

# SITE HAZARD ASSESSMENT

## WORKSHEET 1

### Summary Score Sheet

#### **SITE INFORMATION:**

#### **Jackpot Food Mart 056 (PetroSun 1056)**

500 George Washington Way  
Richland, WA 99352

**Benton County Parcel ID:** 111984020563001

**Section/Township/Range:** 11/09N/28E

**Latitude:** 46.27247

**Longitude:** -119.27241

**Ecology Facility Site ID No.:** 38214358

**Cleanup Site ID:** 5992

*Site scored/ranked for the February 2012 update*

#### **Site Description**

The Jackpot Food Mart 056 site is a 0.7 acre lot located at 500 George Washington Way in Richland, WA (see Figures 1-3). The property is owned by Pacific Convenience & Fuels (PCF), Inc. Located on the site property are a gas station and a convenience store. PCF also owns a similar sized lot directly to the north of the site which is undeveloped. Directly to the east is a large 15 acre parcel owned by the City of Richland. The parcel has is occupied primarily by a park (Howard Amon) and a Community Center with a large parking lot. There is a ~17-foot grade change from where the gas station is located and the park below.

Within Howard Amon Park there are tennis courts, a large playground, a wading pool, and picnic areas. Farther east is the Columbia River (~820 feet away). The shoreline is used by sunbathers, swimmers, and operators of water recreational vehicles. To the north is a small business district and due west of the site is a hotel. Beyond the hotel is a residential area. Due south of the site is a small vacant landscaped area owned by the City of Richland and beyond that are small businesses. It is noteworthy to point out that there are several other petroleum cleanup sites within a half-mile radius and upgradient of this site (see Table 1).

#### **Background/Site Sampling**

##### **Timeline of Events**

##### **1959**

Time Oil Company purchases property from the United States of America, Housing and Home Finance Administrator. Property had previously been restaurant, bus depot, cab company and gas station (5).

##### **1968**

Time Oil Constructs convenience store and gas station at the site.

### **1990**

Three underground storage tanks (UST) and their respective piping were removed in May-June. **No detailed report of the tank removal exists and tank sizes remain unknown.** Six soil samples were taken during the excavation and total petroleum hydrocarbon as gasoline (TPH-G) levels ranged from “not detected” to 1,108 mg/kg.(1) Tanks were replaced with a new tank system approximately 20 feet to the northeast of the old tank field (see Figure 4).

### **1993**

Environmental Science & Engineering, Inc (ESE) of Redmond, Washington **drilled one unsaturated zone vapor monitoring (VW-1) well and five groundwater monitoring wells (MW-1 through MW-5)** in June/July (see Figure 5). Soils were described as “clasts supported gravels and cobbles with a sandy to silty matrix...” (1). Groundwater was encountered and ranged from 28 to 30 feet below ground surface (bgs). Soil samples from MW-1 located in former UST basin and groundwater samples from several wells exceeded Model Toxics Control Act (MTCA) cleanup levels for TPH-G, benzene, toluene, ethylbenzene, and xylene (BTEX) at that time (see Tables 2 and 3). Groundwater flow direction and gradient varied across the site but flow generally to east. Vapor extraction testing was performed and it was determined that soil vapor extraction could be feasible form of remediation. ESE speculated that contaminated groundwater may have flowed off site and into City of Richland property to the east. They recommended drilling more groundwater monitoring wells to determine extent of plume.

### **1995**

AGRA Earth and Environmental, Inc. (AEE) of Spokane, Washington performed additional work including the installation of **six more groundwater monitoring wells (MW-6 through MW-11), one groundwater/vapor extraction well (RW-1) and one groundwater air sparging well (SW-1)** (see Figure 5). Monitoring wells MW-6, MW-8 and MW-9 were installed cross-gradient from the plume in order to define lateral limits of affected groundwater on the sides of the plume (2). The other wells were oriented to determine the linear extent of contamination down gradient and up gradient.

Soil analysis from within the area of affected ground water indicated that there was a 5-foot layer of submerged contaminated soil (referred to as the smear zone) approximately 5 to 10 feet below the static level of the groundwater. The location of the wells and the extent of the smear zone are shown in Figure 5. A cross-section of the smear zone is shown in Figure 6. AEE speculated that the initial soil contamination event occurred prior to the construction of McNary Dam (1953) on the Columbia River. After the completion of the dam, the level of the Columbia River (~820 feet east of site) increased causing a similar increase in the groundwater and submerging the contaminated soil.

**Groundwater samples taken from MW-1 through MW-4, MW-7, MW-10, MW-11 and RW-1 contained target analyte concentrations exceeding MTCA cleanup levels at the time. MW-7, MW-10, MW-11 are located outside of Jackpot Foodmart property lines.** Groundwater at the site ranged from 27.2 to 28.5 feet bgs and in Howard Amon Park the groundwater level ranged from 9.6 to 17.7 feet bgs. In addition, more work was performed to determine the feasibility of using air sparging coupled with a vapor extraction system to remediate the site.

During 1995 AEE also performed soil/seep sampling along the bank of the Columbia River and a limited risk assessment for Howard Amon park. Five soil samples and two seep samples were collected (see Figure 7) and analyzed for TPH-G and BTEX. All soil and seep samples were below limits of detection except for Seep-02 which had a toluene value of 0.66 ug/L. AEE speculated that the toluene may have been the result of motor boats and other recreational water craft using the river and shoreline. In the risk assessment report, AEE concluded that visitors to the site and Howard Amon Park were not at risk because the contamination was 8 to 10 feet below grade and all drinking water at park was provided by city water coming from off site. AEE did indicate that there was the potential for visitors of the park to come in contact with groundwater along the banks of the Columbia River but that soil and seep sample data indicated that contaminants were not present.

In November, **approximately 11 more groundwater wells were installed to monitor off-site contamination.** Down gradient wells were installed in Howard Amon park and near the baseball field to the east. Groundwater monitoring in the park area indicated that contamination was present as below MTCA levels or just slightly above. In addition, two upgradient wells were installed on Barth Avenue to the west. Contamination was found in these wells also and suggested the possibility of an impact from another site.

#### **1996-2002**

**Substantial reductions of contaminants of concern were made during this time period by a combination of 3 subsystems of air sparging wells and vapor extraction. Compare Figures 8 and 9.**

**Five additional air sparge wells (SW-2 through SW-6) and four additional soil vapor extraction (SVE) wells (VW-2 through VW-5) were installed.** These were connected to other preexisting wells via underground PVC and steel pipe to create a remedial system later referred to as the Subject Property Remedial System (SPRS) (6). An above ground treatment compound was completed in September of 1996. The remedial system extends across the full width and perpendicular to the submerged petroleum hydrocarbon-impacted soil (6). A test to determine how successful the SPRS system was conducted beginning on October 1, 1996 through April 1 1997. The test indicated that hydrocarbons were being successfully removed and remediation continued.

**Due to the success of the SPRS system, additional remediation systems were installed in Howard Amon Park and near the former baseball field.** Installation of air sparging and SVE wells east and west of the baseball field were completed in December of 1997. The remedial subsystem on the east side became known as the East Park Remedial System (EPRS) and became fully operational in May 1998. The remedial subsystem on the west side became known as the West Park Remedial System (WPRS) and became fully operational in January 1999 (see Figures 10 and 11).

In 2001, quarterly groundwater monitoring of 14 selected wells was implemented. GeoEngineers compiled data on the effectiveness of the hydrocarbon removal from the three remedial subsystems from commencement up to the start of 2000 (see Table 4). Groundwater data from all 48 groundwater wells in and around the site were also compiled and summarized in the same report. In general, data demonstrated that the remediation systems were successful at removing some, but not all hydrocarbons from the site. The authors of the report indicated that some of the decreases in hydrocarbons could be attributed to natural bioremediation and attenuation.

In October of 2001, the EPRS had to be removed due the construction of the new Richland Community Center. **Wells MW-10,-12,-24, -26 and SW-8, -9, -10 were decommissioned and new wells were installed approximately 50-100 feet east of the former location. Wells MW-27, -28, -29 and SW-8, -9, -10 were added.**

### **2003-2008**

GeoEngineers continued to perform ground water monitoring of 14 selected wells on a quarterly basis. In August 2003, GeoEngineers injected hydrogen peroxide in a shallow aquifer on site to determine if it will facilitate bioremediation at the site. The process was repeated in July of 2005. There was not much evidence given as to how effective these treatments were.

**In July of 2004, GeoEngineers installed 4 more monitoring wells (MW-30 through MW-33) as it was determined that groundwater flow had a tendency to migrate in an east-southeast direction in the central portion of the site (see Figure12). Beginning in 2005 a new environmental contractor, Sound Environmental Strategies (SES), began performing ground water monitoring on a quarterly basis. Between first and second quarters of 2006 the EPRS-2 system was decommissioned and approximately 10 monitoring wells were decommissioned. In late 2006, SES installed three new remediation wells (PE-1, -2, and -3) which were equipped with Plume Eater® technology in 2007.** The third quarter 2008 report was the last ground water monitoring that SES performed at the site. Analytical data from the last four quarters indicate that both GRPH and lead still exceeded MTCA, Method A Cleanup Levels for Ground Water at the time. Contamination was grouped in three hot spots- near the former tank field, just southeast of the tank field, and due east of the tank field near the Community Center parking lot. Sound Environmental Strategies' contract ended in mid-2008 and they did not perform any more work at the site. According to Ryan Bixby at SES, the SPRS system stopped functioning in June of 2008 (phone interview).

### **2009-Present**

In phone conversations with Walter Sprague, Director of Retail Services for PCF, it was determined that remedial activities at the site were suspended when Time Oil sold the property to PetroSun Fuels in mid-2008. Activities at the site resumed in 2010 when PetroSun Fuels became PCF. In 2010 the environmental consulting firm Environ Strategy (ES) Consultants, Inc. (San Ramon, CA) was hired by PCF, to assist in the final closure of the site. ES performed ground water monitoring in 13 wells (MW-2, MW-5 through MW-7, MW-13, MW-17, MW-23, MW-25, MW-27 and MW-30 through MW-33.) at the site. EC reported that only one well (MW-5) exceeded MTCA, Method A Cleanup Levels for Ground Water levels for the COC that were tested. That well had lead levels of 22 ug/L (see Table 5). Fourth quarter ground water monitoring was performed by ES in November 2011. Benzene was detected in wells MW-01 (6.09 ug/L), MW-04 (28 ug/L) exceeding the MTCA A Cleanup Levels for Ground Water (5 ug/L) (19).

### **Site Hazard Assessment**

Jim Coleman with the Benton-Franklin Health District (BFHD) was responsible for conducting the site hazard assessment. Mr. Coleman contacted Steve Mathew for access to the site. Steve Mathew is the Compliance and Maintenance Manager, for PCF. Mr. Coleman met with Mr. Mathew at the Jackpot Food Mart 056 on January 10, 2012. Mr. Mathew said he had worked with Time Oil/PCF for approximately 30 years and has visited the site numerous times during that period. He said he helped

install the new gas tanks in 1990 but was not involved in the pulling of the old tanks. Mr. Mathew said he was not intimately involved in the remediation of the site.

The treatment compound (SPRS) is still at the site in its original location (see Figures 13 and 14). Presently, it is not operating. It is secure inside a chain link fence that is kept locked at all times. The blower room seemed to be in good shape but it was obvious that the system had not been used for some time. During the inspection, I took photos of the site. I was able to locate many of the monitoring wells (on and off-site) and vaults and all appeared in good shape. There is a substantial grade change going from the site to the park below. The slope has been landscaped by the city of Richland and terminates in the parking lot of the Community Center (see Figure 14, lower photo). I was able to locate the monitoring wells located along the perimeter of the parking lot and also MW-17 and MW-23 in the park near the Columbia River. I walked along the shoreline and noticed a cutaway bank but there was no seeping water coming out of the bank (see Figure 15).

The area near the store, parking lot and gas pumps are all covered with asphalt as well as area to west. Areas to the north and south of site are deteriorating asphalt or landscaped soils. Soils at the site have been well characterized at the site due to all of the remedial work that has been done. The closure report from EC states,

“In general, subsurface soils beneath the site consist of a thin (approximately 3 feet) gravelly sand (fill) layer sandy silt and/or silty SAND with gravel to a depth of approximately 8 to 10.5 feet. The sand and silt overlie a medium dense, brown to grayish brown sandy GRAVEL with cobbles which grades into gravelly SAND with trace silt to a depth of approximately 45 feet. At location MW-9, hard very stiff, dry, dark tan clayey SILT to silty CLAY was encountered at approximately 42.5 to 45.5 feet bgs. At the deep in-situ sparging well, very coarse gravels, cobbles and boulders were encountered at approximately 48 feet to 50.5 feet (total depth). Borings completed in the vicinity of the Howard Amon Park encountered medium dense, damp, brown gravelly SAND (fill) over native sandy GRAVEL and gravelly SAND with interbedded medium to coarse (well sorted) sand (glacio-fluvial deposits).” (13)

All nearby residences and businesses are on City of Richland (COR) water. COR gets its water from the Columbia River and also from several ground water sources. Two of the of the groundwater sources (Well#5 and Well#14) are located within a 2 mile radius of the site and the wells are still used as a sources for COR. Water at Howard Amon Park is supplied by COR and the visitors to the park would not be exposed to the contamination since it is in the groundwater approximately 9 feet below ground surface. In addition, ground water monitoring indicates that the ground water under the grass of the park is no longer contaminated. Seeps along the shoreline of the river were not active during the site visit.

**SPECIAL CONSIDERATIONS (include limitations in site file data or data which cannot be accommodated in the model, but which are important in evaluating the risk associated with the site, or any other factor(s) over-riding a decision of no further action for the site):**

Due to the significant contamination documented on-site being primarily subsurface, the surface water and air routes are not applicable for WARM scoring for this site. Thus, only the groundwater route will be scored.

**ROUTE SCORES:**

Surface Water/Human Health: NS  
Air/Human Health: NS  
Groundwater/Human Health: 75.4

Surface Water/Environmental.: NS  
Air/Environmental: NS

**OVERALL RANK: 2**

WORKSHEET 2  
Route Documentation

1. **SURFACE WATER ROUTE – NOT SCORED.** No data or direct observation exists to support that contaminants were released into the Columbia River. 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:

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:

Source: 1,2,13

Gasoline/Benzene, Lead

b. Explain basis for choice of substance(s) to be used in scoring:

These substances were detected in groundwater samples taken monitor wells at site.

c. List those management units to be considered for scoring:

Source: 1,2,13

Subsurface soil/groundwater.

d. Explain basis for choice of unit to be used in scoring:

Contaminants were detected in soil and groundwater samples at site.

WORKSHEET 6  
Groundwater Route

**1.0 SUBSTANCE CHARACTERISTICS**

<b>1.1 Human Toxicity</b>										
Substance	Drinking Water Standard (µg/L)	Value	Acute Toxicity (mg/ kg-bw)	Value	Chronic Toxicity (mg/kg/day)	Value	Carcinogenicity		Value	
							WOE	PF*		
1 Benzene	5	8	3306	3	ND	ND	A	.029	5	
2 Lead	15	6	-	X	<0.001	10	-	-	X	

\* Potency Factor

Source:

**Highest Value: 10**  
(Max = 10)  
**Plus 2 Bonus Points? 2**  
**Final Toxicity Value: 12**  
(Max = 12)

<b>1.2 Mobility (use numbers to refer to above listed substances)</b>	
<b>Solubility (mg/L)</b>	
Benzene, 1800 mg/L	3
Lead, (K)=0.1-1.0	2

Source: 1,2,4,5

**Value: 3**  
(Max = 3)

<b>1.3 Substance Quantity:</b>	
Explain basis: Based on amount of GRPH (2.8tons, 5684 lbs) removed (see Figure 4)	Source: <u>1,2,6</u> <b>Value: <u>2</u></b> (Max=10)

**2.0 MIGRATION POTENTIAL**

		Source	Value
<b>2.1</b>	<b>Containment (explain basis):</b> Verified contaminated soils	1,2	<b><u>10</u></b> (Max = 10)
<b>2.2</b>	<b>Net precipitation:</b> 5'' – 3.4'' = 1.6''	5	<b><u>1</u></b> (Max = 5)
<b>2.3</b>	<b>Subsurface hydraulic conductivity:</b> sands/gravels		<b><u>4</u></b> (Max = 4)
<b>2.4</b>	<b>Vertical depth to groundwater:</b> ~16 feet (shortest distance in contaminated well MW-25 in 2005 GeoEngineers Report)		<b><u>8</u></b> (Max = 8)



### 3.0 TARGETS<sup>1</sup>

		Source	Value
3.1	<b>Groundwater usage:</b> Private supply, unthreatened alts. avail.		<u>4</u> (Max = 10)
3.2	<b>Distance to nearest drinking water well:</b> <u>3,900 feet</u> (City of Richland Wells)		<u>2</u> (Max = 5)
3.3	<b>Population served within 2 miles:</b> Greater than 10,000		<u>100</u> (Max = 100)
3.4	<b>Area irrigated by (groundwater) wells within 2 miles:</b> <b>Greater than 4,500 acres = 685 acres, score=20 after calculation</b>		<u>20</u> (Max = 50)

<sup>1</sup>Note: Wells located on the opposite side of the Columbia River from the site were not included in the calculations since they are cross-gradient from the source of contamination.

### 4.0 RELEASE

		Source	Value
	<b>Explain basis for scoring a release to groundwater:</b> Confirmed release to groundwater.		<u>5</u> (Max = 5)

### SOURCES USED IN THIS REPORT

1. Results of Site Assessment of Time Oil Property #01-056 Located at 500 George Washington Way, Richland, WA, Environmental Science & Engineering, Inc, Redmond, Washington, November 4, 1993.
2. Subsurface Petroleum Hydrocarbon Assessment and Remedial Investigation, Richland Jackpot Foodmart (Time Oil Co. Property 01-056), AGRA Earth & Environmental (Spokane, WA), Inc, June 19, 1995.
3. Limited Qualitative Risk Assessment Richland Jackpot (Time Oil Co. Property 01-056), AGRA Earth & Environmental, Inc, October 13, 1995.
4. Results of Bank/Seep Sampling on Columbia River Near Time Oil Property 01-056, Richland, WA, AGRA Earth & Environmental, Inc, August 17, 1995..
5. Phase I Environmental Site Assessment, Jackpot Foodmart, AGRA Earth & Environmental, Inc, March 1, 1996.

6. Report: Remedial Activities September 2001 through December 2002, Time Oil Company Property 01-056, GeoEngineers, May 20, 2003.
7. Groundwater Monitoring Report (April 2005), Richland Jackpot (Property 01-056), GeoEngineers, Inc., June 21, 2005.
8. Groundwater Monitoring and Operations and Maintenance Report, First Quarter 2007, Sound Environmental Strategies Corporation, June 6, 2007.
9. Groundwater Monitoring and Operations and Maintenance Report, Second Quarter 2007, Sound Environmental Strategies Corporation, October 29, 2007
10. Groundwater Monitoring and Operations and Maintenance Report, Third Quarter 2007, Sound Environmental Strategies Corporation, October 29, 2007.
11. Groundwater Monitoring and Operations and Maintenance Report, Second Quarter 2008, Sound Environmental Strategies Corporation, October 27, 2008.
12. Remedial Action Alternatives Analyses, Time Oil. Facility No 01-056, Sound Environmental Strategies Corporation, May 19, 2006.
13. Site Closure Plan: PC&F Site 01-056, Environ Strategy Consultants, Inc., January 21, 2011.
14. Washington State Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January 1992
15. Washington State Department of Ecology, WARM Scoring Manual, April 1992.
16. Washington Climate – Net Rainfall Table
17. Washington State Department of Ecology, Water Rights Application System (WRATS) printout for two-mile radius of site.
18. Washington Department of Health, Sentry Internet Database printout for public water supplies.
19. Fourth Quarter 2011 Groundwater Monitoring Report, Site 01-056, Environ Strategy Consultants, Inc., January 26, 2012.

**Appendix I: Figures (see Attachments)**

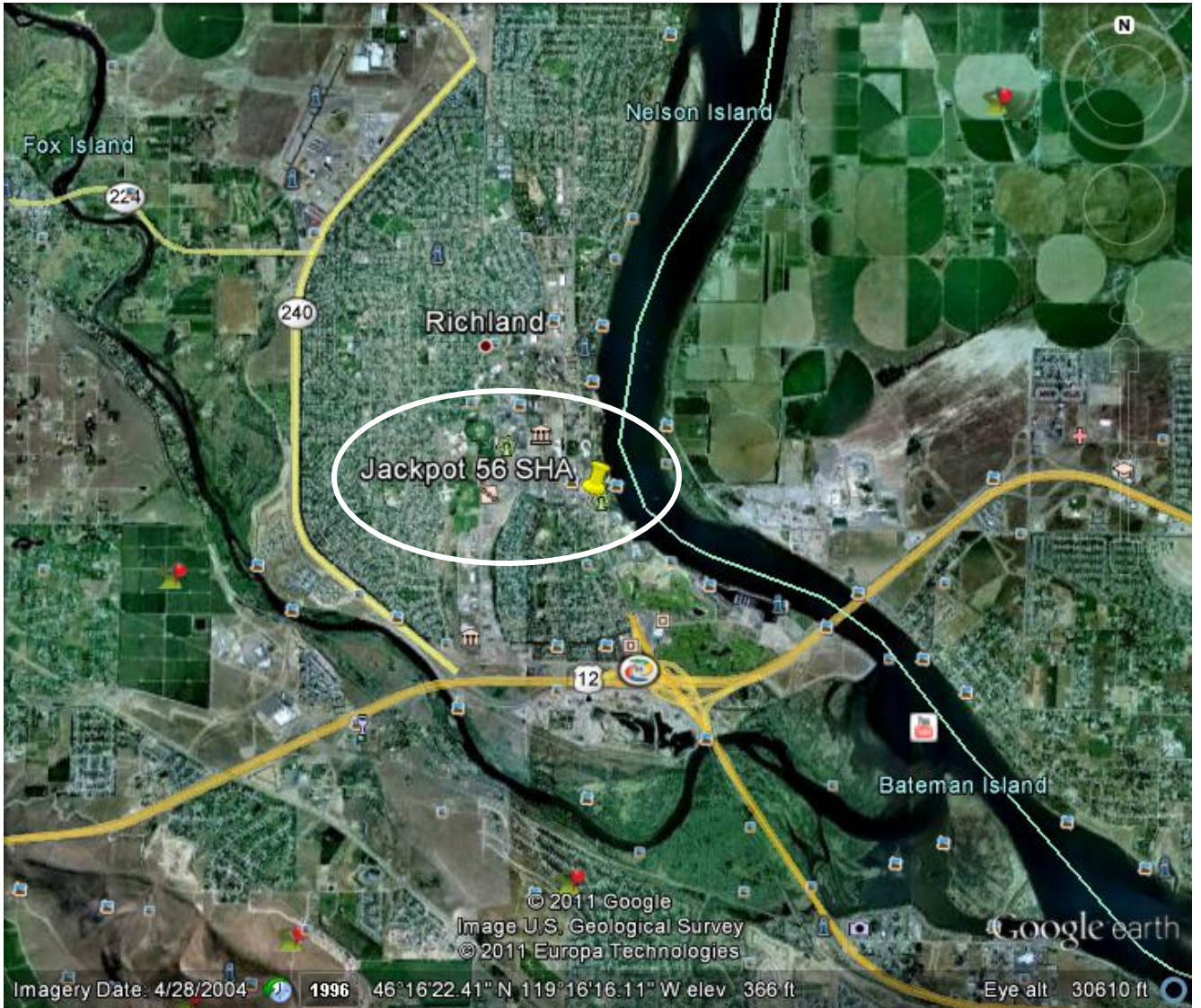


Figure 1. Site Map. Aerial photo of Richland area showing location of Jackpot Food Mart 056. Photo taken in April 2004.



Figure 2. Aerial Photo of site taken in 1996 prior to the construction of the Richland Community Center.



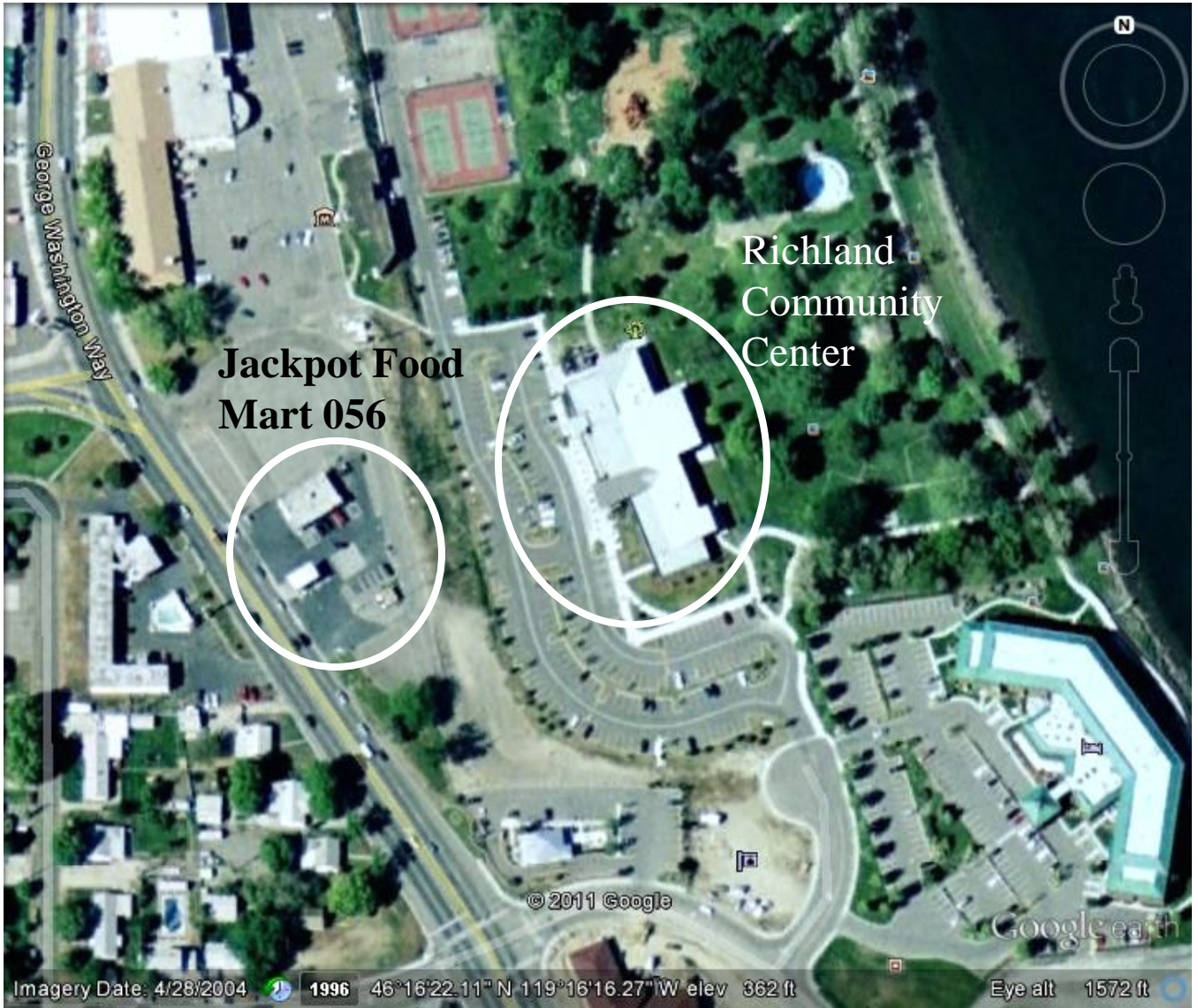


Figure 3. Aerial photo of Richland area showing location of Jackpot Food Mart 056 and Richland Community Center to the east. Photo taken in April 2004.

**Appendix II: Tables (see Attachments)**

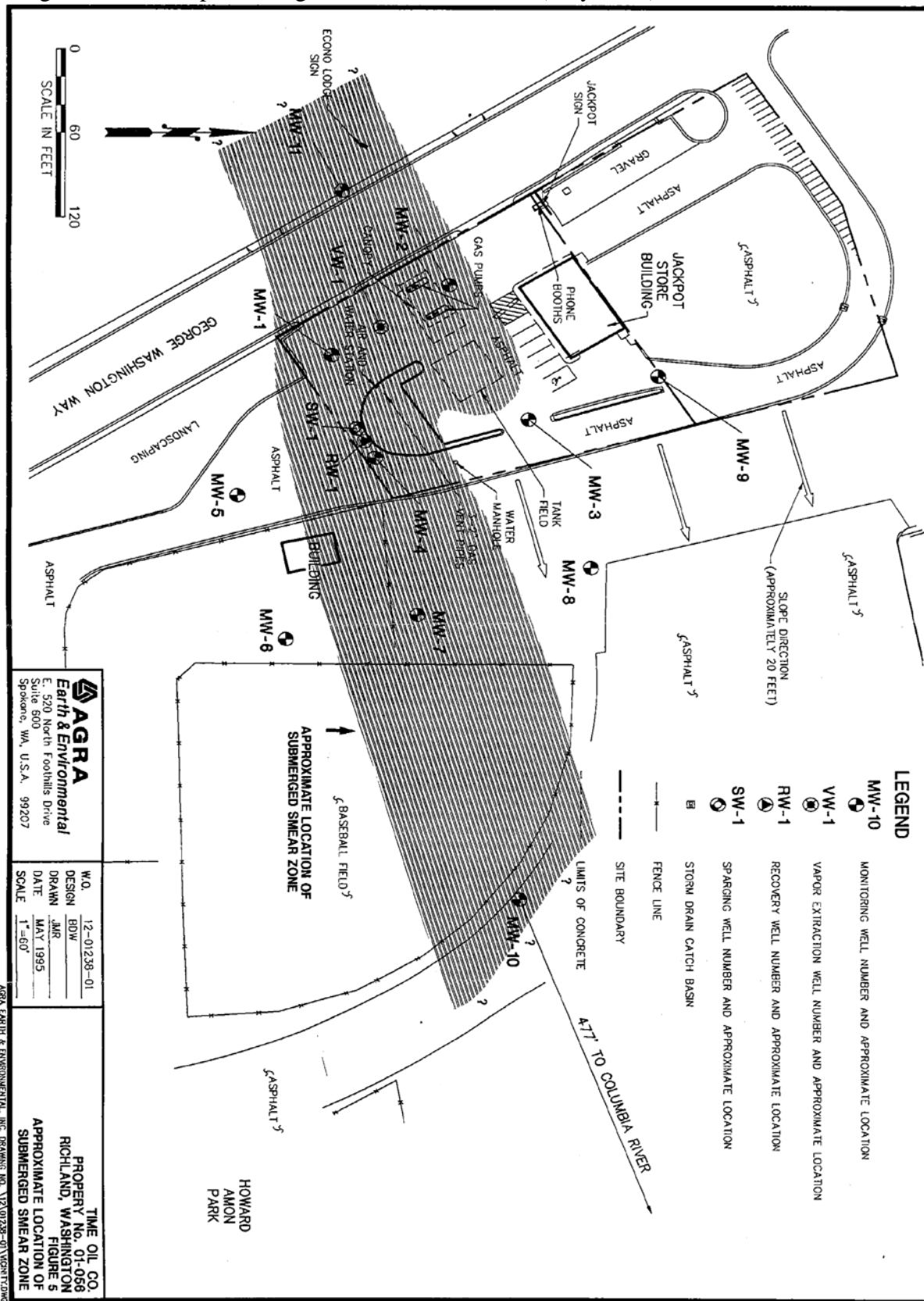
Table 1. Partial List of Petroleum Contaminated Site Within a 0.5 Mile Radius of the Jackpot Food Mart.

Site Name	Facility ID	Address	City
CBC WSU Nurse Training Facility	999978	1011 Northgate Dr.	Richland
Chevron Station	27223439	1323 Lee Blvd	Richland
L&L Exxon	78835792	1315 Lee Blvd	Richland
P&K Auto Service	38448497	1415 Gillespie	Richland
US Bank Facility	44976422	701 Stevens Drive	Richland





Figure 5. Site Map Showing Wells Present on Site (May 1995)



**LEGEND**

- MW-10 MONITORING WELL NUMBER AND APPROXIMATE LOCATION
- VW-1 VAPOR EXTRACTION WELL NUMBER AND APPROXIMATE LOCATION
- RW-1 RECOVERY WELL NUMBER AND APPROXIMATE LOCATION
- SW-1 SPRACING WELL NUMBER AND APPROXIMATE LOCATION
- STORM DRAIN CATCH BASIN
- FENCE LINE
- SITE BOUNDARY

APPROXIMATE LOCATION OF SUBMERGED SMEAR ZONE

**AGRA**  
Earth & Environmental  
E. 520 North Foothills Drive  
Suite 600  
Spokane, WA, U.S.A. 99207

W.O. 12-01239-01  
DESIGN BDW  
DRAIN JHR  
DATE MAY 1995  
SCALE 1"=60'

TIME OIL CO.  
PROPERTY No. 01-056  
RICHLAND, WASHINGTON  
FIGURE 5  
APPROXIMATE LOCATION OF SUBMERGED SMEAR ZONE

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING NO. 12-01239-01-V01011239

Tables 2 and 3. Groundwater and Soil Data: Summer 1993

**LABORATORY-REPORTED ANALYTICAL RESULTS OF SELECTED SOIL SAMPLES ANALYZED FOR GASOLINE CONSTITUENTS (ppm)**

Sample ID	TPH-D	TPH-G	B	T	E	X
MW-1 @ 20'	1000	1500	ND<0.75	6.7	22	340
MW-1 @ 25'	400	570	ND<1.5	6.4	11	95
VW-1 @ 15'	ND<50	ND<5	ND<0.015	ND<0.015	ND<0.015	ND<0.045
VW-1 @ 25'	ND<50	ND<5	ND<0.015	ND<0.015	ND<0.015	ND<0.045
MW-2 @ 5'	ND<50	ND<5	ND<0.015	ND<0.015	ND<0.015	ND<0.045
MW-2 @ 10'	ND<50	ND<5	ND<0.015	ND<0.015	ND<0.015	ND<0.045
MW-2 @ 27'	ND<50	ND<5	ND<0.015	ND<0.015	ND<0.015	ND<0.045
B-3 @ 18'	ND<50	ND<5	ND<0.015	ND<0.015	ND<0.015	ND<0.045
B-3 @ 30'	ND<50	ND<5	ND<0.015	ND<0.015	ND<0.015	ND<0.045
MTCA	200	100	0.5	40	20	20

**NOTES:**

- TPH-D: Total petroleum hydrocarbons as diesel
- TPH-G: Total petroleum hydrocarbons as gasoline
- BTEX: Benzene, toluene, ethylbenzene, and total xylenes
- ND: Not detected at indicated detection limit
- MTCA: State of Washington Model Toxics Control Act Cleanup Level - Soil
- ppm: Parts per million or milligrams per kilogram

**LABORATORY-REPORTED ANALYTICAL RESULTS OF GROUNDWATER SAMPLES COLLECTED JUNE 21 AND JULY 8, 1993**

Well ID	TPH-D (ug/l)	TPH-G (ug/l)	B (ug/l)	T (ug/l)	E (ug/l)	X (ug/l)
MW-1	19,000	2,300	35	1,000	620	4,600
MW-2	2,600	6,800	38	550	190	1,900
	780*	9,200*	25*	350*	170*	660*
MW-3	ND<1,000	400	3	2	1	ND<3
MW-4	15,000	43,000	49	1,200	1,900	12,000
MW-5	ND<1,000	ND<1,000	ND<1	ND<1	ND<1	ND<3
VW-1*	5,200*	59,000*	ND<50*	2,000*	2,400*	14,000*
MTCA	1,000	1,000	5	40	30	20

**NOTES:**

- TPH-D: Total petroleum hydrocarbons as diesel
- TPH-G: Total petroleum hydrocarbons as gasoline
- BTEX: Benzene, toluene, ethylbenzene, and total xylenes
- MTCA: State of Washington Model Toxics Control Act Clean-up Level
- ug/l: Micrograms per liter or approximately parts per billion
- ND: Not detected at indicated detection limit
- \*: Sample results from July 8, 1993

Figure 6. Cross Section of the Smear Zone

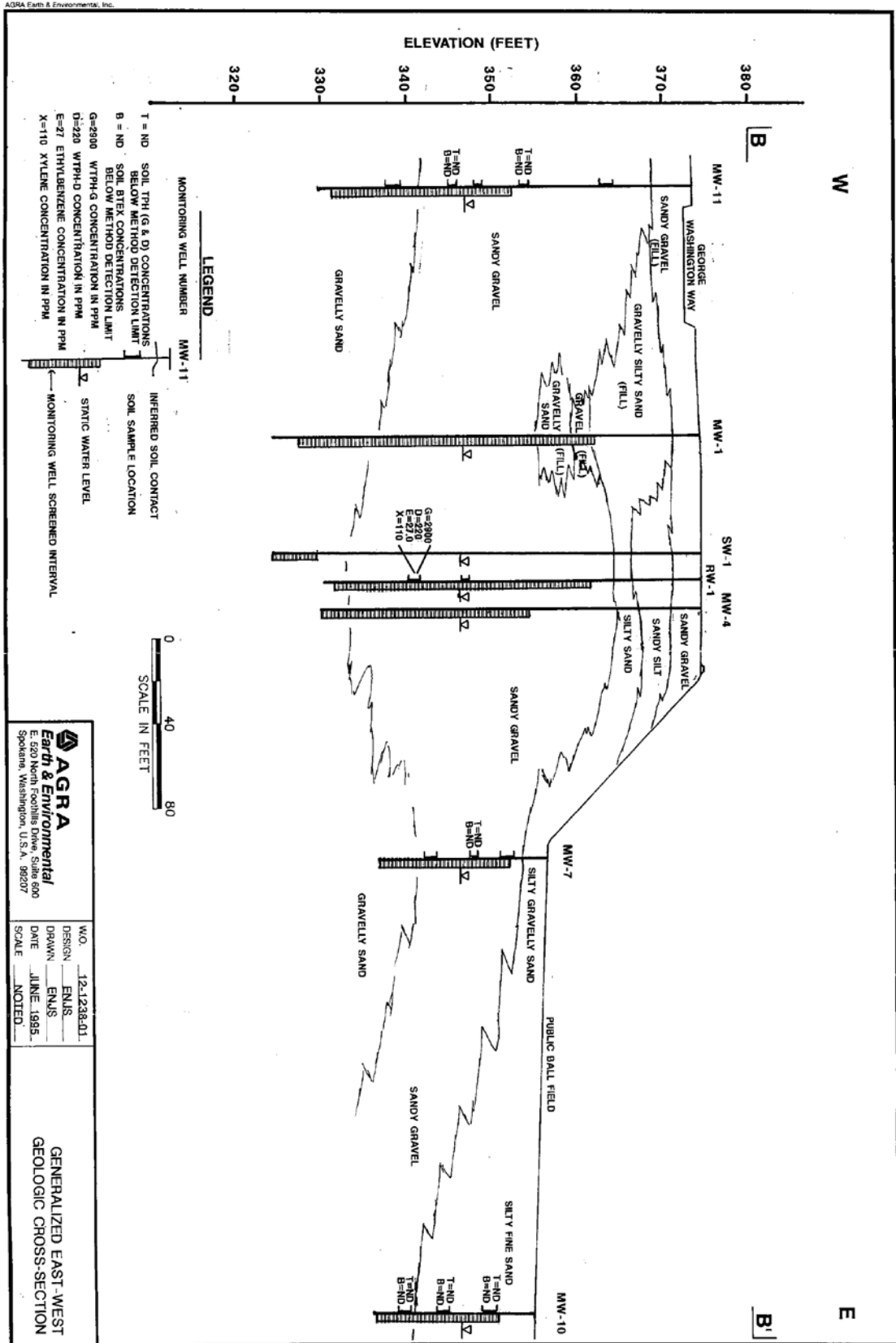


Figure 7. Map Showing Where Seep Samples Were Taken Along the Columbia River Downgradient from the Site.

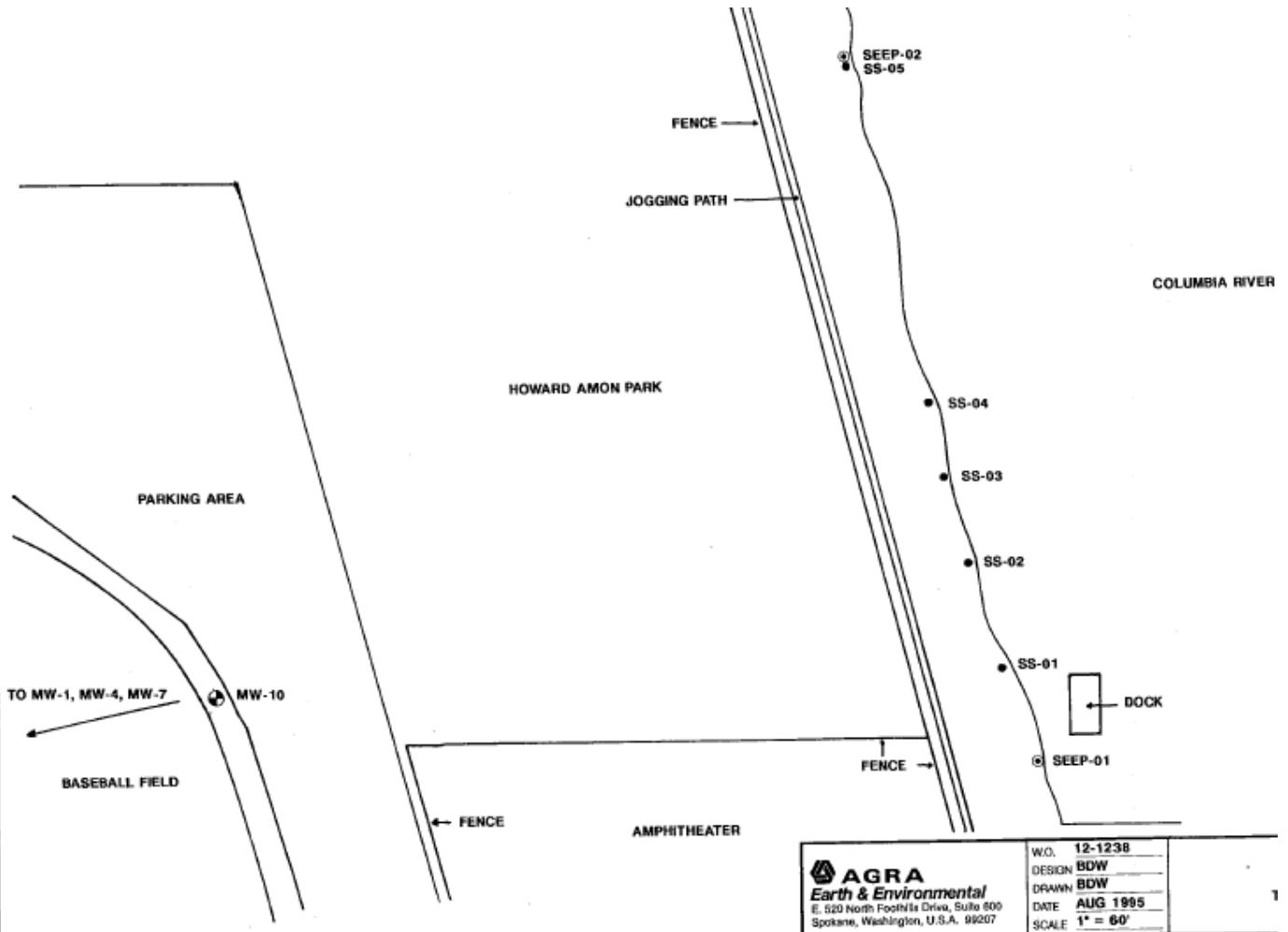


Figure 8. Map of Site Showing Contamination Prior to Remediation.

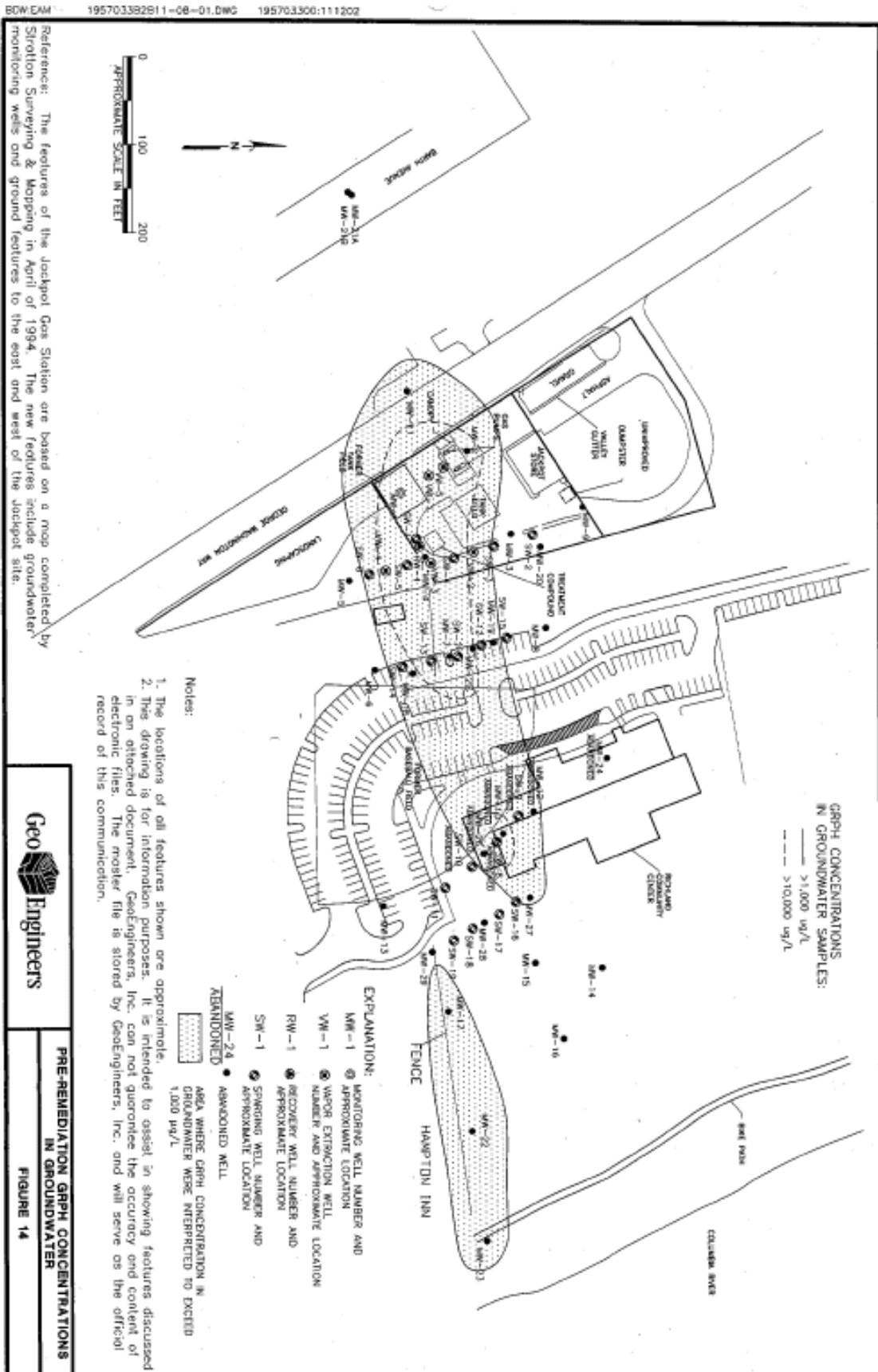
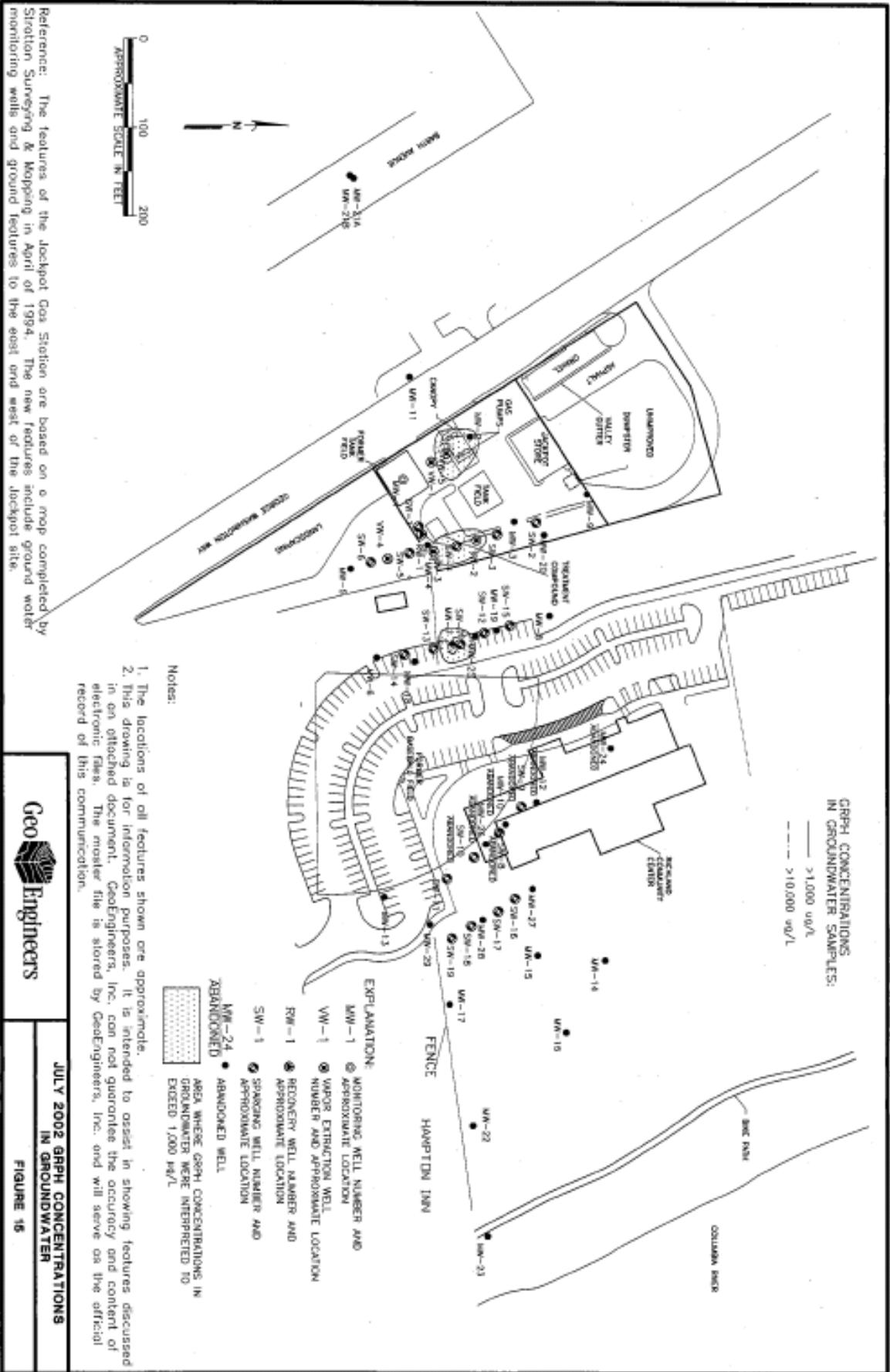


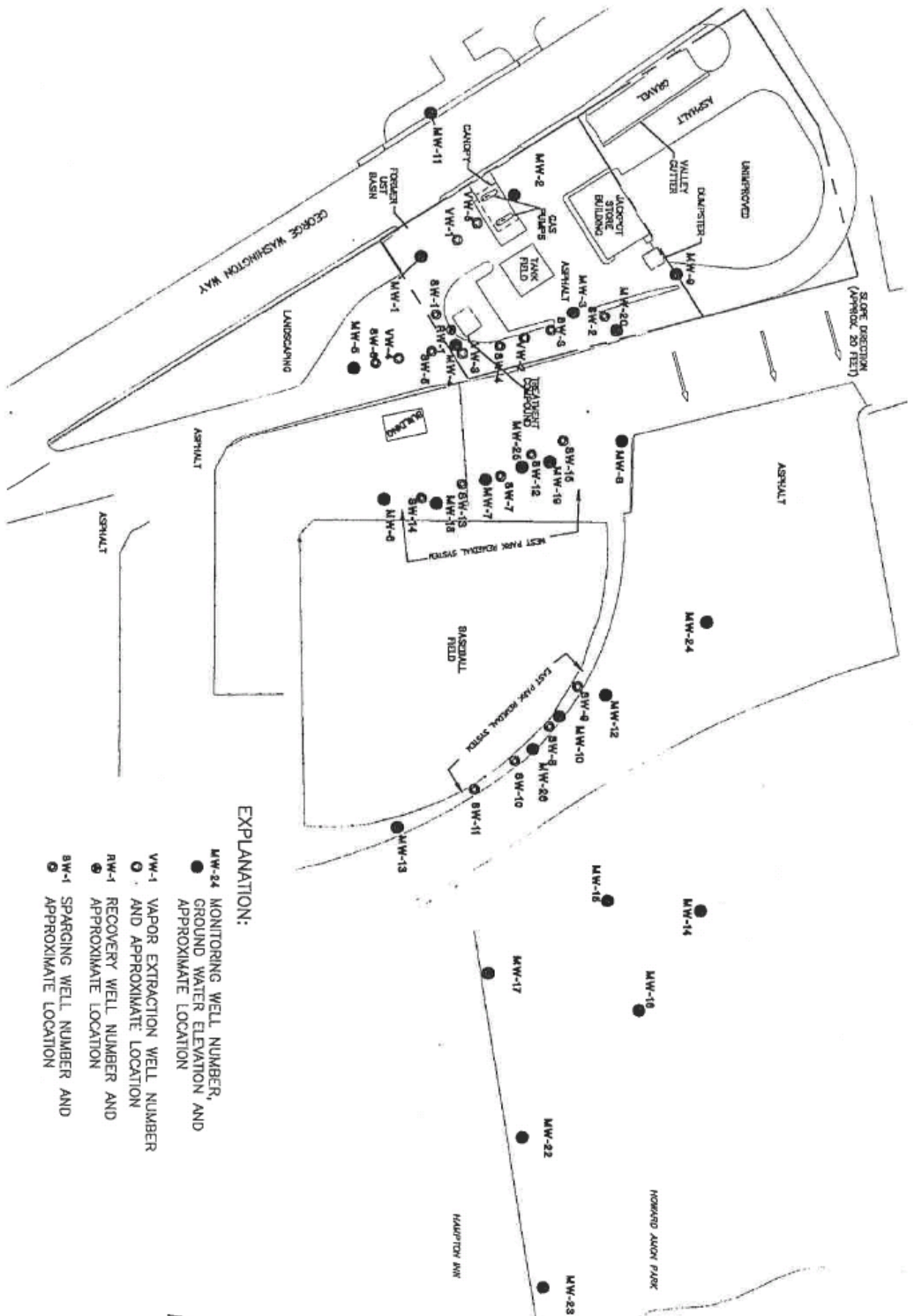


Figure 9. Map Showing Extent of Contamination Post-remediation (July 2002)



**JULY 2002 GRPH CONCENTRATIONS IN GROUNDWATER**  
**FIGURE 16**

Figure 10. Site Map Showing the West and East Side Remedial Systems



**EXPLANATION:**

- MW-24 MONITORING WELL NUMBER, GROUND WATER ELEVATION AND APPROXIMATE LOCATION
- VAPOR EXTRACTION WELL NUMBER AND APPROXIMATE LOCATION
- RECOVERY WELL NUMBER AND APPROXIMATE LOCATION
- SPARGING WELL NUMBER AND APPROXIMATE LOCATION



Figure 11. Schematic of Remediation Systems

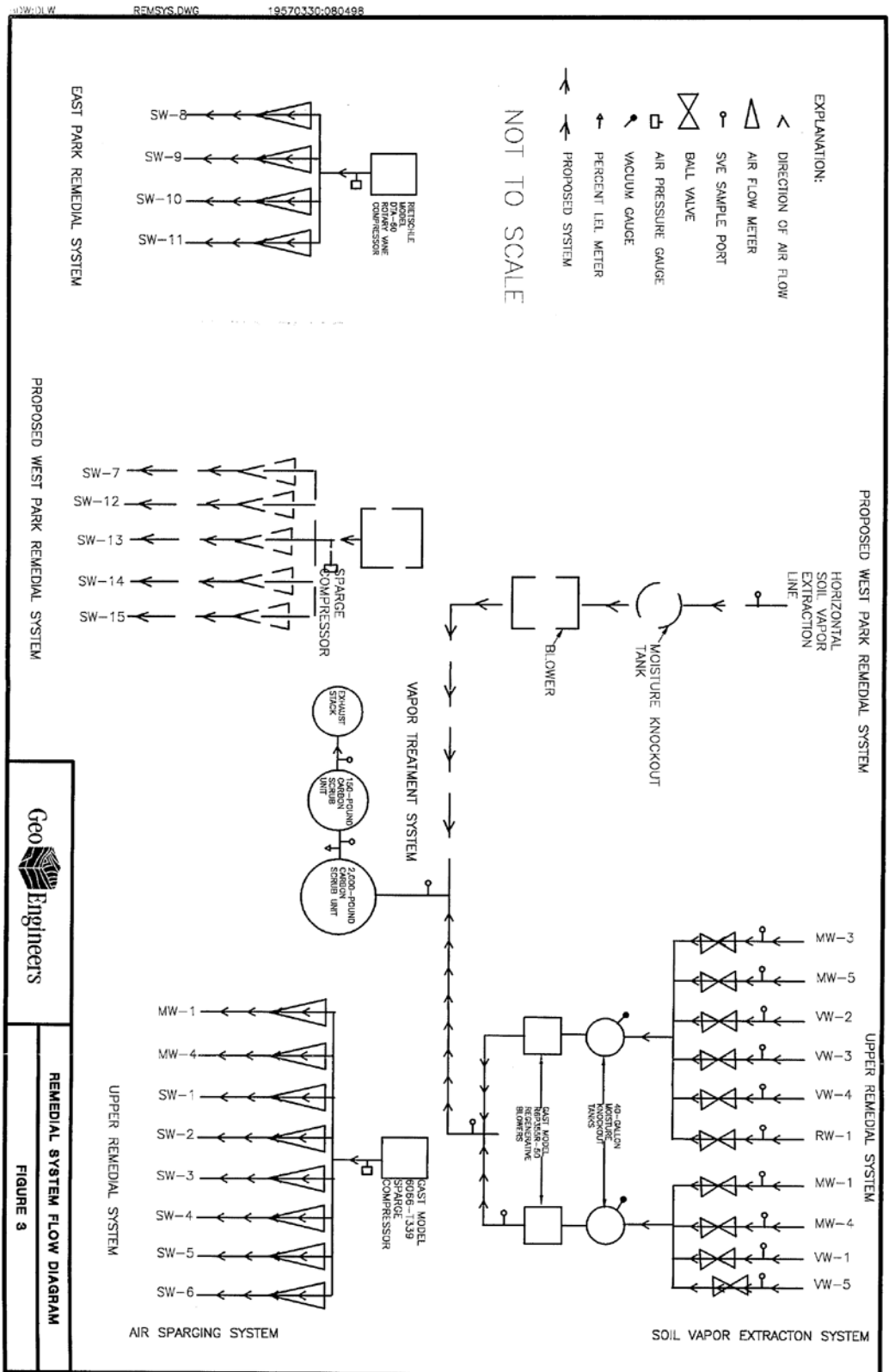


Table 4. Remedial Systems at the Jackpot Food Mart and Hydrocarbon Capture.

Remedial System	Location	Start Date	End Date	Hydrocarbons Recovered through 2008 (Pounds)
<b>Subject property (SPRS)</b>	SE Corner of site property. Modified in 2007 to include 3 Plume Eater Wells	10/1996	Last record of maintenance and operation May 2008	2,768 <sup>1</sup> 2,409 <sup>2</sup>
<b>East Park (EPRS)</b>	East of former baseball field Howard Amon Park (off-site)	5/1996	10/2000(Re-located due to construction of Richland Community Center)	NA
<b>East Park-2 (EPRS-2)</b>	SE Corner of Richland Community Center (off-site)	6/2001	Decommissioned in First Quarter of 2006 due to low levels of contaminants of concern	NA
<b>West Park (WPRS)</b>	West of former baseball field (off-site)	1/1999	12/1999 (SVE)?	507 <sup>1</sup>

<sup>1</sup>Report: Remedial Activities September 2001 through December 2002, Time Oil Company Property 01-056, GeoEngineers, May 20, 2003.

Figure 12 Site Map Showing the Direction of Groundwater Flow

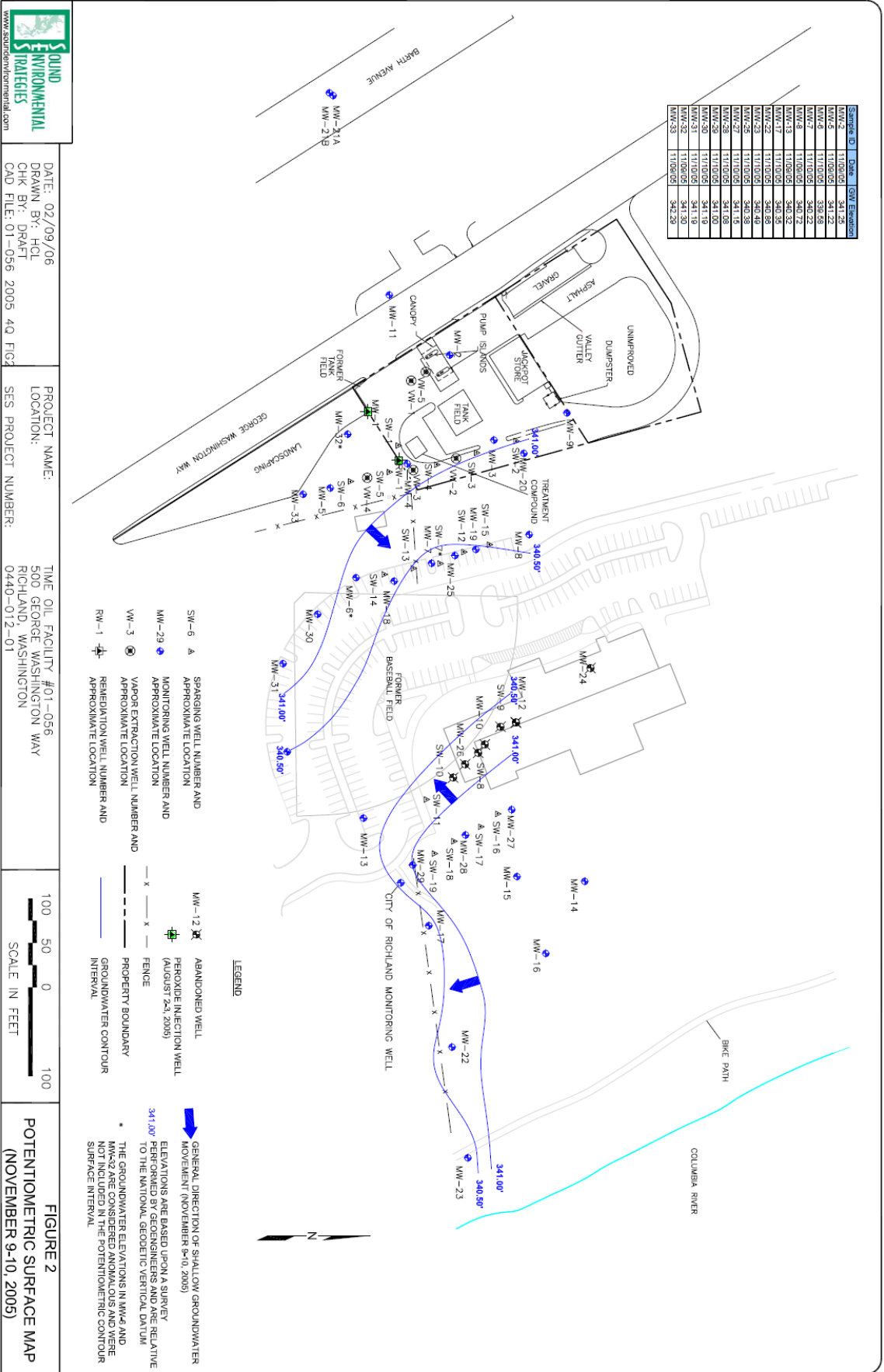


Figure 13. Site Map Showing Treatment Compound and Decommissioned Wells

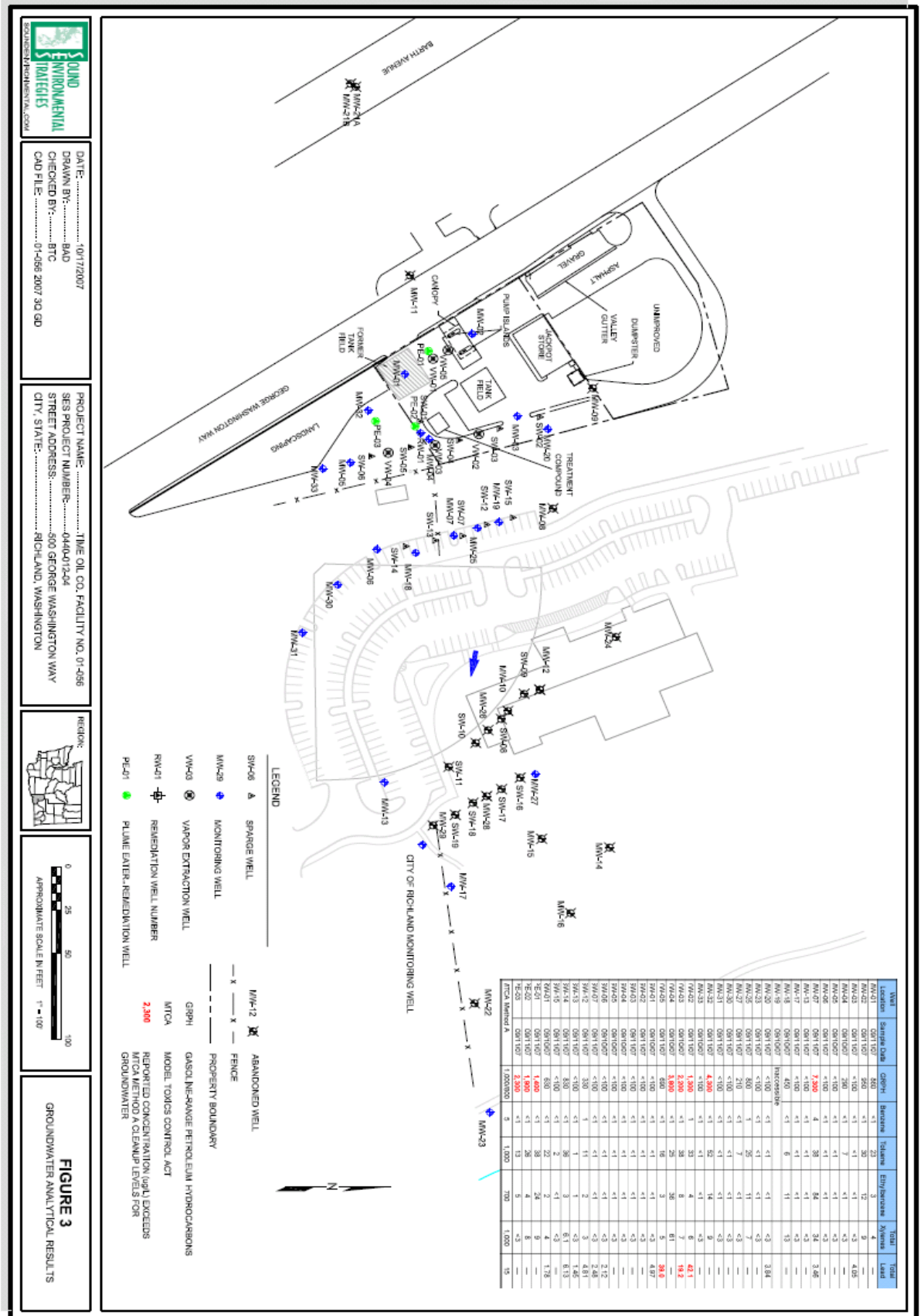


Table 5. Ground Water Testing Performed in July 2010

WELL ID	WELL STATUS	SAMPLE DATE	ANALYTICAL PARAMETERS						
			TPH-Gx (µg/L)	B (µg/L)	T (µg/L)	E (µg/L)	X (µg/L)	MTBE (µg/L)	Lead (µg/L)
MW-02	Active	7/13/10	<50	<0.5	<0.5	<0.5	<0.5	<0.5	12.5
MW-05	Active	7/13/10	67.8	<0.5	<0.5	<0.5	<0.5	<0.5	22
MW-06	Active	7/13/10	377	<0.5	<0.5	0.52 J	<0.5	<0.5	na
MW-07	Active	7/13/10	<50	<0.5	<0.5	<0.5	<0.5	<0.5	14.2
MW-13	Active	7/12/10	<50	<0.5	<0.5	<0.5	<0.5	<0.5	na
MW-17	Active	7/12/10	<50	<0.5	<0.5	<0.5	<0.5	<0.5	na
MW-23	Active	7/12/10	<50	<0.5	<0.5	<0.5	<0.5	<0.5	na
MW-25	Active	7/13/10	<50	<0.5	<0.5	<0.5	<0.5	<0.5	na
MW-27	Active	7/12/10	<50	<0.5	<0.5	<0.5	<0.5	<0.5	na
MW-30	Active	7/13/10	<50	<0.5	<0.5	<0.5	<0.5	<0.5	na
MW-31	Active	7/13/10	<50	<0.5	<0.5	<0.5	<0.5	<0.5	na
MW-32	Active	7/13/10	52.2	0.65 J	<0.5	0.61 J	<0.5	<0.5	13.4
MW-33	Active	7/13/10	57.6	<0.5	<0.5	<0.5	<0.5	<0.5	9.28
MTCA Cleanup Goals			1,000/800 <sup>1</sup>	5	1,000	700	1,000	20	15

Figure 14. Photos Taken During Site Visit on 011012



Looking to the North .

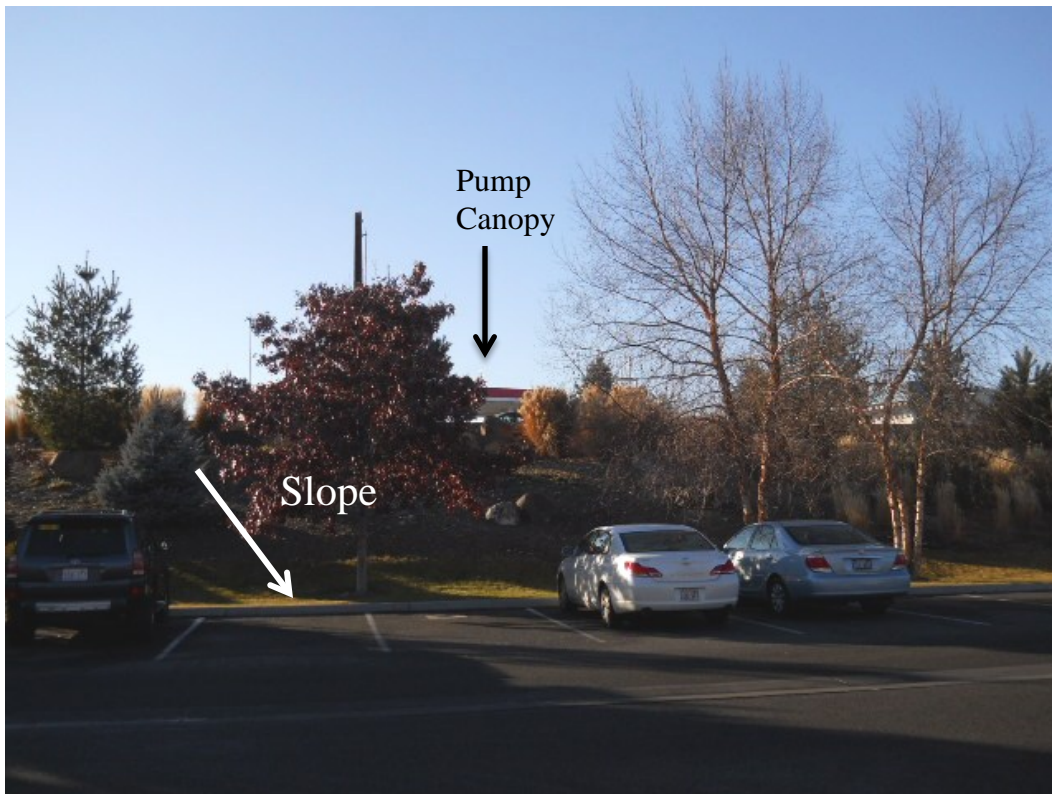


Photo taken in the Richland Community Center parking lot looking to west. Top of canopy above gas pumps can be seen.



Figure 15. Photo of Cutaway Bank Along Columbia River Downgradient of the Jackpot Food Mart (Looking West. Arrow is pointing to fencepost of fence shown on many of the site maps).

