Site Hazard Assessment

Chevron Station 98944
1323 Lee Blvd
Richland, WA 99352

Ecology Facility Site ID No.: 27223439
Cleanup Site ID: 5798
December 17, 2014

Other Site Information
Current Owner: Cazier Enterprises
Benton County Parcel ID: 111983020402001
Section/Township/Range: 11 9N 28E
Latitude: 46.27468
Longitude: -119.28151

Site scored/ranked for the February 2015 update

Background
The site is located at 1323 Lee Boulevard in Richland, WA (see Figures 1 and 2). The city of Richland has a unique history. Up until the mid-1900s, it was a very small farming village. In 1942 the federal government decided that Richland and the surrounding area was a prime location for a portion of the Manhattan Project, a research and development project that produced the first atomic bombs during World War II (1). All of the land and buildings were owned by the government and much of the city was planned by the Army Corps of Engineers. In 1954 the first mayor of Richland was elected who traveled to Washington, D.C. to negotiate increased rights such as private ownership of property.

According to the 1954 Polk reverse index, the business located at 1323 Lee Boulevard was a gas station and the business name was listed as "Standard Station." Property ownership at this time is assumed to be the federal government. According to an environmental assessment report (2), the property was sold to a private company, Standard Oil, Inc., in 1960. At that time, records indicate at the new owners installed an 8,000 gallon underground storage tank (UST) in May 1960. The tank was used for leaded gasoline. Blueprints of the property (see Figure 3) indicate there may have already been three other USTs already in place when this new tank was installed (2).

The site operated as a Chevron gas station until 1968. Starting in 1968 and ending in 1972, Standard Oil started using the property as a training facility for new employees. The property remained vacant from 1972 to 1976. In 1976, the gas station was demolished and the USTs were removed, but no formal documentation of the removal of the tanks is known to exist (2). According to information listed on the Department of Ecology (Ecology) website (12), an 8,000 gallon UST was "closed in place" in April 2001. The property remained vacant until 2003 when it was purchased by Cazier

Enterprises and developed as a Subway restaurant franchise. The restaurant is currently operating at the site at the time this report was written.

Site Description

The property is located at the intersection of Lee Boulevard and Gillespie Street in Richland, WA, population 48,000 (see Figures 1 and 2). The property is irregular shaped, resembling a ¼ circle section. It is located in the central business district of Richland and businesses surround the property with residential areas 350 feet to the southeast and 2200 feet to the west. The site is located in close proximity (~1000-foot radius) to six other leaking underground storage tanks (LUST) sites; others are farther away. Most of these LUST sites are former gas stations, but one site, New City Cleaners, was identified has having groundwater contaminated with high levels tetrachloroethylene.

Previous Site Investigations

In 1994 Technico Environmental Services (Kennewick, WA) performed a Phase I and II environmental assessment and this is the source of most of the historical information regarding the site (2). Technico was hired by Sam Volpentest who was the property owner at the time. Technico interviewed that last operator of the gas station while it was still operating. According to their report only gasoline was sold at the station. Technico was able to obtain old blue prints/maps (Figures 3 and 4) from Chevron which show the location of the USTs and the fuel islands. According to these figures, there were four USTs in the northwest corner of the lot that stored fuel. In addition, there were two small USTs just south of the station building. These tanks stored heating oil for the business and waste oil generated on site (2).

According to the Technico report, when the service station was demolished in 1976 the demolition crew "did a very good job of removing all of the tanks and any associated contaminated soils" (2). Technico did some excavation at the all of the sites on the property identified as being above a UST or a pump island. Excavation was performed with a backhoe and soil and groundwater samples were taken at these site. The report indicated that the excavation sites "had been excavated previously and filled with concrete debris and fill". No tanks were located but there was evidence of old fuel lines onsite.

Technico took seven soil samples from sites 1-7 shown on Figure 4. The depths that soil samples were taken ranged from zero to eight feet below the ground surface (bgs). The soil sampling procedure and a description of soil sites are absent from the report. It is possible that some of the soil samples could have from areas that were previously filled. The soil samples were analyzed for gasoline, diesel, and waste oil by Anatek Labs (Moscow, ID) using WTPH-HCID, EPA 8260. All soil samples were below detection limits.

Technico also took groundwater samples from approximately 15 different locations at the site. Once again, no sampling plan was present in the report and no mention is given what depth ground water was encountered. Other reports indicate that ground water is approximately 7-8 deep at the site (3,4). The Technico report indicated that five of the ground water samples " were dipped from open excavations made with a backhoe" and the other water samples were obtained from "Geoprobe groundwater implants screened at approximately 1 to 1.5 feet below the surface of the groundwater" (2). A figure of a Geoprobe is given in the report and the report stated a peristaltic pump was used, but other than that, few details about the groundwater sampling are given.

The groundwater samples were analyzed for TPH-gas, Benzene, Toluene, Ethylbenzene, Xylene (BTEX), and one sample was analyzed for lead. Five of the samples exceeded Model Toxic Control Act (MTCA), Method A, groundwater cleanup levels at the time for one or all of the constituents that were tested. These samples came either from the vicinity of the fuel islands or near the north portion of the tank excavation pit. Technico concluded that the soil cleanup at the site was sufficient but that groundwater was still contaminated and that more assessment and/or remediation would be needed prior to the sale of the property.

In August 1994, Chevron U.S.A Products Co. hired AGRA Earth and Environmental, Inc (Spokane, WA) to install three groundwater monitoring wells at the site and to collect soil and water from the wells identified as MW-1, MW-2 and MW-3 (see Figure5, light gray text). Three air rotary borings were performed to a maximum depth of 15 feet. Soil samples were collected approximately every five feet. Boring logs indicated that soils were fine sandy silt to about 7 feet bgs and sandy gravel from 7 to 15 feet bgs. Groundwater samples were also taken. All samples were analyzed for BTEX, gasoline (WTPH-G) and diesel (WTPH-D). Samples were analyzed by Analytical Technologies, Inc. (Renton, WA). Soil samples did show some petroleum contamination but all levels were below MTCA Method, A soil cleanup at the time. Ground water from all three monitoring well had petroleum contamination (see Table 1) and all samples exceeded MTCA cleanup levels for all constituents tested. The authors of the report noted that chromatograms of the diesel in the water were most likely weathered diesel. Well drilling, sampling procedures and analytical data were all documented according to protocol.

In August 1996, AGRA performed more groundwater monitoring (4). AGRA installed 12 Geoprobe monitoring wells and performed more groundwater analysis. Again, many of the samples were above cleanup standards at the time. In this report, AGRA speculated that some of the groundwater contamination near the western border of the site may be due to off-site contamination from another LUST site (P&K Auto, Facility Site#38448497). Another company, Gettler-Ryan, was hired to conduct periodic groundwater sampling from 1994 to December 2004 (5). Data from all of the groundwater sampling during this time period is shown in Table 1.

In 2007, Conestoga-Rovers and Associates (CRA) were hired by Chevron to conduct more groundwater monitoring on the site (5). At that time, CRA indicated that there was insufficient water in MW-1 through MW-3 for reliable monitoring. They decommissioned MW-1 through MW-3 and installed five more groundwater monitoring wells, MW-4 through MW-8 (see Figures 5 and 6). Depth to water ranged from 14 feet bgs to 20 feet bgs. All wells were drilled to an approximate depth of 26 feet bgs. Soil and groundwater samples were taken from all wells. All samples were analyzed for previously listed petroleum product as well as Methyl-tert-butyl ether (MTBE), 1,2- Dibromoethane (EDB), 1,2-Dichloroethane (EDC), Halogenated volatile organic compounds (HVOCs), carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and total lead.

No analytes were detected in the soil above MTCA Method A cleanup levels. TPH-G, TPH-D and total lead were detected above MTCA Method A cleanup levels in the groundwater from wells MW-4, MW-6, and MW-8 (see Table 1). Ethylbenzene, total xylenes, and naphthalene were also detected above cleanup levels in well MW-8. CRA proposed that quarterly ground water monitoring be conducted.

Groundwater was monitored quarterly in 2008 and then shifted to an annual monitoring in 2009 and 2010. Throughout this period contaminants appeared to attenuate or migrate off-site. Even so, cleanup levels were exceeded for several constituents in three different wells (MW-4, MW-6, and MW-8). The last record of groundwater monitoring event was performed in September 2011 by Arcadis US Inc.(7). The only constituent that exceeded MTCA, Method A cleanup levels for

groundwater was TPH-Gas at 2,100 parts per million (ppm) (see Table 1). This level was detected in MW-8 only.

Site Hazard Assessment

The site hazard assessment of the property was conducted by James Coleman, Environmental Health Specialist II for the Benton-Franklin Health District. Permission to inspect the site was granted by the property owner, Russell Cazier, to Jim Coleman via phone conversation on November 17, 2014. The inspection was conducted on November 20, 2014.

The site is currently occupied by a Subway restaurant which is located in the northeast portion of the lot. The site is in close proximity to three other LUST sites (Figure 2). P&K Auto (Facility #38448497) is located approximately 100 feet due west of the Chevron site. P&K Auto site ranked as a "2" in August 2005 and later given a "No Further Action" in December 2008. The site is now a Rite Aid drug store. Approximately 170 feet to the northwest is the US Bank Facility (Facility #44976422) which was given a ranking of "3" in December 2005. There is no documentation of an official cleanup at the site. Leo's Line Up (aka L&L Exxon Service, Facility #78835792) is located approximately 130 feet due east. It was given a ranking of "2" in August 2010 and final cleanup was completed in September 2014.

The site is level and the entrances and parking lot are covered in asphalt (see Figure 7, Photos 1-4). The perimeter of the site has some landscaping and city sidewalks. The current business directly to the east is Ancient Arts Massage. The rear of this property is covered with gravel. The six monitoring wells (MW-4 through MW-8) shown in Figure 6 were still present. A photo of MW-6 was taken. Storm drains were present in the parking area. Soils at the site are described as were fine sandy silt to about 7 feet bgs and sandy gravel from 7 to 15 feet bgs (3).

ROUTE SCORES:

Surface Water/Human Health:	**NS**	Surface Water/Environmental.	:	**NS**
Air/Human Health:	**NS**	Air/Environmental:		**NS**
Groundwater/Human Health:	**40.8 => Q3**			

OVERALL RANK: **3**

WORKSHEET 2
Route Documentation

1. **SURFACE WATER ROUTE – NOT SCORED.** No data or direct observation exists to support that contaminants were released into any surface water near the site. The site is covered primarily with asphalt.
   a. List those substances to be considered for scoring: Source:
   b. Explain basis for choice of substance(s) to be used in scoring.
   c. List those management units to be considered for scoring: Subsurface soil/groundwater. Source:
   d. Explain basis for choice of unit to be used in scoring:

2. **AIR ROUTE – NOT SCORED**
   a. List those substances to be considered for scoring: Source:
   b. Explain basis for choice of substance(s) to be used in scoring:
   c. List those management units to be considered for scoring: Source:
   d. Explain basis for choice of unit to be used in scoring:

3. **GROUNDWATER ROUTE**
   a. List those substances to be considered for scoring: TPH as gasoline (benzene)
      Source: 3,7

b. Explain basis for choice of substance(s) to be used in scoring: TPH-Gas was detected in the groundwater at the site. Source: 3,7

c. List those management units to be considered for scoring: Subsurface soil/groundwater. Source: 3,7

a. Explain basis for choice of unit to be used in scoring: TPH-Gas was detected in groundwater samples at site. Source: 3,7

WORKSHEET 6
Groundwater Route

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity										
Substance		**Drinking Water Standard (µg/L)**	**Value**	**Acute Toxicity (mg/ kg-bw)**	**Value**	**Chronic Toxicity (mg/kg/day)**	**Value**	**Carcinogenicity**		**Value**
								WOE	**PF***	
1	TPH as Gasoline (Benzene)	5	8	3306	3	ND	ND	A	.029	5

** Potency Factor*

Source: 3,7,9
Highest Value: 8
(Max = 10)
Plus 2 Bonus Points?
Final Toxicity Value: **8**
(Max = 12)

Continued on following page

1.2 Mobility (use numbers to refer to above listed substances)	
Cations/Anions [Coefficient of Aqueous Migration (K)] OR Solubility (mg/L)	
1= TPH as Gasoline (Benzene), 1800 mg/L	1=3

Source: 9
Value: 3
(Max = 3)

1.3 Substance Quantity: **Volume=5,001-25,000 gallons**	
Explain basis: Very little data exists to support an accurate estimation of substance quantity. There is no information on how much soil was excavated when the tank(s) were removed and how substantial the leaking may have been. The Washington Ranking Method Scoring manual suggests using a one time tank volume if no other evidence exists. The one tank that was known to be on site had a volume of 8,000 gallons and this is the value that was used for scoring.	Source: **Value: 5** (Max=10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment (explain basis):** Spill that has been capped. Scored as a landfill with cover but no liner or leachate collection system.	3,7,9	**6** (Max = 10)
2.2	**Net precipitation:** 5" – 3.4" = 1.6"	10	**1** (Max = 5)
2.3	**Subsurface hydraulic conductivity:** Sandy-Gravel	3,7,9	**4** (Max = 4)
2.4	**Vertical depth to groundwater:** Approximately 7 feet	3,7,9	**8** (Max = 8)

3.0 TARGETS[1]

		Source	Value
3.1	**Groundwater usage:**	11,12	**4** (Max = 10)
3.2	**Distance to nearest drinking water well:** 3,000 **feet (City of Richland, Well#14)**	12	**2** (Max = 5)
3.3	**Population served within 2 miles:** City of Richland, Population ~46,000	12	**100** (Max = 100)
3.4	**Area irrigated by (groundwater) wells within 2 miles: 1948 acres= 0.75x44=33**	11	**33** (Max = 50)

4.0 RELEASE

	Source	Value
Explain basis for scoring a release to groundwater: Confirmed release to groundwater.	3,7	**5** (Max = 5)

SOURCES USED IN SCORING

1. Richland, WA http://en.wikipedia.org/wiki/Richalnd,_Washington

2. Phase I and II Environmental Assessment of Property at 1323 Lee Boulevard, Prepared for Sam Volpentest by Technico Environmental Services, July 8, 1994.

3. Environmental Site Assessment, Former Chevron Service Station #9-8944, Prepared for Chevron U.S.A. Products Co. by AGRA Earth and Environmental, Inc., October 25, 1994.

4. Geoprobe Assessment, Former Chevron Station 9-8944, Prepared for Chevron USA Products co. by AGRA Earth and Environmental, Inc., September 30, 1996.

5. Soil and Groundwater Assessment Report, Former Chevron Service Station #9-8944, Conestoga-Rovers & Associates, December 11, 2007.

6. Site Conceptual Model Report, Former Chevron Service Station No. 9-8944, Prepared for Chevron Products Company by KHM Environmental, Inc., December 1, 2000.

7. Annual Groundwater Monitoring Report 2011, Chevron Service Station No. 9-8944, Prepared for Chevron EMC by Arcadis US, Inc., November 17, 2011.

8. Washington State Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January 1992

9. Washington State Department of Ecology, WARM Scoring Manual, April 1992.

10. Washington Climate – Net Rainfall Table

11. Washington State Department of Ecology, Water Rights Application System (WRATS) printout for two-mile radius of site.

12. Leaking Underground Storage Tanks (LUST) Sites Near Sensitive Wellheads, Charles San Juan, Ecology Publication No. 09-09-048, December 2009. Additional information was obtained from City of Richland regarding well usage.

13. Washington Department of Ecology, 2014. Integrated Site Information System (ISIS)-Underground Storage Tank Database. Website accessed November 2014. Online at https://fortress.wa.gov/ecy/tcpwebreporting/Report.aspx

Appendix I: Tables and Figures (attached as a separate document)

WASHINGTON RANKING METHOD
ROUTE SCORES SUMMARY AND RANKING CALCULATION SHEET

Site name: Chevron Station #9-8944 Region: Central

Street, city, county: 1323 Lee Boulevard Richland, WA

Ecology Facility Site ID: 27223439

This site was (X) ranked, ( ) re-ranked, for the February 19, 2009, Site Register update, based on the August 2008 quintile update values from a total of 1126 assessed/scored sites.

Pathway	Route Score(s)	Quintile Group number(s)	Priority scores:
SW-HH	_____	_____	$\frac{H^2 + 2M + L}{8} = \frac{(4)^2+2(0)+0}{8}=2.0$
Air-HH	_____	_____	
GW-HH	__40.8_____	_____4_____	
SW-En	_____	_____	$\frac{H^2 + 2L}{7} =$ _____
Air-En	_____	_____	

Use the matrix presented to the right, along with the two priority scores, to determine the site ranking. N/A refers to where there is no applicable pathway (e.g. typically with ground water route-only sites).

Human Health	Environment 5	4	3	2	1	N/A
5	1	1	1	1	1	1
4	1	2	2	2	3	2
3	1	2	3	4	4	3
2	2	3	4	4	5	**3**
1	2	3	4	5	5	5
N/A	3	4	5	5	5	NFA

DRAFT / FINAL

Matrix ("bin") Ranking: **3**

CONFIDENCE LEVEL: The relative position of this site within this bin is:

_____almost into the next higher bin.
___X__right in the middle, unlikely to ever change.
_____almost into the next lower bin.

TABLE 1
GROUNDWATER MONITORING DATA AND ANALYTICAL RESULTS
CHEVRON SITE NO. 9-8944
RICHLAND, WASHINGTON

					HYDROCARBONS			PRIMARY VOCs				LEAD		OXYGENATES		PAHs							
Location	Date	TOC	DTW	GWE	TPH-GRO	TPH-DRO	TPH-HRO	B	T	E	X	Dissolved	Total	MTBE by SW8020	MTBE by SW8260B	Naphthalene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene
MTCA Method A Cleanup Levels					800/1000	500	500	5	1000	700	1000	NA	15	NA	20	160	NA	NA	NA	NA	NA	NA	NA
	Units	ft	ft	ft-amsl	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-1	08/11/1994	93.98	7.03	86.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	08/25/1994	93.98	7.00	86.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	09/23/1994	93.98	7.00	86.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	08/12/1996	93.98	7.29	86.69	**14,400**	--	--	**94.4**	15.5	325	978	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	02/27/2000	93.98	8.58	85.40	**16,200**	--	--	**11.7**	<8.00	439	504	--	--	<25.0	--	--	--	--	--	--	--	--	--
MW-1	02/21/2001	93.98	8.66	85.32	**6,320**	--	--	**38.3**	9.30	194	64.1	--	--	15.4	<4.00	--	--	--	--	--	--	--	--
MW-1	05/22/2001[1]	93.98	9.95	84.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	08/11/2001	93.98	9.14	84.84	**8,450**	--	--	**48.4**	11.8	410	356	--	--	<50.0	<50.0	--	--	--	--	--	--	--	--
MW-1	11/10/2001	93.98	9.85	84.13	**6,650**	--	--	**49.2**	11.0	340	97.9	--	--	16.8	<5.00	--	--	--	--	--	--	--	--
MW-1	02/04/2002	93.98	10.71	83.27	**1,480**	--	--	1.81	<1.00	71.6	3.81	--	--	--	<5.00	--	--	--	--	--	--	--	--
MW-1	08/24/2002[2]	93.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	02/20/2003	93.98	10.55	83.43	91	--	--	<0.50	<0.50	<1.0	<3.0	--	--	<2.5	--	--	--	--	--	--	--	--	--
MW-1	08/21/2003	93.98	11.26	82.72	78	--	--	<0.5	<0.5	<0.5	<1.5	--	--	<2.5	--	--	--	--	--	--	--	--	--
MW-1	02/19/2004[1]	93.98	11.79	82.19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	08/10/2004[1]	93.98	10.97	83.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	12/03/2004[1]	93.98	11.39	82.59	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	02/21/2006[3]	93.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	10/23/2007[4]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-2	08/11/1994	93.21	6.10	87.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-2	08/25/1994	93.21	6.11	87.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-2	09/23/1994	93.21	6.11	87.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-2	08/12/1996	93.21	6.40	86.81	**17,400**	--	--	**152**	39.2	306	1,120	--	--	--	--	--	--	--	--	--	--	--	--
MW-2	02/27/2000	93.21	7.77	85.44	**7,500**	--	--	**99.8**	13.0	175	453	--	--	<10.0	--	--	--	--	--	--	--	--	--
MW-2	02/21/2001	93.21	7.84	85.37	**1,510**	--	--	**20.1**	5.43	31.9	67.2	--	--	<5.00	<2.00	--	--	--	--	--	--	--	--
MW-2	05/22/2001	93.21	8.14	85.07	**4,310**	--	--	**34.9**	7.91	109	211	--	--	11.6	<5.00	--	--	--	--	--	--	--	--
MW-2	08/11/2001	93.21	8.35	84.86	**1,870**	--	--	**14.6**	2.90	16.6	20.5	--	--	<25.0	<5.00	--	--	--	--	--	--	--	--
MW-2	11/10/2001	93.21	9.10	84.11	**4,320**	--	--	**51.0**	6.44	53.0	91.5	--	--	25.1	<5.00	--	--	--	--	--	--	--	--
MW-2	02/04/2002	93.21	9.96	83.25	**4,500**	--	--	**33.3**	2.80	74.5	97.6	--	--	--	<5.00	--	--	--	--	--	--	--	--
MW-2	08/24/2002	93.21	9.18	84.03	**3,400**	--	--	17	2.10	25	56	--	--	<2.5	--	--	--	--	--	--	--	--	--
MW-2	02/20/2003	93.21	9.78	83.43	**2,600**	--	--	**7.3**	1.80	47	32	--	--	<2.5	--	--	--	--	--	--	--	--	--
MW-2	08/21/2003	93.21	10.52	82.69	**840**	--	--	2.1	<2.0	2.9	<3.0	--	--	<2.5	--	--	--	--	--	--	--	--	--
MW-2	02/19/2004	93.21	11.06	82.15	950	--	--	<5.0	<0.5	3.0	<5.0	--	--	<2.5	--	--	--	--	--	--	--	--	--
MW-2	08/10/2004	93.21	10.16	83.05	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	<2.5	--	--	--	--	--	--	--	--	--
MW-2	12/03/2004	93.21	10.68	82.53	<48	--	--	<0.5	<0.5	<0.5	<1.5	--	--	<2.5	--	--	--	--	--	--	--	--	--
MW-2	02/21/2006[3]	93.21	11.52	81.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-2	10/23/2007[4]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	08/11/1994	94.57	7.63	86.94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	08/25/1994	94.57	7.59	86.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	09/23/1994	94.57	7.59	86.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	08/12/1996	94.57	7.89	86.68	**37,700**	--	--	**84.6**	77.1	**1,190**	**3,800**	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	02/27/2000	94.57	9.18	85.39	**30,700**	--	--	**42.4**	60.1	**1,160**	**3,250**	--	--	<25.0	--	--	--	--	--	--	--	--	--
MW-3	02/21/2001	94.57	9.23	85.34	**6,090**	--	--	**29.9**	6.07	182	293	--	--	8.75	<4.00	--	--	--	--	--	--	--	--

TABLE 1
GROUNDWATER MONITORING DATA AND ANALYTICAL RESULTS
CHEVRON SITE NO. 9-8944
RICHLAND, WASHINGTON

					HYDROCARBONS			PRIMARY VOCs				LEAD		OXYGENATES		PAHs							
Location	Date	TOC	DTW	GWE	TPH-GRO	TPH-DRO	TPH-HRO	B	T	E	X	Dissolved	Total	MTBE by SW8020	MTBE by SW8260B	Naphthalene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene
MTCA Method A Cleanup Levels					800/1000	500	500	5	1000	700	1000	NA	15	NA	20	160	NA	NA	NA	NA	NA	NA	NA
	Units	ft	ft	ft-amsl	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-3	05/22/2001[1]	94.57	9.52	85.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	08/11/2001[1]	94.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	11/10/2001[1]	94.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	02/04/2002[2]	94.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	08/24/2002[3]	94.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	02/20/2003[3]	94.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	08/21/2003[3]	94.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	02/19/2004[3]	94.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	08/10/2004[3]	94.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	12/03/2004[4]	94.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	02/21/2006[3]	94.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	10/23/2007[2]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	10/23/2007	359.19	12.69	346.50	2,800	610	<250	0.17	0.48	78	17.1	<2.0	20	--	<0.14	2.3	<0.010	<0.010	<0.010	<0.010	<0.021	<0.010	<0.010
MW-4	03/24/2008	359.19	14.00	345.19	1,700	560	<240	<1.0	<1.0	89	28.9	<2.0	24	--	<1.0	--	--	--	--	--	--	--	--
MW-4	05/12/2008	359.19	14.21	344.98	570	110	<95	<0.5	<0.5	46	<0.5	--	0.21	--	<0.5	--	--	--	--	--	--	--	--
MW-4	07/28/2008	359.19	13.02	346.17	460	570	<96	<0.5	<0.5	5	<0.5	--	0.16	--	<0.5	--	--	--	--	--	--	--	--
MW-4	11/03/2008	359.19	13.54	345.65	63	48	<74	<0.5	<0.5	<0.5	<0.5	--	0.18 J	--	<0.5	--	--	--	--	--	--	--	--
MW-4	02/11/2009	359.19	13.91	345.28	2,600 J	2,600	<150	--	--	--	--	--	0.18	--	--	--	--	--	--	--	--	--	--
MW-4	08/11/2010	359.19	13.67	345.52	200	<130	<250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	09/09/2011	359.19	13.78	345.41	180	<29	<67	--	--	--	--	--	0.15	--	--	--	--	--	--	--	--	--	--
MW-5	10/23/2007	359.07	12.42	346.65	51	<120	<250	<0.10	<0.066	0.49	0.799	<2.0	6.9	--	<0.14	0.020	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010
MW-5	03/24/2008	359.07	13.73	345.34	<50	<120	<240	<1.0	<1.0	<1.0	<2.0	<2.0	27	--	<1.0	--	--	--	--	--	--	--	--
MW-5	05/12/2008	359.07	13.93	345.14	110	<77	<96	<0.5	<0.5	<0.5	<0.5	--	0.11	--	<0.5	--	--	--	--	--	--	--	--
MW-5	07/28/2008	359.07	12.78	333.51	<50	<76	<95	<0.5	<0.5	<0.5	<0.5	--	0.34	--	<0.5	--	--	--	--	--	--	--	--
MW-5	11/03/2008	359.07	13.30	345.77	<50	<29	<67	<0.5	<0.5	<0.5	<0.5	--	0.18 J	--	<0.5	--	--	--	--	--	--	--	--
MW-5	02/10/2009	359.07	13.61	345.46	--	--	--	--	--	--	--	--	0.44	--	--	--	--	--	--	--	--	--	--
MW-5	08/11/2010	359.07	13.35	345.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-5	09/09/2011	359.07	13.35	345.72	--	--	--	--	--	--	--	--	0.16	--	--	--	--	--	--	--	--	--	--
MW-6	10/23/2007	358.85	12.14	346.71	3,400	670	<260	<0.10	<0.066	0.41	0.57	3.0	27	--	<0.14	2.8	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010
MW-6	03/24/2008	358.85	13.42	345.43	1,100	830	<240	<1.0	<1.0	<1.0	<2.0	<2.0	67	--	<1.0	--	--	--	--	--	--	--	--
MW-6	05/12/2008	358.85	13.69	345.16	500	330	<96	<0.5	<0.5	<0.5	<0.5	--	2.0	--	<0.5	--	--	--	--	--	--	--	--
MW-6	07/28/2008	358.85	12.53	333.79	700	170	<96	<0.5	<0.5	<0.5	<0.5	--	1.5	--	<0.5	--	--	--	--	--	--	--	--
MW-6	11/03/2008	358.85	13.03	345.82	790	150	<67	<0.5	<0.5	<0.5	<0.5	--	0.92	--	<0.5	--	--	--	--	--	--	--	--
MW-6	02/11/2009	358.85	13.34	345.51	470	100	<65	--	--	--	--	--	0.76	--	--	--	--	--	--	--	--	--	--
MW-6	08/11/2010	358.85	13.20	345.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-6	09/09/2011	358.85	13.18	345.67	610	44	<68	--	--	--	--	--	0.77	--	--	--	--	--	--	--	--	--	--
MW-7	10/23/2007	359.01	12.63	346.38	73	<130	<260	<0.10	<0.066	0.14	.26	<2.0	13	--	<0.14	0.031	<0.010	<0.010	<0.010	<0.010	<0.021	<0.010	<0.010
MW-7	03/24/2008	359.01	14.00	345.01	<50	<120	<240	<1.0	<1.0	<1.0	<2.0	<2.0	33	--	<1.0	--	--	--	--	--	--	--	--
MW-7	05/12/2008	359.01	14.19	344.82	<50	<76	<95	<0.5	<0.5	<0.5	<0.5	--	0.070	--	<0.5	--	--	--	--	--	--	--	--
MW-7	07/28/2008	359.01		333.15	<50	<78	<97	<0.5	<0.5	<0.5	<0.5	--	11.2	--	<0.5	--	--	--	--	--	--	--	--

TABLE 1
GROUNDWATER MONITORING DATA AND ANALYTICAL RESULTS
CHEVRON SITE NO. 9-8944
RICHLAND, WASHINGTON

					HYDROCARBONS			PRIMARY VOCs				LEAD		OXYGENATES		PAHs							
Location	Date	TOC	DTW	GWE	TPH-GRO	TPH-DRO	TPH-HRO	B	T	E	X	Dissolved	Total	MTBE by SW8020	MTBE by SW8260B	Naphthalene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene
MTCA Method A Cleanup Levels					800/1000	500	500	5	1000	700	1000	NA	15	NA	20	160	NA	NA	NA	NA	NA	NA	NA
	Units	ft	ft	ft-amsl	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-7	11/03/2008	359.01	13.54	345.47	<50	<29	<67	<0.5	<0.5	<0.5	<0.5	–	1.3	–	<0.5	–	–	–	–	–	–	–	–
MW-7	02/10/2009	359.01	13.89	345.12	–	–	–	–	–	–	–	–	0.49	–	–	–	–	–	–	–	–	–	–
MW-7	08/11/2010	359.01	13.61	345.40	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
MW-7	09/09/2011	359.01	13.71	345.30	–	–	–	–	–	–	–	–	0.60	–	–	–	–	–	–	–	–	–	–
MW-8	10/23/2007	359.29	12.79	346.50	33,000	4,000	270	0.12	16	1,300	2,280	<2.0	22	–	<0.14	190	<0.010	<0.010	<0.010	<0.010	<0.021	<0.010	<0.010
MW-8	03/24/2008	359.29	14.01	345.28	13,000	3,000	<240	<1.0	15	610	821	<2.0	54	–	<1.0	320	–	–	–	–	–	–	–
MW-8	05/12/2008	359.29	14.31	344.98	18,000 J	4,600	<970	<1	17	640	1,100	–	0.44	–	<1	410	–	–	–	–	–	–	–
MW-8	07/28/2008	359.29	13.13	346.16	16,000	8,000	<490	<0.5	9	800	1,300	–	1.2	–	<0.5	500	–	–	–	–	–	–	–
MW-8	11/03/2008	359.29	13.65	345.64	15,000	6,900	<670	<0.5	10	760	520	–	1.6	–	<0.5	410	–	–	–	–	–	–	–
MW-8	02/11/2009	359.29	13.92	345.37	4,800	550	<66	<0.5	0.8	200	70	–	0.24	–	-	110	–	–	–	–	–	–	–
MW-8	08/11/2010	359.29	13.74	345.55	9,900	1,000	<250	<2.0	2.9	620	973	–	–	–	-	300	–	–	–	–	–	–	–
MW-8	09/09/2011	359.29	13.85	345.44	2,100 [2,200]	130 [120]	<67 [<67]	<0.5 [<0.5]	0.5 [0.6]	45 [46]	4 [4]	–	0.29 [0.31]	–	-	24 [24]	–	–	–	–	–	–	–
Trip Blank	02/27/2000	–	–	–	<50.0	–	–	<0.500	<0.500	<0.500	<1.00	–	–	<5.00	–	–	–	–	–	–	–	–	–
Trip Blank	02/21/2001	–	–	–	<50.0	–	–	<0.500	<0.500	<0.500	<1.00	–	–	<5.00	–	–	–	–	–	–	–	–	–
Trip Blank	05/22/2001	–	–	–	<50.0	–	–	<0.500	<0.500	<0.500	<1.00	–	–	<5.00	–	–	–	–	–	–	–	–	–
Trip Blank	08/11/2001	–	–	–	<50.0	–	–	<0.500	<0.500	<0.500	<1.50	–	–	<5.00	–	–	–	–	–	–	–	–	–
Trip Blank	11/10/2001	–	–	–	<100	–	–	<0.500	<2.00	<1.00	<1.50	–	–	<5.00	–	–	–	–	–	–	–	–	–
Trip Blank	02/04/2002	–	–	–	<50.0	–	–	<0.500	<0.500	<0.500	<1.00	–	–	<5.00	–	–	–	–	–	–	–	–	–
Trip Blank	08/24/2002	–	–	–	<50	–	–	<0.50	<0.50	<0.50	<1.5	–	–	<2.5	–	–	–	–	–	–	–	–	–
Trip Blank	02/20/2003	–	–	–	<50	–	–	<0.50	<0.50	<0.50	<1.5	–	–	<2.5	–	–	–	–	–	–	–	–	–
Trip Blank	08/21/2003	–	–	–	<50	–	–	<0.5	<0.5	<0.5	<1.5	–	–	<2.5	–	–	–	–	–	–	–	–	–
Trip Blank	02/19/2004	–	–	–	<50	–	–	<0.5	<0.5	<0.5	<1.5	–	–	<2.5	–	–	–	–	–	–	–	–	–
Trip Blank	08/10/2004	–	–	–	<50	–	–	<0.5	<0.5	<0.5	<1.5	–	–	<2.5	–	–	–	–	–	–	–	–	–
Trip Blank	12/03/2004	–	–	–	<48	–	–	<0.5	<0.5	<0.5	<1.5	–	–	<2.5	–	–	–	–	–	–	–	–	–
Trip Blank	10/23/2007	–	–	–	<50	–	–	<1.0	<1.0	<1.0	<2.0	–	–	–	–	–	–	–	–	–	–	–	–
Trip Blank	03/24/2008	–	–	–	<50	–	–	<1.0	<1.0	<1.0	<2.0	–	–	–	–	–	–	–	–	–	–	–	–
Trip Blank	05/12/2008	–	–	–	<50	–	–	<0.5	<0.5	<0.5	<0.5	–	–	–	–	–	–	–	–	–	–	–	–
Trip Blank	07/28/2008	–	–	–	<50	–	–	<0.5	<0.5	<0.5	<0.5	–	–	–	–	–	–	–	–	–	–	–	–
Trip Blank	11/03/2008	–	–	–	<50	–	–	<0.5	<0.5	<0.5	<0.5	–	–	–	–	–	–	–	–	–	–	–	–
Trip Blank	02/10/2009	–	–	–	<50	–	–	<0.5	<0.5	<0.5	<0.5	–	–	–	–	–	–	–	–	–	–	–	–
Trip Blank	08/11/2010	–	–	–	<50	–	–	<2.0	<2.0	<2.0	-	–	–	–	–	–	–	–	–	–	–	–	–
Trip Blank	09/09/2011	–	–	–	<50	–	–	<0.5	<0.5	<0.5	<0.5	–	–	–	–	–	–	–	–	–	–	–	–
Equipment Blank	09/09/2011	–	–	–	<50	<29	<68	<0.5	<0.5	<0.5	<0.5	–	<0.080	–	–	<1	–	–	–	–	–	–	–

LEGEND:

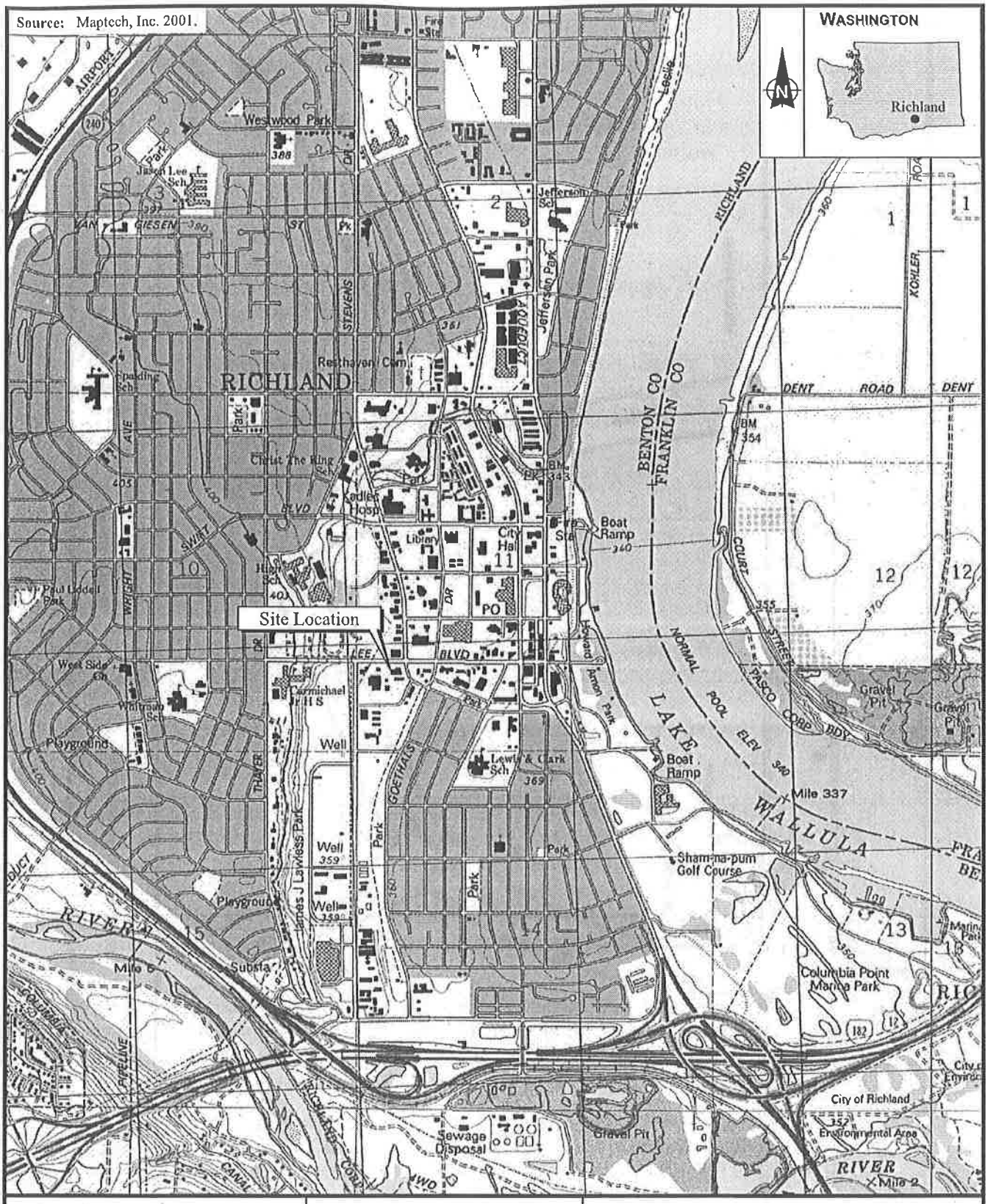
MTCA = Model Toxics Control Act Cleanup Regulations [WAC 173-340-720(2)(a)(1), as amended February 2001]
NA = No applicable MTCA Method A cleanup level
TOC = Top of Casing
DTW = Depth to Water

TABLE 1
GROUNDWATER MONITORING DATA AND ANALYTICAL RESULTS
CHEVRON SITE NO. 9-8944
RICHLAND, WASHINGTON

					HYDROCARBONS			PRIMARY VOCs				LEAD		OXYGENATES		PAHs							
Location	Date	TOC	DTW	GWE	TPH-GRO	TPH-DRO	TPH-HRO	B	T	E	X	Dissolved	Total	MTBE by SW8020	MTBE by SW8260B	Naphthalene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene
MTCA Method A Cleanup Levels					800/1000	500	500	5	1000	700	1000	NA	15	NA	20	160	NA	NA	NA	NA	NA	NA	NA
	Units	ft	ft	ft-amsl	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L

GWE = Groundwater elevation
(ft-amsl) = Feet Above Mean sea level
ft = Feet
µg/L = Micrograms per Liter
TPH-DRO = Total Petroleum Hydrocarbons - Diesel Range Organics
TPH-GRO = Total Petroleum Hydrocarbons - Gasoline Range Organics
TPH-HRO = Total Petroleum Hydrocarbons - Oil Range Organics
BTEX = Benzene, toluene, ethylbenzene, xylenes
VOCs = Volatile organic compounds
MTBE = Methyl tertiary butyl ether
PAHs = Polycyclic aromatic hydrocarbons
– = Not available / not applicable
<x = Not detected above laboratory method detection limit
J = Estimated concentration
[1] = Not sampled due to insufficient water
[2] = Inaccessible
[3] = Dry
[4] = Destroyed
[5] = Inaccessible - Paved over

NOTES:
Concentrations in bold exceed MTCA Method A Cleanup Levels



ecology and environment, inc. International Specialists in the Environment Seattle, Washington	FORMER CHEVRON STATION 9-8944 Richland, Washington	Figure 1 SITE LOCATION MAP		
	0 1000 2000 Approximate Scale in Feet	Date: 10-28-08	Drawn by: AES	10:002330WD1502\fig 1

Figure 2. Aerial Photo of Site Showing Multiple Other Leaking Underground Storage Tanks (LUST).

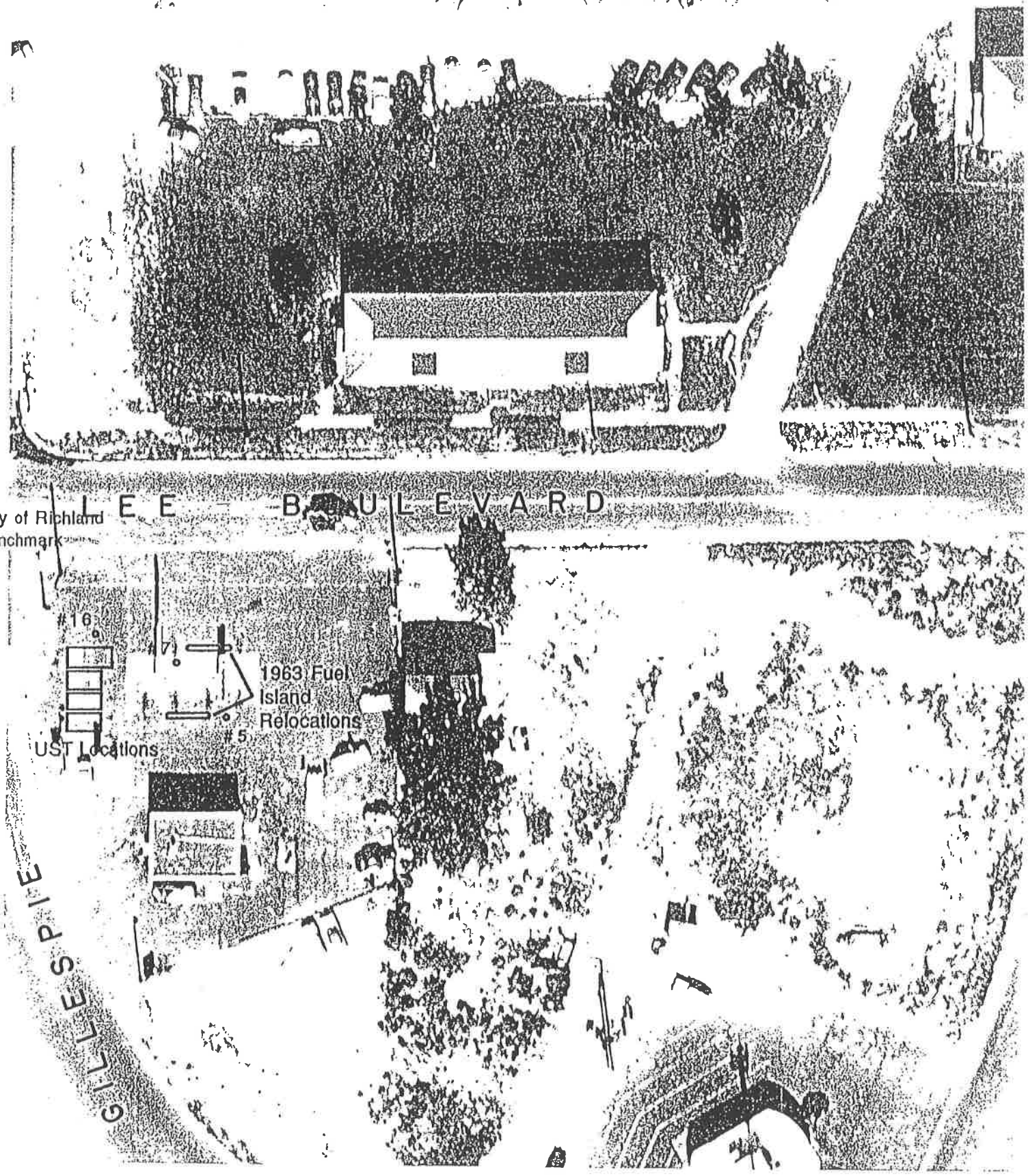


Figure 3

1952 Aerial photo with 1963 modifications

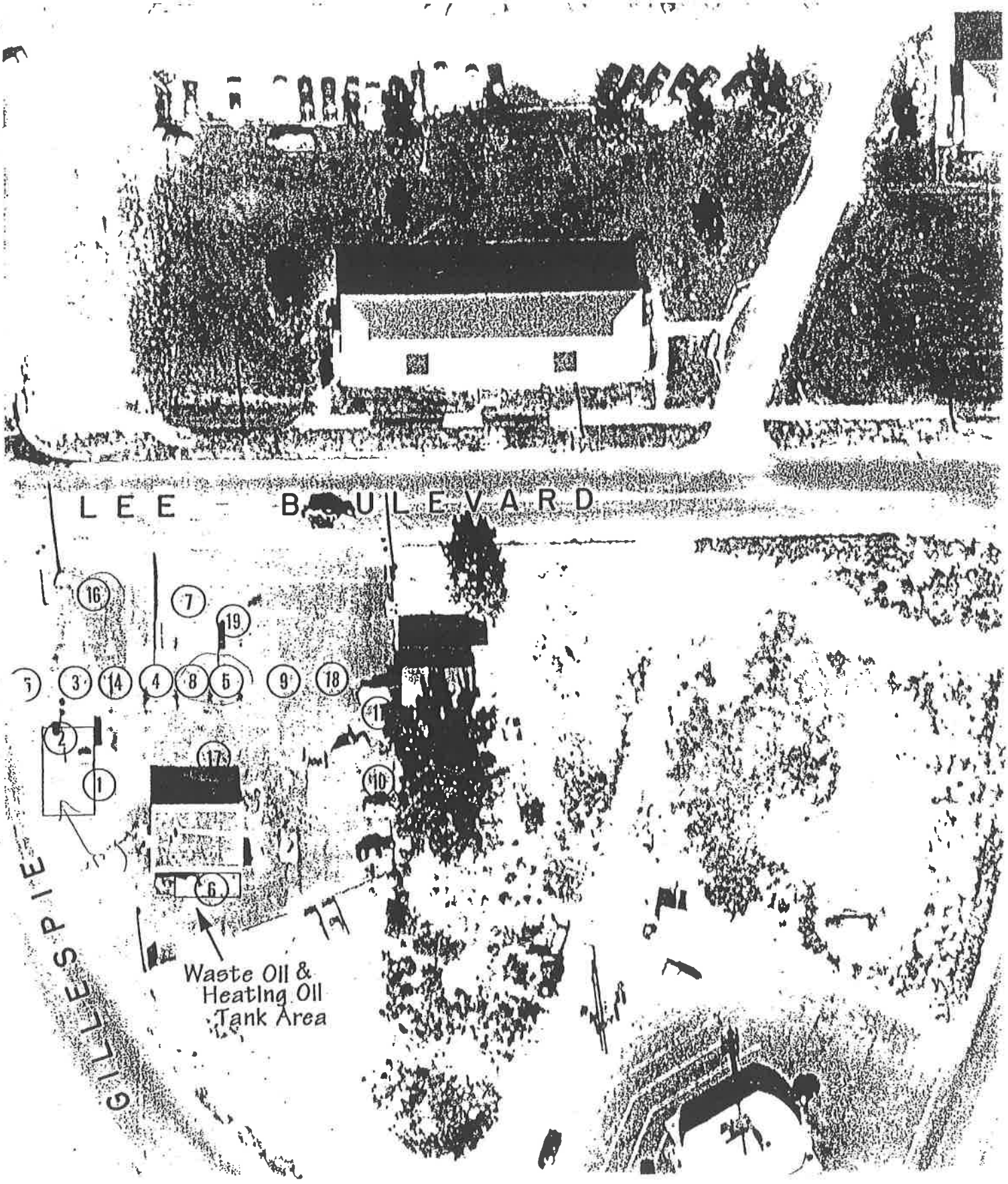


Figure 4
Tank and Sampling locations

12/11/07

Expanded Site Plan

EXPLANATION

- MW-4 — Monitoring well location
- MW-1 — Destroyed monitoring well location
- P-1 — AGRA soil boring location

STEVENS DRIVE

GOETHALS DRIVE

LEE BOULEVARD

Former Chevron Station 9-8944
1323 Lee Blvd.

GILLESPIE STREET

RAILROAD AVENUE

HARDING STREET

GILLESPIE STREET

P-1, P-2, P-3, P-4, P-5, P-6, P-7, P-8, P-9, P-10, P-11, P-12

MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8

DRIVE-CUT

PLANTER

Former UST Pit

Former Dispenser Island (typ.)

Subway Restaurant Building

PARKING

Former Station Building

TRASH

Light (typ.)

Catch Basin (typ.)

Approximate Property Line

Approximate Groundwater Flow Direction

Building

Building

Building

Building

Building

PARK
(GRASS)

N

0 30 60 120

Scale (ft)

Basemap modified from drawing provided by Statewide Land Surveying & GoogleEarth image

FIGURE

5

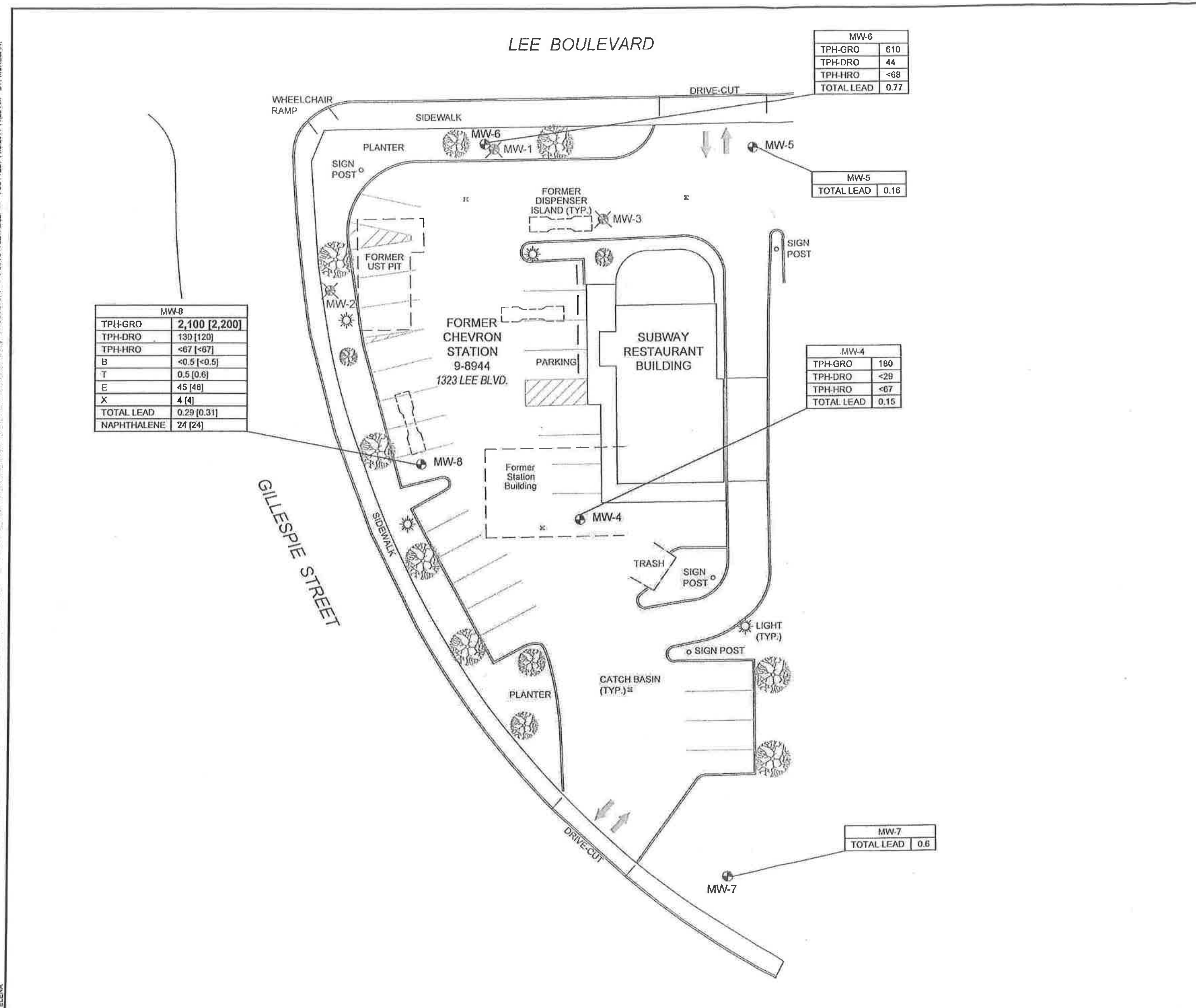
Former Chevron Station 9-8944

1323 Lee Boulevard

Richland, Washington

CONESTOGA-ROVERS & ASSOCIATES

I:\EVERETT.CHEVRON\MT2-21WA SITES\9-8944 RICHLAND\FIGURES\EXP SITE PLAN.DWG



LEGEND:

MW-5	MONITORING WELL LOCATION AND IDENTIFICATION
180	TPH-GRO/TPH-DRO/TPH-HRO/B/T/E/X/TOTAL LEAD/NAPHTHALENE CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)
<67	CONCENTRATION NOT DETECTED ABOVE LABORATORY REPORTING LIMIT
[120]	DUPLICATE SAMPLE CONCENTRATION IN (µg/L)
TPH-GRO	TOTAL PETROLEUM HYDROCARBONS - GASOLINE RANGE ORGANICS
TPH-DRO	TOTAL PETROLEUM HYDROCARBONS - DIESEL RANGE ORGANICS
TPH-HRO	TOTAL PETROLEUM HYDROCARBONS - HEAVY RANGE ORGANICS
B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	TOTAL XYLENES

NOTE: CONCENTRATIONS IN BOLD EXCEED MTCA METHOD A GROUNDWATER CLEANUP LEVELS

NOTES:

1. BASE MAP PROVIDED BY CONESTOGA-ROVERS & ASSOCIATES, DATED 11/3/2008, AT A SCALE OF 1"=30'.
2. ALL SITE FEATURES AND LOCATIONS ARE APPROXIMATE.

0 30' 60'

GRAPHIC SCALE

CHEVRON SERVICE STATION NO. 9-8944
RICHLAND, WASHINGTON

GROUNDWATER CONCENTRATIONS MAP
SEPTEMBER 9, 2011

ARCADIS

Figure 6

Figure 7 (page 1 of 2). Photos Taken During Site Hazard Assessment by Jim Coleman, BFHD

Photo 1: View of Subway Restaurant, Photo taken looking to south

Photo 2: View of Subway Restaurant. Photo taken looking to the east.

Figure 7 (page 2 of 2). Photos Taken During Site Hazard Assessment by Jim Coleman, BFHD

Photo 3: A portion of the rear parking lot and non-asphalt (gravel) area on adjoining property to the southeast of the Subway Restaurant.

Photo 4: Photo of access port to monitoring well 6, typical of all MW on site.