SECOND PERIODIC REVIEW

South Wilbur Petroleum Contamination Site
Wilbur, WA

Cleanup Site ID 1949
Facility/Site ID 7096

January 2019
Washington Department of Ecology
Toxics Cleanup Program
Eastern Regional Office
Spokane, WA

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1.0 INTRODUCTION

This report presents the Washington State Department of Ecology's (Ecology) second periodic review for the South Wilbur Petroleum Contamination Site (Site). This periodic review is required as part of the site cleanup process under the Model Toxics Control Act (MTCA), Ch. 70.105D Revised Code of Washington, implemented by Ecology. Periodic reviews evaluate post-cleanup site conditions and monitoring data to assure human health and the environment are being protected. They are required for sites where an institutional control is part of the cleanup action. The first periodic review was completed in 2012.

Lincoln County conducted cleanup actions at the Site in 2005. These actions addressed contaminated soils, but residual soil and groundwater contamination remains at the Site. Groundwater monitoring has been ongoing since completion of the cleanup action, and institutional controls are in place to ensure the remedy remains protective.

2.0 SUMMARY OF SITE CONDITIONS

2.1 SITE DESCRIPTION AND HISTORY

The Site is located approximately one block south of downtown Wilbur in Lincoln County, Washington (Figure 1). It is comprised of three separate properties: the former Washington State Department of Transportation (WSDOT) Maintenance Facility, the Lincoln County Maintenance Facility, and the former Lincoln Mutual No. 3 fueling station. It is bounded to the north by Goose Creek, to the west by the City Park, to the south by Front Avenue and a railroad yard, and to the east by Brace Street.

WSDOT operated its maintenance facility from the 1930s through the early 1970s, when major maintenance activities moved to Davenport. Major activities included vehicle maintenance, fueling, and storage of road maintenance supplies. Diesel and gasoline were stored in underground storage tanks (USTs). By 1996, all remaining equipment and personnel had been relocated to a different facility, and the Town of Wilbur leased the property for equipment storage. In 2001, the Site was purchased by Lincoln County.

The Lincoln County maintenance facility was in operation from the 1930s through the present. Site activities were similar to the WSDOT facility, including vehicle fueling and maintenance and supply storage. Four USTs were located on the Site storing diesel, gasoline, and waste oil. All of these tanks were decommissioned and removed between 1990 and 1992.

The former Lincoln Mutual No. 3 property was the location of a fueling station, and is estimated from aerial photographs to have operated from the 1950s through the 1980s. The property contained a fueling island, a 1,900 gallon diesel aboveground storage tank, and is inferred from photographs to have had two USTs near the fueling island. Fueling operations were discontinued prior to purchase by the present owners. Currently, the Site building is used as office space and the surrounding land is now paved and used for parking. Figure 2 shows the locations of all properties and approximate locations of petroleum discharges (in areas where tanks were formerly located, listed as "source areas" in the figure).

2.2 PREVIOUS SITE INVESTIGATIONS

A series of investigations have taken place to aid in determining the type, amount, extent, and source of the petroleum hydrocarbon contamination. Reports documenting these investigations can be found at Ecology's Eastern Regional Office in Spokane.

In 1990, three USTs on the Lincoln County maintenance facility property were decommissioned. It is not known if there were releases related to these tanks. In 1992, one more UST was removed. Soil samples collected from the excavation showed diesel and benzene, toluene, ethylbenzene, and xylene (BTEX) compounds were not present above cleanup levels.

The WSDOT property was first investigated in June 1991, when soil contamination was discovered during the removal of two USTs. It was also noted in a June 1992 WSDOT investigation that a sump in the shop building was full of oily water.

In 1995, the Lincoln County Highway Department completed a limited Phase II Investigation on four Lincoln County maintenance facility properties, including the one in Wilbur. Results for the Site showed no petroleum contamination adjacent to and just below the asphalt wash pads, to a depth of one foot below ground surface (bgs).

In February 1995, a Phase I and Phase II Environmental Site Assessment was completed for the WSDOT property to determine potential sources and possible extent of contamination at the Site. A drywell was excavated in October of 1996 and the majority of contaminated soil was removed; however, gasoline contamination was still present in the bottom and north wall of the excavation.

In July 1996, the WSDOT performed a soil and groundwater investigation. Four monitoring wells were installed on-site and soil and groundwater samples were collected. Results indicated soil was contaminated with gasoline to a depth of around 15 feet bgs, and groundwater had concentrations of gasoline and BTEX exceeding cleanup levels.

WSDOT completed a second site characterization in May 1997 to investigate the extent of petroleum contamination beyond their property. Three additional wells were installed on the Lincoln County property, and soil and groundwater samples were again collected. Results showed soil exceedances for gasoline, benzene, and xylene; groundwater showed levels of gasoline, BTEX, and diesel exceeding cleanup levels. A third investigation was undertaken by WSDOT because the plume appeared to be larger than originally thought. A direct-push sampling rig was used to investigate areas upgradient of both properties. Groundwater and soil results again showed soil contaminated with gasoline and xylene, and groundwater contaminated with gasoline, benzene, toluene, and xylene. Impacted areas were located to the southeast and east of the Site.

In 1999, Ecology completed a limited site investigation of the WSDOT property, the Lincoln County property, and the former Lincoln Mutual No. 3 property, which lies upgradient of the two maintenance facilities. Soil samples were collected upgradient of both maintenance facilities to help characterize other potential sources. Soil sampling showed gasoline contamination and

groundwater samples had concentrations of gasoline, diesel, and BTEX exceeding cleanup levels on all three properties.

In 2001, Lincoln County completed the Remedial Investigation/Feasibility Study (RI/FS). The RI/FS further evaluated the nature and extent of soil and groundwater contamination at all three properties comprising the Site. Results showed soil and groundwater contamination with gasoline, diesel, and BTEX at concentrations exceeding cleanup levels. Surface water and sediment samples did not show contamination by any of the petroleum-related compounds. Results indicated potential source areas located near former USTs. These areas are shown in gray on Figure 2.

2.5 Remedial Actions

Remedial actions were completed under the Cleanup Action Plan (CAP) for the Site, and under Consent Decree #05-2-00143-8 between Ecology and Lincoln County. The selected remedy involved the removal of approximately 2,182 tons of petroleum-contaminated soil from three source areas in 2005. The first area was to the north and west of the Lincoln County Garage building, the second was in the area of former fuel dispensers on the Lincoln Mutual No. 3 property, and the third was to the east of the fuel dispensers (shown in Figures 1 and 3). This represents all accessible contaminated soil at the Site. Once contaminated soil was removed, a slurry of oxygen-releasing compound was mixed with clean backfill and emplaced into each excavation and along the downgradient edge of the property. The oxygen-releasing compound was placed at depths designed to interact with the upper surface of groundwater where residual petroleum was present. This barrier was intended to interact with and help remediate residual contaminated groundwater that had already moved past the excavation treatment zones and prevent it from leaving the Site.

A phytoremediation barrier consisting of willow trees was also installed at the downgradient boundary of the three contaminated properties. The trees were intended to provide additional protection of downgradient groundwater and surface water by intercepting contaminated groundwater before it left the Site. Figure 3 shows the locations of all remedial actions.

Institutional controls were also placed on all three properties to minimize the potential for exposure to remaining contamination. Controls included fencing to limit Site access, and deed restrictions to restrict activities that may interfere with the integrity of the cleanup action or cause an exposure to contamination.

The cleanup action required quarterly monitoring of all twelve monitoring wells at the Site. Samples were collected for all Site indicators, which included gasoline, diesel, and BTEX. Additionally, parameters designed to track the biological breakdown of contaminants were measured, including dissolved oxygen, nitrate, ferrous iron, and sulfate.

Based on recommendations of the previous periodic review, Lincoln County performed an evaluation of newer technologies that would be applicable in low permeability environments. That evaluation resulted in the pilot testing of a lance injection technology using chemical and

biological oxidants to increase contaminant degradation in 2013. This technology was able to access contaminated soils below building foundations.

Additionally, several changes were made to the Compliance Monitoring Plan for the site, based on requests from Lincoln County beginning in spring 2016:

- Sampling will occur annually instead of quarterly, in the spring
- Cleanup levels have been met at wells MW7, MW8, MW11, and MW12. These wells had at least four consecutive monitoring events without exceedances for site contaminants. These wells will no longer be sampled.

3.0 PERIODIC REVIEW

3.1 REGULATION

Under Washington Administrative Code (WAC) 173-340-420, a periodic review of the cleanup action takes place at least every five years after the initiation of the cleanup action. A periodic review is required at sites where any of the following occur:

- The department conducts a cleanup action.
- The department approves a cleanup action under an order, agreed order, or consent decree.
- As resources permit, whenever the department issues a no further action opinion.

AND one of the following conditions exists:

- An institutional control and/or financial assurance is required as part of the cleanup action.
- Cleanup level is based on a practical quantitation limit as provided for in WAC 173-340-707.
- Modifications to the default equations or assumptions using site-specific information would significantly increase the concentration of hazardous substances remaining at the site after cleanup or the uncertainty in the ecological evaluation or the reliability of the cleanup action is such that additional review is necessary to assure long-term protection of human health and the environment.

Because the cleanup action was performed under a consent decree and institutional controls are required, the site is subject to periodic reviews at a frequency of no less than every five years.

3.2 BASIS

This review is based on documents describing the actions listed in Section 2.5. These include periodic groundwater compliance monitoring reports submitted quarterly and annually from 2012 through 2018.

3.3 EFFECTIVENESS OF COMPLETED CLEANUP ACTIONS

All accessible contaminated soils were removed from the Site. Due to the low permeability of Site soils, limited options to remediate contaminated groundwater were available at the time of the remedial action. Since the sources of petroleum contamination were near buildings, it was expected that some amount of contamination remains under the buildings. This soil was not able

to be excavated, yet remains as a potential ongoing source of contamination to groundwater. The pilot test in 2013 likely had an impact on those soils, but did not fully remediate them. The effectiveness of the oxygen-releasing compound and phytoremediation barrier was limited, and has been documented in previous periodic reviews.

Institutional controls at the Site include access restrictions and a restrictive covenant. Fencing is regularly checked and maintained. Restrictive covenants for all three properties, which limit the uses of the Site, were recorded with the County Assessor's office and are in place. These institutional controls have proven effective in reducing exposure and protecting the integrity of the remedy.

Groundwater contaminant concentrations were monitored quarterly from September 2006 through December 2015 at all site wells. Beginning in 2016, monitoring occurs annually at wells MW-1, MW-2, MW-3, MW-4, MW-6, MW-9, and MW-10. Although MW-9 has had no exceedances of any site contaminants, it remains in the sampling program as the only well to measure background concentrations. Diesel hasn't had exceedances since 2015, and toluene has remained below cleanup levels. Therefore, an analysis of contaminant trends will only be performed on wells MW-1 through MW-4, MW-6, and MW-10, and for all contaminants except diesel and toluene. Table 1 shows the concentration data, and figures 4 through 9 show concentration trends at all monitoring wells. Table 2 shows the cleanup levels for groundwater at the Site. These cleanup levels are based on Method A for unrestricted use.

Mann-Kendall statistical tests were performed on wells MW-1, MW-2, MW-3, MW-4, MW-6, and MW-10 for the contaminants exceeding cleanup levels. Table 3 shows the results of the analysis. Positive Kendall tau values indicate increasing trends, and negative Kendall tau values indicate decreasing trends. The greater the positive or negative value is, the stronger the trend is.

MW-2 and MW-6 have the highest contaminant concentrations, with MW-4 showing high gasoline concentrations. MW-2 shows strongly decreasing trends for every contaminant, likely due to this well's location immediately downgradient of the excavation and treatment areas. In the previous periodic review, MW-6 showed primarily increasing trends, but now shows decreasing trends for all contaminants. This is likely due to the injection of treatment chemicals in 2013. MW-1 previously had decreasing trends, but now trends are increasing for both gasoline and benzene. MW-10 shows increasing trends for gasoline, but remains below cleanup levels for all other contaminants.

The selected cleanup action was estimated to have a reasonable restoration time frame of 3 years. Improvements in groundwater quality have occurred, but since groundwater still exceeds cleanup levels, that time frame has not been achieved. This indicates that the cleanup action as originally designed has not been entirely successful, but concentration decreases and increases are reasonable and expected given the subsurface environment.

3.4 New scientific information for individual hazardous substances or mixtures present at the Site

No new scientific information is available for gasoline, diesel, or BTEX.

3.5 New applicable state and federal laws for hazardous substances present at the Site

MTCA has been amended since the CAP was written. In 2007, updates were made to the way cleanup levels were calculated for certain mixtures of chemicals. However, no changes impacted the chemicals at this Site. No new federal or state laws would affect any contaminants at the Site.

3.6 Current and projected Site and resource uses

Lincoln County still owns both the County Maintenance facility and the former WSDOT maintenance facility. Both are used for the storage, maintenance, and repair of county vehicles. The use has not changed since the remedy and is not expected to change. Upgrades have been made to the facility such as paving maintenance areas and adding connections to storm sewers.

The former Lincoln Mutual No. 3 property use also has not changed since the remedy. The building is currently used for storage, and is not expected to change.

Groundwater under the Site is not currently used as a drinking water supply, and is not expected to change.

3.7 Availability and practicability of more permanent remedies

A "permanent" cleanup action is defined in MTCA as a cleanup action in which cleanup standards can be met without further action being required. Soil removal was performed as a part of the remedy because it was determined to be a permanent cleanup action.

No permanent remedies were available for groundwater due to the low permeability of the soil. However, some remedies are considered more permanent than others. At the time of the remedial action, oxygen-releasing compound was the most appropriate technology to encourage bioremediation of chemicals in groundwater but monitoring indicates the oxygen releasing compound is no longer effective. Additional technologies were evaluated, and lance injection of chemical and biological oxidants was determined to be practicable and was implemented. However, its effectiveness is still limited by the soil permeability.

3.8 Availability of improved analytical techniques

No improved analytical techniques are available.

4.0 Conclusions

Ecology has determined the remedy at the South Wilbur Petroleum Contamination Site is generally protective of human health and the environment. Contaminant degradation is still limited primarily due to the low soil permeability and thus the slow rate of biodegradation. Continued groundwater monitoring will measure groundwater impacts and trends. Despite increases in contaminant concentrations and exceedances of cleanup levels, institutional controls

in the form of deed restrictions remain effective in preventing exposure to contamination. Further periodic reviews will be required as long as institutional controls are in place at the Site, in accordance with WAC 173-340-420(7).

5.0 REFERENCES CITED

CH2MHill, 2002, *Lincoln County Remedial Investigation/Feasibility Study Report, South Wilbur Petroleum Contamination Site.*

GeoEngineers, 2006, *Cleanup Action Report, South Wilbur Petroleum Contamination Site.*

Washington State Department of Ecology, 2007, *Model Toxics Cleanup Act Regulation Chapter 173-340 WAC.*

FIGURES

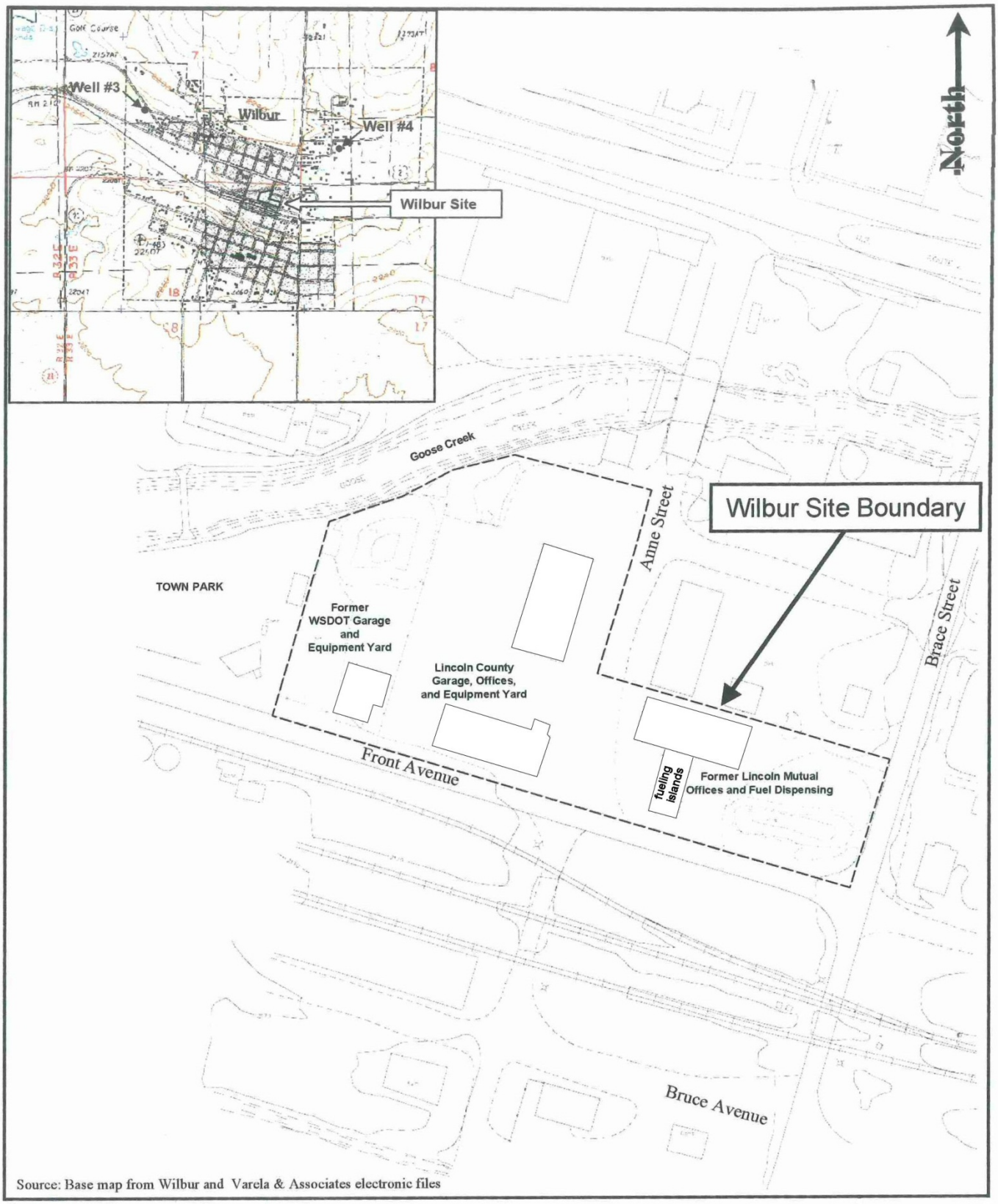

Figure 1. Site Location & Layout (modified from CH2MHill 2002)

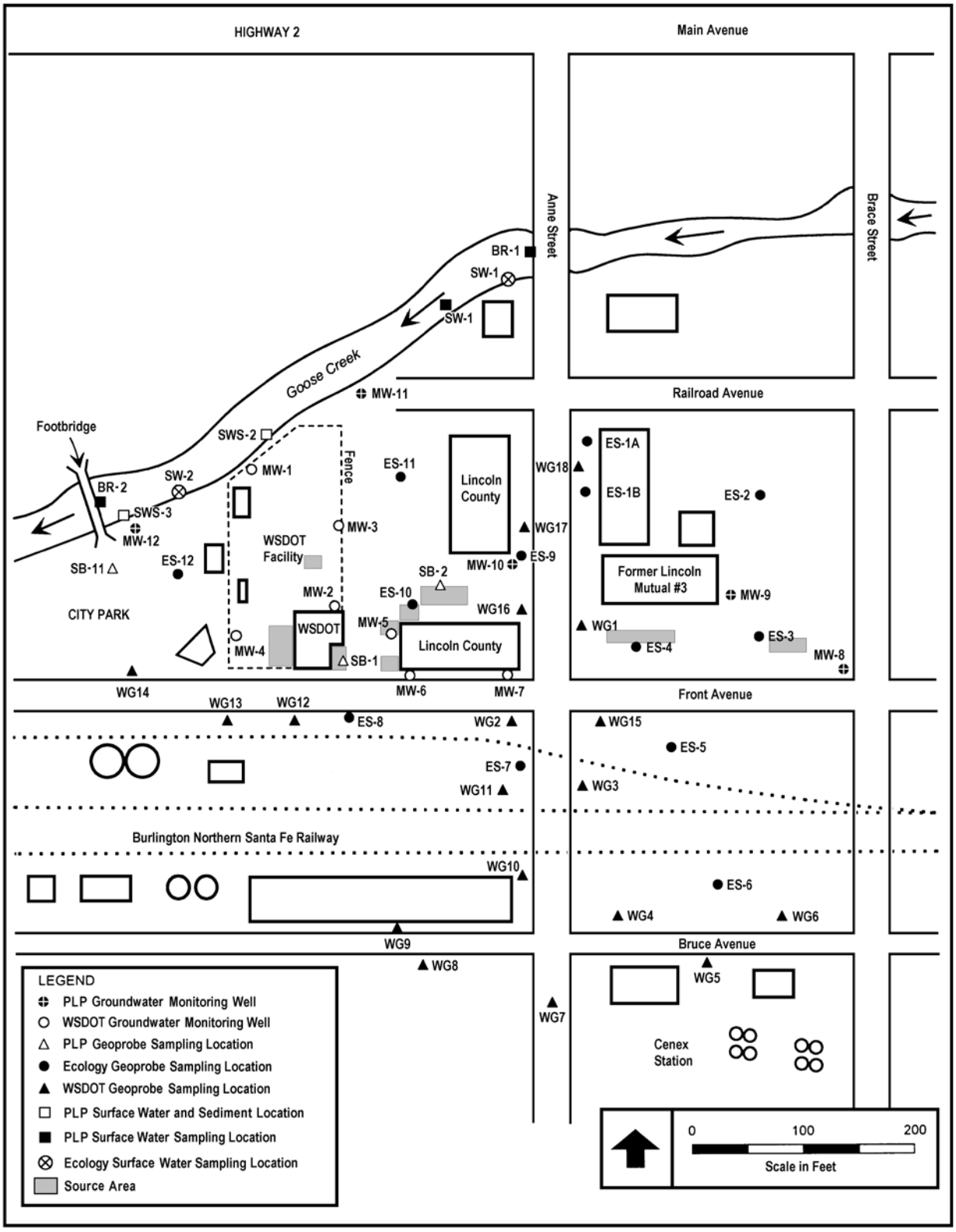

Figure 2. Investigation Locations & Source Areas (CH2MHill 2002)

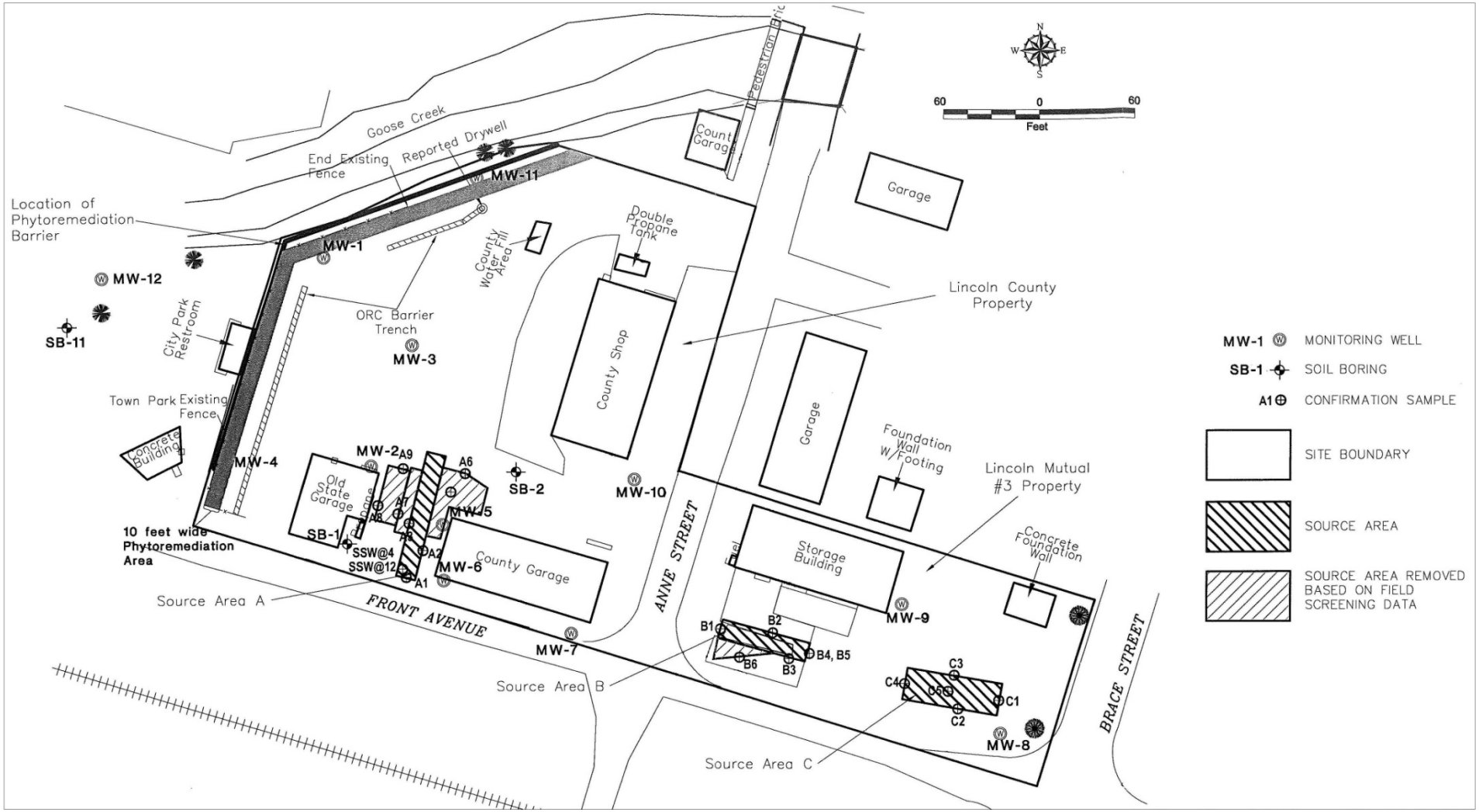

Figure 3. Locations of Remedial Actions (modified from GeoEngineers 2006)

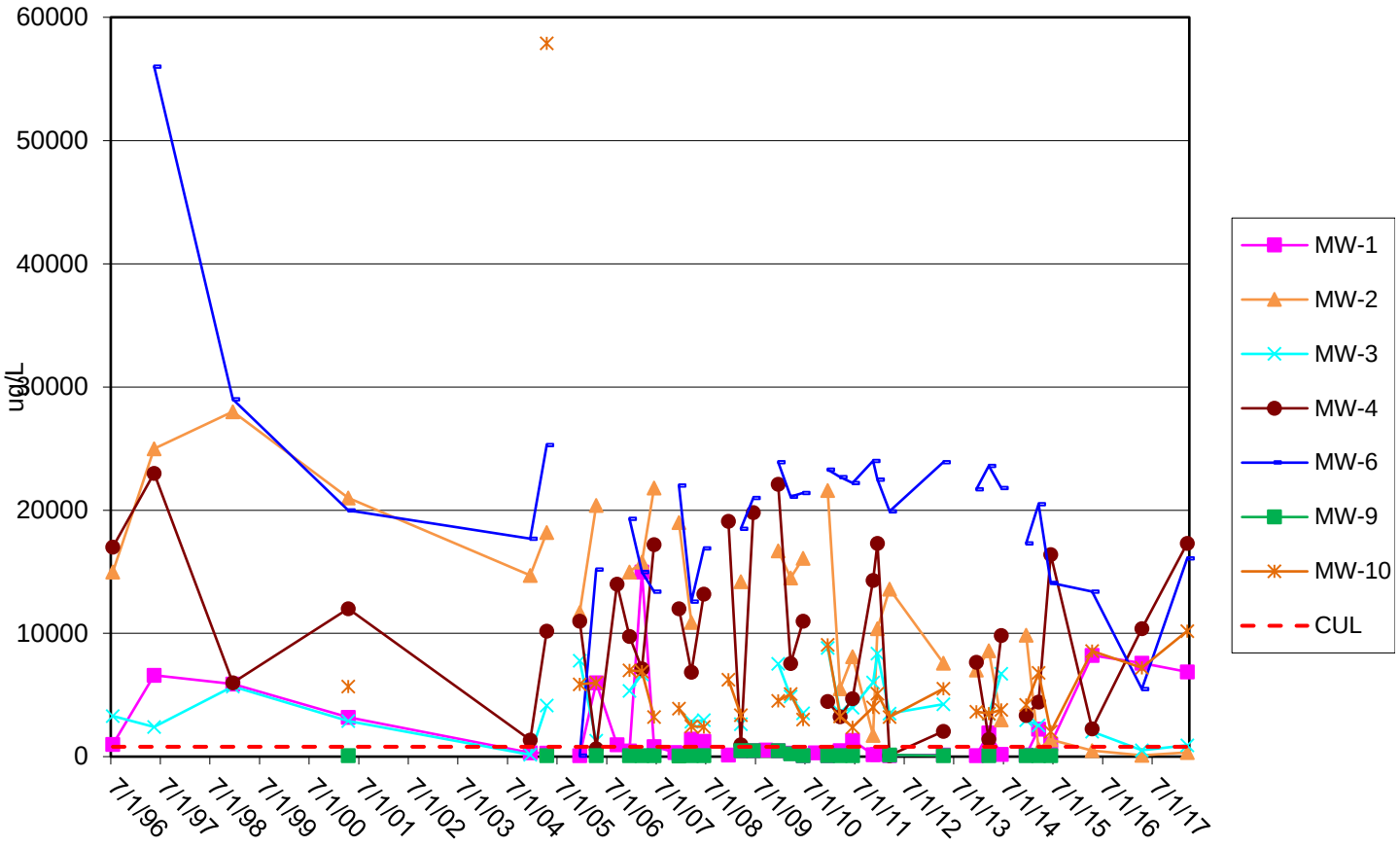

Figure 4. Gasoline Concentrations

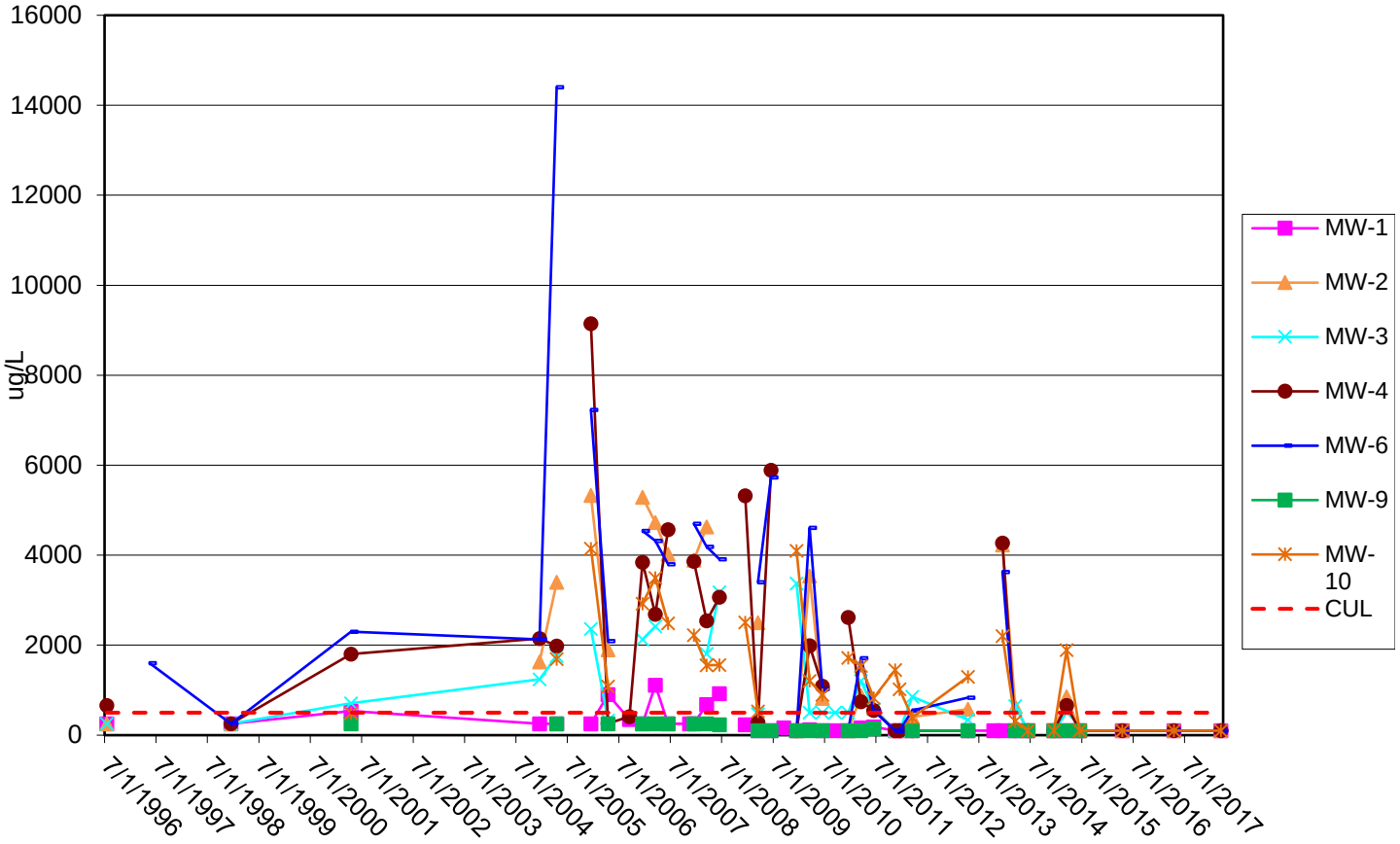

Figure 5. Diesel Concentrations

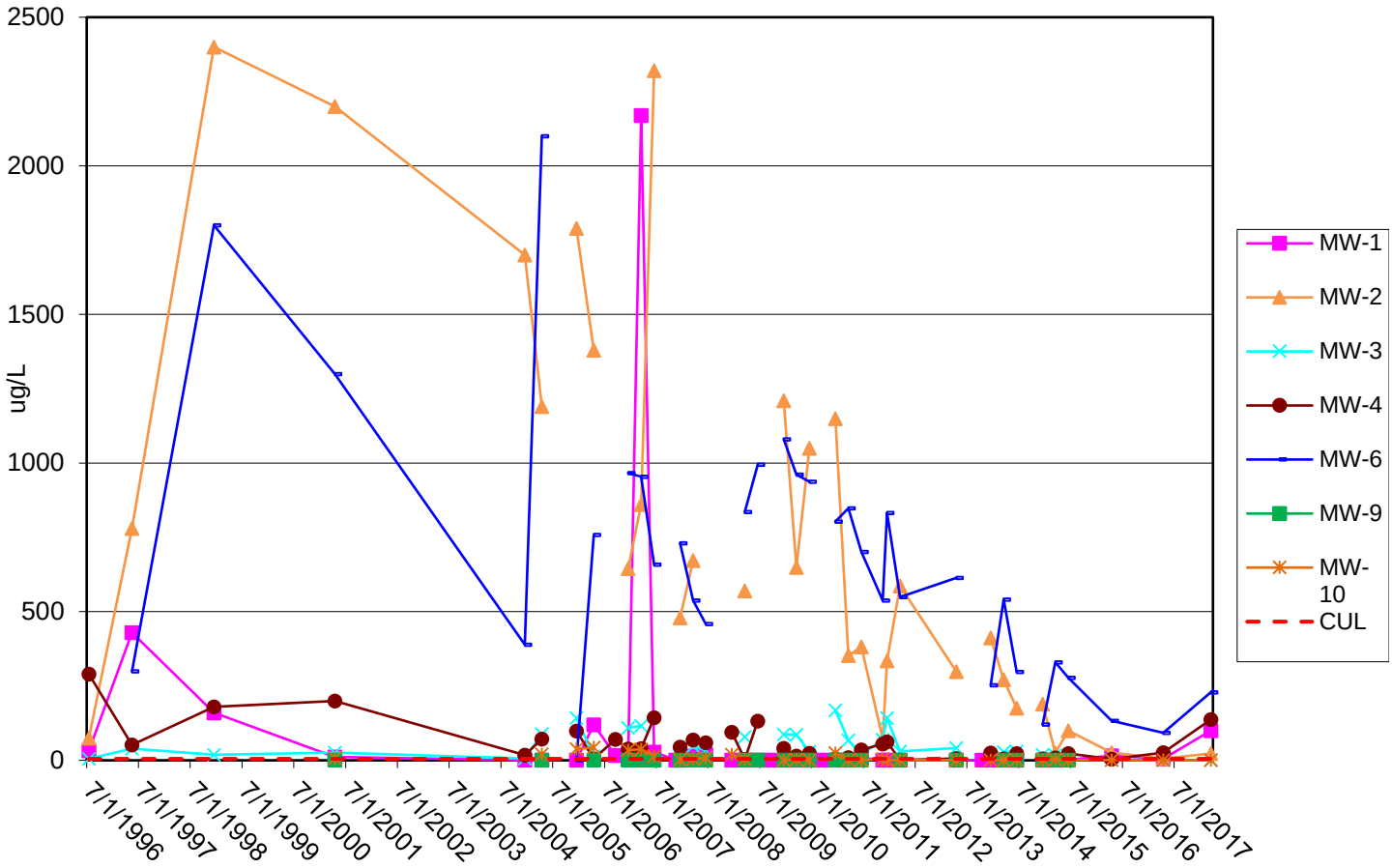

Figure 6. Benzene Concentrations

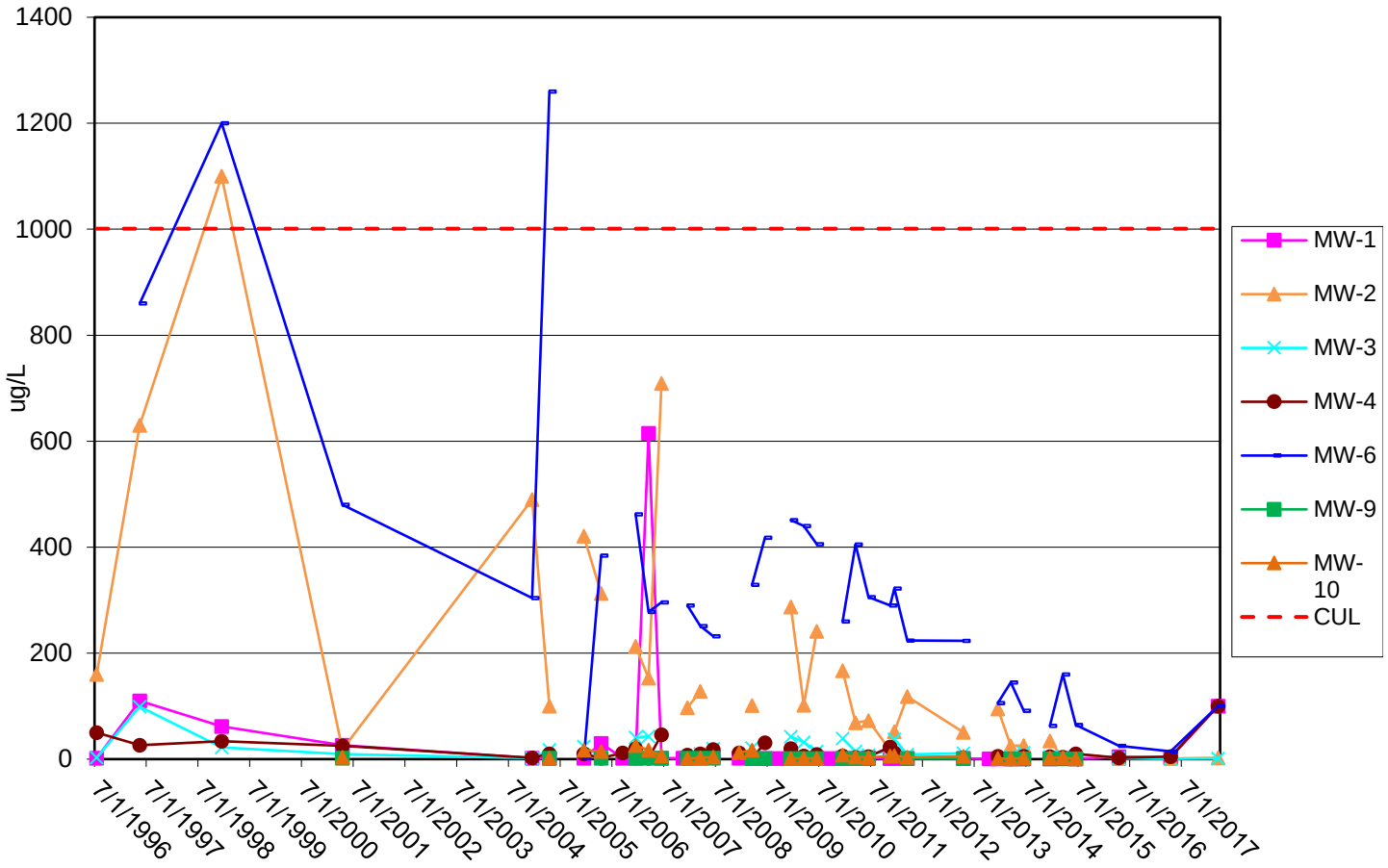

Figure 7. Toluene Concentrations

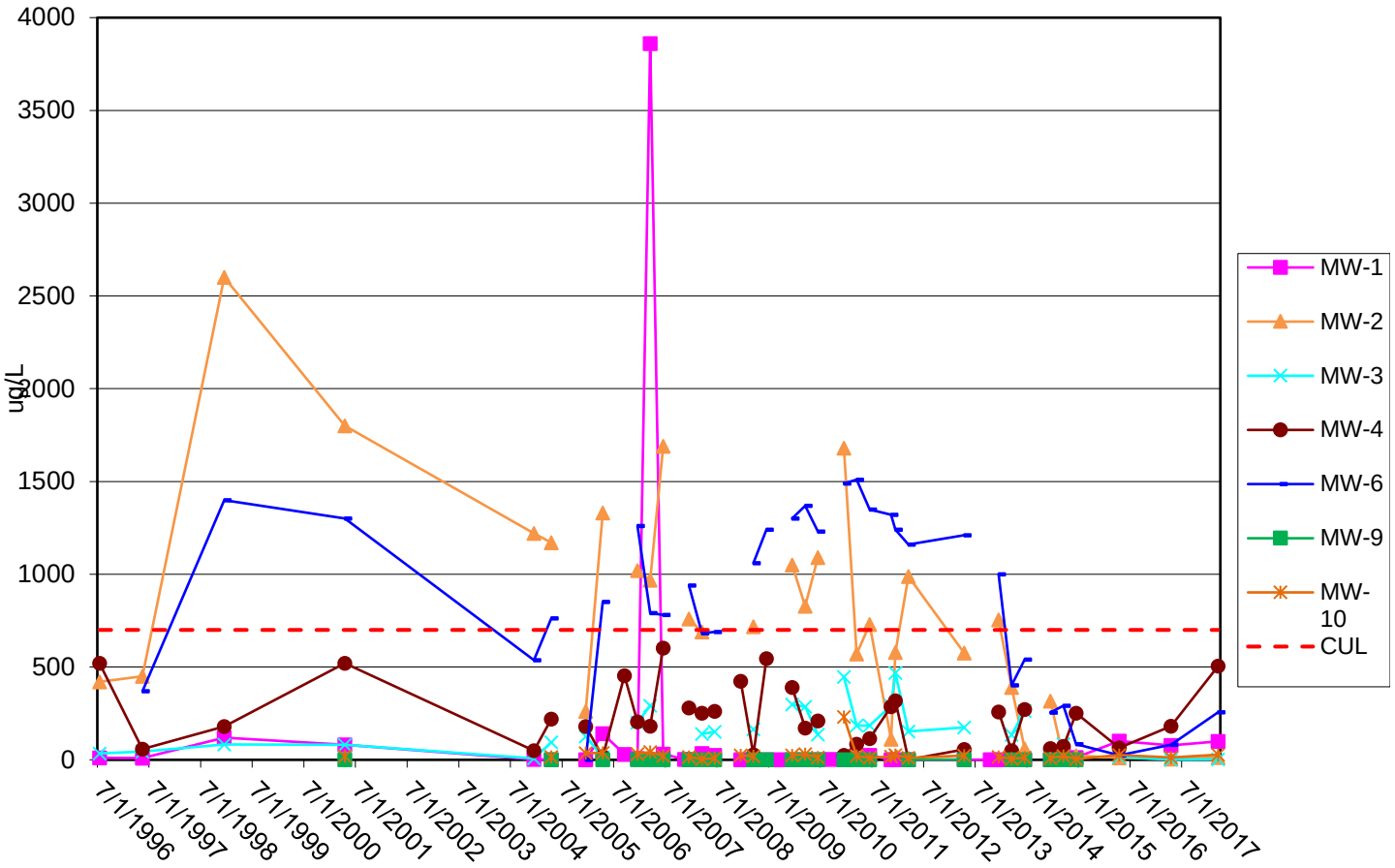

Figure 8. Ethylbenzene Concentrations

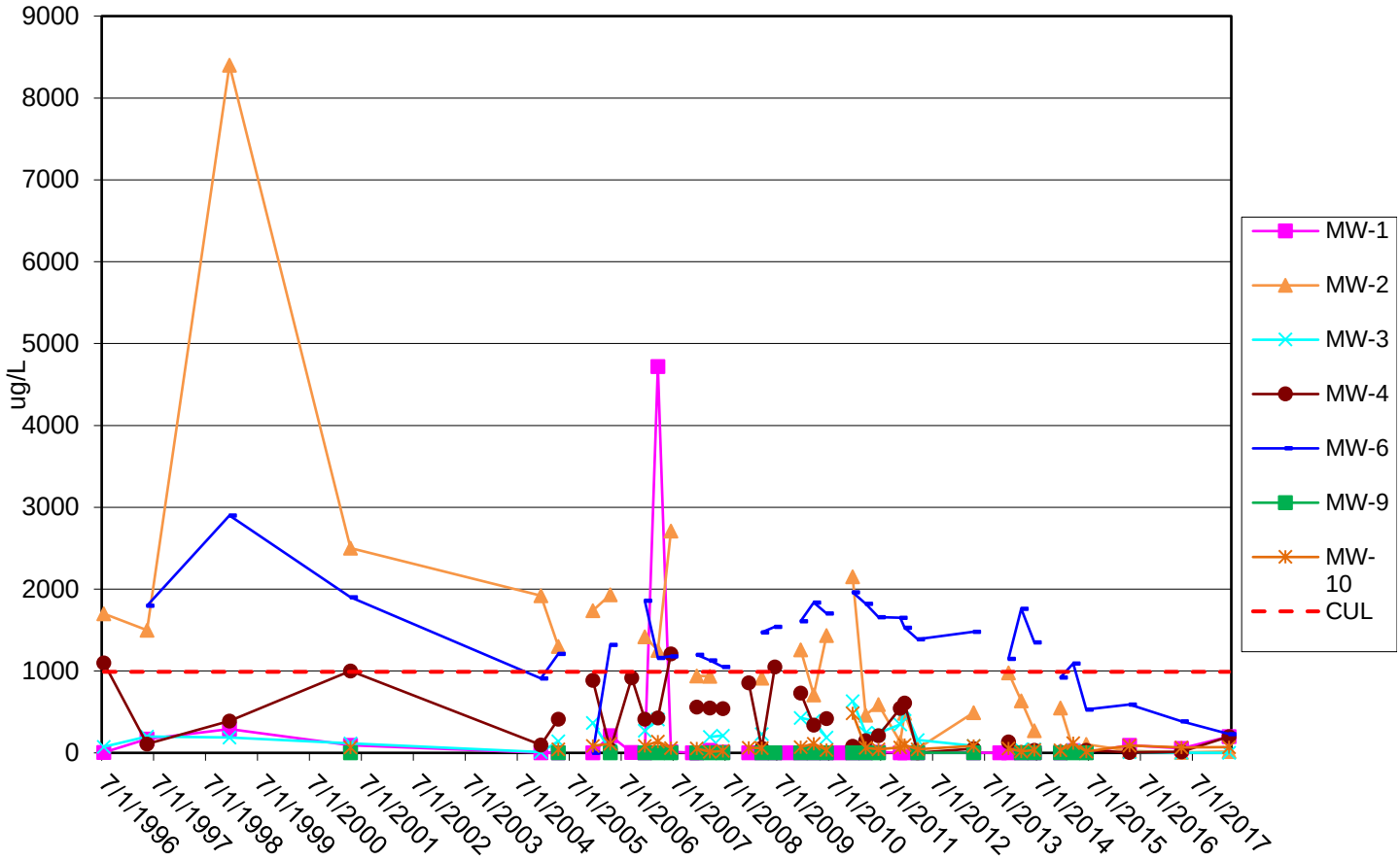

Figure 9. Xylene Concentrations

TABLES

Table 1. Contaminant Concentrations

	Date	MW-1	MW-2	MW-3	MW-4	MW-6	MW-9	MW-10
Gasoline	9/29/06	***963***	--	--	***14,000***	--	--	--
(µg/L)	12/19/06	478	***15,000***	***5350***	***9770***	***19,300***	ND	***7010***
	3/19/07	***15,000***	***15,800***	***6670***	***7140***	***15,000***	ND	***6900***
	6/26/07	***819***	***21,800***	--	***17,200***	***13,400***	ND	***3220***
	11/2/07	333	--	--	--	--	--	--
	12/12/07	ND	***19,000***	--	***12,000***	***22,000***	ND	***3900***
	3/27/08	***1430***	***10,900***	***2840***	***6850***	***12,600***	ND	***2450***
	6/4/08	***1240***	--	***2970***	***13,200***	***16,900***	ND	***2410***
	9/12/08	--	--	--	--	--	--	--
	12/3/08	132	--	--	***19,100***	--	--	***6240***
	3/25/09	ND	***14,200***	***2630***	***981***	***18,500***	ND	***3370***
	6/26/09	ND	--	--	***19,800***	***21,000***	ND	--
	9/29/09	535	--	--	--	--	--	--
	12/10/09	ND	***16,700***	***7550***	***22,100***	***23,900***	ND	***4540***
	3/24/10	301	***14,500***	***4880***	***7560***	***21,100***	ND	***5100***
	6/17/10	ND	***16,100***	***3510***	***11,000***	***21,400***	ND	***3020***
	9/14/10	314	--	--	--	--	--	--
	12/7/10	ND	***21,600***	***8820***	***4470***	***23,300***	ND	***9090***
	3/24/11	483	***5510***	***3600***	***3250***	***22,700***	ND	***3260***
	6/21/11	1320	***8130***	***3980***	***4700***	***22,200***	ND	***2380***
	11/22/11	176	***1730***	***6030***	***14,300***	***24,000***	--	***4000***
	12/28/11	185	***10,400***	***8380***	***17,300***	***22,500***	--	***5120***
	3/26/12	ND	***13,600***	***3500***	100	***19,900***	132	***3230***
	4/1/13	128	***7580***	***4260***	***2050***	***23,900***	ND	***5520***
	10/16/13	--	--	--	--	--	--	--
	12/17/13	ND	***7040***	--	***7670***	***21,700***	--	***3650***
	3/17/14	***1930***	***8610***	***3470***	***1400***	***23,600***	ND	***3490***
	6/4/14	195	***3000***	***6740***	***9840***	***21,800***		***3800***
	9/22/14	--	--	--	--	--	--	--
	12/15/14	126	***9850***	***2960***	***3350***	***17,300***	ND	***4210***
	3/18/15	***2230***	612	***2540***	***4430***	***20,500***	ND	***6810***
	6/9/15	***1030***	***1380***	--	***16,400***	***14,100***	ND	***2020***
	4/13/16	***8220***	500	***2030***	***2250***	***13,400***	ND	***8570***
	4/19/17	***7580***	102	518	***10,400***	***5480***	ND	***7220***
	3/14/18	***6890***	340	***926***	***17,300***	***16,100***	ND	***10,200***
Diesel	9/29/06	349	--	--	***411***	--	--	--
(µg/L)	12/19/06	ND	***5290***	***2130***	***3840***	***4540***	ND	***2920***
	3/19/07	***1114***	***4730***	***2420***	***2690***	***4320***	ND	***3500***
	6/26/07	ND	***4020***	--	***4570***	***3800***	ND	***2490***
	11/2/07	ND	--	--	--	--	--	--
	12/12/07	ND	***3890***	--	***3860***	***4700***	ND	***2222***
	3/27/08	***680***	***4630***	***1810***	***2540***	***4190***	ND	***1550***
	6/4/08	***921***	--	***3180***	***3070***	***3910***	236	***1560***
	9/12/08	--	--	--	--	--	--	--
	12/3/08	236	--	--	***5320***	--	--	***2510***
	3/25/09	ND	***2500***	471	280	***3400***	ND	***533***

	6/26/09	ND	--	--	***5890***	***5730***	ND	--
	9/29/09	164	--	--	--	--	--	--
	12/10/09	ND	ND	***3370***	ND	ND	ND	***4100***
	3/24/10	119	***3540***	ND	***1990***	***4610***	ND	***1210***
	6/17/10	ND	***823***	ND	***1090***	***1030***	ND	***897***
	9/14/10	ND	--	ND	--	--	--	--
	12/7/10	ND	ND	ND	***2620***	ND	ND	***1720***
	3/24/11	161	***881***	***1210***	***746***	***1710***	ND	***1540***
	6/21/11	182	***616***	***581***	***552***	***541***	145	***829***
	11/22/11	ND	ND	ND	ND	ND	--	***1450***
	12/28/11	ND	ND	ND	ND	ND	--	***1020***
	3/26/12	ND	408	***855***	ND	***554***	ND	394
	4/1/13	ND	***577***	***344***	ND	***831***	ND	***1300***
	10/16/13	ND	--	--	--	--	--	--
	12/17/13	ND	***4230***	--	***4270***	***3630***	--	***2200***
	3/17/14	ND	***634***	***646***	ND	ND	ND	311
	6/4/14	ND	ND	ND	ND	ND	ND	ND
	9/22/14	--	--	--	--	--	--	--
	12/15/14	ND	ND	ND	ND	ND	ND	ND
	3/18/15	ND	***857***	***504***	***664***	ND	ND	***1890***
	6/9/15	ND	ND	--	ND	ND	ND	ND
	4/13/16	ND	ND	ND	ND	ND	ND	ND
	4/19/17	ND	ND	ND	ND	ND	ND	ND
	3/14/18	ND	ND	ND	ND	ND	ND	ND
Benzene	9/29/06	***16.2***	--	--	***70.5***	--	--	--
(µg/L)	12/19/06	2.81	***645***	***109***	***38.5***	***967***	ND	***34.2***
	3/19/07	***2170***	***861***	***116***	***39.5***	***954***	ND	***37.8***
	6/26/07	***27.6***	***2320***	--	***143***	***659***	ND	***14.9***
	11/2/07	ND	--	--	--	--	--	--
	12/12/07	ND	***480***	--	***45***	***730***	ND	1.9
	3/27/08	***14.8***	***672***	***47.9***	***69***	***538***	ND	***5.57***
	6/4/08	***19.7***	--	***33***	***59.5***	***459***	ND	***8.07***
	9/12/08	--	--	--	--	--	--	--
	12/3/08	ND	--	--	***94.6***	--	--	***19.6***
	3/25/09	ND	***570***	***79.2***	***3.5***	***836***	ND	3.6
	6/26/09	ND	--	--	***132***	***995***	ND	--
	9/29/09	ND	--	--	--	--	--	--
	12/10/09	ND	***1210***	***87***	***40.3***	***1080***	ND	ND
	3/24/10	ND	***649***	***86.6***	***14***	***961***	ND	2.87
	6/17/10	ND	***1050***	***29***	***23.5***	***937***	ND	ND
	9/14/10	ND	--	--	--	--	--	--
	12/7/10	ND	***1150***	***168***	5	***803***	ND	***25.4***
	3/24/11	ND	***353***	***67.3***	***9.48***	***848***	ND	ND
	6/21/11	***8.23***	***382***	***18.6***	***35.4***	***701***	ND	ND
	11/22/11	ND	***73.2***	***69.7***	***55.3***	***538***	--	4.35
	12/28/11	ND	***335***	***142***	***62.4***	***832***	--	ND
	3/26/12	ND	***587***	***29.9***	ND	***549***	ND	ND
	4/1/13	ND	***299***	***41.7***	***6.16***	***614***	ND	ND
	10/16/13	ND	--	--	--	--	--	--

	12/17/13	ND	***412***	--	***24.4***	***253***	--	1.18
	3/17/14	ND	***272***	***28.1***	***5.16***	***541***	ND	0.74
	6/4/14	ND	***176***	***29.7***	***23.1***	***298***	ND	2.5
	9/22/14	--	--	--	--	--	--	--
	12/15/14	ND	***189***	***18.2***	***5.21***	***121***	ND	2.5
	3/18/15	0.95	***24.4***	***17.3***	***7.97***	***330***	ND	2.86
	6/9/15	2.4	***100***	--	***22.9***	***278***	ND	ND
	4/13/16	15	***26***	2.5	***4.17***	***133***	ND	0.74
	4/19/17	***5.4***	***6***	ND	***26.3***	***93***	ND	ND
	3/14/18	ND	***22.8***	1.27	***137***	***229***	ND	1.41
Toluene	9/29/06	ND	--	--	11.6	--	--	--
(µg/L)	12/19/06	ND	213	40.8	20.1	462	ND	25.8
	3/19/07	615	153	43.1	2	278	ND	16.8
	6/26/07	ND	709	--	46.2	296	ND	6.39
	11/2/07	ND	--	--	--	--	--	--
	12/12/07	ND	97	--	7.6	290	ND	1.4
	3/27/08	2.73	128	10	10	251	ND	2.48
	6/4/08	3.77	--	20	18	232	ND	3.9
	9/12/08	--	--	--	--	--	--	--
	12/3/08	ND	--	--	11.8	--	--	12.6
	3/25/09	ND	101	20.9	1.4	329	ND	17.1
	6/26/09	ND	--	--	31	418	ND	--
	9/29/09	ND	--	--	--	--	--	--
	12/10/09	ND	287	42.5	19.8	451	ND	ND
	3/24/10	ND	102	32.3	6.05	440	ND	ND
	6/17/10	ND	241	14.9	9.1	406	ND	ND
	9/14/10	ND	--	--	--	--	--	--
	12/7/10	ND	167	39	6.2	260	ND	7.7
	3/24/11	1.16	68.6	14.8	3.04	405	ND	3.99
	6/21/11	2.42	72.6	7.92	4.87	306	ND	3.27
	11/22/11	ND	17	17.6	23	290	--	5.64
	12/28/11	ND	52.1	37.1	11.5	322	--	6.4
	3/26/12	ND	118	8.86	ND	224	ND	3.78
	4/1/13	1.11	50.6	10.9	2.58	223	ND	5.55
	10/16/13	ND	--	--	--	--	--	--
	12/17/13	ND	94.6	--	5.37	106	--	1.36
	3/17/14	ND	25	5.38	0.97	145	ND	ND
	6/4/14	ND	25.8	12.5	5.37	91.1	ND	2.5
	9/22/14	--	--	--	--	--	--	--
	12/15/14	ND	34.4	5	5	62.8	ND	2.5
	3/18/15	1.38	2.52	4.23	3.32	160	ND	3.14
	6/9/15	ND	10	--	10	64.9	ND	ND
	4/13/16	4.5	1.5	2.5	2.5	25	ND	1.12
	4/19/17	2.9	ND	ND	5	14.7	ND	2.59
	3/14/18	ND	2.31	1.16	ND	ND	ND	5.67
Ethyl-	9/29/06	29.2	--	--	453	--	--	--
benzene	12/19/06	8.02	***1020***	201	205	***1260***	ND	30.3
(µg/L)	3/19/07	***3860***	***969***	292	182	***791***	ND	42

	6/26/07	31.2	***1690***	--	602	***781***	ND	20.2
	11/2/07	2.44	--	--	--	--	--	--
	12/12/07	ND	***760***	--	280	***940***	ND	16
	3/27/08	34.2	690	140	251	682	ND	4.29
	6/4/08	25	--	152	262	689	ND	9.58
	9/12/08	--	--	--	--	--	--	--
	12/3/08	ND	--	--	423	--	--	24.5
	3/25/09	1.3	***717***	164	28.2	***1060***	ND	18.6
	6/26/09	ND	--	--	545	***1240***	1.6	--
	9/29/09	ND	--	--	--	--	--	--
	12/10/09	ND	***1050***	298	390	***1300***	ND	23.8
	3/24/10	ND	***828***	286	172	***1370***	ND	30.4
	6/17/10	ND	***1090***	136	210	***1230***	ND	13.1
	9/14/10	2.1	--	--	--	--	--	--
	12/7/10	ND	***1680***	447	24.8	***1490***	ND	231
	3/24/11	6.2	570	184	83.7	***1510***	ND	21.3
	6/21/11	24.8	***729***	185	114	***1350***	ND	10.8
	11/22/11	ND	111	291	286	***1320***	--	17.8
	12/28/11	ND	579	468	318	***1240***	--	26.6
	3/26/12	ND	***988***	153	ND	***1160***	ND	10.3
	4/1/13	ND	576	174	55.4	***1210***	ND	22.8
	10/16/13	ND	--	--	--	--	--	--
	12/17/13	ND	***754***	--	259	***1000***	--	16.1
	3/17/14	ND	390	134	48.9	402	ND	5.17
	6/4/14	ND	59.7	263	271	541	ND	11.8
	9/22/14	--	--	--	--	--	--	--
	12/15/14	ND	316	44.5	61.6	255	ND	9.16
	3/18/15	26.2	10.6	85	72.7	292	ND	20.9
	6/9/15	12.6	22	--	252	84	ND	4.56
	4/13/16	101	11	16.1	63.9	25	ND	26.7
	4/19/17	77	4	1.1	181	81	ND	12
	3/14/18	100	12.5	3.27	506	257	ND	27
Xylene	9/29/06	6.56	--	--	917	--	--	--
(µg/L)	12/19/06	3.29	***1420***	273	411	***1860***	ND	86.2
	3/19/07	***4720***	***1250***	410	427	***1160***	ND	139
	6/26/07	13	***2710***	--	***1210***	***1180***	ND	57.5
	11/2/07	3.46	--	--	--	--	--	--
	12/12/07	1.5	940	--	560	***1200***	ND	55
	3/27/08	30.9	938	196	548	***1130***	ND	12
	6/4/08	8.63	--	212	540	***1050***	ND	23.6
	9/12/08	--	--	--	--	--	--	--
	12/3/08	1.5	--	--	857	--	--	61.2
	3/25/09	ND	913	229.5	57.5	***1472***	ND	59.1
	6/26/09	ND	--	--	***1050***	***1540***	2.8	--
	9/29/09	ND	--	--	--	--	--	--
	12/10/09	ND	***1260***	428.8	730	***1610***	ND	71.2
	3/24/10	1.25	709	393	341	***1837***	ND	114
	6/17/10	ND	***1435***	188	419	***1704***	ND	35.8
	9/14/10	1.9	--	--	--	--	--	--

	12/7/10	ND	***2154***	634	81.5	***1963***	ND	486
	3/24/11	3.18	460	246	152	***1820***	ND	62.6
	6/21/11	11.4	590	243	210	***1660***	ND	45.6
	11/22/11	ND	132	348	547	***1650***	--	65.3
	12/28/11	ND	484	533	611	***1530***	--	96.6
	3/26/12	ND	51.8	159	ND	1390	2.29	43.1
	4/1/13	ND	494	84.7	52.2	1480	ND	87.4
	10/16/13	ND	--	--	--	--	--	--
	12/17/13	ND	979	--	134	1150	--	54
	3/17/14	ND	637	44.8	7.23	1760	ND	19.2
	6/4/14	ND	272	44.4	32.5	1350	ND	34.6
	9/22/14	--	--	--	--	--	--	--
	12/15/14	ND	550	24.5	10	922	ND	33.9
	3/18/15	29.04	46.74	33.1	11.38	1093	ND	120.4
	6/9/15	4.9	104	--	31	532	ND	18.9
	4/13/16	94.5	24	9.3	7.5	591	ND	89.9
	4/19/17	55	5	3	14	387	3	65.6
	3/14/18	200	16.5	1.18	200	229	ND	71.2
ND = not detected			***Bold italics*** = exceeds cleanup level			-- = well was dry		

Table 2. Groundwater Cleanup Levels

Contaminant	Method A Cleanup Level, µg/L
TPH-gasoline	800
TPH-diesel	500
Benzene	5
Toluene	1000
Ethyl benzene	700
Xylene	1000
µg/L - micrograms per liter	

Table 3. Mann-Kendall Tau Value Analysis

Well	Analyte	Tau Value	Trend
MW-1	gasoline	0.556	increasing
MW-1	benzene	0.6	increasing
MW-2	gasoline	-0.644	decreasing
MW-2	benzene	-0.778	decreasing
MW-2	ethylbenzene	-0.689	decreasing
MW-2	xylene	-0.733	decreasing
MW-3	gasoline	-0.571	decreasing
MW-3	benzene	-0.5	decreasing
MW-4	gasoline	0.467	increasing
MW-4	benzene	0.244	slightly increasing
MW-6	gasoline	-0.733	decreasing
MW-6	benzene	-0.511	decreasing
MW-6	ethylbenzene	-0.689	decreasing
MW-6	xylene	-0.778	decreasing
MW-10	gasoline	0.467	increasing
MW-10	benzene	0.044	no trend
MW-10	Xylene	0.067	no trend
Tau value of <0.1 = no change			
Tau value between 0.1 and 0.3 = slight change			
Tau value over 0.3 = change, more significant the closer to 1			