# EXECUTIVE SUMMARY

The Northwest Pipe Company property ("the designated property" or "the Site") is located at 6307 Toledo Street, Houston, Harris County, Texas. The designated property consists of approximately 12.3622-acres and is located in an area of mixed industrial/commercial and residential land use. The facility served as a steel pipe mill that was in operation from the early 1950s to 2014. A comprehensive environmental site assessment has been performed at the Site in accordance with the Texas Risk Reduction Program (TRRP; 30 Texas Administrative Code Chapter 350) administered by the Texas Commission on Environmental Quality (TCEQ). The facility is enrolled in the TCEQ Voluntary Cleanup Program (VCP) with VCP ID Number 2665. Based on the findings of the comprehensive site assessment, key site characteristics include the following:

- Shallow groundwater underlying the Site at approximately 20 to 30 feet below ground surface has been affected by the following constituents of concern (COCs) in concentrations that exceed the applicable ingestion-based Protective Concentration Levels (PCLs): 1,1-Dichloroethylene (1,1-DCE); Tetrachloroethylene (PCE); Trichloroethylene (TCE); cis-1,2-Dichloroethylene (cis-1,2-DCE); Vinyl chloride; and 1,2-Dichloroethane (1,2-DCA).
- The affected shallow groundwater-bearing zone has been designated by TCEQ as Class 2, with a sustainable well yield of approximately 650 gallons per day (less than 0.5 gallons per minute).
- The extent of affected groundwater has been delineated per TRRP requirements. The groundwater PCLE zone is located at, and in the vicinity of, the southern portion of the Northwest Pipe Company property (see Figure C.2)
- The affected shallow groundwater does not threaten water supply wells or other receptors located in the vicinity of the Site, and the City of Houston provides potable water to the Site vicinity.
- The groundwater plume is stable due to the historical nature of release, slow-moving groundwater, and natural attenuation of the COCs. Plume stability was confirmed through a lines-of-evidence evaluation that included historical COC concentration trends over time and distance, geochemical indicators of biodegradation, and fate and transport analysis using analytical groundwater modeling.
- Soil sampling results indicated that no constituents, with the exception of 1,1-DCE at a single location, reported exceedences of applicable ingestion (i.e., soil-to-groundwater) PCLs.
- COC concentrations in soil and groundwater do not exceed non-ingestion PCLs at any location.

The proposed response action for affected groundwater is a City of Houston Municipal Setting Designation (MSD), which would prohibit use of shallow groundwater underlying the designated property, thereby eliminating the potential for ingestion of affected groundwater.

# APPENDIX A

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

1. ***Provide a legal description of the boundaries of the designated property, including metes and bounds, and a copy of the deed for the property. A professional surveyor currently registered with the Texas Board of Professional Surveying must certify that all property descriptions with metes and bounds are accurate.***

## ATTACHMENTS

Attachment A.1 Metes and Bounds Description and Plat Map

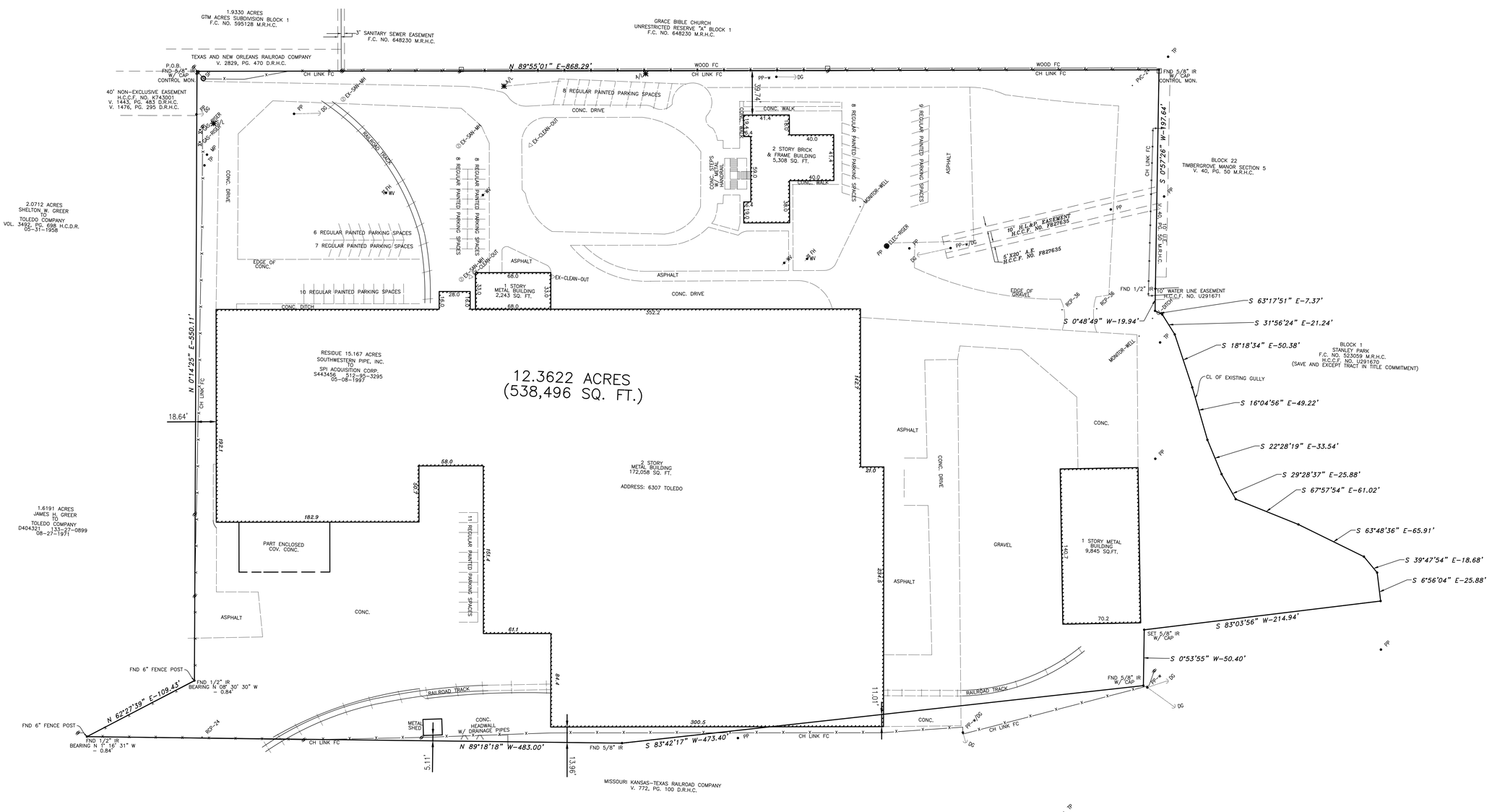
Attachment A.2 Deed of Subject Property

# APPENDIX A

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

## Attachment A.1

## Metes and Bounds Description and Plat Map




TO: NORTHWEST PIPE COMPANY, FIDELITY NATIONAL TITLE INSURANCE COMPANY;

This is to certify that this map or plat and the survey on which it is based were made and in accordance with the "2011 Minimum Standard Detail Requirements for ALTA/ACSM Land Title Surveys," jointly established and adopted by ALTA and NSPS, and includes items 1, 2, 3, 4, 6(b), 7(a), 7(b)(1), 7(c), 8, 9, 11(a), 13, 14, 16, 17, 18 and 21 of Table A thereof. The field work was completed on 07-30-2015.

REGISTERED N. M. MATHIS 4517 PROFESSIONAL LAND SURVEYOR STATE OF TEXAS

| 11–20–2015 | N. M. Mathis | 4517 |
|---|---|---|
| DATE | N. M. MATHIS | R.P.L.S. NO. |

GENERAL NOTES

1. ALL BEARINGS ARE BASED ON THE WEST LINE TO BE N 0°14'25" E.
2. A PORTION OF THE SUBJECT SITE IS LOCATED WITHIN THE 100 YEAR SPECIAL FLOOD HAZARD AREA ACCORDING TO THE MOST REGENT OFFICIAL INSURANCE RATE MAP, DATED JUNE 09, 2014 MAP NUMBER 48201C0570M, ZONES X SHADED, AE PROMULGATED BY THE ADMINISTRATOR OF THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT OF THE UNITED STATES. ANY REFERENCE TO THE 100 YEAR FLOOD PLAIN OR FLOOD HAZARD ZONES, ARE AN ESTIMATE BASED ON DATA PROVIDED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY'S FLOOD INSURANCE PROGRAM AND SHOULD NOT BE INTERPRETED AS A STUDY OR DETERMIN–ATION OF THE FLOODING PROPENSITIES OF THIS PROPERTY.
3. FUTURE REDEVELOPMENT OF SITE IS SUB–JECT TO CITY OF HOUSTON ORDINANCE NO. 85–1878, DATED OCTOBER 23, 1985 BY THE CITY OF HOUSTON, A CERTIFIED COPY OF WHICH WAS FILED AUGUST 1, 1991, CITY OF HOUSTON RELATING TO RULES, AND REGULATIONS, PROCEDURES AND DESIGN STANDARDS FOR DEVELOPING AND PLATTING AND PROVIDING FOR ESTABLISHING BUILDING SETBACK LINES.
4. FOR ADDITIONAL BUILDING RESTRICTION, SEE RESTRICTIVE COVENANTS.
5. UTILITIES SHOWN HEREON ARE BASED ON CITY OF HOUSTON AND UTILITY COMPANY DRAWINGS WITH FIELD TIES TO EXISTING SURFACE FIXTURES. ALL UTILITIES SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION. DUE TO A LACK OF HISTORICAL INFORMATION AND ONGOING CONSTRUCTION IN THE AREA UTILITY INFORMATION MAY BE INCOMPLETE OR SHOWN INCORRECTLY. SURVEYOR WILL REVISE THE DRAWING IF ADDITIONAL INFORMATION BECOMES AVAILABLE. ALL COMMUNICATION LINES SHOWN AS MARKED AT SURFACE ELEVATIONS. ALL WATER LINES GAS LINES AND BURIED ELECTRIC ARE ASSUMED TO HAVE 4' OF COVER.

*LEGEND*

- TRAFFIC SIGN
- COMMUNICATIONS MANHOLE
- TELEPHONE ENCLOSURE
- CHAIN LINK FENCE
- WOOD FENCE
- POWER POLE
- POWER POLE w/DOWN GUY
- STREET/AREA LIGHT
- GAS VALVE
- GAS METER
- STORM/SAN/CHILLWATER MANHOLE
- ROOF OVERHANG
- ELEC MANHOLE
- E — OVERHEAD ELECTRIC LINE
- 12" RCP — STORM SEWER WITH SIZE
- 2"G — BURIED GAS LINE WITH SIZE
- 12"WL — BURIED WATER LINE WITH SIZE
- // — CHAIN LINK FENCE
- CMP — CORRUGATED METAL PIPE
- IP — IRON PIPE
- IR — IRON ROD
- ℄ — CENTERLINE
- PTP — PINCH TOP PIPE
- PULL BOX
- NO PARKING SIGN
- CURB INLET
- SQUARE INLET
- TRAFFIC SIGNAL POLE
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- SANITARY CLEAN OUT
- JUNCTION BOX
- GAS MANHOLE
- HANDICAP PARKING
- TELEPHONE
- SAMPLE WELL
- YD=YARD DRAIN

METES AND BOUNDS DESCRIPTION
12.3622 ACRES OF LAND OUT OF
JOHN REINERMAN SURVEY, A-642
HOUSTON, HARRIS COUNTY, TEXAS

All that certain 12.3622 acres of land out of the John Reinerman Survey, A-642, Houston, Harris County, Texas being the residue of that same called 15.167 acre tract described in a deed dated 05-08-1997 from Southwestern Pipe, Inc. to SPI Acquisition Corp. filed in the Official Public Records of Real Property of Harris County, Texas, at Clerk File No. S443456, Film Code No. 512-95-3295 and being more particularly described by metes and bounds as follows:

BEGINNING at a found 5/8" iron rod marking the northwest corner of said 15.167 acre tract;

THENCE N 89° 55' 01" E – 868.29', with the north line of said 15.167 acre tract to a found 5/8" iron rod with cap for corner;

THENCE S 0° 57' 26" E – 197.64', with the west line of Block 1 of the Stanley Park Subdivision, according to the plat thereof recorded in Harris County Clerk's File No. 523059, to a found 5/8" iron rod and being the centerline of an existing gully, the following bearings and distances;

S 0° 48' 49" W – 19.94', to a point for corner;
S 63° 17' 51" E – 7.37', to a point for corner;
S 31° 56' 24" E – 21.24', to a point for corner;
S 18° 18' 34" E – 50.38', to a point for corner;
S 16° 04' 56" E – 49.22', to a point for corner;
S 22° 28' 19" E – 33.54', to a point for corner;
S 29° 28' 37" E – 25.88', to a point for corner;
S 67° 57' 54" E – 61.02', to a point for corner;
S 63° 48' 36" E – 65.91', to a point for corner;
S 39° 47' 54" E – 18.68', to a point for corner;
S 06° 56' 04" E – 25.88', to a point for corner;

THENCE S 83° 03' 56" W – 214.94', with the south line of said 15.167 acre tract to a set 5/8" iron rod with cap for corner;

THENCE S 0° 53' 55" W – 50.40', with the south line of said 15.167 acre tract to a found 5/8" iron rod with cap for corner;

THENCE S 83° 42' 17" W – 473.40', with the north line of the MK & T Railroad to a found 5/8" iron rod for angle point;

THENCE N 89° 18' 18" E – 483.00', with the north line of said MK & T Railroad to a found 6" fence post for corner;

THENCE N 62° 27' 39" E – 109.43', with the east line of that certain called 1.6191 tract described in a deed dated 08-27-1971 from James H. Greer to the Toledo Company filed in the Official Public Records of Real Property of Harris County, Texas, at Clerk File No. D404321, Film Code No. 133-27-0899 to a found 6" fence post for corner;

THENCE N 0° 14' 25" E – 550.11' with the west line of said 15.167 tract to the POINT OF BEGINNING and containing 12.3622 acres (538,496 square feet) of land, more of less.

SCHEDULE B EXCEPTIONS

b. Easement 40 feet wide for road and as a way of ingress and egress and right and easement to construct, maintain and operate a railroad spur as set forth in the deed from Shelton W. Greer to Southwest Steel Products, dated June 22, 1946, recorded in Volume 1476, Page 295 of the Deed Records of Harris County, Texas.(PLOTTED)

c. Unrecorded easement from S. S. McClendon, Jr.,et al.,to Houston Lighting & Power Company, dated September 1, 1955, covering 2 feet by 2 feet to cover the location of one pole and an aerial easement 7.5 feet wide from a plane 30 feet above the ground as shown on Houston Lighting & Power Company's Sketch No. A•R-10555 H, and as excepted in the Deed from Southwest Steel Products to Armco Steel Corporation by deed dated June 30, 1960, recorded in Volume 4070, Page 448 (8198058) of the Deed Records of Harris County, Texas. (NO SKETCH AVAILABLE TO LOCATE)

d. Water meter easement (10' X 20') granted to the City of Houston by instrument recorded under Harris County Clerk's File No. 0572229, as corrected by E221641.(DOES NOT AFFECT)

e. An unobstructed ground easement ten (10) feet in width and 242 feet in length, together with an aerial easement twenty (20) feet wide from a plane twenty (20) feet above the ground upward with the same centerline as at ground level,granted to Houston Lighting & Power Company by instrument recorded under Harris County Clerk's File No. F827635, the location of the centerline of which is shown on Sketch No. 78-1334 attached thereto.(PLOTTED)

f. Water line easement 10 feet wide granted to Southwestern Pipe, Inc. by instrument recorded under Harris County Clerk's File No. U291671.(PLOTTED)

g. Water meter easement granted to the City of Houston by instrument recorded under Harris County Clerk's File No. W767365.(DOES NOT AFFECT)

h. Memorandum of Purchase Option Agreement dated March 31, 2014, by and between Northwest Pipe Company and Centric Pipe, LLC recorded under Harris County Clerk's File No. 20140131428.(NOT PLOTTED)

PREJEAN & COMPANY, INC.
surveying / mapping
9324 WESTVIEW DRIVE
HOUSTON, TX 77055
713–467–MAPS

# ALTA/ACSM LAND TITLE SURVEY

12.3622 ACRES OUT OF THE

## JOHN REINERMAN SURVEY, A–642

HOUSTON, HARRIS COUNTY, TEXAS

| 11–20–2015 | 1"=40' | JOB NO. 41–635 |
|---|---|---|
| GF NO. 1033005853 | FIDELITY NATIONAL TITLE INSURANCE COMPANY | |

# APPENDIX A

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

## Attachment A.2
## Deed of Subject Property

S443456

512-95-3295

# SPECIAL WARRANTY DEED

05/08/97 200410422 S443456 $17.00

STATE OF TEXAS §
§ KNOW ALL MEN BY THESE PRESENTS:
COUNTY OF HARRIS §

THAT SOUTHWESTERN PIPE, INC. ("Grantor"), a Delaware corporation, for and in consideration of the sum of Ten Dollars ($10.00) and other good and valuable consideration to it in hand paid by SPI ACQUISITION CORP. ("Grantee"), a Texas corporation, the receipt and sufficiency of which is hereby acknowledged and confessed, has GRANTED, SOLD and CONVEYED and by these presents does GRANT, SELL and CONVEY unto Grantee whose address is 6307 Toledo Street, Houston, Texas 77008, the real property (the "Property") located in Harris County, Texas described on Exhibit A attached hereto and made a part hereof for all purposes, together with all improvements thereon and appurtenances thereto.

This conveyance is made and accepted subject to (i) restrictive covenants affecting the Property; (ii) any discrepancies, conflicts or shortages in area or boundary lines, or any encroachments, if any overlapping of improvements; (iii) standby fees and taxes for the current and subsequent years, and subsequent assessments for prior years due to a change in land usage or ownership; (iv) existing building and zoning ordinances; (v) rights of parties in possession; (vi) covenants, restrictions, conditions, reservations, exceptions and easements; (vii) oil, gas, mineral and royalty conveyances, and leases of record, if any, in effect, shown of record in the county clerk's office where the Property, or any part thereof is located; and (viii) other conditions and encumbrances affecting title to the extent (but no further) that each such matter described or referred to in this sentence is valid and subsisting as of the date hereof and affects title to the Property (collectively, the "Existing Encumbrances").

TO HAVE AND TO HOLD the Property, together with all and singular the rights and appurtenances thereto in anywise belonging, unto Grantee, its successors and assigns, forever, subject to the Existing Encumbrances; and Grantor does hereby bind itself, its successors and assigns, to WARRANT and FOREVER DEFEND all and singular the Property, subject to the Existing Encumbrances, unto Grantee, its successors and assigns, against every person whomsoever lawfully claiming or to claim the same or any part thereof, by, through or under Grantor, but not otherwise.

FILED
97 MAY -8 PM 4:30
COUNTY CLERK
HARRIS COUNTY, TEXAS

H1995A-132935.1
11257:0013

Vesting deed

COPYRIGHT © 1997 CHICAGO TITLE DATA, INC. ALL RIGHTS RESERVED
NO PART OF THIS MICROFILM MAY BE REPRODUCED IN ANY FORM OR BY ANY MEANS WITHOUT PERMISSION IN WRITING FROM THE COPYRIGHT OWNER.

512-95-3296

IN TESTIMONY WHEREOF, this instrument is dated effective as of the 30th day of April, 1997.

SOUTHWESTERN PIPE, INC.

By: [signature]
Name: PHILIP LEWIS
Title: PRES

THE STATE OF TEXAS §
§
COUNTY OF HARRIS §

This instrument was acknowledged before me on this 30th day of April, 1997, by PHILIP LEWIS, PRESIDENT of Southwestern Pipe, Inc., a Delaware corporation, on behalf of said corporation.

[signature]
Notary Public in and for
the State of Texas
Printed Name: Jeanette Lindsay
My Commission Expires:

JEANETTE LINDSAY
Notary Public, State of Texas
My Commission Expires
MARCH 23, 1998

0037596

111995A:132925-1
11257.0013



COPYRIGHT © [illegible] DATA, INC. ALL RIGHTS RESERVED
[illegible]

512-95-3297

Exhibit A

FIELD NOTES of 15.167 Acres of land in the John Reinerman Survey, Abstract No. 642, Houston, Harris County, Texas, said 15.167 Acres being more particularly described as follows:

BEGINNING at a fence corner, the Southwest corner of Lot 11, Block 22 of Timbergrove Manor, a Subdivision recorded in Volume 40 at Page 50 of the Map Records of Harris County, Texas;

THENCE along the South lines of Blocks 22 and 21 of said Timbergrove Manor, North 83 degrees 40 minutes 42 seconds East 612.86 feet to a 1-1/4 inch iron pipe in a Gully;

THENCE along the Center-line of said Gully in a Southwesterly direction with all of its meanders approximately 450 feet to a point in the North line of the M.K.T. Railroad, Eureka Yards;

THENCE along the North line of said Eureka Yards, South 83 degrees 12 minutes 51 seconds West at 39.55 feet pass a 3/4 inch iron pipe and T Rail, in all 370.0 feet to an iron rod for corner whence the Southwest corner of Block 22, Timbergrove Manor bears North 01 degree 03 minutes 05 seconds East 337.25 feet;

THENCE South 01 degree 02 minutes 50 seconds West 50.40 feet to a fence corner for corner;

THENCE along the North line of said Eureka Yards, as follows:

South 83 degrees 56 minutes 58 seconds West 478.38 feet;

and North 83 degrees 06 minutes 26 seconds West 462.79 feet to a 6-inch iron post for corner;

H1995A 32925-1
11257:00.3

512-953-3298

THENCE North 62 degrees 40 minutes 57 seconds East 199.18 feet to a 6-inch iron post for corner;

THENCE North 00 degrees 25 minutes 52 seconds East 549.40 feet to a 6-inch iron post for corner;

THENCE South 89 degrees 56 minutes 15 seconds East 867.95 feet to a fence corner for corner;

THENCE along the West line of Block 22 of Timbergrove Manor, South 01 degree 11 minutes 01 second West 198.08 feet to the PLACE OF BEGINNING containing 15.167 Acres of land.

M. Lozano

H. Lozano, Public Surveyor
Texas Reg. No. 80

Map No. 1240-A

[illegible]
[illegible] THE
[illegible] ADEQUATE
[illegible]
[illegible]

512-95-3299

After recording, return to:

Mr. Kevin Peter
Liddell, Sapp, Zivley, Hill & LaBoon, L.L.P.
3400 Texas Commerce Tower
600 Travis Street
Houston, Texas 77002

ANY PROVISION HEREIN WHICH RESTRICTS THE SALE, RENTAL, OR USE OF THE DESCRIBED REAL PROPERTY BECAUSE OF COLOR OR RACE IS INVALID AND UNENFORCEABLE UNDER FEDERAL LAW
THE STATE OF TEXAS
COUNTY OF HARRIS

I hereby certify that this instrument was FILED in File Number Sequence on the date and at the time stamped hereon by me; and was duly RECORDED, in the Official Public Records of Real Property of Harris County, Texas

MAY 8 1997

COUNTY CLERK
HARRIS COUNTY TEXAS

**APPENDIX B**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

***2. Provide a description of the current use, and, to the extent known, the anticipated use(s), of the designated property and properties within 500 feet of the boundary of the designated property.***

The Northwest Pipe Company property ("the designated property" or "the Site") is located in an area of mixed industrial/commercial and residential land use (see Figure B.1). The designated property to be included in the Municipal Setting Designation, as measured by the most recent survey dated 20 November 2015, is 12.3622 acres.

As shown on Figure B.1, the designated property is bounded to the north by Grace Bible Church and Southwaste Disposal LLC, to the east by residential properties and an undeveloped wooded tract owned by 5177 Builders Ltd., to the west by several commercial tracts owned by Greer Capital Corporation, and to the south by Union Pacific Railroad. There are residential neighborhoods located northeast and south of the designated property. The closest residence is located approximately 200 feet northeast of the affected groundwater plume.

Northwest Pipe Company plans to sell the property and no land use restrictions are anticipated on future use. There is no anticipated change in land use at the Union Pacific Railroad property to the south or the Grace Bible Church property to the north. According to records at the Harris County Appraisal District, the undeveloped land to the east that is owned by 5177 Builders Ltd. was platted for residential development in 2003, but to date no construction has occurred on that property.

The tracts to the west of the designated property are owned by Greer Capital Corporation and have commercial buildings. The Southwaste Disposal LLC facility is used to process oil and grease collected as part of commercial grease trap maintenance and transportation services. The tract of land located west adjacent to Southwaste Disposal LLC is currently undeveloped, but was formerly a peanut processing facility. There are no known anticipated changes to land use at either of these properties.

**ATTACHMENTS**

Figure B.1 Property Map

N

## LEGEND

| | |
|---|---|
| 6307 | Property address number |
| | MSD Designated Property |
| | Property boundary (from Houston GIMS) |
| | Neighboring VCP boundaries |
| | Municipal Setting Designation boundary |
| | Drainage ditch |

### Notes

Background Imagery: Microsoft Bing system via ESRI's ArcGIS Online premium services (http://maps.bing.com)

Feet
0 100 200

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (ft)

GSI ENVIRONMENTAL

## PROPERTY MAP

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

| | | | |
|---|---|---|---|
| GSI Job No. | G-3990 | Drawn By: | CDM |
| Issued: | 1-Feb-2016 | Chk'd By: | JMS |
| Map ID: | 012_11 | Appv'd By: | TMM |

**FIGURE B.1**

**APPENDIX C**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

***3. Provide a map showing:***

- ***a. The location of the designated property.*** (See Figure C.1)
- ***b. The topography of the designated property as indicated on publicly available sources, which must note the watershed <u>including the nearest surface water body</u> and whether the designated property is located in a floodplain or floodway, as those terms are defined in Chapter 19 of the Code of Ordinances.*** (See Figure C.1)
- ***c. The detected area of groundwater contamination.*** (See Figures C.2 and C.3A through C.3H)
- ***d. The location of all soil sampling locations and all groundwater monitoring wells.*** (See Figure C.2)
- ***e. Groundwater gradients, to the extent known, and direction of groundwater flow.*** (See Figure C.4)
- ***f. The ingestion protective concentration level exceedance (PCLE) zone for each contaminant of concern, to the extent known.*** (See Figures C.2 and C.3A through C.3H)
- ***g. Depth to groundwater for each affected zone.*** (Figure C.4)

The Northwest Pipe Company property is located at 6307 Toledo Street in Houston, Harris County, Texas. Surface topography at the designated property is generally flat at an elevation of approximately 55 feet mean sea level (MSL; USGS, 2013). As shown on Figure C.1, the Site is located within the Buffalo Bayou watershed, but close to the boundary of the Whiteoak Bayou watershed (HCFCD, 2007). Buffalo Bayou is approximately 1.6 miles south, while Whiteoak Bayou is approximately 0.6 miles east of the designated property. The nearest surface water body is a drainage ditch located along the southern boundary of the target property. The Site is located within the 100 year floodplain (FEMA, 2014).

Soil and groundwater investigations have been conducted at the property since January 2014. Locations of soil borings and groundwater monitoring wells at the designated property are shown on Figure C.2. Results of the investigations indicate that the affected groundwater zone is stable and of limited extent (see Appendix G). The groundwater PCLE zone is generally located at, and in the vicinity of, the southern portion of the Northwest Pipe Company property.

# APPENDIX C

## Supplemental Information based on City of Houston Technical Review Comments

In a letter dated 9 June 2016, the City of Houston requested additional information as part of the technical review of the MSD application. The City of Houston request and the additional information related to Appendix C are provided below.

City of Houston Request, Appendix C: Figure C.2 illustrates that the plume extends beyond the southern boundary. Please provide discussion regarding the drainage ditch along the southern boundary of the target property. This discussion should include evidence that groundwater from the designated property is not entering the drainage ditch, potentially contaminating surface water.

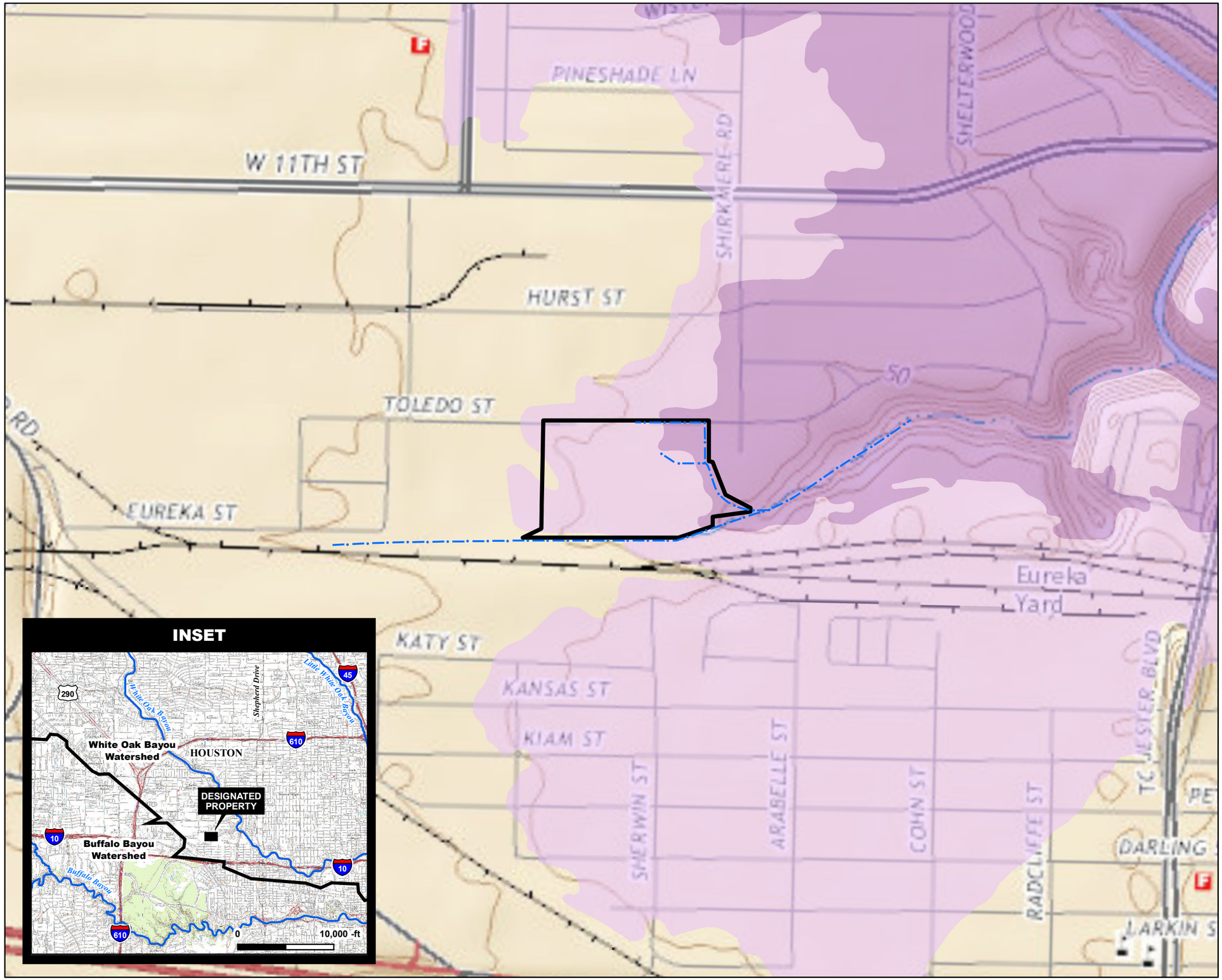
***Response:*** The drainage ditch originates approximately 2,400 feet to the west of the site and carries rainfall runoff from adjacent properties to Whiteoak Bayou, which is located approximately 3,400 feet east of the site. The base of the drainage ditch is approximately 10 feet below ground surface (bgs) in the vicinity of the affected groundwater. Shallow groundwater does not discharge to the drainage ditch based on the groundwater gradient map (see Figure C.4) that includes groundwater elevation data from numerous wells on both the north and south sides of the drainage ditch.

The measured groundwater elevations demonstrate that groundwater flow is in an easterly direction in the vicinity of the drainage ditch (i.e., flow is parallel to the ditch as opposed to toward the ditch). Boring logs for monitoring wells installed near the ditch (e.g., MW-5, MW-10, MW-11, MW-12, and MW-13) also demonstrate that groundwater saturation is encountered at or below 17.5 feet bgs along the drainage ditch, with clay soil overlying the uppermost GWBU. As such, more than approximately 7.5 feet of clay separates the GWBU from the base of the drainage ditch.

This same information was also presented to the Texas Commission on Environmental Quality (TCEQ) in the Tier 1 Ecological Exclusion Checklist of the Affected Property Assessment Report (APAR). TCEQ, through their review and comment on the APAR, concurred with the finding that groundwater does not threaten the drainage ditch and did not require any further assessment of the drainage ditch.

## ATTACHMENTS


| | |
|---|---|
| Figure C.1 | Site Location and Topographic Map |
| Figure C.2 | Soil and Groundwater Sampling Location Map |
| Figure C.3A | Groundwater COC Concentration Map: VOCs |
| Figure C.3B | Groundwater COC Concentration Map: 1,1-Dichloroethylene |
| Figure C.3C | Groundwater COC Concentration Map: Tetrachloroethylene |
| Figure C.3D | Groundwater COC Concentration Map: Trichloroethylene |
| Figure C.3E | Groundwater COC Concentration Map: cis-1,2-Dichloroethylene |
| Figure C.3F | Groundwater COC Concentration Map: Vinyl chloride |
| Figure C.3G | Groundwater COC Concentration Map: 1,2-Dichloroethane |
| Figure C.4 | Groundwater Gradient Map: 1 December 2015 |
| Figure C.5 | Geologic Cross-Section A-A': Northwest-Southeast Orientation |




N

## LEGEND

- MSD Designated Property
- Drainage ditch
- Railroad tracks and spurs
- Watershed boundary

**Flood Zones:**

- 0.2% annual chance flood
- 1.0% annual chance flood

## Notes

1. Flood zones: FEMA, 2014. Flood Map Service Center, Federal Emergency Management Agency, https://msc.fema.gov/portal, accessed 26 October 2015.
2. Background Imagery: USGS, 2013. Houston Heights Quadrangle, Texas-Harris Co., 7.5-minute series, U.S. National Map. (Sources: https://msc.fema.gov/portal and http://www.arcgis.com/home/webmap).

Feet
0 250 500

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (ft)

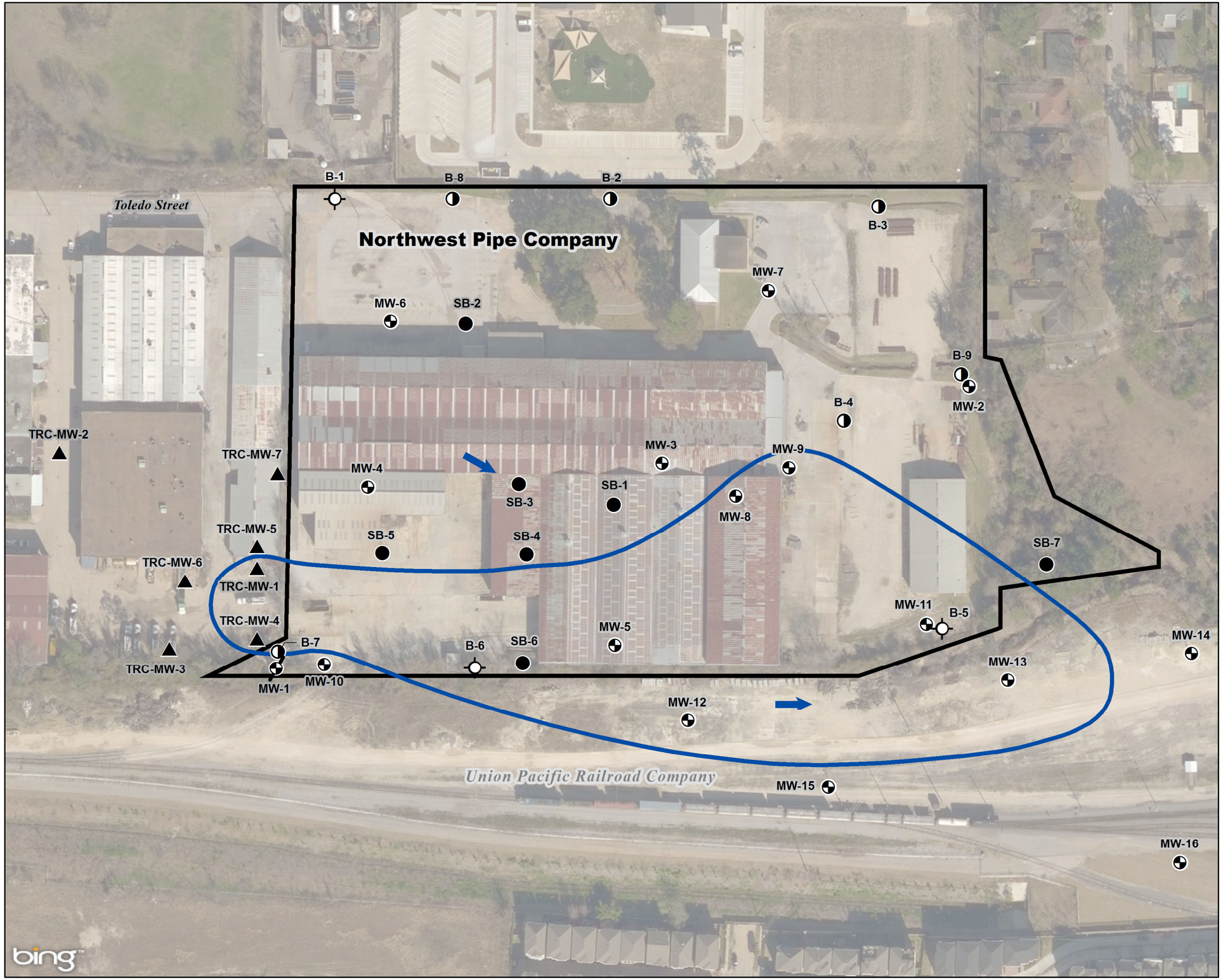
GSI ENVIRONMENTAL

## SITE LOCATION AND TOPOGRAPHIC MAP

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

| | | | |
|---|---|---|---|
| GSI Job No. | G-3990 | Drawn By: | CDM |
| Issued: | 1-Feb-2016 | Chk'd By: | JMS |
| Map ID: | **012_13** | Appv'd By: | TMM |

**FIGURE C.1**




N

## LEGEND

- GSI monitoring well
- Phase II soil boring
- GSI soil boring
- Phase II temporary well (Feb-2014)
- Former monitoring well (plugged and abandoned)
- TRC monitoring well
- General direction of groundwater flow
- Extent of Affected Groundwater/PCLE Zone
- MSD Designated Property

**Notes**

Background Imagery: Landiscor High Resolution Imagery taken March, 2012; Resolution: 1 Foot.

Feet
0 60 120

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (ft)

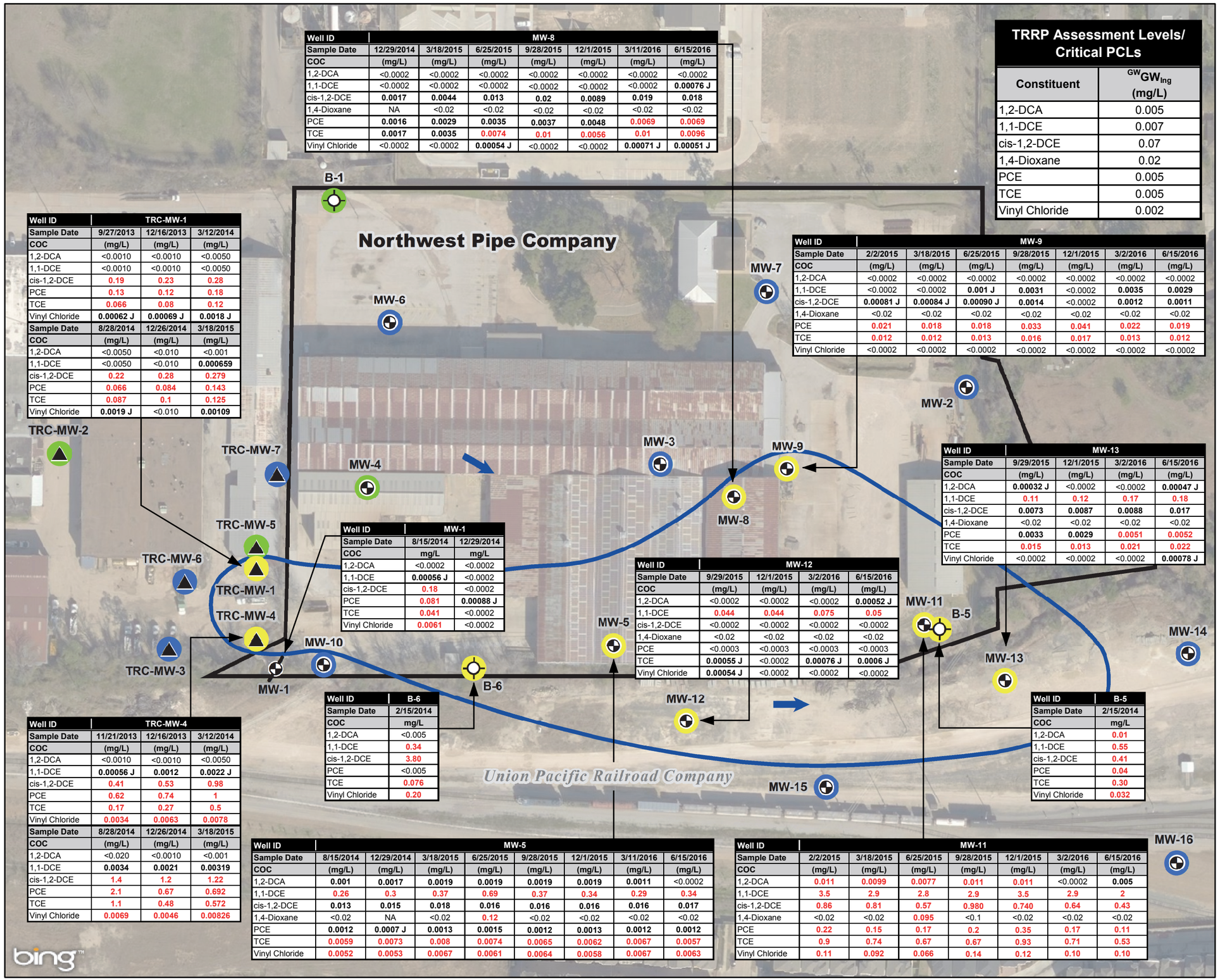
GSI ENVIRONMENTAL

## SOIL AND GROUNDWATER SAMPLING LOCATION MAP

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

| | | | |
|---|---|---|---|
| GSI Job No. | G-3990 | Drawn By: | CDM |
| Issued: | 1-Feb-2016 | Chk'd By: | JMS |
| Map ID: | **012_12** | Appv'd By: | TMM |

**FIGURE C.2**




| Well ID | MW-8 | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample Date | 12/29/2014 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 | 3/11/2016 | 6/15/2016 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| 1,2-DCA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| 1,1-DCE | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | **0.00076 J** |
| cis-1,2-DCE | **0.0017** | **0.0044** | **0.013** | **0.02** | **0.0089** | **0.019** | **0.018** |
| 1,4-Dioxane | NA | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| PCE | **0.0016** | **0.0029** | **0.0035** | **0.0037** | **0.0048** | **0.0069** | **0.0069** |
| TCE | **0.0017** | **0.0035** | **0.0074** | **0.01** | **0.0056** | **0.01** | **0.0096** |
| Vinyl Chloride | <0.0002 | <0.0002 | **0.00054 J** | <0.0002 | <0.0002 | **0.00071 J** | **0.00051 J** |

| TRRP Assessment Levels/ Critical PCLs | |
|---|---|
| Constituent | $^{GW}GW_{Ing}$ (mg/L) |
| 1,2-DCA | 0.005 |
| 1,1-DCE | 0.007 |
| cis-1,2-DCE | 0.07 |
| 1,4-Dioxane | 0.02 |
| PCE | 0.005 |
| TCE | 0.005 |
| Vinyl Chloride | 0.002 |

| Well ID | TRC-MW-1 | | |
|---|---|---|---|
| Sample Date | 9/27/2013 | 12/16/2013 | 3/12/2014 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| 1,2-DCA | <0.0010 | <0.0010 | <0.0050 |
| 1,1-DCE | <0.0010 | <0.0010 | <0.0050 |
| cis-1,2-DCE | **0.19** | **0.23** | **0.28** |
| PCE | **0.13** | **0.12** | **0.18** |
| TCE | **0.066** | **0.08** | **0.12** |
| Vinyl Chloride | **0.00062 J** | **0.00069 J** | **0.0018 J** |
| Sample Date | 8/28/2014 | 12/26/2014 | 3/18/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| 1,2-DCA | <0.0050 | <0.010 | <0.001 |
| 1,1-DCE | <0.0050 | <0.010 | **0.000659** |
| cis-1,2-DCE | **0.22** | **0.28** | **0.279** |
| PCE | **0.066** | **0.084** | **0.143** |
| TCE | **0.087** | **0.1** | **0.125** |
| Vinyl Chloride | **0.0019 J** | <0.010 | **0.00109** |

| Well ID | MW-9 | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample Date | 2/2/2015 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 | 3/2/2016 | 6/15/2016 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| 1,2-DCA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| 1,1-DCE | <0.0002 | <0.0002 | **0.001 J** | **0.0031** | <0.0002 | **0.0035** | **0.0029** |
| cis-1,2-DCE | **0.00081 J** | **0.00084 J** | **0.00090 J** | **0.0014** | <0.0002 | **0.0012** | **0.0011** |
| 1,4-Dioxane | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| PCE | **0.021** | **0.018** | **0.018** | **0.033** | **0.041** | **0.022** | **0.019** |
| TCE | **0.012** | **0.012** | **0.013** | **0.016** | **0.017** | **0.013** | **0.012** |
| Vinyl Chloride | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |

| Well ID | MW-13 | | | |
|---|---|---|---|---|
| Sample Date | 9/29/2015 | 12/1/2015 | 3/2/2016 | 6/15/2016 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| 1,2-DCA | **0.00032 J** | <0.0002 | <0.0002 | **0.00047 J** |
| 1,1-DCE | **0.11** | **0.12** | **0.17** | **0.18** |
| cis-1,2-DCE | **0.0073** | **0.0087** | **0.0088** | **0.017** |
| 1,4-Dioxane | <0.02 | <0.02 | <0.02 | <0.02 |
| PCE | **0.0033** | **0.0029** | **0.0051** | **0.0052** |
| TCE | **0.015** | **0.013** | **0.021** | **0.022** |
| Vinyl Chloride | <0.0002 | <0.0002 | <0.0002 | **0.00078 J** |

| Well ID | MW-1 | |
|---|---|---|
| Sample Date | 8/15/2014 | 12/29/2014 |
| COC | mg/L | mg/L |
| 1,2-DCA | <0.0002 | <0.0002 |
| 1,1-DCE | **0.00056 J** | <0.0002 |
| cis-1,2-DCE | **0.18** | <0.0002 |
| PCE | **0.081** | **0.00088 J** |
| TCE | **0.041** | <0.0002 |
| Vinyl Chloride | **0.0061** | <0.0002 |

| Well ID | MW-12 | | | |
|---|---|---|---|---|
| Sample Date | 9/29/2015 | 12/1/2015 | 3/2/2016 | 6/15/2016 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| 1,2-DCA | <0.0002 | <0.0002 | <0.0002 | **0.00052 J** |
| 1,1-DCE | **0.044** | **0.044** | **0.075** | **0.05** |
| cis-1,2-DCE | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| 1,4-Dioxane | <0.02 | <0.02 | <0.02 | <0.02 |
| PCE | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| TCE | **0.00055 J** | <0.0002 | **0.00076 J** | **0.0006 J** |
| Vinyl Chloride | **0.00054 J** | <0.0002 | <0.0002 | <0.0002 |

| Well ID | B-6 |
|---|---|
| Sample Date | 2/15/2014 |
| COC | mg/L |
| 1,2-DCA | <0.005 |
| 1,1-DCE | **0.34** |
| cis-1,2-DCE | **3.80** |
| PCE | <0.005 |
| TCE | **0.076** |
| Vinyl Chloride | **0.20** |

| Well ID | B-5 |
|---|---|
| Sample Date | 2/15/2014 |
| COC | mg/L |
| 1,2-DCA | **0.01** |
| 1,1-DCE | **0.55** |
| cis-1,2-DCE | **0.41** |
| PCE | **0.04** |
| TCE | **0.30** |
| Vinyl Chloride | **0.032** |

| Well ID | TRC-MW-4 | | |
|---|---|---|---|
| Sample Date | 11/21/2013 | 12/16/2013 | 3/12/2014 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| 1,2-DCA | <0.0010 | <0.0010 | <0.0050 |
| 1,1-DCE | **0.00056 J** | **0.0012** | **0.0022 J** |
| cis-1,2-DCE | **0.41** | **0.53** | **0.98** |
| PCE | **0.62** | **0.74** | **1** |
| TCE | **0.17** | **0.27** | **0.5** |
| Vinyl Chloride | **0.0034** | **0.0063** | **0.0078** |
| Sample Date | 8/28/2014 | 12/26/2014 | 3/18/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| 1,2-DCA | <0.020 | <0.0010 | <0.001 |
| 1,1-DCE | **0.0034** | **0.0021** | **0.00319** |
| cis-1,2-DCE | **1.4** | **1.2** | **1.22** |
| PCE | **2.1** | **0.67** | **0.692** |
| TCE | **1.1** | **0.48** | **0.572** |
| Vinyl Chloride | **0.0069** | **0.0046** | **0.00826** |

| Well ID | MW-5 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample Date | 8/15/2014 | 12/29/2014 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 | 3/11/2016 | 6/15/2016 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| 1,2-DCA | **0.001** | **0.0017** | **0.0019** | **0.0019** | **0.0019** | **0.0019** | **0.0011** | <0.0002 |
| 1,1-DCE | **0.26** | **0.3** | **0.37** | **0.69** | **0.37** | **0.34** | **0.29** | **0.34** |
| cis-1,2-DCE | **0.013** | **0.015** | **0.018** | **0.016** | **0.016** | **0.016** | **0.016** | **0.017** |
| 1,4-Dioxane | <0.02 | NA | <0.02 | **0.12** | <0.02 | <0.02 | <0.02 | <0.02 |
| PCE | **0.0012** | **0.0007 J** | **0.0013** | **0.0015** | **0.0012** | **0.0013** | **0.0012** | **0.0012** |
| TCE | **0.0059** | **0.0073** | **0.008** | **0.0074** | **0.0065** | **0.0062** | **0.0067** | **0.0057** |
| Vinyl Chloride | **0.0052** | **0.0053** | **0.0067** | **0.0061** | **0.0064** | **0.0058** | **0.0067** | **0.0063** |

| Well ID | MW-11 | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample Date | 2/2/2015 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 | 3/2/2016 | 6/15/2016 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| 1,2-DCA | **0.011** | **0.0099** | **0.0077** | **0.011** | **0.011** | <0.0002 | **0.005** |
| 1,1-DCE | **3.5** | **2.9** | **2.8** | **2.9** | **3.5** | **2.9** | **2** |
| cis-1,2-DCE | **0.86** | **0.81** | **0.57** | **0.980** | **0.740** | **0.64** | **0.43** |
| 1,4-Dioxane | <0.02 | <0.02 | **0.095** | <0.1 | <0.02 | <0.02 | <0.02 |
| PCE | **0.22** | **0.15** | **0.17** | **0.2** | **0.35** | **0.17** | **0.11** |
| TCE | **0.9** | **0.74** | **0.67** | **0.67** | **0.93** | **0.71** | **0.53** |
| Vinyl Chloride | **0.11** | **0.092** | **0.066** | **0.14** | **0.12** | **0.10** | **0.10** |

## LEGEND

- GSI monitoring well
- Phase II temporary well (Feb-2014)
- Former monitoring well (plugged and abandoned)
- TRC monitoring well
- General direction of groundwater flow
- Extent of Affected Groundwater/PCLE Zone
- MSD Designated Property
- COCs not detected in most recent sample
- One or more COCs detected at a concentration below the Assessment Level/Critical PCL in most recent sample
- One or more COCs detected at a concentration exceeding the Assessment Level/Critical PCL in most recent sample

## Notes

1. **Red** = exceeds Assessment Level.
2. J = Estimated concentration.
3. Maximum concentrations in duplicates shown.
4. Data for TRC monitoring wells obtained from TCEQ files.
5. Background Imagery: Landiscor High Resolution Imagery taken March, 2012; Resolution: 1 Foot.

Feet
0 60 120

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (ft)

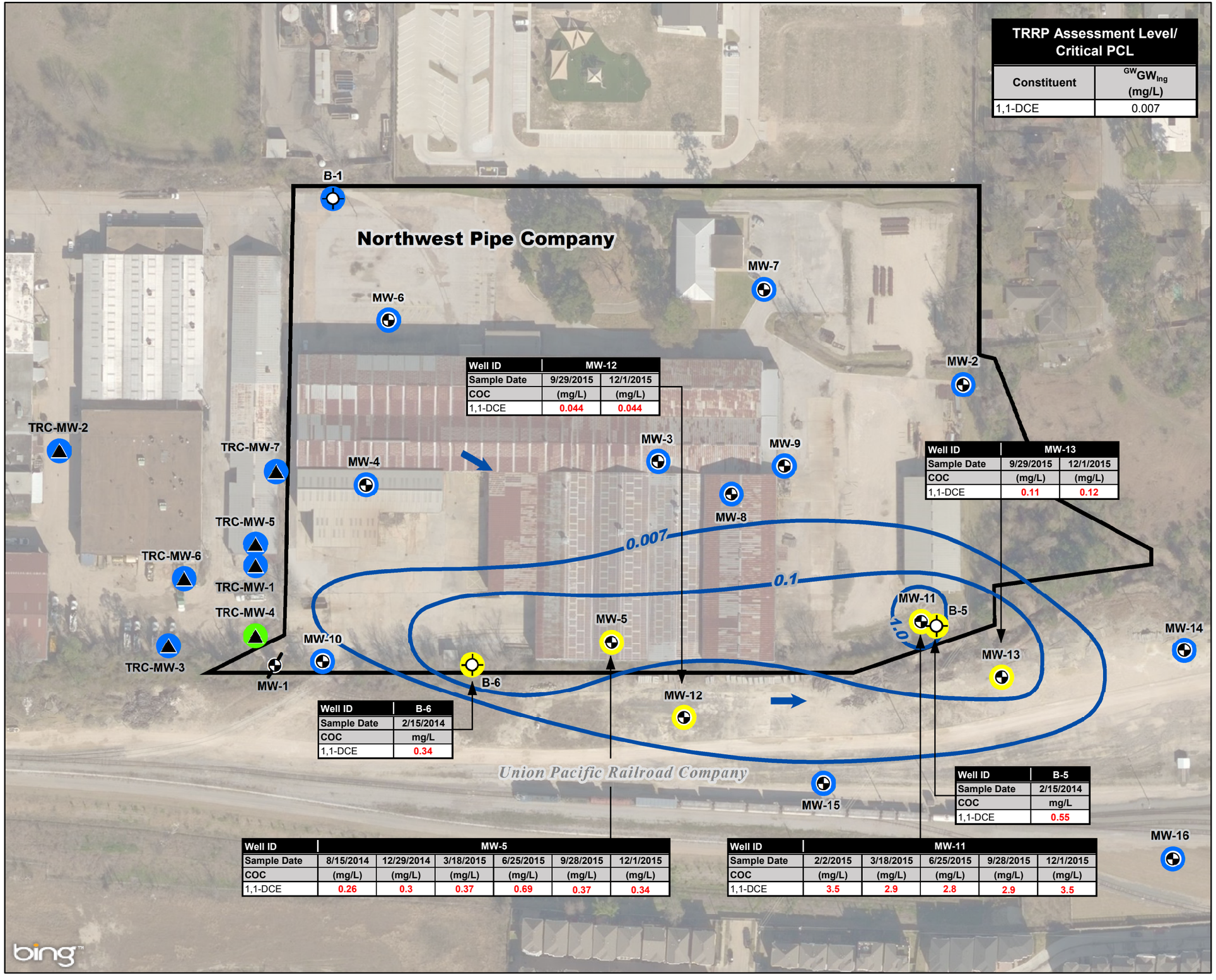
GSI ENVIRONMENTAL

# GROUNDWATER COC CONCENTRATION MAP: VOCs

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

| | | | |
|---|---|---|---|
| GSI Job No. G-3990 | | Drawn By: | CDM |
| Issued: 1-Feb-2016 | Revised: 9-Sep-2016 | Chk'd By: | DCK |
| Map ID: 012_01 | | Appv'd By: | TMM |

**FIGURE C.3A**




| Well ID | MW-12 | |
|---|---|---|
| Sample Date | 9/29/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) |
| 1,1-DCE | 0.044 | 0.044 |

| Well ID | MW-13 | |
|---|---|---|
| Sample Date | 9/29/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) |
| 1,1-DCE | 0.11 | 0.12 |

| Well ID | B-6 |
|---|---|
| Sample Date | 2/15/2014 |
| COC | mg/L |
| 1,1-DCE | 0.34 |

| Well ID | B-5 |
|---|---|
| Sample Date | 2/15/2014 |
| COC | mg/L |
| 1,1-DCE | 0.55 |

| Well ID | MW-5 | | | | | |
|---|---|---|---|---|---|---|
| Sample Date | 8/15/2014 | 12/29/2014 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| 1,1-DCE | 0.26 | 0.3 | 0.37 | 0.69 | 0.37 | 0.34 |

| Well ID | MW-11 | | | | |
|---|---|---|---|---|---|
| Sample Date | 2/2/2015 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| 1,1-DCE | 3.5 | 2.9 | 2.8 | 2.9 | 3.5 |

**TRRP Assessment Level/ Critical PCL**

| Constituent | $^{GW}GW_{Ing}$ (mg/L) |
|---|---|
| 1,1-DCE | 0.007 |

N

## LEGEND

- GSI monitoring well
- Phase II temporary well (Feb-2014)
- Former monitoring well (plugged and abandoned)
- TRC monitoring well
- General direction of groundwater flow
- 0.1 COC concentration contour, mg/L
- MSD Designated Property
- 1,1-DCE not detected in most recent sample
- 1,1-DCE detected at a concentration below the Assessment Level/Critical PCL in most recent sample
- 1,1-DCE detected at a concentration exceeding the Assessment Level/Critical PCL in most recent sample

## Notes

1. **Red** = exceeds Assessment Level.
2. J = Estimated concentration.
3. Maximum concentrations in duplicates shown.
4. Data for TRC monitoring wells obtained from TCEQ files.
5. Background Imagery: Landiscor High Resolution Imagery taken March, 2012; Resolution: 1 Foot.

Feet
0 60 120

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (ft)

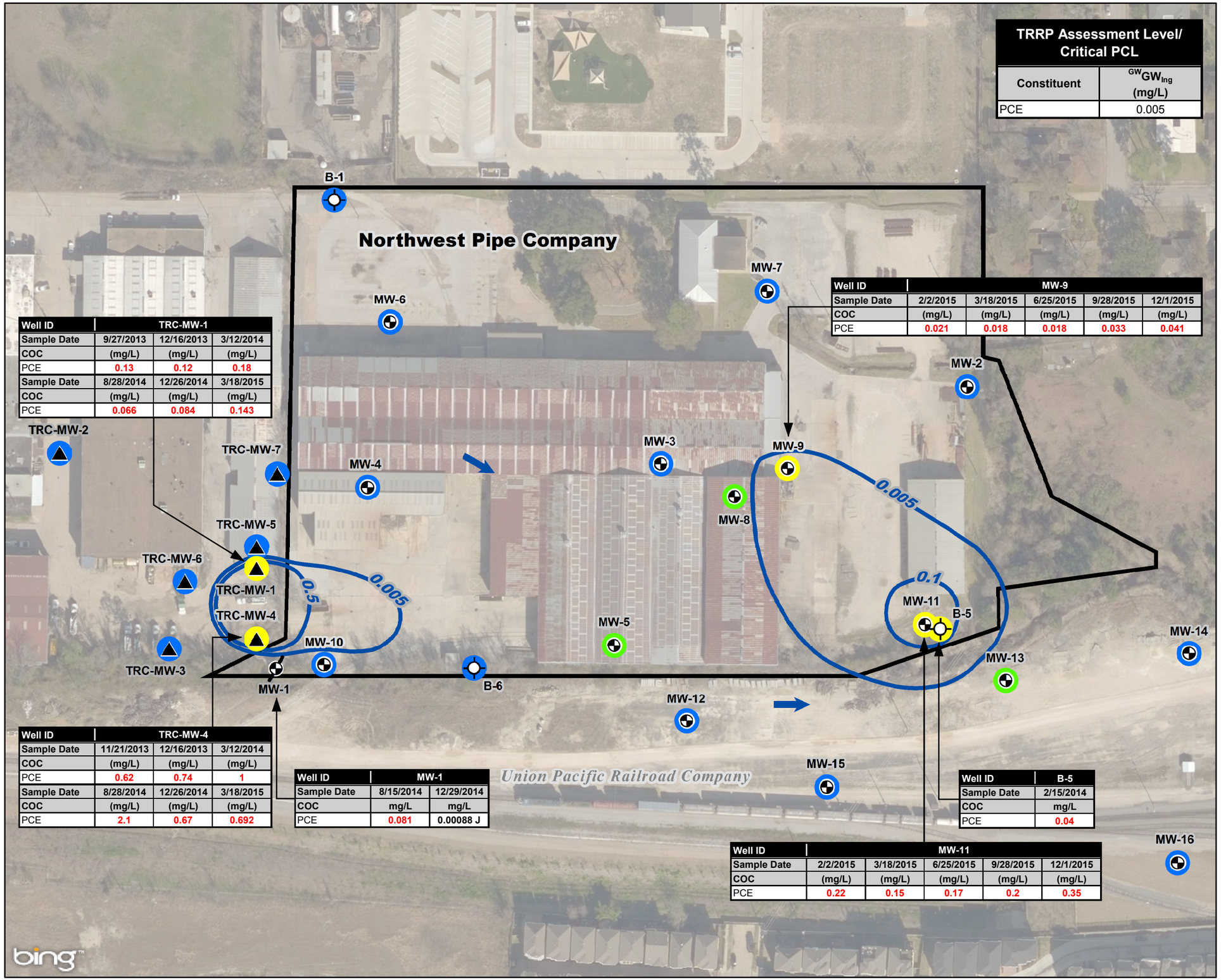
GSI ENVIRONMENTAL

# GROUNDWATER COC CONCENTRATION MAP: 1,1-Dichloroethylene

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

| | | | |
|---|---|---|---|
| GSI Job No. | G-3990 | Drawn By: | CDM |
| Issued: | 1-Feb-2016 | Chk'd By: | DCK |
| Map ID: | 012_02 | Appv'd By: | TMM |

**FIGURE C.3B**




| TRRP Assessment Level/ Critical PCL | |
|---|---|
| Constituent | $^{GW}GW_{Ing}$ (mg/L) |
| PCE | 0.005 |

| Well ID | TRC-MW-1 | | |
|---|---|---|---|
| Sample Date | 9/27/2013 | 12/16/2013 | 3/12/2014 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| PCE | 0.13 | 0.12 | 0.18 |
| Sample Date | 8/28/2014 | 12/26/2014 | 3/18/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| PCE | 0.066 | 0.084 | 0.143 |

| Well ID | MW-9 | | | | |
|---|---|---|---|---|---|
| Sample Date | 2/2/2015 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| PCE | 0.021 | 0.018 | 0.018 | 0.033 | 0.041 |

| Well ID | TRC-MW-4 | | |
|---|---|---|---|
| Sample Date | 11/21/2013 | 12/16/2013 | 3/12/2014 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| PCE | 0.62 | 0.74 | 1 |
| Sample Date | 8/28/2014 | 12/26/2014 | 3/18/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| PCE | 2.1 | 0.67 | 0.692 |

| Well ID | MW-1 | |
|---|---|---|
| Sample Date | 8/15/2014 | 12/29/2014 |
| COC | mg/L | mg/L |
| PCE | 0.081 | 0.00088 J |

| Well ID | B-5 |
|---|---|
| Sample Date | 2/15/2014 |
| COC | mg/L |
| PCE | 0.04 |

| Well ID | MW-11 | | | | |
|---|---|---|---|---|---|
| Sample Date | 2/2/2015 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| PCE | 0.22 | 0.15 | 0.17 | 0.2 | 0.35 |

## LEGEND

- GSI monitoring well
- Phase II temporary well (Feb-2014)
- Former monitoring well (plugged and abandoned)
- TRC monitoring well
- General direction of groundwater flow
- 0.1 — COC concentration contour, mg/L
- MSD Designated Property
- PCE not detected in most recent sample
- PCE detected at a concentration below the Assessment Level/Critical PCL in most recent sample
- PCE detected at a concentration exceeding the Assessment Level/Critical PCL in most recent sample

## Notes

1. **Red** = exceeds Assessment Level.
2. J = Estimated concentration.
3. Maximum concentrations in duplicates shown.
4. Data for TRC monitoring wells obtained from TCEQ files.
5. Background Imagery: Landiscor High Resolution Imagery taken March, 2012; Resolution: 1 Foot.

Feet
0 60 120

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (ft)

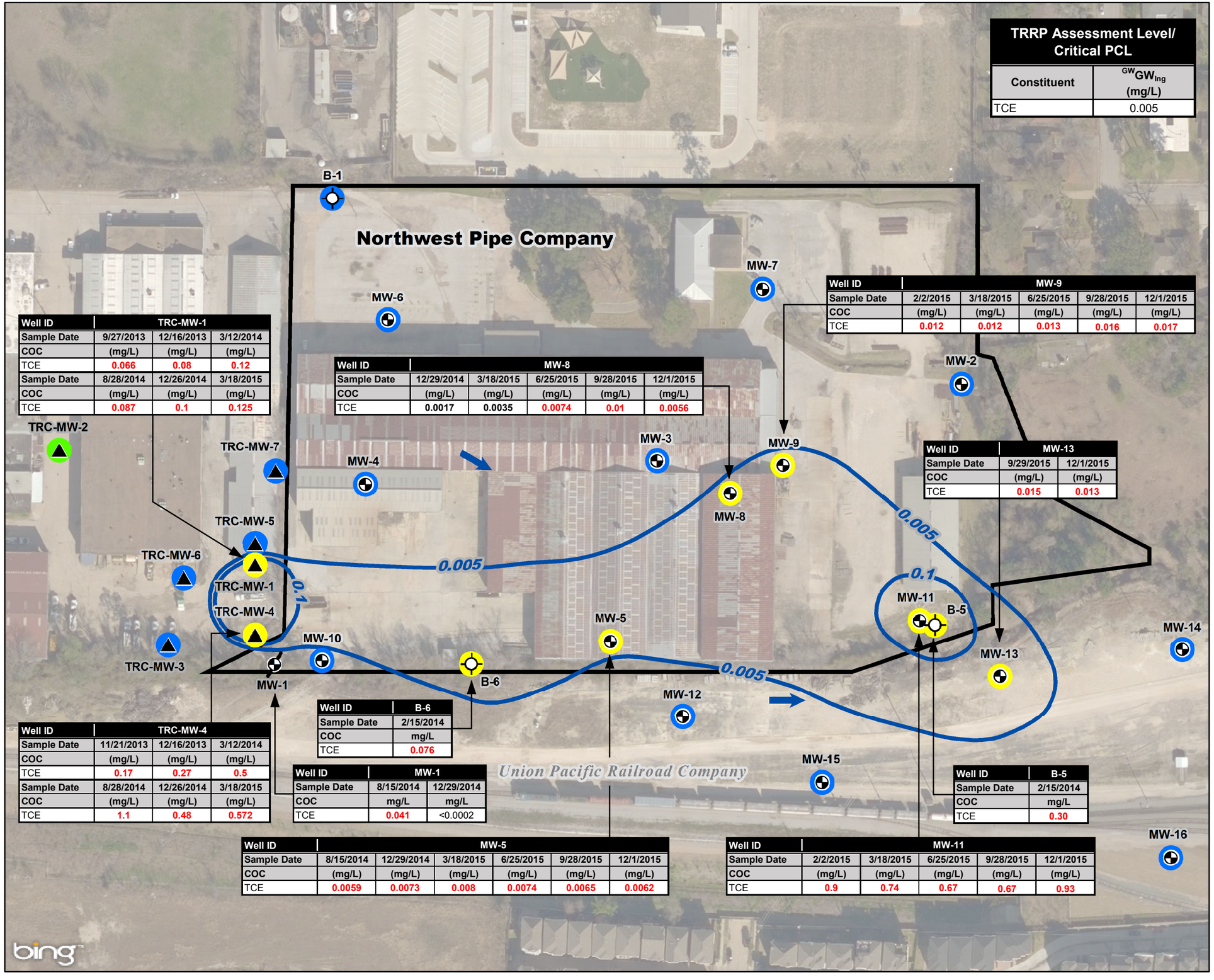
GSI ENVIRONMENTAL

# GROUNDWATER COC CONCENTRATION MAP: Tetrachloroethylene

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

| | | | |
|---|---|---|---|
| GSI Job No. | G-3990 | Drawn By: | CDM |
| Issued: | 1-Feb-2016 | Chk'd By: | DCK |
| Map ID: | 012_03 | Appv'd By: | TMM |

**FIGURE C.3C**




| TRRP Assessment Level/ Critical PCL | |
|---|---|
| Constituent | $^{GW}GW_{Ing}$ (mg/L) |
| TCE | 0.005 |

| Well ID | TRC-MW-1 | | |
|---|---|---|---|
| Sample Date | 9/27/2013 | 12/16/2013 | 3/12/2014 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| TCE | 0.066 | 0.08 | 0.12 |
| Sample Date | 8/28/2014 | 12/26/2014 | 3/18/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| TCE | 0.087 | 0.1 | 0.125 |

| Well ID | MW-8 | | | | |
|---|---|---|---|---|---|
| Sample Date | 12/29/2014 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| TCE | 0.0017 | 0.0035 | 0.0074 | 0.01 | 0.0056 |

| Well ID | MW-9 | | | | |
|---|---|---|---|---|---|
| Sample Date | 2/2/2015 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| TCE | 0.012 | 0.012 | 0.013 | 0.016 | 0.017 |

| Well ID | MW-13 | |
|---|---|---|
| Sample Date | 9/29/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) |
| TCE | 0.015 | 0.013 |

| Well ID | TRC-MW-4 | | |
|---|---|---|---|
| Sample Date | 11/21/2013 | 12/16/2013 | 3/12/2014 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| TCE | 0.17 | 0.27 | 0.5 |
| Sample Date | 8/28/2014 | 12/26/2014 | 3/18/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| TCE | 1.1 | 0.48 | 0.572 |

| Well ID | B-6 |
|---|---|
| Sample Date | 2/15/2014 |
| COC | mg/L |
| TCE | 0.076 |

| Well ID | MW-1 | |
|---|---|---|
| Sample Date | 8/15/2014 | 12/29/2014 |
| COC | mg/L | mg/L |
| TCE | 0.041 | <0.0002 |

| Well ID | B-5 |
|---|---|
| Sample Date | 2/15/2014 |
| COC | mg/L |
| TCE | 0.30 |

| Well ID | MW-5 | | | | | |
|---|---|---|---|---|---|---|
| Sample Date | 8/15/2014 | 12/29/2014 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| TCE | 0.0059 | 0.0073 | 0.008 | 0.0074 | 0.0065 | 0.0062 |

| Well ID | MW-11 | | | | |
|---|---|---|---|---|---|
| Sample Date | 2/2/2015 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| TCE | 0.9 | 0.74 | 0.67 | 0.67 | 0.93 |

## LEGEND

- GSI monitoring well
- Phase II temporary well (Feb-2014)
- Former monitoring well (plugged and abandoned)
- TRC monitoring well
- General direction of groundwater flow
- 0.1 COC concentration contour, mg/L
- MSD Designated Property
- TCE not detected in most recent sample
- TCE detected at a concentration below the Assessment Level/Critical PCL in most recent sample
- TCE detected at a concentration exceeding the Assessment Level/Critical PCL in most recent sample

## Notes

1. Red = exceeds Assessment Level.
2. J = Estimated concentration.
3. Maximum concentrations in duplicates shown.
4. Data for TRC monitoring wells obtained from TCEQ files.
5. Background Imagery: Landiscor High Resolution Imagery taken March, 2012; Resolution: 1 Foot.

Feet
0 60 120

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (ft)

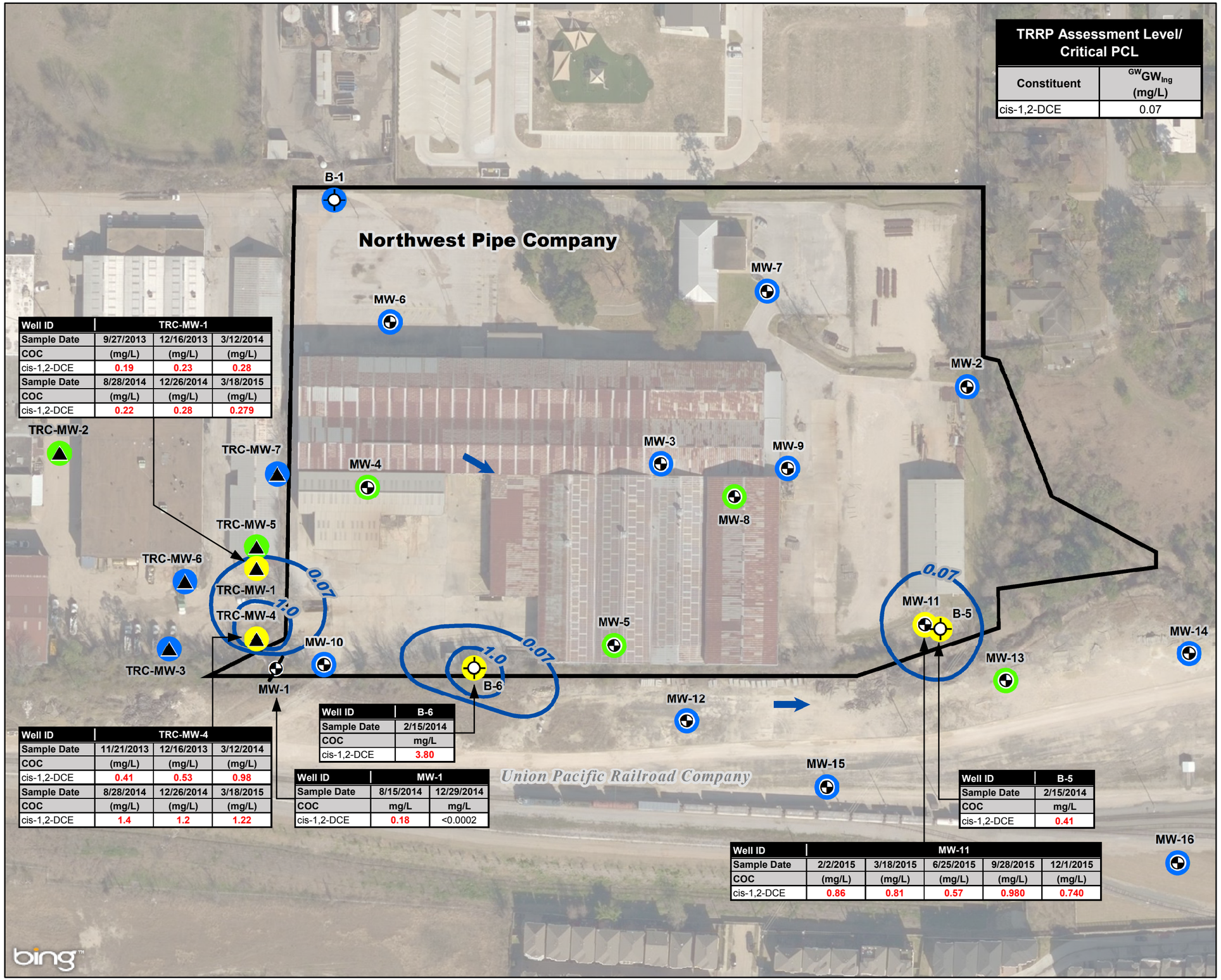
GSI ENVIRONMENTAL

# GROUNDWATER COC CONCENTRATION MAP: Trichloroethylene

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

| | | | |
|---|---|---|---|
| GSI Job No. | G-3990 | Drawn By: | CDM |
| Issued: | 1-Feb-2016 | Chk'd By: | DCK |
| Map ID: | 012_04 | Appv'd By: | TMM |

**FIGURE C.3D**




| TRRP Assessment Level/ Critical PCL | |
|---|---|
| Constituent | $^{GW}GW_{Ing}$ (mg/L) |
| cis-1,2-DCE | 0.07 |

| Well ID | TRC-MW-1 | | |
|---|---|---|---|
| Sample Date | 9/27/2013 | 12/16/2013 | 3/12/2014 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| cis-1,2-DCE | 0.19 | 0.23 | 0.28 |
| Sample Date | 8/28/2014 | 12/26/2014 | 3/18/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| cis-1,2-DCE | 0.22 | 0.28 | 0.279 |

| Well ID | TRC-MW-4 | | |
|---|---|---|---|
| Sample Date | 11/21/2013 | 12/16/2013 | 3/12/2014 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| cis-1,2-DCE | 0.41 | 0.53 | 0.98 |
| Sample Date | 8/28/2014 | 12/26/2014 | 3/18/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| cis-1,2-DCE | 1.4 | 1.2 | 1.22 |

| Well ID | B-6 |
|---|---|
| Sample Date | 2/15/2014 |
| COC | mg/L |
| cis-1,2-DCE | 3.80 |

| Well ID | MW-1 | |
|---|---|---|
| Sample Date | 8/15/2014 | 12/29/2014 |
| COC | mg/L | mg/L |
| cis-1,2-DCE | 0.18 | <0.0002 |

| Well ID | B-5 |
|---|---|
| Sample Date | 2/15/2014 |
| COC | mg/L |
| cis-1,2-DCE | 0.41 |

| Well ID | MW-11 | | | | |
|---|---|---|---|---|---|
| Sample Date | 2/2/2015 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| cis-1,2-DCE | 0.86 | 0.81 | 0.57 | 0.980 | 0.740 |

## LEGEND

- GSI monitoring well
- Phase II temporary well (Feb-2014)
- Former monitoring well (plugged and abandoned)
- TRC monitoring well
- General direction of groundwater flow
- 0.07 COC concentration contour, mg/L
- MSD Designated Property
- cis-1,2-DCE not detected in most recent sample
- cis-1,2-DCE detected at a concentration below the Assessment Level/Critical PCL in most recent sample
- cis-1,2-DCE detected at a concentration exceeding the Assessment Level/Critical PCL in most recent sample

## Notes

1. **Red** = exceeds Assessment Level.
2. J = Estimated concentration.
3. Maximum concentrations in duplicates shown.
4. Data for TRC monitoring wells obtained from TCEQ files.
5. Background Imagery: Landiscor High Resolution Imagery taken March, 2012; Resolution: 1 Foot.

Feet
0 60 120

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (ft)

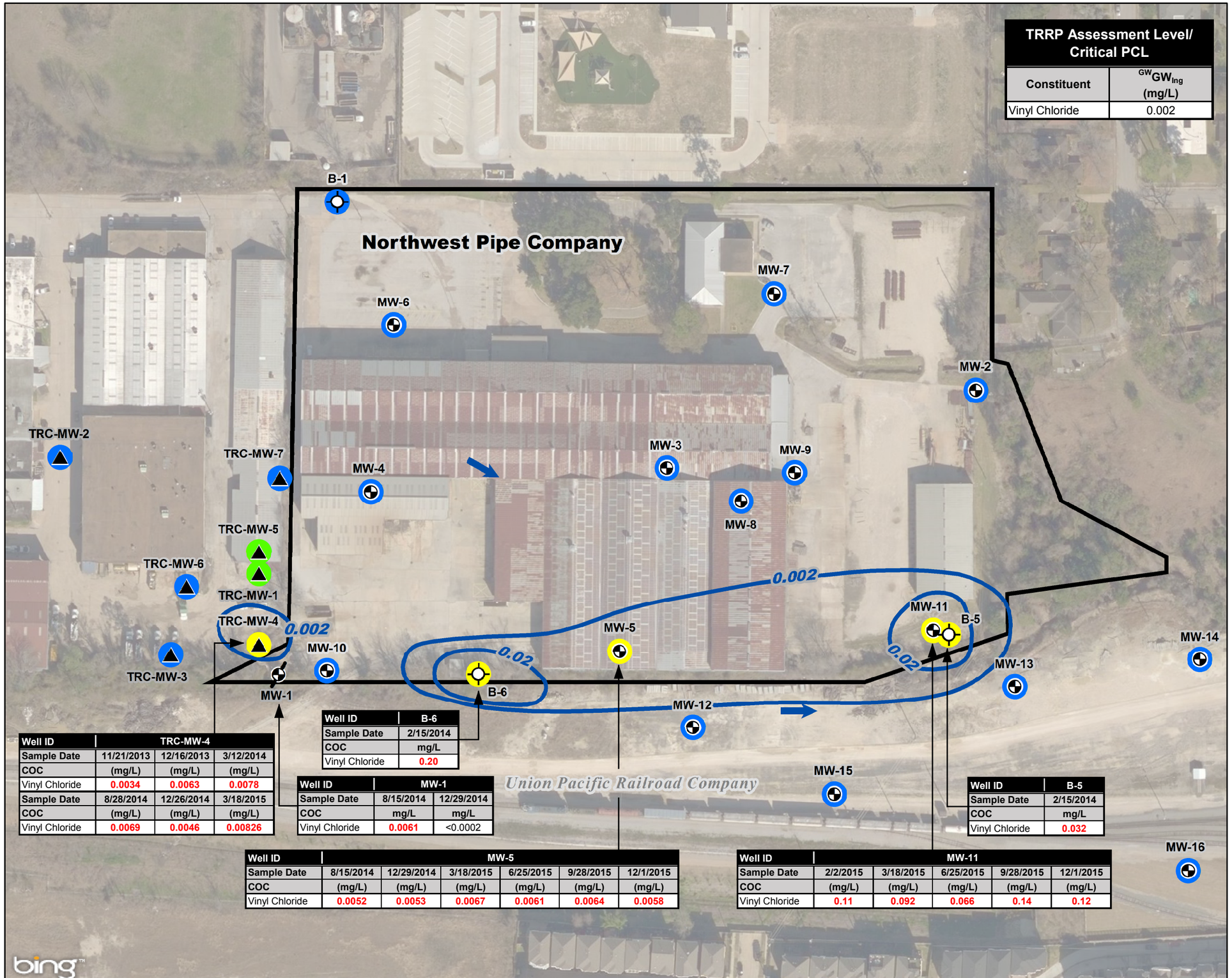
GSI ENVIRONMENTAL

# GROUNDWATER COC CONCENTRATION MAP: cis-1,2-Dichloroethylene

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

| | | | |
|---|---|---|---|
| GSI Job No. | G-3990 | Drawn By: | CDM |
| Issued: | 1-Feb-2016 | Chk'd By: | DCK |
| Map ID: | 012_05 | Appv'd By: | TMM |

**FIGURE C.3E**




| TRRP Assessment Level/ Critical PCL | |
|---|---|
| Constituent | $^{GW}GW_{Ing}$ (mg/L) |
| Vinyl Chloride | 0.002 |

| Well ID | TRC-MW-4 | | |
|---|---|---|---|
| Sample Date | 11/21/2013 | 12/16/2013 | 3/12/2014 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| Vinyl Chloride | 0.0034 | 0.0063 | 0.0078 |
| Sample Date | 8/28/2014 | 12/26/2014 | 3/18/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) |
| Vinyl Chloride | 0.0069 | 0.0046 | 0.00826 |

| Well ID | B-6 |
|---|---|
| Sample Date | 2/15/2014 |
| COC | mg/L |
| Vinyl Chloride | 0.20 |

| Well ID | MW-1 | |
|---|---|---|
| Sample Date | 8/15/2014 | 12/29/2014 |
| COC | mg/L | mg/L |
| Vinyl Chloride | 0.0061 | <0.0002 |

| Well ID | B-5 |
|---|---|
| Sample Date | 2/15/2014 |
| COC | mg/L |
| Vinyl Chloride | 0.032 |

| Well ID | MW-5 | | | | | |
|---|---|---|---|---|---|---|
| Sample Date | 8/15/2014 | 12/29/2014 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| Vinyl Chloride | 0.0052 | 0.0053 | 0.0067 | 0.0061 | 0.0064 | 0.0058 |

| Well ID | MW-11 | | | | |
|---|---|---|---|---|---|
| Sample Date | 2/2/2015 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| Vinyl Chloride | 0.11 | 0.092 | 0.066 | 0.14 | 0.12 |

## LEGEND

- GSI monitoring well
- Phase II temporary well (Feb-2014)
- Former monitoring well (plugged and abandoned)
- TRC monitoring well
- General direction of groundwater flow
- 0.02 COC concentration contour, mg/L
- MSD Designated Property
- Vinyl chloride not detected in most recent sample
- Vinyl chloride detected at a concentration below the Assessment Level/Critical PCL in most recent sample
- Vinyl chloride detected at a concentration exceeding the Assessment Level/Critical PCL in most recent sample

## Notes

1. Red = exceeds Assessment Level.
2. J = Estimated concentration.
3. Maximum concentrations in duplicates shown.
4. Data for TRC monitoring wells obtained from TCEQ files.
5. Background Imagery: Landiscor High Resolution Imagery taken March, 2012; Resolution: 1 Foot.

Feet
0 60 120

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (ft)

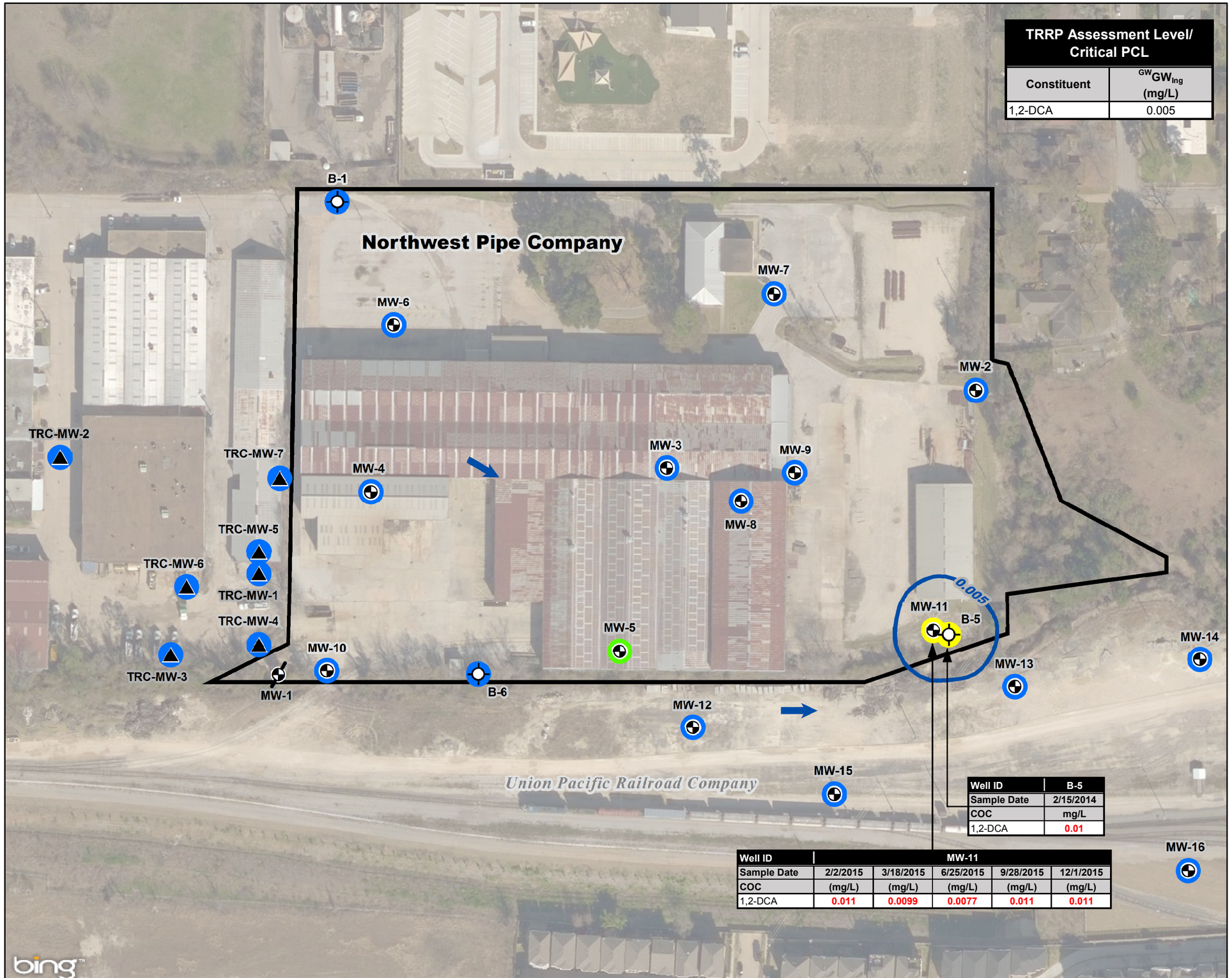
GSI ENVIRONMENTAL

# GROUNDWATER COC CONCENTRATION MAP: Vinyl Chloride

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

| | | | |
|---|---|---|---|
| GSI Job No. | G-3990 | Drawn By: | CDM |
| Issued: | 1-Feb-2016 | Chk'd By: | DCK |
| Map ID: | 012_06 | Appv'd By: | TMM |

**FIGURE C.3F**




| TRRP Assessment Level/ Critical PCL | |
|---|---|
| Constituent | $^{GW}GW_{Ing}$ (mg/L) |
| 1,2-DCA | 0.005 |

| Well ID | B-5 |
|---|---|
| Sample Date | 2/15/2014 |
| COC | mg/L |
| 1,2-DCA | 0.01 |

| Well ID | MW-11 | | | | |
|---|---|---|---|---|---|
| Sample Date | 2/2/2015 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| COC | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| 1,2-DCA | 0.011 | 0.0099 | 0.0077 | 0.011 | 0.011 |

## LEGEND

- GSI monitoring well
- Phase II temporary well (Feb-2014)
- Former monitoring well (plugged and abandoned)
- TRC monitoring well
- General direction of groundwater flow
- 0.005 COC concentration contour, mg/L
- MSD Designated Property
- 1,2-DCA not detected in most recent sample
- 1,2-DCA detected at a concentration below the Assessment Level/Critical PCL in most recent sample
- 1,2-DCA detected at a concentration exceeding the Assessment Level/Critical PCL in most recent sample

## Notes

1. **Red** = exceeds Assessment Level.
2. J = Estimated concentration.
3. Maximum concentrations in duplicates shown.
4. Data for TRC monitoring wells obtained from TCEQ files.
5. Background Imagery: Landiscor High Resolution Imagery taken March, 2012; Resolution: 1 Foot.

Feet
0 60 120

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (ft)

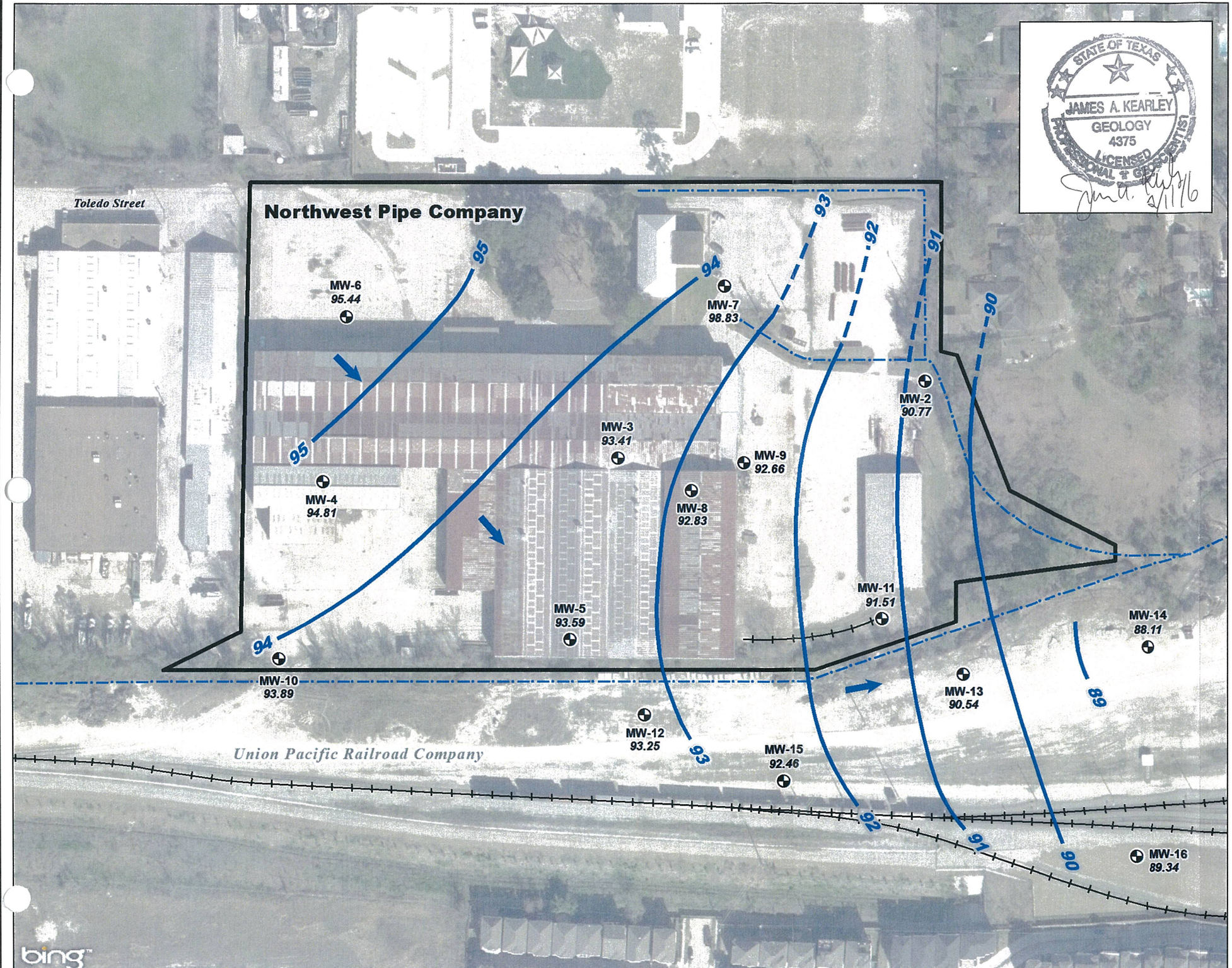
GSI ENVIRONMENTAL

# GROUNDWATER COC CONCENTRATION MAP: 1,2-Dichloroethane

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

| | | | |
|---|---|---|---|
| GSI Job No. | G-3990 | Drawn By: | CDM |
| Issued: | 1-Feb-2016 | Chk'd By: | DCK |
| Map ID: | 012_07 | Appv'd By: | TMM |

**FIGURE C.3G**




STATE OF TEXAS
JAMES A. KEARLEY
GEOLOGY
4375
LICENSED
PROFESSIONAL GEOSCIENTIST
2/11/16

N

## LEGEND

- Monitoring well
- 90.39 Static water elevation, Feet Site Datum
- 90 Potentiometric surface contour, Feet Site Datum
- General direction of groundwater flow
- MSD Designated Property
- Drainage ditch
- Railroad tracks and spurs

## Notes

Background Imagery: Microsoft Bing system via ESRI's ArcGIS Online premium services (http://maps.bing.com)

Feet
0 60 120

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (ft)

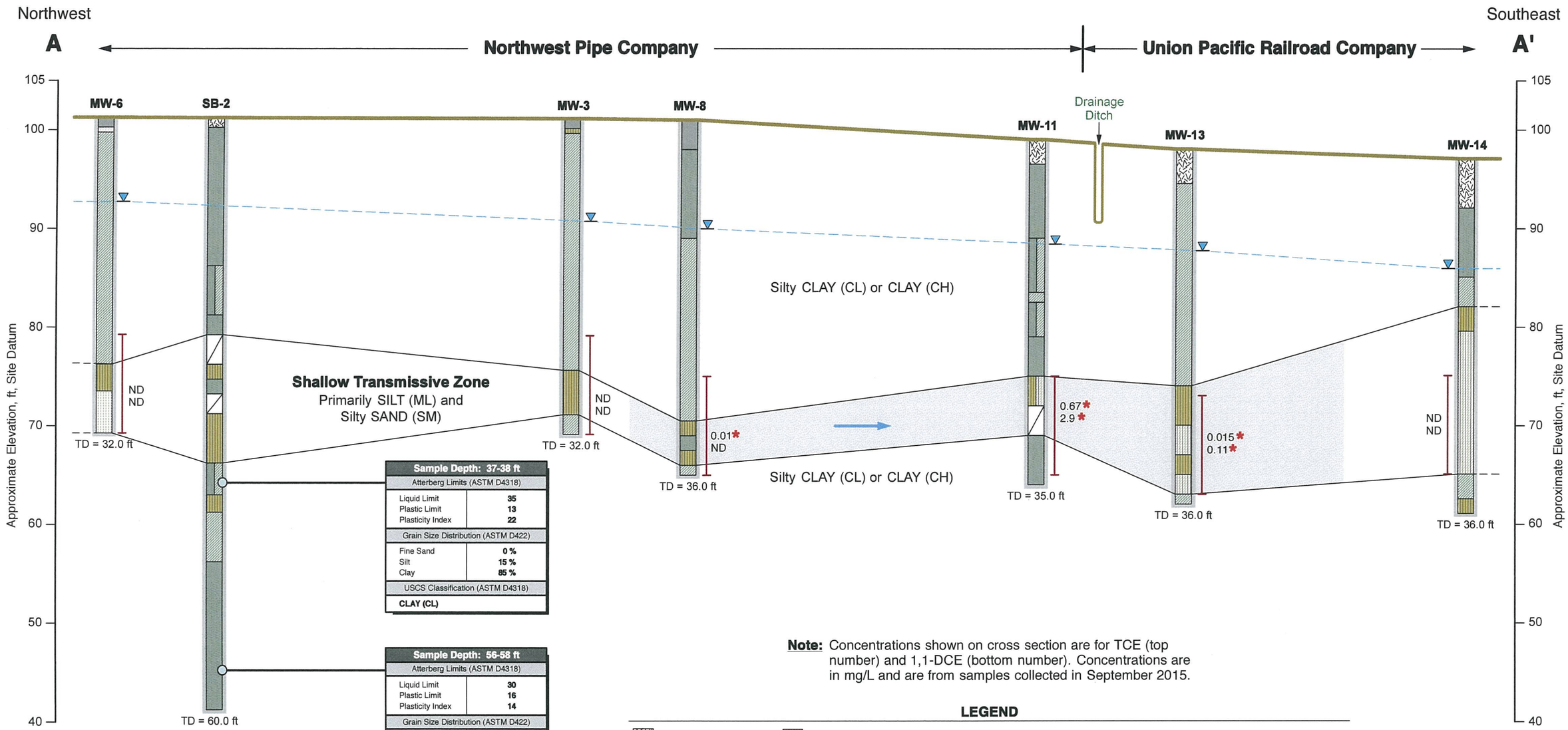
GSI ENVIRONMENTAL

## GROUNDWATER GRADIENT MAP: 1 DECEMBER 2015

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

| | | | |
|---|---|---|---|
| GSI Job No. | G-3990 | Drawn By: | CDM |
| Issued: | 1-Feb-2016 | Chk'd By: | DCK |
| Map ID: | 012_09 | Appv'd By: | JAK |

**FIGURE C.4**

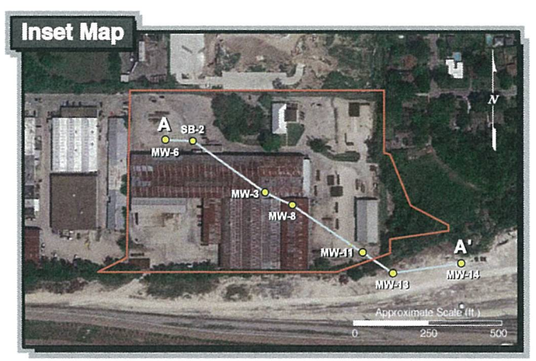



| Sample Depth: 37-38 ft | |
|---|---|
| Atterberg Limits (ASTM D4318) | |
| Liquid Limit | 35 |
| Plastic Limit | 13 |
| Plasticity Index | 22 |
| Grain Size Distribution (ASTM D422) | |
| Fine Sand | 0 % |
| Silt | 15 % |
| Clay | 85 % |
| USCS Classification (ASTM D4318) | |
| CLAY (CL) | |

| Sample Depth: 56-58 ft | |
|---|---|
| Atterberg Limits (ASTM D4318) | |
| Liquid Limit | 30 |
| Plastic Limit | 16 |
| Plasticity Index | 14 |
| Grain Size Distribution (ASTM D422) | |
| Fine Sand | 10 % |
| Silt | 70 % |
| Clay | 20 % |
| USCS Classification (ASTM D4318) | |
| Silty CLAY (CL) | |

**Note:** Concentrations shown on cross section are for TCE (top number) and 1,1-DCE (bottom number). Concentrations are in mg/L and are from samples collected in September 2015.

**Inset Map**




## LEGEND

- FILL
- Concrete
- CLAY (CH)
- CLAY, silty CLAY or sandy CLAY (CL)
- SILT (ML)
- Silty SAND (SM)
- SAND (SP)
- Not recovered
- Geotechnical sample point
- Screened interval
- TD Total depth of boring, ft below ground surface (BGS)
- ND Not detected at a detection limit of < 0.0002 mg/L
- * Concentration exceeds critical PCL
- Static water level (SWL), as measured on 1-Oct-2015
- Direction of groundwater flow in Shallow Transmissive Zone
- Approximate extent of groundwater PCLE Zone

HORIZONTAL SCALE, ft

0 40 80 120 160

VERTICAL SCALE: 1 INCH = 10 ft

VERTICAL EXAGGERATION: 8X

STATE OF TEXAS
JAMES A. KEARLEY
GEOLOGY
4375
LICENSED GEOSCIENTIST
2/1/16

GSI ENVIRONMENTAL
Texas Registration Number: 50243

| | | | |
|---|---|---|---|
| GSI Job No. | 3990 | Drawn By: | DLB |
| Issued: | 1-Feb-16 | Chk'd By: | JMS |
| Revised: | ——— | Aprv'd By: | JAK |
| Scale: | As Shown | | FIGURE C.5 |

**GEOLOGIC CROSS-SECTION A-A'**
**NORTHWEST-SOUTHEAST ORIENTATION**
**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

**APPENDIX D**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

***4. Provide for each contaminant of concern within the designated groundwater:***

***a. A description of the ingestion protective concentration level exceedance (PCLE) zone and the non-ingestion PCLE zone, including a specification of the horizontal area and the minimum and maximum depth below grounds surface (bgs).***

***b. The level of contamination, the ingestion protective concentration level (PCL), and the non-ingestion PCL, all expressed as mg/L units.***

***c. Its basic geochemical properties (e.g. whether the contaminant of concern migrates with groundwater, floats, or is soluble in water.)***

As shown on Figure C.2 in Appendix C of this application, the affected groundwater (i.e., as defined by the ingestion-based PCLE zone) is located on the southern portion of the Northwest Pipe Company facility, and extends south to the Union Pacific Railroad Company property. There are no non-ingestion PCLE zones present at the property. The affected groundwater is limited to the uppermost groundwater bearing unit (GWBU), which is generally encountered between approximately 20 and 30 feet below ground surface (ft bgs). As shown in Figure C.5, the uppermost GWBU is a relatively thin stratum comprised of silt and fine-grain sand. The GWBU was determined to meet the definition of Class 2, as defined by the TCEQ, based on a sustainable well yield that ranged from approximately 515 to 890 gallons per day. As such, all Residential Assessment Levels (RALs) and critical PCLs are based on the Class 2 groundwater designation.

The constituents of concern (COCs) detected in groundwater at concentrations exceeding PCLs are summarized in Table D.1 below. The estimated combined PCLE zone area for all seven COCs is approximately 253,000 square feet. The COCs (1,1-dichloroethylene [1,1-DCE]; tetrachloroethylene [PCE]; trichloroethylene [TCE]; cis-1,2-dichloroethylene [cis-1,2-DCE]; vinyl chloride; and 1,2-dichloroethane [1,2-DCA]) are volatile organic compounds (VOCs). All of these COCs are susceptible to natural attenuation processes, including biodegradation, dispersion, volatilization, and adsorption. Cis-1,2-DCE and vinyl chloride are biodegradation daughter products of natural biodegradation of PCE and TCE. 1,1-DCE and 1,2-DCA are daughter products of 1,1,1-trichloroethane (1,1,1-TCA) degradation. Note that 1,1,1-TCA has not been detected in any groundwater samples, which is significant as it confirms the historical and depleted nature of the source.

**Table D.1. Maximum Groundwater Concentrations for COCs Exceeding Groundwater Ingestion PCLs**

| COC (CAS No.) | Most Recent Max. Concentration Observed (mg/L) | RAL (mg/L) | Ingestion PCL ($^{GW}GW_{Ing}$) (mg/L) | Non-ingestion PCL ($^{Air}GW_{Inh-V}$) (mg/L) | Estimated Ingestion PCLE Zone Area ($ft^2$) |
|---|---|---|---|---|---|
| 1,1-Dichloroethylene (75-35-4) | 3.7 (MW-11; Dec. 2015) | 0.007 | 0.007 | 1700 | 215,000 |
| Tetrachloroethylene (127-18-4) | 0.36 (MW-11; Dec. 2015) | 0.005 | 0.005 | 500 | 70,500 |
| Trichloroethylene (79-01-6) | 0.93 (MW-11; Dec. 2015) | 0.005 | 0.005 | 24 | 174,500 |
| cis-1,2-Dichloroethylene (156-59-2) | 3.8 (B-6; Feb. 2014) | 0.07 | 0.07 | 1200 | 36,000 |
| Vinyl chloride (75-01-4) | 0.2 (B-6; Feb. 2014) | 0.002 | 0.002 | 3.8 | 83,000 |
| 1,2-Dichloroethane (107-06-2) | 0.011 (MW-11; Dec. 2015) | 0.005 | 0.005 | 33 | 13,000 |

Notes:
1. * = RAL corresponds to the method quantitation limit (MQL).
2. RAL = Residential Assessment Level; PCL = Protective Concentration Limit.

**APPENDIX E**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

***5. A table displaying the following information for each contaminant of concern, to the extent known:***

***a. The maximum concentration level for soil and groundwater, the ingestion protective concentration level, and the non-ingestion protective concentration level, all expressed as mg/kg for soils and mg/L for groundwater.***

***b. The critical protective concentration level without the municipal setting designation, highlighting any exceedances.***

Groundwater and soil have been characterized by the sampling and analysis of samples collected in 2014 through 2015. In addition to the groundwater sampling event conducted by Criterium in February 2014, 6 groundwater monitoring events have been conducted by GSI since August 2014. A total of 42 soil samples have been collected from 26 soil borings. Samples have been analyzed for a broad range of COCs including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), and Resource Conservation and Recovery Act (RCRA) metals.

Results of the affected property assessment and a subsequent groundwater sampling event in December 2015 indicated that six COCs (1,1-DCE, PCE, TCE, cis-1,2-DCE, vinyl chloride, and 1,2-DCA) are present in groundwater at the designated property at concentrations in exceedance of applicable ingestion PCLs. Soil analytical results indicated that no constituents, with the exception of 1,1-DCE at a single location, resulted in exceedance of applicable ingestion PCLs. There are no exceedances of non-ingestion PCLs in soil or groundwater. The maximum groundwater and soil concentrations for the six COCs are provided on Tables E.1 and E.2, respectively.

**Table E.1. Maximum Groundwater Concentrations for COCs Exceeding Groundwater Ingestion PCLs**

| COC (CAS No.) | Most Recent Max. Concentration Observed (mg/L) | RAL (mg/L) | Ingestion PCL ($^{GW}GW_{Ing}$) (mg/L) | Non-ingestion PCL ($^{Air}GW_{Inh-V}$) (mg/L) | Estimated Ingestion PCLE Zone Area ($ft^2$) |
|---|---|---|---|---|---|
| 1,1-Dichloroethylene (75-35-4) | 3.7 (MW-11; Dec. 2015) | 0.007 | 0.007 | 1700 | 215,000 |
| Tetrachloroethylene (127-18-4) | 0.36 (MW-11; Dec. 2015) | 0.005 | 0.005 | 500 | 70,500 |
| Trichloroethylene (79-01-6) | 0.93 (MW-11; Dec. 2015) | 0.005 | 0.005 | 24 | 174,500 |
| cis-1,2-Dichloroethylene (156-59-2) | 3.8 (B-6; Feb. 2014) | 0.07 | 0.07 | 1200 | 36,000 |
| Vinyl chloride (75-01-4) | 0.2 (B-6; Feb. 2014) | 0.002 | 0.002 | 3.8 | 83,000 |
| 1,2-Dichloroethane (107-06-2) | 0.011 (MW-11; Dec. 2015) | 0.005 | 0.005 | 33 | 13,000 |

Notes:
1. * = RAL corresponds to the method quantitation limit (MQL).
2. RAL = Residential Assessment Level; PCL = Protective Concentration Limit.

**Table E.2. Maximum Soil Concentrations for COCs Exceeding Soil and Groundwater Ingestion PCLs**

| COC (CAS No.) | Maximum Concentration Observed (mg/Kg) | RAL (mg/Kg) | Soil-to-Groundwater PCL ($^{GW}Soil_{Ing}$) (mg/kg) | Non-Ingestion PCL ($^{Air}Soil_{Inh-V}$) (mg/kg) |
|---|---|---|---|---|
| 1,1-Dichloroethylene (75-35-4) | 0.44 (B-6-D @ 17 ft bgs; Feb. 2014) | 0.05 | 0.05 | 12,000 |
| Tetrachloroethylene (127-18-4) | 0.0022 J (SB-1 @ 0.8-2 ft bgs; Aug. 2014) | 0.05 | 0.05 | 5000 |
| Trichloroethylene (79-01-6) | 0.0051 J (SB-2 @ 3-4 ft bgs; Feb. 2015) | 0.034 | 0.034 | 160 |
| cis-1,2-Dichloroethylene (156-59-2) | 0.051 (B-5-G @ 25 ft bgs; Feb. 2014) | 0.25 | 0.25 | 4400 |
| Vinyl chloride (75-01-4) | 0.02 (B-6-D @ 17 ft bgs; Feb. 2014) | 0.022 | 0.022 | 42 |
| 1,2-Dichloroethane (107-06-2) | 0.007 (B-6-D @ 17 ft bgs; Feb. 2014) | 0.014 | 0.014 | 91 |

Notes:
1. ND = Not detected; ft bgs = feet below ground surface.
2. RAL = Residential Assessment Level; PCL = Protective Concentration Limit.
3. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.

**APPENDIX F**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

***6. If the plume extends beyond the limits of property owners listed in this application, list the owners of the additional property beneath which the plume(s) extend(s), and a summary of interactions with those property owners about the plume(s) and this MSD application. Please Note: You are not required under this item to notify affected property owners, only to provide a summary of who affected property owners are, and if there have been any communications. "No contact" can be an acceptable answer.***

As shown on Figure B.1 of this application, the groundwater plume is present off-site to the south of the Site on property owned by Union Pacific Railroad Company. In addition, the groundwater plume has been conservatively identified on the property to the west of the Site on owned by Greer Capital Corporation. The interactions with those property owners regarding the plume and the MSD are summarized below.

**Greer Capital Corporation:** TRC General Holdings LLC (TRC) leases part of the property owned by Greer Capital Corporation and has investigated soil and shallow groundwater at, and in the vicinity of, the Greer Capital property. Monitoring wells installed by TRC in the southeast corner of the Greer Capital Corporation property detected elevated concentrations of chlorinated VOCs. During 2014 and 2015, Northwest Pipe Company and TRC exchanged groundwater analytical data from various sampling events. Note that it appears the impacts detected by TRC at the Greer Capital property were sourced from the Greer property and did not originate from the Northwest Pipe Company property. The connection of the groundwater plumes on the two properties has been conservatively inferred based on proximity and groundwater flow direction. It is our understanding that TRC plans to submit a separate MSD application for the Greer Capital property.

**Union Pacific Railroad Company:** During 2015, Northwest Pipe Company installed groundwater monitoring wells on the Union Pacific Railroad (UP) property and has informed UP on the results of laboratory analysis. Northwest Pipe Company representatives are currently working with Union Pacific Railroad representatives to include the UP property in the designated property of the MSD. If concurrence is obtained in advance of the public meeting for this MSD application, then Northwest Pipe Company may amend this application to include the UP property.

**APPENDIX G**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

***7. Provide a statement as to whether the plume of contamination is stable (i.e., no change) or contracting and delineated, <u>with the basis for that statement.</u> Please include historical sampling data.***

The comprehensive Site assessment that was performed from February 2014 to December 2015 has resulted in delineation of the groundwater plume and confirmation of groundwater plume stability. As discussed in Appendix J, the most probable sources of the groundwater impacts detected at the Site are incidental releases of chlorinated solvents that occurred as part of historical Site and neighboring property operations, which began at the Site in the early 1950s. Given the lack of any on-going source, the contaminant mass within the groundwater is diminishing and thus, while some variations in groundwater concentrations over time may occur, the groundwater plume overall is also in a stable to declining state. The following sections provide additional discussion of the plume delineation and stability determinations.

## GROUNDWATER PLUME DELINEATION

Site assessment activities for this project were conducted according to the guidelines of the Texas Commission on Environmental Quality (TCEQ) Texas Risk Reduction Program (TRRP; 30 Texas Administrative Code, Chapter 350) with oversight provided by the TCEQ Voluntary Cleanup Program (VCP). Per TRRP guidelines, the Site assessment process culminates in submittal of the Affected Property Assessment Report (APAR) to TCEQ. Northwest Pipe Company submitted the APAR for this site to TCEQ on 30 November 2015.

The APAR requires full delineation of affected property, where “affected” is defined by the TCEQ as a medium (soil, groundwater, etc.) containing constituent concentrations exceeding the lowest applicable Protective Concentration Level (PCL). For groundwater at this Site, the PCL for each constituent of concern (COC) was based on the ingestion pathway. Therefore, the full extent of groundwater containing concentrations in excess of the ingestion-based PCL was delineated as part of the Site assessment. A combined delineation map showing the maximum extent of COCs in excess of PCLs is provided on Figure C.3A, and delineation maps for individual COCs are provided on Figures C.3B through C.3G.

## GROUNDWATER PLUME STABILITY

A stable groundwater plume provides evidence that natural conditions are effectively controlling the extent of COCs and that expansion of the groundwater plume over time is unlikely to occur. The natural processes that are primarily responsible for achieving a stable groundwater plume involve biodegradation by native microorganisms, adsorption of COCs to soil particles, and

dispersion of the COCs through groundwater flow. Collectively, these processes are referred to as natural attenuation. TCEQ guidance recommends demonstrating a stable groundwater plume using a lines-of-evidence approach (TCEQ, 2010), involving the following three tiers:

1. **Primary line of evidence:** Relies on historical groundwater data to demonstrate a stable or decreasing trend of COC concentrations over time and with distance away from the source area. This line of evidence is the minimum required to demonstrate plume stability. Depending on the level of confidence in the plume trend results, the analysis may proceed to the secondary and other lines of evidence to provide additional support.

2. **Secondary line of evidence:** Relies on hydrogeologic or chemical indicators to document signatures or "footprints" of certain natural attenuation processes. Example data include presence of "daughter" products to indicate active degradation processes, ratios of parent compounds to daughter products to evaluate the extent of degradation, geochemistry data to demonstrate that appropriate subsurface conditions exist, and groundwater flow rate calculations to evaluate plume migration potential.

3. **Other lines of evidence:** Most often consist of predictive modeling studies or lab studies to further demonstrate an understanding of the natural attenuation processes occurring at a site and their effectiveness at stabilizing the groundwater plume. This line of evidence is typically utilized when the primary line of evidence indicates a stable plume, but the extent of data is such that additional analysis is needed to confirm the historical trend data.

The degree to which the various lines of evidence are evaluated at a given site, or whether the analysis proceeds beyond the primary line of evidence, depends on the project objectives and the extent of available data. For this project, all three lines of evidence have been evaluated since the period of available data is approximately 2 years and some of the downgradient monitoring wells currently have only two monitoring events. By evaluating all available lines of evidence, and if the lines of evidence converge to a common finding, then a higher degree of confidence is achieved. The following sections provide the technical approach and findings of the groundwater plume stability analysis.

**Primary Lines of Evidence**

<u>COC Concentration vs. Time Trends</u>

The primary line of evidence used to evaluate plume stability was COC concentration trends over time in monitoring wells (see Table G.1 for complete VOC sampling data). Trend evaluation was performed using the Mann-Kendall test, which is a non-parametric statistical procedure for analyzing concentration trends in groundwater monitoring data that is recommended by TCEQ in the TRRP-33 guidance document (TCEQ, 2010). The test can be used with data sets that are incomplete or have irregular sampling intervals. The Mann-Kendall procedure provides a "trend confidence" result representing the statistical confidence that a trend is increasing, probably increasing, stable, probably decreasing, or decreasing (Aziz et al., 2003).

The Mann-Kendall test was applied to the six monitoring wells having exceedances of the ingestion-based PCLs for the six primary COCs (i.e., PCE; TCE; cis-1,2-DCE; vinyl chloride; 1,2-DCA; and 1,1-DCE). The Mann-Kendall test requires a minimum of four sampling events to calculate a trend and often six to eight sampling events are required to meet the statistical confidence and coefficient of variation criteria needed to establish a trend. Two of the wells, MW-12 and MW-13 located on the Union Pacific property, only have two sampling events and therefore a trend calculation was not possible. The remaining wells have five or six sampling events to date, and therefore, trend calculation was possible. Many of the COCs the statistical confidence criteria have not been met, resulting in a "No Trend" result for several wells and COCs. A summary of Mann-Kendall results for each well and COC is provided on the table below.

| | **PCE** | **TCE** | **cis-1,2-DCE** | **VC** | **1,2-DCA** | **1,1-DCE** |
|---|---|---|---|---|---|---|
| **MW-5** | NT | **Stable** | NT | NT | NT | NT |
| **MW-8** | Increasing | NT | NT | NT | **Stable** | **Stable** |
| **MW-9** | NT | Increasing | NT | **Stable** | **Stable** | NT |
| **MW-11** | NT | **Stable** | **Stable** | NT | NT | NT |
| **MW-12** | Not Enough Data for Trend Calculation | | | | | |
| **MW-13** | Not Enough Data for Trend Calculation | | | | | |

Note: NT = No Trend

As indicated on the table above, where the monitoring data are sufficient to establish a trend, the majority of the results indicate a stable groundwater plume. For the two instances where an increasing trend was indicated (PCE at MW-8 and TCE at MW-9), the concentrations of these compounds are very low, with PCE being below the ingestion-based PCL (maximum concentration of 0.0048 mg/L vs. PCL of 0.005 mg/L) and TCE being only slightly above the ingestion-based PCL (maximum concentration of 0.017 mg/L vs. PCL of 0.005 mg/L). These monitoring wells are located within the interior of the site and upgradient of MW-11, which exhibits stable concentrations. As such, these wells do not impact the overall finding of a stable groundwater plume at the site (this finding is further supported by the modeling work described below).

COC Concentration vs. Distance Trends

The groundwater plume maps for individual COCs (Figures C.3B through C.3G) indicate strong patterns of decreasing concentrations with distance away from the high concentration wells (i.e., MW-11 on the east portion of the property and TRC-MW-4 located immediately west of the property). These data confirm that COCs are being naturally attenuated in groundwater.

**Secondary Lines of Evidence**

Presence of Biodegradation Daughter Products

The presence and concentration of biodegradation daughter products indicates microbial biodegradation is an active natural attenuation process at the Site. The presence of cis-1,2-DCE, vinyl chloride, and 1,2-DCA are all indicative of the biological reductive

dechlorination process (note that cis-1,2-DCE and vinyl chloride are both products of PCE and TCE biodegradation; while 1,2-DCE is a product of 1,1,1-TCA biodegradation). It should be noted that in downgradient areas of chlorinated solvent plumes where dissolved oxygen concentrations are often higher, both vinyl chloride and cis-1,2-DCE are susceptible to aerobic biodegradation processes that oxidize the chlorinated compound to carbon dioxide, water, and chloride (Wiedemeier et al., 1999). The presence and concentrations of 1,1-DCE indicates that hydrolysis (an abiotic degradation mechanism) of 1,1,1-TCA has occurred (1,1-DCE is the product of 1,1,1-TCA hydrolysis). The lack of detectable concentrations of 1,1,1-TCA confirms the historical and depleted nature of the original source material.

Geochemical Indicators of Biodegradation

Depressed levels of dissolved oxygen (DO) and oxidation-reduction potential (ORP) are common indicators of the biological reductive dechlorination process. Sampling data for these parameters (see Table G.6) indicates that DO levels are generally below 1 mg/L within the groundwater plume (indicating anaerobic conditions that are favorable for reductive dechlorination) and that ORP levels are generally negative (indicating the presence of reducing conditions that are favorable for reductive dechlorination). Based on these conditions, the biodegradation processes are expected to continue to further reduce COC concentrations over time.

**Other Lines of Evidence**

Fate and Transport Modeling

The semi-analytical transport model BIOCHLOR (Aziz et al., 2000) was used to further evaluate plume stability and to the future migration potential of PCE, its biodegradation daughter products (i.e., TCE, *cis*-1,2-DCE and vinyl chloride), and 1,1-DCE. Simulations for the both the east plume area and west plume area were completed. Figure G.1 illustrates the groundwater flow paths modeled for the east and west plume areas. The following paragraphs describe the methodology and results of the modeling study.

*Technical Approach and Methods*

***Groundwater Model:*** BIOCHLOR, a semi-analytical transport model incorporating first-order biodegradation kinetics (Aziz et al., 2000), was used to simulate the groundwater fate and transport of PCE and its biodegradation daughter products (TCE; cis-1,2-DCE, and vinyl chloride), as well as 1,1-DCE (which is a daughter product in the degradation of 1,1,1-trichloroethane [1,1,1-TCA]). BIOCHLOR is one of the most widely used models for evaluating the fate and transport of chlorinated compounds in groundwater.

***General Approach:*** Plume stability was evaluated by conducting two model runs for each of two site areas. The first run simulated current plume conditions in order to establish biodegradation rate constants. To this end, biodegradation rates for each COC were calibrated to match current concentration versus distance sampling data. The second run simulated steady-state plume conditions using a run time of 500 years. Every model input other than run

time, including the calibrated biodegradation rates, remained constant between the two model runs.

The key model output from the second model run is the groundwater plume length predicted 500 years in the future, which is compared to the current plume length as a measure of the groundwater plume stability. If the long-term run predicts a much longer groundwater plume than is currently observed, then the plume may be likely to increase in size over time. On the other hand, if the long-term plume length is predicted to be about the same size as the current plume length, then the plume is considered stable. Note that the model assumes a ***constant*** contaminant source, which is a conservative (and unrealistic) assumption, but one that allows long-term examination of groundwater plume conditions. This does not mean the lifetime of the plume is expected to be 500 years. In reality, the source is also decaying and will become exhausted after some period, as will the groundwater plume (likely much less than 500 years).

***Site-wide Input Parameters:*** The common input parameters used in the model simulations and references for the values are listed in the following table:

| Parameter | Value | Reference |
|---|---|---|
| Hydraulic Conductivity | $7.5 \times 10^{-4}$ cm/sec | Representative value from slug tests |
| Hydraulic Gradient | 0.005 | Approximate average value |
| Effective Porosity | 0.25 | Common value for silty sands (Aziz et al., 2000) |
| Seepage Velocity | 15.5 ft/yr | Calculated by BIOCHLOR using above inputs |
| Soil Bulk Density | 1.67 kg/L | BIOCHLOR default (Aziz et al., 2000) |
| Fraction Organic Carbon | 0.0018 | BIOCHLOR default (Aziz et al., 2000) |
| $K_{oc}$ PCE | 426 L/kg | BIOCHLOR default (Aziz et al., 2000) |
| $K_{oc}$ TCE | 130 L/kg | BIOCHLOR default (Aziz et al., 2000) |
| $K_{oc}$ cis-1,2-DCE | 125 L/kg | BIOCHLOR default (Aziz et al., 2000) |
| $K_{oc}$ VC | 30 L/kg | BIOCHLOR default (Aziz et al., 2000) |
| Source Thickness | 7 feet | Average groundwater thickness at site |

*Model Simulations for the East Portion of the Site*

At the east portion of the Site, the fate and transport of PCE and its biodegradation daughter products was evaluated, along with 1,1-DCE, which was evaluated in a separate model run.

Monitoring well MW-11 was assumed to be the source area for these runs since the highest COC concentrations in this area have been measured in this well. Data from downgradient wells MW-13 and MW-14 were used to calibrate the biodegradation rates in this portion of the site. The groundwater flow path for the east portion of the site is shown on Figure G.1.

***East Site Area Model Parameters:*** Input parameters that were unique to this portion of the site are summarized on the following table.

| Parameter | Value | Reference |
|---|---|---|
| First Run Simulation Time (calibration) | 55 years | Approximate time from early site operations (~1960) to present |
| Second Run Simulation Time (prediction) | 500 years | Long time period to allow for maximum plume development |
| Modeled Area Length | 340 feet | Distance from highest concentration well MW-11 to downgradient wells MW-14 and MW-16 |
| Modeled Area Width | 120 feet | Estimated width of elevated concentrations in the vicinity of MW-11 |
| $K_{oc}$ 1,1-DCE | 65 L/kg | TRRP PCL Tables (TRRP, 2015) |

***East Site Area Methods:*** The COC concentrations at well MW-11, consistently the highest concentration well, were used as source zone concentrations. The 1,1-DCE plume was simulated separately from PCE and its biodegradation daughter products. Biodegradation rates were calibrated to observed concentrations and then applied to the long-term steady-state run.

***East Site Area Results:*** Attachment G.1 contains all of the model input and output files for the modeling simulations. The simulated plume length downgradient of well MW-11 (i.e., groundwater with concentrations exceeding ingestion-based PCLs) at the end of the 55-year model period was approximately 175 feet for PCE, 225 feet for TCE, 100 feet for cis-1,2-DCE, and 250 feet for vinyl chloride. The plume length for 1,1-DCE was about 250 feet. The biodegradation rates mostly fell within observed literature values for each compound, though the biodegradation rate required to calibrate vinyl chloride was relatively high (4.0 per year). This is likely due to the fact that vinyl chloride is susceptible to aerobic degradation process in addition to the anaerobic reductive dechlorination process that is assumed by the model. The plume lengths for each contaminant at the end of the 500-year model period were approximately equal to those for the 55-year model period, indicating a stable groundwater plume for each COC.

*Model Simulations for the West Portion of the Site*

At the west portion of the Site, only PCE and its biodegradation daughter products were evaluated. Monitoring well TRC-MW-4 was assumed to be the source area for these runs since the highest COC concentrations in this area have been measured in this well. Data from

downgradient wells B-6, MW-5, MW-12, and MW-15 were used to calibrate the biodegradation rate in this portion of the Site. The groundwater flow path for the west portion of the site is shown on Figure G.1.

***West Site Area Model Parameters:*** Input parameters that were unique to this portion of the Site are summarized on the following table.

| Parameter | Value | Reference |
|---|---|---|
| First Run Simulation Time (calibration) | 55 years | Approximate time from early site operations (~1960) to present |
| Second Run Simulation Time (prediction) | 500 years | Long time period to allow for maximum plume development |
| Modeled Area Length | 740 feet | Distance from highest concentration well to downgradient, low concentration well |
| Modeled Area Width | 80 feet | Estimated width of elevated concentrations in the vicinity of TRC-MW-4 |

***West Site Area Methods:*** The concentrations at well TRC-MW-4, the highest concentration well for most of the compounds evaluated, were used as the source zone concentrations. The biodegradation rates for each compound were calibrated to observed concentrations and then applied to the long-term steady-state run.

***West Site Area Results:*** Attachment G.1 contains all of the model input and output files for the modeling simulations. The simulated plume length downgradient of well TRC-MW-4 at the end of the 55-year model period was approximately 325 feet for PCE, 400 feet for TCE, 225 feet for cis-1,2-DCE, and 500 feet for vinyl chloride. The biodegradation rates fell within literature values reported for each compound. The plume lengths for each contaminant at the end of the 500-year model period were approximately equal to those for the 55-year model period, indicating a stable groundwater plume for each COC.

*Model Conclusions*

The modeling results have confirmed that site conditions are sufficient to maintain a stable plume over a long period of time. The slow groundwater velocity, coupled with the active degradation and attenuation processes, are responsible for the observed and predicted groundwater plume stability. Additionally, the model simulations assume a constant source, when in reality both the source and plumes will decay over time.

***KEY POINT***

The BIOCHLOR semi-analytical model was used to evaluate plume stability as an additional line of evidence to support the primary and secondary lines of evidence. Conservative inputs were used in the model formulation. Results indicate that groundwater plumes at both the eastern and western portions of the site are stable and are very unlikely to migrate appreciable distances beyond the current plume extents. This finding is consistent with the historical nature of the groundwater plumes.

## REFERENCES

Aziz, C.E., C.J. Newell, J.R. Gonzales, P. Haas, T.P. Clement, and Y. Sun, 2000. *Biochlor Natural Attenuation Decision Support System, User's Manual. Version 1.0*. U.S. EPA Office of Research and Development, Washington, D.C. EPA/600/R-00/008.

Aziz, C.E., C.J. Newell, and J.R. Gonzales, 2002. *Biochlor Natural Attenuation Decision Support System, User's Manual Addendum. Version 2.2*. Air Force Center for Environmental Excellence, Brooks Air Force Base, San Antonio, Texas.

Aziz, J.J., M. Ling, H. Rifai, C.J. Newell, and J.R. Gonzales, 2003. MAROS: A Decision Support System for Optimizing Monitoring Plans. *Ground Water*, 41(3):355-367.

TCEQ, 2010. *Monitored Natural Attenuation Demonstrations under TRRP*, RG-366/TRRP-33, Texas Commission on Environmental Quality, Revised September 2010.

Texas Risk Reduction Program (TRRP), December 2015. Protective Concentration Levels and Supporting Tables. Texas Commission on Environmental Quality.

Wiedemeier, T.H., H.S. Rifai, C.J. Newell, and J.T. Wilson, 1999. *Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface*, John Wiley & Sons, Inc., New York, NY.

## ATTACHMENTS

Table G.1 Groundwater Sampling and Testing Results: VOCs
Table G.2 Groundwater Sampling and Testing Results: SVOCs
Table G.3 Groundwater Sampling and Testing Results: Metals
Table G.4 Groundwater Sampling and Testing Results: TPH
Table G.5 Criterium Phase II Groundwater Sampling Results
Table G.6 Groundwater Sampling and Testing Results: Geochemical Parameters
Figure G.1 BIOCHLOR Modeling Location Map
Attachment G.1 BIOCHLOR Modeling Input and Output Files

# APPENDIX G

## Supplemental Information based on City of Houston Technical Review Comments

In a letter dated 9 June 2016, the City of Houston requested additional information as part of the technical review of the MSD application. The City of Houston request and the additional information related to Appendix G are provided below.

City of Houston Request, Appendix G: The results of the Mann-Kendall analysis indicate there is no trend for the tetrachloroethylene (PCE) concentrations in MW-9 and MW-11. However, the sampling data suggests an increasing trend in concentrations in both wells. The results of the Mann-Kendall analysis also indicate there is no trend for the trichloroethylene (TCE) concentrations in MW-8; however, the sampling data suggests an increasing trend in concentrations. In addition, both Mann-Kendall and the sampling data indicate increasing concentrations of TCE in MW-9. Please provide additional discussion regarding the increasing concentrations of PCE and TCE in these wells in relation to plume stability.

The City is requiring a minimum of four sampling events, in addition to other lines of evidence when necessary, to determine stability for monitoring wells displaying PCL exceedances, as recommended by TCEQ in RG-366 "Monitored Natural Attenuation Demonstrations under TRRP". Quarterly sampling events are preferred for all demonstrations of plume stability and required for demonstrations of plume stability that rely on statistical analysis. As such, we are requesting additional sampling for MW-12 and MW-13.

***Response:*** An additional quarterly groundwater sampling event was conducted in June 2016. With the June event, all permanent monitoring wells at the site, including MW-12 and MW-13, have been sampled for at least four consecutive quarters and most monitoring wells now have seven to eight consecutive quarters of monitoring data. Results of the June sampling event, which are shown on the enclosed revisions of Figure C.3A and Table G.1, were very consistent with the previous monitoring data and provide further confirmation that the groundwater plume at the designated property is delineated and stable.

The plume stability demonstration presented in the MSD application consisted of a lines-of-evidence approach for evaluating plume stability as recommended by TCEQ and US EPA guidance on monitored natural attenuation. The lines-of-evidence evaluated were groundwater concentration trends over time, geochemical and biological indicators of natural attenuation, and groundwater fate and transport modeling using the BIOCHLOR natural attenuation model. Based on the weight of evidence, the groundwater plume is stable. The principal points in this regard are discussed below.

- *There is no active source of contaminants at the property and therefore, overall contaminant mass is declining.* To the extent any on-site sources of chlorinated solvents may have affected shallow groundwater, such potential sources would have been incidental, historical releases that pre-dated site operations by Northwest Pipe Company. There were no known or suspected releases at the property during the time period that Northwest Pipe Company operated at the site (1999 to 2013). Given the lack of any active source, the contaminant mass within the groundwater is diminishing and

thus, while some variations in groundwater concentrations over time may occur, the groundwater plume overall is in a stable to declining state.

- *The June 2016 monitoring data indicates that site-wide maximum concentrations (MW-11) have declined by approximately 30 to 70%.* MW-11 has routinely exhibited the highest concentrations of chlorinated compounds at the site. However, based on results of the June 2016 sampling event, concentrations of ***all*** chlorinated compounds at MW-11 have shown a reduction of approximately 30 to 70% from historical maximums. Because the concentrations at MW-11 have been higher than other wells within the plume, the trends observed at this well dominate overall plume behavior and the concentration reductions at MW-11 translate to an overall declining plume.

- *The June 2016 monitoring data shows concentration reductions at MW-8 and MW-9.* MW-8 and 9 were also mentioned in the City's response as wells with potentially increasing concentration trends. Both of these wells have shown minor detections of PCE and TCE that only slightly exceed ingestion-based PCLs. Concentrations reported for both of these wells in June 2016 were less than or equal to concentrations reported from the previous sampling event. It is further noted that these monitoring wells are located at the ***upgradient*** fringe of the groundwater plume, and the very minor concentrations at these wells will ***not*** have a measurable impact on the downgradient plume (i.e., toward MW-11), where concentrations are higher.

- *Groundwater fate and transport modeling shows that the groundwater plume will not expand beyond the designated property in the future.* Northwest Pipe Company elected to conduct predictive modeling of the groundwater plume as further support of the other lines-of evidence for plume stability. The model was developed based on the site-specific hydrogeologic parameters and calibrated to the actual concentration data observed throughout the groundwater plume. The model demonstrated that site conditions are sufficient to maintain a stable plume over a long period of time as a result of the slow groundwater flow velocity and the active degradation and attenuation processes. A key input of the model that is paramount to the plume stability finding is the assumption of a ***continuous*** contaminant source. As discussed in the first bullet point above, the actual contaminant mass is declining at the site because there is no on-going source. However, modeling the plume ***as if*** there were a continuous source provides a high degree of confidence that the plume will not expand in the future.

In summary, the lines of evidence demonstrate that the site conditions, including historical source, very slow moving groundwater, and active natural biodegradation processes, have resulted in an overall stable plume. Though low-level concentration fluctuations have been observed at select monitoring wells for select constituents, the most recent monitoring data and modeling results confirm that such fluctuations do not translate into an expanding plume and have no impact on overall plume stability. Rather, the monitoring data show that the downgradient wells continue to exhibit no detections of constituents of concern, and that maximum concentrations have declined 30 to 70% over the monitoring period.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-1 | MW-1 | MW-2 | MW-2 | MW-2 Dup. | MW-2 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 8/15/2014 | 12/29/2014 | 8/18/2014 | 12/29/2014 | 12/29/2014 | 3/18/2015 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Benzene | 71-43-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Bromoform | 75-25-2 | 1.2 E-1 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Bromomethane | 74-83-9 | 3.4 E-2 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | <0.0006 | <0.0006 | <0.0006 | <0.0006 | <0.0006 | <0.0006 |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Chloroethane | 75-00-3 | 9.8 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Chloroform | 67-66-3 | 2.4 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Chloromethane | 74-87-3 | 7.0 E-2 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Cumene | 98-82-8 | 2.4 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Cyclohexane | 110-82-7 | 1.2 E+2 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | **0.00056 J** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | **0.18** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | **0.0012** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | NA | <0.02 | NA | NA | <0.020 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Methyl acetate | 79-20-9 | 2.4 E+1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | <0.0007 | <0.0007 | <0.0007 | <0.0007 | <0.0007 | <0.0007 |
| Methylene chloride | 75-09-2 | 5.0 E-3 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Styrene | 100-42-5 | 1.0 E-1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | **0.081** | **0.00088 J** | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Toluene | 108-88-3 | 1.0 E+0 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | **0.041** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | **0.0061** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Xylene, o- | 95-47-6 | 1.0 E+1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-2 | MW-2 | MW-2 | MW-3 | MW-3 | MW-3 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 6/25/2015 | 9/28/2015 | 12/1/2015 | 8/15/2014 | 12/29/2014 | 3/18/2015 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | <0.002 | <0.002 | NA | <0.002 | <0.002 | <0.002 |
| Benzene | 71-43-2 | 5.0 E-3 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Bromoform | 75-25-2 | 1.2 E-1 | <0.0004 | <0.0004 | NA | <0.0004 | <0.0004 | <0.0004 |
| Bromomethane | 74-83-9 | 3.4 E-2 | <0.0004 | <0.0004 | NA | <0.0004 | <0.0004 | <0.0004 |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | <0.0006 | <0.0006 | NA | <0.0006 | <0.0006 | <0.0006 |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Chloroethane | 75-00-3 | 9.8 E+0 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Chloroform | 67-66-3 | 2.4 E-1 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Chloromethane | 74-87-3 | 7.0 E-2 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Cumene | 98-82-8 | 2.4 E+0 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Cyclohexane | 110-82-7 | 1.2 E+2 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | <0.0004 | <0.0004 | NA | <0.0004 | <0.0004 | <0.0004 |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | <0.0004 | <0.0004 | NA | <0.0004 | <0.0004 | <0.0004 |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | <0.0001 | <0.0001 | NA | <0.0001 | <0.0001 | <0.0001 |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | <0.02 | <0.02 | <0.02 | NA | <0.020 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| Methyl acetate | 79-20-9 | 2.4 E+1 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | <0.0007 | <0.0007 | NA | <0.0007 | <0.0007 | <0.0007 |
| Methylene chloride | 75-09-2 | 5.0 E-3 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Styrene | 100-42-5 | 1.0 E-1 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Toluene | 108-88-3 | 1.0 E+0 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Xylene, o- | 95-47-6 | 1.0 E+1 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-3 | MW-3 | MW-3 | MW-4 | MW-4 | MW-4 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 6/25/2015 | 9/28/2015 | 12/1/2015 | 8/19/2014 | 12/29/2014 | 3/18/2015 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | <0.002 | <0.002 | NA | <0.002 | <0.002 | <0.002 |
| Benzene | 71-43-2 | 5.0 E-3 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Bromoform | 75-25-2 | 1.2 E-1 | <0.0004 | <0.0004 | NA | <0.0004 | <0.0004 | <0.0004 |
| Bromomethane | 74-83-9 | 3.4 E-2 | <0.0004 | <0.0004 | NA | <0.0004 | <0.0004 | <0.0004 |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | <0.0006 | <0.0006 | NA | <0.0006 | <0.0006 | <0.0006 |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Chloroethane | 75-00-3 | 9.8 E+0 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Chloroform | 67-66-3 | 2.4 E-1 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Chloromethane | 74-87-3 | 7.0 E-2 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Cumene | 98-82-8 | 2.4 E+0 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Cyclohexane | 110-82-7 | 1.2 E+2 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | <0.0004 | <0.0004 | NA | <0.0004 | <0.0004 | <0.0004 |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | <0.0004 | <0.0004 | NA | <0.0004 | <0.0004 | <0.0004 |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | <0.0002 | <0.0002 | <0.0002 | **0.00052 J** | **0.0011** | **0.0017** |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | <0.0002 | <0.0002 | <0.0002 | **0.00098 J** | **0.0011** | **0.0018** |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | <0.0001 | <0.0001 | NA | <0.0001 | <0.0001 | <0.0001 |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | <0.02 | <0.02 | <0.02 | NA | <0.020 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| Methyl acetate | 79-20-9 | 2.4 E+1 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | <0.0007 | <0.0007 | NA | <0.0007 | <0.0007 | <0.0007 |
| Methylene chloride | 75-09-2 | 5.0 E-3 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | <0.0002 | <0.0002 | NA | <0.0002 | **0.0014** | **0.00026 J** |
| Styrene | 100-42-5 | 1.0 E-1 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Toluene | 108-88-3 | 1.0 E+0 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | **0.00046 J** | **0.00047 J** | **0.0011** |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Xylene, o- | 95-47-6 | 1.0 E+1 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-4 | MW-4 | MW-4 | MW-5 | MW-5 | MW-5 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 6/25/2015 | 9/28/2015 | 12/1/2015 | 8/15/2014 | 12/29/2014 | 3/18/2015 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | <0.002 | <0.002 | NA | <0.002 | <0.002 | <0.002 |
| Benzene | 71-43-2 | 5.0 E-3 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Bromoform | 75-25-2 | 1.2 E-1 | <0.0004 | <0.0004 | NA | <0.0004 | <0.0004 | <0.0004 |
| Bromomethane | 74-83-9 | 3.4 E-2 | <0.0004 | <0.0004 | NA | <0.0004 | <0.0004 | <0.0004 |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | <0.0006 | <0.0006 | NA | <0.0006 | <0.0006 | <0.0006 |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Chloroethane | 75-00-3 | 9.8 E+0 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Chloroform | 67-66-3 | 2.4 E-1 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Chloromethane | 74-87-3 | 7.0 E-2 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Cumene | 98-82-8 | 2.4 E+0 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Cyclohexane | 110-82-7 | 1.2 E+2 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | <0.0004 | <0.0004 | NA | <0.0004 | <0.0004 | <0.0004 |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | <0.0004 | <0.0004 | NA | <0.0004 | <0.0004 | <0.0004 |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | <0.0002 | <0.0002 | <0.0002 | **0.031** | **0.037** | **0.041** |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | **0.001** | **0.0017** | **0.0019** |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | **0.0014** | <0.0002 | <0.0002 | **0.26** | **0.3** | **0.37** |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | **0.0016** | **0.0017** | **0.0017** | **0.013** | **0.015** | **0.018** |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | <0.0001 | <0.0001 | NA | <0.0001 | <0.0001 | <0.0001 |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | <0.02 | <0.02 | <0.02 | NA | <0.020 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| Methyl acetate | 79-20-9 | 2.4 E+1 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | <0.0007 | <0.0007 | NA | <0.0007 | <0.0007 | <0.0007 |
| Methylene chloride | 75-09-2 | 5.0 E-3 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Styrene | 100-42-5 | 1.0 E-1 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | <0.0003 | <0.0003 | <0.0003 | **0.0012** | **0.0007 J** | **0.0013** |
| Toluene | 108-88-3 | 1.0 E+0 | <0.0002 | <0.0002 | NA | <0.0002 | <0.0002 | <0.0002 |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | <0.001 | <0.001 | NA | <0.001 | <0.001 | <0.001 |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | **0.0011** | **0.0012** | <0.0002 | **0.0059** | **0.0073** | **0.008** |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | <0.0002 | <0.0002 | <0.0002 | **0.0052** | **0.0053** | **0.0067** |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |
| Xylene, o- | 95-47-6 | 1.0 E+1 | <0.0003 | <0.0003 | NA | <0.0003 | <0.0003 | <0.0003 |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | <0.0005 | <0.0005 | NA | <0.0005 | <0.0005 | <0.0005 |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-5 | MW-5 | MW-5 | MW-5 Dup. | MW-5 | MW-5 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 6/25/2015 | 9/28/2015 | 12/1/2015 | 12/1/2015 | 3/11/2016 | 6/15/2016 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | <0.002 | <0.002 | NA | NA | NA | NA |
| Benzene | 71-43-2 | 5.0 E-3 | <0.0002 | <0.0002 | NA | NA | NA | NA |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | <0.0002 | <0.0002 | NA | NA | NA | NA |
| Bromoform | 75-25-2 | 1.2 E-1 | <0.0004 | <0.0004 | NA | NA | NA | NA |
| Bromomethane | 74-83-9 | 3.4 E-2 | <0.0004 | <0.0004 | NA | NA | NA | NA |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | <0.0006 | <0.0006 | NA | NA | NA | NA |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | <0.0005 | <0.0005 | NA | NA | NA | NA |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | <0.0003 | <0.0003 | NA | NA | NA | NA |
| Chloroethane | 75-00-3 | 9.8 E+0 | <0.0003 | <0.0003 | NA | NA | NA | NA |
| Chloroform | 67-66-3 | 2.4 E-1 | <0.0002 | <0.0002 | NA | NA | NA | NA |
| Chloromethane | 74-87-3 | 7.0 E-2 | <0.0002 | <0.0002 | NA | NA | NA | NA |
| Cumene | 98-82-8 | 2.4 E+0 | <0.0003 | <0.0003 | NA | NA | NA | NA |
| Cyclohexane | 110-82-7 | 1.2 E+2 | <0.0003 | <0.0003 | NA | NA | NA | NA |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | <0.001 | <0.001 | NA | NA | NA | NA |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | <0.0003 | <0.0003 | NA | NA | NA | NA |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | <0.0002 | <0.0002 | NA | NA | NA | NA |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | <0.0005 | <0.0005 | NA | NA | NA | NA |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | <0.0004 | <0.0004 | NA | NA | NA | NA |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | <0.0004 | <0.0004 | NA | NA | NA | NA |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | <0.0003 | <0.0003 | NA | NA | NA | NA |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | **0.037** | **0.036** | **0.032** | **0.031** | **0.03** | **0.03** |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | **0.0019** | **0.0019** | **0.0019** | **0.0018** | **0.0011** | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | **0.69** | **0.37** | **0.34** | **0.33** | **0.29** | **0.34** |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | **0.016** | **0.016** | **0.016** | **0.016** | **0.016** | **0.017** |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | **0.00075 J** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | <0.0005 | <0.0005 | NA | NA | NA | NA |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | <0.0001 | <0.0001 | NA | NA | NA | NA |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | <0.0002 | <0.0002 | NA | NA | NA | NA |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | **0.12** | <0.020 | <0.02 | <0.02 | <0.02 | <0.02 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | <0.0003 | <0.0003 | NA | NA | NA | NA |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | <0.001 | <0.001 | NA | NA | NA | NA |
| Methyl acetate | 79-20-9 | 2.4 E+1 | <0.001 | <0.001 | NA | NA | NA | NA |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | <0.0003 | <0.0003 | NA | NA | NA | NA |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | <0.0005 | <0.0005 | NA | NA | NA | NA |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | <0.0007 | <0.0007 | NA | NA | NA | NA |
| Methylene chloride | 75-09-2 | 5.0 E-3 | <0.001 | <0.001 | NA | NA | NA | NA |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | <0.0002 | <0.0002 | NA | NA | NA | NA |
| Styrene | 100-42-5 | 1.0 E-1 | <0.0003 | <0.0003 | NA | NA | NA | NA |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | <0.0005 | <0.0005 | NA | NA | NA | NA |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | **0.0015** | **0.0012** | **0.0013** | **0.0012** | **0.0012** | **0.0012** |
| Toluene | 108-88-3 | 1.0 E+0 | <0.0002 | <0.0002 | NA | NA | NA | NA |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | <0.001 | <0.001 | NA | NA | NA | NA |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | <0.0005 | <0.0005 | NA | NA | NA | NA |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | <0.0003 | <0.0003 | NA | NA | NA | NA |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | **0.0074** | **0.0065** | **0.0062** | **0.0064** | **0.0067** | **0.0057** |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | <0.0003 | <0.0003 | NA | NA | NA | NA |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | **0.0061** | **0.0064** | **0.0058** | **0.0065** | **0.0067** | **0.0063** |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | <0.0005 | <0.0005 | NA | NA | NA | NA |
| Xylene, o- | 95-47-6 | 1.0 E+1 | <0.0003 | <0.0003 | NA | NA | NA | NA |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | <0.0005 | <0.0005 | NA | NA | NA | NA |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-6 | MW-6 Dup. | MW-6 | MW-6 | MW-6 | MW-6 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 8/18/2014 | 8/18/2014 | 12/29/2014 | 3/18/2015 | 6/25/2015 | 9/28/2015 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Benzene | 71-43-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Bromoform | 75-25-2 | 1.2 E-1 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Bromomethane | 74-83-9 | 3.4 E-2 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | <0.0006 | <0.0006 | **0.0017 J** | <0.0006 | <0.0006 | <0.0006 |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | **0.00081 J** |
| Chloroethane | 75-00-3 | 9.8 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Chloroform | 67-66-3 | 2.4 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Chloromethane | 74-87-3 | 7.0 E-2 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Cumene | 98-82-8 | 2.4 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Cyclohexane | 110-82-7 | 1.2 E+2 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | <0.0002 | <0.0002 | <0.0002 | **0.0013** | <0.0002 | <0.0002 |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | <0.02 | NA | <0.020 | <0.02 | <0.02 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Methyl acetate | 79-20-9 | 2.4 E+1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | <0.0007 | <0.0007 | <0.0007 | <0.0007 | <0.0007 | <0.0007 |
| Methylene chloride | 75-09-2 | 5.0 E-3 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | **0.00097 J** | **0.00089 J** | **0.0018** | **0.00089 J** | **0.00069 J** | <0.0002 |
| Styrene | 100-42-5 | 1.0 E-1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Toluene | 108-88-3 | 1.0 E+0 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | **0.0004 J** | <0.0002 | <0.0002 |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Xylene, o- | 95-47-6 | 1.0 E+1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-6 | MW-7 | MW-7 | MW-7 | MW-7 | MW-7 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 12/1/2015 | 12/29/2014 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | NA | <0.002 | <0.002 | <0.002 | <0.002 | NA |
| Benzene | 71-43-2 | 5.0 E-3 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Bromoform | 75-25-2 | 1.2 E-1 | NA | <0.0004 | <0.0004 | <0.0004 | <0.0004 | NA |
| Bromomethane | 74-83-9 | 3.4 E-2 | NA | <0.0004 | <0.0004 | <0.0004 | <0.0004 | NA |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | NA | <0.0006 | <0.0006 | <0.0006 | <0.0006 | NA |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Chloroethane | 75-00-3 | 9.8 E+0 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Chloroform | 67-66-3 | 2.4 E-1 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Chloromethane | 74-87-3 | 7.0 E-2 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Cumene | 98-82-8 | 2.4 E+0 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Cyclohexane | 110-82-7 | 1.2 E+2 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | NA | <0.001 | <0.001 | <0.001 | <0.001 | NA |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | NA | <0.0004 | <0.0004 | <0.0004 | <0.0004 | NA |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | NA | <0.0004 | <0.0004 | <0.0004 | <0.0004 | NA |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | <0.0002 | **0.00076 J** | **0.00075 J** | **0.00065 J** | <0.0002 | <0.0002 |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | <0.0002 | **0.0017** | **0.0019** | **0.0017** | <0.0002 | <0.0002 |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | <0.0002 | <0.0002 | **0.0011** | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | NA | <0.0001 | <0.0001 | <0.0001 | <0.0001 | NA |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | NA | <0.020 | <0.02 | <0.020 | <0.02 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | NA | <0.001 | <0.001 | <0.001 | <0.001 | NA |
| Methyl acetate | 79-20-9 | 2.4 E+1 | NA | <0.001 | <0.001 | <0.001 | <0.001 | NA |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | NA | <0.0007 | <0.0007 | <0.0007 | <0.0007 | NA |
| Methylene chloride | 75-09-2 | 5.0 E-3 | NA | <0.001 | <0.001 | <0.001 | <0.001 | NA |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Styrene | 100-42-5 | 1.0 E-1 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | NA | <0.0005 | <0.0005 | 0.0005 | 0.0005 | NA |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | <0.0003 | <0.0003 | **0.00097 J** | <0.0003 | <0.0003 | <0.0003 |
| Toluene | 108-88-3 | 1.0 E+0 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | NA | <0.001 | <0.001 | <0.001 | <0.001 | NA |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | <0.0002 | **0.00024 J** | **0.00069 J** | <0.0002 | <0.0002 | <0.0002 |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Xylene, o- | 95-47-6 | 1.0 E+1 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-8 | MW-8 | MW-8 | MW-8 | MW-8 | MW-8 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 12/29/2014 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 | 3/11/2016 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | <0.002 | <0.002 | <0.002 | <0.002 | NA | NA |
| Benzene | 71-43-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA | NA |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA | NA |
| Bromoform | 75-25-2 | 1.2 E-1 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | NA | NA |
| Bromomethane | 74-83-9 | 3.4 E-2 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | NA | NA |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | <0.0006 | <0.0006 | <0.0006 | <0.0006 | NA | NA |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA | NA |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA | NA |
| Chloroethane | 75-00-3 | 9.8 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA | NA |
| Chloroform | 67-66-3 | 2.4 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA | NA |
| Chloromethane | 74-87-3 | 7.0 E-2 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA | NA |
| Cumene | 98-82-8 | 2.4 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA | NA |
| Cyclohexane | 110-82-7 | 1.2 E+2 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA | NA |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | <0.001 | <0.001 | <0.001 | <0.001 | NA | NA |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA | NA |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA | NA |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA | NA |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | NA | NA |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | NA | NA |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA | NA |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | **0.0017** | **0.0044** | **0.013** | **0.02** | **0.0089** | **0.019** |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.0002 | <0.0002 | **0.00068 J** | **0.0011** | <0.0002 | **0.0013** |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA | NA |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | NA | NA |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA | NA |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | NA | <0.020 | <0.02 | <0.02 | <0.02 | <0.02 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA | NA |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | <0.001 | <0.001 | <0.001 | <0.001 | NA | NA |
| Methyl acetate | 79-20-9 | 2.4 E+1 | <0.001 | <0.001 | <0.001 | <0.001 | NA | NA |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA | NA |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA | NA |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | <0.0007 | <0.0007 | <0.0007 | <0.0007 | NA | NA |
| Methylene chloride | 75-09-2 | 5.0 E-3 | <0.001 | <0.001 | <0.001 | <0.001 | NA | NA |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | <0.0002 | <0.0002 | 0.0002 | 0.0002 | NA | NA |
| Styrene | 100-42-5 | 1.0 E-1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA | NA |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA | NA |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | **0.0016** | **0.0029** | **0.0035** | **0.0037** | **0.0048** | **0.0069** |
| Toluene | 108-88-3 | 1.0 E+0 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA | NA |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | <0.001 | <0.001 | <0.001 | <0.001 | NA | NA |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA | NA |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA | NA |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | **0.0017** | **0.0035** | **0.0074** | **0.01** | **0.0056** | **0.01** |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA | NA |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | <0.0002 | <0.0002 | **0.00054 J** | <0.0002 | <0.0002 | **0.00071 J** |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA | NA |
| Xylene, o- | 95-47-6 | 1.0 E+1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA | NA |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA | NA |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-8 | MW-9 | MW-9 | MW-9 | MW-9 Dup. | MW-9 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 6/15/2016 | 2/2/2015 | 3/18/2015 | 6/25/2015 | 6/25/2015 | 9/28/2015 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | NA | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Benzene | 71-43-2 | 5.0 E-3 | NA | **0.00099 J** | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Bromoform | 75-25-2 | 1.2 E-1 | NA | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Bromomethane | 74-83-9 | 3.4 E-2 | NA | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | NA | <0.0006 | <0.0006 | <0.0006 | <0.0006 | <0.0006 |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Chloroethane | 75-00-3 | 9.8 E+0 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Chloroform | 67-66-3 | 2.4 E-1 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Chloromethane | 74-87-3 | 7.0 E-2 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Cumene | 98-82-8 | 2.4 E+0 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Cyclohexane | 110-82-7 | 1.2 E+2 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | NA | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | NA | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | NA | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | <0.0002 | **0.00032 J** | **0.00043 J** | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | **0.00076 J** | <0.0002 | <0.0002 | <0.0002 | **0.001 J** | <0.0002 |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | **0.018** | **0.00081 J** | **0.00084 J** | **0.00077 J** | **0.00090 J** | **0.00086 J** |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | **0.0012** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | NA | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | <0.020 | <0.020 | <0.02 | <0.02 | <0.02 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | NA | **0.00054 J** | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | NA | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Methyl acetate | 79-20-9 | 2.4 E+1 | NA | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | NA | <0.0007 | <0.0007 | <0.0007 | <0.0007 | <0.0007 |
| Methylene chloride | 75-09-2 | 5.0 E-3 | NA | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | NA | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Styrene | 100-42-5 | 1.0 E-1 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | **0.0069** | **0.021** | **0.018** | **0.018** | **0.018** | **0.032** |
| Toluene | 108-88-3 | 1.0 E+0 | NA | **0.0029** | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | NA | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | NA | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | **0.0096** | **0.012** | **0.012** | **0.012** | **0.013** | **0.015** |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | NA | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | **0.00051 J** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | NA | **0.0016 J** | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Xylene, o- | 95-47-6 | 1.0 E+1 | NA | **0.00075 J** | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | NA | **0.0024 J** | <0.0005 | <0.0005 | <0.0005 | <0.0005 |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-9 Dup. | MW-9 | MW-9 | MW-9 Dup. | MW-9 | MW-9 Dup. |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 9/28/2015 | 12/1/2015 | 3/2/2016 | 3/2/2016 | 6/15/2016 | 6/15/2016 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | <0.002 | NA | NA | NA | NA | NA |
| Benzene | 71-43-2 | 5.0 E-3 | <0.0002 | NA | NA | NA | NA | NA |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | <0.0002 | NA | NA | NA | NA | NA |
| Bromoform | 75-25-2 | 1.2 E-1 | <0.0004 | NA | NA | NA | NA | NA |
| Bromomethane | 74-83-9 | 3.4 E-2 | <0.0004 | NA | NA | NA | NA | NA |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | <0.0006 | NA | NA | NA | NA | NA |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | <0.0005 | NA | NA | NA | NA | NA |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | <0.0003 | NA | NA | NA | NA | NA |
| Chloroethane | 75-00-3 | 9.8 E+0 | <0.0003 | NA | NA | NA | NA | NA |
| Chloroform | 67-66-3 | 2.4 E-1 | <0.0002 | NA | NA | NA | NA | NA |
| Chloromethane | 74-87-3 | 7.0 E-2 | <0.0002 | NA | NA | NA | NA | NA |
| Cumene | 98-82-8 | 2.4 E+0 | <0.0003 | NA | NA | NA | NA | NA |
| Cyclohexane | 110-82-7 | 1.2 E+2 | <0.0003 | NA | NA | NA | NA | NA |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | <0.001 | NA | NA | NA | NA | NA |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | <0.0003 | NA | NA | NA | NA | NA |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | <0.0002 | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | <0.0005 | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | <0.0004 | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | <0.0004 | NA | NA | NA | NA | NA |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | <0.0003 | NA | NA | NA | NA | NA |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | **0.0031** | <0.0002 | <0.0002 | **0.0035** | <0.0002 | **0.0029** |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | **0.0014** | <0.0002 | <0.0002 | **0.0012** | **0.00069 J** | **0.0011** |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | <0.0005 | NA | NA | NA | NA | NA |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | <0.0001 | NA | NA | NA | NA | NA |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | <0.0002 | NA | NA | NA | NA | NA |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | <0.0003 | NA | NA | NA | NA | NA |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | <0.001 | NA | NA | NA | NA | NA |
| Methyl acetate | 79-20-9 | 2.4 E+1 | <0.001 | NA | NA | NA | NA | NA |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | <0.0003 | NA | NA | NA | NA | NA |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | <0.0005 | NA | NA | NA | NA | NA |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | <0.0007 | NA | NA | NA | NA | NA |
| Methylene chloride | 75-09-2 | 5.0 E-3 | <0.001 | NA | NA | NA | NA | NA |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | <0.0002 | NA | NA | NA | NA | NA |
| Styrene | 100-42-5 | 1.0 E-1 | <0.0003 | NA | NA | NA | NA | NA |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | <0.0005 | NA | NA | NA | NA | NA |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | **0.033** | **0.041** | **0.021** | **0.022** | **0.019** | **0.018** |
| Toluene | 108-88-3 | 1.0 E+0 | <0.0002 | NA | NA | NA | NA | NA |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | <0.001 | NA | NA | NA | NA | NA |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | <0.0005 | NA | NA | NA | NA | NA |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | <0.0003 | NA | NA | NA | NA | NA |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | **0.016** | **0.017** | **0.012** | **0.013** | **0.012** | **0.011** |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | <0.0003 | NA | NA | NA | NA | NA |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | <0.0005 | NA | NA | NA | NA | NA |
| Xylene, o- | 95-47-6 | 1.0 E+1 | <0.0003 | NA | NA | NA | NA | NA |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | <0.0005 | NA | NA | NA | NA | NA |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-10 | MW-10 | MW-10-Dup. | MW-10 | MW-10 | MW-10 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 2/3/2015 | 3/18/2015 | 3/18/2015 | 6/25/2015 | 9/28/2015 | 12/1/2015 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | NA |
| Benzene | 71-43-2 | 5.0 E-3 | **0.00068 J** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Bromoform | 75-25-2 | 1.2 E-1 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | NA |
| Bromomethane | 74-83-9 | 3.4 E-2 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | NA |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | <0.0006 | <0.0006 | <0.0006 | <0.0006 | <0.0006 | NA |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Chloroethane | 75-00-3 | 9.8 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Chloroform | 67-66-3 | 2.4 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Chloromethane | 74-87-3 | 7.0 E-2 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Cumene | 98-82-8 | 2.4 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Cyclohexane | 110-82-7 | 1.2 E+2 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | NA |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | NA |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | <0.0004 | NA |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | **0.0011** | **0.00067 J** | **0.00073 J** | **0.00061 J** | <0.0002 | <0.0002 |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | **0.0042** | <0.0002 | **0.0011** | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | NA |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.0002 | <0.020 | <0.020 | <0.02 | <0.02 | <0.02 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | **0.00039 J** | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | NA |
| Methyl acetate | 79-20-9 | 2.4 E+1 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | NA |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | <0.0007 | <0.0007 | <0.0007 | <0.0007 | <0.0007 | NA |
| Methylene chloride | 75-09-2 | 5.0 E-3 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | NA |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Styrene | 100-42-5 | 1.0 E-1 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | **0.0021** | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Toluene | 108-88-3 | 1.0 E+0 | **0.002** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | NA |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | NA |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | **0.0021** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | **0.0012 J** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |
| Xylene, o- | 95-47-6 | 1.0 E+1 | **0.00057 J** | <0.0003 | <0.0003 | <0.0003 | <0.0003 | NA |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | **0.0018 J** | <0.0005 | <0.0005 | <0.0005 | <0.0005 | NA |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-10 | MW-10 | MW-11 | MW-11 | MW-11 | MW-11 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 3/2/2016 | 6/15/2016 | 2/3/2015 | 3/18/2015 | 6/25/2015 | 9/28/2015 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | NA | NA | <0.002 | <0.002 | <0.002 | <0.01 |
| Benzene | 71-43-2 | 5.0 E-3 | NA | NA | **0.00092 J** | **0.00028 J** | <0.0002 | <0.001 |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | NA | NA | <0.0002 | <0.0002 | <0.0002 | <0.001 |
| Bromoform | 75-25-2 | 1.2 E-1 | NA | NA | <0.0004 | <0.0004 | <0.0004 | <0.002 |
| Bromomethane | 74-83-9 | 3.4 E-2 | NA | NA | <0.0004 | <0.0004 | <0.0004 | <0.002 |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | NA | NA | <0.0006 | <0.0006 | <0.0006 | <0.003 |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | NA | NA | <0.0005 | <0.0005 | <0.0005 | <0.0025 |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | NA | NA | <0.0003 | <0.0003 | <0.0003 | <0.0015 |
| Chloroethane | 75-00-3 | 9.8 E+0 | NA | NA | <0.0003 | <0.0003 | <0.0003 | <0.0015 |
| Chloroform | 67-66-3 | 2.4 E-1 | NA | NA | **0.00037 J** | **0.00035 J** | <0.0002 | <0.001 |
| Chloromethane | 74-87-3 | 7.0 E-2 | NA | NA | <0.0002 | <0.0002 | <0.0002 | <0.001 |
| Cumene | 98-82-8 | 2.4 E+0 | NA | NA | <0.0003 | <0.0003 | <0.0003 | <0.0015 |
| Cyclohexane | 110-82-7 | 1.2 E+2 | NA | NA | <0.0003 | <0.0003 | <0.0003 | <0.0015 |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | NA | NA | <0.001 | <0.001 | <0.001 | <0.005 |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | NA | NA | <0.0003 | <0.0003 | <0.0003 | <0.0015 |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | NA | NA | <0.0002 | <0.0002 | <0.0002 | <0.001 |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | NA | NA | <0.0005 | <0.0005 | <0.0005 | <0.0025 |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | NA | NA | **0.00047 J** | <0.0004 | <0.0004 | <0.002 |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | NA | NA | <0.0004 | <0.0004 | <0.0004 | <0.002 |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | NA | NA | <0.0003 | <0.0003 | <0.0003 | <0.0015 |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | <0.0002 | **0.00057 J** | **0.049** | **0.046** | **0.036** | **0.044** |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | <0.0002 | **0.011** | **0.0099** | **0.0077** | **0.011** |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | <0.0002 | <0.0002 | **3.5** | **2.9** | **2.8** | **2.9** |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | <0.0002 | <0.0002 | **0.86** | **0.810** | **0.570** | **0.980** |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.0002 | <0.0002 | **0.0093** | **0.0064** | **0.02** | **0.0065** |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | NA | NA | <0.0005 | <0.0005 | <0.0005 | <0.0025 |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | NA | NA | <0.0001 | <0.0001 | <0.0001 | <0.0005 |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | NA | NA | <0.0002 | <0.0002 | <0.0002 | <0.001 |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | <0.02 | <0.020 | <0.020 | **0.095** | <0.1 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | NA | NA | **0.00051 J** | <0.0003 | <0.0003 | <0.0015 |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | NA | NA | <0.001 | <0.001 | <0.001 | <0.005 |
| Methyl acetate | 79-20-9 | 2.4 E+1 | NA | NA | <0.001 | <0.001 | <0.001 | <0.005 |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | NA | NA | <0.0003 | <0.0003 | <0.0003 | <0.0015 |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | NA | NA | <0.0005 | <0.0005 | <0.0005 | <0.0025 |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | NA | NA | <0.0007 | <0.0007 | <0.0007 | <0.0035 |
| Methylene chloride | 75-09-2 | 5.0 E-3 | NA | NA | <0.001 | <0.001 | <0.001 | <0.005 |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | NA | NA | <0.0002 | <0.0002 | <0.0002 | <0.001 |
| Styrene | 100-42-5 | 1.0 E-1 | NA | NA | <0.0003 | <0.0003 | <0.0003 | <0.0015 |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | NA | NA | <0.0005 | <0.0005 | <0.0005 | <0.0025 |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | <0.0003 | <0.0003 | **0.22** | **0.15** | **0.17** | **0.2** |
| Toluene | 108-88-3 | 1.0 E+0 | NA | NA | **0.0025** | <0.0002 | <0.0002 | <0.001 |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | NA | NA | <0.001 | <0.001 | <0.001 | <0.005 |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | NA | NA | <0.0005 | <0.0005 | <0.0005 | <0.0025 |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.001 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | NA | NA | **0.0016** | <0.0003 | **0.001** | <0.0015 |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | <0.0002 | <0.0002 | **0.9** | **0.74** | **0.67** | **0.67** |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | NA | NA | <0.0003 | <0.0003 | <0.0003 | <0.0015 |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | <0.0002 | <0.0002 | **0.11** | **0.092** | **0.066** | **0.14** |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | NA | NA | **0.0019 J** | <0.0005 | <0.0005 | <0.0025 |
| Xylene, o- | 95-47-6 | 1.0 E+1 | NA | NA | **0.00070 J** | <0.0003 | <0.0003 | <0.0015 |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | NA | NA | **0.0026 J** | <0.0005 | <0.0005 | <0.0025 |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-11 | MW-11 Dup. | MW-11 | MW-11 | MW-12 | MW-12 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 12/1/2015 | 12/1/2015 | 3/2/2016 | 6/15/2016 | 9/29/2015 | 12/1/2015 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | NA | NA | NA | NA | NA | NA |
| Benzene | 71-43-2 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | NA | NA | NA | NA | NA | NA |
| Bromoform | 75-25-2 | 1.2 E-1 | NA | NA | NA | NA | NA | NA |
| Bromomethane | 74-83-9 | 3.4 E-2 | NA | NA | NA | NA | NA | NA |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | NA | NA | NA | NA | NA | NA |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | NA | NA | NA | NA | NA | NA |
| Chloroethane | 75-00-3 | 9.8 E+0 | NA | NA | NA | NA | NA | NA |
| Chloroform | 67-66-3 | 2.4 E-1 | NA | NA | NA | NA | NA | NA |
| Chloromethane | 74-87-3 | 7.0 E-2 | NA | NA | NA | NA | NA | NA |
| Cumene | 98-82-8 | 2.4 E+0 | NA | NA | NA | NA | NA | NA |
| Cyclohexane | 110-82-7 | 1.2 E+2 | NA | NA | NA | NA | NA | NA |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | NA | NA | NA | NA | NA | NA |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | NA | NA | NA | NA | NA | NA |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | NA | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | NA | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | NA | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | NA | NA | NA | NA | NA | NA |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | NA | NA | NA | NA | NA | NA |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | **0.045** | **0.044** | **0.036** | **0.029** | **0.0041** | **0.0035** |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | **0.011** | **0.011** | <0.0002 | **0.005** | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | **3.5** | **3.7** | **2.9** | **2.0** | **0.044** | **0.044** |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | **0.74** | **0.77** | **0.64** | **0.43** | <0.0002 | <0.0002 |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | **0.0059** | **0.0054** | **0.0052** | **0.0036** | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | NA | NA | NA | NA | NA | NA |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | NA | NA | NA | NA | NA | NA |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | NA | NA | NA | NA | NA | NA |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | NA | NA | NA | NA | NA | NA |
| Methyl acetate | 79-20-9 | 2.4 E+1 | NA | NA | NA | NA | NA | NA |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | NA | NA | NA | NA | NA | NA |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | NA | NA | NA | NA | NA | NA |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | NA | NA | NA | NA | NA | NA |
| Methylene chloride | 75-09-2 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | NA | NA | NA | NA | NA | NA |
| Styrene | 100-42-5 | 1.0 E-1 | NA | NA | NA | NA | NA | NA |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | NA | NA | NA | NA | NA | NA |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | **0.35** | **0.36** | **0.17** | **0.11** | <0.0003 | <0.0003 |
| Toluene | 108-88-3 | 1.0 E+0 | NA | NA | NA | NA | NA | NA |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | NA | NA | NA | NA | NA | NA |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | NA | NA | NA | NA | NA | NA |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | **0.93** | **0.93** | **0.71** | **0.53** | **0.00055 J** | <0.0002 |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | NA | NA | NA | NA | NA | NA |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | **0.12** | **0.11** | **0.1** | **0.095** | **0.00054 J** | <0.0002 |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | NA | NA | NA | NA | NA | NA |
| Xylene, o- | 95-47-6 | 1.0 E+1 | NA | NA | NA | NA | NA | NA |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | NA | NA | NA | NA | NA | NA |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicated an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-12 | MW-12 | MW-13 | MW-13 Dup. | MW-13 | MW-13 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 3/2/2016 | 6/15/2016 | 9/29/2015 | 9/29/2015 | 12/1/2015 | 3/2/2016 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | NA | NA | NA | NA | NA | NA |
| Benzene | 71-43-2 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | NA | NA | NA | NA | NA | NA |
| Bromoform | 75-25-2 | 1.2 E-1 | NA | NA | NA | NA | NA | NA |
| Bromomethane | 74-83-9 | 3.4 E-2 | NA | NA | NA | NA | NA | NA |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | NA | NA | NA | NA | NA | NA |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | NA | NA | NA | NA | NA | NA |
| Chloroethane | 75-00-3 | 9.8 E+0 | NA | NA | NA | NA | NA | NA |
| Chloroform | 67-66-3 | 2.4 E-1 | NA | NA | NA | NA | NA | NA |
| Chloromethane | 74-87-3 | 7.0 E-2 | NA | NA | NA | NA | NA | NA |
| Cumene | 98-82-8 | 2.4 E+0 | NA | NA | NA | NA | NA | NA |
| Cyclohexane | 110-82-7 | 1.2 E+2 | NA | NA | NA | NA | NA | NA |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | NA | NA | NA | NA | NA | NA |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | NA | NA | NA | NA | NA | NA |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | NA | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | NA | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | NA | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | NA | NA | NA | NA | NA | NA |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | NA | NA | NA | NA | NA | NA |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | **0.0055** | **0.0038** | **0.0015** | **0.0012** | **0.0016** | **0.0020** |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | **0.00052 J** | **0.00032 J** | **0.00031 J** | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | **0.075** | **0.05** | **0.11** | **0.095** | **0.12** | **0.17** |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | <0.0002 | <0.0002 | **0.0073** | **0.0051** | **0.0087** | **0.0088** |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | NA | NA | NA | NA | NA | NA |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | NA | NA | NA | NA | NA | NA |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | NA | NA | NA | NA | NA | NA |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | NA | NA | NA | NA | NA | NA |
| Methyl acetate | 79-20-9 | 2.4 E+1 | NA | NA | NA | NA | NA | NA |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | NA | NA | NA | NA | NA | NA |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | NA | NA | NA | NA | NA | NA |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | NA | NA | NA | NA | NA | NA |
| Methylene chloride | 75-09-2 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | NA | NA | NA | NA | NA | NA |
| Styrene | 100-42-5 | 1.0 E-1 | NA | NA | NA | NA | NA | NA |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | NA | NA | NA | NA | NA | NA |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | <0.0003 | <0.0003 | **0.0033** | **0.003** | **0.0029** | **0.0051** |
| Toluene | 108-88-3 | 1.0 E+0 | NA | NA | NA | NA | NA | NA |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | NA | NA | NA | NA | NA | NA |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | NA | NA | NA | NA | NA | NA |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | **0.00076 J** | **0.0006 J** | **0.015** | **0.013** | **0.013** | **0.021** |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | NA | NA | NA | NA | NA | NA |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | NA | NA | NA | NA | NA | NA |
| Xylene, o- | 95-47-6 | 1.0 E+1 | NA | NA | NA | NA | NA | NA |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | NA | NA | NA | NA | NA | NA |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicates an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-13 | MW-14 | MW-14 | MW-14 | MW-14 | MW-15 |
|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 6/15/2016 | 9/30/2015 | 12/1/2015 | 3/2/2016 | 6/15/2016 | 9/29/2015 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | NA | NA | NA | NA | NA | NA |
| Benzene | 71-43-2 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | NA | NA | NA | NA | NA | NA |
| Bromoform | 75-25-2 | 1.2 E-1 | NA | NA | NA | NA | NA | NA |
| Bromomethane | 74-83-9 | 3.4 E-2 | NA | NA | NA | NA | NA | NA |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | NA | NA | NA | NA | NA | NA |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | NA | NA | NA | NA | NA | NA |
| Chloroethane | 75-00-3 | 9.8 E+0 | NA | NA | NA | NA | NA | NA |
| Chloroform | 67-66-3 | 2.4 E-1 | NA | NA | NA | NA | NA | NA |
| Chloromethane | 74-87-3 | 7.0 E-2 | NA | NA | NA | NA | NA | NA |
| Cumene | 98-82-8 | 2.4 E+0 | NA | NA | NA | NA | NA | NA |
| Cyclohexane | 110-82-7 | 1.2 E+2 | NA | NA | NA | NA | NA | NA |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | NA | NA | NA | NA | NA | NA |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | NA | NA | NA | NA | NA | NA |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | NA | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | NA | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | NA | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | NA | NA | NA | NA | NA | NA |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | NA | NA | NA | NA | NA | NA |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | **0.0026** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | **0.00047 J** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | **0.18** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | **0.00075 J** |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | **0.017** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | NA | NA | NA | NA | NA | NA |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | NA | NA | NA | NA | NA | NA |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | NA | NA | NA | NA | NA | NA |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | NA | NA | NA | NA | NA | NA |
| Methyl acetate | 79-20-9 | 2.4 E+1 | NA | NA | NA | NA | NA | NA |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | NA | NA | NA | NA | NA | NA |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | NA | NA | NA | NA | NA | NA |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | NA | NA | NA | NA | NA | NA |
| Methylene chloride | 75-09-2 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | NA | NA | NA | NA | NA | NA |
| Styrene | 100-42-5 | 1.0 E-1 | NA | NA | NA | NA | NA | NA |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | NA | NA | NA | NA | NA | NA |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | **0.0052** | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Toluene | 108-88-3 | 1.0 E+0 | NA | NA | NA | NA | NA | NA |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | NA | NA | NA | NA | NA | NA |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | NA | NA | NA | NA | NA | NA |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | NA | NA | NA | NA | NA | NA |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | **0.022** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | **0.00026 J** |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | NA | NA | NA | NA | NA | NA |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | **0.00078 J** | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | NA | NA | NA | NA | NA | NA |
| Xylene, o- | 95-47-6 | 1.0 E+1 | NA | NA | NA | NA | NA | NA |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | NA | NA | NA | NA | NA | NA |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicates an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.1**
**GROUNDWATER SAMPLING AND TESTING RESULTS: VOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-15 | MW-15 | MW-15 | MW-16 | MW-16 | MW-16 | MW-16 |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 12/1/2015 | 3/2/2016 | 6/15/2016 | 9/30/2015 | 12/1/2015 | 3/2/2016 | 6/15/2016 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260*** | | | | | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | NA | NA | NA | NA | NA | NA | NA |
| Benzene | 71-43-2 | 5.0 E-3 | NA | NA | NA | NA | NA | NA | NA |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | NA | NA | NA | NA | NA | NA | NA |
| Bromoform | 75-25-2 | 1.2 E-1 | NA | NA | NA | NA | NA | NA | NA |
| Bromomethane | 74-83-9 | 3.4 E-2 | NA | NA | NA | NA | NA | NA | NA |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | NA | NA | NA | NA | NA | NA | NA |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | NA | NA | NA | NA | NA | NA | NA |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | NA | NA | NA | NA | NA | NA | NA |
| Chloroethane | 75-00-3 | 9.8 E+0 | NA | NA | NA | NA | NA | NA | NA |
| Chloroform | 67-66-3 | 2.4 E-1 | NA | NA | NA | NA | NA | NA | NA |
| Chloromethane | 74-87-3 | 7.0 E-2 | NA | NA | NA | NA | NA | NA | NA |
| Cumene | 98-82-8 | 2.4 E+0 | NA | NA | NA | NA | NA | NA | NA |
| Cyclohexane | 110-82-7 | 1.2 E+2 | NA | NA | NA | NA | NA | NA | NA |
| Dibromo-3-chloropropane, 1,2- | 96-12-8 | 1.0 E-3 | NA | NA | NA | NA | NA | NA | NA |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | NA | NA | NA | NA | NA | NA | NA |
| Dibromoethane, 1,2- | 106-93-4 | 1.0 E-3 | NA | NA | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | NA | NA | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | NA | NA | NA | NA | NA | NA | NA |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | NA | NA | NA | NA | NA | NA | NA |
| Dichlorodifluoromethane | 75-71-8 | 4.9 E+0 | NA | NA | NA | NA | NA | NA | NA |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | NA | NA | NA | NA | NA | NA | NA |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | NA | NA | NA | NA | NA | NA | NA |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | NA | NA | NA | NA | NA | NA | NA |
| Dioxane, 1,4- | 123-91-1 | 2.0 E-2 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Ethyl benzene | 100-41-4 | 7.0 E-1 | NA | NA | NA | NA | NA | NA | NA |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | NA | NA | NA | NA | NA | NA | NA |
| Methyl acetate | 79-20-9 | 2.4 E+1 | NA | NA | NA | NA | NA | NA | NA |
| Methyl cyclohexane | 108-87-2 | 1.2 E+2 | NA | NA | NA | NA | NA | NA | NA |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | NA | NA | NA | NA | NA | NA | NA |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | NA | NA | NA | NA | NA | NA | NA |
| Methylene chloride | 75-09-2 | 5.0 E-3 | NA | NA | NA | NA | NA | NA | NA |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | NA | NA | NA | NA | NA | NA | NA |
| Styrene | 100-42-5 | 1.0 E-1 | NA | NA | NA | NA | NA | NA | NA |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | NA | NA | NA | NA | NA | NA | NA |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| Toluene | 108-88-3 | 1.0 E+0 | NA | NA | NA | NA | NA | NA | NA |
| Trichlor-1,2,2-trifluoroethane, 1,1,2- | 76-13-1 | 7.3 E+2 | NA | NA | NA | NA | NA | NA | NA |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | NA | NA | NA | NA | NA | NA | NA |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | NA | NA | NA | NA | NA | NA | NA |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | NA | NA | NA | NA | NA | NA | NA |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | NA | NA | NA | NA | NA | NA | NA |
| Xylene, o- | 95-47-6 | 1.0 E+1 | NA | NA | NA | NA | NA | NA | NA |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | NA | NA | NA | NA | NA | NA | NA |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicates an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
5. Dup = Duplicate sample.
6. NA = Sample not analyzed for the analyte.

**TABLE G.2**
**GROUNDWATER SAMPLING AND TESTING RESULTS: SVOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-1 | MW-2 | MW-3 | MW-4 |
|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 8/15/2014 | 8/18/2014 | 8/15/2014 | 8/19/2014 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L |
| ***Semivolatile Organic Compounds (SVOCs) By EPA Method 8270*** | | | | | | |
| Acenaphthene | 83-32-9 | 1.5 E+0 | <0.00003 | <0.00003 | <0.00003 | <0.00003 |
| Acenaphthylene | 208-96-8 | 1.5 E+0 | <0.000021 | <0.000021 | <0.000021 | <0.000021 |
| Acetophenone | 98-86-2 | 2.4 E+0 | **0.00013 J** | **0.00011 J** | **0.000065 J** | **0.0001 J** |
| Anthracene | 120-12-7 | 7.3 E+0 | <0.00002 | <0.00002 | <0.00002 | <0.00002 |
| Atrazine | 1912-24-9 | 3.0 E-3 | <0.00004 | <0.00004 | <0.00004 | **0.0011** |
| Benz-a-anthracene | 56-55-3 | 1.3 E-3 | <0.000025 | <0.000025 | <0.000025 | <0.000025 |
| Benzaldehyde | 100-52-7 | 2.4 E+0 | <0.000046 n | <0.000046 n | <0.000046 n | <0.000046 n |
| Benzo-a-pyrene | 50-32-8 | 2.0 E-4 | <0.00003 | <0.00003 | <0.00003 | <0.00003 |
| Benzo-b-fluoranthene | 205-99-2 | 1.3 E-3 | <0.000028 | <0.000028 | <0.000028 | <0.000028 |
| Benzo-g,h,i-perylene | 191-24-2 | 7.3 E-1 | <0.000026 | <0.000026 | <0.000026 | <0.000026 |
| Benzo-k-fluoranthene | 207-08-9 | 1.3 E-2 | <0.000028 | <0.000028 | <0.000028 | <0.000028 |
| Biphenyl, 1,1- | 92-52-4 | 1.2 E+1 | <0.000032 | <0.000032 | <0.000032 | <0.000032 |
| Bis (2-chloroethoxy) methane | 111-91-1 | 8.3 E-4 | <0.000022 | <0.000022 | <0.000022 | <0.000022 |
| Bis (2-chloroethyl) ether | 111-44-4 | 8.3 E-4 | <0.000029 | <0.000029 | <0.000029 | <0.000029 |
| Bis (2-chloroisopropyl) ether | 108-60-1 | 1.3 E-2 | <0.000064 | <0.000064 | <0.000064 | <0.000064 |
| Bis (2-ethyl-hexyl) phthalate | 117-81-7 | 6.0 E-3 | **0.00025** | **0.000062 J** | **0.00013 J** | **0.00017 J** |
| Bromophenyl phenylether, 4- | 101-55-3 | 2.0 E-4 | <0.000047 | <0.000047 | <0.000047 | <0.000047 |
| Butyl benzyl phthalate | 85-68-7 | 4.8 E-1 | <0.000021 | <0.000021 | <0.000021 | <0.000021 |
| Caprolactam | 105-60-2 | 1.2 E+1 | <0.000059 | **0.000097 J** | <0.000059 | <0.000059 |
| Carbazole | 86-74-8 | 4.6 E-2 | <0.000025 | <0.000025 | <0.000025 | <0.000025 |
| Chloro-3-methylphenol, 4- | 59-50-7 | 1.2 E-1 | <0.000022 | <0.000022 | <0.000022 | <0.000022 |
| Chloroaniline, p- | 106-47-8 | 4.6 E-3 | <0.000021 | <0.000021 | <0.000021 | <0.000021 |
| Chloronaphthalene, 2- | 91-58-7 | 2.0 E+0 | <0.00004 | <0.00004 | <0.00004 | <0.00004 |
| Chlorophenol, 2- | 95-57-8 | 1.2 E-1 | <0.00004 | <0.00004 | <0.00004 | <0.00004 |
| Chlorophenyl phenylether, 4- | 7005-72-3 | 2.0 E-4 | <0.000043 | <0.000043 | <0.000043 | <0.000043 |
| Chrysene | 218-01-9 | 1.3 E-1 | <0.000046 | <0.000046 | <0.000046 | <0.000046 |
| Cresol, m,p- (3&4-methylphenol) | 106-44-5 | 1.2 E-1 | <0.00003 | **0.00018 J** | <0.00003 | <0.00003 |
| Cresol, o- (2-methylphenol) | 95-48-7 | 1.2 E+0 | <0.000033 | <0.000033 | <0.000033 | <0.000033 |
| Dibenz-a,h-anthracene | 53-70-3 | 2.0 E-4 | <0.000026 | <0.000026 | <0.000026 | <0.000026 |
| Dibenzofuran | 132-64-9 | 9.8 E-2 | <0.000025 | <0.000025 | <0.000025 | <0.000025 |
| Dichlorobenzidine, 3,3- | 91-94-1 | 2.0 E-3 | <0.000024 | <0.000024 | <0.000024 | <0.000024 |
| Dichlorophenol, 2,4- | 120-83-2 | 7.3 E-2 | <0.000065 | **0.00011 J** | <0.000065 | <0.000065 |
| Diethyl phthalate | 84-66-2 | 2.0 E+1 | **0.00028** | **0.00097** | **0.00015 J** | **0.00022** |
| Dimethyl phenol, 2,4- | 105-67-9 | 4.9 E-1 | <0.000033 | <0.000033 | <0.000033 | <0.000033 |
| Dimethylphthalate | 131-11-3 | 2.0 E+1 | <0.00003 | <0.00003 | <0.00003 | <0.00003 |
| Di-n-butyl phthalate | 84-74-2 | 2.4 E+0 | <0.00003 | **0.000075 J** | **0.000056 J** | **0.000088 J** |
| Dinitro-2-methylphenol, 4,6- | 534-52-1 | 2.4 E-3 | <0.000073 | <0.000073 | <0.000073 | <0.000073 |
| Dinitrophenol, 2,4- | 51-28-5 | 4.9 E-2 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Dinitrotoluene, 2,4- | 121-14-2 | 1.3 E-3 | <0.00003 | <0.00003 | <0.00003 | <0.00003 |
| Dinitrotoluene, 2,6- | 606-20-2 | 1.3 E-3 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Di-n-octyl phthalate | 117-84-0 | 2.4 E-1 | <0.000023 | <0.000023 | <0.000023 | <0.000023 |
| Fluoranthene | 206-44-0 | 9.8 E-1 | <0.00002 | <0.00002 | <0.00002 | <0.00002 |
| Fluorene | 86-73-7 | 9.80E-01 | <0.000021 | <0.000021 | <0.000021 | <0.000021 |
| Hexachlorobenzene | 118-74-1 | 1.0 E-3 | <0.00007 | <0.00007 | <0.00007 | <0.00007 |
| Hexachlorobutadiene | 87-68-3 | 1.2 E-2 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Hexachlorocyclopentadiene | 77-47-4 | 5.0 E-2 | <0.000054 | <0.000054 | <0.000054 | <0.000054 |
| Hexachloroethane | 67-72-1 | 1.7 E-2 | <0.000034 | <0.000034 | <0.000034 | <0.000034 |
| Indeno-1,2,3-cd-pyrene | 193-39-5 | 1.3 E-3 | <0.000051 | <0.000051 | <0.000051 | <0.000051 |
| Isophorone | 78-59-1 | 9.6 E-1 | <0.00003 | <0.00003 | <0.00003 | <0.00003 |
| Methylnaphthalene, 2- | 91-57-6 | 9.8 E-2 | **0.000057 J** | <0.000034 | <0.000034 | <0.000034 |
| Naphthalene | 91-20-3 | 4.9 E-1 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Nitroaniline, 2- | 88-74-4 | 7.3 E-3 | <0.000038 | <0.000038 | <0.000038 | <0.000038 |
| Nitroaniline, 3- | 99-09-2 | 7.3 E-3 | <0.000056 | <0.000056 | <0.000056 | <0.000056 |

**TABLE G.2**
**GROUNDWATER SAMPLING AND TESTING RESULTS: SVOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-1 | MW-2 | MW-3 | MW-4 |
|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 8/15/2014 | 8/18/2014 | 8/15/2014 | 8/19/2014 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L |
| ***Semivolatile Organic Compounds (SVOCs) By EPA Method 8270 (continued)*** | | | | | | |
| Nitroaniline, 4- | 100-01-6 | 4.6 E-2 | <0.00004 | <0.00004 | <0.00004 | <0.00004 |
| Nitrobenzene | 98-95-3 | 4.9 E-2 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Nitrophenol, 2- | 88-75-5 | 4.9 E-2 | <0.000024 | <0.000024 | <0.000024 | <0.000024 |
| Nitrophenol, 4- | 100-02-7 | 4.9 E-2 | <0.00006 | <0.00006 | <0.00006 | <0.00006 |
| Nitrosodi-n-propylamine, n- | 621-64-7 | 2.0 E-4 | <0.00004 | <0.00004 | <0.00004 | <0.00004 |
| Nitrosodiphenylamine | 86-30-6 | 1.9 E-1 | <0.000029 | <0.000029 | <0.000029 | <0.000029 |
| Pentachlorophenol | 87-86-5 | 1.0 E-3 | <0.000046 | <0.000046 | <0.000046 | <0.000046 |
| Phenanthrene | 85-01-8 | 7.3 E-1 | <0.00002 | <0.00002 | <0.00002 | <0.00002 |
| Phenol | 108-95-2 | 7.3 E+0 | <0.000032 | <0.000032 | <0.000032 | **0.000048 J** |
| Pyrene | 129-00-0 | 7.3 E-1 | <0.000022 | <0.000022 | <0.000022 | <0.000022 |
| Trichlorophenol, 2,4,5- | 95-95-4 | 2.4 E+0 | <0.00004 | <0.00004 | <0.00004 | <0.00004 |
| Trichlorophenol, 2,4,6- | 88-06-2 | 2.4 E-2 | <0.00006 | <0.00006 | <0.00006 | <0.00006 |

Notes:
1. Detections are shown in **bold**.
2. < = Constituent not detected at specified Sample Quantitation Limit.
3. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
4. Dup = Duplicate sample.

**TABLE G.2**
**GROUNDWATER SAMPLING AND TESTING RESULTS: SVOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-5 | MW-6 | MW-6 Dup. |
|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 8/15/2014 | 8/18/2014 | 8/18/2014 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L |
| ***Semivolatile Organic Compounds (SVOCs) By EPA Method 8270*** | | | | | |
| Acenaphthene | 83-32-9 | 1.5 E+0 | <0.00003 | <0.00003 | <0.00003 |
| Acenaphthylene | 208-96-8 | 1.5 E+0 | <0.000021 | <0.000021 | <0.000021 |
| Acetophenone | 98-86-2 | 2.4 E+0 | **0.000095 J** | **0.000081 J** | **0.000069 J** |
| Anthracene | 120-12-7 | 7.3 E+0 | <0.00002 | <0.00002 | <0.00002 |
| Atrazine | 1912-24-9 | 3.0 E-3 | <0.00004 | <0.00004 | <0.00004 |
| Benz-a-anthracene | 56-55-3 | 1.3 E-3 | <0.000025 | <0.000025 | <0.000025 |
| Benzaldehyde | 100-52-7 | 2.4 E+0 | <0.000046 | <0.000046 n | <0.000046 n |
| Benzo-a-pyrene | 50-32-8 | 2.0 E-4 | <0.00003 | <0.00003 | <0.00003 |
| Benzo-b-fluoranthene | 205-99-2 | 1.3 E-3 | <0.000028 | <0.000028 | <0.000028 |
| Benzo-g,h,i-perylene | 191-24-2 | 7.3 E-1 | <0.000026 | <0.000026 | <0.000026 |
| Benzo-k-fluoranthene | 207-08-9 | 1.3 E-2 | <0.000028 | <0.000028 | <0.000028 |
| Biphenyl, 1,1- | 92-52-4 | 1.2 E+1 | <0.000032 | <0.000032 | <0.000032 |
| Bis (2-chloroethoxy) methane | 111-91-1 | 8.3 E-4 | <0.000022 | <0.000022 | <0.000022 |
| Bis (2-chloroethyl) ether | 111-44-4 | 8.3 E-4 | <0.000029 | <0.000029 | <0.000029 |
| Bis (2-chloroisopropyl) ether | 108-60-1 | 1.3 E-2 | <0.000064 | <0.000064 | <0.000064 |
| Bis (2-ethyl-hexyl) phthalate | 117-81-7 | 6.0 E-3 | **0.00069** | **0.00011 J** | **0.00015 J** |
| Bromophenyl phenylether, 4- | 101-55-3 | 2.0 E-4 | <0.000047 | <0.000047 | <0.000047 |
| Butyl benzyl phthalate | 85-68-7 | 4.8 E-1 | <0.000021 | <0.000021 | <0.000021 |
| Caprolactam | 105-60-2 | 1.2 E+1 | <0.000059 | **0.000098 J** | **0.000097 J** |
| Carbazole | 86-74-8 | 4.6 E-2 | <0.000025 | <0.000025 | <0.000025 |
| Chloro-3-methylphenol, 4- | 59-50-7 | 1.2 E-1 | <0.000022 | <0.000022 | <0.000022 |
| Chloroaniline, p- | 106-47-8 | 4.6 E-3 | <0.000021 | <0.000021 | <0.000021 |
| Chloronaphthalene, 2- | 91-58-7 | 2.0 E+0 | <0.00004 | <0.00004 | <0.00004 |
| Chlorophenol, 2- | 95-57-8 | 1.2 E-1 | <0.00004 | <0.00004 | <0.00004 |
| Chlorophenyl phenylether, 4- | 7005-72-3 | 2.0 E-4 | <0.000043 | <0.000043 | <0.000043 |
| Chrysene | 218-01-9 | 1.3 E-1 | <0.000046 | <0.000046 | <0.000046 |
| Cresol, m,p- (3&4-methylphenol) | 106-44-5 | 1.2 E-1 | <0.00003 | <0.00003 | <0.00003 |
| Cresol, o- (2-methylphenol) | 95-48-7 | 1.2 E+0 | <0.000033 | <0.000033 | <0.000033 |
| Dibenz-a,h-anthracene | 53-70-3 | 2.0 E-4 | <0.000026 | <0.000026 | <0.000026 |
| Dibenzofuran | 132-64-9 | 9.8 E-2 | <0.000025 | <0.000025 | <0.000025 |
| Dichlorobenzidine, 3,3- | 91-94-1 | 2.0 E-3 | <0.000024 | <0.000024 | <0.000024 |
| Dichlorophenol, 2,4- | 120-83-2 | 7.3 E-2 | <0.000065 | **0.000068 J** | <0.000065 |
| Diethyl phthalate | 84-66-2 | 2.0 E+1 | **0.0002** | **0.00024** | **0.00026** |
| Dimethyl phenol, 2,4- | 105-67-9 | 4.9 E-1 | <0.000033 | <0.000033 | <0.000033 |
| Dimethylphthalate | 131-11-3 | 2.0 E+1 | <0.00003 | <0.00003 | <0.00003 |
| Di-n-butyl phthalate | 84-74-2 | 2.4 E+0 | **0.000099 J** | **0.00016 J** | **0.00019 J** |
| Dinitro-2-methylphenol, 4,6- | 534-52-1 | 2.4 E-3 | <0.000073 | <0.000073 | <0.000073 |
| Dinitrophenol, 2,4- | 51-28-5 | 4.9 E-2 | <0.00005 | <0.00005 | <0.00005 |
| Dinitrotoluene, 2,4- | 121-14-2 | 1.3 E-3 | <0.00003 | <0.00003 | <0.00003 |
| Dinitrotoluene, 2,6- | 606-20-2 | 1.3 E-3 | <0.00005 | <0.00005 | <0.00005 |
| Di-n-octyl phthalate | 117-84-0 | 2.4 E-1 | **0.00026** | <0.000023 | <0.000023 |
| Fluoranthene | 206-44-0 | 9.8 E-1 | <0.00002 | <0.00002 | <0.00002 |
| Fluorene | 86-73-7 | 9.80E-01 | <0.000021 | <0.000021 | <0.000021 |
| Hexachlorobenzene | 118-74-1 | 1.0 E-3 | <0.00007 | <0.00007 | <0.00007 |
| Hexachlorobutadiene | 87-68-3 | 1.2 E-2 | <0.00005 | <0.00005 | <0.00005 |
| Hexachlorocyclopentadiene | 77-47-4 | 5.0 E-2 | <0.000054 | <0.000054 | <0.000054 |
| Hexachloroethane | 67-72-1 | 1.7 E-2 | <0.000034 | <0.000034 | <0.000034 |
| Indeno-1,2,3-cd-pyrene | 193-39-5 | 1.3 E-3 | <0.000051 | <0.000051 | <0.000051 |
| Isophorone | 78-59-1 | 9.6 E-1 | <0.00003 | <0.00003 | <0.00003 |
| Methylnaphthalene, 2- | 91-57-6 | 9.8 E-2 | <0.000034 | <0.000034 | <0.000034 |
| Naphthalene | 91-20-3 | 4.9 E-1 | <0.00005 | <0.00005 | <0.00005 |
| Nitroaniline, 2- | 88-74-4 | 7.3 E-3 | <0.000038 | <0.000038 | <0.000038 |
| Nitroaniline, 3- | 99-09-2 | 7.3 E-3 | <0.000056 | <0.000056 | <0.000056 |

**TABLE G.2**
**GROUNDWATER SAMPLING AND TESTING RESULTS: SVOCS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-5 | MW-6 | MW-6 Dup. |
|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 8/15/2014 | 8/18/2014 | 8/18/2014 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L |
| ***Semivolatile Organic Compounds (SVOCs) By EPA Method 8270 (continued)*** | | | | | |
| Nitroaniline, 4- | 100-01-6 | 4.6 E-2 | <0.00004 | <0.00004 | <0.00004 |
| Nitrobenzene | 98-95-3 | 4.9 E-2 | <0.00005 | <0.00005 | <0.00005 |
| Nitrophenol, 2- | 88-75-5 | 4.9 E-2 | <0.000024 | <0.000024 | <0.000024 |
| Nitrophenol, 4- | 100-02-7 | 4.9 E-2 | <0.00006 | <0.00006 | <0.00006 |
| Nitrosodi-n-propylamine, n- | 621-64-7 | 2.0 E-4 | <0.00004 | <0.00004 | <0.00004 |
| Nitrosodiphenylamine | 86-30-6 | 1.9 E-1 | <0.000029 | <0.000029 | <0.000029 |
| Pentachlorophenol | 87-86-5 | 1.0 E-3 | <0.000046 | <0.000046 | <0.000046 |
| Phenanthrene | 85-01-8 | 7.3 E-1 | <0.00002 | <0.00002 | <0.00002 |
| Phenol | 108-95-2 | 7.3 E+0 | <0.000032 | <0.000032 | <0.000032 |
| Pyrene | 129-00-0 | 7.3 E-1 | <0.000022 | <0.000022 | <0.000022 |
| Trichlorophenol, 2,4,5- | 95-95-4 | 2.4 E+0 | <0.00004 | <0.00004 | <0.00004 |
| Trichlorophenol, 2,4,6- | 88-06-2 | 2.4 E-2 | <0.00006 | <0.00006 | <0.00006 |

Notes:
1. Detections are shown in **bold**.
2. < = Constituent not detected at specified Sample Quantitation Limit.
3. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
4. Dup = Duplicate sample.

GSI ENVIRONMENTAL

**TABLE G.3**
**GROUNDWATER SAMPLING AND TESTING RESULTS: METALS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-1 | MW-2 | MW-3 | MW-4 | MW-5 | MW-6 | MW-6 Dup. |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 8/15/2014 | 8/18/2014 | 8/15/2014 | 8/19/2014 | 8/15/2014 | 8/18/2014 | 8/18/2014 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Metals by EPA Methods 6010B, 6020, and 7471A*** | | | | | | | | | |
| Arsenic, Total | 7440-38-2 | 1.0 E-2 | <0.001 | **0.00232 J** | <0.001 | **0.00182 J** | **0.00428 J** | **0.00106 J** | **0.00140 J** |
| Barium, Total | 7440-39-3 | 2.0 E+0 | **0.0304** | **0.220** | **1.26** | **0.434** | **1.29** | **0.494** | **0.516** |
| Cadmium, Total | 7440-43-9 | 5.0 E-3 | **0.00187 J** | <0.0006 | <0.0006 | <0.0006 | <0.0006 | <0.0006 | <0.0006 |
| Chromium, Total | 7440-47-3 | 1.0 E-1 | <0.001 | **0.00653** | <0.001 | **0.00990** | **0.0410** | <0.001 | <0.001 |
| Lead, Total | 7439-92-1 | 1.5 E-2 | <0.0005 | **0.00314 J** | <0.0005 | **0.00137 J** | **0.00565** | <0.0005 | <0.0005 |
| Mercury, Total | 7439-97-6 | 2.0 E-3 | <0.00004 | <0.00004 | <0.00004 | <0.00004 | <0.00004 | <0.00004 | <0.00004 |
| Selenium, Total | 7782-49-2 | 5.0 E-2 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | **0.00122 J** | **0.00158 J** |
| Silver, Total | 7440-22-4 | 1.2 E-1 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Arsenic, Dissolved | 7440-38-2 | 1.0 E-2 | <0.001 | **0.00101 J** | <0.001 | **0.00107 J** | <0.001 | **0.00121 J** | **0.00118 J** |
| Barium, Dissolved | 7440-39-3 | 2.0 E+0 | **0.0308** | **0.148** | **1.20** | **0.357** | **1.07** | **0.511** | **0.508** |
| Cadmium, Dissolved | 7440-43-9 | 5.0 E-3 | **0.00195 J** | <0.0008 | <0.0008 | <0.0008 | <0.0008 | <0.0008 | <0.0008 |
| Chromium, Dissolved | 7440-47-3 | 1.0 E-1 | <0.001 | <0.001 | <0.001 | **0.00186 J** | <0.001 | <0.001 | <0.001 |
| Lead, Dissolved | 7439-92-1 | 1.5 E-2 | <0.0007 | <0.0007 | <0.0007 | <0.0007 | <0.0007 | <0.0007 | <0.0007 |
| Mercury, Dissolved | 7439-97-6 | 2.0 E-3 | <0.000042 | <0.000042 | **0.000173 J** | <0.000042 | <0.000042 | <0.000042 | <0.000042 |
| Selenium, Dissolved | 7782-49-2 | 5.0 E-2 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | **0.00191 J** | **0.00151 J** |
| Silver, Dissolved | 7440-22-4 | 1.2 E-1 | <0.0008 | <0.0008 | <0.0008 | <0.0008 | <0.0008 | <0.0008 | <0.0008 |

Notes:
1. Detections are shown in **bold**.
2. < = Constituent not detected at specified Sample Quantitation Limit.
3. J = Estimated concentration detected between the Sample Quantitation Limit and Method Quantitation Limit.
4. Dup = Duplicate sample.

GSI ENVIRONMENTAL

**TABLE G.4**
**GROUNDWATER SAMPLING AND TESTING RESULTS: TPH**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | MW-1 | MW-2 | MW-3 | MW-4 | MW-5 | MW-6 | MW-6 Dup. |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 8/15/2014 | 8/18/2014 | 8/15/2014 | 8/19/2014 | 8/15/2014 | 8/18/2014 | 8/18/2014 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| ***Total Petroleum Hydrocarbons by TX 1005*** | | | | | | | | | |
| nC6 to nC12 | NA | 9.8 E-1 | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 |
| >nC12 to nC28 | NA | 9.8 E-1 | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 |
| >nC28 to nC35 | NA | 9.8 E-1 | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 |
| Total Petroleum Hydrocarbons | NA | NA | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 |

Notes:
1. < = Constituent not detected at specified Sample Quantitation Limit.
2. Dup = Duplicate sample.

GSI ENVIRONMENTAL

**TABLE G.5**
**CRITERIUM PHASE II GROUNDWATER SAMPLING RESULTS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | B-1 | B-5 | B-6 |
|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 2/15/2014 | 2/15/2014 | 2/15/2014 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L |
| ***Volatile Organic Compounds (VOCs) By EPA Method 8260B*** | | | | | |
| Acetone | 67-64-1 | 2.2 E+1 | <0.05 | <0.05 | <0.05 |
| Benzene | 71-43-2 | 5.0 E-3 | <0.005 | <0.005 | <0.005 |
| Bromodichloromethane | 75-27-4 | 1.5 E-2 | <0.005 | <0.005 | <0.005 |
| Bromoform | 75-25-2 | 1.2 E-1 | <0.005 | <0.005 | <0.005 |
| Bromomethane | 74-83-9 | 3.4 E-2 | <0.01 | <0.01 | <0.01 |
| Carbon disulfide | 75-15-0 | 2.4 E+0 | <0.005 | <0.005 | <0.005 |
| Carbon tetrachloride | 56-23-5 | 5.0 E-3 | <0.005 | <0.005 | <0.005 |
| Chlorobenzene | 108-90-7 | 1.0 E-1 | <0.005 | <0.005 | <0.005 |
| Chloroethane | 75-00-3 | 9.8 E+0 | <0.01 | <0.01 | <0.01 |
| Chloroform | 67-66-3 | 2.4 E-1 | <0.005 | <0.005 | <0.005 |
| Chloromethane | 74-87-3 | 7.0 E-2 | <0.005 | <0.005 | <0.005 |
| Dibromochloromethane | 124-48-1 | 1.1 E-2 | <0.005 | <0.005 | <0.005 |
| Dichloroethane, 1,1- | 75-34-3 | 4.9 E+0 | <0.005 | **0.02** | **0.29** |
| Dichloroethane, 1,2- | 107-06-2 | 5.0 E-3 | <0.005 | **0.0052** | <0.005 |
| Dichloroethylene, 1,1- | 75-35-4 | 7.0 E-3 | <0.005 | **0.55** | **0.34** |
| Dichloroethylene, cis-1,2- | 156-59-2 | 7.0 E-2 | <0.005 | **0.41** | **3.80** |
| Dichloroethylene, trans-1,2 | 156-60-5 | 1.0 E-1 | <0.005 | <0.005 | **0.042** |
| Dichloropropane, 1,2- | 78-87-5 | 5.0 E-3 | <0.005 | <0.005 | <0.005 |
| Dichloropropene, cis 1,3- | 10061-01-5 | 1.7 E-3 | <0.005 | <0.005 | <0.005 |
| Dichloropropene, trans 1,3- | 10061-02-6 | 9.1 E-3 | <0.005 | <0.005 | <0.005 |
| Ethylbenzene | 100-41-4 | 7.0 E-1 | <0.005 | <0.005 | <0.005 |
| Hexanone, 2- | 591-78-6 | 1.2 E-1 | <0.01 | <0.01 | <0.01 |
| Methyl ethyl ketone | 78-93-3 | 1.5 E+1 | <0.02 | <0.02 | <0.02 |
| Methyl isobutyl ketone | 108-10-1 | 2.0 E+0 | <0.01 | <0.01 | <0.01 |
| Methylene chloride | 75-09-2 | 5.0 E-3 | <0.005 | <0.005 | <0.005 |
| MTBE (methyl tert-butyl ether) | 1634-04-4 | 2.4 E-1 | <0.005 | <0.005 | <0.005 |
| Styrene | 100-42-5 | 1.0 E-1 | <0.005 | <0.005 | <0.005 |
| Tetrachloroethane, 1,1,2,2- | 79-34-5 | 4.6 E-3 | <0.005 | <0.005 | <0.005 |
| Tetrachloroethylene | 127-18-4 | 5.0 E-3 | <0.005 | **0.039** | <0.005 |
| Toluene | 108-88-3 | 1.0 E+0 | <0.005 | <0.005 | <0.005 |
| Trichloroethane, 1,1,1- | 71-55-6 | 2.0 E-1 | <0.005 | <0.005 | <0.005 |
| Trichloroethane, 1,1,2- | 79-00-5 | 5.0 E-3 | <0.005 | <0.005 | <0.005 |
| Trichloroethylene | 79-01-6 | 5.0 E-3 | <0.005 | **0.3** | **0.076** |
| Trichlorofluoromethane | 75-69-4 | 7.3 E+0 | <0.005 | <0.005 | <0.005 |
| Vinyl acetate | 108-05-4 | 2.4 E+1 | <0.01 | <0.01 | <0.01 |
| Vinyl chloride | 75-01-4 | 2.0 E-3 | <0.01 | **0.032** | **0.20** |
| Xylene, m,p- | 179601-23-1 | 1.0 E+1 | <0.005 | <0.005 | <0.005 |
| Xylene, o- | 95-47-6 | 1.0 E+1 | <0.005 | <0.005 | <0.005 |
| Xylenes, Total | 1330-20-7 | 1.0 E+1 | <0.005 | <0.005 | <0.005 |
| ***Polychlorinated Biphenyls (PCBs) by EPA Method 8082A*** | | | | | |
| Arochlors | 1336-36-3 | 5.0 E-4 | <0.0005 | <0.0005 | <0.0005 |
| ***Total Petroleum Hydrocarbons by EPA Method 8015C*** | | | | | |
| C-6 to C-10 Aliphatics | NA | 9.8 E-1 | <0.1 | **0.71** | **3.5** |
| C-10 to C-28 Aliphatics | NA | 9.8 E-1 | <0.15 | <0.15 | <0.15 |
| C-28 to C-35 Aliphatics | NA | 9.8 E-1 | <0.15 | <0.15 | <0.15 |

**TABLE G.5**
**CRITERIUM PHASE II GROUNDWATER SAMPLING RESULTS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | B-1 | B-5 | B-6 |
|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 2/15/2014 | 2/15/2014 | 2/15/2014 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L |
| ***Metals by EPA Methods 6020*** | | | | | |
| Arsenic | 7440-38-2 | 1.0 E-2 | <0.004 | <0.004 | <0.004 |
| Beryllium | 7440-41-7 | 4.0 E-3 | <0.002 | <0.002 | <0.002 |
| Cadmium | 7440-43-9 | 5.0 E-3 | <0.002 | <0.002 | <0.002 |
| Chromium | 7440-47-3 | 1.0 E-1 | <0.004 | <0.004 | <0.004 |
| Copper | 7440-50-8 | 1.3 E+0 | <0.002 | <0.002 | <0.002 |
| Lead | 7439-92-1 | 1.5 E-2 | <0.001 | <0.001 | <0.001 |
| Mercury | 7439-97-6 | 2.0 E-3 | <0.0002 | <0.0002 | <0.0002 |
| Nickel | 7440-02-0 | 4.9 E-1 | **0.0104** | **0.00501** | **0.00682** |
| Selenium | 7782-49-2 | 5.0 E-2 | <0.005 | <0.005 | <0.005 |
| Silver | 7440-22-4 | 1.2 E-1 | <0.001 | <0.001 | <0.001 |
| Thalium | 7791-12-0 | 2.0 E-3 | <0.002 | <0.002 | <0.002 |
| Zinc | 7440-66-6 | 7.3 E+0 | **0.0123** | **0.00955** | **0.0114** |
| ***Semivolatile Organic Compounds (SVOCs) By EPA Method 8270D*** | | | | | |
| Acenaphthene | 83-32-9 | 1.5 E+0 | <0.02 | <0.005 | <0.005 |
| Acenaphthylene | 208-96-8 | 1.5 E+0 | <0.005 | <0.005 | <0.005 |
| Aniline | 62-53-3 | 1.6 E-1 | <0.005 | <0.005 | <0.005 |
| Anthracene | 120-12-7 | 7.3 E+0 | <0.005 | <0.005 | <0.005 |
| Benz-a-anthracene | 56-55-3 | 1.3 E-3 | <0.005 | <0.005 | <0.005 |
| Benzo-a-pyrene | 50-32-8 | 2.0 E-4 | <0.005 | <0.005 | <0.005 |
| Benzo-b-fluoranthene | 205-99-2 | 1.3 E-3 | <0.005 | <0.005 | <0.005 |
| Benzo-g,h,i-perylene | 191-24-2 | 7.3 E-1 | <0.005 | <0.005 | <0.005 |
| Benzoic acid | 65-85-0 | 9.8 E+1 | <0.02 | <0.02 | <0.02 |
| Benzo-k-fluoranthene | 207-08-9 | 1.3 E-2 | <0.005 | <0.005 | <0.005 |
| Benzyl alcohol | 100-51-6 | 2.4 E+0 | <0.01 | <0.01 | <0.01 |
| Bis (2-chloroethoxy) methane | 111-91-1 | 8.3 E-4 | <0.005 | <0.005 | <0.005 |
| Bis (2-chloroethyl) ether | 111-44-4 | 8.3 E-4 | <0.005 | <0.005 | <0.005 |
| Bis (2-chloroisopropyl) ether | 108-60-1 | 1.3 E-2 | <0.005 | <0.005 | <0.005 |
| Bis (2-ethyl-hexyl) phthalate | 117-81-7 | 6.0 E-3 | <0.005 | <0.005 | <0.005 |
| Bromophenyl phenylether, 4- | 101-55-3 | 2.0 E-4 | <0.005 | <0.005 | <0.005 |
| Butyl benzyl phthalate | 85-68-7 | 4.8 E-1 | <0.005 | <0.005 | <0.005 |
| Carbazole | 86-74-8 | 4.6 E-2 | <0.005 | <0.005 | <0.005 |
| Chloro-3-methylphenol, 4- | 59-50-7 | 1.2 E-1 | <0.005 | <0.005 | <0.005 |
| Chloroaniline, 4- | 106-47-8 | 4.6 E-3 | <0.005 | <0.005 | <0.005 |
| Chloronaphthalene, 2- | 91-58-7 | 2.0 E+0 | <0.005 | <0.005 | <0.005 |
| Chlorophenol, 2- | 95-57-8 | 1.2 E-1 | <0.005 | <0.005 | <0.005 |
| Chlorophenyl phenylether, 4- | 7005-72-3 | 2.0 E-4 | <0.005 | <0.005 | <0.005 |
| Chrysene | 218-01-9 | 1.3 E-1 | <0.005 | <0.005 | <0.005 |
| Cresol, m,p- | 106-44-5 | 1.2 E-1 | <0.005 | <0.005 | <0.005 |
| Cresol, o- | 95-48-7 | 1.2 E+0 | <0.005 | <0.005 | <0.005 |
| Dibenz-a,h-anthracene | 53-70-3 | 2.0 E-4 | <0.005 | <0.005 | <0.005 |

**TABLE G.5**
**CRITERIUM PHASE II GROUNDWATER SAMPLING RESULTS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| LOCATION ID: | | Groundwater | B-1 | B-5 | B-6 |
|---|---|---|---|---|---|
| SAMPLE DATE: | | Assessment | 2/15/2014 | 2/15/2014 | 2/15/2014 |
| ANALYTE | CAS No. | Level (mg/L) | mg/L | mg/L | mg/L |
| ***Semivolatile Organic Compounds (SVOCs) By EPA Method 8270 (continued)*** | | | | | |
| Dibenzofuran | 132-64-9 | 9.8 E-2 | <0.005 | <0.005 | <0.005 |
| Dichlorobenzene, 1,2- | 95-50-1 | 6.0 E-1 | <0.005 | <0.005 | <0.005 |
| Dichlorobenzene, 1,3- | 541-73-1 | 7.3 E-1 | <0.005 | <0.005 | <0.005 |
| Dichlorobenzene, 1,4- | 106-46-7 | 7.5 E-2 | <0.005 | <0.005 | <0.005 |
| Dichlorobenzidine, 3,3- | 91-94-1 | 2.0 E-3 | <0.005 | <0.005 | <0.005 |
| Dichlorophenol, 2,4- | 120-83-2 | 7.3 E-2 | <0.005 | <0.005 | <0.005 |
| Diethyl phthalate | 84-66-2 | 2.0 E+1 | <0.005 | <0.005 | <0.005 |
| Dimethyl phthalate | 131-11-3 | 2.0 E+1 | <0.005 | <0.005 | <0.005 |
| Dimethylphenol, 2,4- | 105-67-9 | 4.9 E-1 | <0.005 | <0.005 | <0.005 |
| Di-n-butyl phthalate | 84-74-2 | 2.4 E+0 | <0.005 | <0.005 | <0.005 |
| Dinitro-2-methylphenol, 4,6- | 534-52-1 | 2.4 E-3 | <0.01 | <0.01 | <0.01 |
| Dinitrophenol, 2,4- | 51-28-5 | 4.9 E-2 | <0.02 | <0.02 | <0.02 |
| Dinitrotoluene, 2,4- | 121-14-2 | 1.3 E-3 | <0.005 | <0.005 | <0.005 |
| Dinitrotoluene, 2,6- | 606-20-2 | 1.3 E-3 | <0.005 | <0.005 | <0.005 |
| Di-n-octyl phthalate | 117-84-0 | 2.4 E-1 | <0.005 | <0.005 | <0.005 |
| Diphenylhydrazine, 1.2- | 122-66-7 | 1.1 E-3 | <0.005 | <0.005 | <0.005 |
| Fluoranthene | 206-44-0 | 9.8 E-1 | <0.005 | <0.005 | <0.005 |
| Fluorene | 86-73-7 | 9.8 E-1 | <0.005 | <0.005 | <0.005 |
| Hexachlorobenzene | 118-74-1 | 1.0 E-3 | <0.005 | <0.005 | <0.005 |
| Hexachlorobutadiene | 87-68-3 | 1.2 E-2 | <0.005 | <0.005 | <0.005 |
| Hexachlorocyclopentadiene | 77-47-4 | 5.0 E-2 | <0.01 | <0.01 | <0.01 |
| Hexachloroethane | 67-72-1 | 1.7 E-2 | <0.005 | <0.005 | <0.005 |
| Indeno-1,2,3-cd-pyrene | 193-39-5 | 1.3 E-3 | <0.005 | <0.005 | <0.005 |
| Isophorone | 78-59-1 | 9.6 E-1 | <0.005 | <0.005 | <0.005 |
| Methylnaphthalene, 2- | 91-57-6 | 9.8 E-2 | <0.005 | <0.005 | <0.005 |
| Naphthalene | 91-20-3 | 4.9 E-1 | <0.005 | <0.005 | <0.005 |
| Nitroaniline, 2- | 88-74-4 | 7.3 E-3 | <0.005 | <0.005 | <0.005 |
| Nitroaniline, 3- | 99-09-2 | 7.3 E-3 | <0.005 | <0.005 | <0.005 |
| Nitroaniline, 4- | 100-01-6 | 4.6 E-2 | <0.005 | <0.005 | <0.005 |
| Nitrobenzene | 98-95-3 | 4.9 E-2 | <0.005 | <0.005 | <0.005 |
| Nitrophenol, 2- | 88-75-5 | 4.9 E-2 | <0.01 | <0.01 | <0.01 |
| Nitrophenol, 4- | 100-02-7 | 4.9 E-2 | <0.02 | <0.02 | <0.02 |
| Nitrosodi-n-propylamine, n- | 621-64-7 | 2.0 E-4 | <0.005 | <0.005 | <0.005 |
| Nitrosodiphenylamine, n- | 86-30-6 | 1.9 E-1 | <0.005 | <0.005 | <0.005 |
| Pentachlorophenol | 87-86-5 | 1.0 E-3 | <0.01 | <0.01 | <0.01 |
| Phenanthrene | 85-01-8 | 7.3 E-1 | <0.005 | <0.005 | <0.005 |
| Phenol | 108-95-2 | 7.3 E+0 | <0.005 | <0.005 | <0.005 |
| Pyrene | 129-00-0 | 7.3 E-1 | <0.005 | <0.005 | <0.005 |
| Trichlorobenzene, 1,2,4- | 120-82-1 | 7.0 E-2 | <0.005 | <0.005 | <0.005 |
| Trichlorophenol, 2,4,5- | 95-95-4 | 2.4 E+0 | <0.005 | <0.005 | <0.005 |
| Trichlorophenol, 2,4,6- | 88-06-2 | 2.4 E-2 | <0.005 | <0.005 | <0.005 |

Notes:
1. Detections are shown in **bold**.
2. Yellow highlight indicates an exceedance of the applicable assessment level.
3. < = Constituent not detected at specified Sample Quantitation Limit.
4. NA = Not applicable.

GSI ENVIRONMENTAL

**TABLE G.6**
**GROUNDWATER SAMPLING AND TESTING RESULTS: GEOCHEMICAL PARAMETERS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

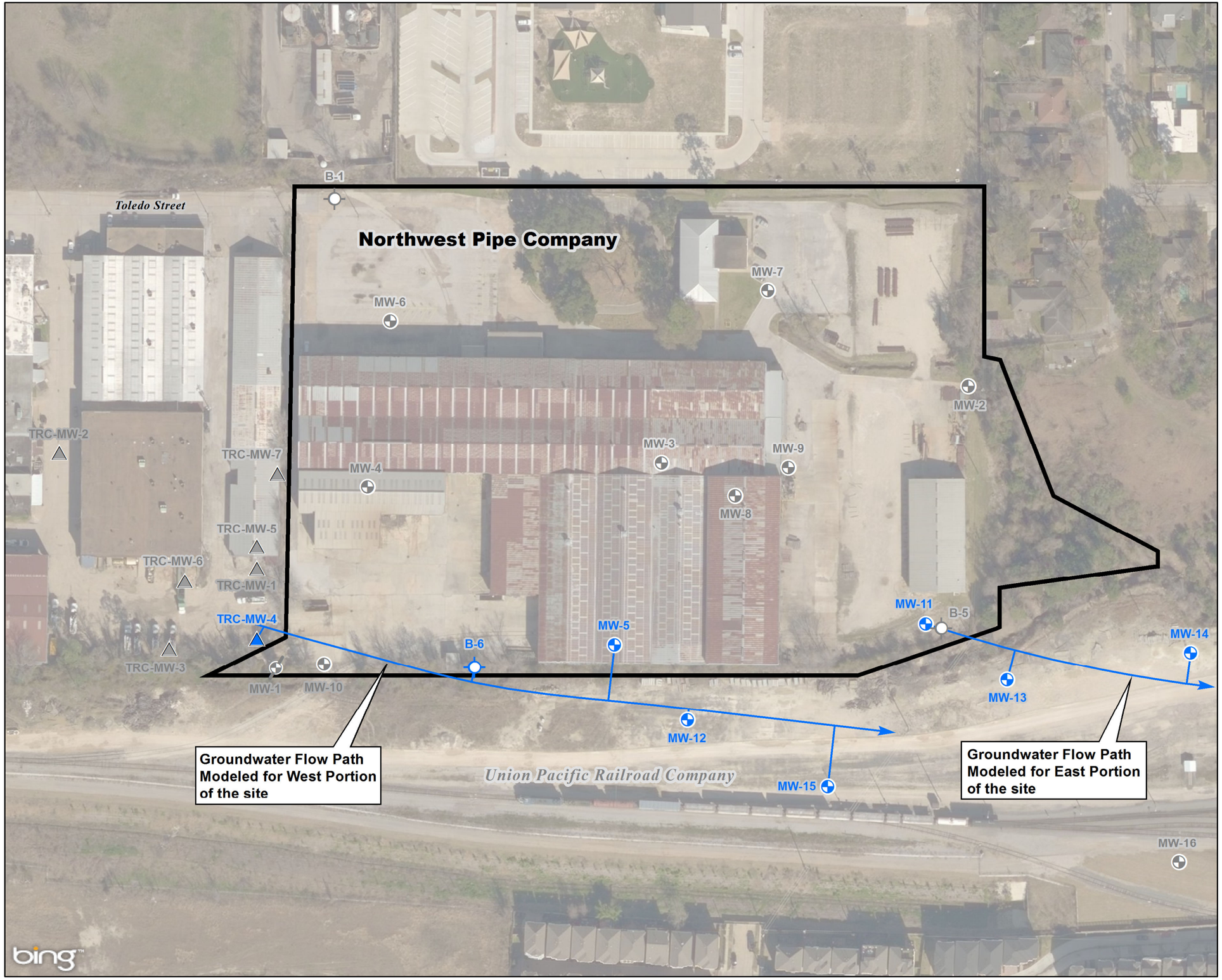
| Well ID No. | Date of Measurement | Temp. (°F) | pH (s.u.) | Specific Conductance (mS/cm) | Field Turbidity (NTU) | Dissolved Oxygen (mg/L) | Redox (mV) |
|---|---|---|---|---|---|---|---|
| MW-1 | 8/15/2014 | 71.9 | 5.80 | 1.282 | 9.13 | 1.19 | 226 |
| | 12/29/2014 | 66.9 | 6.41 | 1.326 | 52.4 | 3.52 | 29.6 |
| MW-2 | 8/18/2014 | 76.4 | 6.72 | 1.178 | 40.6 | 1.42 | -172 |
| | 12/29/2014 | 68.8 | 6.60 | 1.218 | 20.4 | 1.55 | -119 |
| | 3/18/2015 | 70.0 | 6.61 | 1.350 | 49.1 | 0.94 | -79.0 |
| | 6/25/2015 | 76.0 | 7.47 | 1.380 | 137 | 0.37 | -1.0 |
| | 9/28/2015 | 73.8 | 6.60 | 0.885 | 0.63 | 0.53 | 3.4 |
| | 12/1/2015 | 71.4 | 6.62 | 1.377 | 4.80 | 0.61 | -13.9 |
| MW-3 | 8/15/2014 | 75.0 | 6.18 | 0.639 | 27.6 | 1.34 | -67.5 |
| | 12/29/2014 | 71.0 | 6.78 | 0.680 | 11.4 | 1.00 | -155 |
| | 3/18/2015 | 70.8 | 6.74 | 0.759 | 25.9 | 0.89 | -200 |
| | 6/25/2015 | 75.8 | 8.55 | 0.791 | 36.2 | 0.48 | -45.0 |
| | 9/28/2015 | 74.6 | 6.84 | 0.417 | 1.84 | 0.62 | -93.6 |
| | 12/1/2015 | 72.4 | 6.80 | 0.723 | 8.73 | 0.40 | -68.5 |
| MW-4 | 8/19/2014 | 76.5 | 7.03 | 0.811 | 144 | 1.86 | -479 |
| | 12/29/2014 | 71.4 | 6.97 | 0.730 | 51.0 | 1.11 | -157 |
| | 3/18/2015 | 71.3 | 6.81 | 0.784 | 98.9 | 4.29 | -166 |
| | 6/25/2015 | 77.0 | 8.31 | 0.845 | 157 | 0.43 | -39.0 |
| | 9/28/2015 | 75.9 | 7.10 | 0.505 | 5.21 | 0.44 | 25.6 |
| | 12/1/2015 | 73.4 | 6.95 | 0.782 | 46.6 | 0.71 | 9.10 |
| MW-5 | 8/15/2014 | 76.7 | 6.13 | 1.065 | >1000 | 1.12 | -116 |
| | 12/29/2014 | 69.2 | 6.73 | 1.140 | 177 | 0.94 | -133 |
| | 3/18/2015 | 74.4 | 6.59 | 1.200 | 111 | 0.82 | -58.0 |
| | 6/25/2015 | 81.5 | 7.62 | 1.220 | 95.6 | 0.33 | -26.0 |
| | 9/28/2015 | 74.3 | 6.82 | 0.620 | 115 | 1.09 | -40.7 |
| | 12/1/2015 | 71.5 | 6.81 | 1.167 | 80.6 | 1.01 | -64.5 |
| MW-6 | 8/18/2014 | 82.3 | 6.87 | 0.814 | 49.4 | 2.66 | -178 |
| | 12/29/2014 | 71.3 | 6.76 | 0.724 | 4.57 | 1.22 | -99.4 |
| | 3/18/2015 | 71.1 | 6.69 | 0.815 | 8.0 | 0.86 | 16.0 |
| | 6/25/2015 | 85.9 | 7.72 | 0.816 | 0.70 | 0.35 | -19.0 |
| | 9/28/2015 | 79.2 | 6.91 | 0.544 | 1.47 | 0.41 | -67.1 |
| | 12/1/2015 | 73.9 | 6.80 | 0.759 | 0.690 | 0.59 | -58.7 |
| MW-7 | 12/29/2014 | 71.8 | 6.98 | 0.742 | 7.50 | 1.25 | -144 |
| | 3/18/2015 | 70.8 | 6.90 | 0.803 | 26.6 | 1.57 | 26.0 |
| | 6/25/2015 | 80.1 | 8.00 | 0.824 | 12.3 | 0.34 | -7.0 |
| | 9/28/2015 | 76.7 | 7.15 | 0.638 | 7.30 | 0.79 | -53.3 |
| | 12/1/2015 | 73.4 | 7.06 | 0.745 | 4.51 | 0.43 | -40.6 |
| MW-8 | 12/29/2014 | 70.3 | 6.82 | 0.694 | 58.7 | 1.22 | -161 |
| | 3/18/2015 | 72.0 | 6.72 | 0.779 | 65.9 | 0.86 | -75.0 |
| | 6/25/2015 | 79.0 | 8.02 | 0.828 | 39.0 | 0.38 | -17.0 |
| | 9/28/2015 | 76.6 | 6.93 | 0.441 | 8.73 | 0.88 | -121 |
| | 12/1/2015 | 72.7 | 6.82 | 0.755 | 8.44 | 0.70 | -79.4 |
| MW-9 | 2/2/2015 | 70.8 | 7.86 | 0.859 | 48.9 | 2.48 | -43.2 |
| | 3/18/2015 | 71.5 | 6.69 | 0.824 | 74.5 | 1.48 | 522 |
| | 6/25/2015 | 83.5 | 7.63 | 0.855 | 117 | 0.37 | 86.0 |
| | 9/28/2015 | 77.2 | 6.91 | 0.431 | 4.83 | 0.62 | 99.1 |
| | 12/1/2015 | 73.1 | 6.84 | 0.788 | 51.2 | 1.33 | 62.8 |
| MW-10 | 2/2/2015 | 70.1 | 6.90 | 0.816 | 248 | 3.60 | 3.70 |
| | 3/18/2015 | 72.8 | 6.67 | 0.870 | 53.4 | 1.17 | 533 |
| | 6/25/2015 | 81.2 | 7.52 | 0.913 | 3.80 | 0.26 | 85.0 |
| | 9/28/2015 | 75.2 | 6.68 | 0.490 | 10.4 | 0.42 | 116 |
| | 12/1/2015 | 71.7 | 6.73 | 0.831 | 4.97 | 0.44 | 54.3 |

**TABLE G.6**
**GROUNDWATER SAMPLING AND TESTING RESULTS: GEOCHEMICAL PARAMETERS**

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

| Well ID No. | Date of Measurement | Temp. (°F) | pH (s.u.) | Specific Conductance (mS/cm) | Field Turbidity (NTU) | Dissolved Oxygen (mg/L) | Redox (mV) |
|---|---|---|---|---|---|---|---|
| MW-11 | 2/2/2015 | 72.6 | 7.60 | 0.911 | 263 | 4.40 | -20.6 |
| | 3/18/2015 | 69.4 | 6.77 | 0.972 | 37.7 | 1.30 | 517 |
| | 6/25/2015 | 80.5 | 7.26 | 0.954 | 34.6 | 0.37 | 57.0 |
| | 9/28/2015 | 75.0 | 6.81 | 0.601 | 2.41 | 0.52 | 45.0 |
| | 12/1/2015 | 71.2 | 6.83 | 0.963 | 7.79 | 0.80 | 37.2 |
| MW-12 | 9/29/2015 | 81.2 | 6.98 | 2.400 | 723 | 2.36 | -28.3 |
| | 12/1/2015 | 73.1 | 6.58 | 2.186 | 25.0 | 0.52 | 112 |
| MW-13 | 9/29/2015 | 78.7 | 7.69 | 2.438 | 108 | 1.22 | -766 |
| | 12/1/2015 | 71.6 | 6.54 | 2.276 | 27.7 | 0.55 | 25.6 |
| MW-14 | 9/30/2015 | 78.3 | 8.00 | 0.839 | 372 | 2.01 | 6.20 |
| | 12/1/2015 | 69.6 | 6.96 | 0.783 | >1000 | 0.34 | -43.2 |
| MW-15 | 9/29/2015 | 80.3 | 7.92 | 1.070 | 67.3 | 2.55 | -13.3 |
| | 12/1/2015 | 71.8 | 6.75 | 1.272 | 6.76 | 0.56 | 87.9 |
| MW-16 | 9/30/2015 | 77.9 | 8.17 | 0.808 | 376 | 0.80 | -0.10 |
| | 12/1/2015 | 72.8 | 6.46 | 0.754 | 13.2 | 0.66 | -1.60 |

Note: Field measurements were collected using a YSI portable field parameter meter and a Hach turbidity meter.




## LEGEND

- GSI monitoring well
- Phase II temporary well (Feb-2014)
- Former monitoring well (plugged and abandoned)
- TRC monitoring well
- MSD Designated Property

**Monitoring wells used in the BIOCHLOR model are shown with blue symbols**

### Notes

Background Imagery: Landiscor High Resolution Imagery taken March, 2012; Resolution: 1 Foot.

Feet
0 60 120

Projected Coordinate System
Datum: NAD 1983
UTM: Zone 15N (ft)

GSI ENVIRONMENTAL

## BIOCHLOR MODELING LOCATION MAP

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP No. 2665

| | | | |
|---|---|---|---|
| GSI Job No. | G-3990 | Drawn By: | CDM |
| Issued: | 1-Feb-2016 | Chk'd By: | JMS |
| Map ID: | **012_14** | Appv'd By: | TMM |

**FIGURE G.1**

# APPENDIX G

**City of Houston Municipal Setting Designation Application**
Northwest Pipe Company, Houston, Texas
TCEQ VCP ID No. 2665

## Attachment G.1
## BIOCHLOR Modeling Input and Output Files

# BIOCHLOR Natural Attenuation Decision Support System

*Version 2.2*
Excel 2000

NWP East Area PCE
Calibration Run
Run Name

**Data Input Instructions:**

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button )
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

## 1. ADVECTION

| | | | |
|---|---|---|---|
| Seepage Velocity* | Vs | 15.5 | (ft/yr) |
| *or* | | | |
| Hydraulic Conductivity | K | 7.5E-04 | (cm/sec) |
| Hydraulic Gradient | i | 0.005 | (ft/ft) |
| Effective Porosity | n | 0.25 | (-) |

## 2. DISPERSION

| | | |
|---|---|---|
| Alpha x* | 34 | (ft) |
| (Alpha y) / (Alpha x)* | 0.1 | (-) |
| (Alpha z) / (Alpha x)* | 1.E-99 | (-) |

Calc.

## 3. ADSORPTION

Retardation Factor* → R

*or*

| | | | | |
|---|---|---|---|---|
| Soil Bulk Density, rho | 1.7 | (kg/L) | | |
| FractionOrganicCarbon, foc | 1.8E-3 | (-) | | |
| Partition Coefficient | Koc | | | |
| PCE | 426 | (L/kg) | 6.21 | (-) |
| TCE | 130 | (L/kg) | 2.59 | (-) |
| DCE | 125 | (L/kg) | 2.53 | (-) |
| VC | 30 | (L/kg) | 1.36 | (-) |
| ETH | 302 | (L/kg) | 4.70 | (-) |
| **Common R (used in model)* =** | | | **2.59** | |

## 4. BIOTRANSFORMATION

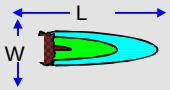
**-1st Order Decay Coefficient***

| | λ (1/yr) | half-life (yrs) | Yield |
|---|---|---|---|
| **Zone 1** | | | |
| PCE → TCE | 0.600 | | 0.79 |
| TCE → DCE | 0.800 | | 0.74 |
| DCE → VC | 1.600 | | 0.64 |
| VC → ETH | 4.000 | | 0.45 |
| **Zone 2** | λ (1/yr) | half-life (yrs) | |
| PCE → TCE | 0.000 | | |
| TCE → DCE | 0.000 | | |
| DCE → VC | 0.000 | | |
| VC → ETH | 0.000 | | |

λ HELP

## 5. GENERAL

| | | |
|---|---|---|
| Simulation Time* | 55 | (yr) |
| Modeled Area Width* | 120 | (ft) |
| Modeled Area Length* | 340 | (ft) |
| Zone 1 Length* | 340 | (ft) |
| Zone 2 Length* | 0 | (ft) |




Zone 2= L - Zone 1

## 6. SOURCE DATA

TYPE: Continuous
Single Planar

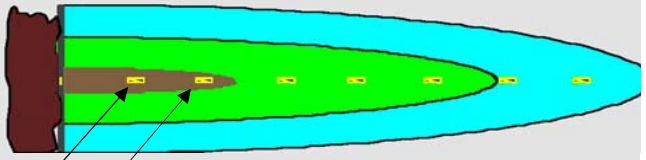
Source Options

Source Thickness in Sat. Zone* 10 (ft)

Y1
Width* (ft) 100

| Conc. (mg/L)* | C1 | $k_s$* (1/yr) |
|---|---|---|
| PCE | .35 | 0 |
| TCE | .93 | 0 |
| DCE | .74 | 0 |
| VC | .12 | 0 |
| ETH | 0 | 0 |

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations



View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

## 7. FIELD DATA FOR COMPARISON

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PCE Conc. (mg/L) | .35 | .003 | .001 | | | | | | | | |
| TCE Conc. (mg/L) | .93 | .013 | .001 | | | | | | | | |
| DCE Conc. (mg/L) | .74 | .009 | .001 | | | | | | | | |
| VC Conc. (mg/L) | 0.1 | .001 | .001 | | | | | | | | |
| ETH Conc. (mg/L) | 0.0 | .0 | .0 | | | | | | | | |
| Distance from Source (ft) | 0 | 120 | 340 | | | | | | | | |
| Date Data Collected | 2015 | | | | | | | | | | |

## 8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | *Help* | Restore | RESET | *SEE* | Paste

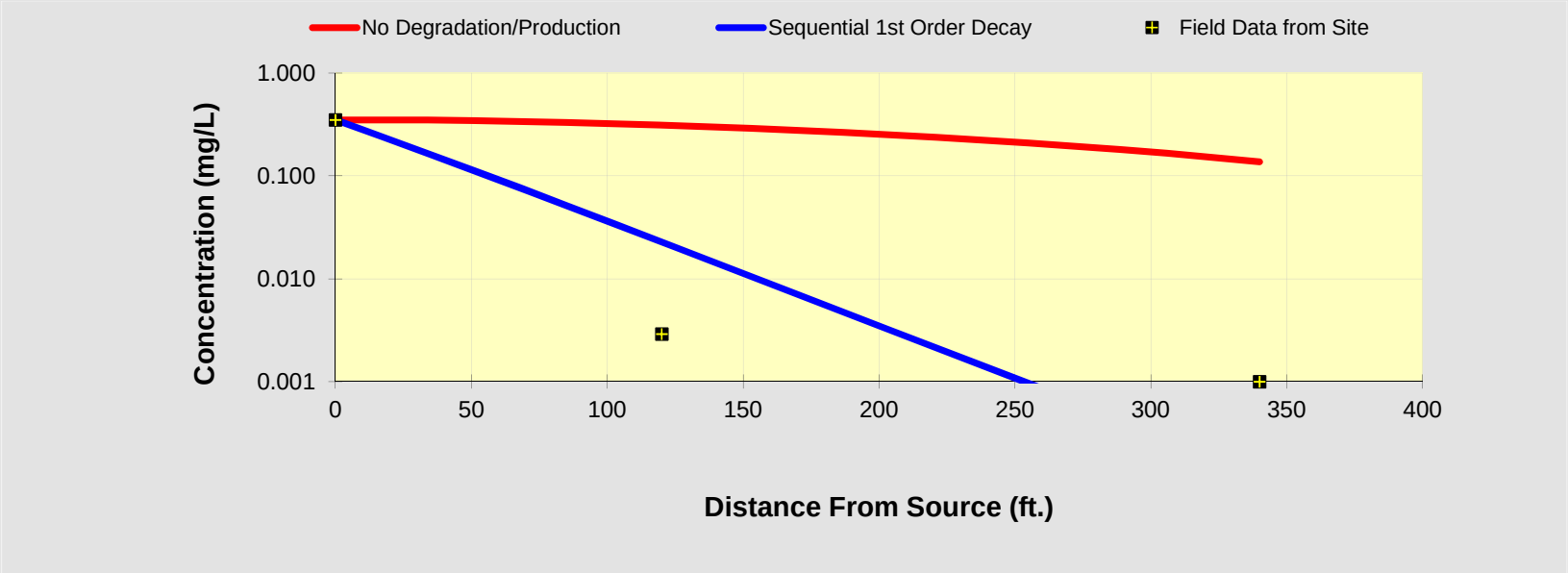
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| PCE | 0 | 34 | 68 | 102 | 136 | 170 | 204 | 238 | 272 | 306 | 340 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 0.350 | 0.348 | 0.339 | 0.322 | 0.300 | 0.276 | 0.251 | 0.223 | 0.195 | 0.166 | 0.137 |
| Biotransformation | 0.3500 | 0.165 | 0.076 | 0.035 | 0.016 | 0.007 | 0.003 | 0.001 | 0.001 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 120 | 340 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 0.350 | 0.003 | 0.001 | | | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

55.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

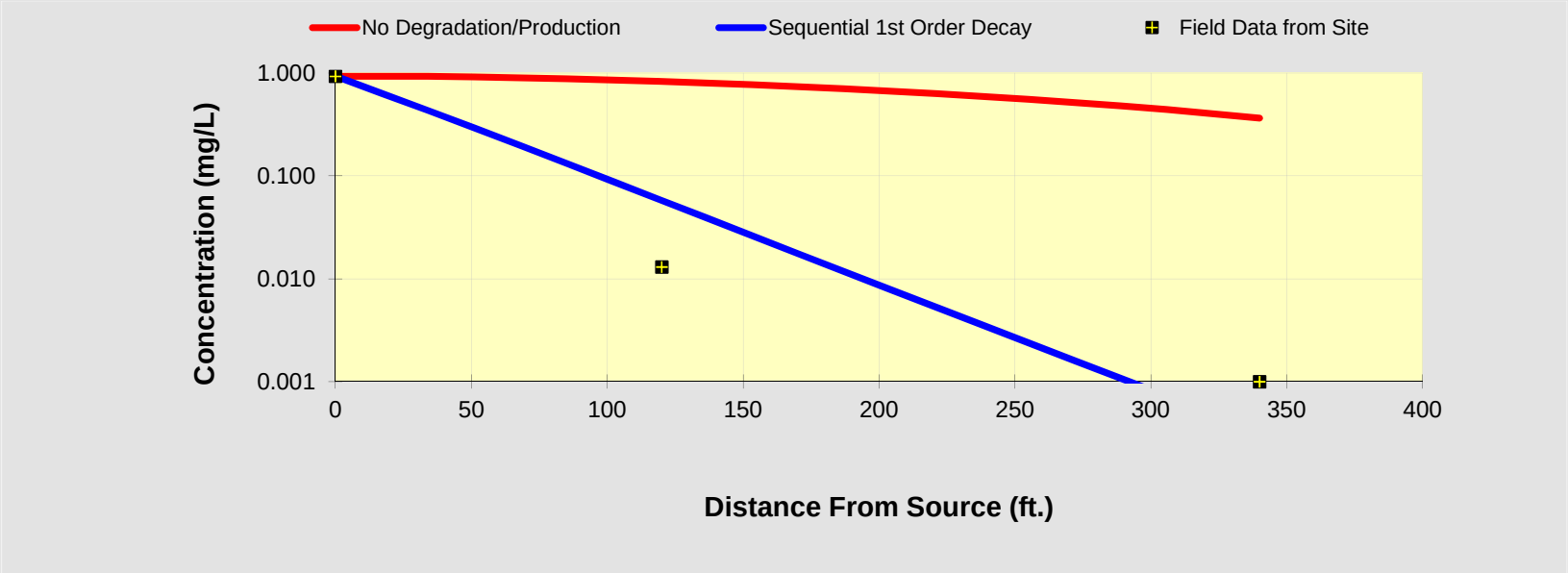
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| TCE | 0 | 34 | 68 | 102 | 136 | 170 | 204 | 238 | 272 | 306 | 340 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 0.930 | 0.926 | 0.901 | 0.855 | 0.798 | 0.734 | 0.666 | 0.593 | 0.517 | 0.440 | 0.363 |
| Biotransformation | 0.9300 | 0.432 | 0.197 | 0.088 | 0.039 | 0.018 | 0.008 | 0.004 | 0.002 | 0.001 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 120 | 340 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 0.930 | 0.013 | 0.001 | | | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

55.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

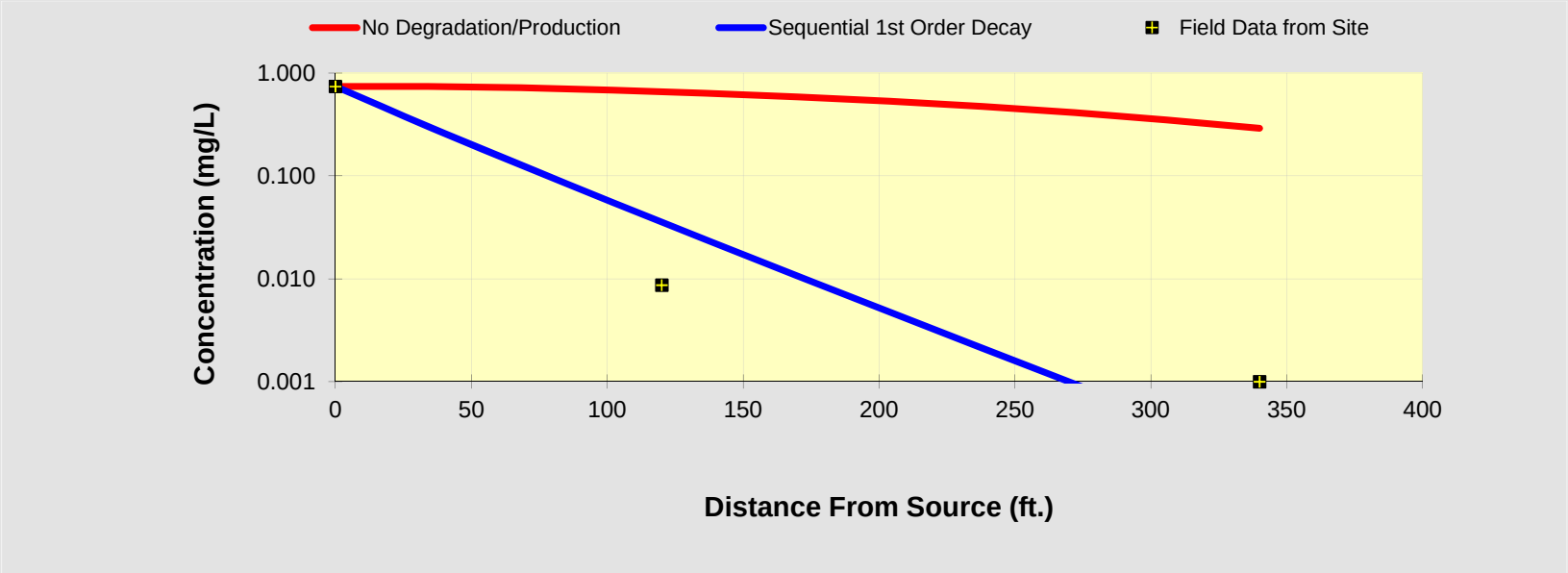
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| DCE | 0 | 34 | 68 | 102 | 136 | 170 | 204 | 238 | 272 | 306 | 340 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 0.740 | 0.737 | 0.717 | 0.680 | 0.635 | 0.584 | 0.530 | 0.472 | 0.412 | 0.350 | 0.289 |
| Biotransformation | 0.7400 | 0.302 | 0.128 | 0.055 | 0.024 | 0.011 | 0.005 | 0.002 | 0.001 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 120 | 340 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 0.740 | 0.009 | 0.001 | | | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

55.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

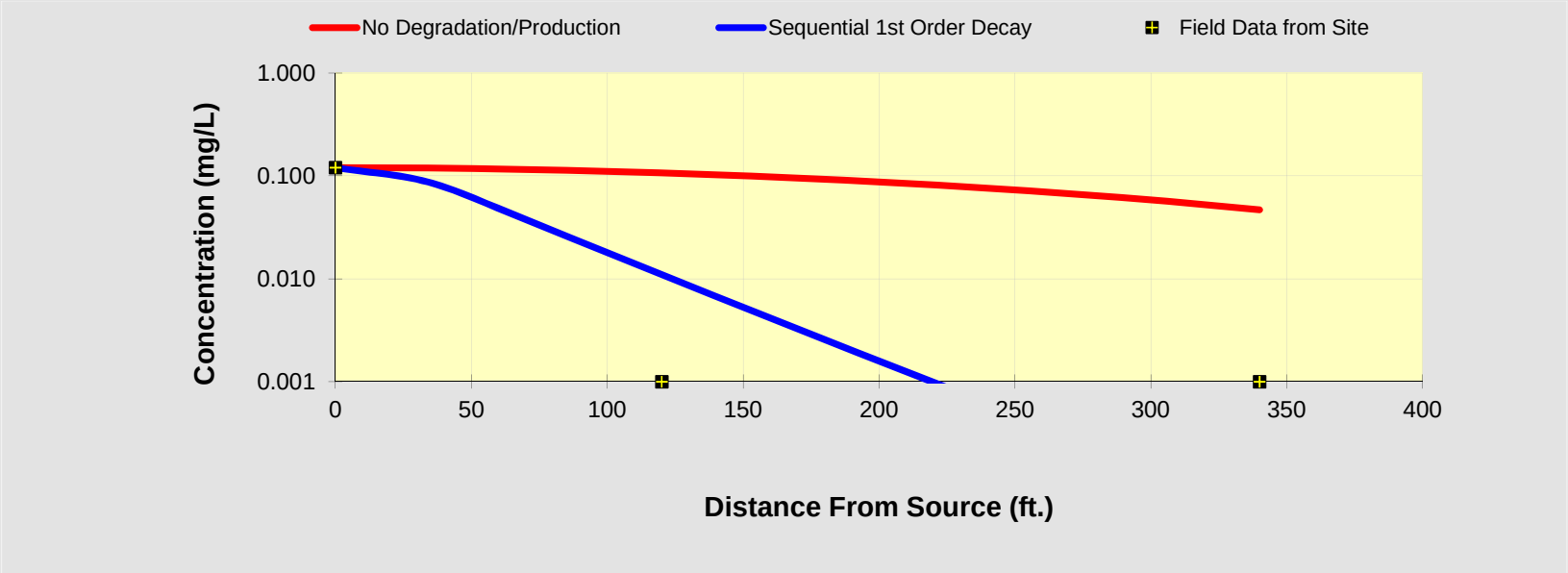
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| VC | 0 | 34 | 68 | 102 | 136 | 170 | 204 | 238 | 272 | 306 | 340 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 0.120 | 0.119 | 0.116 | 0.110 | 0.103 | 0.095 | 0.086 | 0.077 | 0.067 | 0.057 | 0.047 |
| Biotransformation | 0.1200 | 0.087 | 0.040 | 0.017 | 0.007 | 0.003 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 120 | 340 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 0.120 | 0.001 | 0.001 | | | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

55.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

# BIOCHLOR Natural Attenuation Decision Support System

*Version 2.2*
Excel 2000

NWP East Area PCE
Prediction Run
Run Name

**Data Input Instructions:**

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button )
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

## 1. ADVECTION

| | | | |
|---|---|---|---|
| Seepage Velocity* | Vs | 15.5 | (ft/yr) |
| *or* | | | |
| Hydraulic Conductivity | K | 7.5E-04 | (cm/sec) |
| Hydraulic Gradient | i | 0.005 | (ft/ft) |
| Effective Porosity | n | 0.25 | (-) |

## 2. DISPERSION

| | | |
|---|---|---|
| Alpha x* | 34 | (ft) |
| (Alpha y) / (Alpha x)* | 0.1 | (-) |
| (Alpha z) / (Alpha x)* | 1.E-99 | (-) |

Calc.

## 3. ADSORPTION

Retardation Factor* → R

*or*

| | | | | |
|---|---|---|---|---|
| Soil Bulk Density, rho | 1.7 | (kg/L) | | |
| FractionOrganicCarbon, foc | 1.8E-3 | (-) | | |
| Partition Coefficient | Koc | | | |
| PCE | 426 | (L/kg) | 6.21 | (-) |
| TCE | 130 | (L/kg) | 2.59 | (-) |
| DCE | 125 | (L/kg) | 2.53 | (-) |
| VC | 30 | (L/kg) | 1.36 | (-) |
| ETH | 302 | (L/kg) | 4.70 | (-) |
| **Common R (used in model)* =** | | | **2.59** | |

## 4. BIOTRANSFORMATION

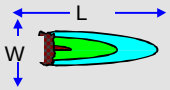
**-1st Order Decay Coefficient***

| | λ (1/yr) | half-life (yrs) | Yield |
|---|---|---|---|
| **Zone 1** | | | |
| PCE → TCE | 0.600 | | 0.79 |
| TCE → DCE | 0.800 | | 0.74 |
| DCE → VC | 1.600 | | 0.64 |
| VC → ETH | 4.000 | | 0.45 |
| **Zone 2** | λ (1/yr) | half-life (yrs) | |
| PCE → TCE | 0.000 | | |
| TCE → DCE | 0.000 | | |
| DCE → VC | 0.000 | | |
| VC → ETH | 0.000 | | |

λ HELP

## 5. GENERAL

| | | |
|---|---|---|
| Simulation Time* | 500 | (yr) |
| Modeled Area Width* | 120 | (ft) |
| Modeled Area Length* | 340 | (ft) |
| Zone 1 Length* | 340 | (ft) |
| Zone 2 Length* | 0 | (ft) |




Zone 2= L - Zone 1

## 6. SOURCE DATA

TYPE: Continuous
Single Planar

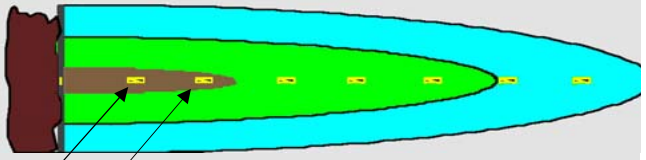
Source Options

Source Thickness in Sat. Zone* 10 (ft)

Y1
Width* (ft) 100

| Conc. (mg/L)* | C1 | $k_s$* (1/yr) |
|---|---|---|
| PCE | .35 | 0 |
| TCE | .93 | 0 |
| DCE | .74 | 0 |
| VC | .12 | 0 |
| ETH | 0 | 0 |

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations



View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

## 7. FIELD DATA FOR COMPARISON

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PCE Conc. (mg/L) | .35 | .003 | .001 | | | | | | | | |
| TCE Conc. (mg/L) | .93 | .013 | .001 | | | | | | | | |
| DCE Conc. (mg/L) | .74 | .009 | .001 | | | | | | | | |
| VC Conc. (mg/L) | 0.1 | .001 | .001 | | | | | | | | |
| ETH Conc. (mg/L) | 0.0 | .0 | .0 | | | | | | | | |
| Distance from Source (ft) | 0 | 120 | 340 | | | | | | | | |
| Date Data Collected | 2015 | | | | | | | | | | |

## 8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | *Help* | Restore | RESET | *SEE* | Paste

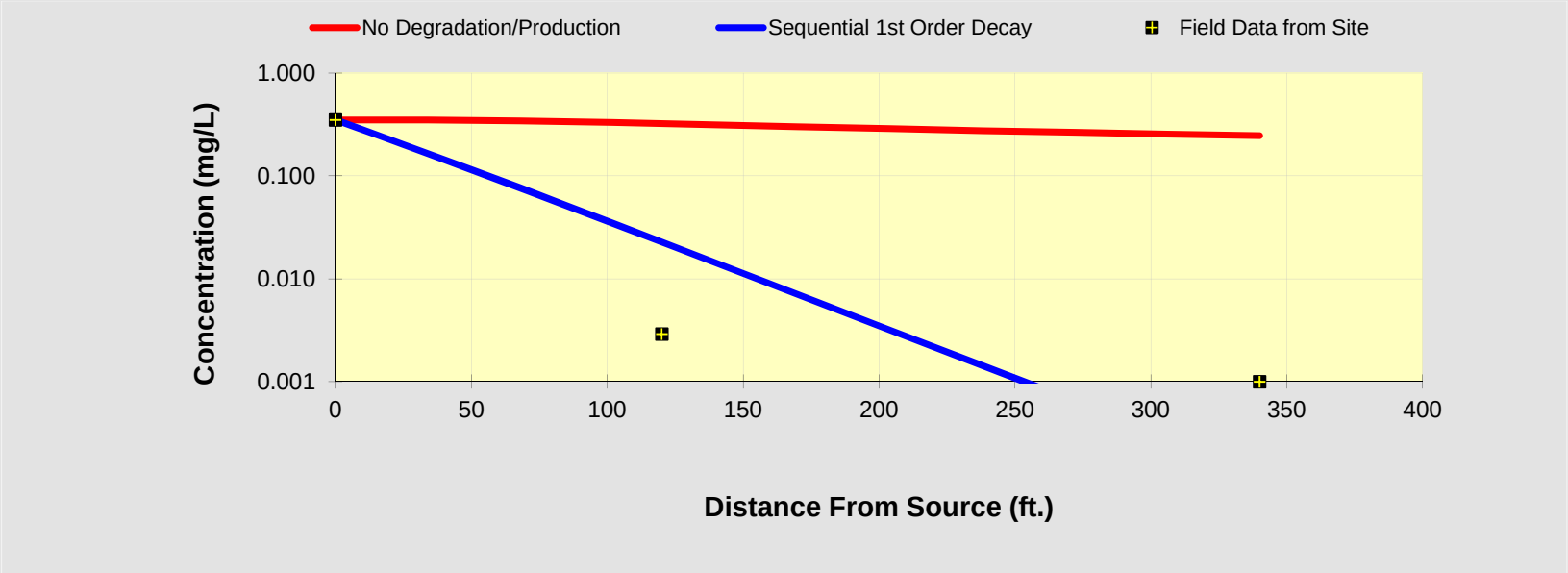
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| PCE | 0 | 34 | 68 | 102 | 136 | 170 | 204 | 238 | 272 | 306 | 340 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 0.350 | 0.350 | 0.343 | 0.330 | 0.315 | 0.301 | 0.287 | 0.275 | 0.264 | 0.254 | 0.246 |
| Biotransformation | 0.3500 | 0.165 | 0.076 | 0.035 | 0.016 | 0.007 | 0.003 | 0.001 | 0.001 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 120 | 340 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 0.350 | 0.003 | 0.001 | | | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

500.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

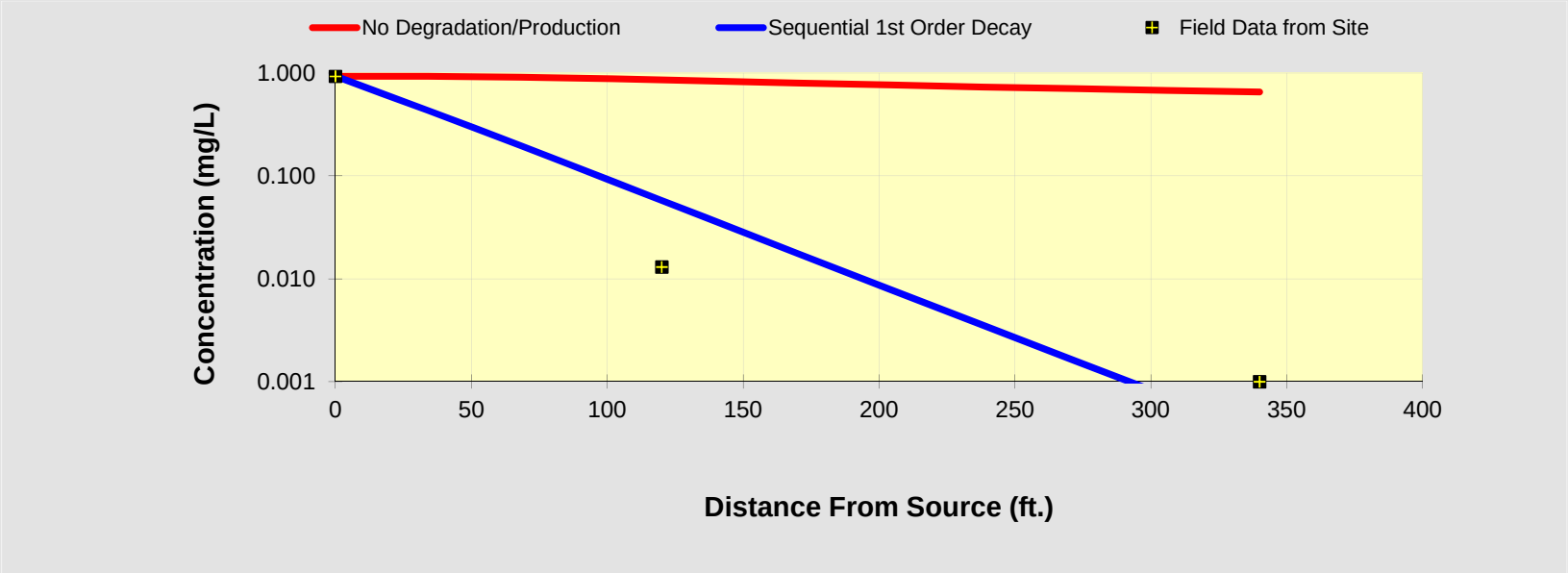
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| TCE | 0 | 34 | 68 | 102 | 136 | 170 | 204 | 238 | 272 | 306 | 340 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 0.930 | 0.929 | 0.911 | 0.876 | 0.837 | 0.798 | 0.763 | 0.731 | 0.702 | 0.676 | 0.652 |
| Biotransformation | 0.9300 | 0.432 | 0.197 | 0.088 | 0.039 | 0.018 | 0.008 | 0.004 | 0.002 | 0.001 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 120 | 340 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 0.930 | 0.013 | 0.001 | | | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

500.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

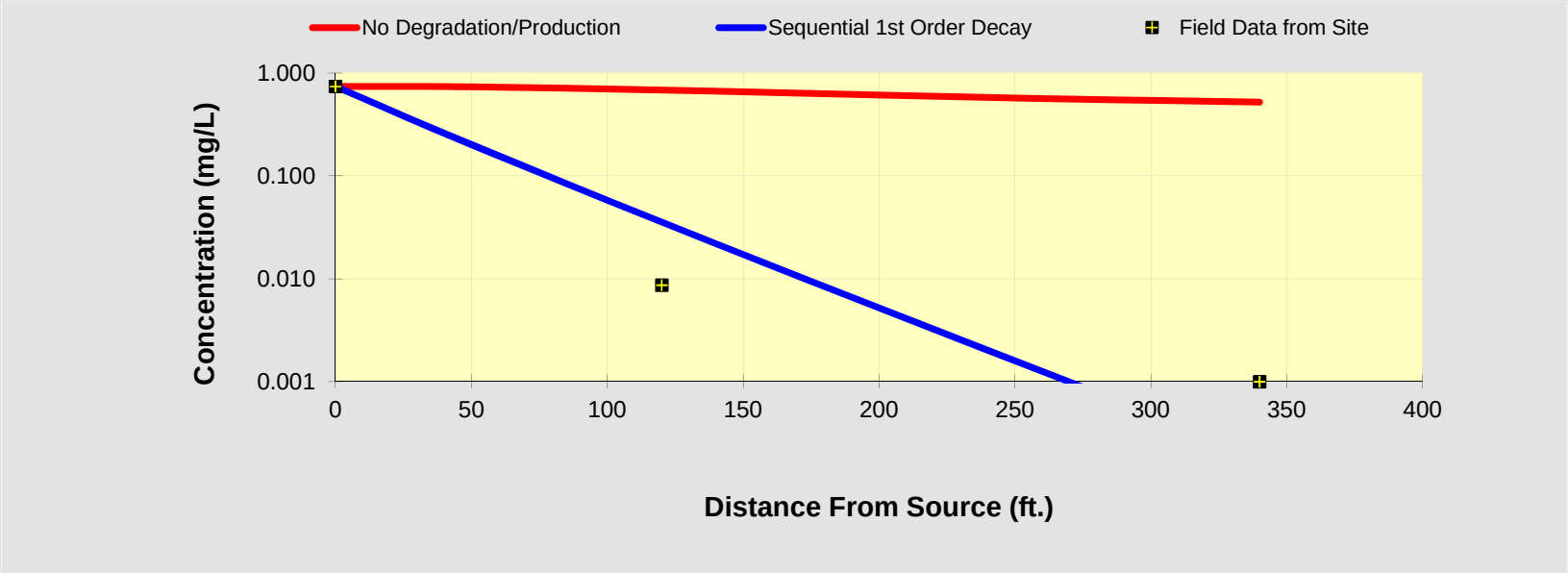
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| DCE | 0 | 34 | 68 | 102 | 136 | 170 | 204 | 238 | 272 | 306 | 340 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 0.740 | 0.739 | 0.725 | 0.697 | 0.666 | 0.635 | 0.607 | 0.582 | 0.559 | 0.538 | 0.519 |
| Biotransformation | 0.7400 | 0.302 | 0.128 | 0.055 | 0.024 | 0.011 | 0.005 | 0.002 | 0.001 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 120 | 340 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 0.740 | 0.009 | 0.001 | | | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

500.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

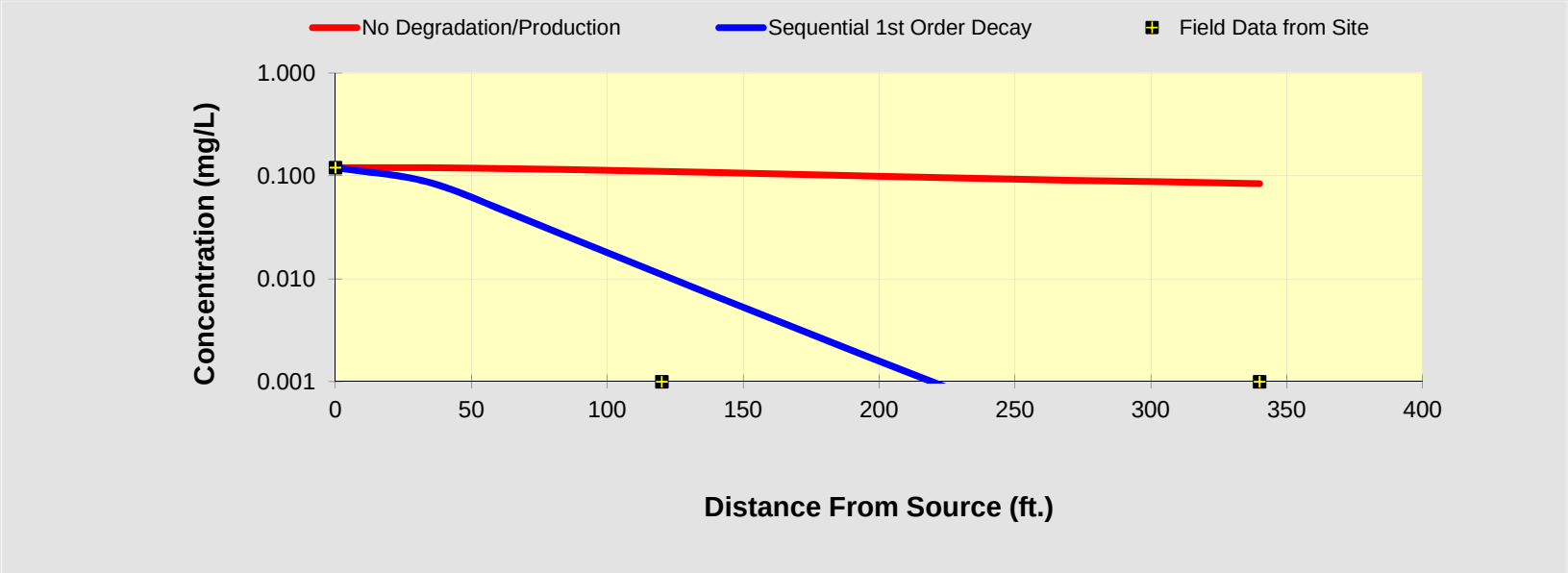
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| VC | 0 | 34 | 68 | 102 | 136 | 170 | 204 | 238 | 272 | 306 | 340 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 0.120 | 0.120 | 0.118 | 0.113 | 0.108 | 0.103 | 0.098 | 0.094 | 0.091 | 0.087 | 0.084 |
| Biotransformation | 0.1200 | 0.087 | 0.040 | 0.017 | 0.007 | 0.003 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 120 | 340 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 0.120 | 0.001 | 0.001 | | | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

500.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

# BIOCHLOR Natural Attenuation Decision Support System

*Version 2.2*
Excel 2000

NWP East Area DCE
Calibration Run
Run Name

**Data Input Instructions:**

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button )
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

## 1. ADVECTION

| | | | |
|---|---|---|---|
| Seepage Velocity* | Vs | 15.5 | (ft/yr) |
| *or* | | | |
| Hydraulic Conductivity | K | 7.5E-04 | (cm/sec) |
| Hydraulic Gradient | i | 0.005 | (ft/ft) |
| Effective Porosity | n | 0.25 | (-) |

## 2. DISPERSION

| | | |
|---|---|---|
| Alpha x* | 34 | (ft) |
| (Alpha y) / (Alpha x)* | 0.1 | (-) |
| (Alpha z) / (Alpha x)* | 1.E-99 | (-) |

Calc.

## 3. ADSORPTION

Retardation Factor* → R

*or*

| | | | | |
|---|---|---|---|---|
| Soil Bulk Density, rho | 1.7 | (kg/L) | | |
| FractionOrganicCarbon, foc | 1.8E-3 | (-) | | |
| Partition Coefficient | Koc | | | |
| PCE | 65 | (L/kg) | 1.79 | (-) |
| TCE | | (L/kg) | | (-) |
| DCE | | (L/kg) | | (-) |
| VC | | (L/kg) | | (-) |
| ETH | | (L/kg) | | (-) |
| **Common R (used in model)* =** | | | **1.79** | |

## 4. BIOTRANSFORMATION

**-1st Order Decay Coefficient***

| **Zone 1** | λ (1/yr) | half-life (yrs) | Yield |
|---|---|---|---|
| PCE → TCE | 0.670 | | 0.79 |
| TCE → DCE | 0.000 | | 0.74 |
| DCE → VC | 0.000 | | 0.64 |
| VC → ETH | 0.000 | | 0.45 |

| **Zone 2** | λ (1/yr) | half-life (yrs) |
|---|---|---|
| PCE → TCE | 0.000 | |
| TCE → DCE | 0.000 | |
| DCE → VC | 0.000 | |
| VC → ETH | 0.000 | |

λ HELP

## 5. GENERAL

| | | |
|---|---|---|
| Simulation Time* | 55 | (yr) |
| Modeled Area Width* | 120 | (ft) |
| Modeled Area Length* | 340 | (ft) |
| Zone 1 Length* | 340 | (ft) |
| Zone 2 Length* | 0 | (ft) |

L, W

Zone 2= L - Zone 1

## 6. SOURCE DATA

TYPE: Continuous Single Planar

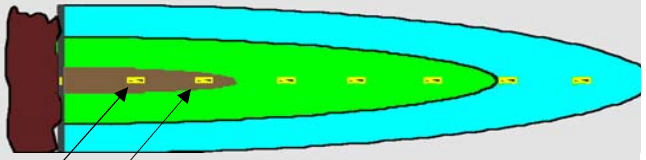
Source Options

Source Thickness in Sat. Zone* 10 (ft)

Width* (ft) Y1 100

| Conc. (mg/L)* | C1 | $k_s$* (1/yr) |
|---|---|---|
| PCE | 3.5 | 0 |
| TCE | .0 | 0 |
| DCE | .0 | 0 |
| VC | .0 | 0 |
| ETH | 0 | 0 |

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations



View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

## 7. FIELD DATA FOR COMPARISON

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PCE Conc. (mg/L) | 3.5 | .12 | .001 | | | | | | | | |
| TCE Conc. (mg/L) | .0 | .0 | .0 | | | | | | | | |
| DCE Conc. (mg/L) | .0 | .0 | .0 | | | | | | | | |
| VC Conc. (mg/L) | 0.0 | .0 | .0 | | | | | | | | |
| ETH Conc. (mg/L) | 0.0 | .0 | .0 | | | | | | | | |
| Distance from Source (ft) | 0 | 120 | 340 | | | | | | | | |
| Date Data Collected | 2015 | | | | | | | | | | |

## 8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | *Help* | Restore | RESET | *SEE* | Paste

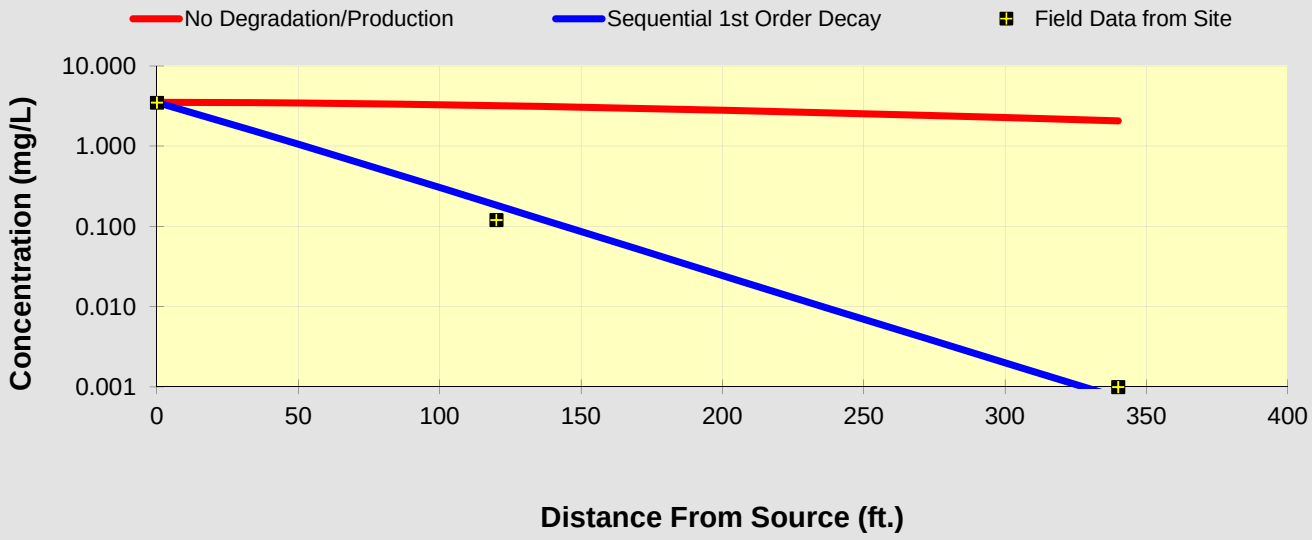
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| 1,1-DCE | 0 | 34 | 68 | 102 | 136 | 170 | 204 | 238 | 272 | 306 | 340 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 3.500 | 3.494 | 3.421 | 3.280 | 3.115 | 2.945 | 2.776 | 2.606 | 2.431 | 2.250 | 2.061 |
| Biotransformation | 3.5000 | 1.554 | 0.678 | 0.290 | 0.123 | 0.052 | 0.022 | 0.009 | 0.004 | 0.002 | 0.001 |

**Monitoring Well Locations (ft)**

| | 0 | 120 | 340 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 3.500 | 0.120 | 0.001 | | | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

55.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

# BIOCHLOR Natural Attenuation Decision Support System

*Version 2.2*
Excel 2000

NWP East Area DCE
Prediction Run
Run Name

**Data Input Instructions:**

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button )
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

## 1. ADVECTION

| | | | |
|---|---|---|---|
| Seepage Velocity* | Vs | 15.5 | (ft/yr) |
| *or* | | | |
| Hydraulic Conductivity | K | 7.5E-04 | (cm/sec) |
| Hydraulic Gradient | i | 0.005 | (ft/ft) |
| Effective Porosity | n | 0.25 | (-) |

## 2. DISPERSION

| | | |
|---|---|---|
| Alpha x* | 34 | (ft) |
| (Alpha y) / (Alpha x)* | 0.1 | (-) |
| (Alpha z) / (Alpha x)* | 1.E-99 | (-) |

Calc.

## 3. ADSORPTION

Retardation Factor* → R

*or*

| | | | | |
|---|---|---|---|---|
| Soil Bulk Density, rho | 1.7 | (kg/L) | | |
| FractionOrganicCarbon, foc | 1.8E-3 | (-) | | |
| Partition Coefficient | Koc | | | |
| PCE | 65 | (L/kg) | 1.79 | (-) |
| TCE | | (L/kg) | | (-) |
| DCE | | (L/kg) | | (-) |
| VC | | (L/kg) | | (-) |
| ETH | | (L/kg) | | (-) |
| **Common R (used in model)* =** | | | **1.79** | |

## 4. BIOTRANSFORMATION

**-1st Order Decay Coefficient***

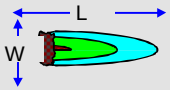
| **Zone 1** | λ (1/yr) | half-life (yrs) | Yield |
|---|---|---|---|
| PCE → TCE | 0.670 | | 0.79 |
| TCE → DCE | 0.000 | | 0.74 |
| DCE → VC | 0.000 | | 0.64 |
| VC → ETH | 0.000 | | 0.45 |

| **Zone 2** | λ (1/yr) | half-life (yrs) |
|---|---|---|
| PCE → TCE | 0.000 | |
| TCE → DCE | 0.000 | |
| DCE → VC | 0.000 | |
| VC → ETH | 0.000 | |

λ HELP

## 5. GENERAL

| | | |
|---|---|---|
| Simulation Time* | 500 | (yr) |
| Modeled Area Width* | 120 | (ft) |
| Modeled Area Length* | 340 | (ft) |
| Zone 1 Length* | 340 | (ft) |
| Zone 2 Length* | 0 | (ft) |




Zone 2= L - Zone 1

## 6. SOURCE DATA

TYPE: Continuous
Single Planar

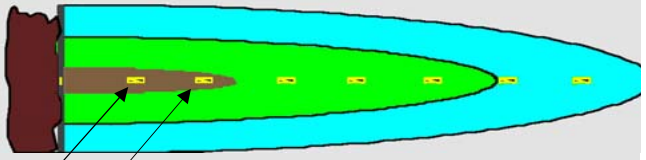
Source Options

Source Thickness in Sat. Zone* 10 (ft)

Width* (ft) Y1 100

| Conc. (mg/L)* | C1 | $k_s$* (1/yr) |
|---|---|---|
| PCE | 3.5 | 0 |
| TCE | .0 | 0 |
| DCE | .0 | 0 |
| VC | .0 | 0 |
| ETH | 0 | 0 |

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations



View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

## 7. FIELD DATA FOR COMPARISON

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PCE Conc. (mg/L) | 3.5 | .12 | .001 | | | | | | | | |
| TCE Conc. (mg/L) | .0 | .0 | .0 | | | | | | | | |
| DCE Conc. (mg/L) | .0 | .0 | .0 | | | | | | | | |
| VC Conc. (mg/L) | 0.0 | .0 | .0 | | | | | | | | |
| ETH Conc. (mg/L) | 0.0 | .0 | .0 | | | | | | | | |
| Distance from Source (ft) | 0 | 120 | 340 | | | | | | | | |
| Date Data Collected | 2015 | | | | | | | | | | |

## 8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | *Help* | Restore | RESET | *SEE* | Paste

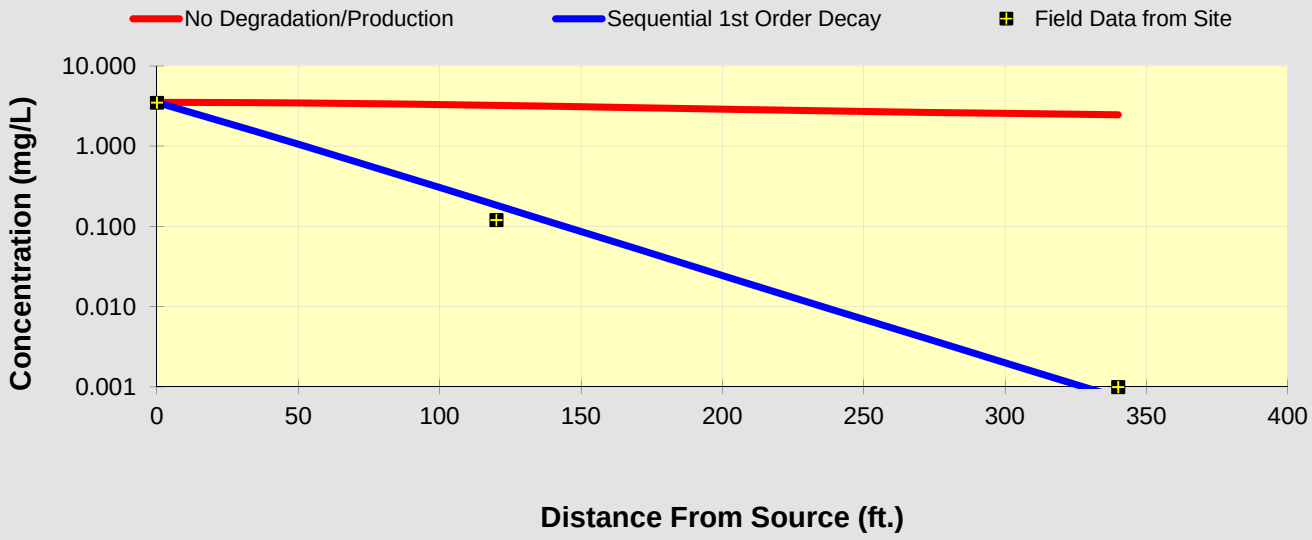
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| 1,1-DCE | 0 | 34 | 68 | 102 | 136 | 170 | 204 | 238 | 272 | 306 | 340 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 3.500 | 3.496 | 3.430 | 3.298 | 3.150 | 3.005 | 2.872 | 2.751 | 2.643 | 2.544 | 2.456 |
| Biotransformation | 3.5000 | 1.554 | 0.678 | 0.290 | 0.123 | 0.052 | 0.022 | 0.009 | 0.004 | 0.002 | 0.001 |

**Monitoring Well Locations (ft)**

| | 0 | 120 | 340 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 3.500 | 0.120 | 0.001 | | | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

500.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

# BIOCHLOR Natural Attenuation Decision Support System

*Version 2.2*
Excel 2000

NWP West Area PCE
Calibration Run
Run Name

**Data Input Instructions:**

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button )
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

## 1. ADVECTION

| | | | |
|---|---|---|---|
| Seepage Velocity* | Vs | 15.5 | (ft/yr) |
| ***or*** | | | |
| Hydraulic Conductivity | K | 7.5E-04 | (cm/sec) |
| Hydraulic Gradient | i | 0.005 | (ft/ft) |
| Effective Porosity | n | 0.25 | (-) |

## 2. DISPERSION

| | | |
|---|---|---|
| Alpha x* | 74.5 | (ft) |
| (Alpha y) / (Alpha x)* | 0.1 | (-) |
| (Alpha z) / (Alpha x)* | 1.E-99 | (-) |

Calc.

## 3. ADSORPTION

Retardation Factor* → R

***or***

| | | | | |
|---|---|---|---|---|
| Soil Bulk Density, rho | 1.7 | (kg/L) | | |
| FractionOrganicCarbon, foc | 1.8E-3 | (-) | | |
| Partition Coefficient | Koc | | | |
| PCE | 426 | (L/kg) | 6.21 | (-) |
| TCE | 130 | (L/kg) | 2.59 | (-) |
| DCE | 125 | (L/kg) | 2.53 | (-) |
| VC | 30 | (L/kg) | 1.36 | (-) |
| ETH | 302 | (L/kg) | 4.70 | (-) |
| **Common R (used in model)* =** | | | **2.59** | |

## 4. BIOTRANSFORMATION

**-1st Order Decay Coefficient***

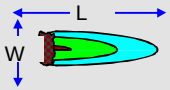
| **Zone 1** | λ (1/yr) | half-life (yrs) | Yield |
|---|---|---|---|
| PCE → TCE | 0.500 | | 0.79 |
| TCE → DCE | 0.550 | | 0.74 |
| DCE → VC | 0.700 | | 0.64 |
| VC → ETH | 0.750 | | 0.45 |

| **Zone 2** | λ (1/yr) | half-life (yrs) |
|---|---|---|
| PCE → TCE | 0.000 | |
| TCE → DCE | 0.000 | |
| DCE → VC | 0.000 | |
| VC → ETH | 0.000 | |

λ HELP

## 5. GENERAL

| | | |
|---|---|---|
| Simulation Time* | 55 | (yr) |
| Modeled Area Width* | 160 | (ft) |
| Modeled Area Length* | 740 | (ft) |
| Zone 1 Length* | 740 | (ft) |
| Zone 2 Length* | 0 | (ft) |




Zone 2= L - Zone 1

## 6. SOURCE DATA

TYPE: Continuous
Single Planar

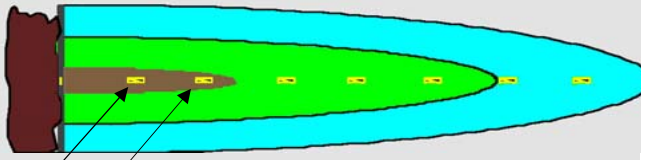
Source Options

Source Thickness in Sat. Zone* 10 (ft)

Y1
Width* (ft) 100

| Conc. (mg/L)* | C1 | $k_s$* (1/yr) |
|---|---|---|
| PCE | 2.1 | 0 |
| TCE | 1.1 | 0 |
| DCE | 1.4 | 0 |
| VC | .083 | 0 |
| ETH | 0 | 0 |

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations



View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

## 7. FIELD DATA FOR COMPARISON

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PCE Conc. (mg/L) | 2.1 | .005 | .002 | .0 | .0 | | | | | | |
| TCE Conc. (mg/L) | 1.1 | .076 | .008 | .001 | .0 | | | | | | |
| DCE Conc. (mg/L) | 1.4 | 3.8 | .018 | .0 | .0 | | | | | | |
| VC Conc. (mg/L) | 0.0 | .2 | .007 | .001 | .0 | | | | | | |
| ETH Conc. (mg/L) | 0.0 | .0 | .0 | .0 | .0 | | | | | | |
| Distance from Source (ft) | 0 | 278 | 443 | 548 | 743 | | | | | | |
| Date Data Collected | 2014 | | | | | | | | | | |

## 8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | Help | Restore | RESET | SEE | Paste

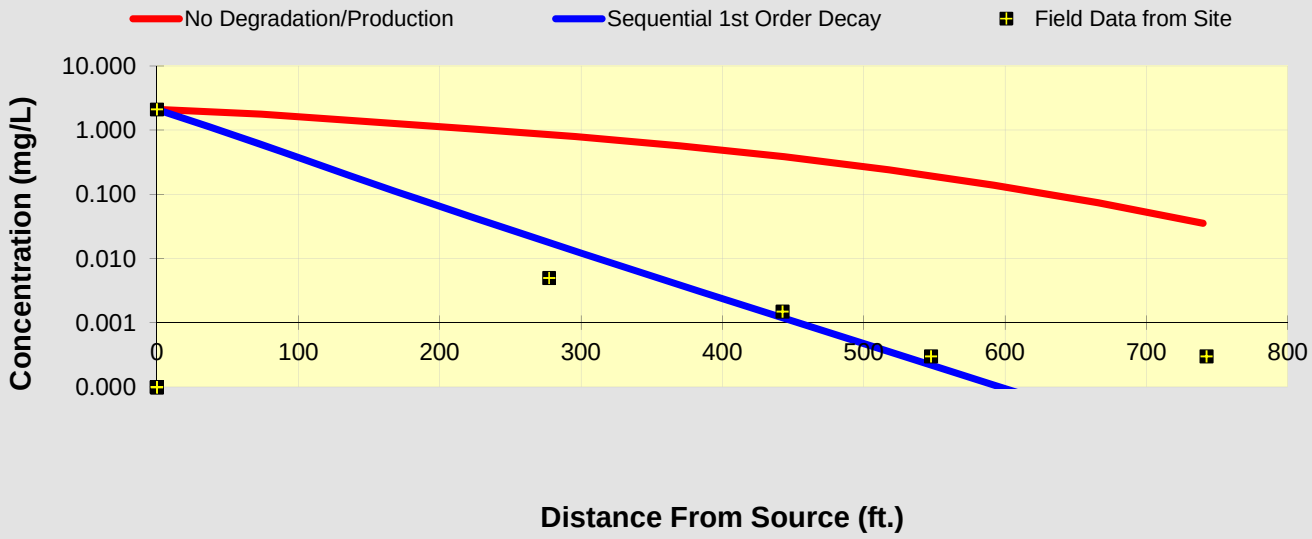
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| PCE | 0 | 74 | 148 | 222 | 296 | 370 | 444 | 518 | 592 | 666 | 740 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 2.100 | 1.765 | 1.358 | 1.050 | 0.791 | 0.568 | 0.383 | 0.240 | 0.139 | 0.074 | 0.036 |
| Biotransformation | 2.1000 | 0.594 | 0.159 | 0.045 | 0.013 | 0.004 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 277.5 | 442.5 | 547.5 | 742.5 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 2.100 | 0.005 | 0.002 | 0.000 | 0.000 | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

55.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

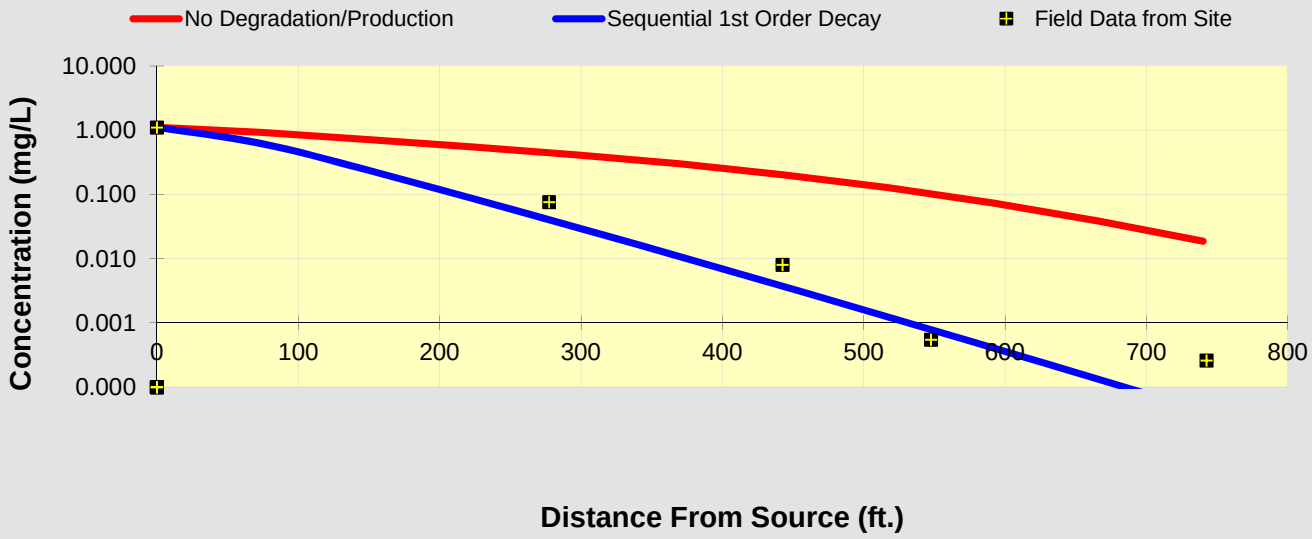
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| TCE | 0 | 74 | 148 | 222 | 296 | 370 | 444 | 518 | 592 | 666 | 740 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 1.100 | 0.924 | 0.712 | 0.550 | 0.414 | 0.298 | 0.201 | 0.126 | 0.073 | 0.039 | 0.019 |
| Biotransformation | 1.1000 | 0.617 | 0.241 | 0.088 | 0.031 | 0.011 | 0.004 | 0.001 | 0.000 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 277.5 | 442.5 | 547.5 | 742.5 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 1.100 | 0.076 | 0.008 | 0.001 | 0.000 | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

55.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

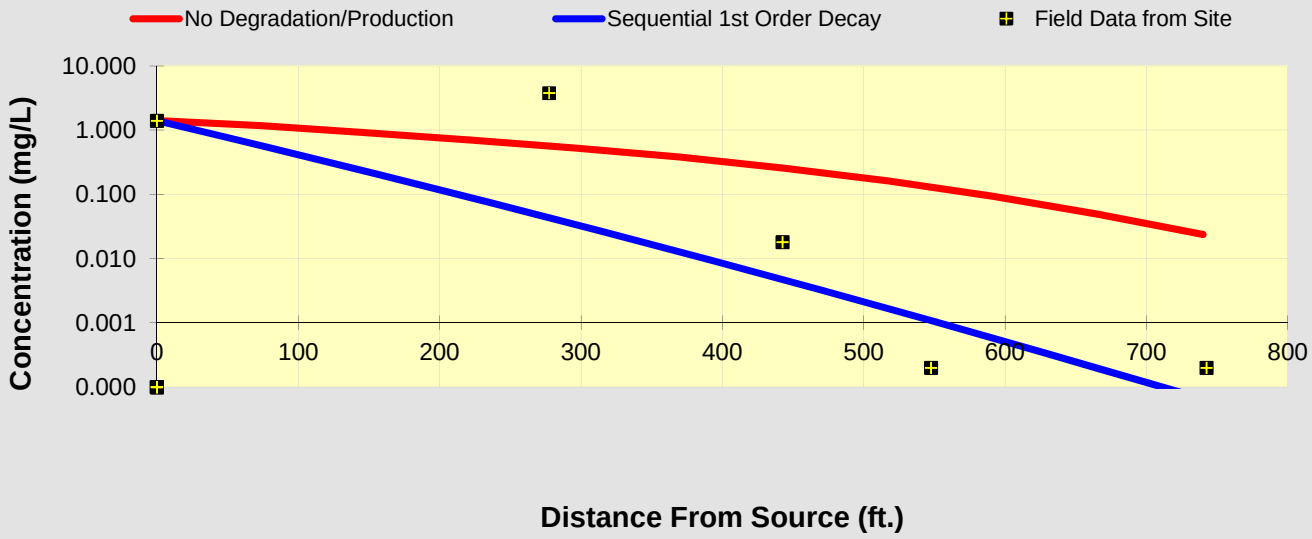
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| DCE | 0 | 74 | 148 | 222 | 296 | 370 | 444 | 518 | 592 | 666 | 740 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 1.400 | 1.176 | 0.906 | 0.700 | 0.527 | 0.379 | 0.256 | 0.160 | 0.093 | 0.049 | 0.024 |
| Biotransformation | 1.4000 | 0.570 | 0.226 | 0.089 | 0.034 | 0.013 | 0.005 | 0.002 | 0.001 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 277.5 | 442.5 | 547.5 | 742.5 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 1.400 | 3.800 | 0.018 | 0.000 | 0.000 | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

55.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

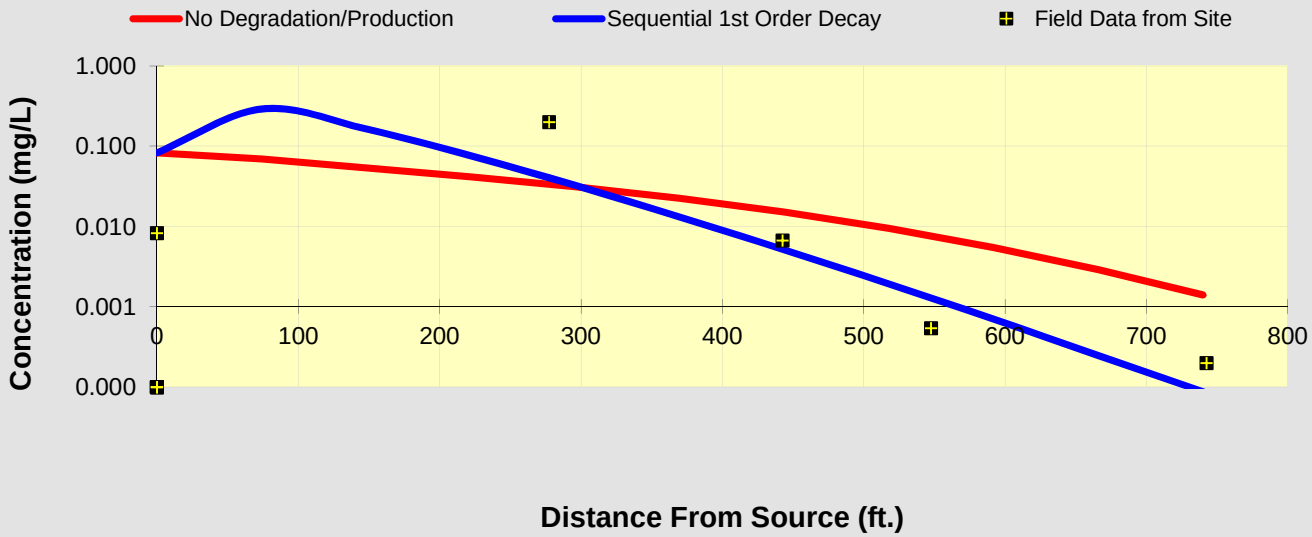
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| VC | 0 | 74 | 148 | 222 | 296 | 370 | 444 | 518 | 592 | 666 | 740 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 0.083 | 0.069 | 0.053 | 0.041 | 0.031 | 0.022 | 0.015 | 0.009 | 0.005 | 0.003 | 0.001 |
| Biotransformation | 0.0826 | 0.290 | 0.164 | 0.076 | 0.032 | 0.013 | 0.005 | 0.002 | 0.001 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 277.5 | 442.5 | 547.5 | 742.5 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 0.008 | 0.200 | 0.007 | 0.001 | 0.000 | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

55.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

# BIOCHLOR Natural Attenuation Decision Support System

*Version 2.2*
Excel 2000

NWP West Area PCE
Prediction Run
Run Name

**Data Input Instructions:**

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button )
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

## 1. ADVECTION

| | | | |
|---|---|---|---|
| Seepage Velocity* | Vs | 15.5 | (ft/yr) |
| ***or*** | | | |
| Hydraulic Conductivity | K | 7.5E-04 | (cm/sec) |
| Hydraulic Gradient | i | 0.005 | (ft/ft) |
| Effective Porosity | n | 0.25 | (-) |

## 2. DISPERSION

| | | |
|---|---|---|
| Alpha x* | 74.5 | (ft) |
| (Alpha y) / (Alpha x)* | 0.1 | (-) |
| (Alpha z) / (Alpha x)* | 1.E-99 | (-) |

Calc.

## 3. ADSORPTION

Retardation Factor* → R

***or***

| | | | | |
|---|---|---|---|---|
| Soil Bulk Density, rho | 1.7 | (kg/L) | | |
| FractionOrganicCarbon, foc | 1.8E-3 | (-) | | |
| Partition Coefficient | Koc | | | |
| PCE | 426 | (L/kg) | 6.21 | (-) |
| TCE | 130 | (L/kg) | 2.59 | (-) |
| DCE | 125 | (L/kg) | 2.53 | (-) |
| VC | 30 | (L/kg) | 1.36 | (-) |
| ETH | 302 | (L/kg) | 4.70 | (-) |
| **Common R (used in model)* =** | | | **2.59** | |

## 4. BIOTRANSFORMATION

**-1st Order Decay Coefficient***

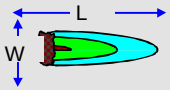
| **Zone 1** | λ (1/yr) | half-life (yrs) | Yield |
|---|---|---|---|
| PCE → TCE | 0.500 | | 0.79 |
| TCE → DCE | 0.550 | | 0.74 |
| DCE → VC | 0.700 | | 0.64 |
| VC → ETH | 0.750 | | 0.45 |

| **Zone 2** | λ (1/yr) | half-life (yrs) |
|---|---|---|
| PCE → TCE | 0.000 | |
| TCE → DCE | 0.000 | |
| DCE → VC | 0.000 | |
| VC → ETH | 0.000 | |

λ HELP

## 5. GENERAL

| | | |
|---|---|---|
| Simulation Time* | 500 | (yr) |
| Modeled Area Width* | 160 | (ft) |
| Modeled Area Length* | 740 | (ft) |
| Zone 1 Length* | 740 | (ft) |
| Zone 2 Length* | 0 | (ft) |




Zone 2= L - Zone 1

## 6. SOURCE DATA

TYPE: Decaying
Single Planar

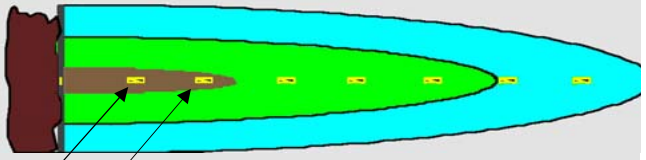
Source Options

Source Thickness in Sat. Zone* 10 (ft)

Width* (ft) Y1 250

| Conc. (mg/L)* | C1 | $k_s$* (1/yr) |
|---|---|---|
| PCE | 2.1 | 0 |
| TCE | 1.1 | 0 |
| DCE | 1.4 | 0 |
| VC | .008 | 0 |
| ETH | 0 | 0 |

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations



View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

## 7. FIELD DATA FOR COMPARISON

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PCE Conc. (mg/L) | 2.1 | .005 | .002 | .0 | .0 | | | | | | |
| TCE Conc. (mg/L) | 1.1 | .076 | .008 | .001 | .0 | | | | | | |
| DCE Conc. (mg/L) | 1.4 | 3.8 | .018 | .0 | .0 | | | | | | |
| VC Conc. (mg/L) | 0.0 | .2 | .007 | .001 | .0 | | | | | | |
| ETH Conc. (mg/L) | 0.0 | .0 | .0 | .0 | .0 | | | | | | |
| Distance from Source (ft) | 0 | 278 | 443 | 548 | 743 | | | | | | |
| Date Data Collected | 2014 | | | | | | | | | | |

## 8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | Help | Restore | RESET | SEE | Paste

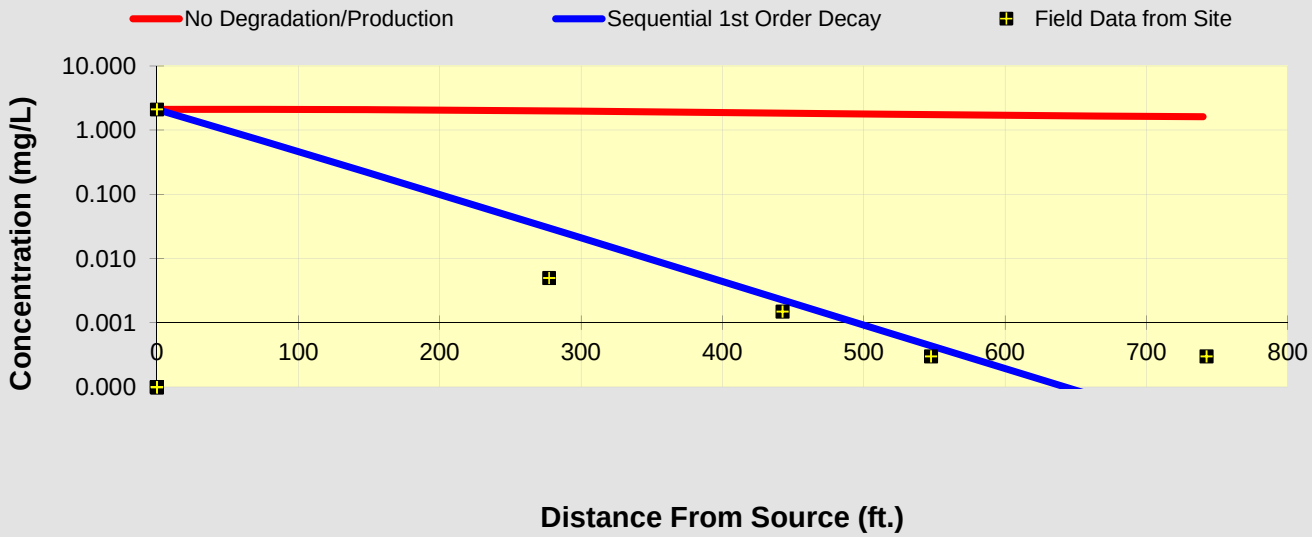
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| PCE | 0 | 74 | 148 | 222 | 296 | 370 | 444 | 518 | 592 | 666 | 740 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 2.100 | 2.100 | 2.084 | 2.037 | 1.974 | 1.906 | 1.839 | 1.775 | 1.715 | 1.660 | 1.608 |
| Biotransformation | 2.1000 | 0.685 | 0.222 | 0.071 | 0.022 | 0.007 | 0.002 | 0.001 | 0.000 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 277.5 | 442.5 | 547.5 | 742.5 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 2.100 | 0.005 | 0.002 | 0.000 | 0.000 | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

500.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

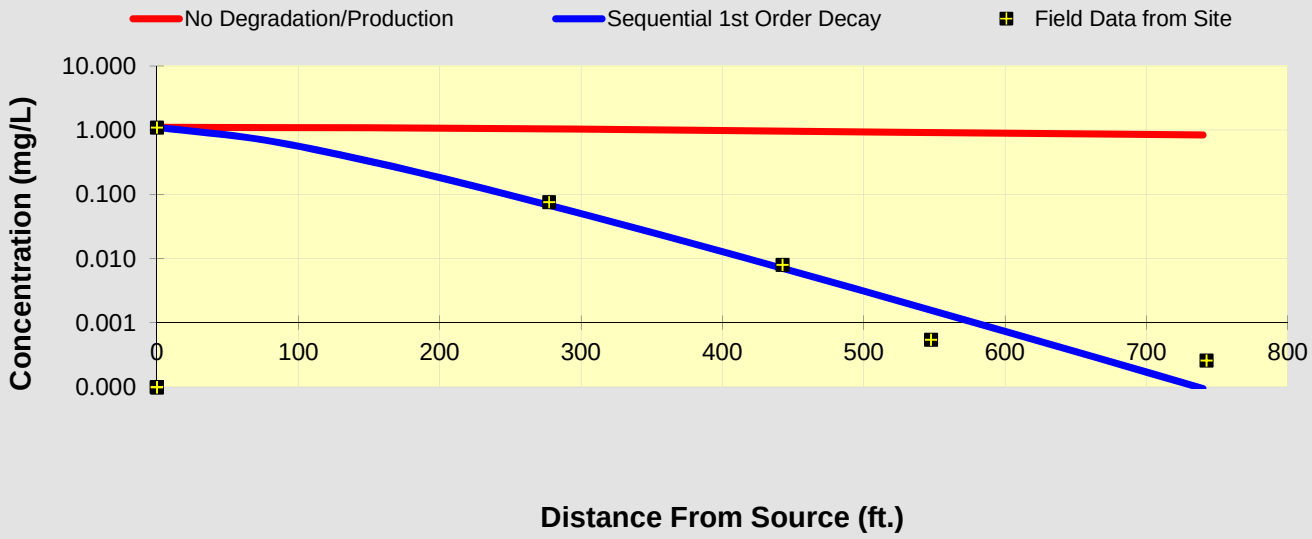
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| TCE | 0 | 74 | 148 | 222 | 296 | 370 | 444 | 518 | 592 | 666 | 740 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 1.100 | 1.100 | 1.091 | 1.067 | 1.034 | 0.998 | 0.963 | 0.930 | 0.898 | 0.869 | 0.843 |
| Biotransformation | 1.1000 | 0.710 | 0.336 | 0.139 | 0.053 | 0.019 | 0.007 | 0.002 | 0.001 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 277.5 | 442.5 | 547.5 | 742.5 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 1.100 | 0.076 | 0.008 | 0.001 | 0.000 | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

500.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

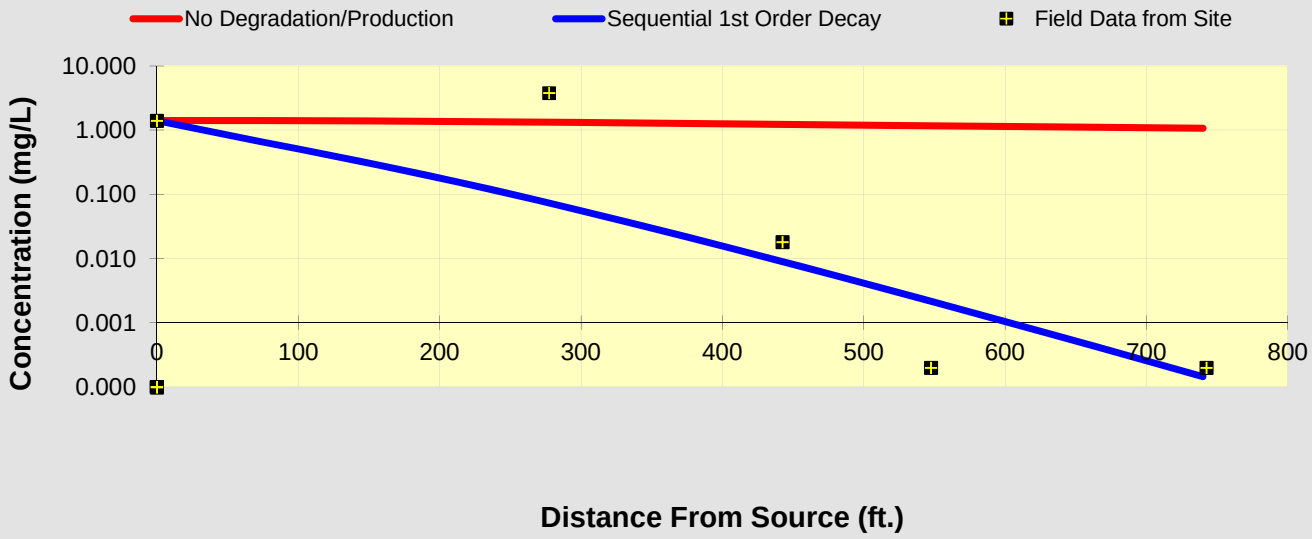
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| DCE | 0 | 74 | 148 | 222 | 296 | 370 | 444 | 518 | 592 | 666 | 740 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 1.400 | 1.400 | 1.389 | 1.358 | 1.316 | 1.271 | 1.226 | 1.183 | 1.143 | 1.107 | 1.072 |
| Biotransformation | 1.4000 | 0.657 | 0.314 | 0.140 | 0.058 | 0.023 | 0.009 | 0.003 | 0.001 | 0.000 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 277.5 | 442.5 | 547.5 | 742.5 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 1.400 | 3.800 | 0.018 | 0.000 | 0.000 | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

500.0 Years

Log ⟺ Linear

Return to Input

To All

To Array

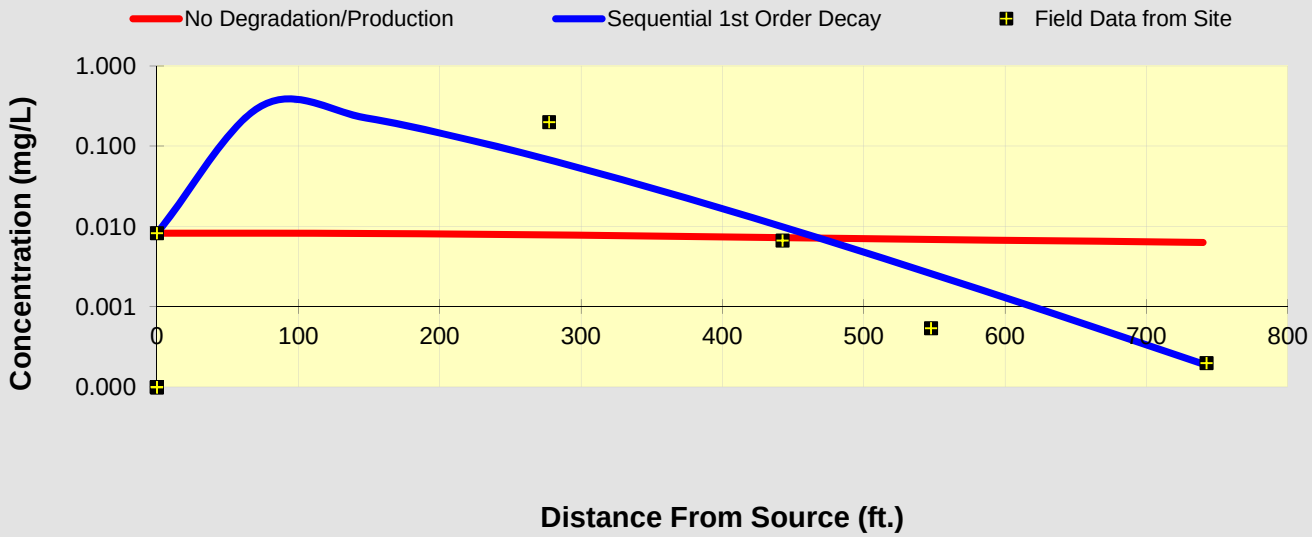
## DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE (mg/L) at Z=0

**Distance from Source (ft)**

| VC | 0 | 74 | 148 | 222 | 296 | 370 | 444 | 518 | 592 | 666 | 740 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Degradation | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.007 | 0.007 | 0.007 | 0.007 | 0.007 | 0.006 |
| Biotransformation | 0.0083 | 0.317 | 0.224 | 0.119 | 0.055 | 0.024 | 0.010 | 0.004 | 0.001 | 0.001 | 0.000 |

**Monitoring Well Locations (ft)**

| | 0 | 277.5 | 442.5 | 547.5 | 742.5 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Data from Site | 0.008 | 0.200 | 0.007 | 0.001 | 0.000 | | | | | | |




See PCE

See TCE

See DCE

See VC

See ETH

Prepare Animation

Time:

500.0 Years

Log ⟺ Linear

Return to Input

To All

To Array