND DESIGNATION

SURFACE WATER

PROPERTY BOUNDARY

BUILDING, TANK OR OTHER STRUCTURE

N

0 300'

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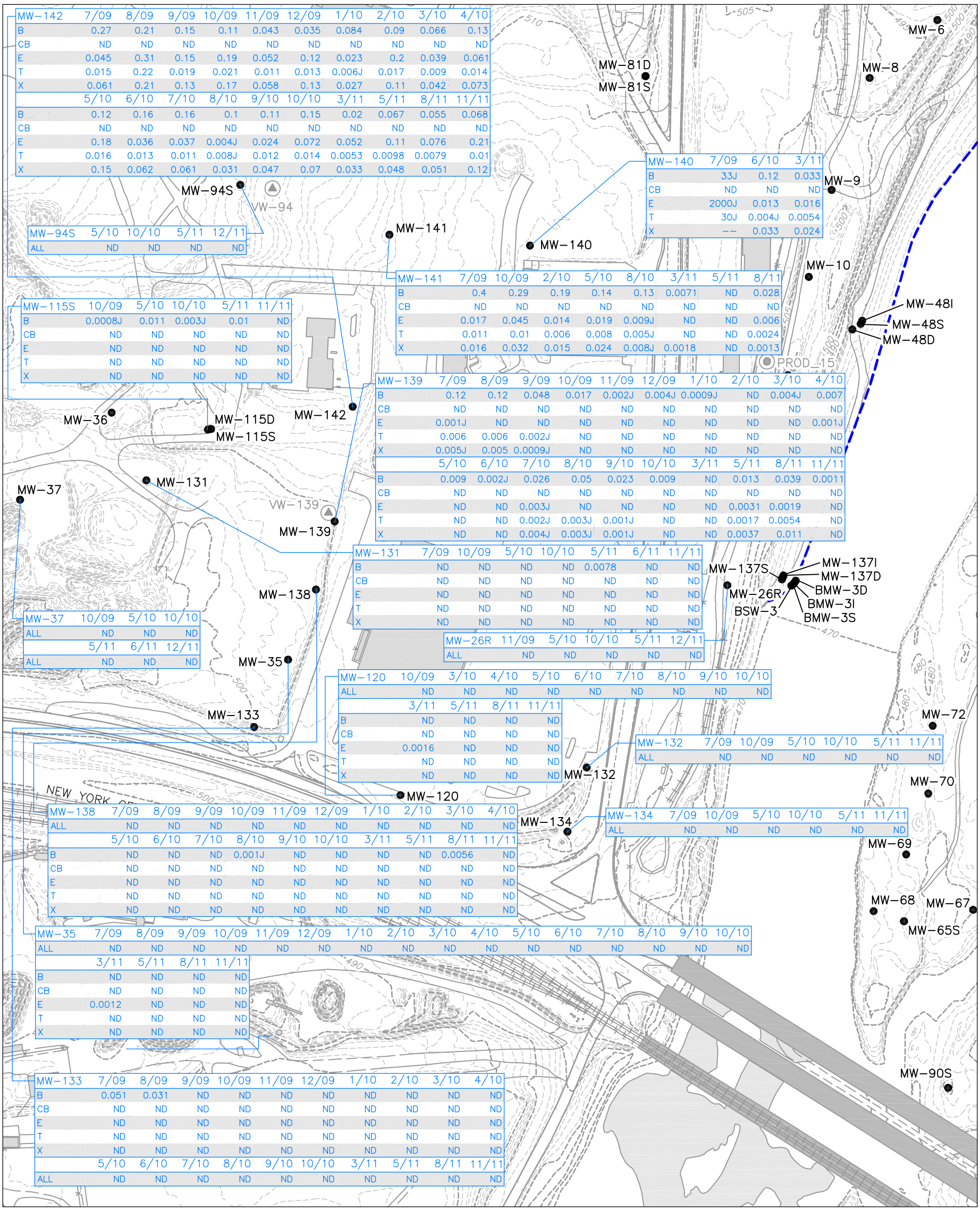
FIGURE 2-5

SENTINEL, POINT OF COMPLIANCE, AND ROST MONITORING NETWORK

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JP	Scale: 1"=300'	Date: 11/19/2010	File: 500ROST-TRANSECTS201201



MW-142	7/09	8/09	9/09	10/09	11/09	12/09	1/10	2/10	3/10	4/10
B	0.27	0.21	0.15	0.11	0.043	0.035	0.084	0.09	0.066	0.13
CB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E	0.045	0.31	0.15	0.19	0.052	0.12	0.023	0.2	0.039	0.061
T	0.015	0.22	0.019	0.021	0.011	0.013	0.006J	0.017	0.009	0.014
X	0.061	0.21	0.13	0.17	0.058	0.13	0.027	0.11	0.042	0.073

	5/10	6/10	7/10	8/10	9/10	10/10	3/11	5/11	8/11	11/11
B	0.12	0.16	0.16	0.1	0.11	0.15	0.02	0.067	0.055	0.068
CB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E	0.18	0.036	0.037	0.004J	0.024	0.072	0.052	0.11	0.076	0.21
T	0.016	0.013	0.011	0.008J	0.012	0.014	0.0053	0.0098	0.0079	0.01
X	0.15	0.062	0.061	0.031	0.047	0.07	0.033	0.048	0.051	0.12

MW-140	7/09	6/10	3/11
B	33J	0.12	0.033
CB	ND	ND	ND
E	2000J	0.013	0.016
T	30J	0.004J	0.0054
X	--	0.033	0.024

MW-94S	5/10	10/10	5/11	12/11
ALL	ND	ND	ND	ND

MW-141	7/09	10/09	2/10	5/10	8/10	3/11	5/11	8/11
B	0.4	0.29	0.19	0.14	0.13	0.0071	ND	0.028
CB	ND	ND	ND	ND	ND	ND	ND	ND
E	0.017	0.045	0.014	0.019	0.009J	ND	ND	0.006
T	0.011	0.01	0.006	0.008	0.005J	ND	ND	0.0024
X	0.016	0.032	0.015	0.024	0.008J	0.0018	ND	0.0013

MW-115S	10/09	5/10	10/10	5/11	11/11
B	0.0008J	0.011	0.003J	0.01	ND
CB	ND	ND	ND	ND	ND
E	ND	ND	ND	ND	ND
T	ND	ND	ND	ND	ND
X	ND	ND	ND	ND	ND

MW-139	7/09	8/09	9/09	10/09	11/09	12/09	1/10	2/10	3/10	4/10
B	0.12	0.12	0.048	0.017	0.002J	0.004J	0.0009J	ND	0.004J	0.007
CB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E	0.001J	ND	ND	ND	ND	ND	ND	ND	ND	0.001J
T	0.006	0.006	0.002J	ND	ND	ND	ND	ND	ND	ND
X	0.005J	0.005	0.0009J	ND	ND	ND	ND	ND	ND	ND

	5/10	6/10	7/10	8/10	9/10	10/10	3/11	5/11	8/11	11/11
B	0.009	0.002J	0.026	0.05	0.023	0.009	ND	0.013	0.039	0.0011
CB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E	ND	ND	0.003J	ND	ND	ND	ND	0.0031	0.0019	ND
T	ND	ND	0.002J	0.003J	0.001J	ND	ND	0.0017	0.0054	ND
X	ND	ND	0.004J	0.003J	0.001J	ND	ND	0.0037	0.011	ND

MW-131	7/09	10/09	5/10	10/10	5/11	6/11	11/11
B	ND	ND	ND	ND	0.0078	ND	ND
CB	ND	ND	ND	ND	ND	ND	ND
E	ND	ND	ND	ND	ND	ND	ND
T	ND	ND	ND	ND	ND	ND	ND
X	ND	ND	ND	ND	ND	ND	ND

MW-37	10/09	5/10	10/10
ALL	ND	ND	ND

	5/11	6/11	12/11
ALL	ND	ND	ND

MW-26R	11/09	5/10	10/10	5/11	12/11
ALL	ND	ND	ND	ND	ND

MW-120	10/09	3/10	4/10	5/10	6/10	7/10	8/10	9/10	10/10
ALL	ND	ND	ND	ND	ND	ND	ND	ND	ND

	3/11	5/11	8/11	11/11
B	ND	ND	ND	ND
CB	ND	ND	ND	ND
E	0.0016	ND	ND	ND
T	ND	ND	ND	ND
X	ND	ND	ND	ND

MW-132	7/09	10/09	5/10	10/10	5/11	11/11
ALL	ND	ND	ND	ND	ND	ND

MW-138	7/09	8/09	9/09	10/09	11/09	12/09	1/10	2/10	3/10	4/10
ALL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

	5/10	6/10	7/10	8/10	9/10	10/10	3/11	5/11	8/11	11/11
B	ND	ND	ND	0.001J	ND	ND	ND	ND	0.0056	ND
CB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

MW-134	7/09	10/09	5/10	10/10	5/11	11/11
ALL	ND	ND	ND	ND	ND	ND

MW-35	7/09	8/09	9/09	10/09	11/09	12/09	1/10	2/10	3/10	4/10	5/10	6/10	7/10	8/10	9/10	10/10
ALL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

	3/11	5/11	8/11	11/11
B	ND	ND	ND	ND
CB	ND	ND	ND	ND
E	0.0012	ND	ND	ND
T	ND	ND	ND	ND
X	ND	ND	ND	ND

MW-133	7/09	8/09	9/09	10/09	11/09	12/09	1/10	2/10	3/10	4/10
B	0.051	0.031	ND	ND	ND	ND	ND	ND	ND	ND
CB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
E	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
T	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

	5/10	6/10	7/10	8/10	9/10	10/10	3/11	5/11	8/11	11/11
ALL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

EXPLANATION

- BSW-3D — BARRIER MONITORING WELL AND DESIGNATION
- MW-27 — MONITORING WELL AND DESIGNATION
- VW-94 — NESTED SOIL VAPOR MONITORING WELL AND DESIGNATION
- PROD_15 — PRODUCTION WELL AND DESIGNATION
- SHEET PILE BARRIER WALL
- FENCE
- BUILDING, TANK OR OTHER STRUCTURE
- 480 — GROUND SURFACE CONTOURS (INTERVAL= 5')

CONSTITUENT TABLE EXPLANATION

WELL DESIGNATION	MW-133	3/10	← SAMPLE DATE
Benzene	B	0.5	
Chlorobenzene	CB	0.8	
Ethylbenzene	E	0.8	
Toluene	T	0.7	
Xylenes, Total	X	0.8	

N

0 200'

NOTES:

1. ALL VALUES ARE IN MILLIGRAMS PER LITER (mg/L)
2. J = ESTIMATED CONCENTRATION
3. -- = NOT MEASURED

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FIGURE 2-6

SOUTHWEST QUAD DISSOLVED PHASE RESULTS SUMMARY (JULY 2009 THROUGH DECEMBER 2011)

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JGP	Scale: 1" = 200'	Date: 5/23/11	File: 500-SW-BTEX-201204

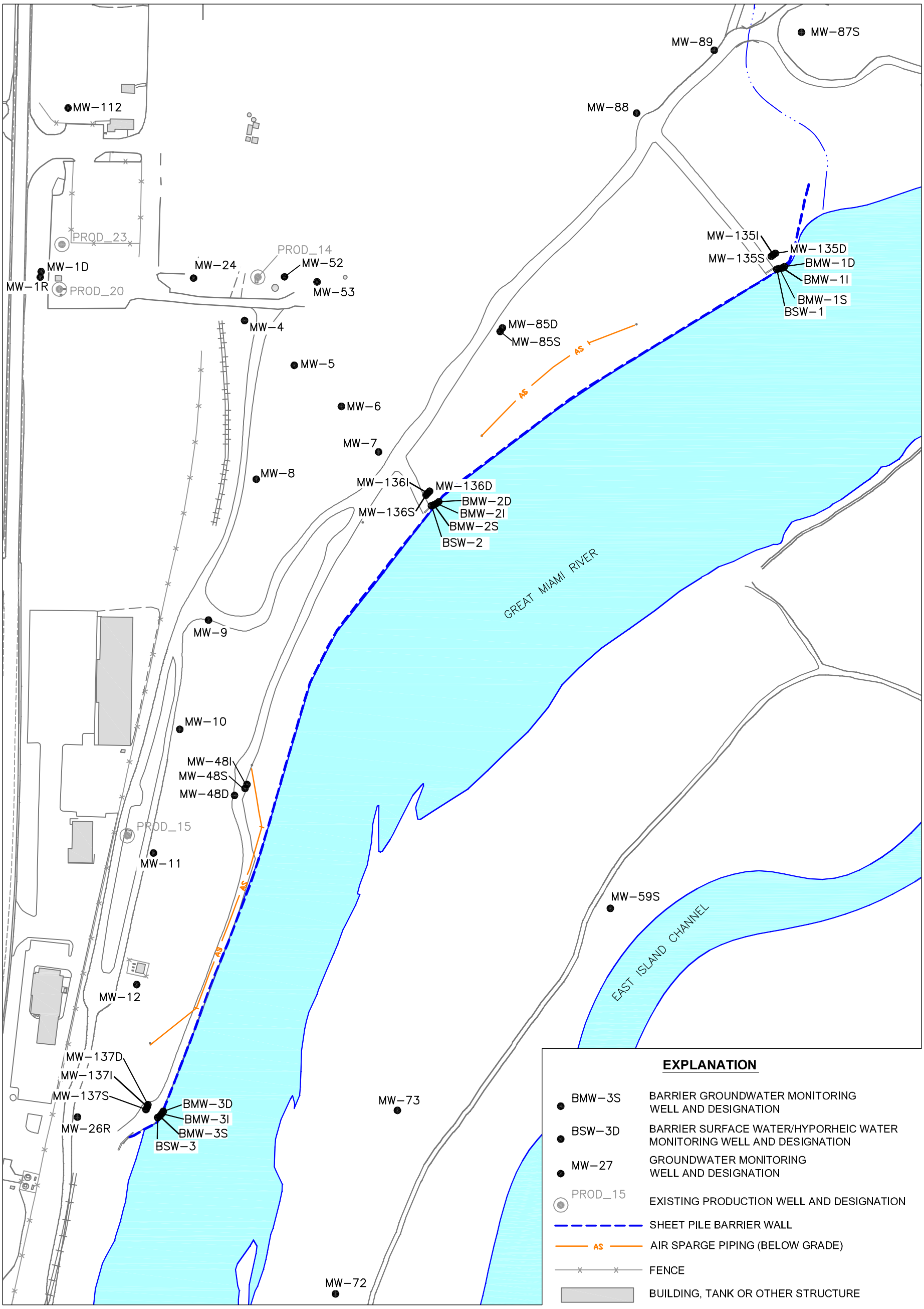

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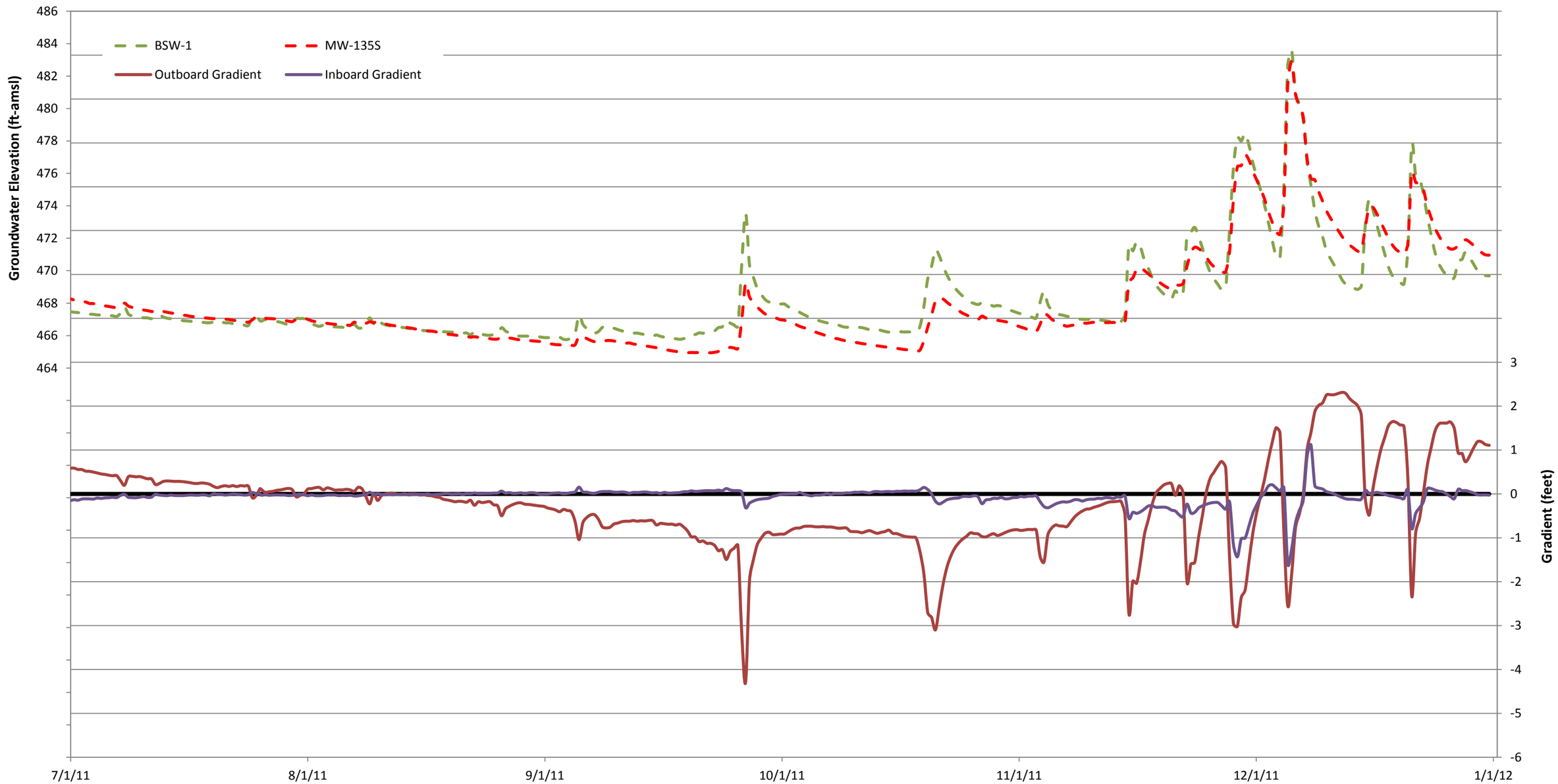
FIGURE 2-7

BARRIER PERFORMANCE AIR SPARGE AND MONITORING WELL NETWORK

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: JP	Scale: 1" = 150'	Date:1/13/11	File: 500ASBUILTMONNET-201201

FIGURE 2-8. BARRIER WALL NORTH TRANSECT VERTICAL GRADIENTS
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



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

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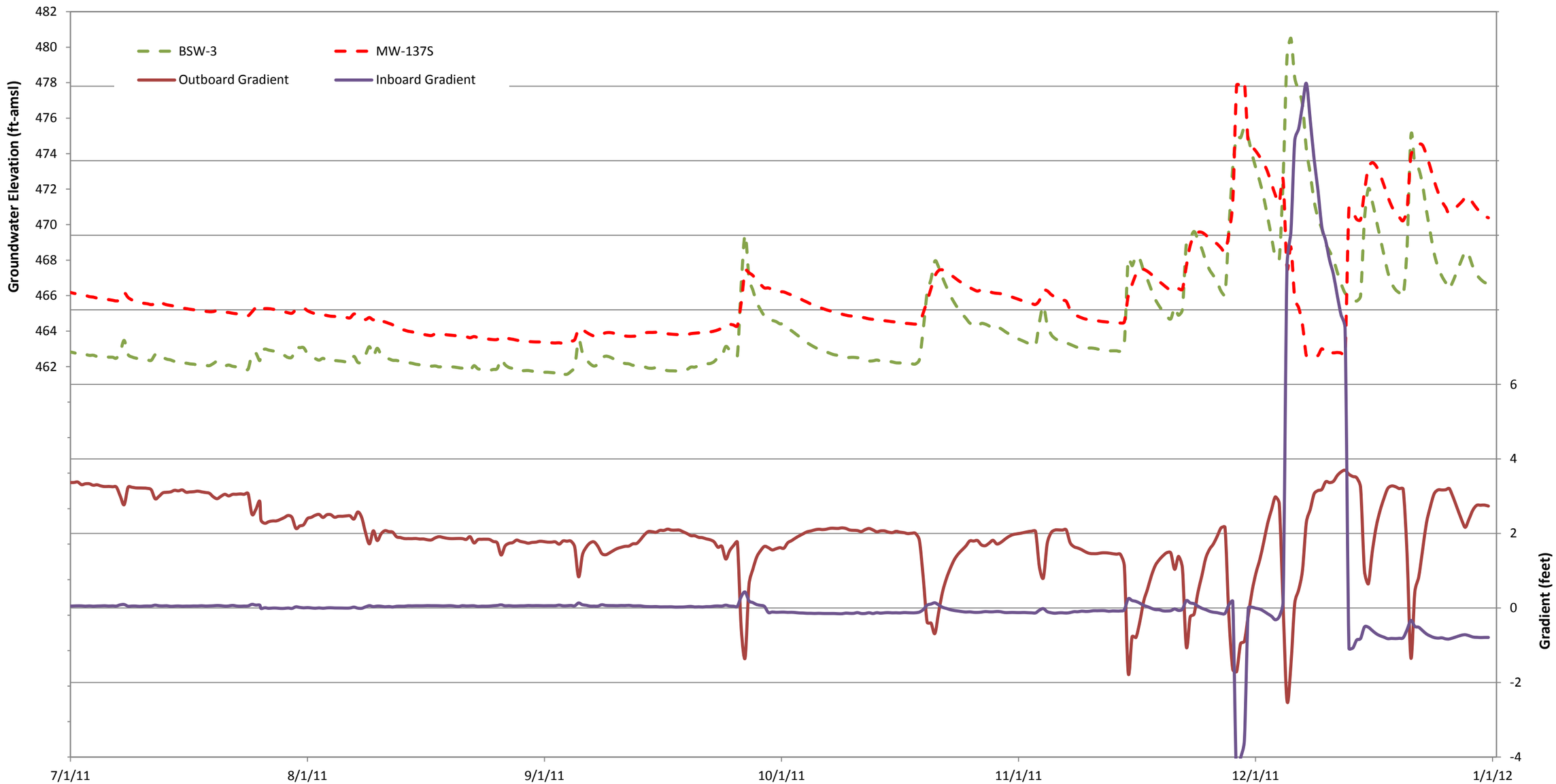
FIGURE 2-9. BARRIER WALL SOUTH TRANSECT VERTICAL GRADIENTS
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



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

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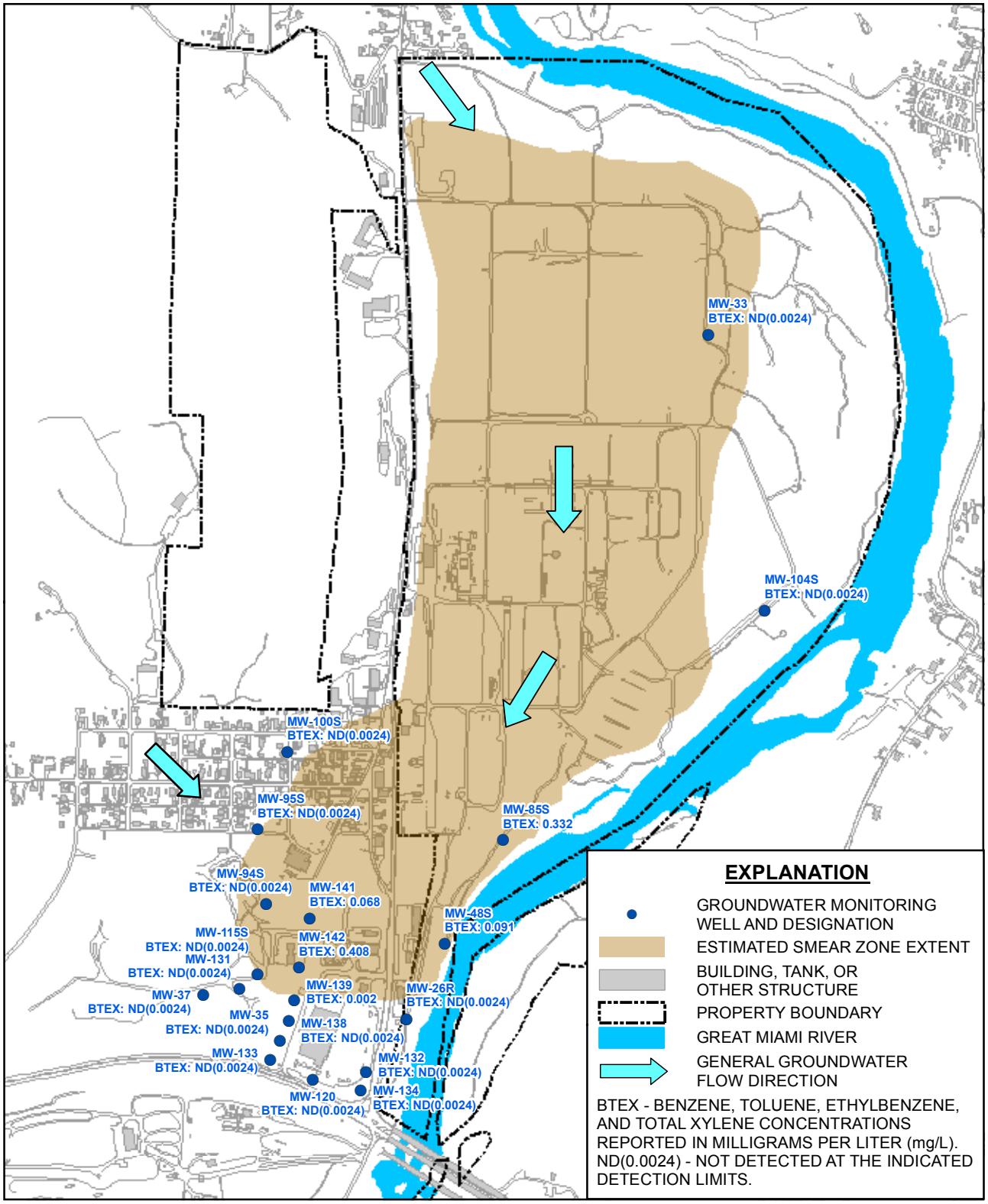

N

0 1,000'

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FIGURE 3-1

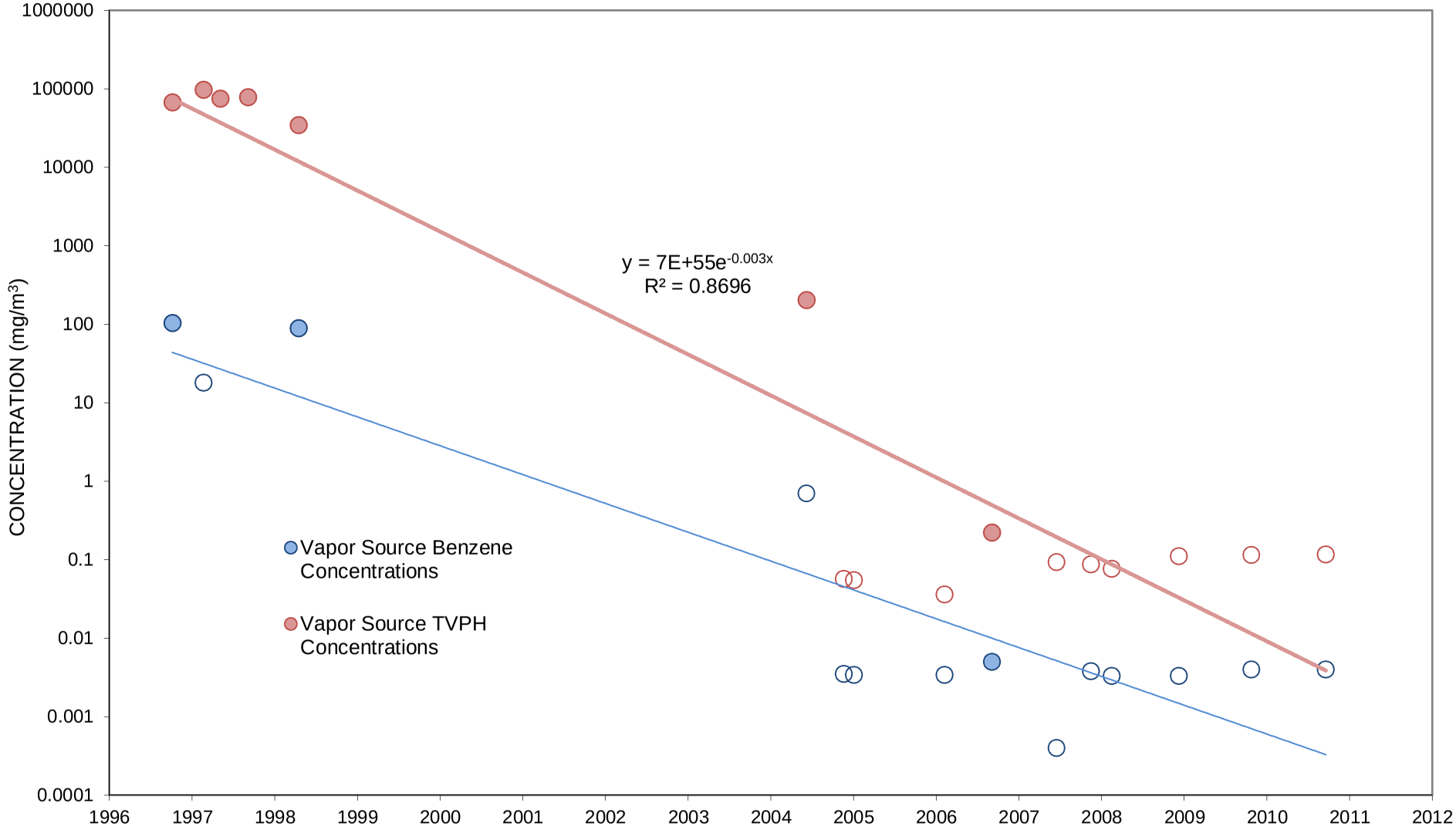
DISSOLVED PHASE CONSTITUENT CONCENTRATIONS

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: BR	Checked By: JP	Scale: 1" = 1000'	Date: 4/11/12	File: 201204_QI_TPHTrends.mxd

US EPA ARCHIVE DOCUMENT

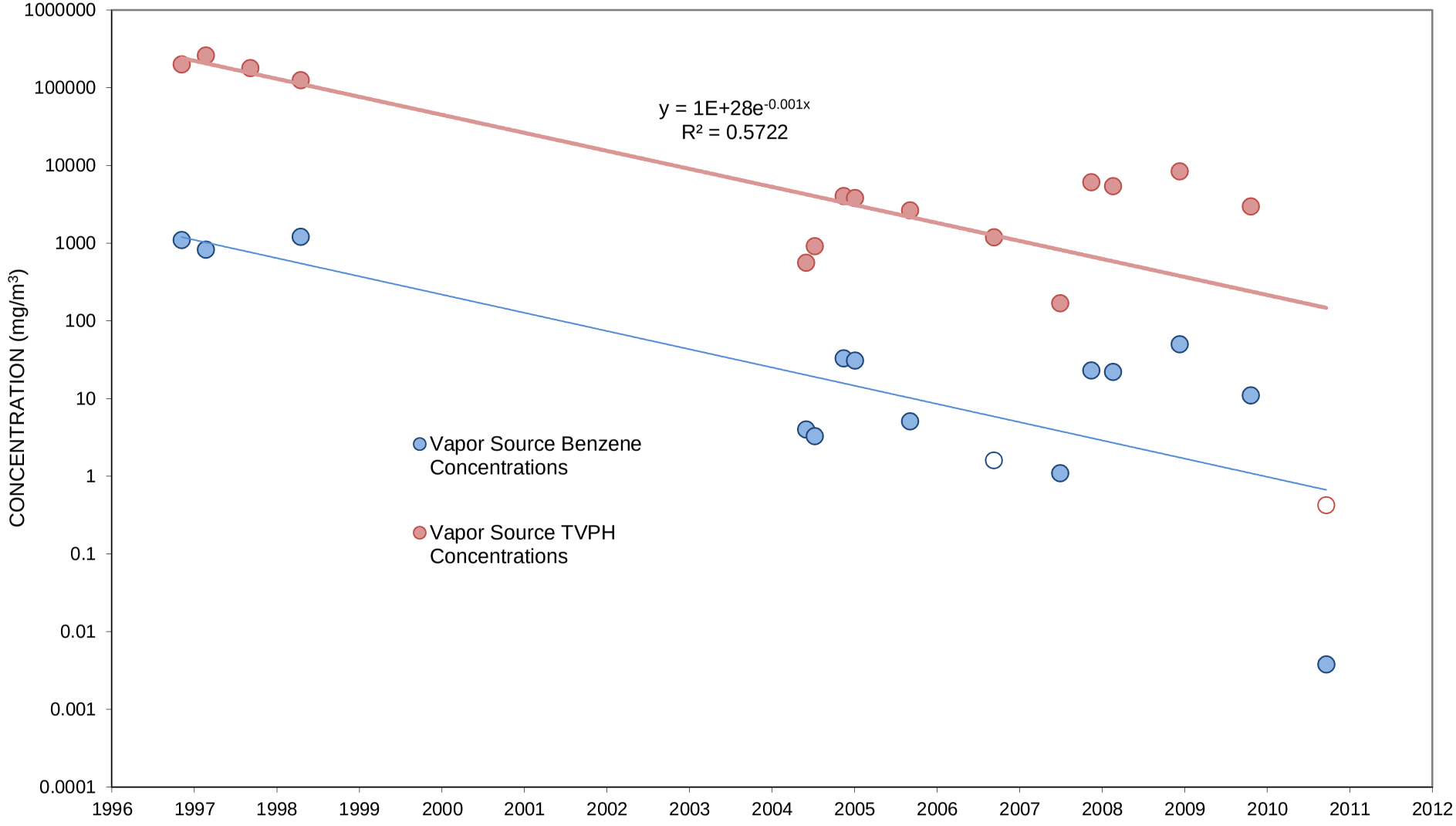
FIGURE 3-2. VAPOR SOURCE CONCENTRATIONS, NESTED VAPOR MONITORING WELL VW-93
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



EXPLANATION
OPEN SYMBOL DESIGNATES A NON-DETECT VALUE

US EPA ARCHIVE DOCUMENT

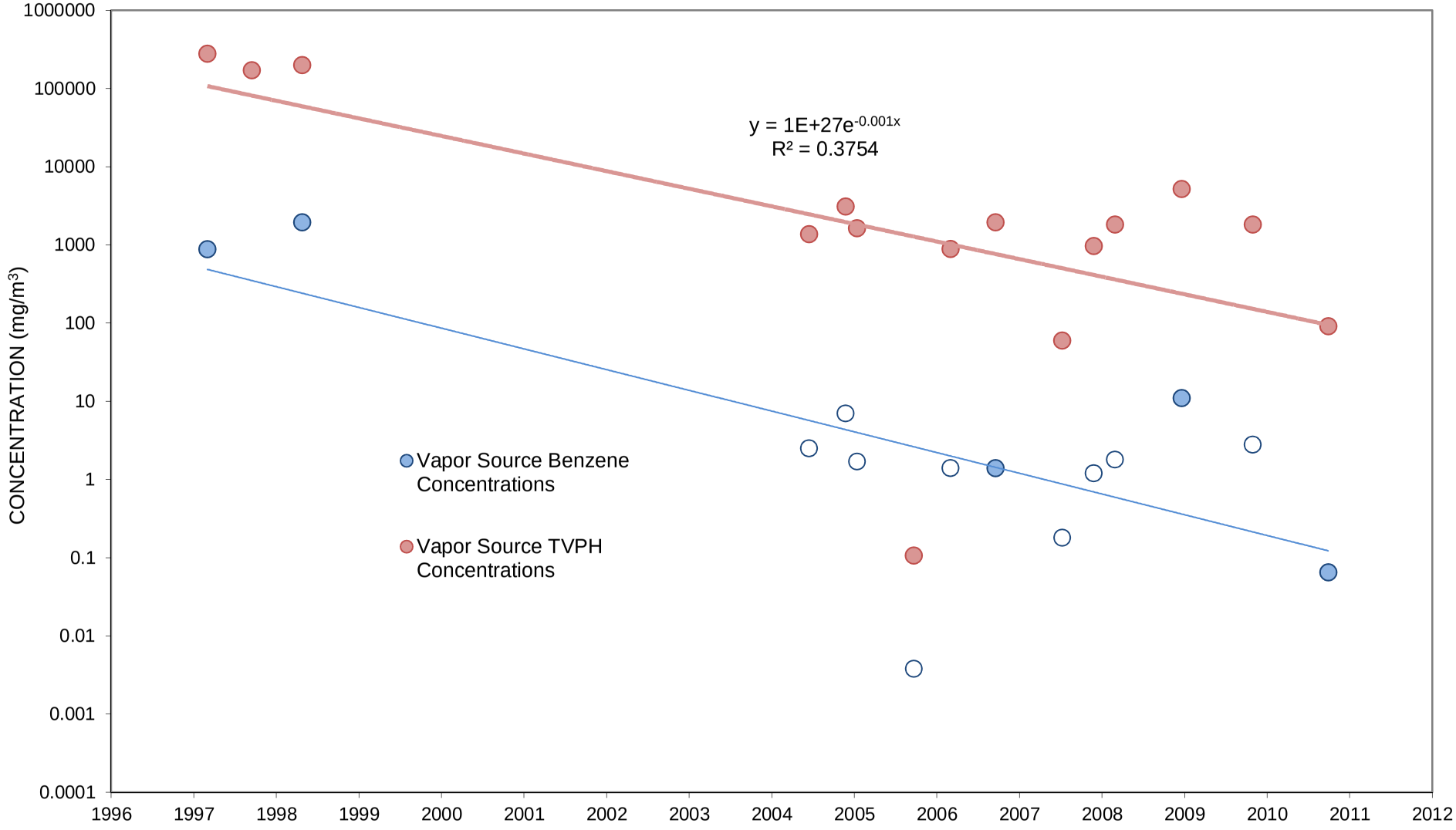
FIGURE 3-3. VAPOR SOURCE CONCENTRATIONS, NESTED VAPOR MONITORING WELL VW-96
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



EXPLANATION
OPEN SYMBOL DESIGNATES A NON-DETECT VALUE

US EPA ARCHIVE DOCUMENT

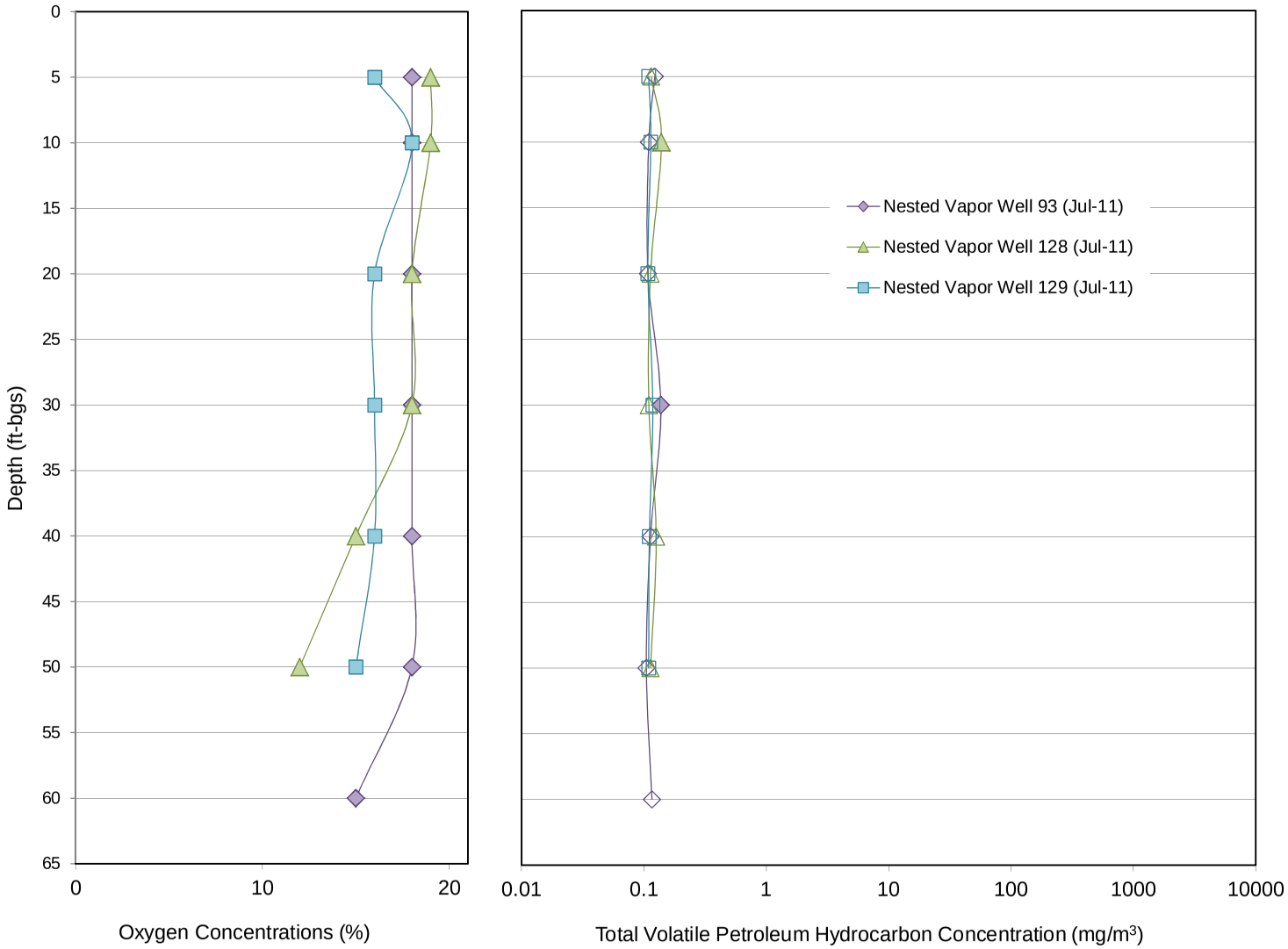
FIGURE 3-4. VAPOR SOURCE CONCENTRATIONS, NESTED VAPOR MONITORING WELL VW-99
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



EXPLANATION
OPEN SYMBOL DESIGNATES A NON-DETECT VALUE

US EPA ARCHIVE DOCUMENT

FIGURE 3-5. TVPH AND FIXED GAS PROFILES, NESTED VAPOR MONITORING WELL VW-93, VW-128, AND VW-129
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



NOTE:
- Open symbols indicate concentration reported below the laboratory detection limit

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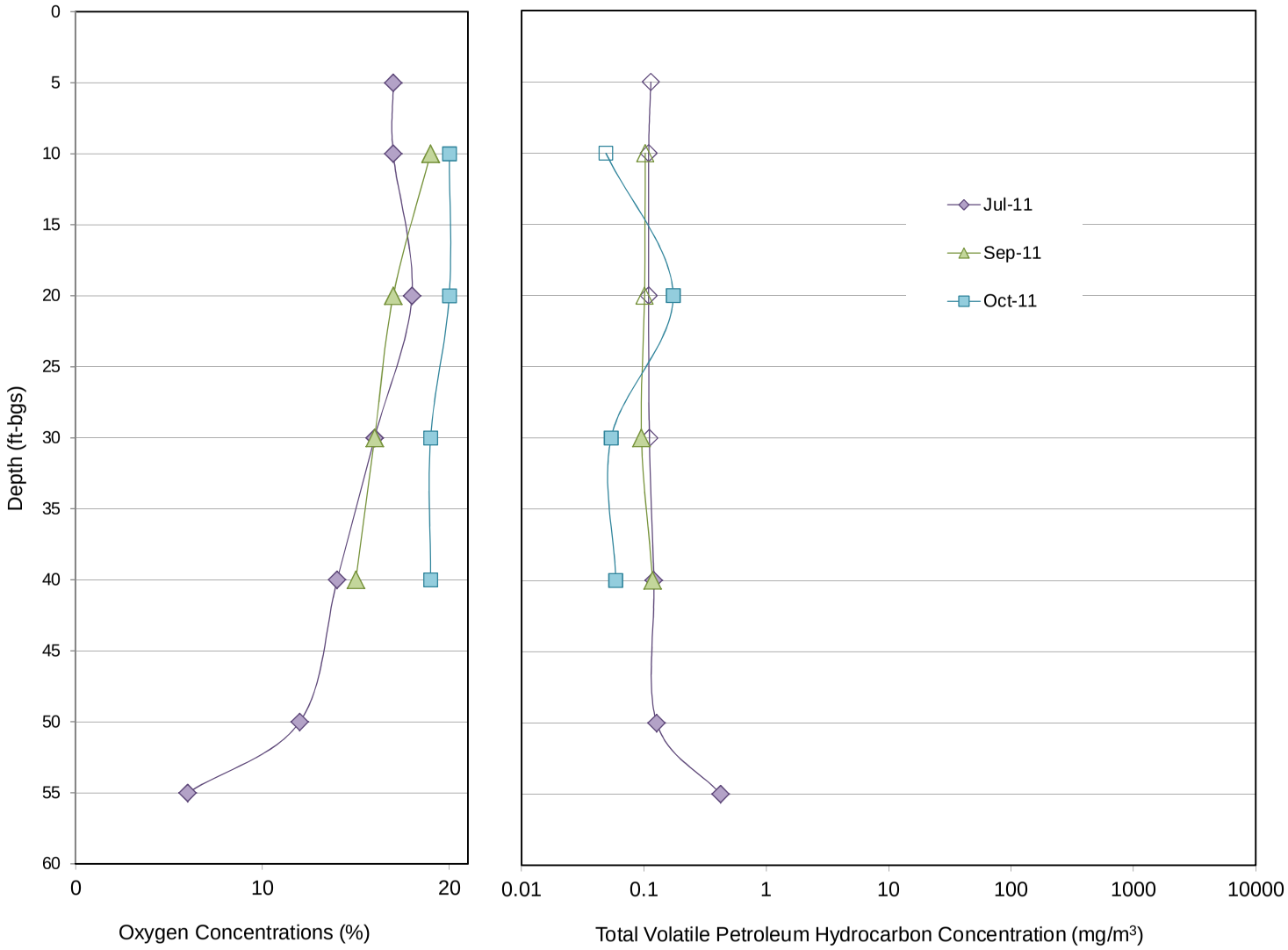
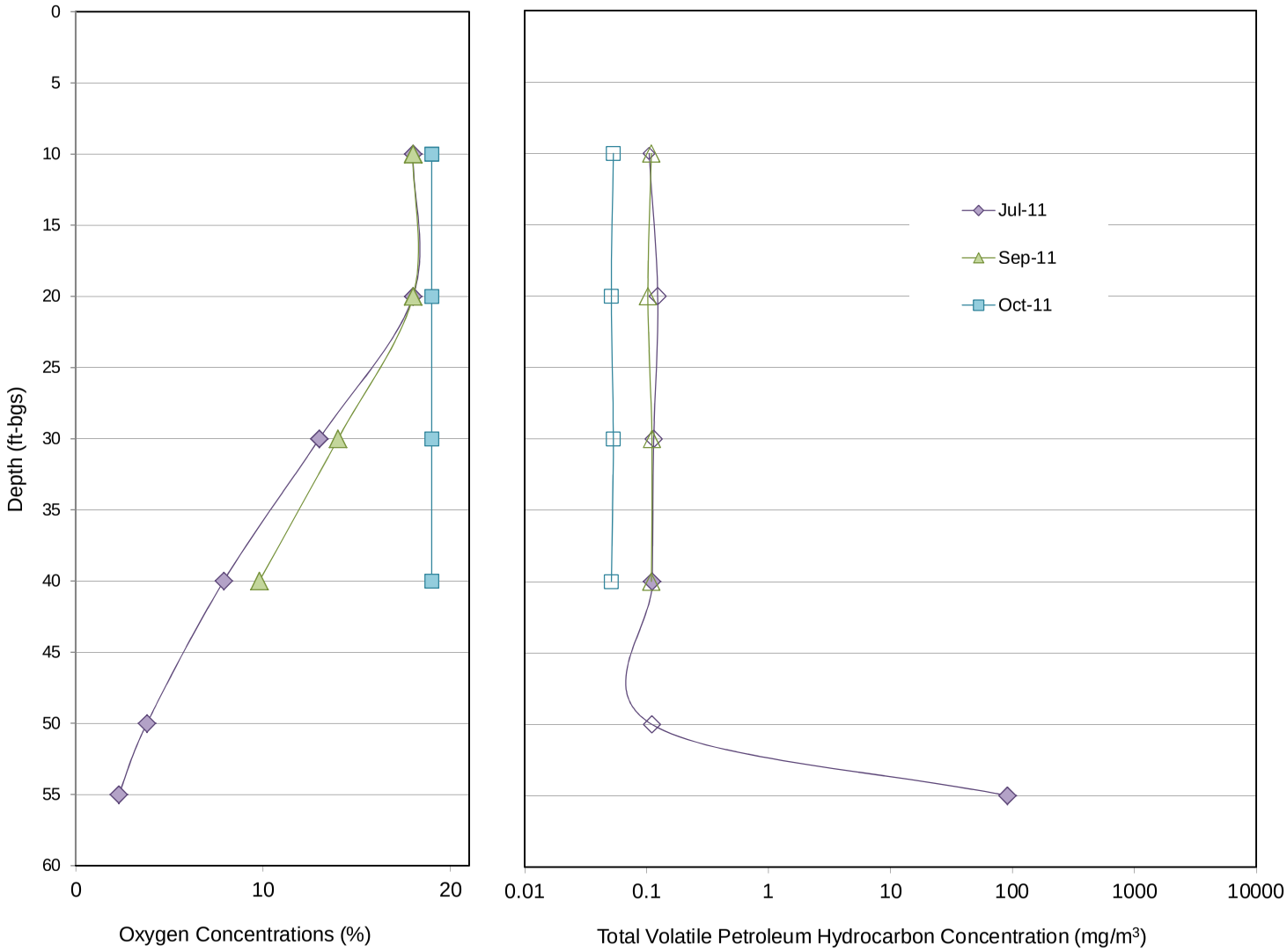
FIGURE 3-6. TVPH AND FIXED GAS PROFILES, NESTED VAPOR MONITORING WELL VW-96
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



NOTE:
- Open symbols indicate concentration reported below the laboratory detection limit

US EPA ARCHIVE DOCUMENT

FIGURE 3-7. TVPH AND FIXED GAS PROFILES, NESTED VAPOR MONITORING WELL VW-99
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



NOTE:
- Open symbols indicate concentration reported below the laboratory detection limit

FIGURE 4-1. LNAPL RECOVERY, DRAWDOWN, AND FLUID LEVEL SUMMARY (2011 HIGH-GRADE EVENT)
SECOND 2010 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

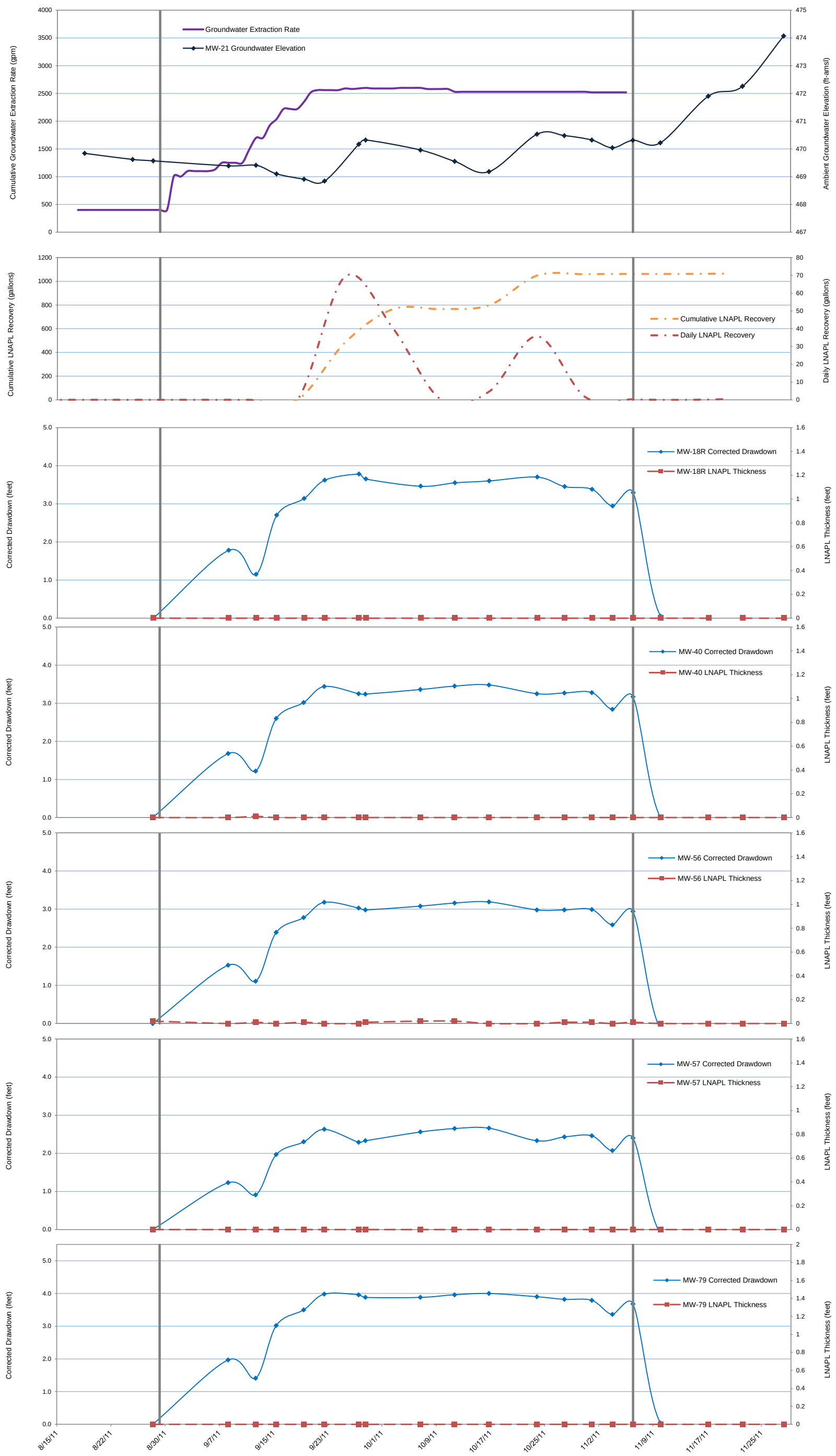
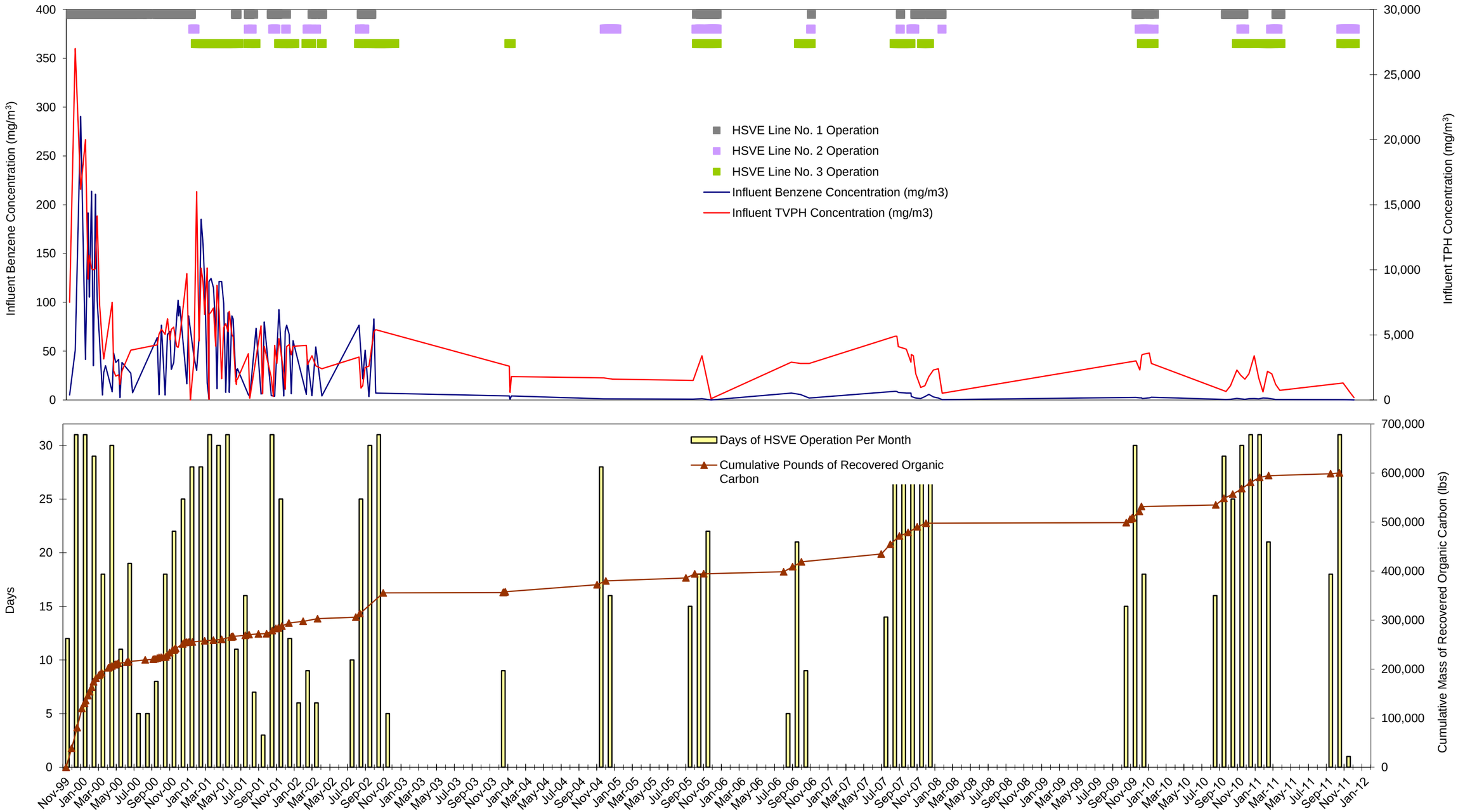


FIGURE 4-2. HSVE OPERATION, INFLUENT CONCENTRATION, AND CUMULATIVE POUNDS OF RECOVERED ORGANIC CARBON
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



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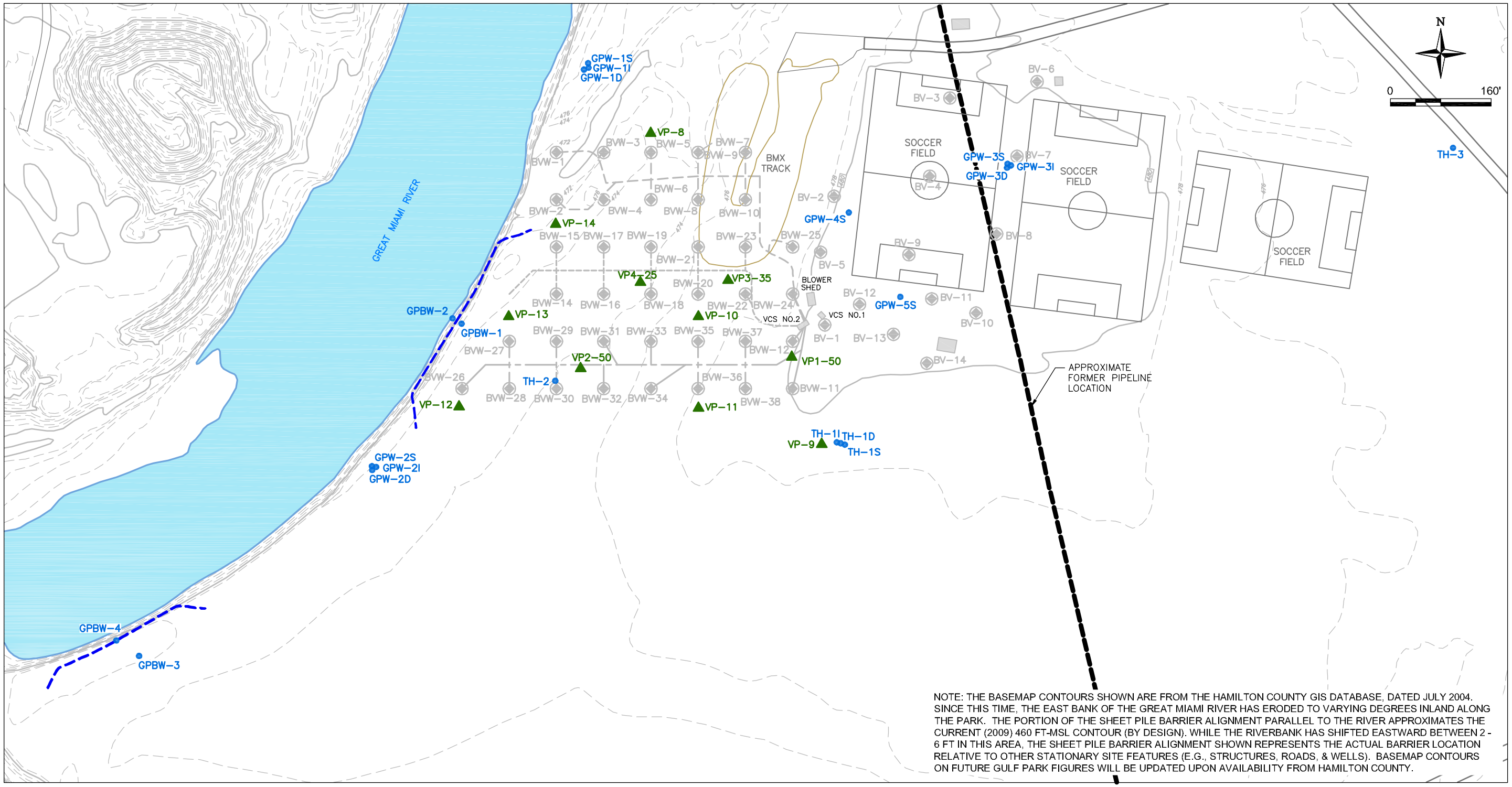

NOTE: THE BASEMAP CONTOURS SHOWN ARE FROM THE HAMILTON COUNTY GIS DATABASE, DATED JULY 2004. SINCE THIS TIME, THE EAST BANK OF THE GREAT MIAMI RIVER HAS ERODED TO VARYING DEGREES INLAND ALONG THE PARK. THE PORTION OF THE SHEET PILE BARRIER ALIGNMENT PARALLEL TO THE RIVER APPROXIMATES THE CURRENT (2009) 460 FT-MSL CONTOUR (BY DESIGN). WHILE THE RIVERBANK HAS SHIFTED EASTWARD BETWEEN 2 - 6 FT IN THIS AREA, THE SHEET PILE BARRIER ALIGNMENT SHOWN REPRESENTS THE ACTUAL BARRIER LOCATION RELATIVE TO OTHER STATIONARY SITE FEATURES (E.G., STRUCTURES, ROADS, & WELLS). BASEMAP CONTOURS ON FUTURE GULF PARK FIGURES WILL BE UPDATED UPON AVAILABILITY FROM HAMILTON COUNTY.

EXPLANATION

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

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FIGURE 5-1

GULF PARK LAYOUT

SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP	Checked By: MM	Scale: 1"=160'	Date: 11/4/11	File: 500GP_LAYOUT201204

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FIGURE 5-2. HYDROGRAPHS AND TRIGGER LEVELS FOR WELLS TH-2 AND GPW-5S (2006-2011)
SECOND 2011 SEMIANNUAL MONITORING PERIOD
GULF PARK, CLEVES, OHIO

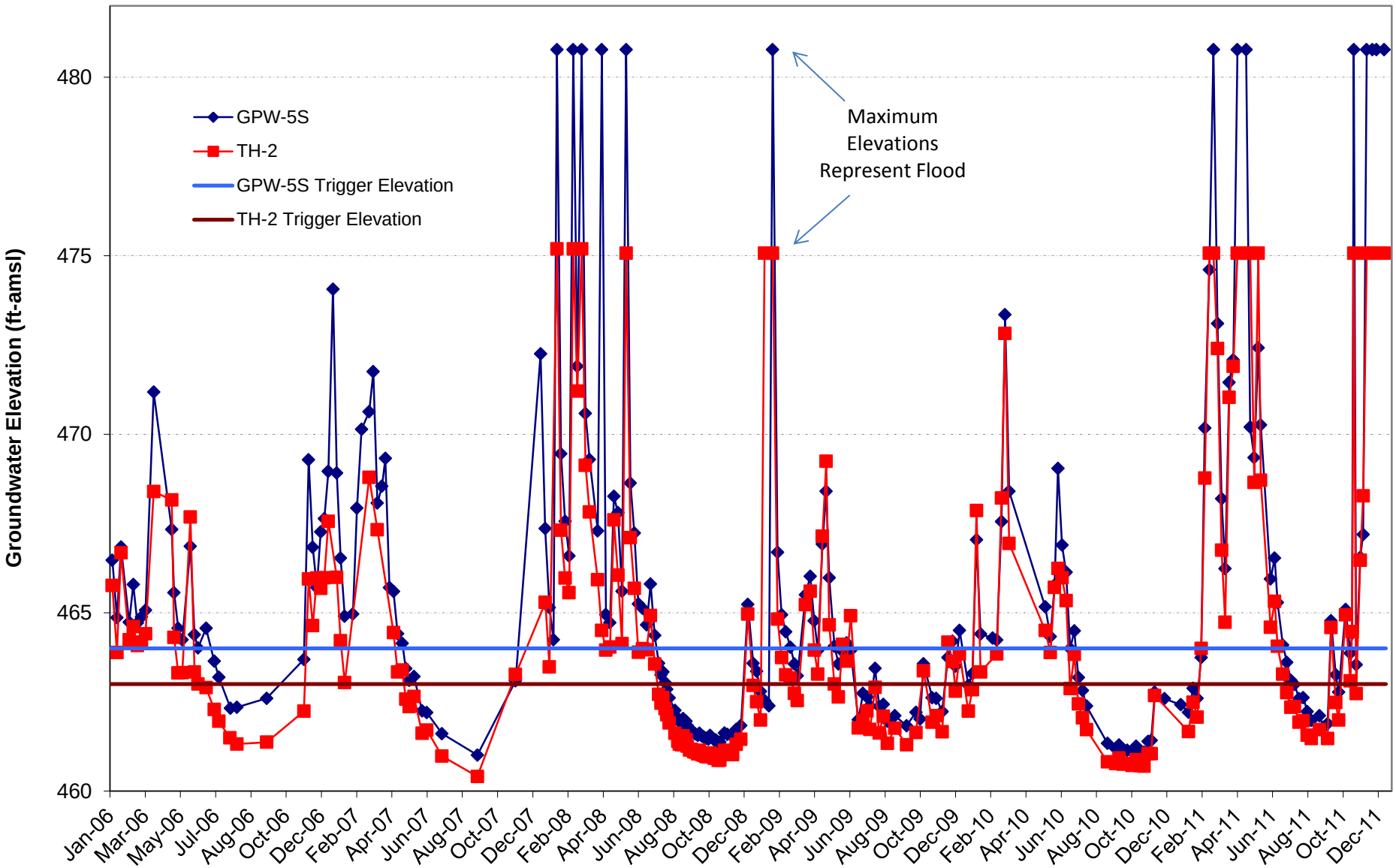

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FIGURE 5-3. TOTAL BTEX CONCENTRATION VERSUS TIME FOR MONITORING WELLS GPW-1S, GPW-2S, GPW-3S, GPW-4S, GPW-5S
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

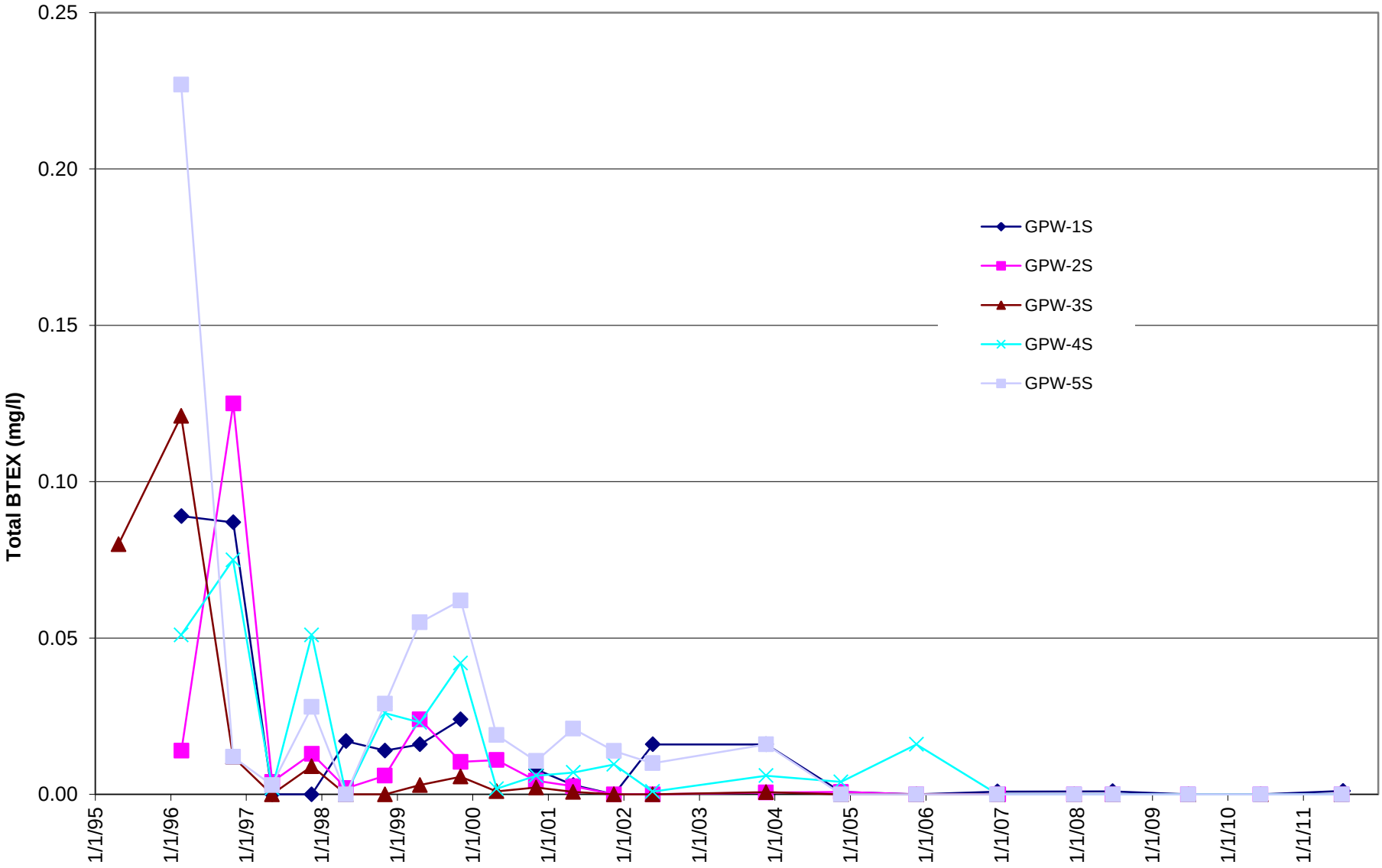

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FIGURE 5-4. TOTAL BTEX CONCENTRATION VERSUS TIME FOR MONITORING WELL TH-1S
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO

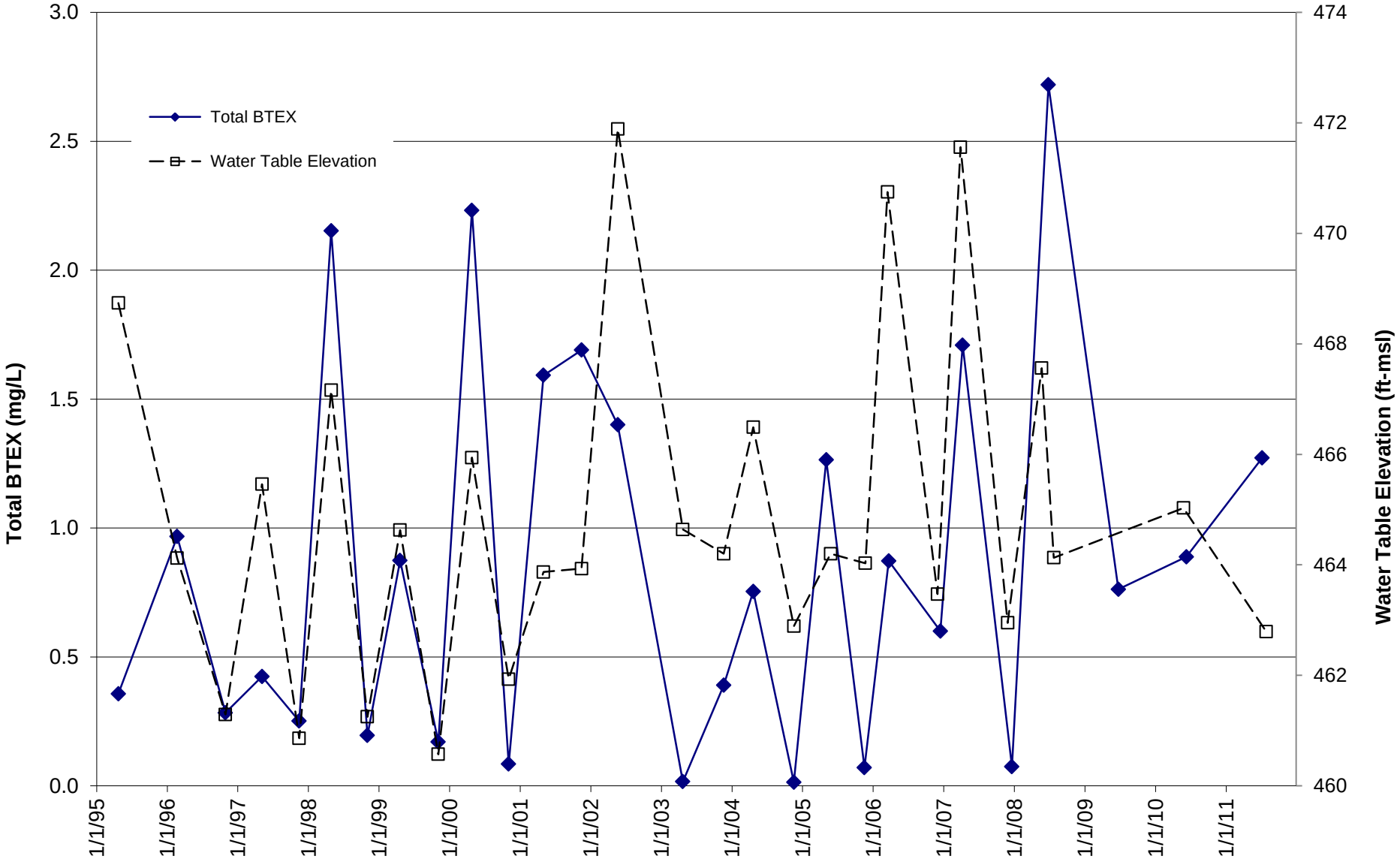

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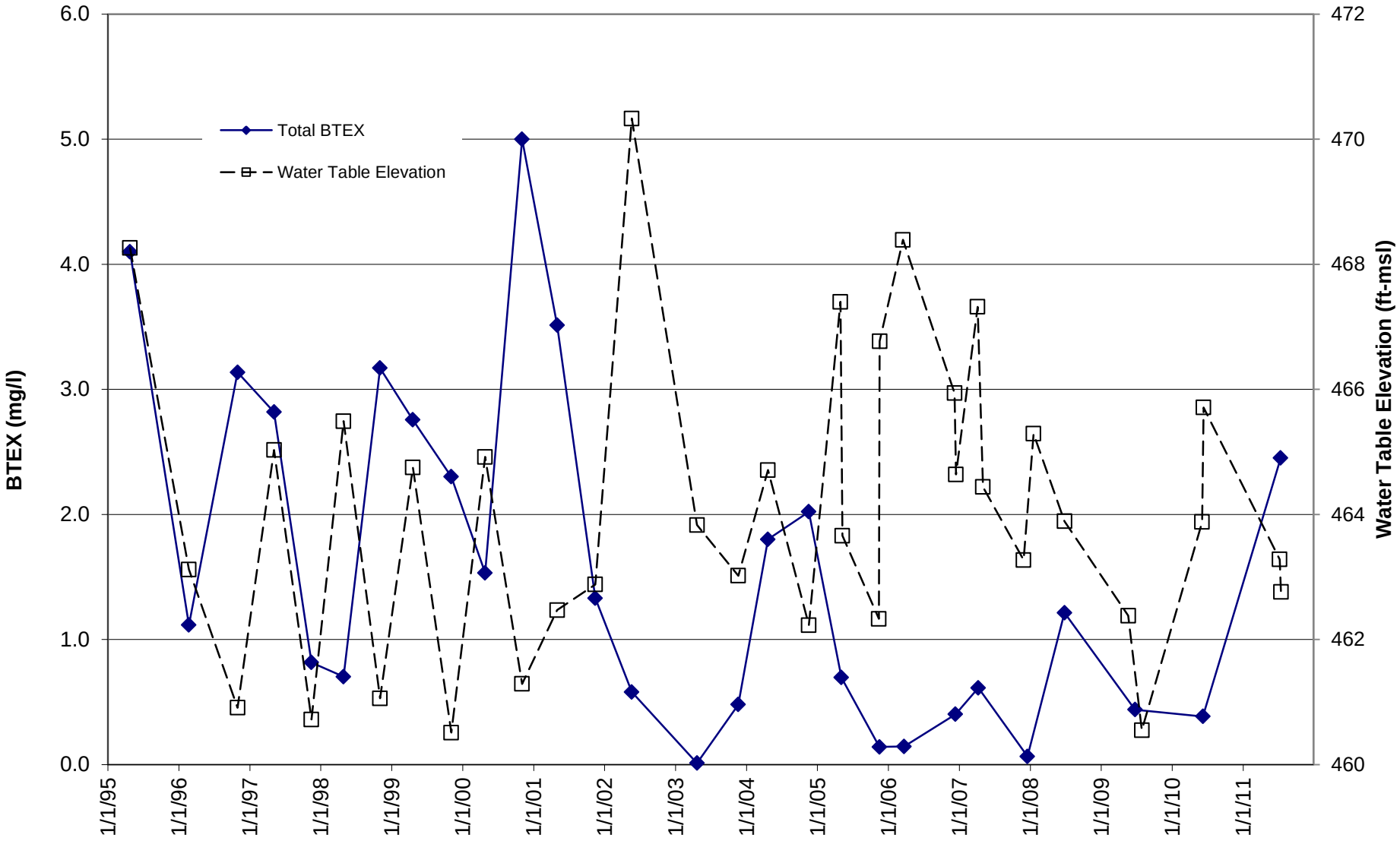
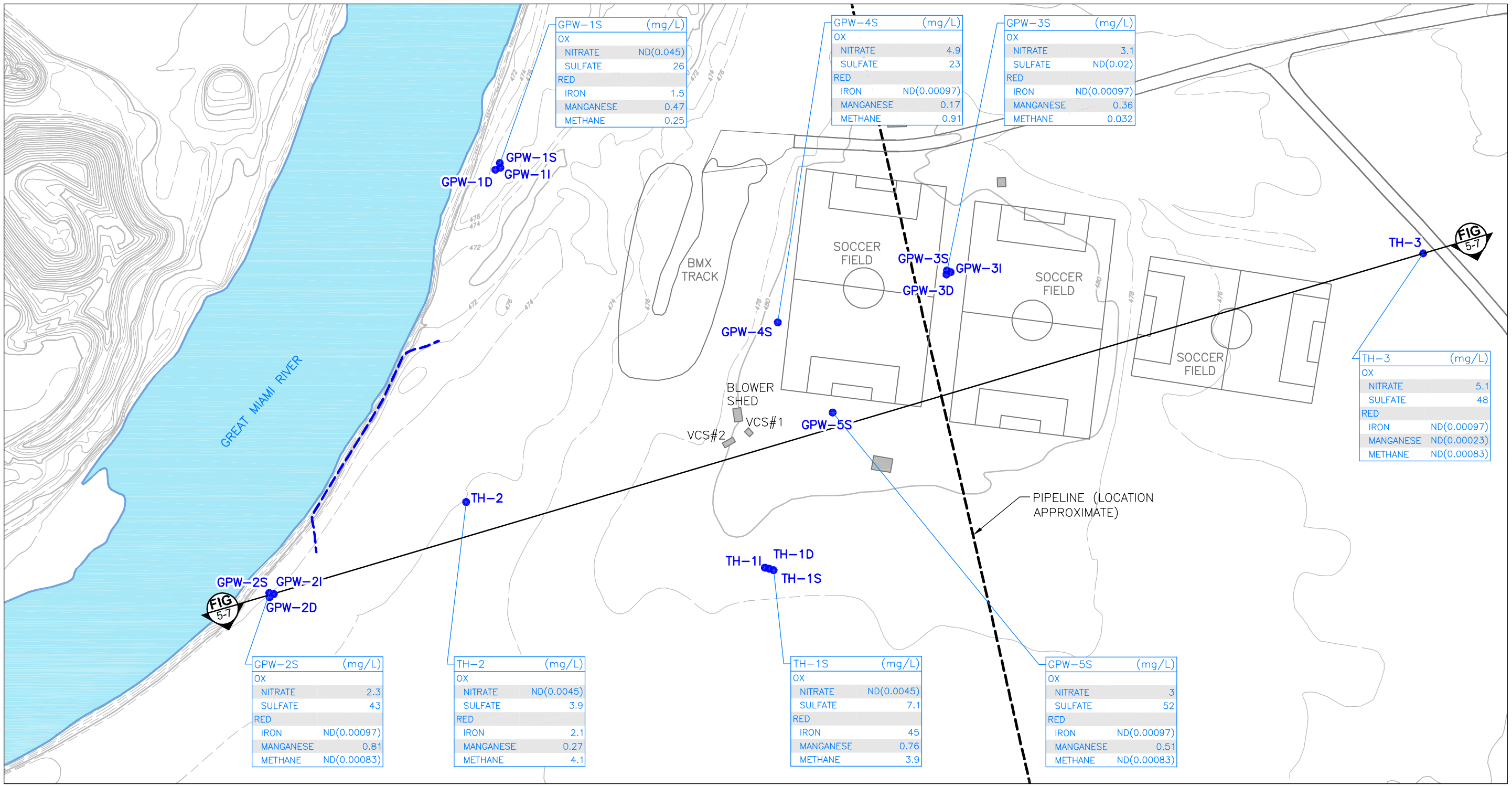
FIGURE 5-5. TOTAL BTEX CONCENTRATION VERSUS TIME FOR MONITORING WELL TH-2
SECOND 2011 SEMIANNUAL MONITORING PERIOD
GULF PARK, CLEVES, OHIO





EXPLANATION

GPW-2S	SHALLOW GROUNDWATER MONITORING WELL AND DESIGNATION
	STRUCTURE
	ROAD
	SHEET PILE BARRIER WALL
480	GENERAL TOPOGRAPHIC CONTOUR (FT AMSL, INTERVAL 2', DASHED WHERE INFERRED)

FT AMSL	FEET ABOVE MEAN SEA LEVEL
mg/L	MILLIGRAMS PER LITER
VCS	VALVE CONTROL SHED

N

0 150'

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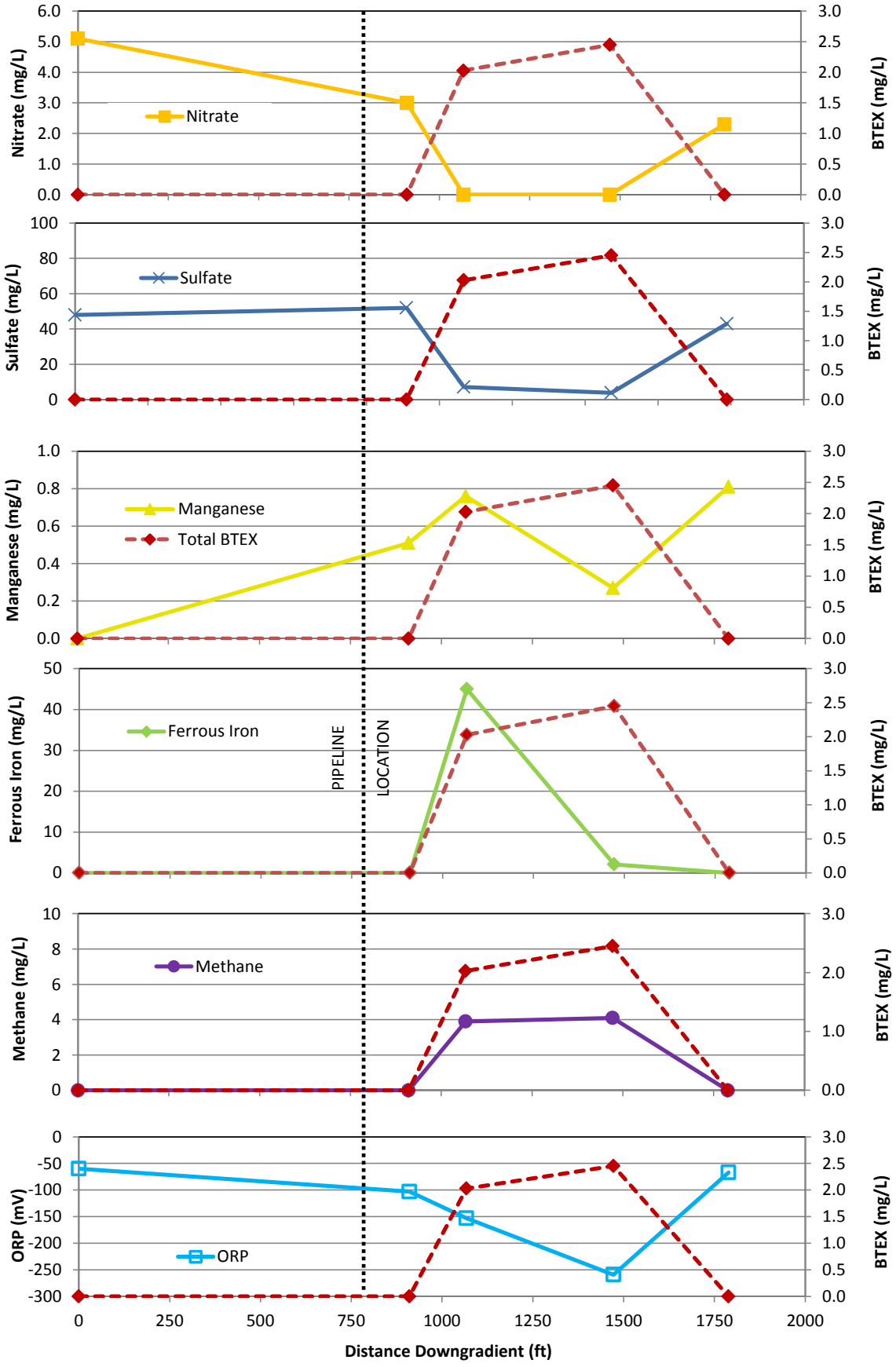
FIGURE 5-6
SUMMARY OF GROUNDWATER OXIDATION AND REDUCTION SPECIES (JULY 2011)
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY
HOOVEN, OHIO

Drawn By: REP | Checked By: JP | Scale: 1" = 150' | Date:4/15/2012 | File: 500GP_OXRED201104

FIGURE 5-7. GULF PARK TOTAL BTEX AND NATURAL ATTENUATION INDICATOR CONCENTRATION VS. DISTANCE
SECOND 2011 SEMIANNUAL MONITORING PERIOD
CHEVRON CINCINNATI FACILITY, HOOVEN, OHIO



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