CDM

RELEASE #592008
SEDRO Woolley Gull #224

Gull Station 224

Hydrocarbon Delineation
Former Gull Station No. 224
21481 State Route 20
Sedro Woolley, Washington

March 18, 2005

Prepared For:

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Seattle, Washington

Prepared By:

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CDM Project No. 19932.43894

A Report Prepared For :

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HYDROCARBON DELINEATION
FORMER GULL STATION NO. 224
21481 STATE ROUTE 20
SEDROWOOLLEY, WASHINGTON

March 18, 2005

For:

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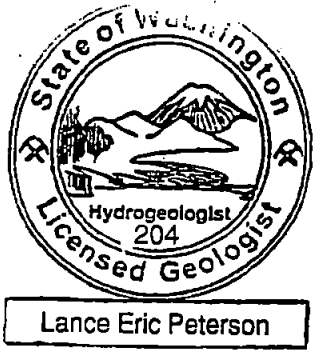

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Introduction

This report documents results of Camp Dresser & McKee Inc.'s (CDM) soil and groundwater assessment of the former Gull Station No. 224 in Sedro-Woolley, Washington (site or subject property). The purpose of this investigation was to evaluate the extent of hydrocarbon contamination onsite and potential for offsite migration.

Site Description

The site is located at the northwest corner of State Route (SR) 20 and Collins Road in Sedro Woolley, Washington (**Figure 1**). The site is 0.39 acres in size and somewhat triangular in shape. A franchised Shell gas station with a convenience store (Quick Food Store) is currently operating on the site. Site features include the convenience store with a detached canopy, two pump islands, three underground storage tanks containing three grades of unleaded gasoline, and a compressed air pump. The entrances, canopied area, and parking areas are paved with asphalt and concrete, except for landscaped planter areas. A narrow strip along the west side of site is landscaped with shrubs. A wedge on the north side of the site is covered by mowed grass. Stormwater runoff in the paved areas is handled by two drywells that are located in the asphalt near the southeastern and southwestern corners of the site. Site features are shown in **Figure 2**.

The station is located in a mixed residential and farming area. Residential properties bound the site on the north and west sides. The home on the west side burned down a number of years ago and the only thing currently remaining on that lot is the concrete foundation. Collins Road bounds the site to the east, followed by an overgrown lot with an apparently vacant house. To the south, across SR 20 are a Burlington Northern railroad line, farmland, and a treed riparian corridor.

Geologic Setting

The site lies at an elevation of about 40 feet above mean sea level (MSL) within the Skagit River Valley and is underlain by alluvial soils deposited by the Skagit River. Various sloughs extend throughout the river valley. Gages Slough extends within about 900 feet of the northwest corner of the site and Hart Slough extends within about 1,500 feet southeast of the intersection of Collins Road and SR 20.

Background

In November 2004, CDM conducted a subsurface soil and groundwater investigation at the site (CDM, 2005). During the subsurface investigation, CDM drilled four borings on the site and installed a monitoring well in each boring. The monitoring wells, initially identified as B1 through B4, but from here out identified as MW1 through MW4, are shown on **Figure 2**. Field screening and analytical testing determined the presence of hydrocarbons in soil and groundwater. The hydrocarbon plume appeared to be migrating in a westerly direction, although the limits of the plume were not fully delineated.

Field Investigation

Purpose and Scope of Work

The purpose of this investigation was to evaluate the downgradient extent of the hydrocarbon plume and potential offsite impact. CDM's scope of work to achieve this objective consisted of the following:

- Explored subsurface conditions at seven locations using direct-push sampling methods.
- Examined soils encountered throughout each test hole to check for evidence of soil and groundwater contamination.
- Collected one groundwater sample from each test hole, and at selected locations, a soil sample, and submitted them to an analytical laboratory for analysis of total petroleum hydrocarbons quantified as gasoline (TPH-G), and for benzene, toluene, ethylbenzene, and xylenes (BTEX).
- Purged and sampled the four existing monitoring wells and submitted collected groundwater samples for analysis of TPH-G and BTEX.
- Measured water levels in existing monitoring wells and resurveyed well casing elevations to determine groundwater flow direction.
- Evaluated current and historical field observations and analytical results as summarized in this report.

Drive-Point Sampling

The field investigation was conducted on February 3, 2005. A truck-mounted drive-point sampling device operated by Cascade Drilling of Woodinville, Washington was utilized to explore subsurface conditions and to collect subsurface soil and groundwater samples for laboratory analysis. The drive-point sampling method utilizes a hydraulically-powered percussion/direct push machine that drives a tool string directly through the ground. Seven test holes denoted as B5 through B11 were extended during this investigation. Test hole locations are shown on **Figure 2.**

Soil samples were collected continuously using core samplers attached to drive rods. Four-foot-long core samplers with acetate liners were used. With the exception of B11, each test hole was logged according to the Unified Soil Classification System as described on **Figure A1** in **Appendix A.** Test hole logs are included in **Appendix A** as **Figures A2** through **A8.** At B11 the rods with the attached well screen were simply driven to the desired depth into groundwater without collecting soil samples.

Soil Sampling: Soil samples were collected from three of the test holes for laboratory analysis. Soil samples from B7 and B9 were collected at depths where there was a strong hydrocarbon odor. The soil sampled from B10 was collected at the groundwater interface. Soil samples were collected using approximately 5 gram core samples, dispensed immediately into preweighed 40 mL VOA vials, and sealed in accordance with EPA Method 5035A. Additional sample was also collected into a four-ounce glass jar for moisture determination.

Groundwater Sampling: Groundwater samples were collected through a stainless steel screen attached to the end of the tool string. After the rods are driven to the desired depth into the saturated interval the rods were pulled back, thereby exposing a four-foot-long screen. Dedicated tubing was inserted through the rods to the desired depth and groundwater was purged and sampled using a peristaltic pump. Approximately 0.5 gallon to 3 gallons of water were purged prior to sampling. Temperature, pH, and specific conductance were measured and recorded before collecting each sample. These data are summarized in **Table 1**. Groundwater samples were collected from the pump discharge directly into laboratory supplied pre-cleaned 40-milliliter (mL) VOA vials containing hydrochloric acid as a preservative.

Decontamination and Hole Closure: Each test hole was filled with bentonite granules and patched with asphalt. Disposable sampling equipment was disposed of at each sample interval. Non-disposable sampling equipment was decontaminated by steam cleaning between test holes.

Survey/Groundwater Elevations

Well casing elevations were surveyed to the nearest 0.01 foot using an arbitrary datum of 100.00 feet. The benchmark was the ground surface next to bollard at western end of the northern pump island. Prior to purging and sampling, water depths and potential free phase hydrocarbons were measured to the nearest 0.01 foot using an MMC electronic oil/water interface probe. No measurable free phase hydrocarbons were present in any of the wells. Water level elevations at monitoring wells MW1 through MW4 are summarized in **Table 2.**

Monitoring Well Sampling

Prior to sampling, each of the four existing wells was purged of stagnant water within the well casing and sandpack. Disposable bailers and nylon twine were used to purge the wells and collect groundwater samples. Temperature, pH, and specific conductance were monitored during purging to check for stabilization before collecting each sample and are summarized in **Table 1.** Groundwater samples were collected in laboratory-supplied glass 40 milliliter (ml) containing hydrochloric acid as a preservative.

Laboratory Analysis

Soil and groundwater samples were delivered under chain-of-custody protocol to OnSite Environmental Inc. (OnSite) in Redmond, Washington for chemical analysis. All samples were analyzed for TPH-G by Northwest Method NWTPH-Gx, and for BTEX by EPA Method 8021B. OnSite's analytical report is provided in **Appendix B.**

Findings and Discussion

Observations

Soils encountered during drilling consisted of interlayered, alluvial, medium to fine-grained sand and silty sand, sandy silt, and silt. Groundwater occurred at approximately 5 to 7 feet below ground surface (ft bgs). The groundwater level had risen by approximately 4 to 5 feet between November 23, 2004 and February 3, 2005 and the groundwater flow direction changed from westerly to easterly, as shown on **Figure 3.**

As noted previously, there are two drywells on the property – one each at the southeast and southwest corners of the property. During our work on February 2, the bottom of the southwest drywell was measured at 6' 4" ft bgs and there was two feet of water in it. The bottom of the southeast drywell was measured at 4' 1" ft bgs and there was 8 inches of water in it. We were not able to determine the exact construction of this drywell system. It appears that water captured in an adjacent catch basin is diverted to the drywell. The drywell appears to be a circular tank set in the ground with a gravel bottom. The effect of the drywells on the groundwater is not known. However, given the location and purpose of these wells, they could cause periodic mounding effects on the east and west sides of the property.

In B7 hydrocarbon odor was apparent at 8 ft bgs and appeared to become stronger at 13 ft bgs The boring was terminated at 14 ft bgs where hydrocarbon odors where quite strong. Similarly, a strong hydrocarbon odor was noted in B9 between about 14 and 16 ft bgs. In both instances, hydrocarbon contamination appeared to be following a silty sand layer that was overlain by a two to four foot silt layer. This is consistent with prior observations in the drilled borings, where the highest concentrations were observed within the 12 to 14 ft depth. Given these observations, we surmise that the release from the UST system is preferentially following a sand layer and may be somewhat capped by an overlying silt layer.

The first two test holes (B5 and B6) were completed at 10 ft bgs because groundwater was encountered at 5 ft bgs. Given observations at B7, the remaining test holes were extended to depths between 15 and 17 ft bgs to ensure that hydrocarbons migrating through this sand layer would be sampled. The temporary well screen was placed across the interval considered most likely to capture hydrocarbon contamination. In

addition, whereas the screened interval at B5 was 6 to 10 ft bgs, a second probe was extended next to B5 (B5b) and a second groundwater sample was collected from the screened interval of 11 to 15 ft bgs.

Analytical Results

Soil analytical data are summarized in **Table 3** and compared against the Model Toxics Control Act (MTCA) Method A cleanup levels. **Figure 4** also summarizes hydrocarbon concentrations in groundwater with respect to exploration locations and site features. Hydrocarbon concentrations were not entirely consistent with field observations. TPH-G, benzene, ethylbenzene, and xylenes were detected in the 13.5 ft sample from B7, but hydrocarbons were not detected in the 15 ft sample from B9. Although TPH-G and benzene concentrations exceeded their respective MTCA Method A soil cleanup levels, the concentrations were not particularly high. Both of these samples had a very strong hydrocarbon odor, so it is probable that hydrocarbons are primarily in the dissolved phase.

No hydrocarbons were detected in the 5 ft soil sample from B10, which was collected at the groundwater interface.

Groundwater

The laboratory results for the groundwater samples are summarized in **Table 4** and compared against MTCA Method A groundwater cleanup levels and prior data collected from MW1 through MW3.

During the current investigation, hydrocarbons were detected in groundwater samples from MW1, MW3, B7, B9, and B11 and concentrations exceeded one or more MTCA Method A cleanup levels at all of these locations. Based on hydrocarbon analytical and groundwater gradient data, the eastern, western, and northern limits of the plume have been delineated. The hydrocarbon plume has migrated toward the west into the parking lot area. It also appears to have migrated across the southern property line which abuts SR20.

Hydrocarbon concentrations in groundwater were consistent with field observations; however, significant differences were observed in hydrocarbon concentrations at MW1 and MW3 between the November 2004 and February 2005 sampling rounds. For example, in November the TPH-G concentration at MW1 was reported at 2,100 micrograms per liter (µg/L), but in February the TPH-G concentration was reported at only 320 µg/L. The TPH-G concentration at MW3 was reported at 55,000 µg/L in November, but was only 860 µg/L in February. However, TPH-G in B7, which is within a few feet of MW1, was reported at 80,000 µg/L in the February sample.

Conclusions and Recommendations

Groundwater depth and flow direction varies substantially and fairly rapidly at this site in response to seasonal variations in rainfall and the presence of drywells. The subsurface is further complicated by a layered alluvial stratigraphy of alternating sands and silts. These conditions all appear to be substantially impacting the occurrence and migration of the hydrocarbon plume.

Hydrocarbon contamination appears to be migrating along layers between 8 and 18 ft bgs, even though groundwater is seasonally as high as 5 ft bgs. This may account for some of the concentration variations observed at individual wells and between adjacent sample locations. The sudden influx of water to the subsurface during rain events through the drywells may also be causing some movement and dilution of the hydrocarbon plume.

At this time, the plume extends in an east-west direction across the center of the site, but has not migrated offsite on the western, eastern, and northern property boundaries. The plume extends at least to the southern property line. There are numerous utility lines along the southern property line, which may influence plume migration.

We recommend evaluating remedial technologies and associated costs to address the release. This may include pilot testing and treatability studies. Based on the evaluation, a recommended cleanup approach can be developed.

Use of this Report

This report was prepared for exclusive use by Gull Industries for this project only. Our scope of services was developed in conjunction with your involvement to achieve specific project objectives, with the intent of establishing an appropriate balance between level of effort and uncertainty. Providing the report to others not party to this mutual scope determination, or using it for other projects or purposes, can result in misunderstandings or incorrect assumptions. CDM can not be responsible for interpretation or extrapolation of the data contained herein, except as stated in our conclusions and recommendations.

We must presume the conditions encountered are representative of the site. However, subsurface conditions may vary between exploration location and with time, and unanticipated condition can and do often occur.

Our work has been performed in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the area. No other warranty, express or implied is made.

References

CDM. 2005. Summary of Subsurface Investigation Results, Former Gull Station No. 224, 21481 State Route 20, Sedro Woolley, Washington. Prepared for Gull Industries. January 14.

Distribution

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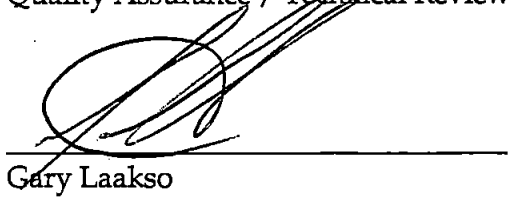
Quality Assurance / Technical Review by:



Gary Laakso
Associate

Tables

Tables

Table 1
Groundwater Parameters
Gull/Former Station No. 224
Sedro-Woolley, Washington

Monitoring Well I.D.	Date Sampled	Specific Conductance (µS/cm)	pH (std units)	Temperature (°C)	Turbidity (NTU)
Monitoring Well I.D. [a]					
MW1	11/23/04	179	5.9	15.6	120
	02/03/05	160	6.17	12.7	NM
MW2	11/23/04	203	5.9	15.3	95.6
	02/03/05	237	5.85	12.2	NM
MW3	11/23/04	405	6.3	13.7	450
	02/03/05	310	5.97	11.0	NM
MW4	11/23/04	NM	NM	NM	NM
	02/03/05	141	6.53	11.7	NM
Temporary Well I.D.					
B5	02/03/05	56.8	5.99	8.4	NM
B5b	02/03/05	122	6.35	12.1	NM
B6	02/03/05	330	6.11	10.4	NM
B7	02/03/05	183	4.85	13.1	NM
B8	02/03/05	384	5.94	10.4	NM
B9	02/03/05	305	6.39	13.6	NM
B10	02/03/05	124	5.65	12.9	NM
B11	02/03/05	212	6.30	13.1	NM

Notes:
a) MW1 - MW4 formerly identified as B1 - B4.
°C - degrees Celsius.
NTU - nephelometric turbidity units.
ms/cm - microsiemens per centimeter.
NM - not measured.

Table 2
Groundwater Elevation Data
Gull /Former Station No. 224
Sedro-Woolley, Washington

Monitoring Well I.D.	Date Measured	Time (hours)	Top of Casing Elevation (feet)	Depth to Groundwater (ft TOC)	Groundwater Elevation (feet)
MW1	11/23/04	1235	101.39	9.55	91.84
	02/03/05	1005	98.80	5.50	93.30
MW2	11/23/04	1435	102.28	10.54	91.74
	02/03/05	1010	99.68	6.13	93.55
MW3	11/23/04	1115	101.08	9.57	91.51
	02/03/05	1000	98.50	4.89	93.61
MW4	11/23/04	NM	NM	NM	NM
	02/03/05	1015	98.00	5.94	92.06

Notes:
a) MW1 - MW4 formerly identified as B1 - B4.
NM - not measured.
ft TOC - feet below top of casing.

Table 3
Analytical Summary - Soil
Gull /Former Station No. 224
Sedro-Woolley, Washington

Test Method and Analyte	Cleanup Level [a]	Sample I.D. and Date Sampled		
		B7-13.5' 02/03/05	B9-15' 02/03/05	B10-5.5' 02/03/05
	mg/kg	mg/kg		
NWTPH-G				
Gasoline	30/100 [b]	98	<6.6	<7.7
NWTPH-Dx				
Diesel	2,000	--	--	--
Lube Oil	2,000	--	--	--
EPA Method 8020B				
MBTE	0.1	--	--	--
Benzene	0.03	0.12	<0.020	<0.020
Ethylbenzene	6	1.7	<0.066	<0.077
Toluene	7	<0.41	<0.066	<0.077
m,p-Xylene	9 [c]	6.8	<0.066	<0.077
o-Xylene		1.1	<0.066	<0.077
EPA Method 6010B				
Total Lead	250	--	--	--

Notes:
Boxed values exceed MTCA Method A cleanup levels.
a) Washington Administrative Code Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested soil cleanup level for unrestricted land uses; promulgated August 15, 2001.
b) 100 mg/kg without benzene and total of ethylbenzene, toluene, and xylene are less than 1% of the gasoline mixture; 30 mg/kg all other gasoline mixtures.
c) Cleanup level is for total m,p-,& o-xylenes.
mg/kg - milligrams per kilogram.
-- not analyzed.
< - analyte not detected at or greater than the listed concentration.

Table 4
Analytical Summary - Water
Gull /Former Station No. 224
Sedro Woolley, Washington

Test Method and Analyte	Cleanup Level [a]	Monitoring Well/Test Hole I.D., Date Sampled, and Screened Interval (ft bgs)									
		MW1		MW2		MW3		MW4	B5	B5b	B6
		11/23/04	02/03/05	11/23/04	02/03/05	11/23/04	02/03/05	02/03/05	02/03/05	02/03/05	02/03/05
		8 - 18		8 - 18		8 - 18		8 - 18	6 - 10	11 - 15	6 - 10
NWTPH-Gx (µg/L)											
Gasoline	800/1,000 [b]	2,100	860	<100	<100	55,000	320	<100	<100	<100	<100
NWTPH-DX (mg/L)											
Diesel	0.5	<0.25	--	<0.26	--	<0.26	--	--	--	--	--
Lube Oil	0.5	<0.40	--	<0.41	--	<0.41	--	--	--	--	--
EPA Method 7021B (µg/L)											
MTBE	20	<10	--	<10	--	<10	--	--	--	--	--
Benzene	5	310	79	5.7	<1.0	590	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	700	33	11	6.7	<1.0	2,300	8.5	<1.0	<1.0	<1.0	<1.0
Toluene	1,000	16	<5.0	2.9	<1.0	660	<1.0	<1.0	<1.0	<1.0	<1.0
m,p-Xylene	1,000 [c]	74	15	29.0	<1.0	11,000	12	<1.0	<1.0	<1.0	<1.0
o-Xylene		23	<5.0	13.0	<1.0	3,900	3.1	<1.0	<1.0	<1.0	<1.0
EPA Method 200.8 (µg/L)											
Total Lead	15	--	--	--	--	5.4	--	--	--	--	--

Table 4
Analytical Summary - Water
Gull /Former Station No. 224
Sedro Woolley, Washington

Test Method and Analyte	Cleanup Level [a]	Monitoring Well/Test Hole I.D., Date Sampled, and Screened Interval (ft bgs)				
		B7	B8	B9	B10	B11
		02/03/05	02/03/05	02/03/05	02/03/05	02/03/05
		10 - 14	7 - 11	13 - 17	10 - 14	11 - 15
NWTPH-Gx (µg/L)						
Gasoline	800/1,000 [b]	80,000	<100	9,200	<100	5,200
NWTPH-DX (mg/L)						
Diesel	0.5	--	--	--	--	--
Lube Oil	0.5	--	--	--	--	--
EPA Method 7021B (µg/L)						
MTBE	20	--	--	--	--	--
Benzene	5	270	<1.0	110	<1.0	13
Ethylbenzene	700	2,300	<1.0	240	<1.0	36
Toluene	1,000	90	<1.0	190	<1.0	3.0
m,p-Xylene	1,000 [c]	7,000	<1.0	590	<1.0	98
o-Xylene		2,700	<1.0	93	<1.0	3.1
EPA Method 200.8 (µg/L)						
Total Lead	15	--	--	--	--	--

Notes:
MW1 - MW4 formerly identified as B1 - B4.
Boxed values exceed MTCA Method A cleanup levels.
a) Washington Administrative Code Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested groundwater cleanup level; promulgated August 15, 2001.
b) 800 µg/L if benzene is present in groundwater; 1,000 µg/L if no detectable benzene in groundwater.
c) Cleanup level is 1,000 µg/L for total xylenes.
ft bgs - feet below ground surface
mg/L - milligrams per liter.
µg/L - micrograms per liter.
-- not analyzed.
< - analyte not detected at or greater than the listed concentration.

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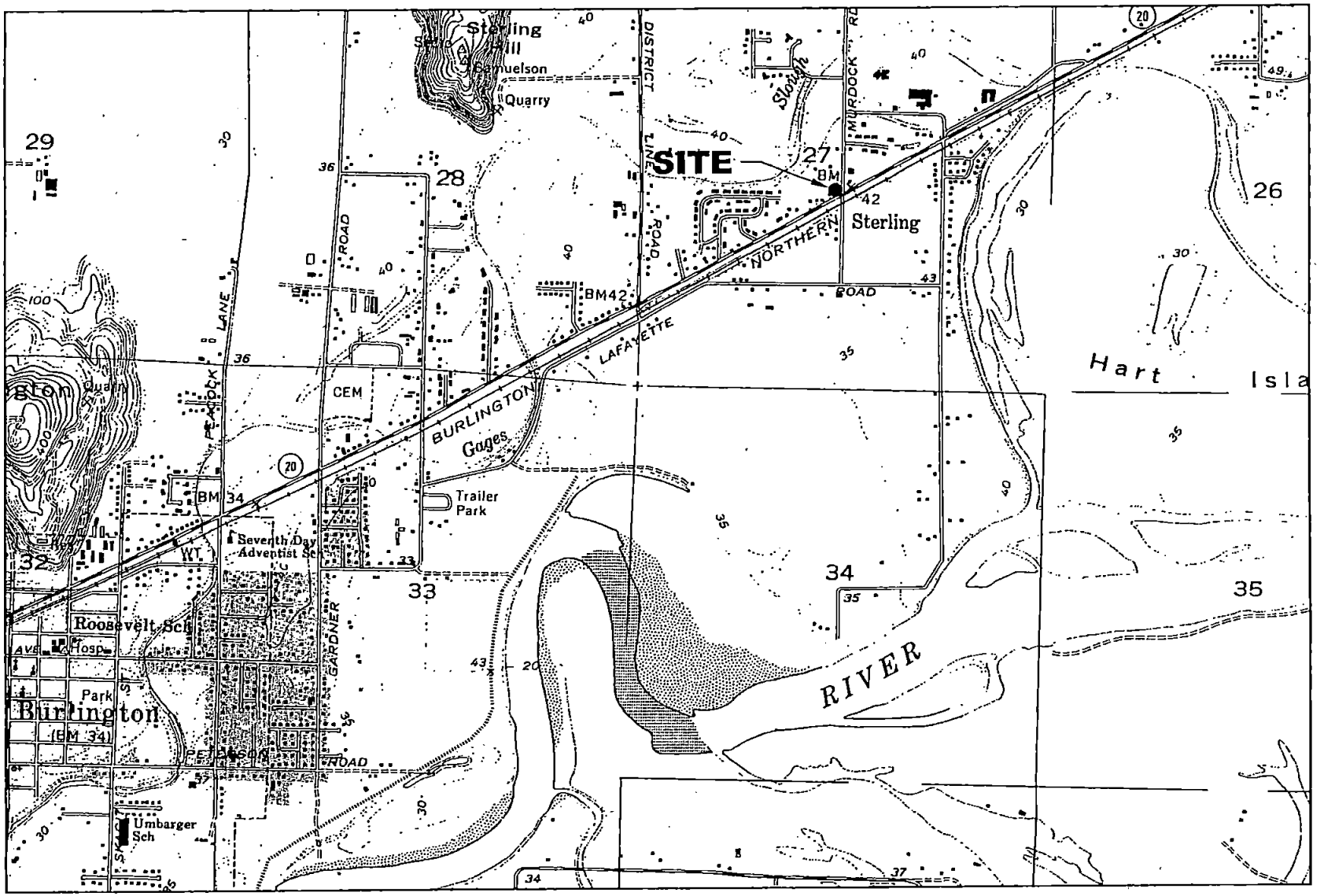
Figures

Figures



SOURCE: USGS MOUNT VERNON QUADRANGLE, 1981

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GULL / FORMER STATION NO 224
SEDRO WOOLLEY, WASHINGTON

Figure No. 1
Vicinity Map

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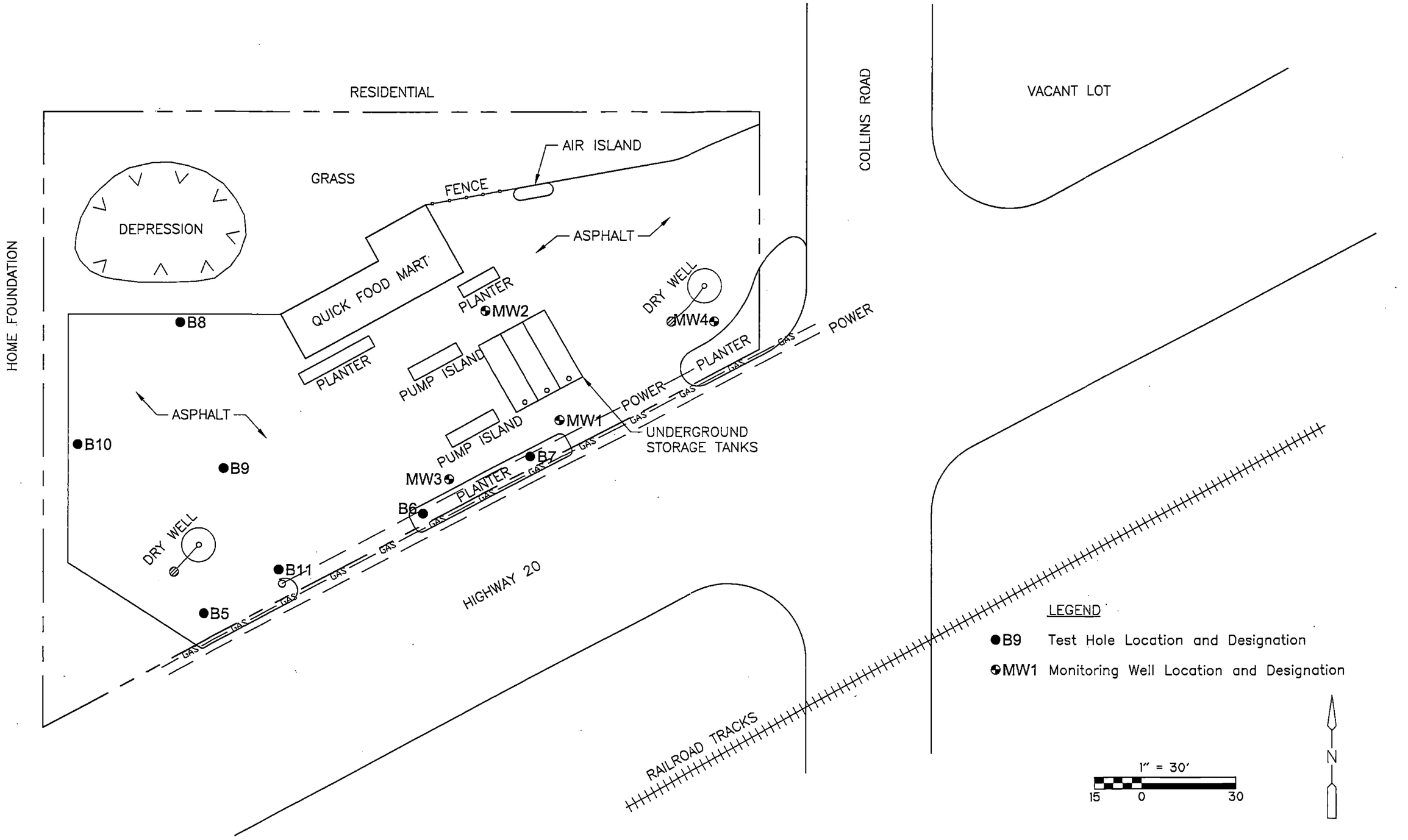

GULL / FORMER STATION NO. 224
SEDRO–WOOLLEY, WASHINGTON

Figure No. 2
Site Plan and Exploration Map

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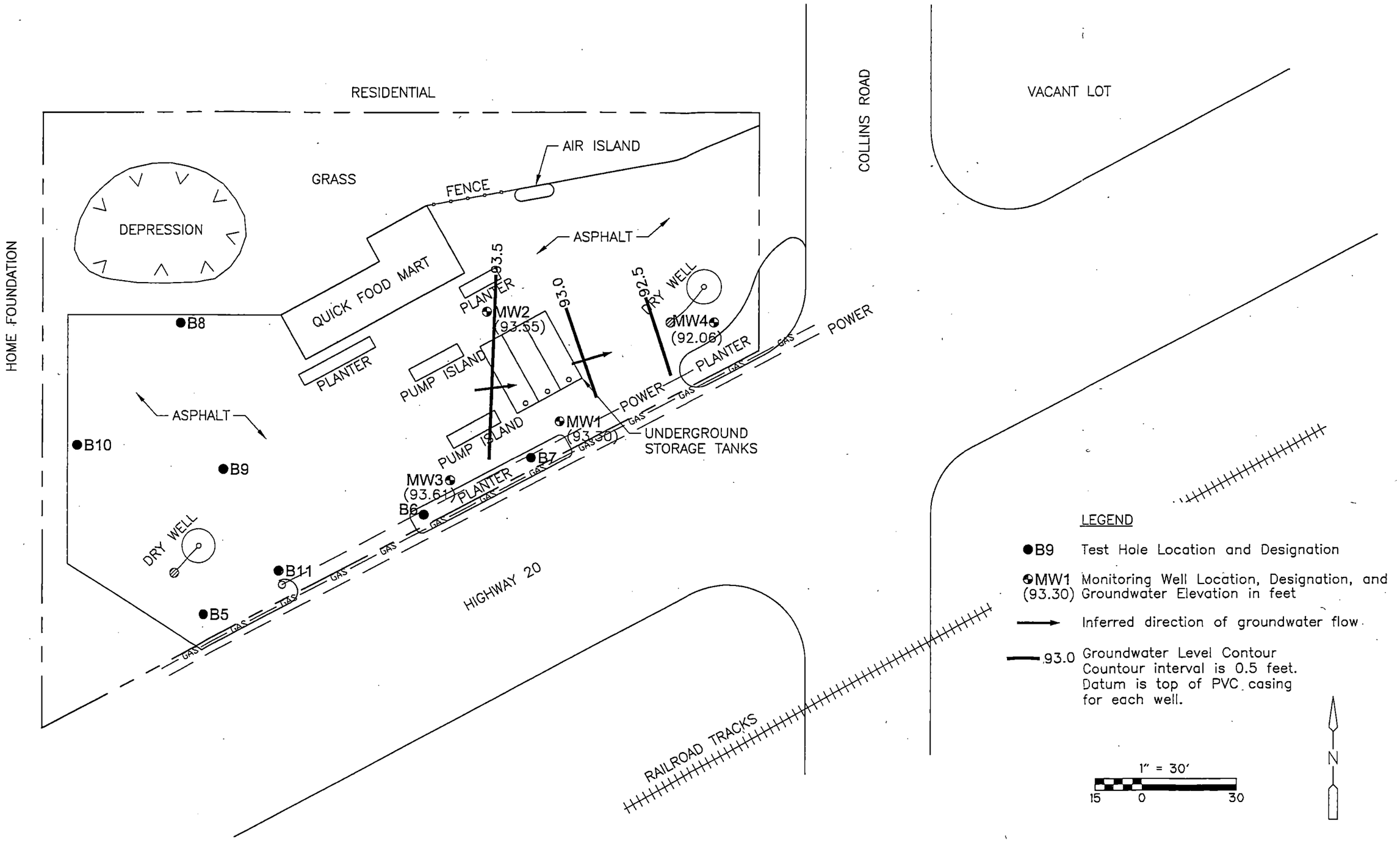

GULL / FORMER STATION NO. 224
SEDRO–WOOLLEY, WASHINGTON

Figure No. 3
Groundwater Contour Map – February 3, 2005

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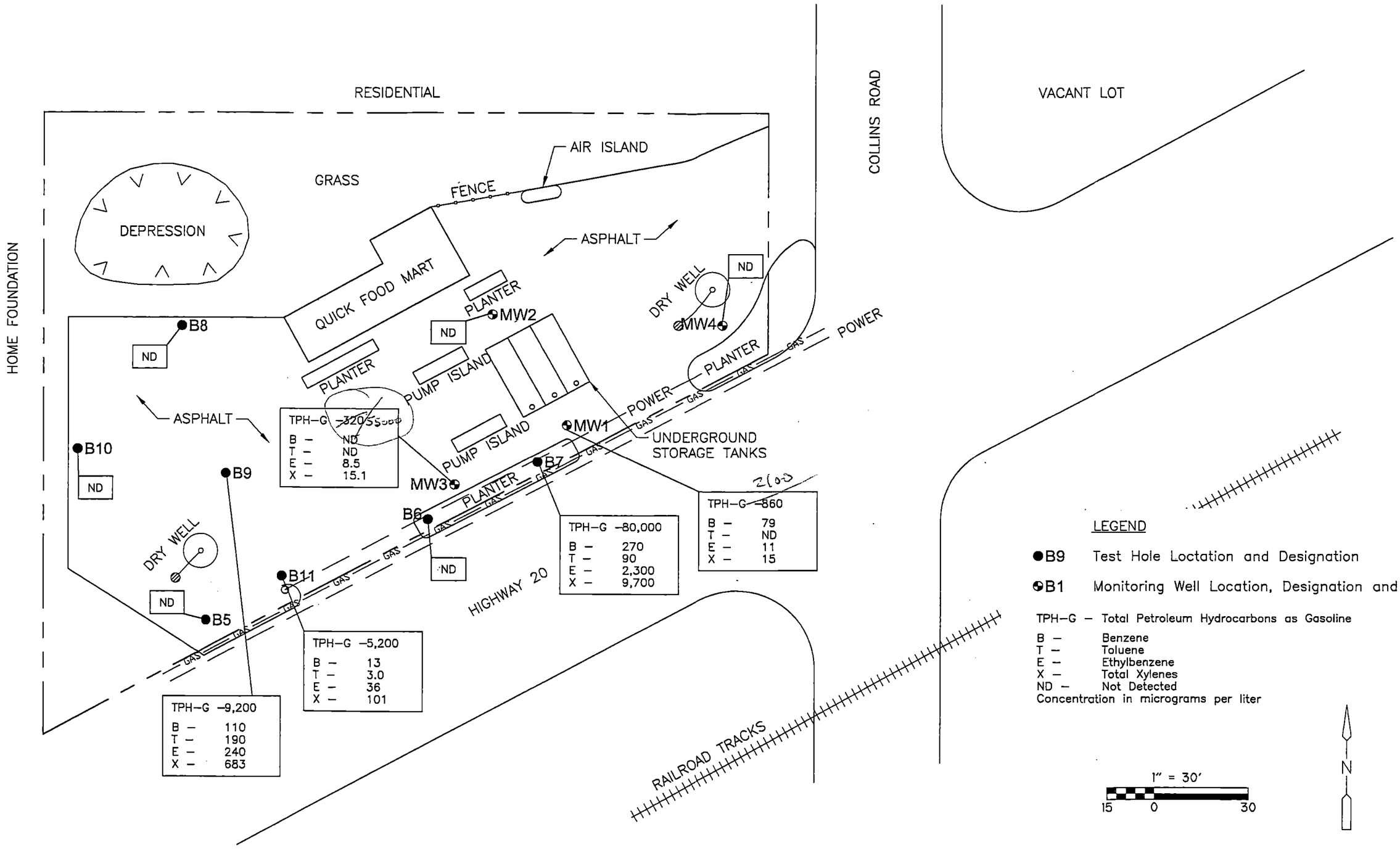

P:\19932\44744\Figure 4

GULL / FORMER STATION NO. 224
SEDRO–WOOLLEY, WASHINGTON

Figure No. 4
Hydrocarbon Conentrations in Groundwater February 3, 2005

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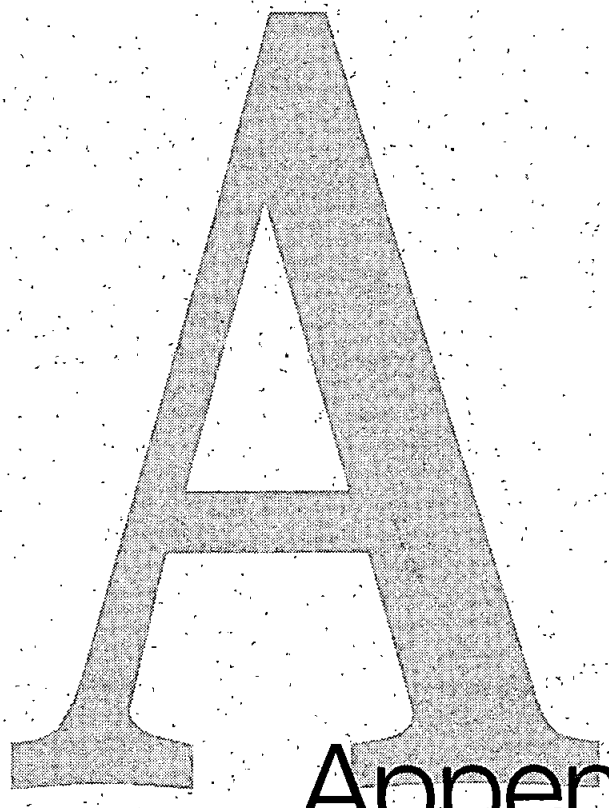


Appendix A

Appendix A
Boring Logs

SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVELS More than half coarse fraction is larger than No. 4 sieve	Clean gravels with little or no fines	GW	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
		Gravel with over 12% fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		Sands with over 12% fines	SM	Silty sand, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

SAMPLE TYPE SYMBOLS

- Disturbed bag or jar sample
- Std. Penetration Test (2.0" OD)
- Type U Ring Sampler (3.25" OD)
- California Sampler (3.0" OD)
- Undisturbed Tube Sample
- Grab Sample
- Core Run
- Non-standard Penetration Test (with split spoon sampler)
- Bulk Sample

CONTACT BETWEEN UNITS

- Change in geologic unit
- Soil type change within geologic unit
- Obscure or gradational change

DESCRIPTORS FOR SOIL STRATA AND STRUCTURE (ENGLISH/METRIC)

General Thickness or Spacing		Structure		General Attitude	
Parting:	less than 1/16 in. (1/6 cm)	Pocket:	Erratic, discontinous deposit of limited extent	Near horizontal:	0 to 10 deg.
Seam:	1/16 to 1/2 in. (1/6 to 1 1/4 cm)	Lens:	Lenticular deposit	Low angle:	10 to 45 deg.
Layer:	1/2 to 12 in. (1 1/4 to 30 1/2 cm)	Varved:	Alternating seams of silt and clay	High angle:	45 to 80 deg.
Stratum:	> 12 in. (30 1/2 cm)	Laminated:	Alternating seams	Near Vertical:	80 to 90 deg.
Scattered:	< 1 per ft. (30 1/2 cm)	Interbedded:	Alternating layers		
Numerous:	> 1 per ft. (30 1/2 cm)				

MOISTURE DESCRIPTION

Dry - Free of moisture, dusty

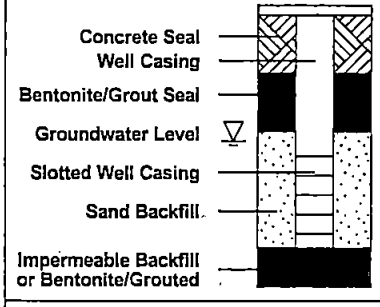
Moist - Damp but no visible free water

Wet - Visible free water, saturated

STRUCTURE DESCRIPTION (cont.)

Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, fractured planes
Blocky, Diced	Breaks easily into small angular lumps
Sheared	Disturbed texture, mix of strengths
Homogenous	Same color and appearance throughout

WELL COMPLETIONS



RELATIVE DENSITY OR CONSISTENCY VS. SPT N-VALUE

COARSE GRAINED			FINE GRAINED		
Density	N (blows/ft)	Approx. Relative Density (%)	Consistency	N (blows/ft)	Approx. Undrained Shear Str. (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	Over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

PHYSICAL PROPERTY TEST

AL -	Atterberg Limits
FC -	Fines Content
GSD -	Grain Size Distribution
MC -	Moisture Content
MD -	Moisture Content/Dry Density
Comp -	Compaction Test (Proctor)
SG -	Specific Gravity
CBR -	California Bearing Ratio
RM -	Resilient Modulus
Perm -	Permeability
TXP -	Triaxial Permeability
Cons -	Consolidation
Chem -	Analytical Chemical Analysis
Corr -	Corrosion
VS -	Vane Shear
DS -	Direct Shear
UC -	Unconfined Compression
TX -	Triaxial Compression
UU -	Unconsolidated, Undrained
CU -	Consolidated, Undrained
CD -	Consolidated, Drained

Notes:

1. Sample descriptions in this report are based on visual field and laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual classification methods in accordance with ASTM D 2488 were used as an identification guide. Where laboratory data are available, soil classifications are in general accordance with ASTM D 2487.

2. Dual symbols are used to indicate gravel and sand units with 5 to 12 percent fines.

3. WOR = weight of rod.

Former Gull Station No. 224
Sedro-Woolley, Washington

CDM

Project No: 19932.43894 Figure: A1

SOIL CLASSIFICATION/LEGEND SEDRO WOOLLEY WL.GPJ CDM_BLLV.GDT 2/18/05 REV.

Boring Log B5 and B5b

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
						0		SM		BROWN SILTY SAND (SM) Medium dense, moist, medium to fine sand.		
						2						
								ML		SANDY SILT (ML) Medium stiff, moist.		
						4						
						▽						
						6		SP		GRAY SAND (SP) Loose, saturated, medium grained, trace silt and trace gravel.		
						8		ML		GRAY SANDY SILT (ML) Medium stiff, moist at 8.5 ft bgs, with some clay and iron oxide mottling.		
								ML		GRAY SILT (ML) Stiff, moist.		
						10				Boring terminated at 9.5 ft bgs. Groundwater encountered at 5.0 ft bgs.		
						12						
						14						
						16						
						18						
						20						
						22						
						24						

Location: _____
Surface Elevation: _____
Logged By: JMM

Drill Rig: Geoprobe
Equipment/Hammer: Continuous Core/
Date Completed: 2-3-05

Former Gull Station No. 224
Sedro-Woolley, Washington

CDM

Boring Log B5 and B5b
Project No: 19932.43894

Figure: A2
1 of 1

LOG OF BORING WITH WELL SEDRO WOOLLEY WL.GPJ CDM_BLLV.GDT 2/21/05 REV.

Boring Log B6

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
						0				BROWN SILTY SAND (SM) Medium dense, moist, medium to fine grained.		
						2		SM		SANDY SILT (ML) Medium stiff, moist.		
						4		ML				
						6				GRAY SAND (SP) Loose, saturated, medium grained, with some gravel and trace silt.		
						8		SP		GRAY SANDY SILT (ML) Medium stiff, moist at 8.5 ft bgs, with some clay.		
						10		ML		GRAY SILT (ML) Stiff, moist. Boring terminated at 10 ft bgs. Groundwater encountered at 5.5 ft bgs.		
						12						
						14						
						16						
						18						
						20						
						22						
						24						

Location: _____
Surface Elevation: _____
Logged By: JMM

Drill Rig: Geoprobe
Equipment/Hammer: Continuous Core/
Date Completed: 2-3-05

Former Gull Station No. 224
Sedro-Woolley, Washington

CDM

Boring Log B6
Project No: 19932.43894

Figure: A3
1 of 1

LOG OF BORING WITH WELL SEDRO WOOLLEY WL.GPJ CDM_BLLY.GDT 2/21/05 REV.

Boring Log B7

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
						2		SM		BROWN SILTY SAND (SM) Medium dense, moist, medium to fine grained.		
						4		ML		BROWN SANDY SILT (ML) Medium stiff, moist.		
						▽6		SP		GRAY SAND (SP) Loose, saturated, medium grained, with some silt.		
						8		ML		GRAY SANDY SILT (ML) Soft, saturated, with some clay and iron oxide mottling, hydrocarbon odor.		
						10		ML		GRAY CLAYEY SILT (ML) Medium stiff, moist.		
						12				Strong hydrocarbon odor.		
						14		SM		GRAY SILTY SAND (SM) Medium dense, moist, medium to fine sand, strong hydrocarbon odor. Boring terminated at 14 ft bgs. Groundwater encountered at 6 ft bgs.		
						16						
						18						
						20						
						22						
						24						

Location: _____
Surface Elevation: _____
Logged By: JMM

Drill Rig: Geoprobe
Equipment/Hammer: Continuous Core/
Date Completed: 2-3-05

Former Gull Station No. 224
Sedro-Woolley, Washington

CDM

Boring Log B7
Project No: 19932.43894

Figure: A4
1 of 1

LOG OF BORING WITH WELL SEDRO WOOLLEY WL.GPJ CDM_BLLY.GDT 2/21/05 REV.

Boring Log B8

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
						0				Asphalt.		
								SM		BROWN SILTY SAND (SM) Medium dense, moist, medium- to fine-grained sand, with some gravel.		
						2				BROWN SANDY SILT (ML) Medium stiff, moist.		
						4		ML				
						6				GRAY SAND (SP) Loose, moist, medium to fine grained, with some silt.		
						8		SP		Becomes coarse grained, with some gravel at 8 ft bgs. Becomes medium to fine grained at 8.5 ft bgs.		
						10		SM		GRAY SILTY SAND (SM) Medium dense, saturated, medium to fine grained.		
								ML		GRAY SANDY SILT (ML) Medium stiff, saturated, with some iron oxide mottling.		
						12				GRAY SILTY SAND (SM) Loose, moist, medium to fine grained.		
						14		SM				
								ML		GRAY SILT (ML) Stiff, moist.		
						16		SM		BROWN SILTY SAND (SM) Medium dense, moist, fine grained. Boring terminated at 16 ft bgs. Groundwater encountered at 7 ft bgs. No odors detected.		
						18						
						20						
						22						
						24						

Location: _____
Surface Elevation: _____
Logged By: JMM

Drill Rig: Geoprobe
Equipment/Hammer: Continuous Core/
Date Completed: 2-3-05

Former Gull Station No. 224
Sedro-Woolley, Washington

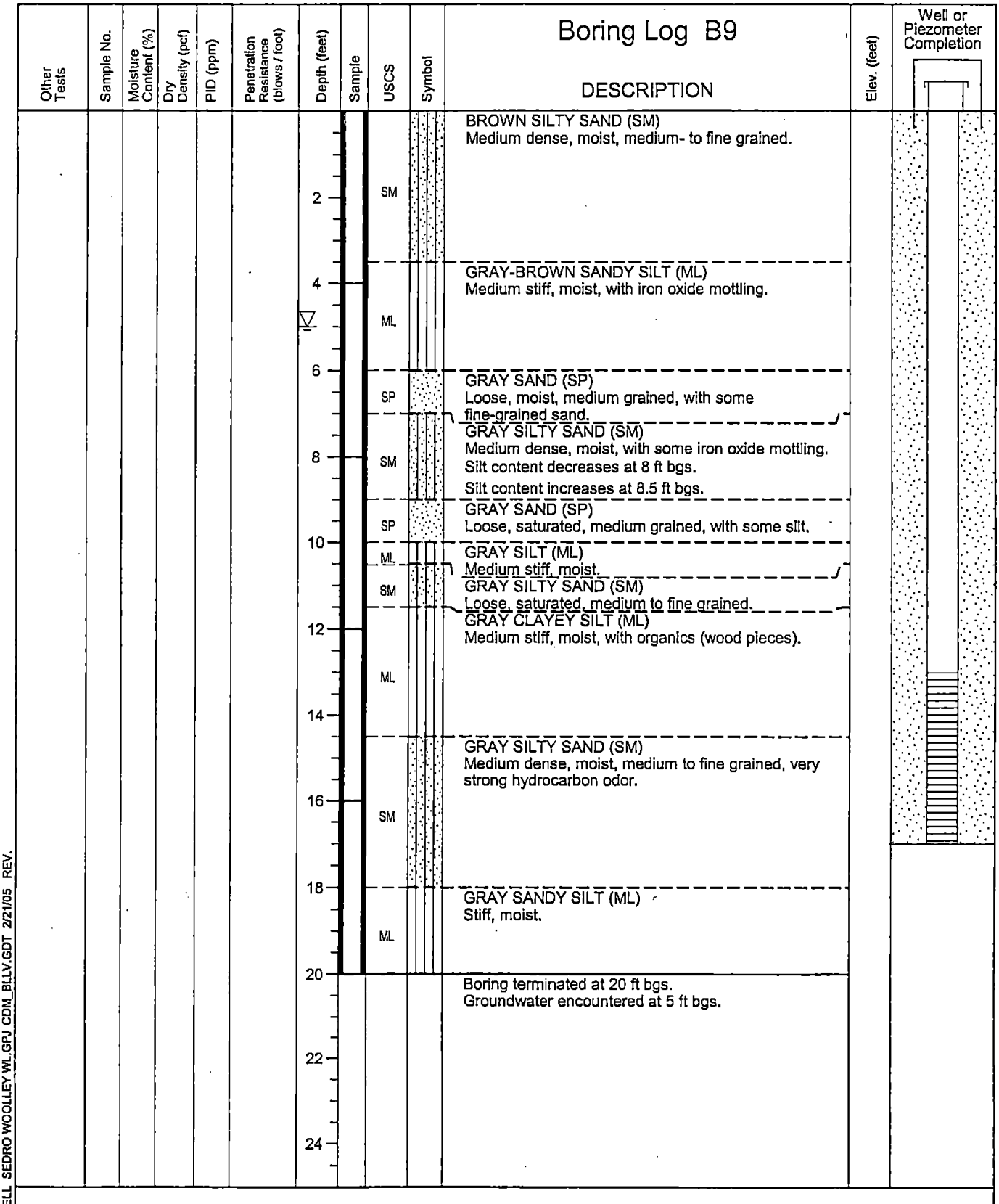
CDM

Boring Log B8
Project No: 19932.43894

Figure: A5
1 of 1

LOG OF BORING WITH WELL SEDRO WOOLLEY WL.GPJ CDM_BLLV.GDT 2/21/05 REV.

Boring Log B9



Location: _____
Surface Elevation: _____
Logged By: JMM

Drill Rig: Geoprobe
Equipment/Hammer: Continuous Core/
Date Completed: 2-3-05

Former Gull Station No. 224
Sedro-Woolley, Washington

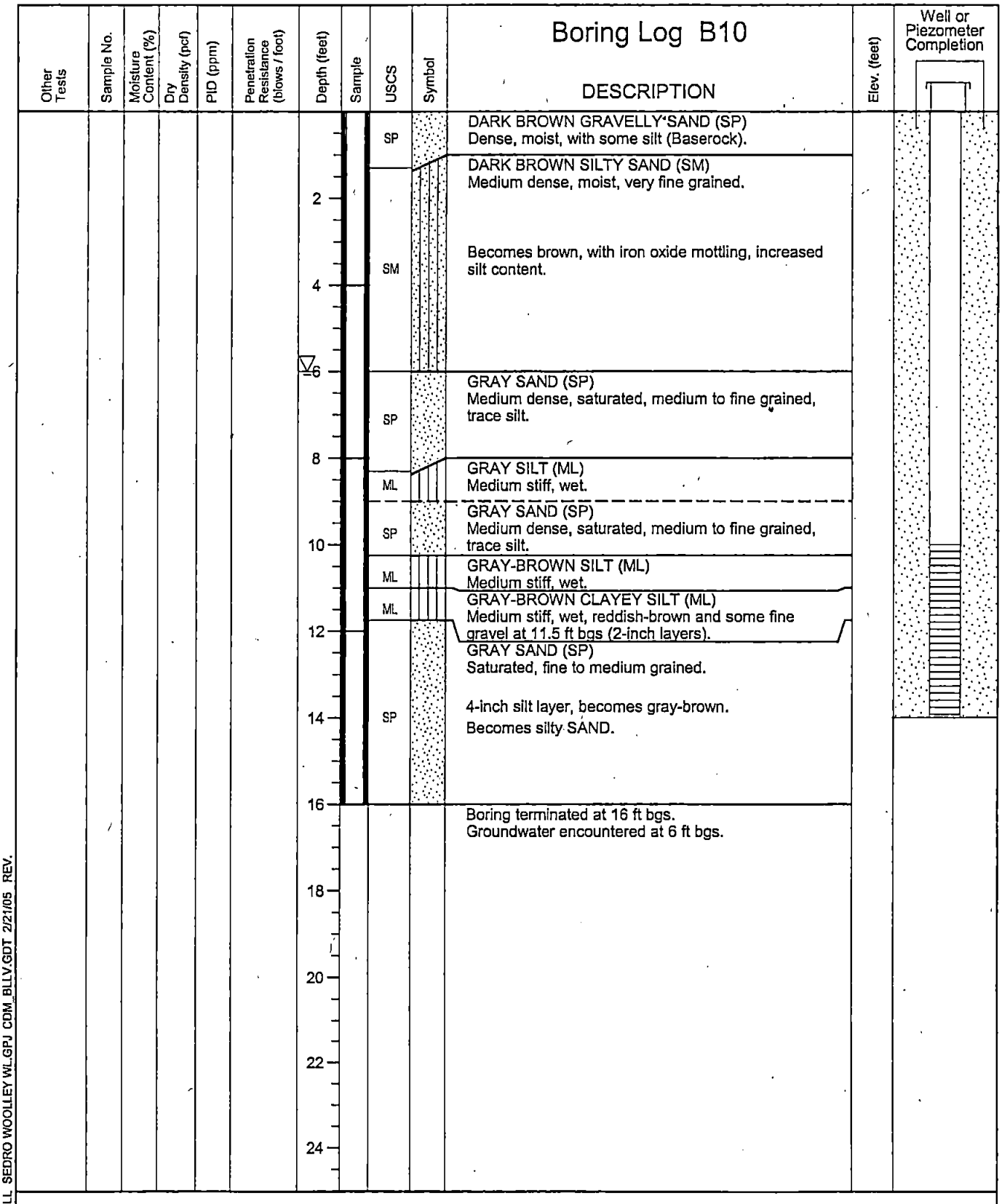
CDM

Boring Log B9
Project No: 19932.43894

Figure: A6
1 of 1

LOG OF BORING WITH WELL SEDRO WOOLLEY WL.GPJ CDM_BLLV.GDT 2/21/05 REV.

Boring Log B10



Location: _____
Surface Elevation: _____
Logged By: JMM

Drill Rig: Geoprobe
Equipment/Hammer: Continuous Core/
Date Completed: 2-3-05

Former Gull Station No. 224
Sedro-Woolley, Washington

CDM

Boring Log B10
Project No: 19932.43894

Figure: A7
1 of 1

LOG OF BORING WITH WELL SEDRO WOOLLEY WL.GPJ CDM_BLLY.GDT 2/21/05 REV.

Boring Log B11

Other Tests	Sample No.	Moisture Content (%)	Dry Density (pcf)	PID (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
						2				Not logged.		
						4						
						6						
						8						
						10						
						12						
						14						
										Boring terminated at 15 ft bgs.		
						16						
						18						
						20						
						22						
						24						

Location:
Surface Elevation:
Logged By: PJM

Drill Rig: Geoprobe
Equipment/Hammer: Continuous Core/
Date Completed: 2-3-05

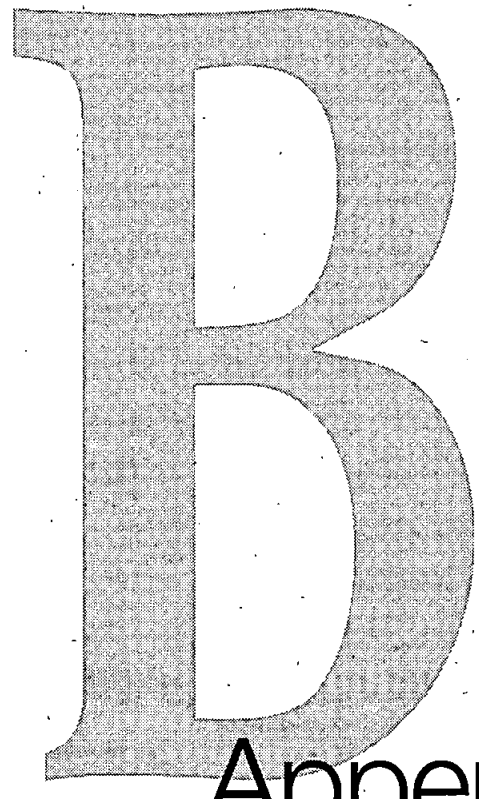
Former Gull Station No. 224
Sedro-Woolley, Washington

CDM

Boring Log B11
Project No: 19932.43894

Figure: A8
1 of 1

LOG OF BORING WITH WELL SEDRO WOOLLEY WL.GPJ CDM_BLLV.GDT 2/21/05 REV.



Appendix B

Appendix B
Laboratory Reports

OnSite Environmental Inc.
Analytical Testing and Mobile Laboratory Services

February 16, 2005

Pam Morrill
CDM
P.O. Box 3885
Bellevue, WA 98009

Re: Analytical Data for Project 19932-44744
Laboratory Reference No. 0502-051

Dear Pam:

Enclosed are the analytical results and associated quality control data for samples submitted on February 4, 2005.

The standard policy of OnSite Environmental Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

Case Narrative

Samples were collected on February 3, 2005 and received by the laboratory on February 4, 2005. They were maintained at the laboratory at a temperature of 2°C to 6°C.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

NWTPH Gx/BTEX (Soil) Analysis

Per EPA Method 5035A, samples were received by the laboratory in preweighed 40 mL VOA vials within 48 hours of sample collection. They were stored in a freezer at between -7°C and -20°C until extraction or analysis.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX

Date Extracted: 2-9-05
Date Analyzed: 2-11-05

Matrix: Soil
Units: mg/kg (ppm)

Client ID:	**B7-13.5**			**B9-15**		
Lab ID:	02-051-02			02-051-04		
	Result	Flags	PQL	**Result**	Flags	PQL
Benzene	**0.12**		0.083	**ND**		0.020
Toluene	**ND**		0.41	**ND**		0.066
Ethyl Benzene	**1.7**		0.41	**ND**		0.066
m,p-Xylene	**6.8**		0.41	**ND**		0.066
o-Xylene	**1.1**		0.41	**ND**		0.066
TPH-Gas	**98**		41	**ND**		6.6
Surrogate Recovery:						
Fluorobenzene	65%			72%		

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX

Date Extracted: 2-9-05
Date Analyzed: 2-11-05

Matrix: Soil
Units: mg/kg (ppm)

Client ID: **B10-5.5**
Lab ID: 02-051-05

	Result	Flags	PQL
Benzene	**ND**		0.020
Toluene	**ND**		0.077
Ethyl Benzene	**ND**		0.077
m,p-Xylene	**ND**		0.077
o-Xylene	**ND**		0.077
TPH-Gas	**ND**		7.7
Surrogate Recovery:			
Fluorobenzene	76%		

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX
METHOD BLANK QUALITY CONTROL

Date Extracted: 2-9-05
Date Analyzed: 2-10-05

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB0209S1

	Result	Flags	PQL
Benzene	ND		0.020
Toluene	ND		0.050
Ethyl Benzene	ND		0.050
m,p-Xylene	ND		0.050
o-Xylene	ND		0.050
TPH-Gas	ND		5.0
Surrogate Recovery:			
Fluorobenzene	86%		

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX
DUPLICATE QUALITY CONTROL

Date Extracted: 2-9-05
Date Analyzed: 2-11-05

Matrix: Soil
Units: mg/kg (ppm)

Lab ID:	02-050-01 Original	02-050-01 Duplicate	RPD	Flags
Benzene	ND	ND	NA	
Toluene	ND	ND	NA	
Ethyl Benzene	ND	ND	NA	
m,p-Xylene	ND	ND	NA	
o-Xylene	ND	ND	NA	
TPH-Gas	ND	ND	NA	
Surrogate Recovery:				
Fluorobenzene	88%	89%		

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX
MS/MSD QUALITY CONTROL

Date Extracted: 2-9-05
Date Analyzed: 2-13-05

Matrix: Soil
Units: mg/kg (ppm)

Spike Level (ppm): 3.21

Lab ID:	02-050-01 **MS**	Percent Recovery	02-050-01 **MSD**	Percent Recovery	**RPD**	**Flags**
Benzene	**3.14**	**98**	**3.21**	**100**	2	
Toluene	**3.19**	**99**	**3.24**	**101**	2	
Ethyl Benzene	**3.20**	**100**	**3.25**	**101**	1	
m,p-Xylene	**3.19**	**99**	**3.22**	**100**	1	
o-Xylene	**3.22**	**100**	**3.26**	**102**	1	

Surrogate Recovery:

Fluorobenzene	95%		96%

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX

Date Extracted: 2-7-05
Date Analyzed: 2-7-05

Matrix: Water
Units: ug/L (ppb)

Client ID:	**B1-2/3/05**			**B2-2/3/05**		
Lab ID:	02-051-06			02-051-07		
	Result	Flags	PQL	**Result**	Flags	PQL
Benzene	**79**		5.0	**ND**		1.0
Toluene	**ND**		5.0	**ND**		1.0
Ethyl Benzene	**11**		5.0	**ND**		1.0
m,p-Xylene	**15**		5.0	**ND**		1.0
o-Xylene	**ND**		5.0	**ND**		1.0
TPH-Gas	**860**		500	**ND**		100
Surrogate Recovery:						
Fluorobenzene	114%			116%		

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX

Date Extracted: 2-7-05
Date Analyzed: 2-7-05

Matrix: Water
Units: ug/L (ppb)

Client ID:	**B3-2/3/05**			**B4-2/3/05**		
Lab ID:	02-051-08			02-051-09		
	Result	Flags	PQL	**Result**	Flags	PQL
Benzene	**ND**		1.0	**ND**		1.0
Toluene	**ND**		1.0	**ND**		1.0
Ethyl Benzene	**8.5**		1.0	**ND**		1.0
m,p-Xylene	**12**		1.0	**ND**		1.0
o-Xylene	**3.1**		1.0	**ND**		1.0
TPH-Gas	**320**		100	**ND**		100
Surrogate Recovery:						
Fluorobenzene	117%			117%		

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX

Date Extracted: 2-7-05
Date Analyzed: 2-7-05

Matrix: Water
Units: ug/L (ppb)

Client ID:	**B5-2/3/05**			**B5b-2/3/05**		
Lab ID:	02-051-10			02-051-11		
	Result	Flags	PQL	**Result**	Flags	PQL
Benzene	**ND**		1.0	**ND**		1.0
Toluene	**ND**		1.0	**ND**		1.0
Ethyl Benzene	**ND**		1.0	**ND**		1.0
m,p-Xylene	**ND**		1.0	**ND**		1.0
o-Xylene	**ND**		1.0	**ND**		1.0
TPH-Gas	**ND**		100	**ND**		100
Surrogate Recovery:						
Fluorobenzene	116%			116%		

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX

Date Extracted: 2-7&9-05
Date Analyzed: 2-7&9-05

Matrix: Water
Units: ug/L (ppb)

Client ID:	**B6-2/3/05**			**B7-2/3/05**		
Lab ID:	02-051-12			02-051-13		
	Result	Flags	PQL	**Result**	Flags	PQL
Benzene	**ND**		1.0	**270**		50
Toluene	**ND**		1.0	**90**		50
Ethyl Benzene	**ND**		1.0	**2300**		50
m,p-Xylene	**ND**		1.0	**7000**		250
o-Xylene	**ND**		1.0	**2700**		50
TPH-Gas	**ND**		100	**80000**		5000
Surrogate Recovery:						
Fluorobenzene	116%			110%		

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX

Date Extracted: 2-7-05
Date Analyzed: 2-7-05

Matrix: Water
Units: ug/L (ppb)

Client ID:	**B8-2/3/05**			**B9-2/3/05**		
Lab ID:	02-051-14			02-051-15		
	Result	Flags	PQL	**Result**	Flags	PQL
Benzene	**ND**		1.0	**110**		50
Toluene	**ND**		1.0	**190**		50
Ethyl Benzene	**ND**		1.0	**240**		50
m,p-Xylene	**ND**		1.0	**590**		50
o-Xylene	**ND**		1.0	**93**		50
TPH-Gas	**ND**		100	**9200**		5000
Surrogate Recovery:						
Fluorobenzene	116%			115%		

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX

Date Extracted: 2-7-05
Date Analyzed: 2-7-05

Matrix: Water
Units: ug/L (ppb)

Client ID:	**B10-2/3/05**			**B11-2/3/05**		
Lab ID:	02-051-16			02-051-17		
	Result	Flags	PQL	**Result**	Flags	PQL
Benzene	**ND**		1.0	**13**		1.0
Toluene	**ND**		1.0	**3.0**		1.0
Ethyl Benzene	**ND**		1.0	**36**		1.0
m,p-Xylene	**ND**		1.0	**98**		1.0
o-Xylene	**ND**		1.0	**3.1**		1.0
TPH-Gas	**ND**		100	**5200**		100
Surrogate Recovery:						
Fluorobenzene	116%			119%		

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX
METHOD BLANK QUALITY CONTROL

Date Extracted: 2-7-05
Date Analyzed: 2-7-05

Matrix: Water
Units: ug/L (ppb)

Lab ID: MB0207W1

	Result	Flags	PQL
Benzene	ND		1.0
Toluene	ND		1.0
Ethyl Benzene	ND		1.0
m,p-Xylene	ND		1.0
o-Xylene	ND		1.0
TPH-Gas	ND		100

Surrogate Recovery:
Fluorobenzene 79%

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX
METHOD BLANK QUALITY CONTROL

Date Extracted: 2-7-05
Date Analyzed: 2-7-05

Matrix: Water
Units: ug/L (ppb)

Lab ID: MB0207W2

	Result	Flags	PQL
Benzene	**ND**		1.0
Toluene	**ND**		1.0
Ethyl Benzene	**ND**		1.0
m,p-Xylene	**ND**		1.0
o-Xylene	**ND**		1.0
TPH-Gas	**ND**		100

Surrogate Recovery:
Fluorobenzene 99%

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX
METHOD BLANK QUALITY CONTROL

Date Extracted: 2-9-05
Date Analyzed: 2-9-05

Matrix: Water
Units: ug/L (ppb)

Lab ID: MB0209W1

	Result	Flags	PQL
Benzene	ND		1.0
Toluene	ND		1.0
Ethyl Benzene	ND		1.0
m,p-Xylene	ND		1.0
o-Xylene	ND		1.0
TPH-Gas	ND		100

Surrogate Recovery:
Fluorobenzene 109%

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX
DUPLICATE QUALITY CONTROL

Date Extracted: 2-7-05
Date Analyzed: 2-7-05

Matrix: Water
Units: ug/L (ppb)

Lab ID:	02-051-07 Original	02-051-07 Duplicate	RPD	Flags
Benzene	ND	ND	NA	
Toluene	ND	ND	NA	
Ethyl Benzene	ND	ND	NA	
m,p-Xylene	ND	ND	NA	
o-Xylene	ND	ND	NA	
TPH-Gas	ND	ND	NA	
Surrogate Recovery:				
Fluorobenzene	116%	116%		

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX
DUPLICATE QUALITY CONTROL

Date Extracted: 2-9-05
Date Analyzed: 2-9-05

Matrix: Water
Units: ug/L (ppb)

Lab ID:	02-044-07 Original	02-044-07 Duplicate	RPD	Flags
Benzene	239	247	3	
Toluene	3980	4070	2	
Ethyl Benzene	407	417	2	
m,p-Xylene	1570	1600	2	
o-Xylene	709	724	2	
TPH-Gas	22500	22600	1	
Surrogate Recovery:				
Fluorobenzene	92%	93%		

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

NWTPH-Gx/BTEX
MS/MSD QUALITY CONTROL

Date Extracted: 2-7-05
Date Analyzed: 2-7-05

Matrix: Water
Units: ug/L (ppb)

Spike Level: 50.0 ppb

Lab ID:	02-051-07 **MS**	Percent Recovery	02-051-07 **MSD**	Percent Recovery	**RPD**	**Flags**
Benzene	**49.9**	**100**	**52.9**	**106**	6	
Toluene	**51.8**	**104**	**54.9**	**110**	6	
Ethyl Benzene	**52.3**	**105**	**55.5**	**111**	6	
m,p-Xylene	**52.3**	**105**	**55.3**	**111**	6	
o-Xylene	**51.6**	**103**	**54.9**	**110**	6	

Surrogate Recovery:

Fluorobenzene	100%	99%

Date of Report: February 16, 2005
Samples Submitted: February 4, 2005
Laboratory Reference: 0502-051
Project: 19932-44744

% MOISTURE

Date Analyzed: 2-9-05

Client ID	Lab ID	% Moisture
B7-13.5	02-051-02	37
B9-15	02-051-04	26
B10-5.5	02-051-05	27

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

G - Insufficient sample quantity for duplicate analysis.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

O - Hydrocarbons indicative of diesel fuel are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a silica gel cleanup procedure.

Y - Sample extract treated with an acid/silica gel cleanup procedure.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

Page 1 of 2

OnSite Environmental Inc.
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • Fax: (425) 885-4603

Company: CDM
Project Number: 19932-447444
Project Name: Gull - Sedro Woolley
Project Manager: Pam Morrill
Sampled by: Jeanette Mullin

Turnaround Request (in working days)

(Check One)

☐ Same Day ☐ 1 Day
☐ 2 Day ☐ 3 Day
☒ Standard (7 working days)
☐ _____ (other)

Laboratory Number: 02-051

Requested Analysis

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Dx	Volatiles by 8260B	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C / SIM	PCBs by 8082	Pesticides by 8081A	Herbicides by 8151A	Total RCRA Metals (8)	TCLP Metals	HEM by 1664	VPH	EPH				Hold	% Moisture
1	B7-9.5	2/3/05	1040	Soil	2																			X	
2	B7-13.5		1055		2		X																		X
3	B7-14		1055		1																			X	
4	B9-15		1310		2		X																		X
5	B10-5.5		1445		2		X																		X
6	B1-2/3/05		1210	H_2O	3		X																		
7	B2-2/3/05		1330		3		X																		
8	B3-2/3/05		1115		3		X																		
9	B4-2/3/05		1250		3		X																		
10	B5-2/3/05		0925		3		X																		

	Signature	Company	Date	Time	Comments/Special Instructions
Relinquished by	Jeanette Mullin	CDM	2/4/05	1030	
Received by	Stacey Dunn	OSE	2/4/05	1030	
Relinquished by					
Received by					
Relinquished by					
Received by					
Reviewed by/Date		Reviewed by/Date			Chromatograms with final report ☐

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Chain of Custody

OnSite Environmental Inc.
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • Fax: (425) 885-4603

Company: CDM
Project Number: 19932-447744
Project Name: Gull - Sedro Woolley
Project Manager: Pam Morrill
Sampled by: Jeanette Mullin

Turnaround Request (in working days)

(Check One)

- ☐ Same Day
- ☐ 1 Day
- ☐ 2 Day
- ☐ 3 Day
- ☒ Standard (7 working days)
- ☐ _____ (other)

Laboratory Number: 02-051

Requested Analysis

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of cont	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Dx	Volatiles by 8260B	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C / SIM	PCBs by 8082	Pesticides by 8081A	Herbicides by 8151A	Total RCRA Metals (8)	TCLP Metals	HEM by 1664	VPH	EPH					% Moisture
11	B5b - 2/3/05	2/3/05	1545	Wtr.	3		X																		
12	B6 - 2/3/05	"	1015	"	3		X																		
13	B7 - 2/3/05	"	1115	"	3		X																		
14	B8 - 2/3/05	"	1225	"	3		X																		
15	B9 - 2/3/05	"	1340	"	3		X																		
16	B10 - 2/3/05	"	1455	"	3		X																		
17	B11 - 2/3/05	"	1530	"	3		X																		

	Signature	Company	Date	Time	Comments/Special Instructions
Relinquished by	Jeanette Mullin	CDM	2/4/05	1030	
Received by	Stacey Dunn	OSE	2/4/05	1030	
Relinquished by					
Received by					
Relinquished by					
Received by					

Reviewed by/Date

Reviewed by/Date

Chromatograms with final report ☐

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