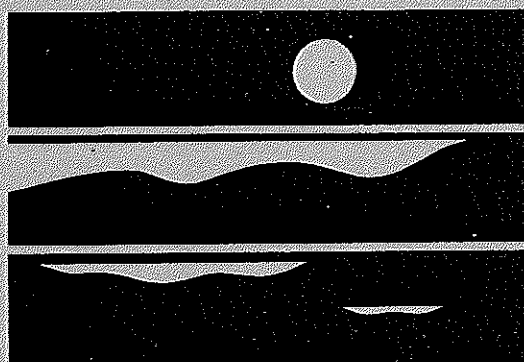


INVESTIGATION OF POTENTIALLY LIABLE PERSONS (PLPs)  
SOIL AND GROUND WATER CONTAMINATION  
YAKIMA RAILROAD AREA  
YAKIMA, WASHINGTON

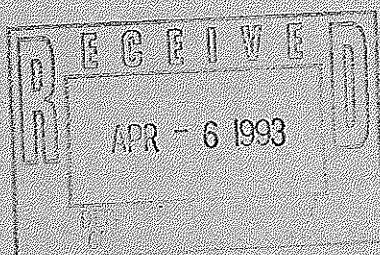


WASHINGTON STATE  
DEPARTMENT OF  
E C O L O G Y

TOXICS CLEANUP PROGRAM

February 1993

This document was part of the official  
Administrative Record for the Yakima  
Railroad Area on October 31, 1996.  
Washington State  
Department of Ecology.



## EXECUTIVE SUMMARY

This report contains the results of the November 1992 geotechnical investigation of the Yakima R.R. area, Yakima, Washington. **The purpose of this investigation was to identify additional potentially liable persons responsible for soil and ground water contamination throughout the Yakima R.R. area.** Potentially liable persons (PLPs) are defined in Part V of the Washington Model Toxics Control Act (MTCA), WAC-173-340-500.

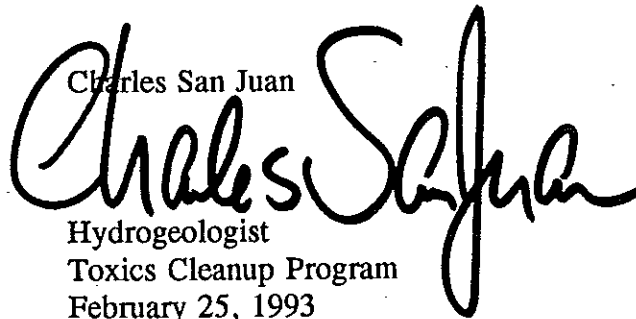
Twelve facilities within a 3.5 mile length of the Yakima R.R. corridor area were investigated. Ground water monitoring wells, ranging in depths from 25 ft. to 100 ft., were installed at six locations. Chlorinated hydrocarbons, ranging in concentration from less than 1 ppb to greater than 400 ppb were detected in the ground water at six locations. Chlorinated hydrocarbons and volatile organic compounds, ranging in concentration from 1 ppb to 8,100 ppb, were detected in soil at five locations.

Alluvium, consisting of approximately 60% sand and 40% gravel and basalt clasts, was the dominant soil lithology encountered within the railroad study area. Ground water depths ranged from 4 - 28 ft. below ground surface and ground water flow rates for the railroad area are estimated to range from 6 to 12 ft/day (2,190 - 4,380 ft/yr). For the unconfined aquifer, the predominant flow direction from the railroad is approximately S 35° E towards the Yakima River.

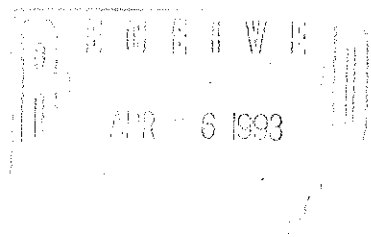
The Yakima Railroad study area is located within the confines of a broad flat basin that has been cut by the Yakima River. Coarse gravelly soils are predominant from ground surface to depths of 500 ft. or more. Ground water is typically found at depths ranging from less than 10 ft. to greater than 20 ft. Ground water flow velocities within the alluvium range from less than a foot to nearly 100 feet per day (U.S.G.S.). Ground water flows downstream from the west side of the basin and discharges into the Yakima River. The ground water table typically rises several feet during the summer irrigation months and returns to previous levels during the winter months.

This investigation was paid for by the Washington State Department of Ecology, Toxics Cleanup Program. The total cost of this investigation was approximately \$35,000.

Charles San Juan



Hydrogeologist  
Toxics Cleanup Program  
February 25, 1993



This document was part of the official  
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Railroad Area on October 31, 1993.  
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## **Investigation of Potentially Liable Persons (PLPs) Yakima R.R. Area**

### **Purpose of the Investigation**

This report contains the results of a November 1992 geotechnical investigation of the Yakima R.R. area, Yakima, Washington. **The purpose of the investigation was to identify additional potentially liable persons responsible for ground water contamination throughout the Yakima R.R. area.** Potentially liable persons (PLPs) are defined in Part V of the Washington Model Toxics Control Act (MTCA), WAC 173-340-500.

### **Focus of this Investigation**

This investigation focused on an 3.7 mile long area of Central Yakima known as the "Yakima R.R." (Figure 1, **Yakima R.R. Facility Location Map**). Ground water within this area has been contaminated with perchlorethylene or tetrachloroethylene, a chlorinated hydrocarbon compound. Twelve locations within the immediate vicinity of the Yakima R.R. corridor were investigated (see Figure 1). Eleven of the twelve locations have active business operations (**Table 1, Facility Investigation List**). The only location without an active business operation is Crest Linen site, at North 1st & B St.. This property is now a vacant lot. The City of Yakima has since acquired the Crest Linen property via tax reversion. One facility, Timpke Machine, was not investigated due to the close proximity of overhead powerlines (drilling rig could not be maneuvered into position to collect samples).

### **Hydrogeologic Setting**

The City of Yakima is located in a broad flat synclinal river basin between two prominent east-west trending basalt ridges to the north and south (see **Figure 2, Yakima Map**). The USGS has characterized this area as the Ahtanum-Moxee subbasin (Foxworthy, 1952, **Figure 3, Ahtanum-Moxee Subbasin**). Each basalt ridge is cut by the Yakima River, which enters from the north through Selah gap and exits to the south at Union Gap. Streams flow from the high basalt ridges into the basin and eventually join the Yakima River. The narrow gorge at Union Gap is also the apex of funnel-like surface water flow from the west half of the basin. The flow velocity of the Yakima River nearly doubles through the basin due to the amount of ground water discharge, which has been estimated at 9,000 acre-feet/month (67,884 gpm). Ground water flow from the alluvium represents approximately 25% of the total discharge to the river (U.S.G.S.). The funnel effect of Union Gap is probably influencing ground water flow as well.

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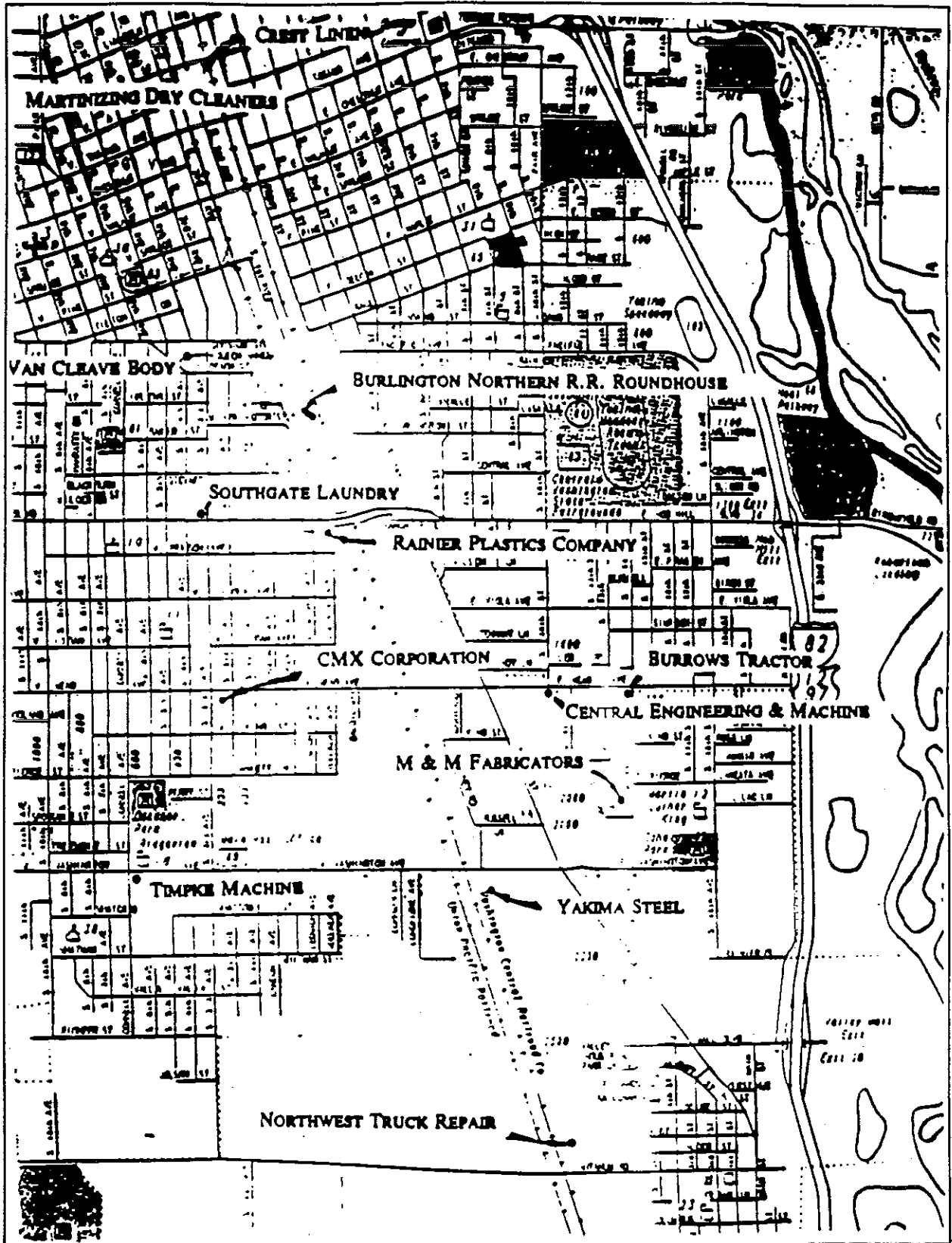


Figure 1: Yakima Railroad Facility Location Map. Scale 1" = 2,295 ft.

Scale 1 = 4224 ft.

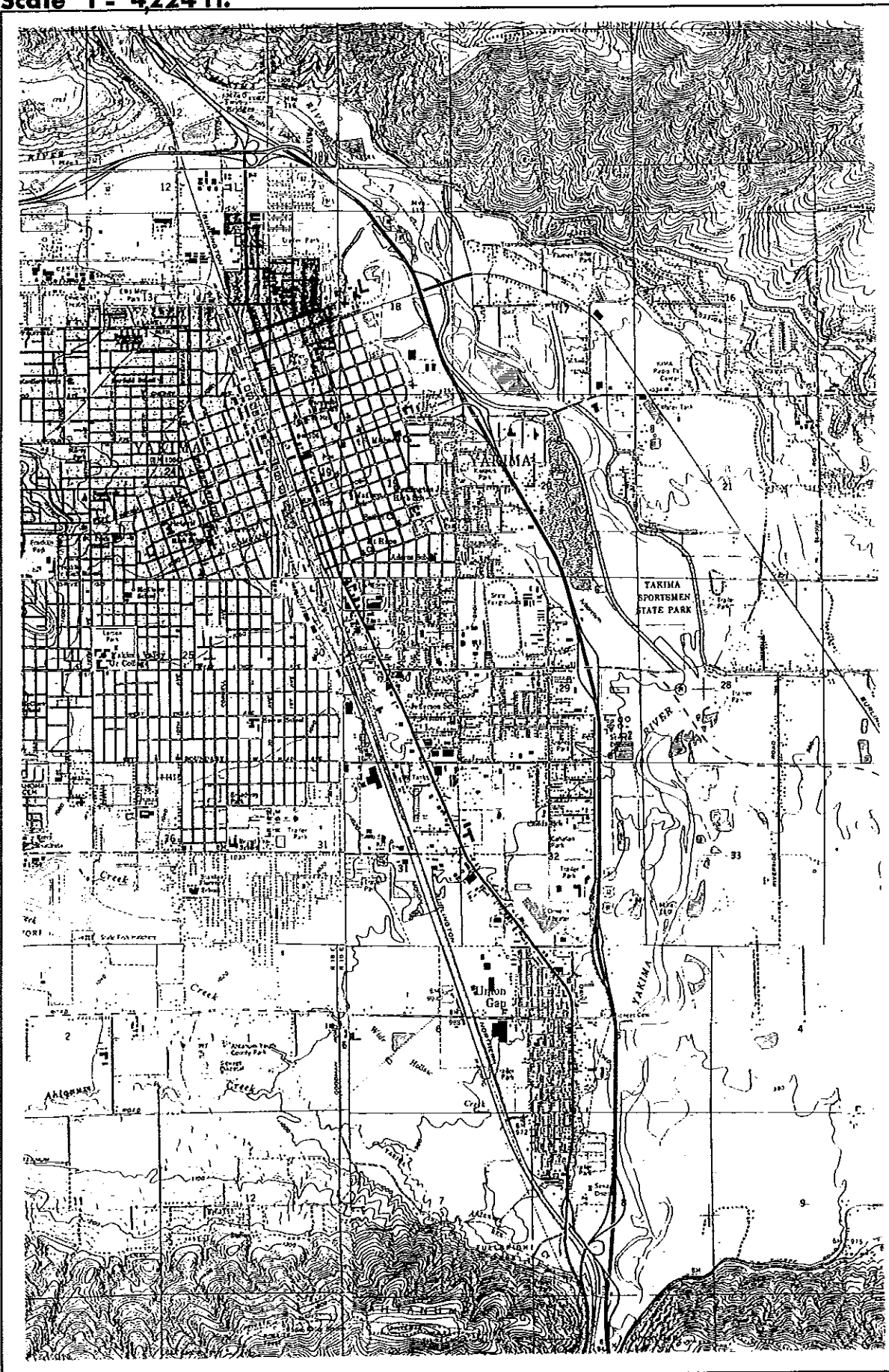


Figure 2: City of Yakima. T.S. 12/13 N, R 18/19 E, Yakima East, West, Selah, and Pomona Quadrangles (U.S.G.S.). Railroad study area is located in Sections 19, 30, & 31.



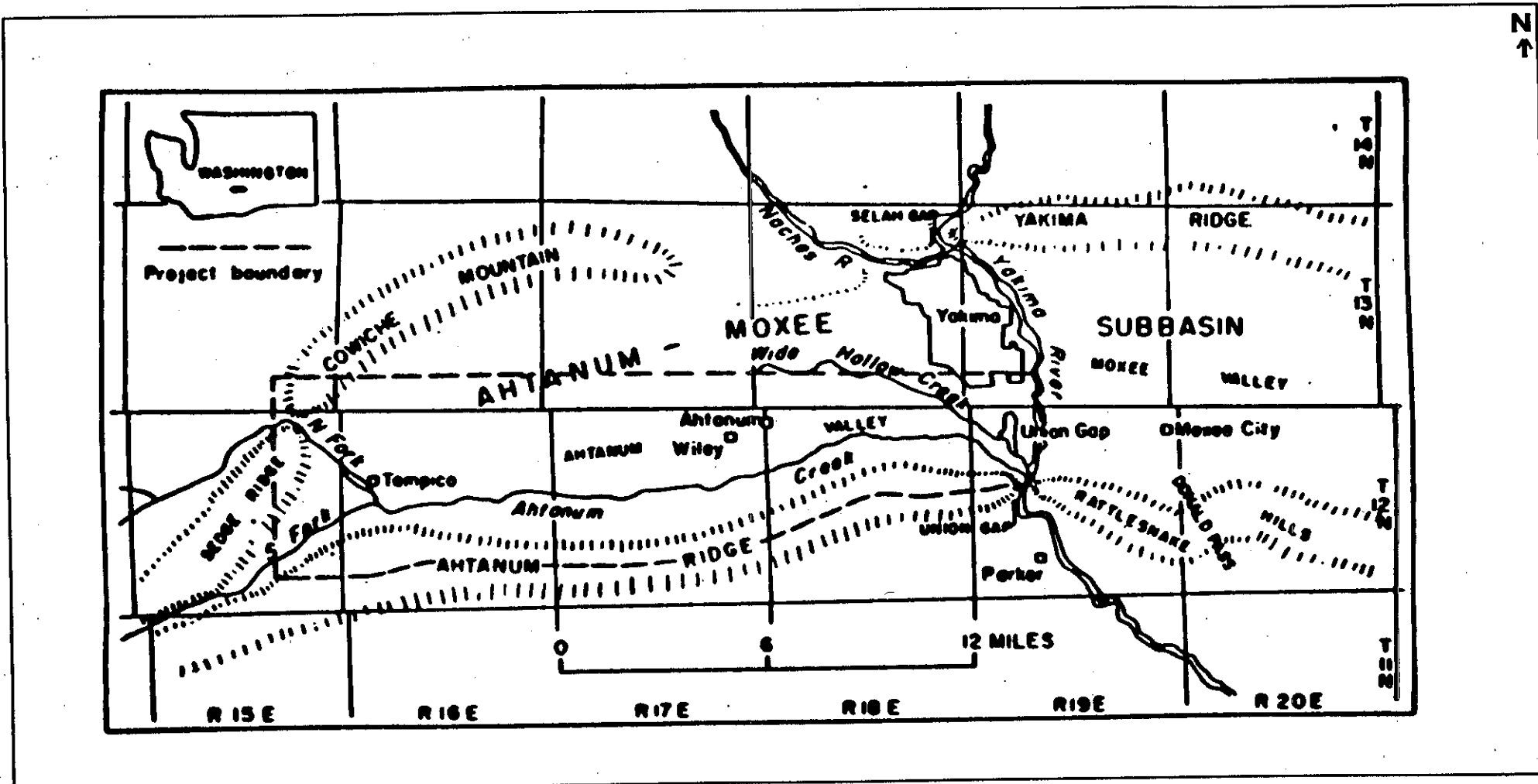


Figure 3: Ahtanum-Moxee Subbasin (Foxworthy, 1952).

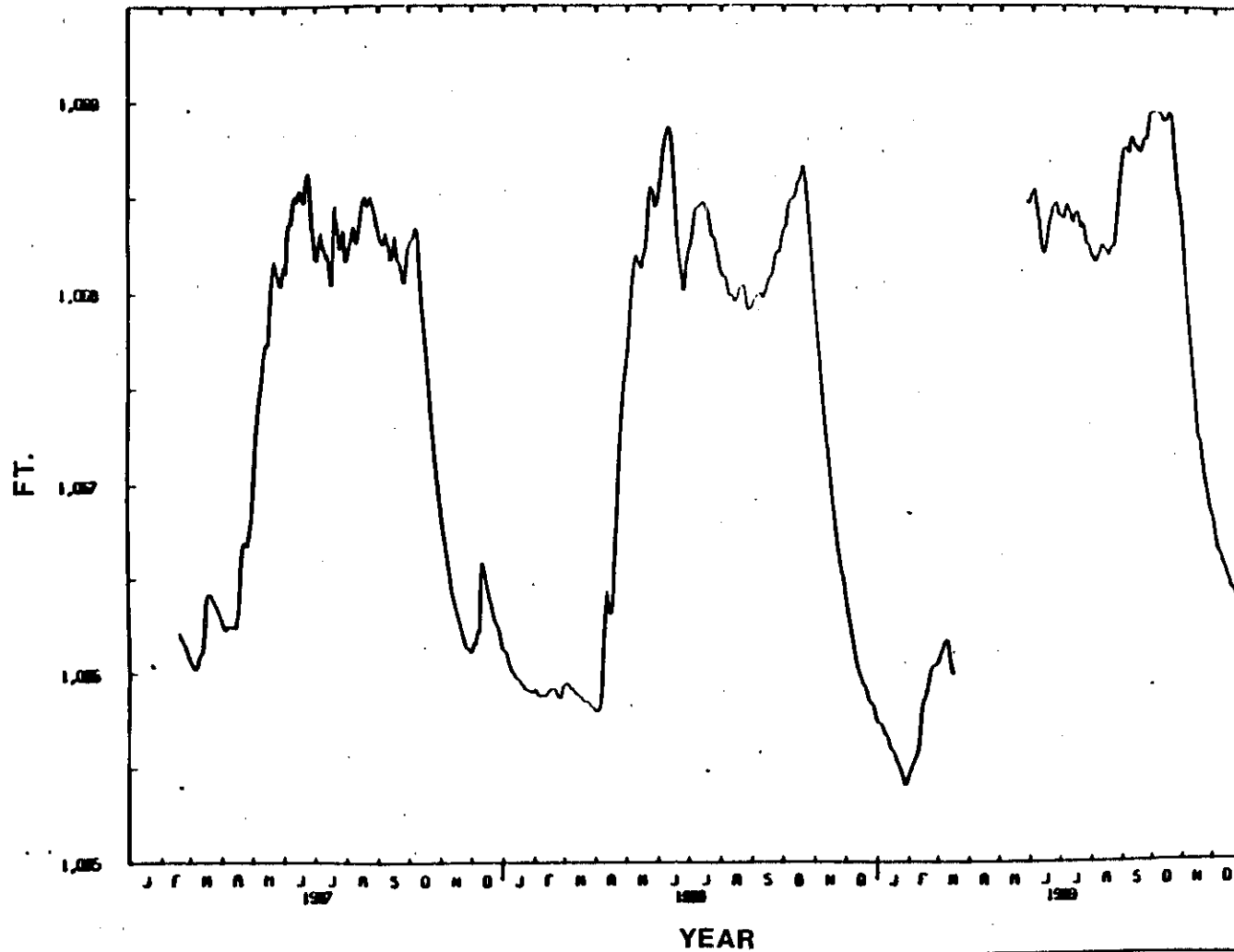


Figure 4: Ground water table fluctuation, Yakima. Several feet of fluctuation is common during the summer irrigation season (Source: U.S.G.S., MW-14, North Yakima Leaking Underground Storage Tank Investigation).

## **Aquifer Properties**

Yield rates of 100 - 400 gpm have been reported for the unconsolidated alluvium (USGS). Yields of 50 - 100 gpm have been reported for several wells within the confines of the railroad area (T.S. 13 N., R 18 & 19 E, Sections 1, 6, 19, 24, 25, 30, 31, & 36). A series of pump tests performed by the USGS (Foxworthy, 1962) on wells set in the alluvium found hydraulic conductivity values ranging from 100 - 6,000 ft/day (USGS, see **Table 3, Ground Water Flow Rates and Aquifer Properties**). Literature hydraulic conductivity values for clean sand to gravel range from  $10^2$  -  $10^4$  gpd/ft<sup>2</sup> (Freeze, and Cherry, 1979). Estimated transmissivity values for the unconfined aquifer range from  $10^2$  -  $10^5$  gpd/ft (based on an aquifer thickness of 100 ft.).

Unconfined ground water depths for northern Yakima are typically less than 15 ft. below grade. Ground water depths for the Union Gap area are in some cases less than 5 ft. below ground surface. The close proximity of ground water to land surface is a reflection of marsh or wetland-type topography in the Union Gap area. Large tracts of land in this area, such as the Yakima Valley Mall, have since been developed and paved.

## **Ground Water Flow Velocities**

Flow rates of 0.4 - 86 ft/day (146 - 31,390 ft/yr) have been reported by the USGS for the Ahtanum-Moxee subbasin. Flow velocities of 6 - 12 ft/day (2,190 - 4,380 ft/yr) were calculated for the railroad study area (see **Table 3, Ground Flow Rates and Aquifer Properties**) based on data from this investigation. Flow rates were computed using the two facilities with the highest and lowest head measurements, (Crest Linen and N.W. Truck Repair).

## **Ground Water Elevations**

Ground water elevational data is presented in **Table 4**. Ground surface and top of casing elevations were surveyed to the nearest 0.01 ft. by Bell & Upton Land Surveyors, Yakima, Washington.

## **Ground Water Flow Direction**

Computer-generated and hand drawn potentiometric surface maps are presented in **Figures 5 & 6**. A three-point solutions was used to analyze flow vectors and hydraulic gradients (see **Figure 7, three-point flow**). The predominant flow direction through the railroad area is approximately S 35° E towards the Yakima River. Flow vectors in the north half of the study area (north of Nob Hill) are more easterly (S 40-60° E).

**Table 2: Principal Aquifer Units - Ahtanum Moxee Subbasin, Yakima Washington**

Age	K (gpd/ft <sup>2</sup> )	Description
Holocene	100 - 6,000 <sup>1</sup>	Alluvium consisting of sand, silt, gravel, and cobbles. Generally forms a thin mantle < 50 thick but may be thicker in places.
Pleistocene		Coarse sand and gravel with large amounts of cemented basalt gravels. Up to 500 ft. in thickness.
Tertiary		Colombia River basalt flows. Contains some interbedded lake and stream-deposited material. Up to 4,000 ft. thick.

Source: USGS, Hydraulic conductivity (K) value obtained from USGS

**Table 3: Estimated Ground Water Flow Velocities and Aquifer Properties, Yakima R.R.**

C. Linen, G.W. Elev. (ft.)	N.W. Truck, G.W. Elev. (ft.)	$\Delta h$ (ft.)	Distance $\ell$ (ft.)	M i l e s	$\frac{i}{ft/ft}$	$i_5$ ft/mile	$T_4$ gpd/ft	K (ft/day)	K (gpd/ft <sup>2</sup> )	$\eta$ (%)	$V_6$ (ft/day)
1049.40	979.34	70.06	18,480	3.5	.004	20	600	13.4	100 <sub>2</sub>	25	0.2
1049.40	979.34	70.06	18,480	3.5	.004	20	300,000	402	3000	25	5.8
1049.40	979.34	70.06	18,480	3.5	.004	20	600,000	804	6000 <sub>2</sub>	25	12

<sup>1</sup> Ground water elevations taken 11/92.

<sup>2</sup> Value obtained from the USGS.

<sup>3</sup> Value obtained from Freeze and Cherry, 1979.

<sup>4</sup> Based on a aquifer thickness of 100 ft., computed using  $T = kb$ .

<sup>5</sup>  $i$  = hydraulic gradient

<sup>6</sup> Ground Water Flow Velocity ( $V$ ) computed using  $v = K (\Delta h) / \ell / 7.48 * \eta$

Where:

$K$  = hydraulic conductivity (gpd/ft<sup>2</sup>)

$\eta$  = porosity (assumed @ .25)

$\Delta h$  = head difference (high to low)

$\ell$  = linear distance

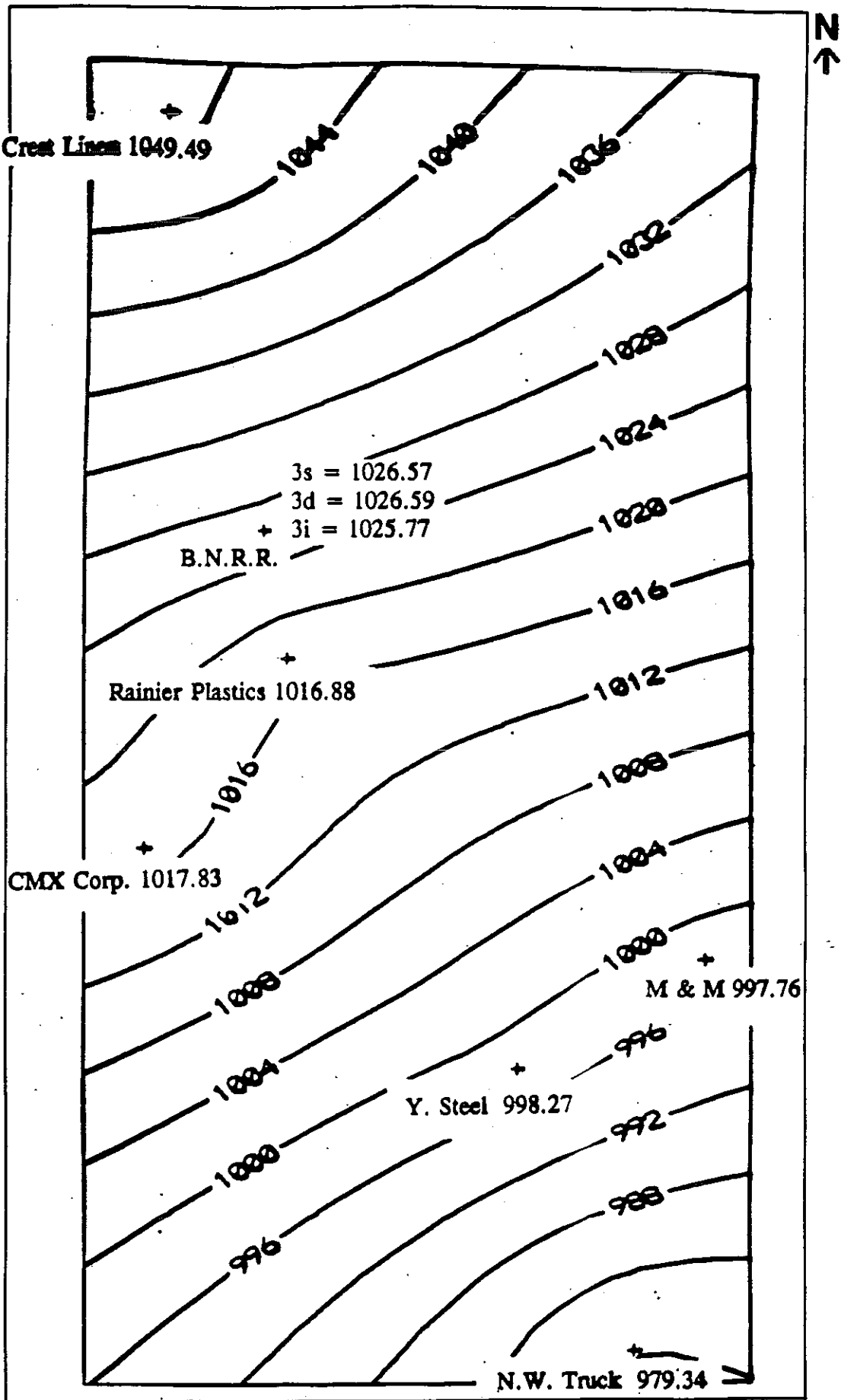


Figure 5: Computer-produced potentiometric surface map, Yakima R.R. (Not to Scale). Map was produced using the SURFER Program, Golden Software, Inc.

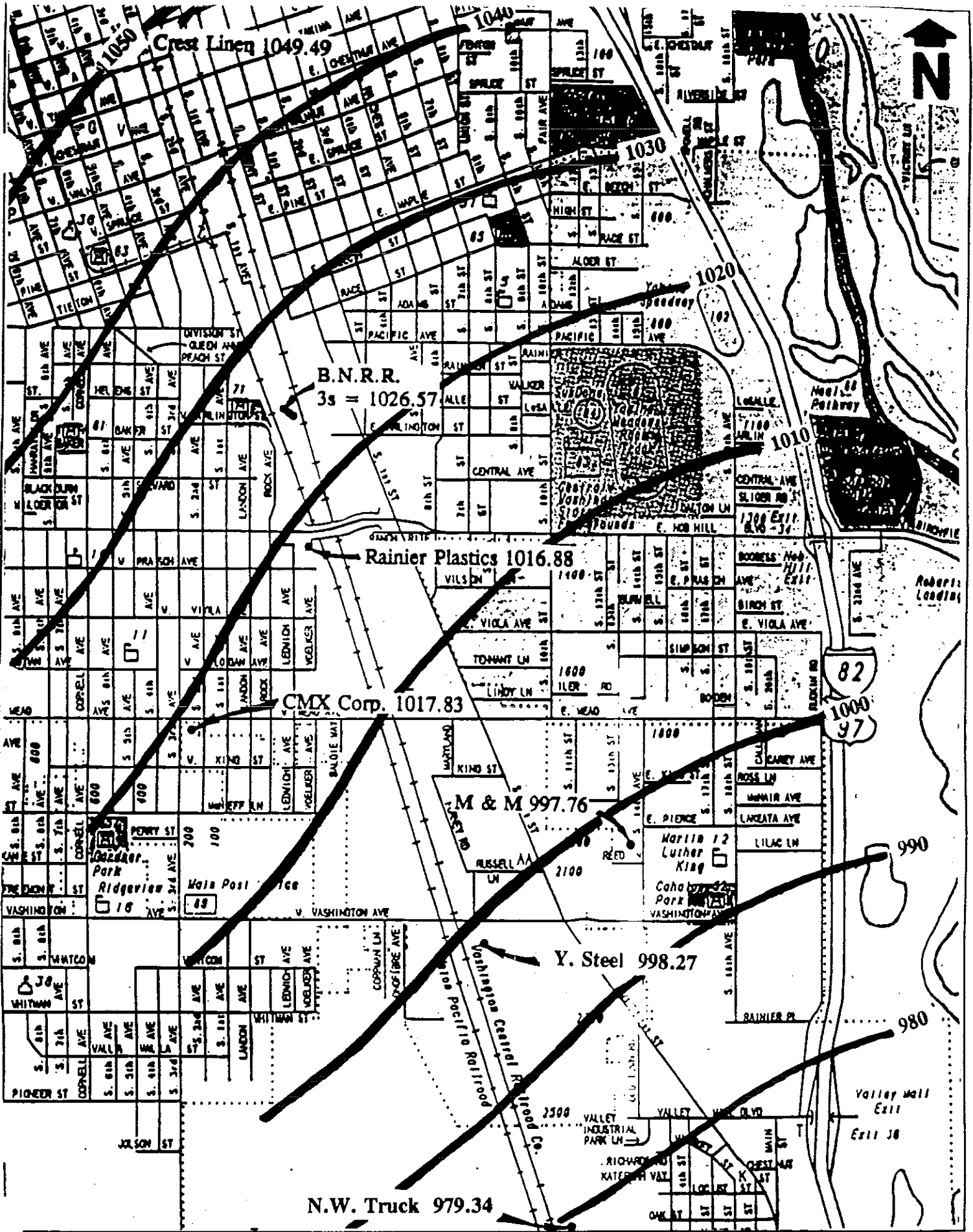
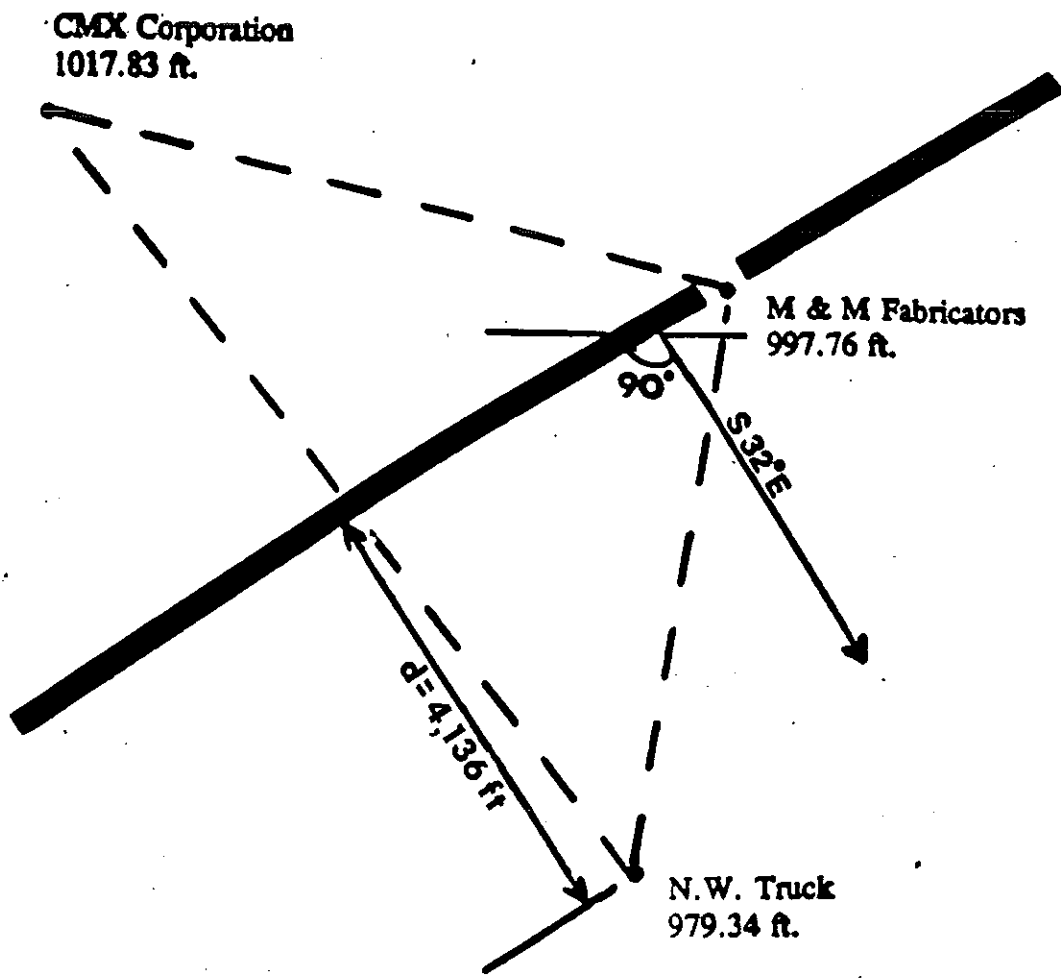


Figure 6: Hand-produced potentiometric surface map, Yakima Railroad study area. Scale 1" = 1,760 ft. Contour Interval = 10 ft. Map is based on ground water elevations taken 17 Nov 92 (see Table 4).



$$\text{Hydraulic gradient} = (997.76 \text{ ft.} - 979.34 \text{ ft.}) / 4,136 \text{ ft.} = 0.004 \text{ ft/ft}$$

Figure 7: Three-point flow analysis, Yakima railroad. Flow is S 32° E with a gradient of 0.004 ft/ft. Scale 1" = 1,760 ft. Diagram is based on ground water elevations taken November 17, 1992.

**Table 4: Elevational Data - Yakima R.R. Monitoring Wells**

Site	Well No.	Total Depth	T.O.C. Elevation (ft.)	Ground Surface Elevation (ft.)	Ground Water Depth (from T.O.C.)	Ground Water Elevation (ft.)
Crest Linen, North 1st & B St.	WDOE-1	35.0	1071.13	1068.20	18.80	1049.40
Rainier Plastics, 1101 Ledwich	WDOE-2	29.0	1035.63	1035.87	18.75	1016.88
B.N.R.R. 3S, 6 East Arlington	WDOE-3S	28.0	1053.32	1050.30	26.75	1026.57
B.N.R.R. 3D	WDOE-3D	52.0	1053.12	1050.30	26.53	1026.59
B.N.R.R. 3I	WDOE-3I	97.0	1053.27	1050.30	27.50	1025.77
M & M Fabricators, 2004 S. 14 th St.	WDOE-4	28.0	1007.32	1008.28	9.76	997.76
CMX Corporation, 206 West Mead	WDOE-5	25.0	1037.03	1039.30	19.20	1017.83
Agri-Tech/Yakima Steel, 6 East Washington	WDOE-6	17.0	1002.27	1002.42	4.00	998.27
N.W. Truck Repair, 805 1/5 Ahtanum Rd.		15.0	988.09	988.05	8.75	979.34

1 All ground water elevations taken on November 17, 1992.



## Ground Water Flow Direction (cont).

A change in flow vector to S 62° E was noted within the vicinity of the Rainier Plastics facility. The unconfined ground water elevation at Rainier (1016.88 ft.) may be a reflection of lower topography. The Rainier facility has been constructed in a low gully area that has since been filled-in with soil for construction purposes. The plant entrance at Ledwich St. is the approximate edge of the former gully. The lower ground water elevation at Rainier may thus be a reflection of lower topography beneath the Nob Hill overpass (see Figures 1 or 2).

## Hydraulic Gradient

Hydraulic gradient values for the railroad were calculated at .004 ft/ft or 20 ft/mile (Table 3, Ground Water Flow Rates & Aquifer Properties).

## Soil Lithology

Poorly sorted alluvium, consisting of approximately 60% fine to coarse sand and 40% gravel (or mixtures thereof) was the predominant soil type encountered. Six soil samples were collected at four separate locations for grain size analysis (Table 5, Grain Size Analysis Summary, see Appendix B also). The predominant USCS soil classification ranged from SW (gravelly sands) to GW (clean gravels). Gravel-sized particles were typically flat subangular to subrounded basalt clasts, ranging from 1/2" - 1" in length. Cobbles and larger stones approaching cobble size were common. Sand-sized particles were typically dark brown in color and varied from coarse to fine. Silt-sized particles normally comprised < 10% of the matrix.

## Soil Adsorptive Properties

One to two soil samples were collected at each drilling location and analyzed for total organic carbon (Table 6, Total Organic Carbon and Soil Metals Values). Total organic carbon values ranged from 0.0006 to 0.031.

The Soil Adsorption Coefficient,  $K_{oc}$ , is a measure of the solid/liquid partitioning that takes place when an organic chemical is adsorbed with soil. It can also be thought of as the ratio of the amount of chemical adsorbed per unit weight of organic carbon (oc) in the soil to the concentration of the chemical in solution at equilibrium (Lyman and Reehl, 1982):

$$K_{oc} = \frac{\text{ug adsorbed/g organic carbon (oc)}}{\text{ug/ml solution}}$$

**Table 5: Grain Size Analysis Summary, Yakima R.R. Sites**

Site	Percentage of Coarse to Fine Sand (< 4.75 mm)	Percentage of Fine to Coarse Gravel (> 4.75 mm)	Percentage of Fines (< .075 mm)	Uniformity Coefficient (D <sub>60</sub> /D <sub>10</sub> )	ASTM Classification
Crest Linen	61 %	39 %	7 %	30	SP-SM
Rainier Plastics	58 %	42 %	6 %	25	SW-SM
B.N.R.R. MW-3D @ 18 ft.	86 %	14 %	16 %	17	SM
B.N.R.R. MW-3D @ 70 ft.	29 %	71 %	3 %	9	GW
M & M Fabricators	89 %	11 %	10 %	23	SW-SM
Burrows Tractor	64 %	36 %	10 %	45	SW-SM
Average =	64.5 %	35.5%	8.7 %	25	

See Appendix "D" for additional information.

Engineering Grain Size Classification	Size Range (mm)
Boulder	> 305
Cobbles	76 - 305
Coarse Gravel	19 - 76
Fine Gravel	4.75 - 19
Coarse Sand	2 - 4.75
Medium Sand	0.42 - 2
Fine Sand	0.075 - 0.42
Fines	< 0.075

Source: Fetter, C.W., Applied Hydrogeology (1988)

**Table 7: Total Organic Carbon and Soil Metals Values**

Site	Sample No.	Depth Collected	Total Organic Carbon (mg/kg)	Total Organic Carbon (g/g)	Sample No.	Ar (mg/kg)	Cd (mg/kg)	Cr (mg/kg)	Pb (mg/kg)	Se (mg/kg)
Crest Linen	468082	6"	3,700	0.0037	468083	9.2	0.41	21.9	3.7	5.0
Rainier Plastics	468088	6"	5,900	0.0059	468086	12	0.58	15	31.5	5.0 U
B.N.R.R. 3 D	468091	3 ft.	1,100	0.011	468123	9.5	0.60	17.2	24.0	5.0 U
	468126	6"	31,000	0.031		5.7 P	0.32 P	16.5	6.7 P	5.0 U
M & M Fabricators	468097	5 ft.	9,100	0.091	468100	4.9	0.78	20.6	30.0	5.0 U
CMX Corporation	468130	3.5 ft.	900	0.0009	468129	20	0.52 P	16.6	46.8	5.0 U
Central Engine & Machine	468101	4 ft.	3,000	0.003	468094	9.9 P	0.36 P	15.6	6.8 P	5.0 U
Burrows Tractor	468112	2.5 ft.	1,200	0.012	468112	5.7 P	0.32 P	16.5	6.7 P	5.0 U
N.W. Truck Repair	468119	4 ft.	3,000	0.003	468117	6.9 P	0.52 P	15.4	4.1 P	6.2 U
Van Cleave Auto Body	478239	2.5 ft.	5800	0.0058	Mean =	9.31	0.49	16.92	17.81	2.84

U = Analyte was not detected at or above the reported result.

P = The Analyte was detected above the instrumentation detection limit but below the established minimum quantitation limit.

## Soil Adsorptive Properties (cont.)

Estimated Soil  $K_{oc}$  values are presented in Table 6. Several factors including temperature, pH, and soil particle size/fraction of organic carbon content ( $f_{oc}$ ) will affect the soil  $K_{oc}$  value. In general, chemicals with a  $K_{oc} < 1,000$  will not readily adsorb to soil organic carbon (Ney, 1990). The low adsorptive capacity of shallow soils (< 100 ft.) within the Yakima R.R. can in part be attributed to the wide range in grain size and lack of fine-grained or colloidal-size (< 0.075mm) material.

**Table 6: Estimated Soil Koc Values**

Chemical	log $K_{ow}$	Equation	$K_{oc}$
1,1,1-Trichloroethane	148	${}_1\log K_{oc} = -0.21 + \log K_{ow}$	91
Perchloroethylene	758	${}_2\log K_{oc} = -0.557 + \log S$ (S in mole fraction) + 4.277	247
Benzene	135	${}_3\log K_{oc} = 0.088 + 0.909 \log K_{ow}$	106

<sup>1</sup> From Karickhoff et al., 1979

<sup>2</sup> From Lhyman, and Reehl, 1982

<sup>3</sup> From Hasset et al., 1983

## Soil Metals Values

Lead, cadmium, chromium, arsenic, and selenium soil metals values are presented in Table 7, Total Organic Carbon and Soil Metals Values.

## Contaminant Characteristics

This investigation focused on the presence of chlorinated hydrocarbons in the shallow aquifer beneath the Yakima R.R. area. Physical and chemical properties for various chlorinated hydrocarbons and volatile organic compounds are presented in Table 8, Contaminant Physical and Chemical Properties. All of the compounds presented in Table 8 were detected in the soil or ground water during this investigation.

## **Investigation Results**

Sample results for soil and water are presented in **Tables 9 & 10**. Trace (< 1 ppb, Crest Linen property) to high (> 400 ppb, Yakima Steel/Agri-Tech property) levels of chlorinated hydrocarbons were detected in ground water at six locations. Low levels (1.0 - 29.0 ppb) of volatile organic and chlorinated hydrocarbon compounds were detected at five locations. Higher levels of chlorinated hydrocarbon compounds (8,100 ppb) were detected in soil at the Agri-Tech site.

## **Individual Summaries**

### **Rainier Plastics**

Installed one flush mount well to 29 ft. depth. Located monitoring well next to previous location of injection well. Injection well had been used as the discharge point (gravity feed from an indoor strand tank) for plant cooling water. There has been historical concerns about the quality of water in/out of the Rainier cooling water system. The injection well has since been removed due to overflow problems during the summer months (rise in ground water table from irrigation recharge). Water supply well for plant cooling system still in place but not operational (NW corner of the building, may be used to water the lawn). **Detected 15 ppb of chlorinated hydrocarbons in ground water.** Data is consistent with earlier sampling events (Ecology & Environment, 12/87). No obvious signs of soil contamination. **Microtip readings equal to 0.0 @ 5 ft. depth. One soil sample non-detect for volatile organic compounds (No. 468085, 0 - 6").** Rainier and sister facility, Shields Bag, produce plastic bags for various consumer products (celery, etc.).

### **Central Engineering & Machine**

Completed one soil boring to 5 ft. depth (see **SB-1, Appendix A**). Soil samples non-detect for volatile organic compounds.

### **Northwest Truck Repair**

Completed one soil boring approximately 20 ft. north of the 4" monitoring well (see **SB-2, Appendix A**). Underground utilities prevented location of soil boring closer to the truck maintenance area. Trace levels (5.7 ppb) of tetrachloroethane detected in site ground water monitor well (well completed as part of a previous investigation).

### **Southgate Laundry**

Completed one soil boring to 5 ft. depth (see **SB-5, Appendix A**). Trace levels of tetrachloroethene (29.0 ppb), toluene (1.2 ppb), and total xylenes (4.6 ppb) detected.

## **Individual Summaries (Cont.)**

### **M & M Fabricators**

Completed one flush mount well to 28 ft. depth. Located well next to dry well at rear of shop. Dry well is apparently used for discharge of wash water from shop. Trace levels of soil (total xylene @ 19.0 ppb) and ground water (2.3 ppb tetrachloroethene) contamination detected.

### **Timpke Machine**

This facility was not investigated due to the close proximity of overhead powerlines and the associated difficulties of maneuvering a drill rig into position.

### **Burrows Tractor**

Completed one soil boring to 10 ft. depth. Microtip readings to 1.4 ppm (Sample Events 190 & 193). Trace levels (7.0 ppb) of acetone detected in soil samples.

### **Martinizing Dry Cleaners**

Completed one soil boring to 5 ft. depth. Microtip readings to 1.9 ppm (Sample Event 227). Low levels (27.0 ppb) of volatile organics (xylene) detected in soil. Small-sized (15 gal.) hazardous waste drum stored on the ground behind facility. No obvious signs of soil contamination.

### **Yakima Steel**

Completed one well to 17 ft. depth and one soil boring to 5 ft. depth. Elevated levels of chlorinated hydrocarbons detected in soil/waste material (2,200 ppb tetrachloroethene) and ground water (430 ppb trichloroethane). Pesticide-type waste streams associated with former property tenants. No explanation for detection of chlorinated hydrocarbons in what was thought to be pesticide waste material. Parking lot area between Yakima Steel and Agri-Tech, the next business immediately north, is underlain by a former pesticide processing lagoon or pit. Historical aerial photographs show pit or lagoon with dimensions of approximately 200 ft. x 50 ft. (Dick Bassett, Toxics Cleanup Program, CRO). Pit was allegedly used by a former tenant (Farmers Supply) to mix sulfur and lime. The lime/sulfur mixture is then mixed with an emulsified oil and sprayed on apple trees to prevent bark scaling. Encountered ground water @ 4 ft. Waste material encountered almost immediately (1-2 ft. depth). Used Level "C" protection to complete both borings due to extremely pungent odors (up to 50 ppm on the Microtip). Ground water dark black in color and very pungent odors. Encountered a green clayey-like waste material (may be sulfur) while drilling the monitor well.

## **Individual Summaries (Cont.)**

### **Van Cleave Body Shop**

Completed one soil boring to 2.5 ft. depth. Encountered large cobbles (8-12" diameter) @ 2.5 ft. depth. All soil samples non detect for volatile organic compounds (see SB-7, Appendix A for location of boring).

### **CMX Corporation**

Completed one flush mount monitor well to 24.5 ft.. Microtip readings are non-detect (Sample Events 217-218). Soil and ground water samples non-detect. Fairly high degree of turbidity in formation water, had trouble developing well. No obvious signs of soil contamination. CMX processes and ships medical x-rays.

### **Crest Linen**

Installed one above ground monitor well to 35 ft. depth. Completed well along the east side of the property near previous location of soil boring DH-2 (Chen-Northern, 1/91). Trace level (< 1 ppb, tetrachloroethene) detected in ground water. Microtip readings to 1.0 ppm @ 5.0 ft. depth. Laboratory tentatively identified Alkyl Benzene Isomer (C<sub>14</sub>H<sub>10</sub>) in soil @ 7.0 ppb (No. 468081, 17 ft. depth). Trace levels of chlorinated hydrocarbons detected (2.5 ppb 1,2-dichloroethene) in ground water during previous investigation (Chen-Northern, 1991). Site is a vacant lot. No obvious signs of soil contamination.

### **Burlington Northern R.R. Roundhouse Area**

Installed three monitor wells to 28, 51.5, and 97 ft. depths. Had previously intended to complete borings closer to the repair shop; however, railroad personnel informed Ecology that the repair shop foundation extends outward from this area for some distance. Noted stained surficial soils near the locomotive repair shop (see Figure 19). Microtip readings to 8 ppm in the first 36 ft. of drilling, WDOE-3D (Sample Events 196 - 208). Acetone detected @ 26.0 ppb, 36.5 ft. depth. Observed a slight oily sheen in the bailed sample water. Detected higher levels (100 ppb of 1,1,1-trichloroethane) in the intermediate depth well (3D) than the shallow or deep well (both wells < 45 ppb 1,1,1-trichloroethane). Higher contaminant concentrations in the intermediate well may be due to the presence of lower permeability sediments starting at approximately 30 ft. (gray silty-sand and clayey gravel). Formations grades to a well sorted gravel (GW) @ 60 ft. Deeper well (3D) had slightly higher ground water elevation (0.02 ft.). Upward head noted while drilling this well. Roundhouse area is used to repair and recondition heavy locomotives.

**Table 8: Contaminant Physical and Chemical Properties**

Compound	Solubility (mg/l) Low < 10 Medium 10 - 1,000 High > 1,000	K <sub>ow</sub> Low < 500 Medium 500-1,000 High > 1,000	Half Life (years) Rapid < 30 Medium 30 - 90 Slow > 90	Volatility mm Hg @ 20° C Low < 10 <sup>-6</sup> Medium 10 <sup>-6</sup> - 10 <sup>-2</sup> High > 10 <sup>-2</sup>
Benzene	1,780	135	2.7	95.2
Perchloroethylene	150 - 200	758	4.2	14.3
DDE	0.01	583,000	N/A	N/A
1,1,1-Trichloroethane	950	309	3.7	100
Toluene	534.8	490	2.9	28.4

After Ney (1990)  
N/A = Not Available



**Table 9: Volatile Organic Sample Result Summary - Soil**

Site	Sample No.	Depth	Compound Detected	Highest Values Detected (ug/kg)	Range (low - high, ug/kg)
Crest Linen	468081	17 ft.	Alkyl Benzene Isomer - Tentatively Identified (C10.H14)	7.0 NJ	5.0 - 7.0
B.N.R.R. 3D	468124	36.5 ft.	Acetone	26.0	
M & M Fabricators	468096	5 ft.	Total Xylenes	19.0	19.0
CMX Corporation	468132	3.5 ft.	Acetone	5.6	
Yakima Steel	468110 468105	5 ft.	Tetrachloroethene 4,4'-DDE	8100.0 10.0	2.0 - 8100.0
Burrows Tractor	468114	7 ft.	Acetone	7.7	7.0 - 7.7
N.W. Truck Repair	468116	4 ft.	Acetone	5.0 J	5.8 - 7.7
Southgate Laundry	478236 478237	< 5 ft.	Tetrachloroethene Toluene Total Xylene	29.0 1.2 4.6	1.2 - 29.0
Martinizing Dry Cleaners	478230	4 ft.	Total Xylenes	27.0	1.8 - 27.0
Van Cleave Auto Body	478238	2.5 ft.	N.D.	N/A	N/A

Table 20 In Situ Organic Sample Result Summary - Ground Water

Site	Sample No.	Well No.	Well Depth	Compound	Highest Values Detected (ug/l)	Range (Low - High, ug/l)
Crest Linen	478255	WDOE-1	35 ft.	Tetrachloroethene Chloroform	0.9 J 1.3	
Rainier Plastics	478243	WDOE-2	29 ft.	Tetrachloroethane	15.0	
B.N.R.R. 3S	478247	WDOE-3S	28 ft.	1,1,1-Trichloroethane Tetrachloroethane	45.0 24.0	
B.N.R.R. 3I	478248	WDOE-3I	52 ft.	1,1,1-Trichloroethane Benzene	100.0 37.0	0.9 - 100.0
B.N.R.R. 3D	478249	WDOE-3D	97 ft.	1,1,1-Trichloroethane	45.0	0.7 - 45.0
M & M Fabricators	478241	WDOE-4	28 ft.	Tetrachloroethene Chloroform	2.3 4.0	2.3 - 4.0
CMX Corporation	478254	WDOE-5	25 ft.	Tetrachloroethane	1.8	1.8
Yakima Steel/Agri-Tech	478252	WDOE-6	17 ft.	Trichloroethene Tetrachloroethene Cis-1,2 Dichloroethene	430.0 420.0 270.0	9.1 - 430
N.W. Truck Repair	478253	WDOE-7	15 ft.	Tetrachloroethane	5.7	1.1 - 5.7

Table 11: Ground Water pH & Specific Conductivity Values

Site	Well No.	Well Depth	pH	Conductivity
Crest Linen	WDOE-1	35 ft.	6.7 J	203
Rainier Plastics	WDOE-2	29 ft.	6.9 J	238
B.N.R.R. 3S	WDOE-3S	28 ft.	6.8 J	184
B.N.R.R. 3I	WDOE-3I	52 ft.	8.4 J	282
B.N.R.R. 3D	WDOE-3D	97 ft.	7.6 J	264
M & M Fabricators	WDOE-4	28 ft.	6.5	196
Yakima Steel/Agri-Tech	WDOE-6	17 ft.	7.0 J	798
N.W. Truck Repair	WDOE-7	15 ft.	6.8	281

J = The associated numerical result is an estimated quantity

## **Drilling Methods**

Ponderosa Drilling of Spokane, Washington was contracted by Ecology for monitoring well and soil boring drilling. All drilling was performed with a top-drive Chicago Pneumatic air rotary drill rig equipped with a air compressor filter. Downhole air pressure was approximately 50 PSI with an air velocity range of 300 - 700 ft<sup>3</sup>/min. Each hole was drilled with a 6" diameter tricone bit. A 6" diameter temporary support casing was also used on each borehole. The temporary support casing was removed upon completion of all shallow wells (< 35 ft.). Water was not injected during drilling. All downhole equipment was steam-cleaned between each soil boring or well completion.

Collection of split-spoon samples at each location was attempted. A 3 ft. long 2" diameter split-spoon core barrel was used. Nearly all of the core samples generated < 6" of recovery due to the gravelly soils and cobbles. Grab samples were also collected from the 55-gal. drill cuttings drum or via a hand-held wire mesh strainer beneath the "cyclone" (funnel off the drill cuttings discharge hose).

### **Air Rotary vs. Other Drilling Methods**

Air rotary drilling was selected for this investigation in anticipation of the cobbles and gravels that comprise the unconsolidated alluvium. Other drilling methods, including hollow stem augur, were considered but ruled out because of concerns about the depths needed (up to 100 ft.) to complete the investigation. Use of backhoe was also considered for sampling soils; however, this method was also ruled out because of the damage potential to asphalt parking lots.

Due to the lack of fines or colloidal-sized material (typically less than 10%), the unconsolidated alluvium has a low adsorptive capacity. Detection of trace to low levels of volatile organic compounds was anticipated because of the low soil adsorptive capacity. The alluvium also poses problems when collecting of split-spoon samples. Cobble-sized stones typically get stuck in the end of the core barrel, which eliminates further recovery within the core barrel. Split-spoon recovery values for this investigation were typically a few inches or less.

Previous investigative data from the Crest Linen site suggests that other drilling methods may have little or no effect on the outcome of sample results. Five boreholes were completed at the Crest Linen site by Chen-Northern Inc. during a January 1991 investigation. Cable tool drilling was used to complete each borehole. Trace levels (1.0 ppb) of chlorinated hydrocarbons were detected in soil. This data compares favorably with the results produced by this investigation (tentatively identified compound @ less than 1 ppb in soil, Crest Linen).

## **Sample Collection, Transport, and Analysis**

All soil and ground water samples were logged using a Department of Ecology Chain of Custody form. The date, number, sample location, and type of analysis requested was recorded on the chain of custody form. All samples were transported in a sealed cooler via Greyhound Bus to the U.S. EPA/Department of Ecology Manchester Laboratory, Port Orchard.

## **Field Equipment**

A Photovac Microtip HL-200 was used to screen all soil samples. The Microtip was calibrated with isobutylene gas prior to the start of each day used. **Microtip field data is presented in Appendix D.**

## **Storage/Disposal of Drill Cuttings & Fluids**

The Microtip was used to screen all drill cuttings. All drill cuttings, except for those cuttings from the two deep wells (3I & 3D) at Burlington Northern Railroad, were stored in 55-gal. drums. Drill cuttings from soil borings were either drummed or placed back in the borehole and grouted.

## **Monitor Well Construction**

Monitor well logs, construction diagrams, and location maps are found in Appendix B

## **Investigation Timeframe**

All of the work for this investigation took place between 2 Nov 92 and 18 Nov 92.

## Report Conclusions

- Ground water is flowing southeast through the railroad area with a gradient and of .002 ft/ft and a flow velocity of between 6 and 12 ft/day. Ground water from the railroad area is discharging to the Yakima River at an approximate rate of 9,000 acre/ft month (68,000 gpm, U.S.G.S.).

- A change in flow vector to nearly due east was noted between the B.N.R.R. roundhouse facility and Rainier Plastics. The change in flow vector is probably the result of gully-like topography beneath what is now the Rainier facility.

- Ground water is much closer to ground surface throughout the Union Gap area.

- Aquifer hydraulic conductivity values for the unconsolidated alluvium range from  $10^2$  -  $10^3$  gpd/ft<sup>2</sup>. Aquifer transmissivity values range for the alluvium are approximately equal to  $10^5$  gpd/ft.

- The unconsolidated alluvium is comprised of approximately 60% fine to coarse sand and 40% fine to coarse gravel. The unconsolidated alluvium ranges in thickness from 50-100 ft.. A "well-cemented" basalt-gravel was not encountered during this investigation.

- The percentage of fines within the alluvium is typically < 10%. The unconsolidated alluvium has a low adsorptive capacity due to the low percentage of fines.

- Total organic carbon values for the unconsolidated alluvium (0-5 ft. depth) range from .0006 to .091 g/g.

- Use of a standard split-spoon core barrel is for the most part not effective when sampling the unconsolidated alluvium.

- Chlorinated hydrocarbons, ranging in concentration from 1 ppb - 400 ppb, were detected in ground water at six different locations during this investigation. Ground water contamination was also detected to a depth of 100 ft. and contaminants are undergoing rapid dispersion and dilution.

- Intermittent layers of silty-sand within the alluvium are affecting contaminant movement and acting as partially confining layers. A slight upward head (0.02 ft.) was noted between shallow and deep monitoring wells at one location (B.N.R.R.).

- Trace (< 1.2 ppb) to high (8,100 ppb) levels of chlorinated hydrocarbons were detected in soil at five locations. Volatile organic compounds, ranging in concentration from 1.8 - 27.0 ppb, were detected in soil at three locations.

## **Additional Investigation Recommendations**

- Locate three to five additional ground water monitoring points along the west side of the Yakima River. Survey each point and assess ground water flow direction and hydraulic interaction with the Yakima River. Recommended locations are (in relation to current roads): Ahtanum Road, Washington, Mead Ave., Nob Hill, Yakima Ave., and Tamarack.

- Locate additional ground water monitoring wells immediately downgradient of the B.N.R.R. roundhouse and Yakima Steel/Agri-Tech properties.

- Complete additional soil borings to identify the approximate limits and waste characteristics of the pesticide mixing pit at the Yakima Steel/Agri-Tech property. Assess how or why chlorinated hydrocarbons were detected in soil and ground water at this location (historical waste streams, etc.).

- Use both a backhoe and a drill rig to collect soil samples at a site with known soil contamination. Assess the impact, if any, of various sample collection techniques within the unconsolidated alluvium.

- Conduct a 24 hour pump test of WDOE-3D (B.N.R.R.) to assess aquifer yield, transmissivity, and hydraulic conductivity values.

- Collect quarterly ground water elevations and assess seasonal water table fluctuations and ground water flow patterns.



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### **Acknowledgements**

Several staff members of the Toxics Cleanup Program Central Regional Office (CRO) were instrumental in the planning and implementation of this investigation. Special assistance was provided by student intern John Allgair, Unit Supervisor Tony Valero, Section Head Tony Grover, and Mark Peterschmidt of the Leaky Underground Storage Tank (LUST) Program. Special assistance on contract issues was provided by Ecology Contracts Officer Chuck Hinds. Ecology is most grateful to Roger Kelly and Art Schroeder of Ponderosa Drilling for the excellent work provided on this project.

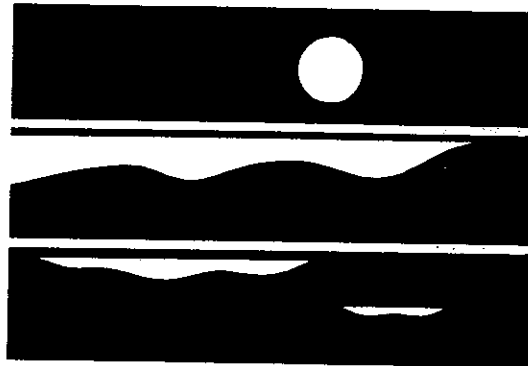
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**Appendix A**

**Well Logs, Construction Diagrams, and Location Maps**



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**RECORD OF SUBSURFACE EXPLORATION**

**WDOE-1 CREST LINEN North 1 St & B St.**

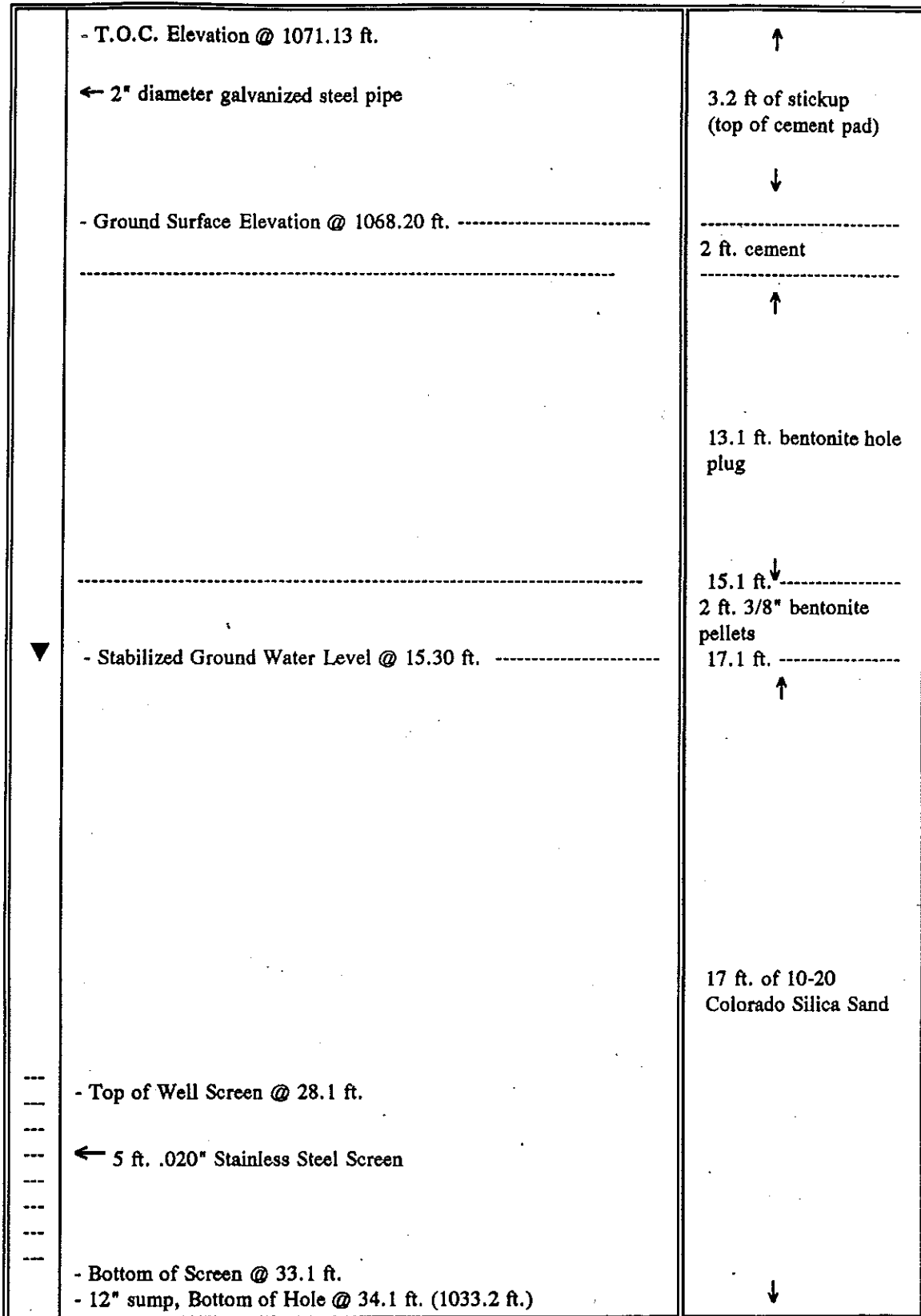
Logged By: Charles San Juan, WDOE	T.O.C. Elevation: 1071.13 ft.
illed By: Roger Kelly, Ponderosa Drilling	Ground Surface Elevation: 1068.20 ft.
Drilling Method: Air Rotary	Ground Water Depth: 15.30 ft. (18.80 ft. from TOC)
Date/Time Started: 2 Nov 92, 1300 hrs	Total Well Depth: 35 ft. (37.3 ft. from TOC)
Date/Time Completed: 3 Nov 92, 1200 hrs	Formation: Alluvium - Stone Fragments, Gravel, and Sand

Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
468080 468082	VOA TOC	1		6" - coarse dark brown sand and gravel, subangular/rounded stones to 1/4", dry. Collected sample with 2" I.D. hand driven core barrel.	SW
		2		Open hole drilling to 5 ft. depth. 0-5 ft. - fine to coarse dark brown sand, trace gravel, dry.	SW,SP
		3			
		4			
		5		Cobbles, dark brown sand, and gravel, moist, weakly cemented. Basalt clasts and large stones to 1/2", subangular/rounded	SW
		6		Started with 6" I.D. temporary casing.	
		7			
		8			
		9			
		10		Coarse sand and gravel, flat stones to 1/2", subangular/rounded, dry.	SW,SP
		11			
		12			
		13			
		14			
		15	▼	Stabilized ground water level @ 15.30 ft (18.80 ft. from TOC). Grading to very coarse gravel and dark brown sand, slightly moist.	SW,SP
		16			
468081 468084	VOA Grain Size	17	▽	Initial ground water level @ 17 ft.	
		18			
		19			
		20		Gravel, trace sand and cobbles, flat, elongate gravel stones to 1/2", wet.	SW
		21			
		22			
		23			
		24			
		25		Coarse gravel and sand, wet.	SW
		26			
		27			
		28			
		29			

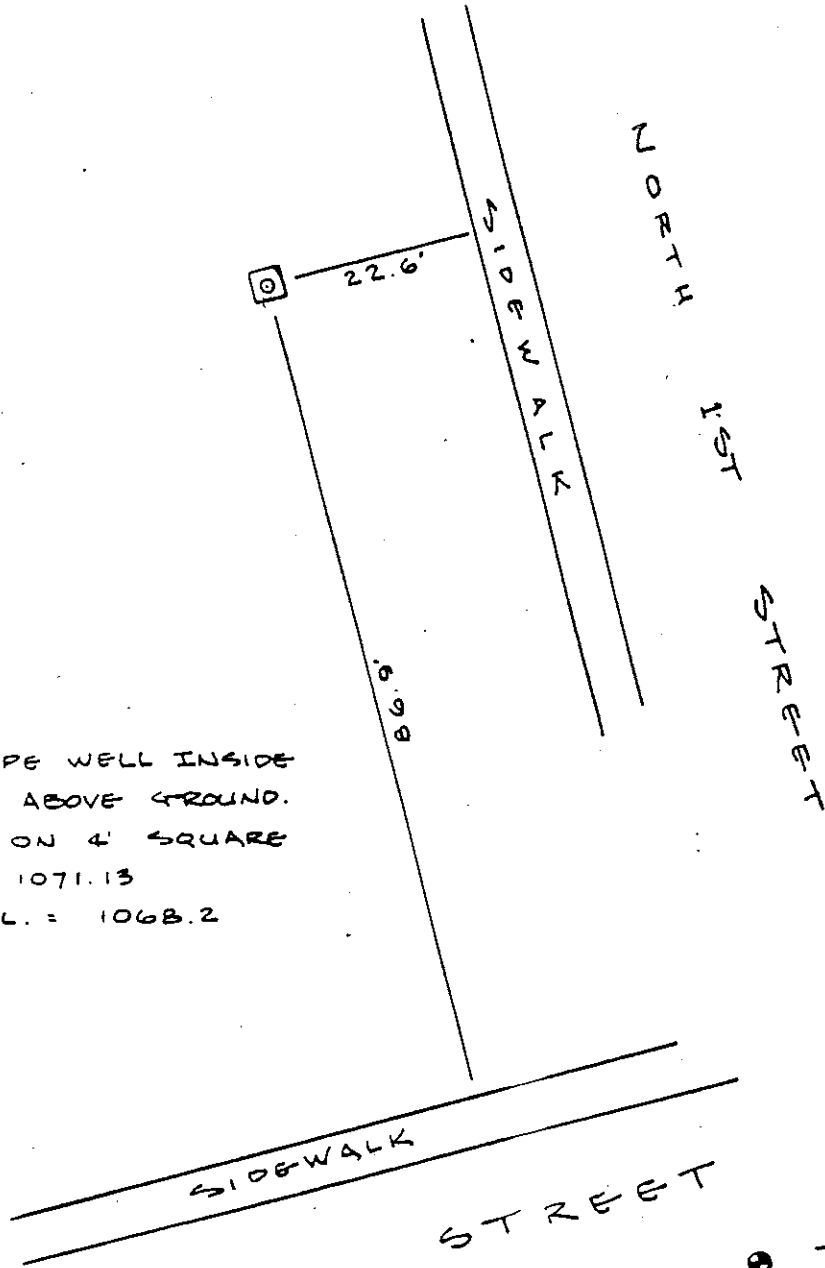
Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		30		No change.	SW
		31			
		32			
		33			
		34			
		35		Bottom of hole. Air developed formation (50 psi downhole) for 30 minutes with 6" I.D. temporary casing in place. Better yield with low air (300 ft <sup>3</sup> /min) - made 5 gal. in 37 seconds (app. 9-10 gpm). Specific conductance at time of development = 180 umhos (YSI TLC Conductivity meter). Removed temporary casing after installing 31' of 2" galvanized steel pipe and 6 ft. .020" well screen.	

**MONITOR WELL CONSTRUCTION DIAGRAM**

**WDOE-1**



**MONITOR WELL LOCATION DIAGRAM  
WDOE-1 CREST LINEN  
North 1st & B St.**



NOTES:  
 2" GAL. PIPE WELL INSIDE  
 CASING 3' ABOVE GROUND.  
 CENTERED ON 4' SQUARE  
 ELEV. = 1071.13  
 GROUND EL. = 1068.2

LOCAL BENCH MARK: N.G.S.  
 BRASS CAP A-244 IN STEPS  
 AT COURTHOUSE 300' E'LY  
 ELEV. = 1065.933

Source: Bell and Upton Land Surveying, 315 N. 3rd Street, Yakima, Washington.  
 (509) 457-7656 or (509) 248-1176

**RECORD OF SUBSURFACE EXPLORATION**

**WDOE-2 RAINIER PLASTICS 1101 Ledwich B St.**

Logged By: Charles San Juan, WDOE

T.O.C. Elevation: 1035.63 ft.

Drilled By: Roger Kelly, Ponderosa Drilling

Ground Surface Elevation: 1035.87 ft.

Drilling Method: Air Rotary

Ground Water Depth (from TOC): 18.75 ft.

Date/Time Started: 3 Nov 92, 1300 hrs

Total Well Depth (from TOC): 29 ft.

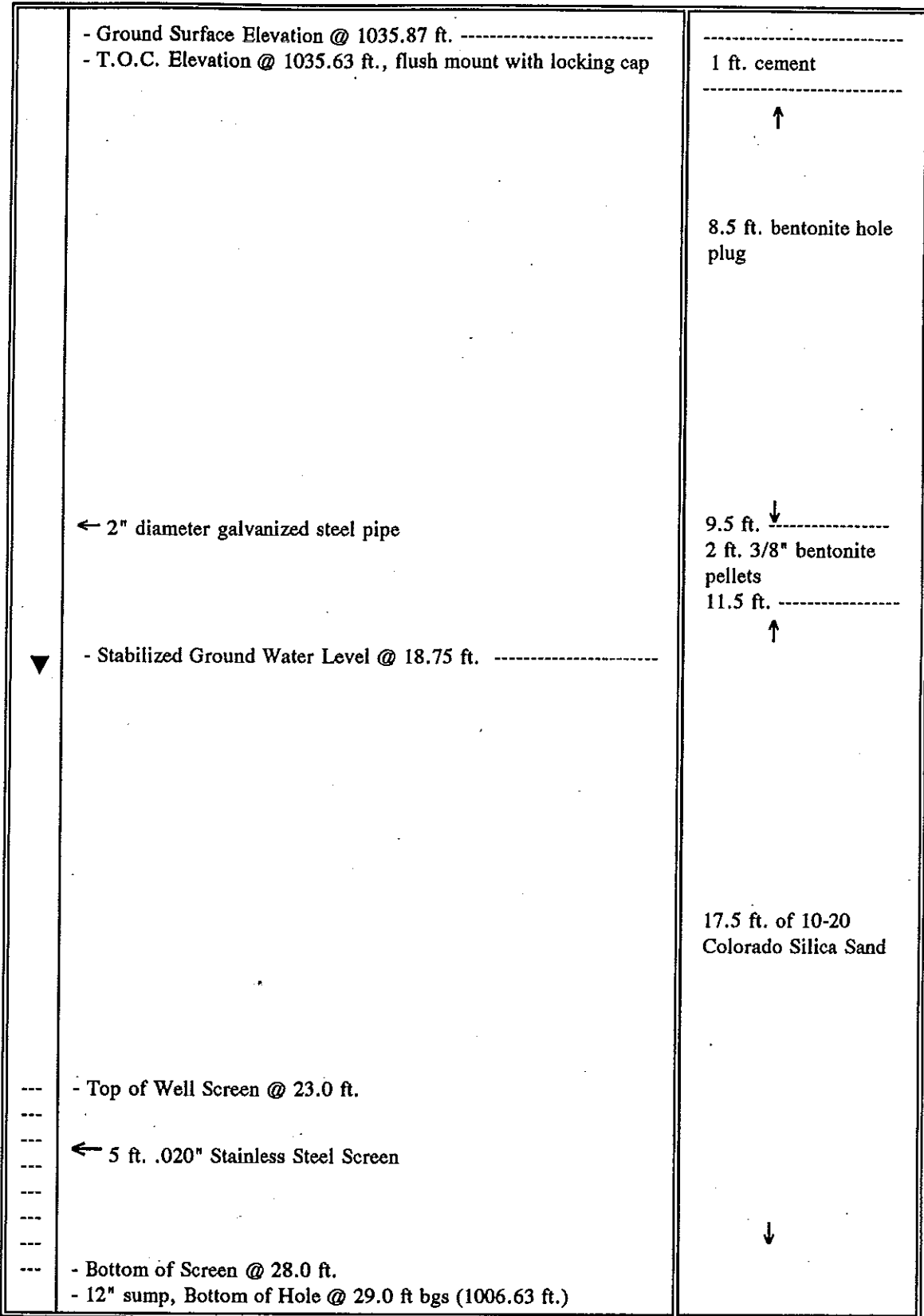
Date/Time Completed: 4 Nov 92, 0900 hrs

Formation: Alluvium - Stone Fragments, Gravel, and Sand

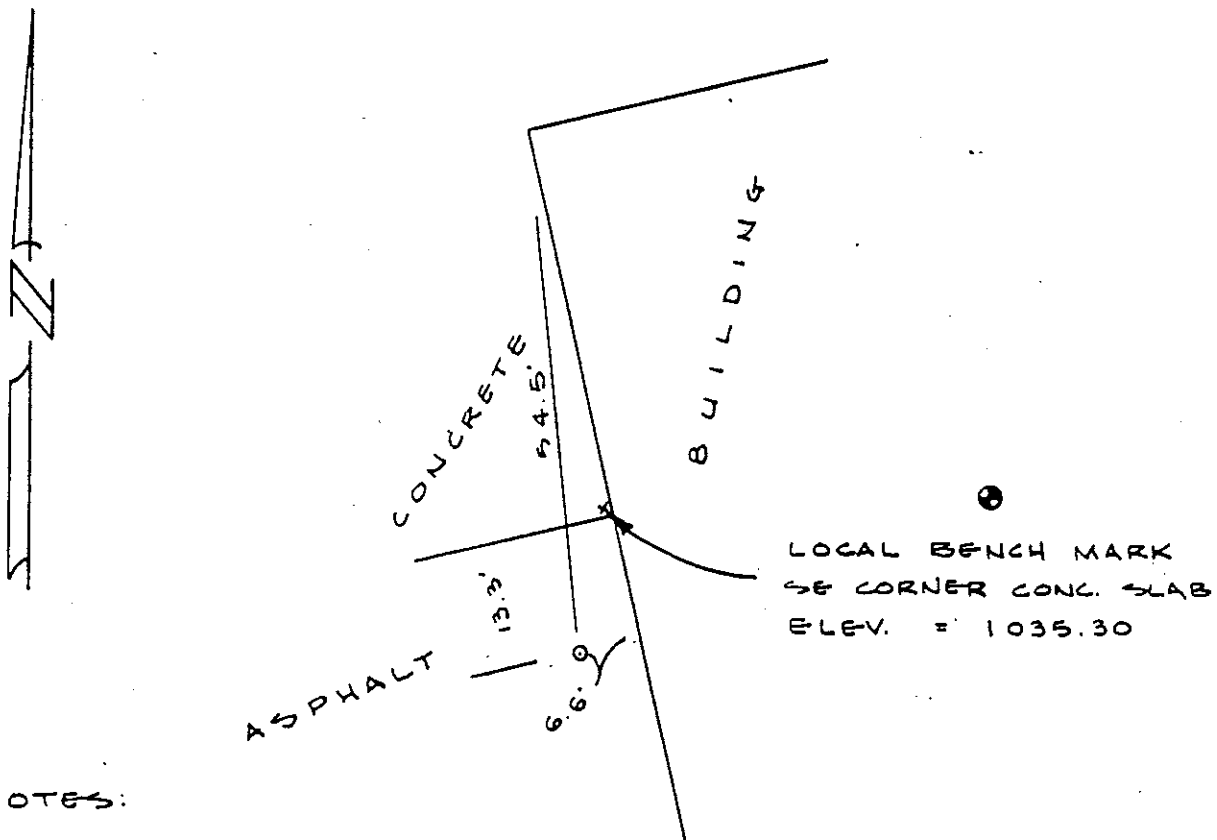
Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
468085 468088	VOA TOC	1		Split-spoon sample @ 6" - dark brown silty-sand, trace to some cobbles and gravel, subangular/rounded stones to 1/4", dry.	SW
		2			
		3			
		4			
468086 468087	Metals Grain Size	5		Open hole drilling to 5 ft. Dark brown silty-sand, trace cobbles and gravel, slightly moist/damp. Started with 6" I.D. temporary casing.	SW,SP
		7			
		8			
		9			
		10		More cobbles.	SW,GP
		11			
		12			
		13			
		14			
		15			
		16		Grading to more coarse dark brown sand and gravel, dry.	SW
		17			
		18	▼	Stabilized ground water level 18.75 ft.	
		19	▽	Initial ground water level @ 19 ft. Split-spoon, < 6" recovery, cobbles and gravel, wet, subrounded/angular stones, trace to little coarse sand.	SW
		20		Coarse dark brown sand, gravel, and cobbles, wet. Lost water; stopped drilling and allowed formation to recover.	SW
		21			
		22			
		23			
		24			
		25			
		26			
		27			
		28		Bottom of Hole. Installed 23 ft. of 2" diameter galvanized steel pipe and 6 ft. of .020" stainless steel screen (flush mount). Removed 6" I.D. support casing upon completion of well.	

**MONITOR WELL CONSTRUCTION DIAGRAM**

**WDOE-2**



**MONITOR WELL LOCATION DIAGRAM  
WDOE-2 RAINIER PLASTICS  
1101 Ledwich**



**NOTES:**

2" GALV. PIPE WELL INSIDE  
CAPPED CASING SET FLUSH.  
TOP OF WELL 0.24' BELOW TOP OF CASING.  
ELEV = 1035.63



**RECORD OF SUBSURFACE EXPLORATION**

**WDOE-3s B.N.R.R. Roundhouse Area 6 East Arlington**

Logged By: Charles San Juan, WDOE

T.O.C. Elevation: 1053.32 ft.

Drilled By: Roger Kelly, Ponderosa Drilling

Ground Surface Elevation: 1050.30 ft.

Drilling Method: Air Rotary

Ground Water Depth: 24.95 ft. (26.75 ft. from TOC)

Date/Time Started: 4 Nov 92, 1100 hrs

Total Well Depth: 28 ft. (29.92 ft. from TOC)

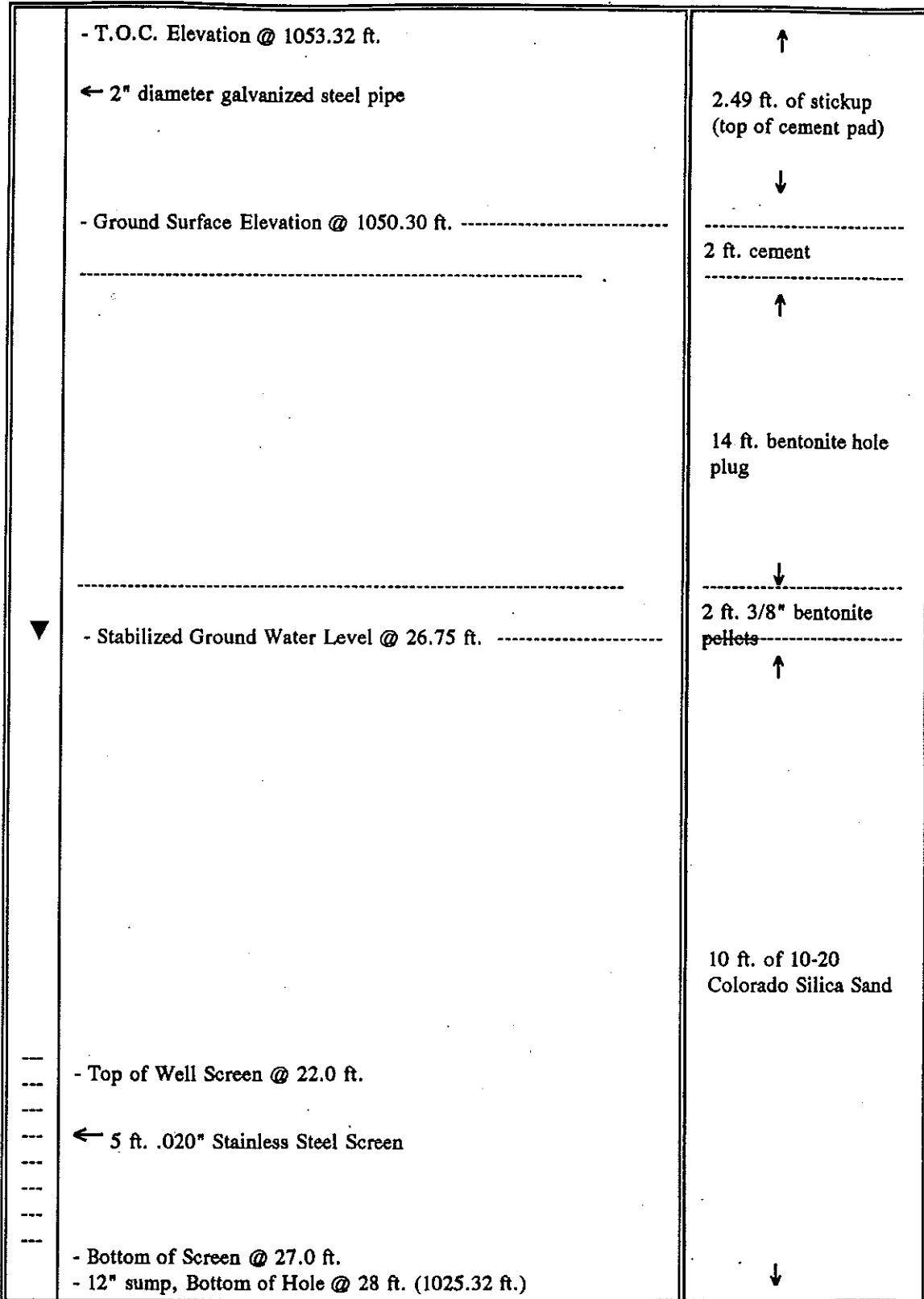
Date/Time Completed: 4 Nov 92, 1600 hrs

Formation: Alluvium - Stone Fragments, Gravel, and Sand

Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		1			
		2			
468089 468091	VOA TOC	3		Dark brown coarse sand, gravel, and cobbles, moist.	GP,GW
		4			
		5		Coarse brown sand, some gravel, trace cobbles.	SW
		6			
		7			
		8			
		9			
		10		Grading to finer sand and silt, some gravel and cobbles, dry.	GM
		11			
		12			
		13			
		14			
		15		Very coarse sand and gravel, trace cobbles, flat elongate stones, subangular/rounded, dry.	GP,GW
		16			
		17			
468090 468092	VOA Metals	18		Split-spoon, < 3" inch recovery - gravel and coarse sand, trace brown silty-sand, angular basalt clasts 1/8" - 1/4".	
		19			
		20		Sand and gravel, angular basalt clasts, poorly sorted, dry.	SW
		21			
		22			
		23		Poorly sorted alluvium, very coarse material.	SW
		24			
		25			
		26	▼	Stabilized ground water level @ 26.75 ft.	
		27	▽	Initial ground water level @ 27 ft. Angular basalt clasts, sand, and gravel, poorly sorted, trace silt, wet.	
		28		Bottom of Hole @ 28 ft. Formation dry from 18-27 ft. while drilling (may be due to air displacement of water). SWL after drilling approximately 18 ft. Removed 6" I.D. temporary casing after installing 24' of 2" galvanized steel pipe and 6 ft. of .020 inch well screen.	

**MONITOR WELL CONSTRUCTION DIAGRAM**

**WDOE-3s**



**RECORD OF SUBSURFACE EXPLORATION**

WDOE-3D B.N.R.R. Roundhouse Area 6 East Arlington

Logged By: Charles San Juan, WDOE

T.O.C. Elevation: 1053.12 ft.

Drilled By: Roger Kelly, Ponderosa Drilling

Ground Surface Elevation: 1050.30 ft.

Drilling Method: Air Rotary

Ground Water Depth: 26.53 ft. (28.95 ft. from TOC)

Date/Time Started: 10 Nov 92, 0700 hrs

Total Well Depth: 97 ft. (99 ft. from TOC)

Date/Time Completed: 11 Nov 92, 1000 hrs

Formation Type: Alluvium - Stone Fragments, Gravel, and Sand

Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
468126	TOC	1		Sampled for TOC @ 6"	
		2			
		3			
		4			
468123	Metals	5		Cobbles, coarse brown sand, and gravel, subangular basalt clasts, dry.	GP
		6			
		7			
		8			
		9			
468122	Pesticides/PCB	10		Fine sand and gravel, trace silt, angular basalt clasts, dry.	GP,GM
		11			
		12			
		13			
		14			
		15			
		16			
		17			
468125 468128	VOA Grain Size	18			
		19			
		20		Brown silty-sand, gravel, and subangular basalt clasts to 1/2", poorly sorted, slightly moist.	GP,GM
		21			
		22			
		23			
		24			
		25		Coarse brown sand, cobbles, and gravel, slightly moist.	
		26	▼	Stabilized ground water level @ 26.53 ft.	
		27			
		28			
		29			
		30		Brown silty sand and gravel, slightly moist	GP
		31			
		32			

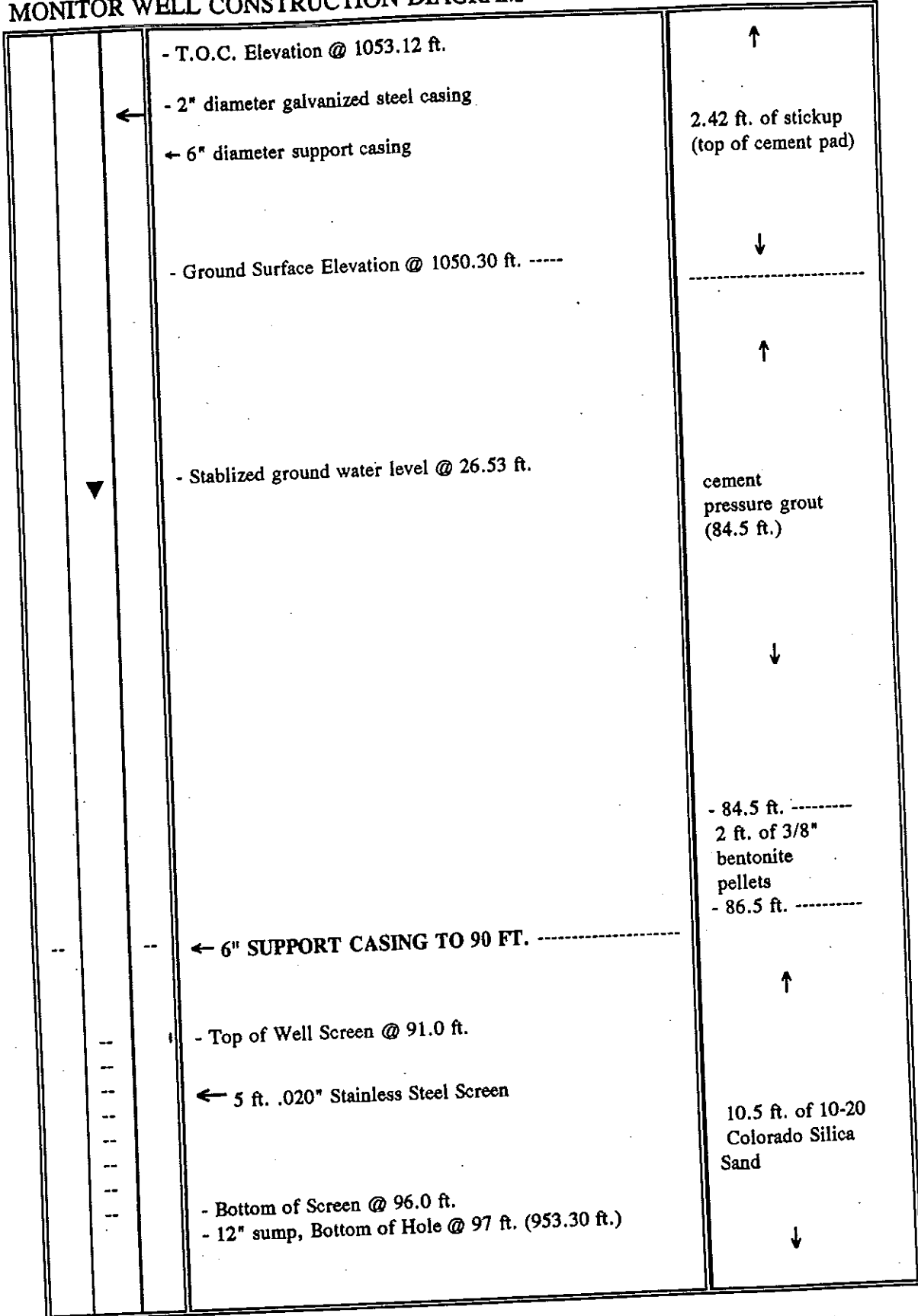
Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		33	▽	Initial ground water elevation @ 33.0 ft. Dark gray clayey sand, gravel, and cobbles, wet.	GC, GP
		34			
		35		Clayey sand, silt, gravel and cobbles, wet, subangular/rounded basalt clasts to 1/2 ".	GC,GM
468124	VOA	36		Collected VOA sample @ 36.5 ft.	
		37			
		38			
		39			
		40		Grayish brown silty-sand with gravel and cobbles, wet.	GC,GM
		41			
		42			
		43			
		44			
		45		Brown silty-sand and gravel, wet.	GP,GM
		46			
		47			
		48			
		49			
468127	VOA	50		No Change. Upward head, harder drilling.	
		51			
		52			
		53			
		54			
		55		Brown silty-sand and gravel, wet, poorly sorted.	GM,GP
		56			
		57			
		58			
		59			
		60		Silty sand, gravel, and cobbles, poorly sorted, wet, rounded basalt clasts and gravel stones to 1".	GW,GP
		61			
		62			
		63			
		64			
		65		Poorly sorted silty-sand, gravel, and cobbles, wet.	SW
		66			
		67			
		68			
		69			
		70		Grading to well sorted gravel and sand, more rounded stones, upward head, harder drilling.	GW
		71			

Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		72			
		73			
		74			
		75		No change.	GW
		76			
		77			
		78			
		79			
		80		No change.	GW
		81			
		82			
		83			
		84			
		85		No change.	
		86			
		87			
		88			
		89			
		90		No change.	GW
		91			
		92			
		93			
		94			
		95		No change.	GW
		96			
468133	pH/Cond.	97		<p>Bottom of Hole @ 97.0 ft. Distinct change in lithology starting @ 30 ft. to gray silty-sand. Upward head from 50 - 80 ft., harder drilling. Air developed with temporary casing in place @ 15-20 gpm for 30 minutes. Installed 93 ft. of 2" galvanized steel pipe and 6 ft. .020 well screen inside 6" I.D. temporary casing. Pressure grouted annular space between 2" monitor well casing and 6" I.D. support casing with 80' x 1.5" tremmie pipe. Retracted temporary casing to 90 ft. depth to grout annular space. Cement grout from ground surface to 86.5 ft. Temporary casing left in place upon well completion.</p> <p>Specific conductance (at time of completion) = 236 umhos/cm Temperature = 17.1 C</p>	

1 Collected during well development

# MONITOR WELL CONSTRUCTION DIAGRAM

WDOE-3D



**RECORD OF SUBSURFACE EXPLORATION**

WDOE-3I B.N.R.R. Roundhouse Area Arlington

Logged By: Charles San Juan, WDOE

T.O.C. Elevation: 1053.27 ft.

Drilled By: Roger Kelly, Ponderosa Drilling

Ground Surface Elevation: 1053.30 ft.

Drilling Method: Air Rotary

Ground Water Depth: 24.95 ft. (27.50 ft. from TOC)

Date/Time Started: 11 Nov 92, 1000 hrs

Total Well Depth: 51.5 ft. (55 ft. from TOC)

Date/Time Completed: 11 Nov 92 1400 hrs

Formation Type: Alluvium - Stone Fragments, Gravel, and Sand

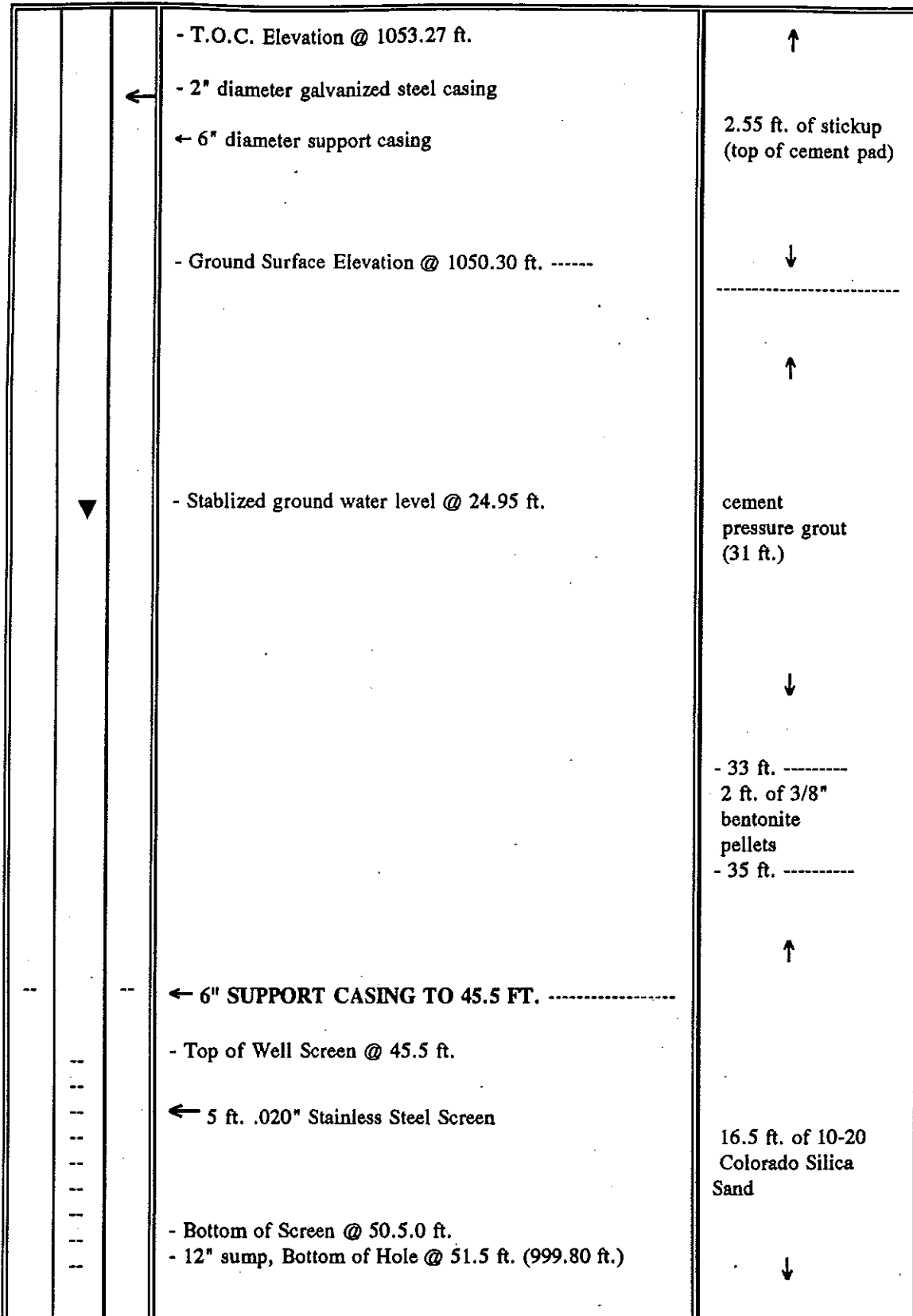
Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		1		Note: See well log for WDOE-3D for lithologic description.	
		2			
		3			
		4			
		5			
		6			
		7			
		8			
		9			
		10			
		11			
		12			
		13			
		14			
		15			
		16			
		17			
		18			
		19			
		20			
		21			
		22			
		23			
		24	▼		Stabilized ground water level @ 24.95 ft. (27.50 ft. from TOC).
		25			
		26			
		27	▽	Initial ground water level @ 27' 3"	
		28			
		30			
		31			

Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		32			
		33			
		34			
		35			
		36			
		37			
		38			
		39			
		40			
		41			
		42			
		43			
		44			
		45			
		46			
		47			
		48			
		49			
		50			
		51			
		52		Bottom of hole @ 51.5 ft. Air developed for 15 minutes with 6" I.D. temporary casing in place. Pressure grouted annular space between 2" monitor well casing and 6" I.D. support casing. Installed 49 ft. of 2" diameter galvanized steel pipe and 6 ft. of .020 inch stainless steel well screen. Retracted 6" I.D. support casing to expose well screen prior to grouting.	

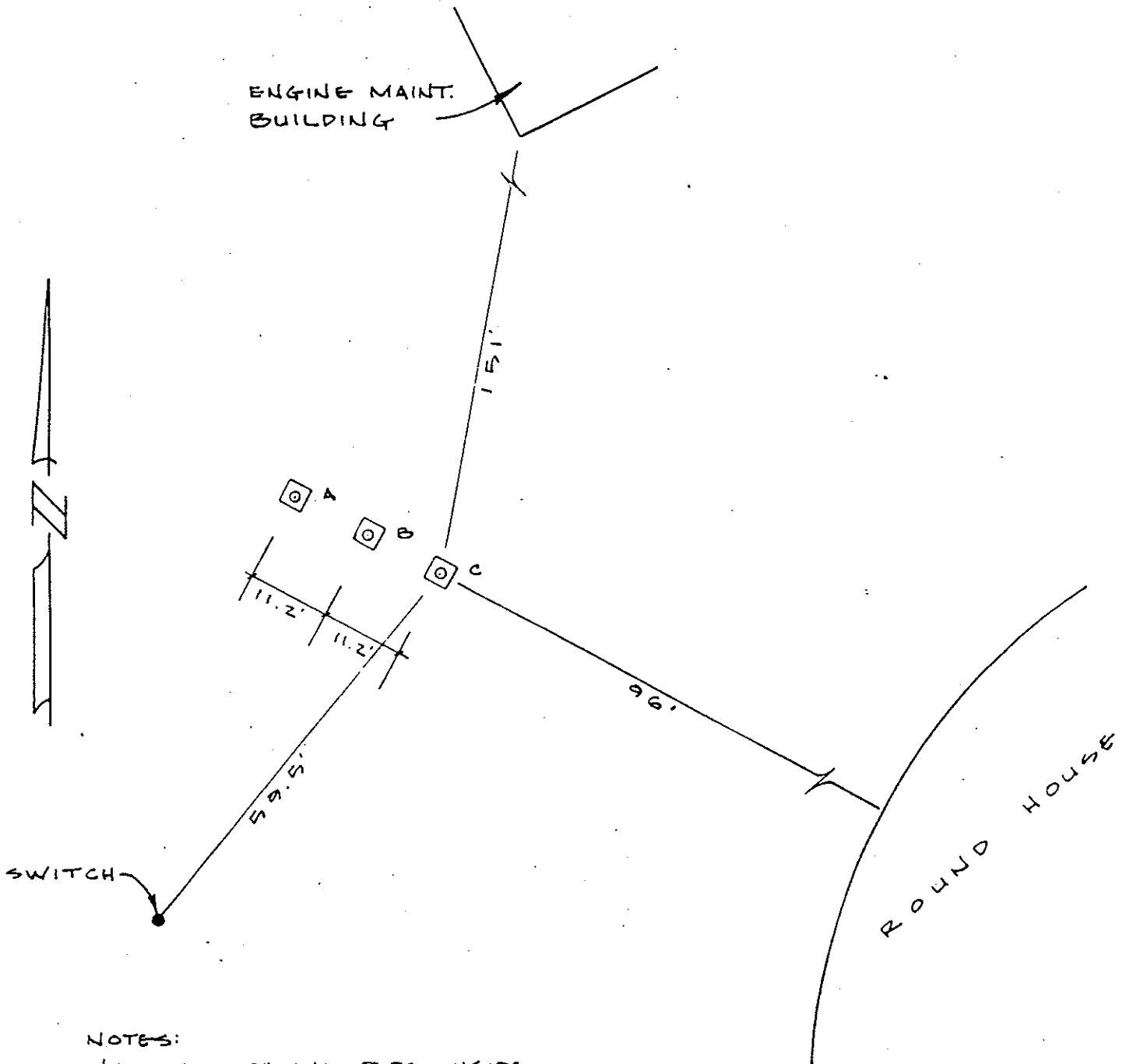


**MONITOR WELL CONSTRUCTION DIAGRAM**

**WDOE-3I**



**MONITOR WELL LOCATION DIAGRAM**  
**WDOE-3S,3D,3I**  
**BURLINGTON NORTHERN R.R. ROUNDHOUSE AREA**  
**6 East Arlington**



**NOTES:**

WELLS ARE 2" GAL. PIPE INSIDE CASING AND 2' TO 3' ABOVE NATURAL GROUND. CENTERED ON 4' SQUARE PADS.

ELEVATIONS	A	1053.27	WDOE-3I
	B	1053.12	WDOE-3D
	C	1053.32	WDOE-3S

GROUND EL = 1050.3

LOCAL BENCH MARK: SET SPIKE IN WEST SIDE OF PWR POLE 150'± SE'LY OF WELLS.  
 ELEV. = 1050.38

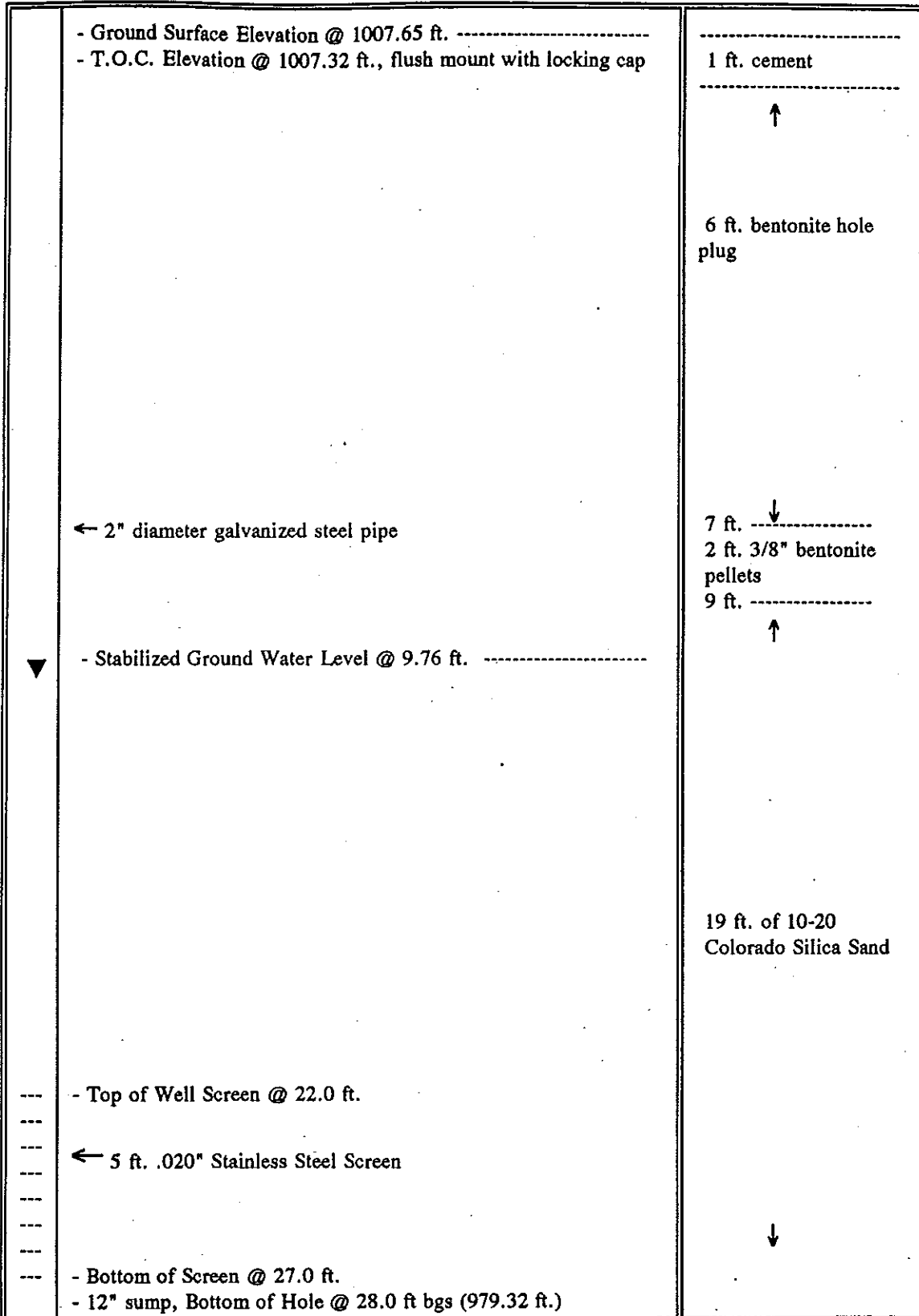
<b>RECORD OF SUBSURFACE EXPLORATION</b>	<b>WDOE-4 M &amp; M Fabricators, 2004 South 14th St.</b>
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Logged By: Charles San Juan, WDOE	T.O.C. Elevation: 1007.32 ft.
Drilled By: Roger Kelly, Ponderosa Drilling	Ground Surface Elevation: 1007.65 ft.
Drilling Method: Air Rotary	Ground Water Depth: 9.76 ft.
Date/Time Started: 5 Nov 92 0940 hrs	Total Well Depth: 28 ft.
Date/Time Completed: 5 Nov 92 1600 hrs	Formation Type: Alluvium - Stone Fragments, Gravel, and Sand

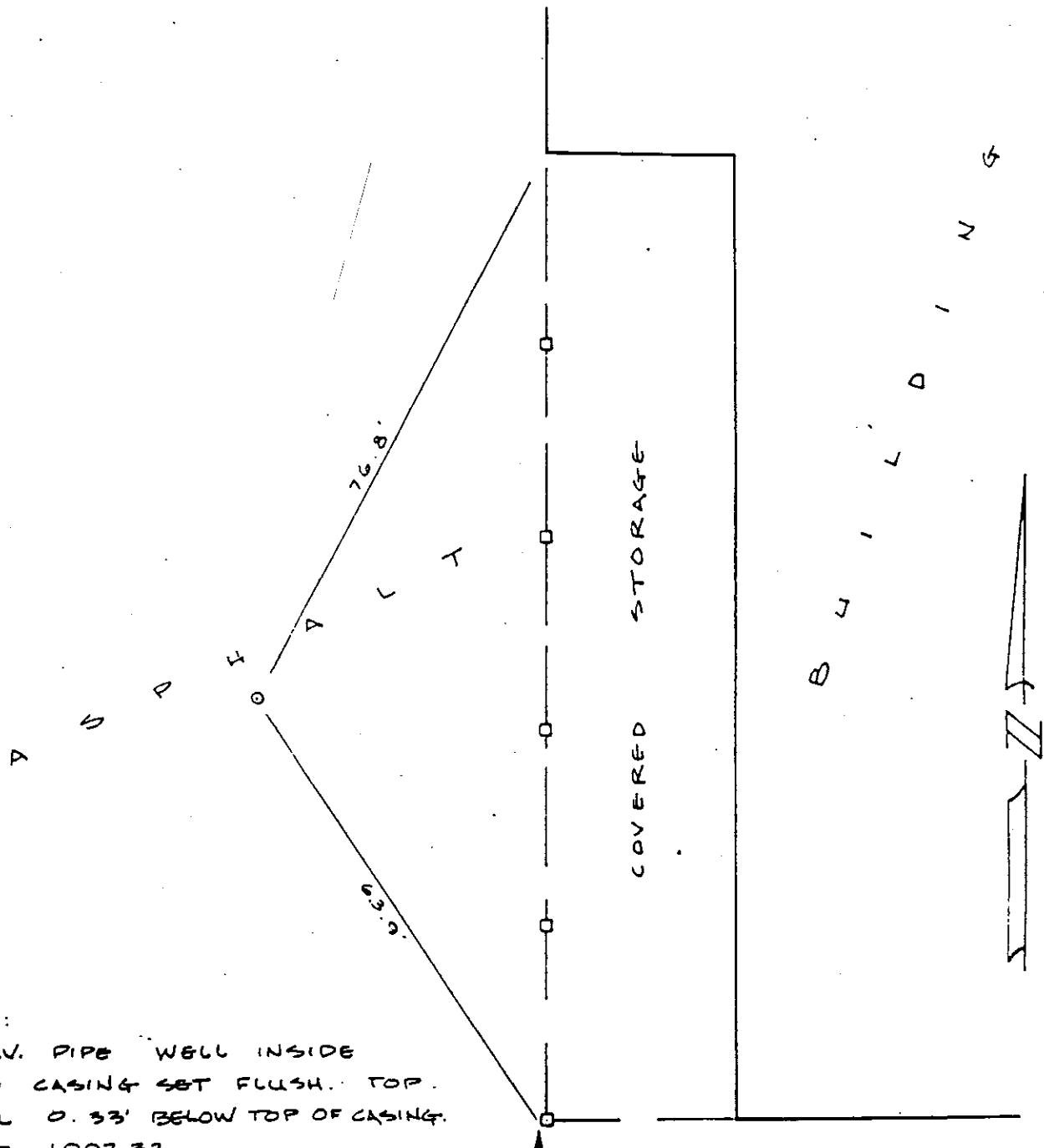
Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		1			
		2			
		3			
		4			
468096 468097 468100	VOA TOC Metals	5		Dark brown clayey to silty-sand, gravel, and cobbles, wet.	GC,GM
		6			
		7			
		8			
		9	▽▽	Initial ground water level @ 9 ft. Stabilized ground water level @ 9.76 ft.	
		10		Well sorted gravel and subangular basalt clasts, trace silty-sand, moist.	GW
		11			
		12			
		13			
		14			
468098 468099	VOA Grain Size	15		Gravel and sand, moist, thin angular basalt clasts.	GP
		16			
		17			
		18		Split-spoon sample, < 6" recovery, poorly sorted sand and gravel, wet, trace silty-sand, rounded gravel stones and basalt clasts.	GP
		19			
		20		Gravel, cobbles, and sand, angular basalt clasts, wet.	GP
		21			
		22			
		23			
		24			
		25		Gravel and cobble, angular basalt clasts to 1", better sorting, more rounded stones, wet.	GP
		26			
		27		Bottom of hole @ 28 ft. Installed 22 ft. of 2" diameter galvanized steel pipe and 6 ft. of .020 inch stainless steel well screen. Removed 6" I.D. temporary casing upon completion.	

**MONITOR WELL CONSTRUCTION DIAGRAM**

**WDOE-4**



**MONITOR WELL LOCATION DIAGRAM  
WDOE-4  
M & M FABRICATORS  
2004 S. 14th St.**



**Notes:**

2" GALV. PIPE WELL INSIDE  
CAPPED CASING SET FLUSH. TOP  
OF WELL 0.33' BELOW TOP OF CASING.  
ELEV = 1007.32

● LOCAL BENCH MARK: TOP  
OF SUPPORT BASE, 0.8'  
ABOVE ASPHALT.  
ELEV. = 1008.28

**RECORD OF SUBSURFACE EXPLORATION**

WDOE-5 CMX Corporation, 206 West Mead

Logged By: Charles San Juan, WDOE

T.O.C. Elevation: 1037.03 ft.

Drilled By: Roger Kelly, Ponderosa Drilling

Ground Surface Elevation: 1037.43 ft.

Drilling Method: Air Rotary

Ground Water Depth: 19.20 ft.

Date/Time Started: 12 Nov 92, 1000 hrs

Total Well Depth: 25 ft.

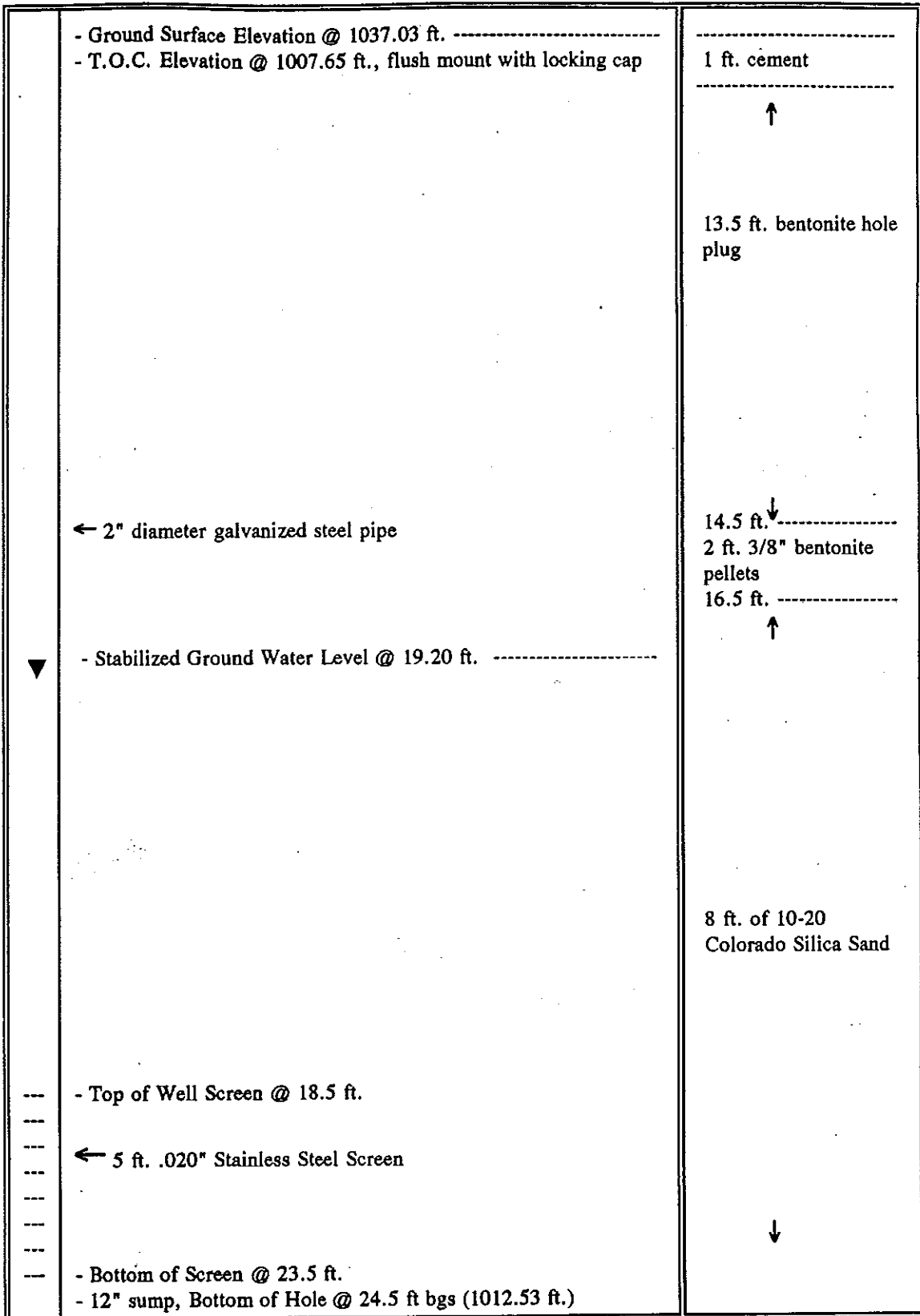
Date/Time Completed: 12 Nov 92, 1400 hrs

Formation Type: Alluvium - Stone Fragments, Gravel, and Sand.

Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		1			
		2			
468129 468130 468131 468132	Metals TOC VOA VOA	3		Open hole to 3.5 ft., split-spoon @ 3.5 ft; cobbles, brown coarse sand and gravel, trace silt, dry, subangular/rounded basalt clasts. Start with 6" I.D. temporary casing.	SW
		4			
		5		Fine sand, silt, and gravel, subangular stones to 1/2", slightly moist.	SW,SP
		6			
		7			
		8			
		9			
		10		Coarse gravel and sand, trace brown silt, moist.	GW
		11			
		12			
		13			
		14			
		15			
		16			
		17		Very moist brown silty sand and well sorted/rounded coarse gravel, stones from 1/4" - 1/2".	SW,GW
		18			
		19	▽▼	Initial ground water elevation @ 19.30 ft. Stabilized ground water elevation @ 19.20 ft.	
		20		Coarse gravel and sand, trace silt, wet.	SW
		21			
		22			
		23			
		24		Bottom of hole @ 24.5 ft. Air developed formation with 6" I.D. temporary casing in place (prior to installing monitor well). Installed 19' 3" of 2" galvanized steel pipe and 5 ft. of .020 stainless steel well screen (flush mount).	

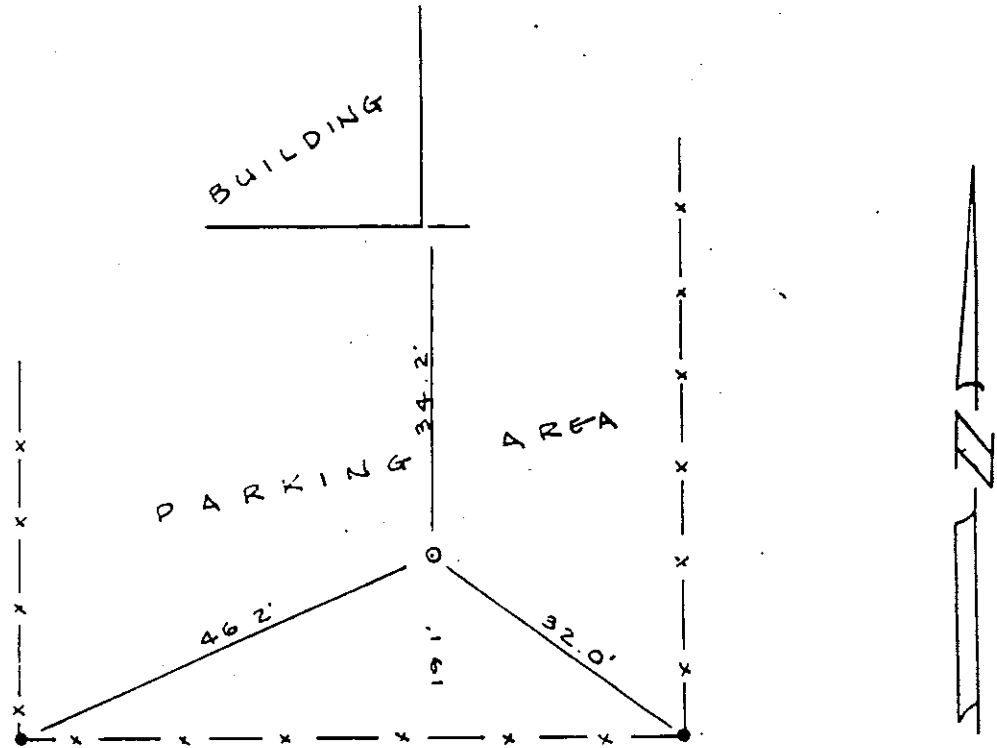
MONITOR WELL CONSTRUCTION DIAGRAM

WDOE-5



**MONITOR WELL LOCATION DIAGRAM  
WDOE-5  
CMX CORPORATION  
206 West Mead**

LOCAL BENCH MARK: SET  
40 P NAIL 40. SIDE POWER POLE  
NO. 310090 NO. SIDE OF BLDG.  
ELEV. = 1039.30



WELL NO. 6  
CMX CORPORATION  
206 W MEAD

**Notes**

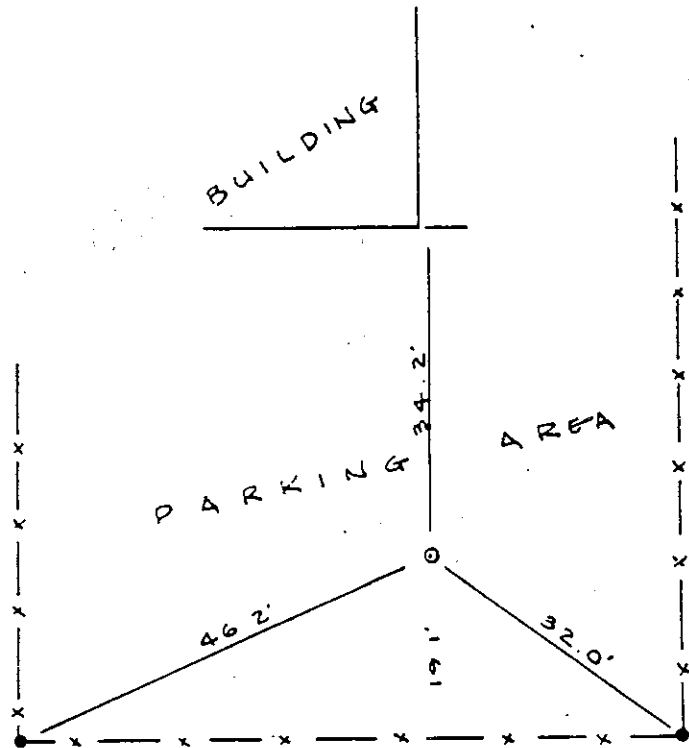
2" GALV. PIPE WELL INSIDE CAPPED  
CASING SET FLUSH. TOP OF WELL  
0.40' BELOW TOP OF CASING.  
ELEV. = 1037.03

Source: Bell and Upton Land Surveying, 315 N. 3rd Street, Yakima, Washington.  
(509) 457-7656 or (509) 248-1176



**MONITOR WELL LOCATION DIAGRAM**  
**WDOE-5**  
**CMX CORPORATION**  
**206 West Mead**

LOCAL BENCH MARK: SET  
 40 P NAIL 40. SIDE POWER POLE  
 NO. 310090 NO. SIDE OF BLDG.  
 ELEV. = 1039.30



WELL NO. 6  
 CMX CORPORATION  
 206 W MEAD

**Notes**

2" GALV. PIPE WELL INSIDE CAPPED  
 CASING SET FLUSH. TOP OF WELL  
 0.40' BELOW TOP OF CASING.  
 ELEV. = 1037.03

Source: Bell and Upton Land Surveying, 315 N. 3rd Street, Yakima, Washington.  
 (509) 457-7656 or (509) 248-1176

**RECORD OF SUBSURFACE EXPLORATION**

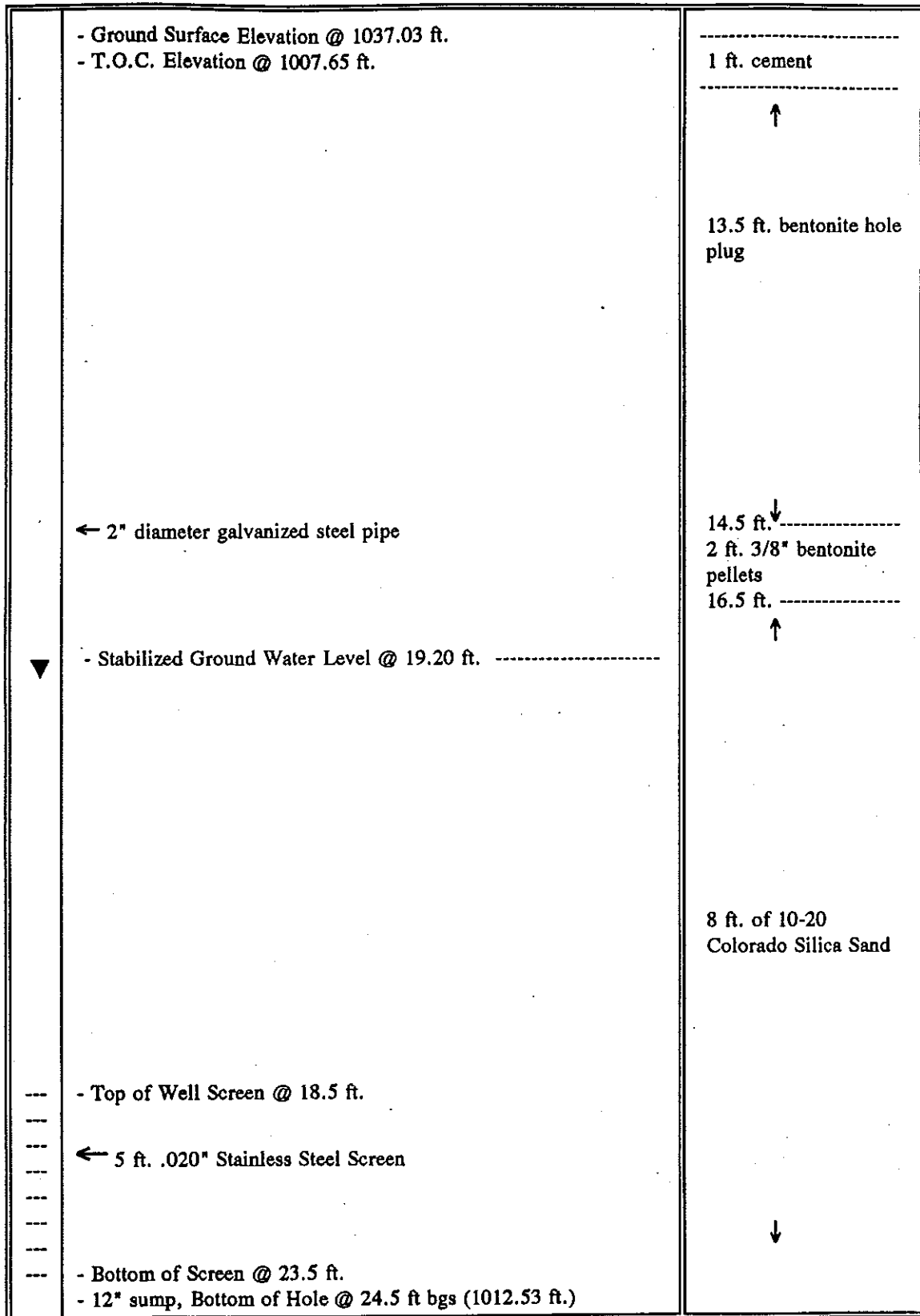
WDOE-6 Agri-Tech/Yakima Steel, 6 East Washington

Logged By: Charles San Juan, WDOE	T.O.C. Elevation: 1002.27 ft.
Drilled By: Roger Kelly, Ponderosa Drilling	Ground Surface Elevation: 1002.51 ft.
Drilling Method: Air Rotary	Ground Water Depth: 4.00 ft.
Date/Time Started: 5 Nov 92, 1600 hrs	Total Well Depth: 17 ft. (16.6 ft from TOC)
Date/Time Completed: 6 Nov 92, 1300 hrs	Formation Type: Alluvial

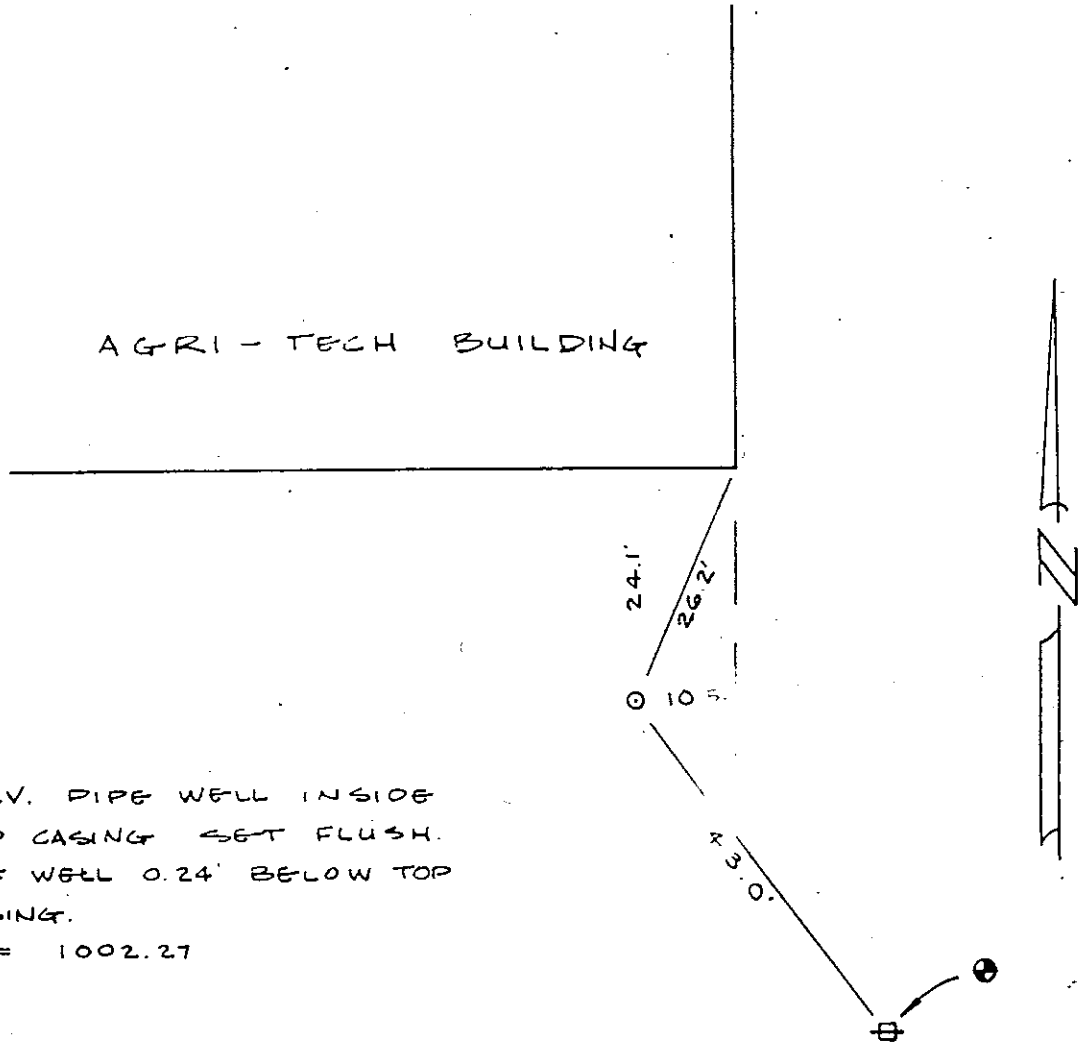
Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		1			
		2			
		3			
		4	▽	Initial ground water level @ 4 ft. Grayish-black formation water and extremely pungent odors (went to Level "C" protection, up to 50 ppm on the Microtip). Open hole to 4 ft.; collected split-spoon sample. Recovered white to gray-colored clayey waste material of unknown origin.	
468106 468107	Pesticide	5			
		6			
		7			
		8			
		9			
110	VOA	10		0 - 10 ft., waste material, sand, and gravel, poorly sorted, wet,. Extremely pungent odors.	SW
		11			
		12			
		13			
		14			
		15			
		16			
		17		Bottom of hole @ 17.0 ft. Poorly sorted gravel and cobbles, wet.  Installed 10' 6" of 2" diameter galvanized steel casing and 6 ft. of 0.020 inch stainless steel screen. Removed 6" I.D. temporary casing upon completion. Completed well while in Level C protective gear.	SW,GP

# MONITOR WELL CONSTRUCTION DIAGRAM

WDOE-6



**MONITOR WELL LOCATION DIAGRAM  
WDOE-6 YAKIMA STEEL/AGRI-TECH  
6 East Washington**



NOTES  
2" GALV. PIPE WELL INSIDE  
CAPPED CASING SET FLUSH.  
TOP OF WELL 0.24' BELOW TOP  
OF CASING.  
ELEV = 1002.27

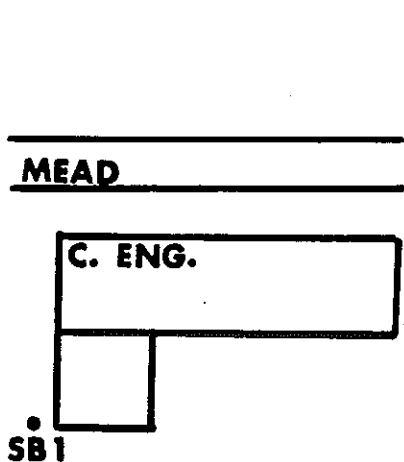
YAKIMA STEEL FABRICATORS  
(THIS AREA)

LOCAL BENCH MARK: SET 40 P  
NAIL IN NW SIDE POWER POLE  
NO. 3.9412 ELEV = 1002.42

<b>RECORD OF SUBSURFACE EXPLORATION</b>	<b>SB-1 Central Engine &amp; Machine 1104 East Mead</b>
Logged By: Charles San Juan, WDOE	T.O.C. Elevation: N/A
Drilled By: Roger Kelly, Ponderosa Drilling	Ground Surface Elevation: N/A
Drilling Method: Air Rotary	Ground Water Depth: Not encountered.
Date/Time Started: 5 Nov 92, 0830 hrs	Total Boring Depth: 5 ft.
Date/Time Completed: 5 Nov 92, 0930 hrs	Formation: Alluvium - Stone Fragments, Sand, and Gravel.

Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		1			
		2			
		3		Coarse to fine brown sand, gravel, and cobbles, rounded stones, dry.	SW
		4			
468094 468095 468101	Metals VOA TOC	5		Open hole drilling to 5 ft. Collected split-spoon sample, < 6" recovery. Bottom of Hole @ 5 ft. Grouted hole with 3/8" bentonite pellets.	

Note: Boring Completed at SW corner of cement driveway that leads into the shop (south side of facility).

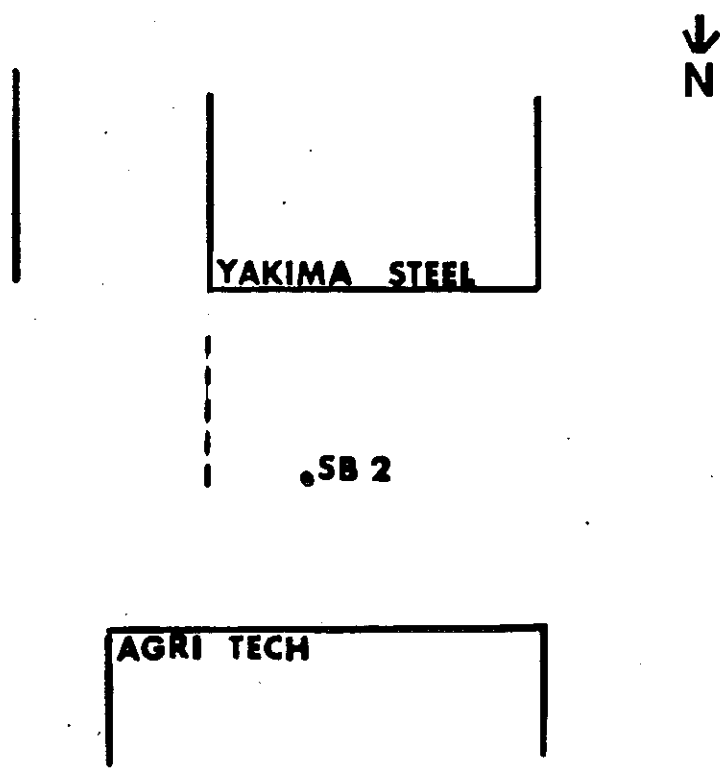


Not to Scale

<b>RECORD OF SUBSURFACE EXPLORATION</b>	<b>SB-2 Yakima Steel, 6 East Washington</b>
Logged By: Charles San Juan, WDOE	T.O.C. Elevation: N/A
Drilled By: Roger Kelly, Ponderosa Drilling	Ground Surface Elevation: 1002 ft.
Drilling Method: Air Rotary	Ground Water Depth: Not encountered.
Date/Time Started: 9 Nov 92, 1030 hrs	Total Boring Depth: 5 ft.
Date/Time Completed: 9 Nov 92, 1200 hrs	Formation: Waste Material and Alluvium

Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		1		6" asphalt cover (parking lot)	
		2			
		3			
		4			
468105 468108 468109	Pesticide/PCB Pesticide/PCB VOA	5		Split-spoon sample. Recovered green clayey waste material of unknown origin. Extremely pungent odor. Grayish muddy residue on drill stem. Grouted hole with cement upon completion.	
		6			
		7			
		8			
		9			
		10		Bottom of Hole @ 10 ft. Grouted hole with 3/8" bentonite pellets.	

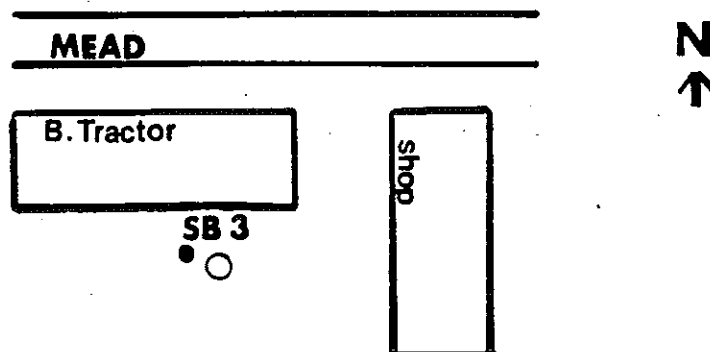
Boring was completed approximately 10 ft. west of the asphalt driveway (midway) that leads into the shop.



Not to Scale

RECORD OF SUBSURFACE EXPLORATION				SB-3 Burrows Tractor, 1308 East Mead Avenue	
Logged By: Charles San Juan, WDOE			T.O.C. Elevation: N/A		
Drilled By: Roger Kelly, Ponderosa Drilling			Ground Surface Elevation:		
Drilling Method: Air Rotary			Ground Water Depth: Not Encountered.		
Date/Time Started: 9 Nov 92, 1315 hrs			Total Boring Depth:		
Date/Time Completed: 9 Nov 92, 1430 hrs			Formation: Alluvium - Stone Fragments, Sand, and Gravel.		
Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		1		6" asphalt (parking lot).	
468111 468113 468112	Grain Size TOC Metals	2		Open hole drilling to 1.5 ft. Start with 6" I.D. temporary casing.	
		3			
		4			
		5			
		6			
468114 468115	VOA VOA	7		0-7 ft. brown sand, coarse gravel, and cobbles, moist. subangular/angular gravel stones to 1/2". Attempted split-spoon, no recovery.	SW
		8			
		9			
		10		Bottom of hole. Removed 6" support casing and grouted hole with 3/8" bentonite pellets.	

1 Boring was completed adjacent to drywell/storm drain, south side of main sales building and west of maintenance shop.

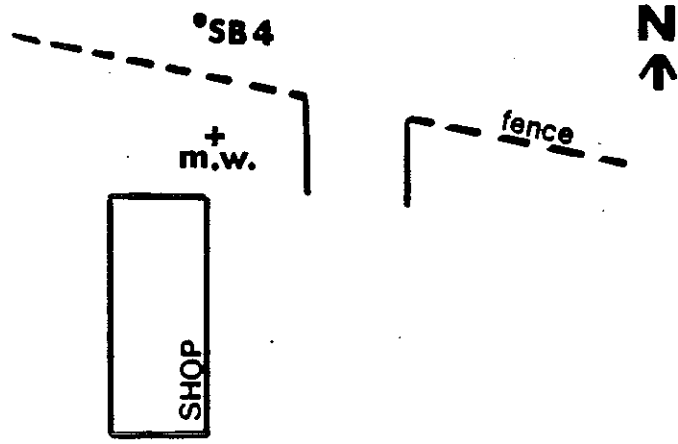


Not to Scale

<b>RECORD OF SUBSURFACE EXPLORATION</b>	<b>SB-4 NW Truck Repair, 805 1/5 Ahtanum Rd</b>
<b>Logged By: Charles San Juan, WDOE</b>	<b>T.O.C. Elevation: N/A</b>
<b>Drilled By: Roger Kelly, Ponderosa Drilling</b>	<b>Ground Surface Elevation: 988 ft.</b>
<b>Drilling Method: Air Rotary</b>	<b>Ground Water Depth: 6.5 ft.</b>
<b>Date/Time Started: 9 Nov 92, 1500 hrs</b>	<b>Total Boring Depth: 10 ft.</b>
<b>Date/Time Completed: 9 Nov 92, 1600 hrs</b>	<b>Formation: Alluvium - Stone Fragments, Sand, and Gravel.</b>

Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		1		Start with 6" temporary support casing.	
		2			
		3			
468116 468119 468117	VOA TOC Metals	4		0-4 ft. Brown clayey sand, gravel, and cobbles, moist/wet. Collected split-spoon sample.	GC,SM
		5			
		6		Initial ground water level @ 6.5 ft.	
		7			
		8			
468120 468121	VOA VOA	9		Brown silty sand, gravel, and cobbles, wet.	
		10		Bottom of hole. Placed drill cuttings back in borehole and grouted with 3/8" bentonite pellets.	

Boring was completed approximately 10 ft. north of chain link fence and approximately 20 ft. west of service road that enters into the junk yard area.



Not to Scale

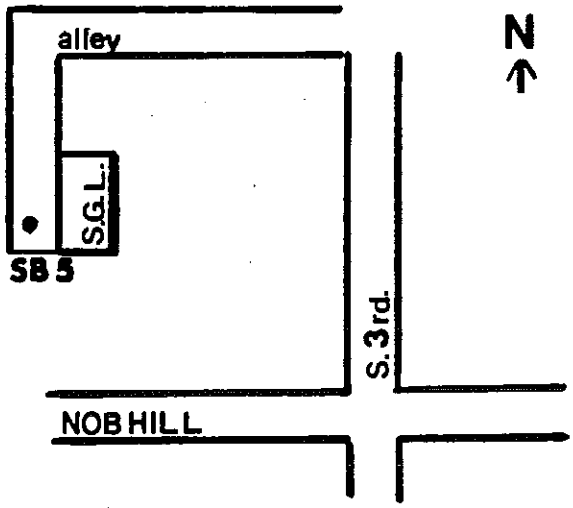


<b>RECORD OF SUBSURFACE EXPLORATION</b>	<b>SB-5 Southgate Laundry, 1020 South Third Avenue</b>
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Logged By: Charles San Juan, WDOE	T.O.C. Elevation: N/A
Drilled By: Roger Kelly, Ponderosa Drilling	Ground Surface Elevation:
Drilling Method: Air Rotary	Ground Water Depth: Not encountered
Date/Time Started: 12 Nov 92, 1530 hrs	Total Boring Depth: 5 ft.
Date/Time Completed: 12 Nov 92, 1600 hrs	Formation: Alluvium - Stone Fragments, Sand, and Gravel.

Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
468234	Metals	1			
468235	TOC				
		2			
		3			
		4			
468236 468237	VOA VOA	5		Open hole to 5 ft. Dark brown silty-sand, gravel, and cobbles. No visual evidence of soil contamination. Grouted hole with 3/8 inch bentonite pellets and existing soil upon completion.	SW

Boring was completed in center of the alley, rear or west entrance to laundry mat.



Not to Scale

RECORD OF SUBSURFACE EXPLORATION				SB-6 Martinizing Dry Cleaners, 812 Summitview	
Logged By: Charles San Juan, WDOE			T.O.C. Elevation: N/A		
Drilled By: Roger Kelly, Ponderosa Drilling			Ground Surface Elevation:		
Drilling Method: Air Rotary			Ground Water Depth: Not encountered		
Date/Time Started: 12 Nov 92, 1615 hrs			Total Boring Depth: 5 ft.		
Date/Time Completed: 12 Nov 92, 1645 hrs			Formation: Alluvium - Stone Fragments, Sand, and Gravel.		
Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
478231	TOC	1			
		2			
		3			
478230 478232 478233	VOA Metals VOA	4			
		5		Open hole from 0-5 ft. Brown silty-sand and gravel. dry. Bottom of boring @ 5 ft. No visual evidence of soil contamination. Grouted hole with 3 3 inch bentonite pellets and existing soil upon completion.	SW

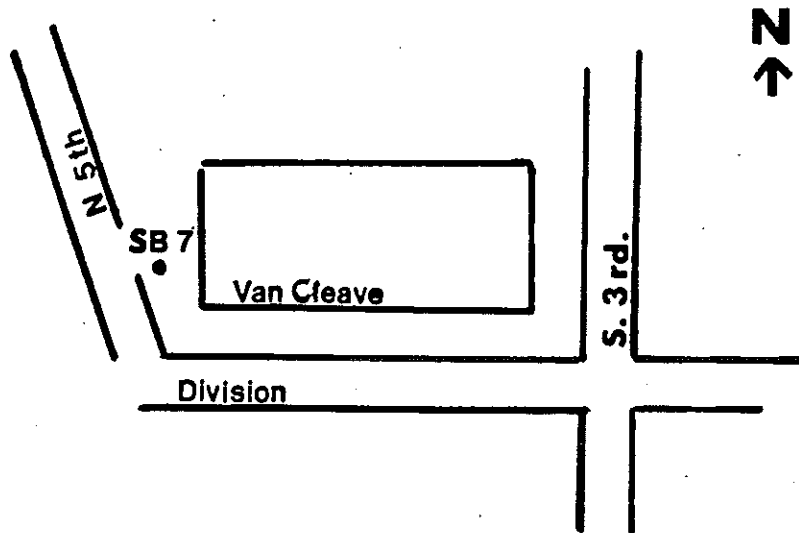
1 Boring was completed approximately 5 ft. from rear door to shop (in dirt alley way).

<b>RECORD OF SUBSURFACE EXPLORATION</b>	<b>SB-7 Van Cleave Body Shop, 305 Division</b>
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Logged By: Charles San Juan, WDOE	T.O.C. Elevation: N/A
Drilled By: Roger Kelly, Ponderosa Drilling	Ground Surface Elevation:
Drilling Method: Air Rotary	Ground Water Depth: Not encountered.
Date/Time Started: 13 Nov 92, 0730 hrs	Total Boring Depth: 2.5 ft.
Date/Time Completed: 13 Nov 92, 0800 hrs	Formation: Cobbles and Alluvium - Stone Fragments, Sand, and Gravel.

Sample No.	Analyzed For	Depth (Ft.)	G.W. @	Description	USCS
		1			
478238 478239	VOA TOC	2		VOA and TOC grab samples @ 2.5 ft.	
		3		Encountered large stones and cobbles to 12" in diameter. Drill-bit refusal @ 3 ft. Collected samples and grouted hole.	

Boring was completed along the west side of the facility, approximately 10 ft. from curb between two wrecked cars.



Not to Scale

**Appendix B**

**Grain Size, Total Metals, and Total Organic Carbon  
Data**

**Crest Linen  
Rainier Plastics  
B.N.R.R.  
M & M Fabricators  
Burrows Tractor**

GEOTECHNICAL LABORATORY TEST DATA

Project : DEPARTMENT OF ECOLOGY YAKIMA RR  
 Project No. : J-293  
 Boring No. : CREST  
 Sample No. : 468084  
 Location : YAKIMA RR  
 Soil Description :  
 Remarks :

Depth :  
 Test Date : 12-8-92  
 Test Method : ASTM D422

Filename : 468084  
 Elevation :  
 Tested by : TP/DF  
 Checked by : RS

Sieve Mesh	Sieve Openings		COARSE SIEVE SET		Percent Finer (%)
	Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	
0.75"	0.748	19.00	-0.20	-0.20	100
0.5"	0.500	12.70	42.40	42.20	78
0.375"	0.374	9.51	12.50	54.70	72
#4	0.187	4.75	20.20	74.90	61
#10	0.079	2.00	18.70	93.60	52
#20	0.033	0.84	20.60	114.20	41
#40	0.017	0.42	33.80	148.00	24
#60	0.010	0.25	19.50	167.50	14
#140	0.004	0.11	10.50	178.00	8
#200	0.003	0.07	1.90	179.90	7

Total Dry Weight of Sample = 194.1

- D85 : 14.3812 mm
- D60 : 4.1846 mm
- D50 : 1.7299 mm
- D30 : 0.5388 mm
- D15 : 0.2673 mm
- D10 : 0.1380 mm

Soil Classification

ASTM Group Symbol : SP-SM  
 ASTM Group Name : Poorly graded sand with silt and gravel  
 AASHTO Group Symbol : A-1-b(0)  
 AASHTO Group Name : Stone Fragments, Gravel and Sand

GEOTECHNICAL LABORATORY TEST DATA

Project : DEPARTMENT OF ECOLOGY YAKIMA RR

Project No. : J-293

Boring No. : RAINIER

Sample No. : 468087

Location : YAKIMA RR

Soil Description :

Remarks :

Depth :  
 Test Date : 12-8-92  
 Test Method : ASTM D422

Filename : 468087

Elevation :

Tested by : TP/DF

Checked by : RS

Sieve Mesh	Sieve Openings		COARSE SIEVE SET		
	Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.75"	0.748	19.00	0.00	0.00	100
0.5"	0.500	12.70	25.70	25.70	86
0.375"	0.374	9.51	17.00	42.70	77
#4	0.187	4.75	35.70	78.40	58
#10	0.079	2.00	40.10	118.50	36
#20	0.033	0.84	25.80	144.30	23
#40	0.017	0.42	13.20	157.50	16
#60	0.010	0.25	8.50	166.00	11
#140	0.004	0.11	7.30	173.30	7
#200	0.003	0.07	1.40	174.70	6

Total Dry Weight of Sample = 186.5

D85 : 12.2178 mm

D60 : 5.1143 mm

D50 : 3.4481 mm

D30 : 1.3345 mm

D15 : 0.3945 mm

D10 : 0.2007 mm

Soil Classification

ASTM Group Symbol : SW-SM

ASTM Group Name : Well-graded sand with silt and gravel

AASHTO Group Symbol : A-1-a(0)

AASHTO Group Name : Stone Fragments, Gravel and Sand

GEOTECHNICAL LABORATORY TEST DATA

Project : DEPARTMENT OF ECOLOGY YAKIMA RR

Filename : 468093

Project No. : J-293

Depth :

Elevation :

Boring No. : BMRR

Test Date : 12-8-92

Tested by : TP/DF

Sample No. : 468093

Test Method : ASTM D422

Checked by : RS

Location : YAKIMA RR

Soil Description :

Remarks :

Sieve Mesh	COARSE SIEVE SET		Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
	Sieve Openings Inches	Millimeters			
0.75"	0.748	19.00	-0.20	-0.20	100
0.5"	0.500	12.70	51.40	51.20	77
0.375"	0.374	9.51	44.30	95.50	56
#4	0.187	4.75	59.30	154.80	29
#10	0.079	2.00	35.30	190.10	13
#20	0.033	0.84	9.40	199.50	9
#40	0.017	0.42	4.60	204.10	7
#60	0.010	0.25	2.90	207.00	5
#140	0.004	0.11	3.00	210.00	4
#200	0.003	0.07	1.00	211.00	3

Total Dry Weight of Sample = 218.3

D85 : 14.6764 mm

D60 : 10.0318 mm

D50 : 8.1056 mm

D30 : 4.8620 mm

D15 : 2.2356 mm

D10 : 1.1119 mm

Soil Classification

ASTM Group Symbol : GW

ASTM Group Name : Well-graded gravel with sand

AASHTO Group Symbol : A-1-a(0)

AASHTO Group Name : Stone Fragments, Gravel and Sand

## GEOTECHNICAL LABORATORY TEST DATA

Project : DEPARTMENT OF ECOLOGY YAKIMA RR

Filename : 468099

Project No. : J-293

Depth :

Elevation :

Boring No. : M&amp;M

Test Date : 12-8-92

Tested by : TP/DF

Sample No. : 468099

Test Method : ASTM D422

Checked by : RS

Location : YAKIMA RR

Soil Description :

Remarks :

Sieve Mesh	COARSE SIEVE SET		Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
	Sieve Openings Inches	Millimeters			
0.375*	0.374	9.51	-0.10	-0.10	100
#4	0.187	4.75	21.10	21.00	89
#10	0.079	2.00	56.30	77.30	61
#20	0.033	0.84	46.30	123.60	38
#40	0.017	0.42	28.90	152.50	23
#60	0.010	0.25	13.80	166.30	17
#140	0.004	0.11	11.40	177.70	11
#200	0.003	0.07	2.30	180.00	10

Total Dry Weight of Sample = 199.3

D85 : 4.1433 mm

D60 : 1.9115 mm

D50 : 1.3165 mm

D30 : 0.5738 mm

D15 : 0.1974 mm

D10 : 0.0814 mm

## Soil Classification

ASTM Group Symbol : SW-SM

ASTM Group Name : Well-graded sand with silt

AASHTO Group Symbol : A-1-b(0)

AASHTO Group Name : Stone Fragments, Gravel and Sand



GEOTECHNICAL LABORATORY TEST DATA

Project : DEPARTMENT OF ECOLOGY YAKIMA RR  
 Project No. : J-293  
 Boring No. : BURBONS TR  
 Sample No. : 468111  
 Location : YAKIMA RR  
 Soil Description :  
 Remarks :

Filename : 468111  
 Elevation :  
 Tested by : TP/DP  
 Checked by : ES

Sieve Mesh	Sieve Openings		COARSE SIEVE SET		
	Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.75"	0.748	19.00	-0.10	-0.10	100
0.5"	0.500	12.70	8.40	8.30	96
0.375"	0.374	9.51	18.50	26.80	86
#4	0.187	4.75	44.70	71.50	64
#10	0.079	2.00	31.40	102.90	48
#20	0.033	0.84	24.80	127.70	35
#40	0.017	0.42	23.50	151.20	23
#60	0.010	0.25	14.30	165.50	16
#140	0.004	0.11	10.20	175.70	11
#200	0.003	0.07	2.20	177.90	10

Total Dry Weight of Sample = 196.6

- D85 : 9.1209 mm
- D60 : 3.9019 mm
- D50 : 2.2702 mm
- D30 : 0.6273 mm
- D15 : 0.2180 mm
- D10 : 0.0862 mm

Soil Classification

ASTM Group Symbol : SW-SM  
 ASTM Group Name : Well-graded sand with silt and gravel  
 AASHTO Group Symbol : A-1-a(0)  
 AASHTO Group Name : Stone Fragments, Gravel and Sand

## GEOTECHNICAL LABORATORY TEST DATA

Project : DEPARTMENT OF ECOLOGY YAKIMA RR

Filename : 468128

Project No. : J-293

Depth :

Elevation :

Boring No. : BMRR 3D 18

Test Date : 12-8-92

Tested by : TP/DF

Sample No. : 468128

Test Method : ASTM D422

Checked by : RS

Location : YAKIMA RR

Soil Description :

Remarks :

Sieve Mesh	Sieve Openings		COARSE SIEVE SET		
	Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
0.5"	0.500	12.70	-0.10	-0.10	100
0.375"	0.374	9.51	6.20	6.10	97
#4	0.187	4.75	23.20	29.30	86
#10	0.079	2.00	35.20	64.50	69
#20	0.033	0.84	34.70	99.20	52
#40	0.017	0.42	29.80	129.00	37
#60	0.010	0.25	19.70	148.70	28
#140	0.004	0.11	19.30	168.00	18
#200	0.003	0.07	4.80	172.80	16

Total Dry Weight of Sample = 205.7

D85 : 4.5719 mm

D60 : 1.2831 mm

D50 : 0.7724 mm

D30 : 0.2830 mm

D15 : N/A

D10 : N/A

## Soil Classification

ASTM Group Symbol : SM

ASTM Group Name : Silty sand

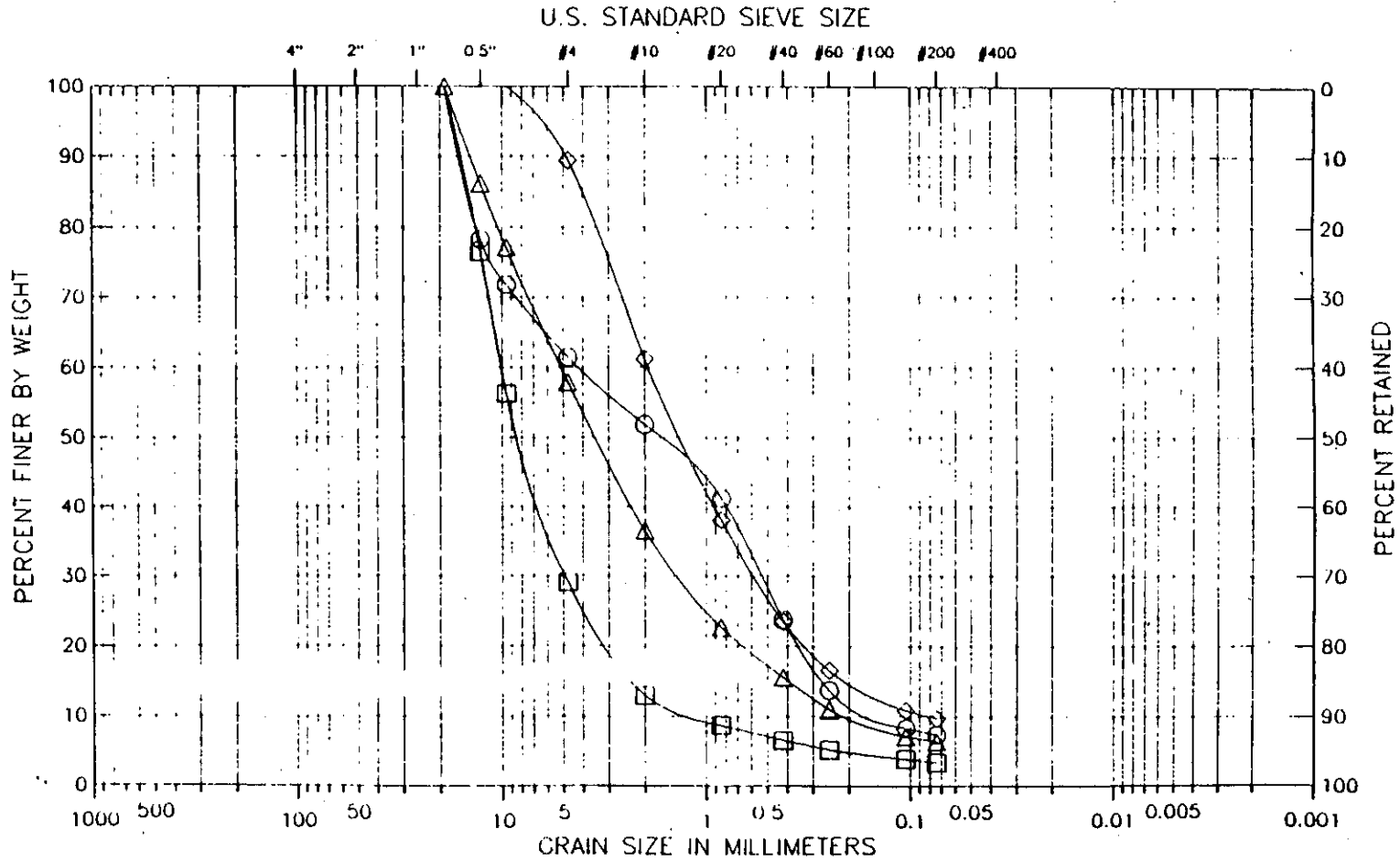
AASHTO Group Symbol : A-1-b(0)

AASHTO Group Name : Stone Fragments, Gravel and Sand

Soil Technology, Inc.

Grain Size Analysis

Project : DEPARTMENT OF ECOLOGY YAKIMA RR  
 Project No.: J-293  
 Location: YAKIMA RR  
 Date : Wed Dec 09 1992



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

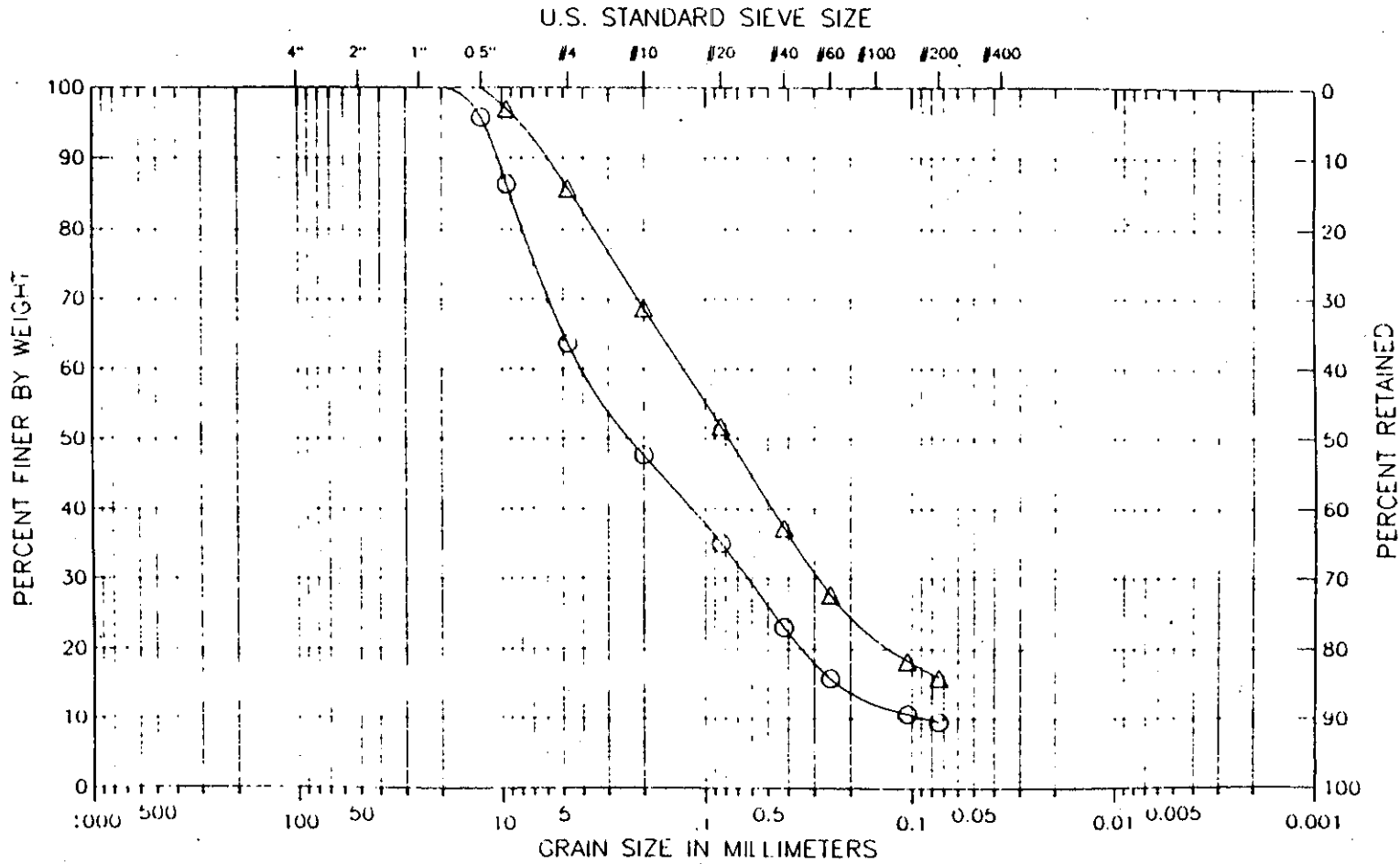
Symbol	Boring No	Sample No	Depth	Filename	Classification / Description
⊕	CRIST	468084		468084	SP-SM Poorly graded sand with silt and gravel
△	RAINIER	468087		468087	SW-SM Well-graded sand with silt and gravel
□	BNKR	468093		468093	GW Well-graded gravel with sand
◇	M&M	468099		468099	SW-SM Well-graded sand with silt

Figure 1

Soil Technology, Inc.

Grain Size Analysis

Project : DEPARTMENT OF ECOLOGY YAKIMA RR  
 Project No.: J-293  
 Location: YAKIMA RR  
 Date : Wed Dec 09 1992



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring No	Sample No	Depth	Filename	Classification / Description
○	BURROWS IR	468111		468111	SW-SM Well-graded sand with silt and gravel
△	BNKR 5D 18	468128		468128	SM Silty sand

Figure 2

## Total Organic Carbon Data



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

MANCHESTER ENVIRONMENTAL LABORATORY

7411 Beach Drive East • Port Orchard, Washington 98366-8204 • (206) 895-4737 • SCAN 744-4737

December 31, 1992

TO: Project Officer  
FROM: David A Thomson (D.A.T.)  
SUBJECT: Quality Assurance memo for Yakima RR TOC Results

**SAMPLE RECEIPT**

The samples from the Yakima RR project was received by the Manchester Laboratory on November 6, November 13, and November 20, 1992 in good condition. The analysis of this sample was subsequently contracted to Sound Analytical Services. The samples were run using EPA Method 9060 modified for soils.

**HOLDING TIMES**

All analyses were performed on December 4, 1992.

**PROCEDURAL BLANKS**

The procedural blanks associated with these samples showed no analytically significant levels of analytes.

**PRECISION DATA**

The sample 468126 was run in duplicate to evaluate precision on this sample set. The Relative Percent Difference (RPD) for TOC was 3%.

**SUMMARY**

The data generated by the analysis of these samples can be used noting the data qualifications discussed in this memo. Please note that the results are reported on a dry weight basis.

Please call David A Thomson at SCAN 744-4737 to further discuss this project.

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4513 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: WA St. Dept. of Ecology

Date: December 8, 1992

Report On: Analysis of Soil

Lab No.: 28745

IDENTIFICATION:

Samples received on 12-01-92

Project: Yakima RR

-----  
ANALYSIS:

TOC per EPA Method 9060

Date Analyzed: 12-4-92

<u>Lab Sample No.</u>	<u>Client ID</u>	<u>Total Organic Carbon, mg/kg</u>
28745-1	468082	3,700
28745-2	468088	5,900
28745-3	468091	1,100
28745-4	468097	9,100
28745-5	468101	1,000
28745-6	468113	1,200
28745-7	468119	3,000
28745-8	468126	31,000
28745-9	468130	900
28745-10	478231	12,000
28745-11	478235	600
28745-12	478239	5,800

SOUND ANALYTICAL SERVICES

  
STAN P. PALMQUIST

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

## QUALITY CONTROL REPORT

### Total Organic Carbon

Client: WA State Dept. of Ecology  
Lab No: 28745qc  
Matrix: Soil  
Units: mg/kg  
Date: December 8, 1992

### DUPLICATE

Dup No. 28745-8

Parameter	Sample(S)	Duplicate(D)	RPD
TOC	31,000	32,000	3.2

RPD = Relative Percent Difference  
=  $[(S - D) / ((S + D) / 2)] \times 100$

### CHECK STANDARDS

Origin of Standard: Environmental Resource Associates  
Date: 12-4-92

Parameter	Result (R)	True Value (TV)	% D
TOC	9,780	10,000	2.2

% D = % Difference  
=  $(TV - R) / TV \times 100$

### METHOD BLANK

Parameter	Blank Value
TOC	184



# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

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## ANALYTICAL NARRATIVE

Client: WA St. Dept. of Ecology  
Lab No: 28745n  
Date: December 8, 1992

Samples were thoroughly mixed and approximately 5 grams dried at 20°C to a constant weight.

The dried sample was then pulverized using a mortar and pestle and analyzed for total organic carbon in accordance with EPA Method 9060.

A duplicate analysis was performed on sample 28745-8

## Soil Metals Data



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY  
MANCHESTER ENVIRONMENTAL LABORATORY

7411 Beach Drive East • Port Orchard, Washington 98366-8204 • (206) 895-4737 • SCAN 744-4737

December 18, 1992

TO: Charles San Juan  
FROM: Bill Kammin, Environmental\_Lab\_Director *BK*  
SUBJECT: Metals Quality Assurance memo for the Yakima Railroad Project

**SAMPLE INFORMATION**

The samples from the Yakima Railroad project were received by the Manchester Laboratory on 11/6/92 in good condition.

**HOLDING TIMES**

All analyses were performed within the USEPA Contract Laboratory Program (CLP) holding times for metals analysis (28 days for mercury, 180 days for all other metals).

**INSTRUMENT CALIBRATION**

Instrument calibration was performed before each analytical run and checked by initial calibration verification standards and blanks. Continuing calibration standards and blanks were analyzed at a frequency of 10% during the run and again at the end of the analytical run. All initial and continuing calibration verification standards were within the relevant USEPA (CLP) control limits. AA calibration gave a correlation coefficient ( $r$ ) of 0.995 or greater, also meeting CLP calibration requirements.

**PROCEDURAL BLANKS**

The procedural blanks associated with these samples showed no analytically significant levels of analytes.

**SPIKED SAMPLE ANALYSES**

Spike and duplicate spike sample analyses were performed on this data set. All spike recoveries were within the CLP acceptance limits of +/- 25%.

## **PRECISION DATA**

The results of the spike and duplicate spike samples were used to evaluate precision on this sample set. The Relative Percent Difference (RPD) for all analytes was within the +/- 20% CLP acceptance window for duplicate analysis.

## **LABORATORY CONTROL SAMPLE (LCS) ANALYSES**

LCS analyses were within the windows established for each parameter.

## **SERIAL DILUTION ANALYSES**

Serial dilution is used in ICP analyses to examine sample results for potential interferences. The serial dilution results for this sample set met CLP specifications.

## **SUMMARY**

For sample -8117 the selenium detection limit was slightly raised to because of a negative interference on the selenium line.

The data generated by the analysis of these samples can be used noting the data qualifications discussed in this memo.

Please call Bill Kammin at SCAN 744-4737 to further discuss this project.

WRK:wrk

Transaction #: 12111603 Laboratory: (WE) Ecology, Manchester Lab

ork Group: (38) Metals - ICP Scan

Instrument: (ICP ) ICP, Jarrell-Ash AtomComp 1100 (DOE)

Method: (EP1-200.7 ) Inductively Coupled Plasma Atomic Emissions Analysis

hemist: (AGH) Hedley, Art DOE Hours Worked:

Project: DOE-520Y YAKIMA R.R.

Prg Ele#: J1K1C

ry Off: San Juan, Charles DOE Analysis Due: 921106 Revised Due:

\*\*\* Sample Records in Transaction \*\*\*

Seq#	Sample #	QA	Date/Time	Description	Alternate Keys
01	92468083	LBK1	921102	CREST L.	
02	92468083		921102	CREST L.	
03	92468086		921103	RAINIER	
04	92468094		921105	CEN. ENG.	
05	92468092		921104	BNRR @18FT	
06	92468100		921105	MM FAB	
	92468112		921109	BTRACTOR	
	92468117		921109	NWTRUCK	
09	92468123		921110	BNRR 3D	
10	92468129		921112	CMX CORP	
11	92468083	LMX1	921102	CREST L.	
12	92468083	LMX2	921102	CREST L.	

Record Type: TRNIN3

Date Verified: 12/14/92

By: M. M. Anderson

Transaction Status: New Transaction...First Printing...Unverified.

Processed: 11-DEC-92 16:10:11 Status: N Batch: (In CUR DB)

Transaction #: 12111603 Seq #: 01 (38) Metals - ICP Scan  
j Code : DOE-520Y YAKIMA R.R. PE # : J1K1C

Blank ID : ESPB 47.04

Sample No.: 92 468083

Alternate Keys:

Sample Matrix: (40) Sediment Units: (00) %Slits:  
A Code: (LBK1) Lab Blank Sample #1 Peaks Total:  
Date Extracted: Date Analyzed: 921125 # Days to Ext/Anal: 0/ 23

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		3.0U
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.20U
3	01029	Chromium Cr-Sedmt mg/kg-dr		0.50U
4	01052	Lead Pb-Sedmt mg/kg-dr		2.0U
5	01148	Selenium Se-Sedmt mg/kg-dr		5.0U

\*\*\* Lab Analysis Report \*\*\*

Transaction #: 12111603 Seq #: 02 (38) Metals - ICP Scan  
 Code : DOE-520Y YAKIMA R.R. PE # : J1K1C

Sample No.: 92 468083 Alternate Keys:

Samp Matrix: (40) Sediment Units: (00) %Slds:  
 Code: ( ) Unspecified Peaks Total:  
 Date Extracted: Date Analyzed: 921125 # Days to Ext/Anal: 0/ 23

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		9.2P
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.41P
3	01029	Chromium Cr-Sedmt mg/kg-dr		21.9
4	01052	Lead Pb-Sedmt mg/kg-dr		3.7P
5	01148	Selenium Se-Sedmt mg/kg-dr		5.0U

\*\*\* Lab Analysis Report \*\*\*

Transaction #: 12111603 Seq #: 03  
Code : DOE-520Y YAKIMA R.R.

(38) Metals - ICP Scan

PE # : J1K1C

Sample No.: 92 468086

Alternate Keys:

Sample Matrix: (40) Sediment

Units: (00)

%Slids:

Code: ( ) Unspecified

Peaks Total:

Date Extracted:

Date Analyzed: 921125

# Days to Ext/Anal:

0/ 22

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		12P
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.58P
3	01029	Chromium Cr-Sedmt mg/kg-dr		15.0
4	01052	Lead Pb-Sedmt mg/kg-dr		31.5
5	01148	Selenium Se-Sedmt mg/kg-dr		5.0U



Transaction #: 12111603 Seq #: 04 (38) Metals - ICP Scan  
Code : DOE-520Y YAKIMA R.R. PE # : J1K1C

Sample No.: 92 468094 Alternate Keys:

Samp Matrix: (40) Sediment Units: (00) %Slits:  
A Code: ( ) Unspecified Peaks Total:  
Date Extracted: Date Analyzed: 921125 # Days to Ext/Anal: 0/ 20

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		9.9P
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.36P
3	01029	Chromium Cr-Sedmt mg/kg-dr		15.6
4	01052	Lead Pb-Sedmt mg/kg-dr		6.8P
5	01148	Selenium Se-Sedmt mg/kg-dr		5.0U

11-DEC-92

Washington State Department of Ecology  
\*\*\* Lab Analysis Report \*\*\*

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Transaction #: 12111603 Seq #: 05 (38) Metals - ICP Scan  
Job Code : DOE-520Y YAKIMA R.R. PE # : J1K1C

Sample No.: 92 468092 . Alternate Keys:

Sample Matrix: (40) Sediment Units: (00) %Slits:  
A Code: ( ) Unspecified Peaks Total:  
Date Extracted: Date Analyzed: 921125 # Days to Ext/Anal: 0/ 21

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		18
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.47P
3	01029	Chromium Cr-Sedmt mg/kg-dr		36.7
4	01052	Lead Pb-Sedmt mg/kg-dr		14
5	01148	Selenium Se-Sedmt mg/kg-dr		5.0U

11-DEC-92

Washington State Department of Ecology

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\*\*\* Lab Analysis Report \*\*\*

Transaction #: 12111603 Seq #: 06 (38) Metals - ICP Scan

Code : DOE-520Y YAKIMA R.R.

PE # : J1K1C

Sample No.: 92 468100

Alternate Keys:

Sample Matrix: (40) Sediment

Units: (00)

%Slits:

Sample Code: ( ) Unspecified

Peaks Total:

Volume Extracted:

Date Analyzed: 921125

# Days to Ext/Anal:

0/ 20

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		4.9P
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.78P
3	01029	Chromium Cr-Sedmt mg/kg-dr		20.6
4	01052	Lead Pb-Sedmt mg/kg-dr		30.0
5	01148	Selenium Se-Sedmt mg/kg-dr		5.0U

Transaction #: 12111603 Seq #: 07 (38) Metals - ICP Scan  
Job Code : DOE-520Y YAKIMA R.R.

PE # : J1K1C

Sample No.: 92 468112 . Alternate Keys:

Sample Matrix: (40) Sediment Units: (00) %Slits:  
Job Code: ( ) Unspecified Peaks Total:  
Date Extracted: Date Analyzed: 921125 # Days to Ext/Anal: 0/ 16

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		5.7P
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.32P
3	01029	Chromium Cr-Sedmt mg/kg-dr		16.5
4	01052	Lead Pb-Sedmt mg/kg-dr		6.7P
5	01148	Selenium Se-Sedmt mg/kg-dr		5.0U

11-DEC-92

Washington State Department of Ecology  
\*\*\* Lab Analysis Report \*\*\*

Page 9

Transaction #: 12111603 Seq #: 08 (38) Metals - ICP Scan  
Job Code : DOE-520Y YAKIMA R.R. PE # : J1K1C

Sample No.: 92 468117 Alternate Keys:

Sample Matrix: (40) Sediment Units: (00) %Slits:  
A Code: ( ) Unspecified Peaks Total:  
Date Extracted: Date Analyzed: 921125 # Days to Ext/Anal: 0/ 16

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		6.9P
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.52P
3	01029	Chromium Cr-Sedmt mg/kg-dr		15.4
4	01052	Lead Pb-Sedmt mg/kg-dr		4.1P
5	01148	Selenium Se-Sedmt mg/kg-dr		6.2U

11-DEC-92

Washington State Department of Ecology  
\*\*\* Lab Analysis Report \*\*\*

Page 10

Section #: 12111603 Seq #: 09  
Code : DOE-520Y YAKIMA R.R.

(38) Metals - ICP Scan

PE # : J1K1C

Sample No.: 92 468123 .

Alternate Keys:

Sample Matrix: (40) Sediment  
Lab Code: ( ) Unspecified

Units: (00)

%Slits:

Peaks Total:

Date Extracted:

Date Analyzed: 921125

# Days to Ext/Anal:

0/ 15

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		9.5P
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.60P
3	01029	Chromium Cr-Sedmt mg/kg-dr		17.2
4	01052	Lead Pb-Sedmt mg/kg-dr		24.0
5	01148	Selenium Se-Sedmt mg/kg-dr		5.0U

11-DEC-92

Washington State Department of Ecology  
\*\*\* Lab Analysis Report \*\*\*

Page 11

Transaction #: 12111603    Seq #: 10    (38) Metals - ICP Scan  
Lab Code : DOE-520Y YAKIMA R.R.    PE # : J1K1C

Sample No.: 92 468129    Alternate Keys:

Sample Matrix: (40) Sediment    Units: (00)    %Slds:  
Lab Code: ( ) Unspecified    Peaks Total:  
Date Extracted:    Date Analyzed: 921125    # Days to Ext/Anal: 0/ 13

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		20
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.52P
3	01029	Chromium Cr-Sedmt mg/kg-dr		16.6
4	01052	Lead Pb-Sedmt mg/kg-dr		46.8
5	01148	Selenium Se-Sedmt mg/kg-dr		5.0U

Transaction #: 12111603 Seq #: 11  
 Lab Code : DOE-520Y YAKIMA R.R.

(38) Metals - ICP Scan

PE # : J1K1C

Sample No.: 92 468083

Alternate Keys:

Sample Matrix: (40) Sediment

Units: (94) % Recov %Slids:

Lab Code: (LMX1) Lab Mtrx Spike #1 (% Rec

Peaks Total:

Date Extracted:

Date Analyzed: 921125

# Days to Ext/Anal:

0/ 23

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr	% Recov	96
2	01028	Cadmium Cd-Sedmt mg/kg-dr	% Recov	99
3	01029	Chromium Cr-Sedmt mg/kg-dr	% Recov	84
4	01052	Lead Pb-Sedmt mg/kg-dr	% Recov	96
5	01148	Selenium Se-Sedmt mg/kg-dr	% Recov	94



Transaction #: 12111603 Seq #: 12  
Job Code : DOE-520Y YAKIMA R.R.

(38) Metals - ICP Scan

PE # : J1K1C

Sample No.: 92 468083

Alternate Keys:

Sample Matrix: (40) Sediment Units: (94) % Recov %Slids:  
 A Code: (LMX2) Lab Mtrx Spike #2 (% Rec Peaks Total:  
 Date Extracted: Date Analyzed: 921125 # Days to Ext/Anal: 0/ 23

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr	% Recov	95
2	01028	Cadmium Cd-Sedmt mg/kg-dr	% Recov	94
3	01029	Chromium Cr-Sedmt mg/kg-dr	% Recov	77
4	01052	Lead Pb-Sedmt mg/kg-dr	% Recov	92
5	01148	Selenium Se-Sedmt mg/kg-dr	% Recov	95



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY  
MANCHESTER ENVIRONMENTAL LABORATORY

7411 Beach Drive East • Port Orchard, Washington 98366-8204 • (206) 895-4737 • SCAN 744-4737

March 9, 1993

TO: Charles San Juan  
FROM: Bill Kammin, Environmental\_Lab\_Director *BK*  
SUBJECT: Metals Quality Assurance memo for the Yakima R. R. sediments Project

#### SAMPLE INFORMATION

The samples from the Yakima R. R. sediments project were received by the Manchester Laboratory on 11/20/92 in good condition.

#### HOLDING TIMES

All analyses were performed within the USEPA Contract Laboratory Program (CLP) holding times for metals analysis (28 days for mercury, 180 days for all other metals).

#### INSTRUMENT CALIBRATION

Instrument calibration was performed before each analytical run and checked by initial calibration verification standards and blanks. Continuing calibration standards and blanks were analyzed at a frequency of 10% during the run and again at the end of the analytical run. All initial and continuing calibration verification standards were within the relevant USEPA (CLP) control limits. AA calibration gave a correlation coefficient (r) of 0.995 or greater, also meeting CLP calibration requirements.

#### PROCEDURAL BLANKS

The procedural blanks associated with these samples showed no analytically significant levels of analytes.

#### SPIKED SAMPLE ANALYSES

Spike and duplicate spike sample analyses were performed on this data set. All spike recoveries were within the CLP acceptance limits of +/- 25%.

## **PRECISION DATA**

The results of the spike and duplicate spike samples were used to evaluate precision on this sample set. The Relative Percent Difference (RPD) for all analytes was within the 20% CLP acceptance window for duplicate analysis.

## **LABORATORY CONTROL SAMPLE (LCS) ANALYSES**

LCS analyses were within the windows established for each parameter.

## **SERIAL DILUTION ANALYSES**

Serial dilution is used in ICP analyses to examine sample results for potential interferences. The serial dilution results for this sample set met CLP specifications.

## **SUMMARY**

The data generated by the analysis of these samples can be used noting the data qualifications discussed in this memo.

Please call Bill Kammin at SCAN 744-4737 to further discuss this project.

WRK:wrk

Transaction #: 03041801 Laboratory: (WE) Ecology, Manchester Lab

Work Group: (38) Metals - ICP Scan

Instrument: (ICP ) ICP, Jarrell-Ash AtomComp 1100 (DOE)

Method: (EPI-200.7 ) Inductively Coupled Plasma Atomic Emissions Analysis

Chemist: (SDM) Moore, Sandy DOE Hours Worked:

Project: DOE-520Y YAKIMA R.R. Prg Ele#: J1K1C

Proj Off: San Juan, Charles DOE Analysis Due: 921106 Revised Due:

\*\*\* Sample Records in Transaction \*\*\*

Seq#	Sample #	QA	Date/Time	Description	Alternate Keys
01	92478232	LBK1	921112	MARTIN	
02	92478232		921112	MARTIN	
03	92478234		921112	SGATELAU	
04	92478234	LMX1	921112	SGATELAU	
05	92478234	LMX2	921112	SGATELAU	

Record Type: TRNIN3

Date Verified: 3-8-93

By: Susan Davis

Transaction Status: New Transaction...First Printing...Unverified.

Processed: 4-MAR-93 18:05:11 Status: N Batch: (In CUR DB)

Transaction #: 03041801 Seq #: 01 (38) Metals - ICP Scan  
 j Code : DOE-520Y YAKIMA R.R. PE # : J1K1C

Blank ID : ESPB 09.28  
 Sample No.: 92 478232

Alternate Keys:

amp Matrix: (40) Sediment Units: (00) %Slids:  
 A Code: (LBK1) Lab Blank Sample #1 Peaks Total:  
 Date Extracted: Date Analyzed: 930301 # Days to Ext/Anal: 0/109

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		3.0U
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.20U
3	01029	Chromium Cr-Sedmt mg/kg-dr		0.50U
4	01052	Lead Pb-Sedmt mg/kg-dr		2.0U
5	01148	Selenium Se-Sedmt mg/kg-dr		5.0U

Transaction #: 03041801 Seq #: 02 (38) Metals - ICP Scan  
j Code : DOE-520Y YAKIMA R.R. PE # : J1K1C

Sample No.: 92 478232 Alternate Keys:

Samp Matrix: (40) Sediment Units: (00) %Slits:  
A Code: ( ) Unspecified Peaks Total:  
Date Extracted: Date Analyzed: 930301 # Days to Ext/Anal: 0/109

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		6.0P
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.71P
3	01029	Chromium Cr-Sedmt mg/kg-dr		15.8
4	01052	Lead Pb-Sedmt mg/kg-dr		34.6
5	01148	Selenium Se-Sedmt mg/kg-dr		6.0U

Transaction #: 03041801 Seq #: 03  
 ) Code : DOE-520Y YAKIMA R.R.

(38) Metals - ICP Scan  
 PE # : J1K1C

Sample No.: 92 478234

Alternate Keys:

Samp Matrix: (40) Sediment

Units: (00)

%Slids:

A Code: ( ) Unspecified

Peaks Total:

Date Extracted:

Date Analyzed: 930301

# Days to Ext/Anal: 0/109

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr		8.7P
2	01028	Cadmium Cd-Sedmt mg/kg-dr		0.47P
3	01029	Chromium Cr-Sedmt mg/kg-dr		32.2
4	01052	Lead Pb-Sedmt mg/kg-dr		9.3P
5	01148	Selenium Se-Sedmt mg/kg-dr		5.0U

Transaction #: 03041801 Seq #: 04 (38) Metals - ICP Scan  
j Code : DOE-520Y YAKIMA R.R. PE # : J1K1C

Sample No.: 92 478234 Alternate Keys:

Samp Matrix: (40) Sediment Units: (94) % Recov %Slids:  
A Code: (LMX1) Lab Mtrx Spike #1 (% Rec Peaks Total:  
ate Extracted: Date Analyzed: 930301 # Days to Ext/Anal: 0/109

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr	% Recov	91
2	01028	Cadmium Cd-Sedmt mg/kg-dr	% Recov	98
3	01029	Chromium Cr-Sedmt mg/kg-dr	% Recov	87
4	01052	Lead Pb-Sedmt mg/kg-dr	% Recov	94
5	01148	Selenium Se-Sedmt mg/kg-dr	% Recov	94



Transaction #: 03041801 Seq #: 05 (38) Metals - ICP Scan  
Code : DOE-520Y YAKIMA R.R. PE # : J1K1C

Sample No.: 92 478234 Alternate Keys:

Sample Matrix: (40) Sediment Units: (94) % Recov %Slds:  
A Code: (LMX2) Lab Mtrx Spike #2 (% Rec Peaks Total:  
Date Extracted: Date Analyzed: 930301 # Days to Ext/Anal: 0/109

Line	Par #	Parameter Description	Units	Value
1	01003	Arsenic As-Sedmt mg/kg-dr	% Recov	91
2	01028	Cadmium Cd-Sedmt mg/kg-dr	% Recov	102
3	01029	Chromium Cr-Sedmt mg/kg-dr	% Recov	86
4	01052	Lead Pb-Sedmt mg/kg-dr	% Recov	93
5	01148	Selenium Se-Sedmt mg/kg-dr	% Recov	93

## **Appendix C**

**C.1. Soil Data - Pesticide, PCB, and VOA Results**

**C.2. Ground Water Data - VOA and Water Quality Results**

## **C.1. Soil Data**

### **Pesticide, PCB, and VOA Results**

State of Washington Department of Ecology  
Manchester Environmental Laboratory  
7411 Beach Dr. East Port Orchard WA. 98366

Data Review  
December 24, 1992

Project: Yakima R.R.  
Sample(s): 478230, 478233, 478236, 478237, 478238, 478241, 478243, 478247,  
478248, 478249, 478250, 478252, 478253, 478254, 478255  
Laboratory: Analytical Resources, Inc. C290  
By: Karin Feddersen *KF*  
Through: Stuart Magoon *Sm*

### Case Summary

These samples were received at the Manchester Environmental Laboratory on November 20, 1992, and transported to Analytical Resources, Inc. on November 20, 1992 for VOC and Pesticide/PCB analysis.

This data was reviewed for qualitative and quantitative accuracy, validity, and usefulness.

There is no need to assimilate the "dilution factor" or "sample wt/vol" into the final values reported; these calculations have already been figured into the reported values.

### DATA QUALIFIER DEFINITIONS

- U - The analyte was not detected at or above the reported result.
- UJ - The analyte was not detected at or above the reported estimated result.
- J - The associated numerical result is an estimated quantity.
- NJ - There is evidence that the analyte is present. The associated numerical result is an estimate.

## VOA

### **Holding Times:**

These samples were analyzed within the SW-846 recommended holding time.

### **Method Blank:**

Acetone was detected in the method blank at a concentration below the quantitation limit, but not in either of the samples.

### **GC/MS Tuning and Calibration:**

Calibration against Bromofluorobenzene (BFB) is acceptable for the initial calibration, continuing calibration and all associated sample analyses.

### **Initial Calibration:**

The initial calibration met the minimum response criteria for the average relative responses. The % Relative Standard Deviations were within the maximum of 30%.

### **Continuing Calibration:**

The average relative response factors for all target analytes were above the minimums. The percent deviations between the initial and continuing calibration standards were within the maximum of 25%, with two exceptions, neither of which affected quantitations of the target analytes in the corresponding samples.

### **Surrogates:**

All surrogate recoveries for this sample, and the associated method blank are reasonable, acceptable, and within QC limits.

### **Sample Data:**

This data is acceptable for use as amended.

## Pesticide/PCB

### Holding Times:

This sample was extracted and analyzed within the SW-846 recommended holding time.

### Method Blank:

No target analytes were detected in the method blank.

### Blank Spike:

Blank spike recoveries are reasonable, acceptable, and within advisory QC limits.

### Surrogates:

All surrogate recoveries for this sample and the associated method blank are reasonable, acceptable, and within advisory QC limits, with the exception of the spike blank. Tetrachlorometaxylene was detected below the advisory QC limit on the DB608 column. This column is used for confirmation of identification only, and therefore does not affect the results. Tetrachlorometaxylene detected was within advisory QC limits on the DB5 column, which is the column used for quantitation of all target analytes. Thus, no qualification of data was warranted.

### Sample Data:

4,4'DDE and Endrin Ketone were detected in sample 478250 at amounts below the quantitation limit, but they were not reported by ARI. The concentrations for these analytes have been calculated and added to the sample data sheet (Form I).

This data is acceptable for use as amended.



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(206) 621-7523 (FAX)

**ORGANICS ANALYSIS DATA SHEET**

Volatiles by Purge & Trap GC/MS

Lab ID: C290J  
Matrix: Soils/Sediments

Sample: 478230

QC Report No: C290 - WDOE  
Project: Yakima RR

Data Release Authorized: *Don B. Patton*  
Report: 12/10/92 MAC:MB

VTSR: 11/20/92

Instrument: FINN 1  
Date Analyzed: 11/24/92

Amount Analyzed: 4.40 gm (Dry Weight)  
Percent Moisture: 13.7%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.3 U
74-83-9	Bromomethane	2.3 U
75-01-4	Vinyl Chloride	2.3 U
75-00-3	Chloroethane	2.3 U
75-09-2	Methylene Chloride	2.3 U
67-64-1	Acetone	5.7 U
75-15-0	Carbon Disulfide	1.1 U
75-35-4	1,1-Dichloroethene	1.1 U
75-34-3	1,1-Dichloroethane	1.1 U
156-60-5	Trans-1,2-Dichloroethene	1.1 U
156-59-2	Cis-1,2-Dichloroethene	1.1 U
67-66-3	Chloroform	1.1 U
107-06-2	1,2-Dichloroethane	1.1 U
78-93-3	2-Butanone	5.7 U
71-55-6	1,1,1-Trichloroethane	1.1 U
56-23-5	Carbon Tetrachloride	1.1 U
108-05-4	Vinyl Acetate	1.1 U
75-27-4	Bromodichloromethane	1.1 U
78-87-5	1,2-Dichloropropane	1.1 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.1 U
79-01-6	Trichloroethene	1.1 U
124-48-1	Dibromochloromethane	1.1 U
79-00-5	1,1,2-Trichloroethane	1.1 U
71-43-2	Benzene	1.1 U
10061-02-6	trans-1,3-Dichloropropene	1.1 U
110-75-8	2-Chloroethylvinylether	1.1 U
75-25-2	Bromoform	1.1 U
108-10-1	4-Methyl-2-Pentanone	5.7 U
591-78-6	2-Hexanone	5.7 U
127-18-4	Tetrachloroethene	3.4
79-34-5	1,1,2,2-Tetrachloroethane	1.1 U
108-88-3	Toluene	1.8
108-90-7	Chlorobenzene	1.1 U
100-41-4	Ethylbenzene	1.9
100-42-5	Styrene	1.1 U
1330-20-7	Total Xylenes	27
75-69-4	Trichlorofluoromethane	2.3 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.3 U

**Surrogate Recoveries**

d8-Toluene	105%
Bromofluorobenzene	87.1%
d4-1,2-Dichloroethane	93.6%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478230

QC Report No: C290 - WDOE

Project No: Yakima RR

Lab ID: C290J

Matrix: Soils/Sediments

Instrument: FINN 1

VTSR: 11/20/92

Data Release Authorized: *David B. Carter*  
Report prepared: 12/15/92 MAC: mb

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	Silane Isomer (bp m/e 281)	VOA	947	7.2 NJ
2	Silane Isomer (bp m/e 73)	VOA	1132	36.2 NJ
3				
4				
5				
6				
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KF





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**ORGANICS ANALYSIS DATA SHEET**

**Volatiles by Purge & Trap GC/MS**

Lab ID: C290K

Matrix: Soils/Sediments

Sample: 478233

QC Report No: C290 - WDOE

Project: Yakima RR

Data Release Authorized: *[Signature]*  
Report: 12/15/92 MAC:MB

VTSR: 11/20/92

Instrument: FINN 1  
Date Analyzed: 11/24/92

Amount Analyzed: 4.95 gm (Dry Weight)  
Percent Moisture: 2.9%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	4.2 J
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.1 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.1 U
591-78-6	2-Hexanone	5.1 U
127-18-4	Tetrachloroethene	1.0 J
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	94.0%
Bromofluorobenzene	93.6%
d4-1,2-Dichloroethane	92.4%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478233

QC Report No: C290 - WDOE  
Project No: Yakima RR

Lab ID: C290K  
Matrix: Soils/Sediments  
Instrument: FINN 1

VTSR: 11/20/92

Data Release Authorized: *[Signature]*  
Report prepared: 12/10/92 MAC: mb

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	Silane Isomer (bp m/e 73)	VOA	1131	48.5 WJ K
2				
3				
4				
5				
6				
7				
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9				
10				
11				
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**ORGANICS ANALYSIS DATA SHEET**

Volatiles by Purge & Trap GC/MS

Lab ID: C290L  
Matrix: Soils/Sediments

Sample: 478236

QC Report No: C290 - WDOE  
Project: Yakima RR

Data Release Authorized: *Don B. Latta*  
Report: 12/15/92 MAC:MB

VTSR: 11/20/92

Instrument: FINN 1  
Date Analyzed: 11/24/92

Amount Analyzed: 4.84 gm (Dry Weight)  
Percent Moisture: 4.8%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.1 U
74-83-9	Bromomethane	2.1 U
75-01-4	Vinyl Chloride	2.1 U
75-00-3	Chloroethane	2.1 U
75-09-2	Methylene Chloride	2.1 U
67-64-1	Acetone	5.2 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.2 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.2 U
591-78-6	2-Hexanone	5.2 U
127-18-4	Tetrachloroethene	11
79-34-5	1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.2
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	4.6
75-69-4	Trichlorofluoromethane	2.1 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.1 U

**Surrogate Recoveries**

d8-Toluene	101%
Bromofluorobenzene	78.2%
d4-1,2-Dichloroethane	91.0%



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(206) 621-7523 (FAX)

**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478236

QC Report No: C290 - WDOE  
Project No: Yakima RR

Lab ID: C290L  
Matrix: Soils/Sediments  
Instrument: FINN 1

VTSR: 11/20/92

Data Release Authorized: *[Signature]*  
Report prepared: 12/10/92 MAC: mb

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	66-25-1	Hexanal	VOA 798	14 µg/Kg
2	-	Silane Isomer (bp m/e 73)	VOA 1131	46 µg/Kg
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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478237

QC Report No: C290 - WDOE  
Project No: Yakima RR

Lab ID: C290M  
Matrix: Soils/Sediments  
Instrument: FINN 1

VTSR: 11/20/92

Data Release Authorized: *[Signature]*  
Report prepared: 12/15/92 MAC: mb

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	Silane Isomer (bp m/e 73)	VOA	1132	7 ± NJ KF
2				
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**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**


Lab ID: C290N  
Matrix: Soils/Sediments

Sample: 478238

QC Report No: C290 - WDOE  
Project: Yakima RR

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Data Release Authorized:   
Report: 12/10/92 MAC:MB

VTSR: 11/20/92

Instrument: FINN 1  
Date Analyzed: 11/24/92

Amount Analyzed: 4.75 gm (Dry Weight)  
Percent Moisture: 5.7%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.1 U
74-83-9	Bromomethane	2.1 U
75-01-4	Vinyl Chloride	2.1 U
75-00-3	Chloroethane	2.1 U
75-09-2	Methylene Chloride	2.1 U
67-64-1	Acetone	5.3 U
75-15-0	Carbon Disulfide	1.1 U
75-35-4	1,1-Dichloroethene	1.1 U
75-34-3	1,1-Dichloroethane	1.1 U
156-60-5	Trans-1,2-Dichloroethene	1.1 U
156-59-2	Cis-1,2-Dichloroethene	1.1 U
67-66-3	Chloroform	1.1 U
107-06-2	1,2-Dichloroethane	1.1 U
78-93-3	2-Butanone	5.3 U
71-55-6	1,1,1-Trichloroethane	1.1 U
56-23-5	Carbon Tetrachloride	1.1 U
108-05-4	Vinyl Acetate	1.1 U
75-27-4	Bromodichloromethane	1.1 U
78-87-5	1,2-Dichloropropane	1.1 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.1 U
79-01-6	Trichloroethene	1.1 U
124-48-1	Dibromochloromethane	1.1 U
79-00-5	1,1,2-Trichloroethane	1.1 U
71-43-2	Benzene	1.1 U
10061-02-6	trans-1,3-Dichloropropene	1.1 U
110-75-8	2-Chloroethylvinylether	1.1 U
75-25-2	Bromoform	1.1 U
108-10-1	4-Methyl-2-Pentanone	5.3 U
591-78-6	2-Hexanone	5.3 U
127-18-4	Tetrachloroethene	1.1 U
79-34-5	1,1,2,2-Tetrachloroethane	1.1 U
108-88-3	Toluene	1.1 U
108-90-7	Chlorobenzene	1.1 U
100-41-4	Ethylbenzene	1.1 U
100-42-5	Styrene	1.1 U
1330-20-7	Total Xylenes	2.1 U
75-69-4	Trichlorofluoromethane	2.1 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.1 U

**Surrogate Recoveries**

d8-Toluene	102%
Bromofluorobenzene	81.4%
d4-1,2-Dichloroethane	92.3%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478238

QC Report No: C290 - WDOE  
Project No: Yakima RR

Lab ID: C290N  
Matrix: Soils/Sediments  
Instrument: FINN 1

VTSR: 11/20/92

Data Release Authorized: *[Signature]*  
Report prepared: 12/10/92 MAC: mb

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	No UNKNOWN pks >10% IS peak height	VOA	-	-
2				
3				
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**ORGANICS ANALYSIS DATA SHEET**

**Volatiles by Purge & Trap GC/MS**

Lab ID: 1124MB  
Matrix: Soils/Sediments

Sample: METHOD BLANK

QC Report No: C290 - WDOE  
Project: Yakima RR

Data Release Authorized: *[Signature]*  
Report: 12/16/92 MAC:MB

VTSR: NA

Instrument: FINN 1  
Date Analyzed: 11/24/92

Amount Analyzed: 5.0 gm (Dry Weight Equivalent)  
Percent Moisture: NA

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	97.8%
Bromofluorobenzene	100%
d4-1,2-Dichloroethane	97.4%





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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

**Sample No:** METHOD BLANK

QC Report No: C290 - WDOE  
Project No: Yakima RR

Lab ID: 1124MB  
Matrix: Soils/Sediments  
Instrument: FINN 1

VTSR: NA

Data Release Authorized: *[Signature]*  
Report prepared: 12/10/92 MAC: mb

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	No UNKNOWN pks >10% IS peak height	VOA	-	-
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State of Washington Department of Ecology  
Manchester Environmental Laboratory  
7411 Beach Dr. East Port Orchard WA. 98366

Data Review  
December 12, 1992

Project: Yakima R.R.  
Sample(s): 468080, 468081, 468085, 468089, 468090, 468095, 468096, 468098  
Laboratory: Analytical Resources, Inc. C191  
By: Karin Feddersen KF  
Through: Stuart Magoon SM

#### Case Summary

These samples were received at the Manchester Environmental Laboratory on November 6, 1992, and transported to Analytical Resources, Inc. on November 9, 1992 for VOC analysis.

This data was reviewed for qualitative and quantitative accuracy, validity, and usefulness.

There is no need to assimilate the "dilution factor" or "sample wt/vol" into the final values reported; these calculations have already been figured into the reported values.

#### DATA QUALIFIER DEFINITIONS

- U - The analyte was not detected at or above the reported result.
- UJ - The analyte was not detected at or above the reported estimated result.
- J - The associated numerical result is an estimated quantity.
- NJ - There is evidence that the analyte is present. The associated numerical result is an estimate.

## VOA

### **Holding Times:**

These samples were analyzed within the SW-846 recommended holding time.

### **Method Blank:**

Acetone was detected in the method blank at concentrations below the quantitation limit. Acetone was also detected in some of the samples at a concentration less than five times that detected in the blank. Therefore, the Acetone detected in these samples is most likely due to laboratory contamination and not native to the samples. All sample results for Acetone have been changed (qualifier "U") to indicate that Acetone was not detected at or above the reported result.

### **GC/MS Tuning and Calibration:**

Calibration against Bromofluorobenzene (BFB) is acceptable for the initial calibration, continuing calibration and all associated sample analyses.

### **Initial Calibration:**

The initial calibration met the minimum response criteria of greater than 0.05 for the average relative response. The % Relative Standard Deviation was within the maximum of 30%.

### **Continuing Calibration:**

The average relative response factors for all target analytes were above the minimums. The percent deviations between the initial and continuing calibration standards were within the maximum of 25%, with several exceptions which did not affect the results.

### **Matrix Spikes (MS/MSD):**

Matrix spike recovery and precision data are reasonable, acceptable, and within advisory QC limits.

### **Surrogates:**

All surrogate recoveries for this sample, and the associated method blank are reasonable, acceptable, and within QC limits.

### **Sample Data:**

This data is acceptable for use as amended.





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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**  
Lab ID: MB1111  
Matrix: Soils/Sediments

Sample: Method Blank

Analytical  
Chemists &  
Consultants

QC Report No: C191 - WDOE  
Project: Yakima R.R.

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *[Signature]*  
Report: 12/03/92 MAC:ctr

VTSR: NA

Instrument: FINN 5  
Date Analyzed: 11/11/92

Amount Analyzed: 5.00 gm (Dry Weight Equivalent)  
Percent Moisture: NA

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	3.4 J
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	101%
Bromofluorobenzene	105%
d4-1,2-Dichloroethane	92.9%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: Method Blank

Lab ID: MB1111  
Matrix: Soils

QC Report No: C191 - WDOE  
Project: Yakima R.R.

Data Release Authorized: *James B. Latta*  
Report: 12/03/92-MAC:ctr

Date Received: NA

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	No UNKNOWN pks > 10% IS peak height	VOA	-	-
2				
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**  
Lab ID: C191A  
Matrix: Soils/Sediments

Sample: 468080

QC Report No: C191 - WDOE  
Project: Yakima R.R.

Data Release Authorized: *[Signature]*  
Report: 12/03/92 MAC:ctr

VTSR: 11/09/92

Instrument: FINN 5  
Date Analyzed: 11/11/92

Amount Analyzed: 5.00 gm (Dry Weight)  
Percent Moisture: 8.2%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.6 <del>U</del> <sup>µg/Kg</sup>
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	106%
Bromofluorobenzene	103%
d4-1,2-Dichloroethane	91.4%





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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

**Sample No: 468080**

Lab ID: C191A  
Matrix: Soils

QC Report No: C191 - WDOE  
Project: Yakima R.R.

Data Release Authorized: *[Signature]*  
Report: 12/03/92-MAC:ctr

Date Received: 11/09/92

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	-	No UNKNOWN pks > 10% IS peak height	VOA	-
2				
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**ORGANICS ANALYSIS DATA SHEET**

**Volatiles by Purge & Trap GC/MS**

Lab ID: C191B

Matrix: Soils/Sediments

Sample: 468081

QC Report No: C191 - WDOE

Project: Yakima R.R.

Data Release Authorized: *R. B. Little*

Report: 12/03/92 MAC:ctr

VTSR: 11/09/92

Instrument: FINN 5

Date Analyzed: 11/11/92

Amount Analyzed: 5.69 gm (Dry Weight)

Percent Moisture: 3.9%

CAS Number		µg/Kg
74-87-3	Chloromethane	1.8 U
74-83-9	Bromomethane	1.8 U
75-01-4	Vinyl Chloride	1.8 U
75-00-3	Chloroethane	1.8 U
75-09-2	Methylene Chloride	4.6 U
67-64-1	Acetone	11 U
75-15-0	Carbon Disulfide	0.9 U
75-35-4	1,1-Dichloroethene	0.9 U
75-34-3	1,1-Dichloroethane	0.9 U
156-60-5	Trans-1,2-Dichloroethene	0.9 U
156-59-2	Cis-1,2-Dichloroethene	0.9 U
67-66-3	Chloroform	0.9 U
107-06-2	1,2-Dichloroethane	0.9 U
78-93-3	2-Butanone	4.4 U
71-55-6	1,1,1-Trichloroethane	0.9 U
56-23-5	Carbon Tetrachloride	0.9 U
108-05-4	Vinyl Acetate	0.9 U
75-27-4	Bromodichloromethane	0.9 U
78-87-5	1,2-Dichloropropane	0.9 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	0.9 U
79-01-6	Trichloroethene	0.9 U
124-48-1	Dibromochloromethane	0.9 U
79-00-5	1,1,2-Trichloroethane	0.9 U
71-43-2	Benzene	0.9 U
10061-02-6	trans-1,3-Dichloropropene	0.9 U
110-75-8	2-Chloroethylvinylether	0.9 U
75-25-2	Bromoform	0.9 U
108-10-1	4-Methyl-2-Pentanone	4.4 U
591-78-6	2-Hexanone	4.4 U
127-18-4	Tetrachloroethene	0.9 U
79-34-5	1,1,2,2-Tetrachloroethane	0.9 U
108-88-3	Toluene	0.9 U
108-90-7	Chlorobenzene	0.9 U
100-41-4	Ethylbenzene	0.9 U
100-42-5	Styrene	0.9 U
1330-20-7	Total Xylenes	1.8 U
75-69-4	Trichlorofluoromethane	1.8 U
76-13-1	1,1,2-Trichlorotrifluoroethane	1.8 U

**Surrogate Recoveries**

d8-Toluene	103%
Bromofluorobenzene	101%
d4-1,2-Dichloroethane	94.8%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

**Sample No: 468081**

Lab ID: C191B  
Matrix: Soil/Sediments

QC Report No: C191 - WDOE  
Project: Yakima R.R.  
Date Received: 11/09/92

Data Release Authorized: *Damb Latta*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)	
1	- Alkyl Benzene C10.H14 Isomer (bp m/e 119)	VOA	1079	5 <del>µg</del> NT	KF
2	- Alkyl Benzene C10.H14 Isomer (bp m/e 119)	VOA	1145	7 <del>µg</del> NT	KF
3	- Alkyl Benzene C10.H14 Isomer (bp m/e 119)	VOA	1176	5 <del>µg</del> NT	KF
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**ORGANICS ANALYSIS DATA SHEET**  
Volatiles by Purge & Trap GC/MS  
Lab ID: C191C  
Matrix: Soils/Sediments

Sample: 468085

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QC Report No: C191 - WDOE  
Project: Yakima R.R.

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Data Release Authorized: *Don B. [Signature]*  
Report: 12/03/92 MAC:ctr

VTSR: 11/09/92

Instrument: FINN 5  
Date Analyzed: 11/11/92

Amount Analyzed: 5.07 gm (Dry Weight)  
Percent Moisture: 7.3%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	4.5 U
67-64-1	Acetone	4.9 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	4.9 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	4.9 U
591-78-6	2-Hexanone	4.9 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Triene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	106%
Bromofluorobenzene	97.0%
d4-1,2-Dichloroethane	94.2%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468085

Lab ID: C191C  
Matrix: Soils

QC Report No: C191 - WDOE  
Project: Yakima R.R.

Data Release Authorized: *[Signature]*  
Report: 12/03/92-MAC:ctr

Date Received: 11/09/92

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	-	No UNKNOWN pks > 10% IS peak height	VOA	-
2				
3				
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**

Lab ID: C191D  
Matrix: Soils/Sediments

Sample: 468089

QC Report No: C191 - WDOE  
Project: Yakima R.R.

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Data Release Authorized: *[Signature]*  
Report: 12/03/92 MAC:ctr

VTSR: 11/09/92

Instrument: FINN 5  
Date Analyzed: 11/11/92

Amount Analyzed: 4.99 gm (Dry Weight)  
Percent Moisture: 8.0%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	106%
Bromofluorobenzene	101%
d4-1,2-Dichloroethane	92.2%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468089

Lab ID: C191D  
Matrix: Soils

QC Report No: C191 - WDOE  
Project: Yakima R.R.

Data Release Authorized: *[Signature]*  
Report: 12/03/92-MAC:ctr

Date Received: 11/09/92

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	-	VOA	-	-
2				
3				
4				
5				
6				
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**  
Lab ID: C191E  
Matrix: Soils/Sediments

Sample: 468090

QC Report No: C191 - WDOE  
Project: Yakima R.R.

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Data Release Authorized: *[Signature]*  
Report: 12/03/92 MAC:ctr

VTSR: 11/09/92

Instrument: FINN 5  
Date Analyzed: 11/11/92

Amount Analyzed: 5.12 gm (Dry Weight)  
Percent Moisture: 5.1%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	4.9 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	4.9 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

KF

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	4.9 U
591-78-6	2-Hexanone	4.9 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	105%
Bromofluorobenzene	101%
d4-1,2-Dichloroethane	93.2%





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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468090

Lab ID: C191E  
Matrix: Soils

QC Report No: C191 - WDOE  
Project: Yakima R.R.

Data Release Authorized: *[Signature]*  
Report: 12/03/92-MAC:ctr

Date Received: 11/09/92

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	-	No UNKNOWN pks > 10% IS peak height	VOA	-
2				
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**ORGANICS ANALYSIS DATA SHEET**

Volatiles by Purge & Trap GC/MS

Lab ID: C191F

Matrix: Soils/Sediments

Sample: 468095

QC Report No: C191 - WDOE

Project: Yakima R.R.

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Data Release Authorized: *[Signature]*

Report: 12/03/92 MAC:ctr

VTSR: 11/09/92

Instrument: FINN 5

Date Analyzed: 11/11/92

Amount Analyzed: 4.83 gm (Dry Weight)

Percent Moisture: 6.2%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.1 U
74-83-9	Bromomethane	2.1 U
75-01-4	Vinyl Chloride	2.1 U
75-00-3	Chloroethane	2.1 U
75-09-2	Methylene Chloride	2.4 U
67-64-1	Acetone	8.3 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.2 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.2 U
591-78-6	2-Hexanone	5.2 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.1 U
75-69-4	Trichlorofluoromethane	2.1 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.1 U

**Surrogate Recoveries**

d8-Toluene	107%
Bromofluorobenzene	100%
d4-1,2-Dichloroethane	92.1%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468095

Lab ID: C191F  
Matrix: Soils

QC Report No: C191 - WDOE  
Project: Yakima R.R.

Data Release Authorized: *P. B. Patton*  
Report: 12/03/92-MAC:ctr

Date Received: 11/09/92

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	-	No UNKNOWN pks > 10% IS peak height	VOA	-
2				
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**ORGANICS ANALYSIS DATA SHEET**  
Volatiles by Purge & Trap GC/MS  
Lab ID: C191G  
Matrix: Soils/Sediments

Sample: 468096

QC Report No: C191 - WDOE  
Project: Yakima R.R.

Data Release Authorized: *[Signature]*  
Report: 12/03/92 MAC:ctr

VTSR: 11/09/92

Instrument: FINN 5  
Date Analyzed: 11/11/92

Amount Analyzed: 4.93 gm (Dry Weight)  
Percent Moisture: 9.5%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.1 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.1 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.1 U
591-78-6	2-Hexanone	5.1 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	19
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	107%
Bromofluorobenzene	96.2%
d4-1,2-Dichloroethane	93.3%



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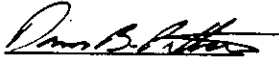
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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468096

Lab ID: C191G  
Matrix: Soils

QC Report No: C191 - WDOE  
Project: Yakima R.R.

Data Release Authorized:   
Report: 12/03/92-MAC:ctr

Date Received: 11/09/92

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	-	No UNKNOWN pks > 10% IS peak height	VOA	-
2				
3				
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**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**  
Lab ID: C191H  
Matrix: Soils/Sediments

Sample: 468098

QC Report No: C191 - WDOE  
Project: Yakima R.R.

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Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *[Signature]*  
Report: 12/03/92 MAC:ctr

VTSR: 11/09/92

Instrument: FINN 5  
Date Analyzed: 11/11/92

Amount Analyzed: 5.03 gm (Dry Weight)  
Percent Moisture: 4.9%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	103%
Bromofluorobenzene	99.9%
d4-1,2-Dichloroethane	93.7%



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(206) 621-7523 (FAX)

**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468098

Lab ID: C191H  
Matrix: Soils

QC Report No: C191 - WDOE  
Project: Yakima R.R.

Data Release Authorized: *[Signature]*  
Report: 12/03/92-MAC:ctr

Date Received: 11/09/92

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	-	No UNKNOWN pks > 10% IS peak height	VOA	-
2				
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**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**  
Lab ID: C191DMS  
Matrix: Soils/Sediments

Sample: 468089  
Matrix Spike  
QC Report No: C191 - WDOE  
Project: Yakima R.R.

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(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *[Signature]*  
Report: 12/03/92 MAC:ctr

VTSR: 11/09/92

Instrument: FINN 5  
Date Analyzed: 11/11/92

Amount Analyzed: 5.20 gm (Dry Weight)  
Percent Moisture: 8.0%

CAS Number		µg/Kg
74-87-3	Chloromethane	1.9 U
74-83-9	Bromomethane	1.9 U
75-01-4	Vinyl Chloride	1.9 U
75-00-3	Chloroethane	1.9 U
75-09-2	Methylene Chloride	1.9 U
67-64-1	Acetone	4.8 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	-
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	4.8 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	-
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	-
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	4.8 U
591-78-6	2-Hexanone	4.8 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	-
108-90-7	Chlorobenzene	-
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	1.9 U
75-69-4	Trichlorofluoromethane	1.9 U
76-13-1	1,1,2-Trichlorotrifluoroethane	1.9 U

**Surrogate Recoveries**

d8-Toluene	103%
Bromofluorobenzene	99.3%
d4-1,2-Dichloroethane	95.4%





**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET**  
Volatiles by Purge & Trap GC/MS  
Lab ID: C191DMSD  
Matrix: Soils/Sediments

Sample: 468089  
Matrix Spike Duplicate

QC Report No: C191 - WDOE  
Project: Yakima R.R.

Analytical  
Chemists &  
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333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *[Signature]*  
Report: 12/03/92 MAC:ctr

VTSR: 11/09/92

Instrument: FINN 5  
Date Analyzed: 11/11/92

Amount Analyzed: 4.95 gm (Dry Weight)  
Percent Moisture: 8.0%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.1 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	-
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.1 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	-
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	-
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.1 U
591-78-6	2-Hexanone	5.1 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	-
108-90-7	Chlorobenzene	-
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	105%
Bromofluorobenzene	97.7%
d4-1,2-Dichloroethane	94.1%





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**SOIL VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY**

ARI Job No: C191D

Client: WDOE  
Project: Yakima R.R.

Sample No: 468089

COMPOUND	SPIKE ADDED ( $\mu\text{g}/\text{Kg}$ )	SAMPLE CONC ( $\mu\text{g}/\text{Kg}$ )	MS CONC ( $\mu\text{g}/\text{Kg}$ )	MS % REC	QC LIMITS REC
1,1-Dichloroethene	48.1	0	59.3	123	59-172
Trichloroethene	48.1	0	55.7	116	62-137
Benzene	48.1	0	57.1	119	66-142
Toluene	48.1	0	57.3	119	59-139
Chlorobenzene	48.1	0	54.5	113	60-133

COMPOUND	SPIKE ADDED ( $\mu\text{g}/\text{Kg}$ )	MSD CONC ( $\mu\text{g}/\text{Kg}$ )	MSD % REC	% RPD	QC LIMITS	
					RPD	REC
1,1-Dichloroethene	50.5	53.5	106	15	22	59-172
Trichloroethene	50.5	53.0	105	10	24	62-137
Benzene	50.5	55.3	110	7.9	21	66-142
Toluene	50.5	52.8	105	13	21	59-139
Chlorobenzene	50.5	50.3	100	13	21	60-133

RPD: 0 out of 5 outside limits  
Spike Recovery: 0 out of 10 outside limits

Asterisked values outside QC Limits

Comments: QC Limits taken from CLP OLM01.6 (June 1991)

*DBP*

Report prepared: 12/03/92 MAC:ctr



State of Washington Department of Ecology  
Manchester Environmental Laboratory  
7411 Beach Dr. East Port Orchard WA. 98366

Data Review  
December 24, 1992

Project: **Yakima R.R.**

Sample(s): 468105, 468106, 468107, 468108, 468109, 468110, 468114, 468115,  
468116, 468118, 468120, 468121, 468122, 468124, 468127, 468132

Laboratory: Analytical Resources, Inc. C230

By: Karin Feddersen *KF*  
Through: Stuart Magoon *SM*

### Case Summary

These samples were received at the Manchester Environmental Laboratory on November 13, 1992, and transported to Analytical Resources, Inc. on November 13, 1992 for VOC and Pesticide/PCB analysis.

This data was reviewed for qualitative and quantitative accuracy, validity, and usefulness.

There is no need to assimilate the "dilution factor" or "sample wt/vol" into the final values reported; these calculations have already been figured into the reported values.

### DATA QUALIFIER DEFINITIONS

- U - The analyte was not detected at or above the reported result.
- UJ - The analyte was not detected at or above the reported estimated result.
- J - The associated numerical result is an estimated quantity.
- NJ - There is evidence that the analyte is present. The associated numerical result is an estimate.



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**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by GC/ECD**


Sample No.: 468107

Analytical  
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Consultants

Lab Sample ID: C230C  
Matrix: Soil

QC Report No.: C230 - WDOE  
Project: Yakima RR

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized:   
Data Prepared: 12/11/92 - MAC: mb  
Date Extracted: 11/17/92  
Date Analyzed: 11/21/92  
Sample Amount: 34.3 g - (Dry Wt.)  
Final Ext. Volume: 10 mls

VTSR: 11/13/92  
GPC Cleanup: Yes  
Alumina Cleanup: Yes  
Sulfur Cleanup: No  
Conc/Dil Factor: 1:1

CAS Number		µg/kg
319-84-6	Alpha-BHC	1.6 U
319-85-7	Beta-BHC	1.6 U
319-86-8	Delta-BHC	1.6 U
58-89-9	Gamma-BHC (Lindane)	1.6 U
76-44-8	Heptachlor	1.6 U
309-00-2	Aldrin	<del>1.6 U</del> 0.5 J KF
1024-57-3	Heptachlor Epoxide	1.6 U
959-98-8	Endosulfan I	1.6 U
60-57-1	Dieldrin	2.2 J
72-55-9	4,4'-DDE	4.6
72-20-8	Endrin	3.2 U
33212-65-9	Endosulfan II	3.2 U
72-54-8	4,4'-DDD	2.9 J
1031-07-8	Endosulfan Sulfate	3.2 U
50-29-3	4,4'-DDT	3.2 U
72-43-5	Methoxychlor	16 U
53494-70-5	Endrin Ketone	3.2 U
7421-36-3	Endrin Aldehyde	3.2 U
5103-74-2	Gamma-Chlordane	<del>1.6 U</del> 0.5 J KF
5103-71-9	Alpha-Chlordane	1.6 U
8001-35-2	Toxaphene	160 U
-	Aroclor-1242/1016	32 U
12672-29-6	Aroclor-1248	32 U
11097-69-1	Aroclor-1254	32 U
11096-82-5	Aroclor-1260	32 U
11104-28-2	Aroclor-1221	64 U
11141-16-5	Aroclor-1232	32 U

Pesticide Surrogate Recovery	% Rec.	QC Limits
Decachlorobiphenyl (DCBP)	101%	60-150
Tetrachlorometaxylene (TCMX)	89.6%	60-150

**Data Qualifiers**

- Value If the result is a value greater than or equal to the detection limit, report the value.
- J Indicates an estimated value when that value is less than the calculated detection limit.
  - X Indicates a value above the linear range of the detector. Dilution required.
  - S Indicates no value reported due to saturation of the detector.
  - D Indicates the surrogate was diluted out.
  - U Indicates compound was analyzed for, but not detected at the given detection limit.
  - NA Indicates compound not analyzed.

## VOA

### **Holding Times:**

These samples were analyzed within the SW-846 recommended holding time.

### **Method Blank:**

Methylene Chloride was detected in two of the method blanks. Methylene Chloride was also detected in sample 468132 at a concentration near that detected in the associated method blank. Therefore, the Methylene Chloride result for sample 468132 has been changed (qualifier "U") to indicate that this analyte was not detected at or above the suspected laboratory contamination level.

### **Soil Methanol Blank:**

Methylene Chloride and Carbon Disulfide were detected in the soil methanol blank which corresponds with the medium level extraction of sample 468110 only. Methylene Chloride was detected in this sample at a concentration near that detected in the blank. Therefore, the Methylene Chloride result for sample 468110 has been changed (qualifier "U") to indicate that this analyte was not detected at or above the suspected laboratory contamination level.

### **GC/MS Tuning and Calibration:**

Calibration against Bromofluorobenzene (BFB) is acceptable for the initial calibration, continuing calibration and all associated sample analyses.

### **Initial Calibration:**

The initial calibration met the minimum response criteria for the average relative responses. The % Relative Standard Deviations were within the maximum of 30%.

### **Continuing Calibration:**

The average relative response factors for all target analytes were above the minimums. The percent deviations between the initial and continuing calibration standards were within the maximum of 25%.

### **Surrogates:**

All surrogate recoveries for these samples and the associated method blanks are reasonable, acceptable, and within QC limits.

**Sample Data:**

Use the sample results from the medium level extraction of sample 468110 for Trichloroethene and tetrachloroethene only. This data is acceptable for use as amended.

**Pesticide/PCB****Holding Times:**

These samples were extracted and analyzed within the SW-846 recommended holding times.

**Method Blank:**

No target analytes were detected in the method blank.

**Matrix Spikes (MS/MSD):**

Matrix spike recovery and precision data are reasonable, acceptable, and within advisory QC limits.

**Surrogates:**

All surrogate recoveries for these samples, the matrix spikes, and the associated method blank are reasonable, acceptable, and within advisory QC limits with two exceptions. Tetrachlorometaxylene detected on the DB5 column in samples 468105 and 468108, and for their subsequent dilutions, was calculated at amounts that vastly exceed the upper advisory QC limit. This is most likely attributable to matrix interferences, and does not indicate a problem with the analysis, since acceptable recoveries for this surrogate in both samples was demonstrated on the DB608 column.

**Sample Data:**

The detection limit has been elevated for analytes that were detected above the quantitation limit, but for which the relative percent difference (RPD) of the calculated concentration was greater than 15% between the two columns. Due to the matrix interference observed in samples 468105 and 468108, the detection limits for Aroclor 1221 and 1232 were raised. Dilutions of these samples were analyzed, and a decreased matrix effect was observed, allowing the detection limits for Aroclor 1221 and 1232 to be lowered in these samples.

Analytes in samples 468106 and 468122 were detected at an amount below the quantitation limits, but they were not reported by ARI. The concentrations for these analytes have been calculated and added to the appropriate sample data sheets (Form I).

This data is acceptable for use as amended.





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(206) 621-7523 (FAX)

15 December 1992

Karin Feddersen  
WA State Dept. of Ecology  
7411 Beach Drive East  
Port Orchard, WA 98366-8204

**RE: Yakima R.R. /ARI Job No. C230**

Dear Ms. Feddersen:

Please find enclosed original reports and sample deliverables for the above referenced project. Eighteen soil samples were received intact on November 13, 1992. The following samples were analyzed for volatile organic compounds (VOC) and pesticide/PCBs, according to the laboratory service request form:

468105	468106	468107	468108	468109	468110	
468114	468115	468116	468118	468120	468121	
468122	468124	468125	468127	468131	468132	

The samples were analyzed within the required holding times, according to USEPA method SW-8080 and method SW-8260. The VOCs were analyzed on November 17, 1992, using GC/MS purge and trap methodology. The VOC analysis was completed using GC/MS instrument FINN #1. Due to the presence of analytes above the instrument linear range sample reanalysis was required. Sample **468110** was reanalyzed on November 18, 1992, and sample **468109** was reanalyzed on November 19, 1992.

The pesticide analysis was initiated on November 17, 1992. The samples were analyzed on GC-ECD instrument #3. A 1 to 10 sample dilution has been included for samples **468105** and **468108**. These sample dilutions have been included due to the raised Aroclor detection limit in the initial analyses. These samples had elevated baselines associated with a possible matrix effect. A pH values greater than 11 was also documented for sample **468105** and **468108**, indicating a difference in sample matrix.

Due to a discrepancy with the actual and reported surrogate concentrations in a vendors pesticide standard mix, all of the pesticide surrogate recoveries associated with this delivery group were calculated using an individual surrogate standard (24-NOV-92 17:16). This standard has been included as part of the standard deliverables.

As always, a copy of these reports and all associated raw data will remain on file with ARI. If you have any questions or require additional information, please feel free to

Ms. Karin Feddersen (12/15/92)

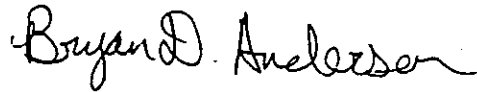
-2-

Analytical Resources, Inc.

contact me at your convenience. I can be reached at the number above, or direct at (206)340-2866, ext. 116. You can also leave a message on voice mail if I am unavailable please leave a message on voice mail and I will return your call.

Sincerely,

ANALYTICAL RESOURCES, INC.

A handwritten signature in cursive script that reads "Bryan D. Anderson".

Bryan D. Anderson  
Project Coordinator

enclosures  
cc: File C230



**ANALYTICAL  
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INCORPORATED**

**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**

Lab ID: C230F2  
Matrix: Soils/Sediments

Sample: 468109

QC Report No: C230-WDOE  
Project: Yakima RR

Analytical  
Chemists &  
Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Don N. Loh*  
Report: 12/07/92 MAC:K kas

VTSR: 11/13/92

Instrument: Finn 1  
Date Analyzed: 11/19/92

Amount Analyzed: 0.71 gm (Dry Weight)  
Percent Moisture: 36.4%

CAS Number		µg/Kg
74-87-3	Chloromethane	14 U
74-83-9	Bromomethane	14 U
75-01-4	Vinyl Chloride	14 U
75-00-3	Chloroethane	14 U
75-09-2	Methylene Chloride	14 U
67-64-1	Acetone	50
75-15-0	Carbon Disulfide	7.0 J
75-35-4	1,1-Dichloroethene	7.1 U
75-34-3	1,1-Dichloroethane	7.1 U
156-60-5	Trans-1,2-Dichloroethene	7.1 U
156-59-2	Cis-1,2-Dichloroethene	7.1 U
67-66-3	Chloroform	7.1 U
107-06-2	1,2-Dichloroethane	7.1 U
78-93-3	2-Butanone	35 U
71-55-6	1,1,1-Trichloroethane	7.1 U
108-05-4	Vinyl Acetate	7.1 U
56-23-5	Carbon Tetrachloride	7.1 U
75-27-4	Bromodichloromethane	7.1 U
78-87-5	1,2-Dichloropropane	7.1 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	7.1 U
79-01-6	Trichloroethene	7.1 U
124-48-1	Dibromochloromethane	7.1 U
79-00-5	1,1,2-Trichloroethane	7.1 U
71-43-2	Benzene	7.1 U
10061-02-6	trans-1,3-Dichloropropene	7.1 U
110-75-8	2-Chloroethylvinylether	7.1 U
75-25-2	Bromoform	7.1 U
108-10-1	4-Methyl-2-Pentanone	35 U
591-78-6	2-Hexanone	35 U
127-18-4	Tetrachloroethene	7.1 U
79-34-5	1,1,2,2-Tetrachloroethane	7.1 U
108-88-3	Toluene	7.1 U
108-90-7	Chlorobenzene	7.1 U
100-41-4	Ethylbenzene	7.1 U
100-42-5	Styrene	7.1 U
1330-20-7	Total Xylenes	14 U
75-69-4	Trichlorofluoromethane	14 U
76-13-1	1,1,2-Trichlorotrifluoroethane	14 U

**Surrogate Recoveries**

d8-Toluene	94.6%
Bromofluorobenzene	101%
d4-1,2-Dichloroethane	94.7%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468109

QC Report No: C230-WDOE

Lab ID: C230F2

Project No: Yakima RR

Matrix: Soils/Sediments

VTSR: 11/13/92

Data Release Authorized: *John H. Lister*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	No UNKNOWN pks >10% IS peak height	VOA	-	-
2				
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**  
Lab ID: C230G  
Matrix: Soils/Sediments

Sample: 468110

QC Report No: C230-WDOE  
Project: Yakima RR

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Data Release Authorized: *[Signature]*  
Report: 12/03/92 MAC:K kas

VTSR: 11/13/92

Instrument: Finn 1  
Date Analyzed: 11/18/92

Amount Analyzed: 3.69 gm (Dry Weight)  
Percent Moisture: 28.0%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.7 U
74-83-9	Bromomethane	2.7 U
75-01-4	Vinyl Chloride	2.7 U
75-00-3	Chloroethane	2.7 U
75-09-2	Methylene Chloride	2.7 U
67-64-1	Acetone	22
75-15-0	Carbon Disulfide	1.9.8 KF
75-35-4	1,1-Dichloroethene	1.4 U
75-34-3	1,1-Dichloroethane	1.4 U
156-60-5	Trans-1,2-Dichloroethene	9.9
156-59-2	Cis-1,2-Dichloroethene	170
67-66-3	Chloroform	1.4 U
107-06-2	1,2-Dichloroethane	1.4 U
78-93-3	2-Butanone	6.3 J
71-55-6	1,1,1-Trichloroethane	1.4 U
108-05-4	Vinyl Acetate	1.4 U
56-23-5	Carbon Tetrachloride	1.4 U
75-27-4	Bromodichloromethane	1.4 U
78-87-5	1,2-Dichloropropane	2.0

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.4 U
79-01-6	Trichloroethene	670 K J KF
124-48-1	Dibromochloromethane	1.4 U
79-00-5	1,1,2-Trichloroethane	1.4 U
71-43-2	Benzene	1.4 U
10061-02-6	trans-1,3-Dichloropropene	1.4 U
110-75-8	2-Chloroethylvinylether	1.4 U
75-25-2	Bromoform	1.4 U
108-10-1	4-Methyl-2-Pentanone	5.8 U
591-78-6	2-Hexanone	6.8 U
127-18-4	Tetrachloroethene	2200 K J KF
79-34-5	1,1,2,2-Tetrachloroethane	1.4 U
108-88-3	Toluene	1.4 U
108-90-7	Chlorobenzene	1.4 U
100-41-4	Ethylbenzene	3.5
100-42-5	Styrene	1.4 U
1330-20-7	Total Xylenes	7.2
75-69-4	Trichlorofluoromethane	2.7 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.7 U

**Surrogate Recoveries**

d8-Toluene	102%
Bromofluorobenzene	82.1%
d4-1,2-Dichloroethane	95.8%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468110

QC Report No: C230-WDOE  
Project No: Yakima RR

Lab ID: C230G  
Matrix: Soils/Sediments

VTSR: 11/13/92

Data Release Authorized: *Don N. Johnson*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	- UNKNOWN Hydrocarbon (bp m/e 43)	VOA	1260	9 J
2	- UNKNOWN Hydrocarbon (bp m/e 57)	VOA	1271	18 J
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**ORGANICS ANALYSIS DATA SHEET**

**Volatiles by Purge & Trap GC/MS**

Lab ID: C230G2

Matrix: Soils/Sediments

Sample: 468110

medium level

QC Report No: C230-WDOE

Project: Yakima RR

Data Release Authorized: *[Signature]*

VTSR: 11/13/92

Report: 12/07/92 MAC:Kkas

Instrument: Finn I

Amount Analyzed: 0.029 gm (Dry Weight)

Date Analyzed: 11/18/92

Percent Moisture: 28.0%

CAS Number		µg/Kg
74-87-3	Chloromethane	340 U
74-83-9	Bromomethane	340 U
75-01-4	Vinyl Chloride	340 U
75-00-3	Chloroethane	340 U
75-09-2	Methylene Chloride	340 JBA KF
67-64-1	Acetone	860 U
75-15-0	Carbon Disulfide	170 U
75-35-4	1,1-Dichloroethene	170 U
75-34-3	1,1-Dichloroethane	170 U
156-60-5	Trans-1,2-Dichloroethene	170 U
156-59-2	Cis-1,2-Dichloroethene	260
67-66-3	Chloroform	170 U
107-06-2	1,2-Dichloroethane	170 U
78-93-3	2-Butanone	1400 UJ
71-55-6	1,1,1-Trichloroethane	170 U
108-05-4	Vinyl Acetate	170 U
56-23-5	Carbon Tetrachloride	170 U
75-27-4	Bromodichloromethane	170 U
78-87-5	1,2-Dichloropropane	170 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	170 U
79-01-6	Trichloroethene	1200
124-48-1	Dibromochloromethane	170 U
79-00-5	1,1,2-Trichloroethane	170 U
71-43-2	Benzene	170 U
10061-02-6	trans-1,3-Dichloropropene	170 U
110-75-8	2-Chloroethylvinylether	170 U
75-25-2	Bromoform	170 U
108-10-1	4-Methyl-2-Pentanone	860 U
591-78-6	2-Hexanone	860 U
127-18-4	Tetrachloroethene	8100
79-34-5	1,1,2,2-Tetrachloroethane	170 U
108-88-3	Toluene	170 U
108-90-7	Chlorobenzene	170 U
100-41-4	Ethylbenzene	170 U
100-42-5	Styrene	170 U
1330-20-7	Total Xylenes	340 U
75-69-4	Trichlorofluoromethane	340 U
76-13-1	1,1,2-Trichlorotrifluoroethane	340 U

**Surrogate Recoveries**

d8-Toluene	87.2%
Bromofluorobenzene	86.3%
d4-1,2-Dichloroethane	89.7%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468110 (medium level)

QC Report No: C230-WDOE

Lab ID: C230G2

Project No: Yakima RR

Matrix: Soils/Sediments

VTSR: 11/13/92

Data Release Authorized: *Dr. N. Ober*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	<del>UNKNOWN Boric Acid type (bp m/e 73)</del>	<del>VOA</del>	<del>481</del>	<del>3200 J</del>
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**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**

Lab ID: C230H  
Matrix: Soils/Sediments

Sample: 468114

QC Report No: C230-WDOE  
Project: Yakima RR

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Data Release Authorized: *[Signature]*  
Report: 12/03/92 MAC:K kas

VTSR: 11/13/92

Instrument: Finn 1  
Date Analyzed: 11/17/92

Amount Analyzed: 4.74 gm (Dry Weight)  
Percent Moisture: 8.3%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.1 U
74-83-9	Bromomethane	2.1 U
75-01-4	Vinyl Chloride	2.1 U
75-00-3	Chloroethane	2.1 U
75-09-2	Methylene Chloride	2.1 U
67-64-1	Acetone	7.7
75-15-0	Carbon Disulfide	1.1 U
75-35-4	1,1-Dichloroethene	1.1 U
75-34-3	1,1-Dichloroethane	1.1 U
156-60-5	Trans-1,2-Dichloroethene	1.1 U
156-59-2	Cis-1,2-Dichloroethene	1.1 U
67-66-3	Chloroform	1.1 U
107-06-2	1,2-Dichloroethane	1.1 U
78-93-3	2-Butanone	5.3 U
71-55-6	1,1,1-Trichloroethane	1.1 U
108-05-4	Vinyl Acetate	1.1 U
56-23-5	Carbon Tetrachloride	1.1 U
75-27-4	Bromodichloromethane	1.1 U
78-87-5	1,2-Dichloropropane	1.1 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.1 U
79-01-6	Trichloroethene	1.1 U
124-48-1	Dibromochloromethane	1.1 U
79-00-5	1,1,2-Trichloroethane	1.1 U
71-43-2	Benzene	1.1 U
10061-02-6	trans-1,3-Dichloropropene	1.1 U
110-75-8	2-Chloroethylvinylether	1.1 U
75-25-2	Bromoform	1.1 U
108-10-1	4-Methyl-2-Pentanone	5.3 U
591-78-6	2-Hexanone	5.3 U
127-18-4	Tetrachloroethene	1.1 U
79-34-5	1,1,2,2-Tetrachloroethane	1.1 U
108-88-3	Toluene	1.1 U
108-90-7	Chlorobenzene	1.1 U
100-41-4	Ethylbenzene	1.1 U
100-42-5	Styrene	1.1 U
1330-20-7	Total Xylenes	2.1 U
75-69-4	Trichlorofluoromethane	2.1 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.1 U

**Surrogate Recoveries**

d8-Toluene	94.0%
Bromofluorobenzene	95.6%
d4-1,2-Dichloroethane	90.5%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468114

QC Report No: C230-WDOE  
Project No: Yakima RR

Lab ID: C230H  
Matrix: Soils/Sediments

VTSR: 11/13/92

Data Release Authorized: *[Signature]*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	No UNKNOWN pks > 10% IS peak height	VOA	-	-
2				
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4				
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**ORGANICS ANALYSIS DATA SHEET**

**Volatiles by Purge & Trap GC/MS**

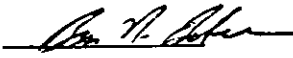
Lab ID: C230J  
Matrix: Soils/Sediments

Sample: 468116

QC Report No: C230-WDOE  
Project: Yakima RR

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Data Release Authorized:   
Report: 12/03/92 MAC:K kas

VTSR: 11/13/92

Instrument: Finn 1  
Date Analyzed: 11/17/92

Amount Analyzed: 4.26 gm (Dry Weight)  
Percent Moisture: 18.2%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.4 U
74-83-9	Bromomethane	2.4 U
75-01-4	Vinyl Chloride	2.4 U
75-00-3	Chloroethane	2.4 U
75-09-2	Methylene Chloride	2.4 U
67-64-1	Acetone	5.0 J
75-15-0	Carbon Disulfide	1.2 U
75-35-4	1,1-Dichloroethene	1.2 U
75-34-3	1,1-Dichloroethane	1.2 U
156-60-5	Trans-1,2-Dichloroethene	1.2 U
156-59-2	Cis-1,2-Dichloroethene	1.2 U
67-66-3	Chloroform	1.2 U
107-06-2	1,2-Dichloroethane	1.2 U
78-93-3	2-Butanone	5.9 U
71-55-6	1,1,1-Trichloroethane	1.2 U
108-05-4	Vinyl Acetate	1.2 U
56-23-5	Carbon Tetrachloride	1.2 U
75-27-4	Bromodichloromethane	1.2 U
78-87-5	1,2-Dichloropropane	1.2 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.2 U
79-01-6	Trichloroethene	1.2 U
124-48-1	Dibromochloromethane	1.2 U
79-00-5	1,1,2-Trichloroethane	1.2 U
71-43-2	Benzene	1.2 U
10061-02-6	trans-1,3-Dichloropropene	1.2 U
110-75-8	2-Chloroethylvinylether	1.2 U
75-25-2	Bromoform	1.2 U
108-10-1	4-Methyl-2-Pentanone	5.9 U
591-78-6	2-Hexanone	5.9 U
127-18-4	Tetrachloroethene	1.2 U
79-34-5	1,1,2,2-Tetrachloroethane	1.2 U
108-88-3	Toluene	1.2 U
108-90-7	Chlorobenzene	1.2 U
100-41-4	Ethylbenzene	1.2 U
100-42-5	Styrene	1.2 U
1330-20-7	Total Xylenes	2.4 U
75-69-4	Trichlorofluoromethane	2.4 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.4 U

**Surrogate Recoveries**

d8-Toluene	94.1%
Bromofluorobenzene	93.2%
d4-1,2-Dichloroethane	85.8%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468116

QC Report No: C230-WDOE

Lab ID: C230J  
Matrix: Soils/Sediments

Project No: Yakima RR

VTSR: 11/13/92

Data Release Authorized: *Don M. [Signature]*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	-	No UNKNOWN pks > 10% IS peak height	VOA	-
2				
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**

Lab ID: C230K  
Matrix: Soils/Sediments

Sample: 468118

QC Report No: C230-WDOE  
Project: Yakima RR

Data Release Authorized:   
Report: 12/03/92 MAC:K kas

VTSR: 11/13/92

Instrument: Finn 1  
Date Analyzed: 11/17/92

Amount Analyzed: 4.21 gm (Dry Weight)  
Percent Moisture: 17.6%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.4 U
74-83-9	Bromomethane	2.4 U
75-01-4	Vinyl Chloride	2.4 U
75-00-3	Chloroethane	2.4 U
75-09-2	Methylene Chloride	2.4 U
67-64-1	Acetone	5.9 U
75-15-0	Carbon Disulfide	1.2 U
75-35-4	1,1-Dichloroethene	1.2 U
75-34-3	1,1-Dichloroethane	1.2 U
156-60-5	Trans-1,2-Dichloroethene	1.2 U
156-59-2	Cis-1,2-Dichloroethene	1.2 U
67-66-3	Chloroform	1.2 U
107-06-2	1,2-Dichloroethane	1.2 U
78-93-3	2-Butanone	5.9 U
71-55-6	1,1,1-Trichloroethane	1.2 U
108-05-4	Vinyl Acetate	1.2 U
56-23-5	Carbon Tetrachloride	1.2 U
75-27-4	Bromodichloromethane	1.2 U
78-87-5	1,2-Dichloropropane	1.2 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.2 U
79-01-6	Trichloroethene	1.2 U
124-48-1	Dibromochloromethane	1.2 U
79-00-5	1,1,2-Trichloroethane	1.2 U
71-43-2	Benzene	1.2 U
10061-02-6	trans-1,3-Dichloropropene	1.2 U
110-75-8	2-Chloroethylvinylether	1.2 U
75-25-2	Bromoform	1.2 U
108-10-1	4-Methyl-2-Pentanone	5.9 U
591-78-6	2-Hexanone	5.9 U
127-18-4	Tetrachloroethene	1.2 U
79-34-5	1,1,2,2-Tetrachloroethane	1.2 U
108-88-3	Toluene	1.2 U
108-90-7	Chlorobenzene	1.2 U
100-41-4	Ethylbenzene	1.2 U
100-42-5	Styrene	1.2 U
1330-20-7	Total Xylenes	2.4 U
75-69-4	Trichlorofluoromethane	2.4 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.4 U

**Surrogate Recoveries**

d8-Toluene	92.4%
Bromofluorobenzene	93.0%
d4-1,2-Dichloroethane	87.3%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

**Sample No:** 468118

QC Report No: C230-WDOE

Lab ID: C230K

Project No: Yakima RR

Matrix: Soils/Sediments

VTSR: 11/13/92

Data Release Authorized: *Don N. Johnson*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	-	No UNKNOWN pks >10% IS peak height	VOA	-
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**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET**

**Volatiles by Purge & Trap GC/MS**

Lab ID: C230L  
Matrix: Soils/Sediments

Sample: 468120

QC Report No: C230-WDOE  
Project: Yakima RR

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Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized:   
Report: 12/03/92 MAC:K kas

VTSR: 11/13/92

Instrument: Finn 1  
Date Analyzed: 11/17/92

Amount Analyzed: 4.13 gm (Dry Weight)  
Percent Moisture: 20.4%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.4 U
74-83-9	Bromomethane	2.4 U
75-01-4	Vinyl Chloride	2.4 U
75-00-3	Chloroethane	2.4 U
75-09-2	Methylene Chloride	2.4 U
67-64-1	Acetone	5.8 J
75-15-0	Carbon Disulfide	1.2 U
75-35-4	1,1-Dichloroethene	1.2 U
75-34-3	1,1-Dichloroethane	1.2 U
156-60-5	Trans-1,2-Dichloroethene	1.2 U
156-59-2	Cis-1,2-Dichloroethene	1.2 U
67-66-3	Chloroform	1.2 U
107-06-2	1,2-Dichloroethane	1.2 U
78-93-3	2-Butanone	6.1 U
71-55-6	1,1,1-Trichloroethane	1.2 U
108-05-4	Vinyl Acetate	1.2 U
56-23-5	Carbon Tetrachloride	1.2 U
75-27-4	Bromodichloromethane	1.2 U
78-87-5	1,2-Dichloropropane	1.2 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.2 U
79-01-6	Trichloroethene	1.2 U
124-48-1	Dibromochloromethane	1.2 U
79-00-5	1,1,2-Trichloroethane	1.2 U
71-43-2	Benzene	1.2 U
10061-02-6	trans-1,3-Dichloropropene	1.2 U
110-75-8	2-Chloroethylvinylether	1.2 U
75-25-2	Bromoform	1.2 U
108-10-1	4-Methyl-2-Pentanone	6.1 U
591-78-6	2-Hexanone	6.1 U
127-18-4	Tetrachloroethene	1.2 U
79-34-5	1,1,2,2-Tetrachloroethane	1.2 U
108-88-3	Toluene	1.2 U
108-90-7	Chlorobenzene	1.2 U
100-41-4	Ethylbenzene	1.2 U
100-42-5	Styrene	1.2 U
1330-20-7	Total Xylenes	2.4 U
75-69-4	Trichlorofluoromethane	2.4 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.4 U

**Surrogate Recoveries**

d8-Toluene	93.9%
Bromofluorobenzene	92.4%
d4-1,2-Dichloroethane	89.6%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468120

QC Report No: C230-WDOE

Lab ID: C230L  
Matrix: Soils/Sediments

Project No: Yakima RR

VTSR: 11/13/92

Data Release Authorized: 

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	-	No UNKNOWN pks > 10% IS peak height	VOA	-
2				
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**ORGANICS ANALYSIS DATA SHEET**

**Volatiles by Purge & Trap GC/MS**


Lab ID: C230M  
Matrix: Soils/Sediments

Sample: 468121

QC Report No: C230-WDOE  
Project: Yakima RR

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Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized:   
Report: 12/03/92 MAC:K kas

VTSR: 11/13/92

Instrument: Finn 1  
Date Analyzed: 11/18/92

Amount Analyzed: 4.30 gm (Dry Weight)  
Percent Moisture: 16.1%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.3 U
74-83-9	Bromomethane	2.3 U
75-01-4	Vinyl Chloride	2.3 U
75-00-3	Chloroethane	2.3 U
75-09-2	Methylene Chloride	2.3 U
67-64-1	Acetone	5.8 U
75-15-0	Carbon Disulfide	1.2 U
75-35-4	1,1-Dichloroethene	1.2 U
75-34-3	1,1-Dichloroethane	1.2 U
156-60-5	Trans-1,2-Dichloroethene	1.2 U
156-59-2	Cis-1,2-Dichloroethene	1.2 U
67-66-3	Chloroform	1.2 U
107-06-2	1,2-Dichloroethane	1.2 U
78-93-3	2-Butanone	5.8 U
71-55-6	1,1,1-Trichloroethane	1.2 U
108-05-4	Vinyl Acetate	1.2 U
56-23-5	Carbon Tetrachloride	1.2 U
75-27-4	Bromodichloromethane	1.2 U
78-87-5	1,2-Dichloropropane	1.2 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.2 U
79-01-6	Trichloroethene	1.2 U
124-48-1	Dibromochloromethane	1.2 U
79-00-5	1,1,2-Trichloroethane	1.2 U
71-43-2	Benzene	1.2 U
10061-02-6	trans-1,3-Dichloropropene	1.2 U
110-75-8	2-Chloroethylvinylether	1.2 U
75-25-2	Bromoform	1.2 U
108-10-1	4-Methyl-2-Pentanone	5.8 U
591-78-6	2-Hexanone	5.8 U
127-18-4	Tetrachloroethene	1.2 U
79-34-5	1,1,2,2-Tetrachloroethane	1.2 U
108-88-3	Toluene	1.2 U
108-90-7	Chlorobenzene	1.2 U
100-41-4	Ethylbenzene	1.2 U
100-42-5	Styrene	1.2 U
1330-20-7	Total Xylenes	2.3 U
75-69-4	Trichlorofluoromethane	2.3 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.3 U

**Surrogate Recoveries**

d8-Toluene	96.3%
Bromofluorobenzene	94.0%
d4-1,2-Dichloroethane	90.8%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468121

QC Report No: C230-WDOE

Lab ID: C230M  
Matrix: Soils/Sediments

Project No: Yakima RR

VTSR: 11/13/92

Data Release Authorized: *[Signature]*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	UNKNOWN Hydrocarbon (bp m/e 43)	VOA	1259	6 NJ KF
2				
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**


Lab ID: C230N  
Matrix: Soils/Sediments

Sample: 468124

QC Report No: C230-WDOE  
Project: Yakima RR

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(206) 621-7523 (FAX)

Data Release Authorized:   
Report: 12/03/92 MAC:K kas

VTSR: 11/13/92

Instrument: Finn 1  
Date Analyzed: 11/18/92

Amount Analyzed: 4.90 gm (Dry Weight)  
Percent Moisture: 5.1%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	26
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.1 U
71-55-6	1,1,1-Trichloroethane	1.0 U
108-05-4	Vinyl Acetate	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.1 U
591-78-6	2-Hexanone	5.1 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	91.3%
Bromofluorobenzene	92.4%
d4-1,2-Dichloroethane	91.4%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468124

QC Report No: C230-WDOE

Lab ID: C230N  
Matrix: Soils/Sediments

Project No: Yakima RR

VTSR: 11/13/92

Data Release Authorized: *[Signature]*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	541-02-6 <del>Decamethylcyclopentasiloxane</del> <i>unknown</i>	VOA	1131	6 <del>NS</del>
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KF



**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET**

**Volatiles by Purge & Trap GC/MS**

Lab ID: C2300  
Matrix: Soils/Sediments

Sample: 468125

QC Report No: C230-WDOE  
Project: Yakima RR

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(206) 621-6490  
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Data Release Authorized: 

VTSR: 11/13/92

Report: 12/03/92 MAC:K kas

Instrument: Finn 1  
Date Analyzed: 11/18/92

Amount Analyzed: 4.81 gm (Dry Weight)  
Percent Moisture: 5.8%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.1 U
74-83-9	Bromomethane	2.1 U
75-01-4	Vinyl Chloride	2.1 U
75-00-3	Chloroethane	2.1 U
75-09-2	Methylene Chloride	2.1 U
67-64-1	Acetone	5.2 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.2 U
71-55-6	1,1,1-Trichloroethane	1.0 U
108-05-4	Vinyl Acetate	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.2 U
591-78-6	2-Hexanone	5.2 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.1 U
75-69-4	Trichlorofluoromethane	2.1 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.1 U

**Surrogate Recoveries**

d8-Toluene	93.5%
Bromofluorobenzene	91.1%
d4-1,2-Dichloroethane	87.6%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468125

QC Report No: C230-WDOE  
Project No: Yakima RR

Lab ID: C2300  
Matrix: Soils/Sediments

VTSR: 11/13/92

Data Release Authorized: *[Signature]*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)	
1 541-02-6	<del>Decamethylcyclopentasiloxane</del> <i>UNKNOWN</i>	VOA	1131	32 J	KF
2					
3					
4					
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7					
8					
9					
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**


Lab ID: C230P  
Matrix: Soils/Sediments

Sample: 468127

QC Report No: C230-WDOE  
Project: Yakima RR

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(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized:   
Report: 12/03/92 MAC:K kas

VTSR: 11/13/92

Instrument: Finn 1  
Date Analyzed: 11/18/92

Amount Analyzed: 4.94 gm (Dry Weight)  
Percent Moisture: 4.6%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.1 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.1 U
71-55-6	1,1,1-Trichloroethane	1.0 U
108-05-4	Vinyl Acetate	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	.0 U
108-10-1	4-Methyl-2-Pentanone	5.1 U
591-78-6	2-Hexanone	5.1 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	92.4%
Bromofluorobenzene	92.1%
d4-1,2-Dichloroethane	91.8%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468127

QC Report No: C230-WDOE

Lab ID: C230P  
Matrix: Soils/Sediments

Project No: Yakima RR

VTSR: 11/13/92

Data Release Authorized: *John P. Johnson*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)	
1 541-02-6	Decamethylcyclopentasiloxane <i>UNKNOWN</i>	VOA	1131	9 J	KF
2					
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**


Lab ID: C230Q  
Matrix: Soils/Sediments

Sample: 468131

QC Report No: C230-WDOE  
Project: Yakima RR

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(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized:   
Report: 12/03/92 MAC:K kas

VTSR: 11/13/92

Instrument: Finn 1  
Date Analyzed: 11/18/92

Amount Analyzed: 4.98 gm (Dry Weight)  
Percent Moisture: 3.7%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	4.8 J
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
108-05-4	Vinyl Acetate	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	92.5%
Bromofluorobenzene	92.6%
d4-1,2-Dichloroethane	92.0%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468131

QC Report No: C230-WDOE

Lab ID: C230Q  
Matrix: Soils/Sediments

Project No: Yakima RR

VTSR: 11/13/92

Data Release Authorized: *[Signature]*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	-	No UNKNOWN pks >10% IS peak height	VOA	-
2				
3				
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**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**

Sample: 468132

Analytical  
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Lab ID: C230R  
Matrix: Soils/Sediments

QC Report No: C230-WDOE  
Project: Yakima RR

333 Ninth Ave. North  
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(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Chris T. Patten*  
Report: 12/03/92 MAC:K kas

VTSR: 11/13/92

Instrument: Finn 1  
Date Analyzed: 11/18/92

Amount Analyzed: 4.98 gm (Dry Weight)  
Percent Moisture: 3.4%

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.3 <del>U</del> <b>KF</b>
67-64-1	Acetone	5.6
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
108-05-4	Vinyl Acetate	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	92.6%
Bromofluorobenzene	88.1%
d4-1,2-Dichloroethane	93.8%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 468132

QC Report No: C230-WDOE

Lab ID: C230R

Project No: Yakima RR

Matrix: Soils/Sediments

VTSR: 11/13/92

Data Release Authorized: *John N. [Signature]*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1 541-02-6	<del>Decamethylcyclopentasiloxane</del> <i>UNKNOWN</i>	VOA	1131	8 J
2				
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KF



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**ORGANICS ANALYSIS DATA SHEET  
Volatiles by Purge & Trap GC/MS**

Lab ID: 1117MB  
Matrix: Soils/Sediments

Sample: Method Blank

QC Report No: C230-WDOE  
Project: Yakima RR

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(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *[Signature]*  
Report: 12/03/92 MAC:K kas

VTSR: NA

Instrument: Finn 1  
Date Analyzed: 11/17/92

Amount Analyzed: 5 gm (Dry Weight Equivalent)  
Percent Moisture: NA

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
108-05-4	Vinyl Acetate	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	95.9%
Bromofluorobenzene	100%
d4-1,2-Dichloroethane	92.7%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: Method Blank

QC Report No: C230-WDOE  
Project No: Yakima RR

Lab ID: 1117MB  
Matrix: Soils/Sediments

VTSR: NA

Data Release Authorized: *Jim N. Johnson*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	No UNKNOWN pks >10% IS peak height	VOA	-	-
2				
3				
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**


Lab ID: 1118MB  
Matrix: Soils/Sediments

Sample: Method Blank 2

QC Report No: C230-WDOE  
Project: Yakima RR

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(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized:   
Report: 12/03/92 MAC:K kas

VTSR: NA

Instrument: Finn 1  
Date Analyzed: 11/18/92

Amount Analyzed: 5 gm (Dry Weight Equivalent)  
Percent Moisture: NA

CAS Number		µg/Kg
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	1.1 J
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
108-05-4	Vinyl Acetate	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	96.9%
Bromofluorobenzene	98.1%
d4-1,2-Dichloroethane	95.5%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No:

Method Blank 2


QC Report No: C230-WDOE

Lab ID: 1118MB

Project No: Yakima RR

Matrix: Soils/Sediments

VTSR: NA

Data Release Authorized: 

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)
1	-	No UNKNOWN pks >10% IS peak height	VOA	-
2				
3				
4				
5				
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**

Lab ID: 1118MB2  
Matrix: Soils/Sediments

Sample: Methanol Blank

QC Report No: C230-WDOE  
Project: Yakima RR

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(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: 

VTSR: NA

Report: 12/08/92 MAC:Kkas

Instrument: Finn 1  
Date Analyzed: 11/18/92

Amount Analyzed: 0.030 gm (Dry Weight Equivalent)  
Percent Moisture: NA

CAS Number		µg/Kg
74-87-3	Chloromethane	330 U
74-83-9	Bromomethane	330 U
75-01-4	Vinyl Chloride	330 U
75-00-3	Chloroethane	330 U
75-09-2	Methylene Chloride	460
67-64-1	Acetone	830 U
75-15-0	Carbon Disulfide	220
75-35-4	1,1-Dichloroethene	170 U
75-34-3	1,1-Dichloroethane	170 U
156-60-5	Trans-1,2-Dichloroethene	170 U
156-59-2	Cis-1,2-Dichloroethene	170 U
67-66-3	Chloroform	170 U
107-06-2	1,2-Dichloroethane	170 U
78-93-3	2-Butanone	830 U
71-55-6	1,1,1-Trichloroethane	170 U
108-05-4	Vinyl Acetate	170 U
56-23-5	Carbon Tetrachloride	170 U
75-27-4	Bromodichloromethane	170 U
78-87-5	1,2-Dichloropropane	170 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	170 U
79-01-6	Trichloroethene	170 U
124-48-1	Dibromochloromethane	170 U
79-00-5	1,1,2-Trichloroethane	170 U
71-43-2	Benzene	170 U
10061-02-6	trans-1,3-Dichloropropene	170 U
110-75-8	2-Chloroethylvinylether	170 U
75-25-2	Bromoform	170 U
108-10-1	4-Methyl-2-Pentanone	830 U
591-78-6	2-Hexanone	830 U
127-18-4	Tetrachloroethene	170 U
79-34-5	1,1,2,2-Tetrachloroethane	170 U
108-88-3	Toluene	170 U
108-90-7	Chlorobenzene	170 U
100-41-4	Ethylbenzene	170 U
100-42-5	Styrene	170 U
1330-20-7	Total Xylenes	330 U
75-69-4	Trichlorofluoromethane	330 U
76-13-1	1,1,2-Trichlorotrifluoroethane	330 U

**Surrogate Recoveries**

d8-Toluene	89.2%
Bromofluorobenzene	89.7%
d4-1,2-Dichloroethane	92.9%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: **Methanol Blank**

QC Report No: C230-WDOE  
Project No: Yakima RR

Lab ID: 1118MB2  
Matrix: Soils/Sediments

VTSR: NA

Data Release Authorized: *[Signature]*

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/Kg)	
1	UNKNOWN Boric Acid type (bp m/e 73)	VOA	488	2000 <b>N3</b>	<b>KF</b>
2					
3					
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**ORGANICS ANALYSIS DATA SHEET**

**Volatiles by Purge & Trap GC/MS**


Lab ID: 1119MB  
Matrix: Soils/Sediments

Sample: Method Blank 3

QC Report No: C230-WDOE  
Project: Yakima RR

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Data Release Authorized:   
Report: 12/03/92 MAC:Kkas

VTSR: NA

Instrument: Finn 1  
Date Analyzed: 11/19/92

Amount Analyzed: 1 gm (Dry Weight Equivalent)  
Percent Moisture: NA

CAS Number		µg/Kg
74-87-3	Chloromethane	10 U
74-83-9	Bromomethane	10 U
75-01-4	Vinyl Chloride	10 U
75-00-3	Chloroethane	10 U
75-09-2	Methylene Chloride	10 U
67-64-1	Acetone	25 U
75-15-0	Carbon Disulfide	5.0 U
75-35-4	1,1-Dichloroethene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U
156-60-5	Trans-1,2-Dichloroethene	5.0 U
156-59-2	Cis-1,2-Dichloroethene	5.0 U
67-66-3	Chloroform	5.0 U
107-06-2	1,2-Dichloroethane	5.0 U
78-93-3	2-Butanone	25 U
71-55-6	1,1,1-Trichloroethane	5.0 U
108-05-4	Vinyl Acetate	5.0 U
56-23-5	Carbon Tetrachloride	5.0 U
75-27-4	Bromodichloromethane	5.0 U
78-87-5	1,2-Dichloropropane	5.0 U

CAS Number		µg/Kg
10061-01-5	cis-1,3-Dichloropropene	5.0 U
79-01-6	Trichloroethene	5.0 U
124-48-1	Dibromochloromethane	5.0 U
79-00-5	1,1,2-Trichloroethane	5.0 U
71-43-2	Benzene	5.0 U
10061-02-6	trans-1,3-Dichloropropene	5.0 U
110-75-8	2-Chloroethylvinylether	5.0 U
75-25-2	Bromoform	5.0 U
108-10-1	4-Methyl-2-Pentanone	25 U
591-78-6	2-Hexanone	25 U
127-18-4	Tetrachloroethene	5.0 U
79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
108-88-3	Toluene	5.0 U
108-90-7	Chlorobenzene	5.0 U
100-41-4	Ethylbenzene	5.0 U
100-42-5	Styrene	5.0 U
1330-20-7	Total Xylenes	10 U
75-69-4	Trichlorofluoromethane	10 U
76-13-1	1,1,2-Trichlorotrifluoroethane	10 U

**Surrogate Recoveries**

d8-Toluene	97.8%
Bromofluorobenzene	102%
d4-1,2-Dichloroethane	93.1%









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**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by GC/ECD**

Sample No.: 468105


Lab Sample ID: C230A  
Matrix: Soil

QC Report No.: C230 - WDOE

Project: Yakima RR

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(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized:   
Data Prepared: 12/11/92 - MAC: mb  
Date Extracted: 11/17/92  
Date Analyzed: 11/21/92  
Sample Amount: 20.6 g - (Dry Wt.)  
Final Ext. Volume: 10 mls

VTSR: 11/13/92

GPC Cleanup: Yes  
Alumina Cleanup: Yes  
Sulfur Cleanup: No  
Conc/Dil Factor: 1:1

CAS Number		µg/kg
319-84-6	Alpha-BHC	33 U
319-85-7	Beta-BHC	2.6 U
319-86-8	Delta-BHC	20 U
58-89-9	Gamma-BHC (Lindane)	17 U
76-44-8	Heptachlor	7.0 U
309-00-2	Aldrin	2.6 U
1024-57-3	Heptachlor Epoxide	11 U
959-98-8	Endosulfan I	2.6 U
60-57-1	Dieldrin	9.6
72-55-9	4,4'-DDE	10
72-20-8	Endrin	5.2 U
33212-65-9	Endosulfan II	5.2 U
72-54-8	4,4'-DDD	5.2 U
1031-07-8	Endosulfan Sulfate	5.2 U
50-29-3	4,4'-DDT	5.2 U
72-43-5	Methoxychlor	26 U
53494-70-5	Endrin Ketone	5.2 U
7421-36-3	Endrin Aldehyde	5.2 U
5103-74-2	Gamma-Chlordane	15 U
5103-71-9	Alpha-Chlordane	2.6 U
8001-35-2	Toxaphene	260 U
-	Aroclor-1242/1016	150 U
12672-29-6	Aroclor-1248	150 U
11097-69-1	Aroclor-1254	100 U
11096-82-5	Aroclor-1260	52 U
11104-28-2	Aroclor-1221	3500 U
11141-16-5	Aroclor-1232	980 U

Pesticide Surrogate Recovery	% Rec.	QC Limits
Decachlorobiphenyl (DCBP)	98.3%	60-150
Tetrachlorometaxylene (TCMX)	NR	60-150

**Data Qualifiers**

Value	If the result is a value greater than or equal to the detection limit, report the value.
J	Indicates an estimated value when that value is less than the calculated detection limit.
X	Indicates a value above the linear range of the detector. Dilution required.
S	Indicates no value reported due to saturation of the detector.
D	Indicates the surrogate was diluted out.
U	Indicates compound was analyzed for, but not detected at the given detection limit.
NA	Indicates compound not analyzed.



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**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by GC/ECD**

Lab Sample ID: C230Adl  
Matrix: Soil

Sample No.: 468105  
DILUTION

QC Report No.: C230 - WDOE  
Project: Yakima RR

Data Release Authorized: *Allen M. Kern*  
Data Prepared: 12/11/92 - MAC: mb  
Date Extracted: 11/17/92  
Date Analyzed: 12/04/92  
Sample Amount: 20.6 g - (Dry Wt.)  
Final Ext. Volume: 10 ml

VTSR: 11/13/92  
GPC Cleanup: Yes  
Alumina Cleanup: Yes  
Sulfur Cleanup: No  
Conc/Dil Factor: 1:10

CAS Number		µg/kg
319-84-6	Alpha-BHC	35 U
319-85-7	Beta-BHC	26 U
319-86-8	Delta-BHC	26 U
58-89-9	Gamma-BHC (Lindane)	26 U
76-44-8	Heptachlor	26 U
309-00-2	Aldrin	26 U
1024-57-3	Heptachlor Epoxide	27 U
959-98-8	Endosulfan I	26 U
60-57-1	Dieldrin	52 U
72-55-9	4,4'-DDE	52 U
72-20-8	Endrin	52 U
33212-65-9	Endosulfan II	52 U
72-54-8	4,4'-DDD	52 U
1031-07-8	Endosulfan Sulfate	52 U
50-29-3	4,4'-DDT	52 U
72-43-5	Methoxychlor	260 U
53494-70-5	Endrin Ketone	52 U
7421-36-3	Endrin Aldehyde	52 U
5103-74-2	Gamma-Chlordane	26 U
5103-71-9	Alpha-Chlordane	26 U
8001-35-2	Toxaphene	2600 U
-	Aroclor-1242/1016	520 U
12672-29-6	Aroclor-1248	520 U
11097-69-1	Aroclor-1254	520 U
11096-82-5	Aroclor-1260	520 U
11104-28-2	Aroclor-1221	2500 U
11141-16-5	Aroclor-1232	730 U

Pesticide Surrogate Recovery	% Rec.	QC Limits
Decachlorobiphenyl (DCBP)	67.4%	60-150
Tetrachloromelaxylene (TCMX)	NR	60-150

**Data Qualifiers**

- Value If the result is a value greater than or equal to the detection limit, report the value.
- J Indicates an estimated value when that value is less than the calculated detection limit.
  - X Indicates a value above the linear range of the detector. Dilution required.
  - S Indicates no value reported due to saturation of the detector.
  - D Indicates the surrogate was diluted out.
  - U Indicates compound was analyzed for, but not detected at the given detection limit.
  - NA Indicates compound not analyzed.





**ANALYTICAL  
RESOURCES  
INCORPORATED**

**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by GC/ECD**

Sample No.: 468106

Lab Sample ID: C230B  
Matrix: Soil

QC Report No.: C230 - WDOE  
Project: Yakima RR

Analytical  
Chemists &  
Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Cath M. Kern*  
Data Prepared: 12/11/92 - MAC: mb  
Date Extracted: 11/17/92  
Date Analyzed: 11/21/92  
Sample Amount: 34.1 g - (Dry Wt.)  
Final Ext. Volume: 10 ml

VTSR: 11/13/92  
GPC Cleanup: Yes  
Alumina Cleanup: Yes  
Sulfur Cleanup: No  
Conc/Dil Factor: 1:1

CAS Number		µg/kg
319-84-6	Alpha-BHC	1.6 U
319-85-7	Beta-BHC	1.6 U
319-86-8	Delta-BHC	1.6 U
58-89-9	Gamma-BHC (Lindane)	1.6 U
76-44-8	Heptachlor	1.6 U
309-00-2	Aldrin	1.6 U
1024-57-3	Heptachlor Epoxide	1.6 U
959-98-8	Endosulfan I	1.6 U
60-57-1	Dieldrin	2.1 J
72-55-9	4,4'-DDE	4.4
72-20-8	Endrin	3.2 U
33212-65-9	Endosulfan II	3.2 U
72-54-8	4,4'-DDD	2.6 J
1031-07-8	Endosulfan Sulfate	3.2 U
50-29-3	4,4'-DDT	3.2 U
72-43-5	Methoxychlor	16 U
53494-70-5	Endrin Ketone	3.2 U
7421-36-3	Endrin Aldehyde	3.2 U
5103-74-2	Gamma-Chlordane	1.6 U
5103-71-9	Alpha-Chlordane	1.6 U
8001-35-2	Toxaphene	160 U
-	Aroclor-1242/1016	32 U
12672-29-6	Aroclor-1248	32 U
11097-69-1	Aroclor-1254	32 U
11096-82-5	Aroclor-1260	32 U
11104-28-2	Aroclor-1221	64 U
11141-16-5	Aroclor-1232	32 U

NOT RE

Pesticide Surrogate Recovery	% Rec.	QC Limits
Decachlorobiphenyl (DCBP)	99.9%	60-150
Tetrachlorometaxylene (TCMX)	104%	60-150

**Data Qualifiers**

- Value If the result is a value greater than or equal to the detection limit, report the value.
- J Indicates an estimated value when that value is less than the calculated detection limit.
  - X Indicates a value above the linear range of the detector. Dilution required.
  - S Indicates no value reported due to saturation of the detector.
  - D Indicates the surrogate was diluted out.
  - U Indicates compound was analyzed for, but not detected at the given detection limit.
  - NA Indicates compound not analyzed.



**ANALYTICAL  
RESOURCES  
INCORPORATED**

Analytical  
Chemists &  
Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by GC/ECD**

Sample No.: 468107

Lab Sample ID: C230C  
Matrix: Soil

QC Report No.: C230 - WDOE  
Project: Yakima RR

Data Release Authorized:  
Data Prepared: 12/11/92 - MAC: mb  
Date Extracted: 11/17/92  
Date Analyzed: 11/21/92  
Sample Amount: 34.3 g - (Dry Wt.)  
Final Ext. Volume: 10 ml

VTSR: 11/13/92  
GPC Cleanup: Yes  
Alumina Cleanup: Yes  
Sulfur Cleanup: No  
Conc/Dil Factor: 1:1

CAS Number		µg/kg
319-84-6	Alpha-BHC	1.6 U
319-85-7	Beta-BHC	1.6 U
319-86-8	Delta-BHC	1.6 U
58-89-9	Gamma-BHC (Lindane)	1.6 U
76-44-8	Heptachlor	1.6 U
309-00-2	Aldrin	<del>1.6 U</del> 0.5 J KF
1024-57-3	Heptachlor Epoxide	1.6 U
959-98-8	Endosulfan I	1.6 U
60-57-1	Dieldrin	2.2 J
72-55-9	4,4'-DDE	4.6
72-20-8	Endrin	3.2 U
33212-65-9	Endosulfan II	3.2 U
72-54-8	4,4'-DDD	2.9 J
1031-07-8	Endosulfan Sulfate	3.2 U
50-29-3	4,4'-DDT	3.2 U
72-43-5	Methoxychlor	16 U
53494-70-5	Endrin Ketone	3.2 U
7421-36-3	Endrin Aldehyde	3.2 U
5103-74-2	Gamma-Chlordane	<del>1.6 U</del> 0.5 J KF
5103-71-9	Alpha-Chlordane	1.6 U
8001-35-2	Toxaphene	160 U
-	Aroclor-1242/1016	32 U
12672-29-6	Aroclor-1248	32 U
11097-69-1	Aroclor-1254	32 U
11096-82-5	Aroclor-1260	32 U
11104-28-2	Aroclor-1221	64 U
11141-16-5	Aroclor-1232	32 U

Pesticide Surrogate Recovery	% Rec.	QC Limits
Decachlorobiphenyl (DCBP)	101%	60-150
Tetrachlorometylene (TCMX)	89.6%	60-150

**Data Qualifiers**

- Value If the result is a value greater than or equal to the detection limit, report the value.
- J Indicates an estimated value when that value is less than the calculated detection limit.
  - X Indicates a value above the linear range of the detector. Dilution required.
  - S Indicates no value reported due to saturation of the detector.
  - D Indicates the surrogate was diluted out.
  - U Indicates compound was analyzed for, but not detected at the given detection limit.
  - NA Indicates compound not analyzed.



**ANALYTICAL  
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INCORPORATED**

**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by GC/ECD**

Sample No.: 468108

Analytical  
Chemists &  
Consultants

Lab Sample ID: C230D  
Matrix: Soil

QC Report No.: C230 - WDOE  
Project: Yakima RR

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Richard M. Newman*

VTSR: 11/13/92

Data Prepared: 12/11/92 - MAC: mb

Date Extracted: 11/17/92

GPC Cleanup: Yes

Date Analyzed: 11/21/92

Alumina Cleanup: Yes

Sample Amount: 23.6 g - (Dry Wt.)

Sulfur Cleanup: No

Final Ext. Volume: 10 mls

Conc/Dil Factor: 1:1

CAS Number		µg/kg
319-84-6	Alpha-BHC	50 U
319-85-7	Beta-BHC	2.6 U
319-86-8	Delta-BHC	10 U
58-89-9	Gamma-BHC (Lindane)	17 U
76-44-8	Heptachlor	11 U
309-00-2	Aldrin	2.6 U
1024-57-3	Heptachlor Epoxide	18 U
959-98-8	Endosulfan I	2.6 U
60-57-1	Dieldrin	14 U
72-55-9	4,4'-DDE	2.8 J
72-20-8	Endrin	5.2 U
33212-65-9	Endosulfan II	5.2 U
72-54-8	4,4'-DDD	5.2 U
1031-07-8	Endosulfan Sulfate	5.2 U
50-29-3	4,4'-DDT	5.2 U
72-43-5	Methoxychlor	26 U
53494-70-5	Endrin Ketone	5.2 U
7421-36-3	Endrin Aldehyde	5.2 U
5103-74-2	Gamma-Chlordane	15 U
5103-71-9	Alpha-Chlordane	2.6 U
8001-35-2	Toxaphene	260 U
	Aroclor-1242/1016	340 U
12672-29-6	Aroclor-1248	430 U
11097-69-1	Aroclor-1254	90 U
11096-82-5	Aroclor-1260	52 U
11104-28-2	Aroclor-1221	8500 U
11141-16-5	Aroclor-1232	640 U

Pesticide Surrogate Recovery	% Rec.	QC Limits
Decachlorobiphenyl (DCBP)	99.4%	60-150
Tetrachlorometaxylene (TCMX)	NR	60-150

**Data Qualifiers**

- Value. If the result is a value greater than or equal to the detection limit, report the value.
- J Indicates an estimated value when that value is less than the calculated detection limit.
  - X Indicates a value above the linear range of the detector. Dilution required.
  - S Indicates no value reported due to saturation of the detector.
  - D Indicates the surrogate was diluted out.
  - U Indicates compound was analyzed for, but not detected at the given detection limit.
  - NA Indicates compound not analyzed.



**ANALYTICAL  
RESOURCES  
INCORPORATED**

**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by GC/ECD**

Lab Sample ID: C230Ddl  
Matrix: Soil

Sample No.: 468108  
Dilution

QC Report No.: C230 - WDOE  
Project: Yakima RR

Analytical  
Chemists &  
Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *[Signature]*

Data Prepared: 12/11/92 - MAC: mb

Date Extracted: 11/17/92

Date Analyzed: 12/04/92

Sample Amount: 23.6 g - (Dry Wt.)

Final Ext. Volume: 10 mls

VTSR: 11/13/92

GPC Cleanup: Yes

Alumina Cleanup: Yes

Sulfur Cleanup: No

Conc/Dil Factor: 1:10

CAS Number		µg/kg
319-84-6	Alpha-BHC	41 U
319-85-7	Beta-BHC	26 U
319-86-8	Delta-BHC	26 U
58-89-9	Gamma-BHC (Lindane)	26 U
76-44-8	Heptachlor	26 U
309-00-2	Aldrin	26 U
1024-57-3	Heptachlor Epoxide	26 U
959-98-8	Endosulfan I	26 U
60-57-1	Dieldrin	52 U
72-55-9	4,4'-DDE	52 U
72-20-8	Endrin	52 U
33212-65-9	Endosulfan-II	52 U
72-54-8	4,4'-DDD	52 U
1031-07-8	Endosulfan Sulfate	52 U
50-29-3	4,4'-DDT	52 U
72-43-5	Methoxychlor	260 U
53494-70-5	Endrin Ketone	52 U
7421-36-3	Endrin Aldehyde	52 U
5103-74-2	Gamma-Chlordane	26 U
5103-71-9	Alpha-Chlordane	26 U
8001-35-2	Toxaphene	2600 U
-	Aroclor-1242/1016	520 U
12672-29-6	Aroclor-1248	520 U
11097-69-1	Aroclor-1254	520 U
11096-82-5	Aroclor-1260	520 U
11104-28-2	Aroclor-1221	4300 U
11141-16-5	Aroclor-1232	640 U

Pesticide Surrogate Recovery	% Rec.	QC Limits
Decachlorobiphenyl (DCBP)	67.7%	60-150
Tetrachloromelaxylene (TCMX)	NR	60-150

**Data Qualifiers**

- Value If the result is a value greater than or equal to the detection limit, report the value.
- J Indicates an estimated value when that value is less than the calculated detection limit.
  - X Indicates a value above the linear range of the detector. Dilution required.
  - S Indicates no value reported due to saturation of the detector.
  - D Indicates the surrogate was diluted out.
  - U Indicates compound was analyzed for, but not detected at the given detection limit.
  - NA Indicates compound not analyzed.



**ANALYTICAL  
RESOURCES  
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**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by GC/ECD**

Sample No.: 468122

Lab Sample ID: C230E  
Matrix: Soil

QC Report No.: C230 - WDOE  
Project: Yakima RR

Analytical  
Chemists &  
Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Cathy M. Newman*  
Data Prepared: 12/11/92 - MAC: mb  
Date Extracted: 11/17/92  
Date Analyzed: 11/21/92  
Sample Amount: 32.3 g - (Dry Wt.)  
Final Ext. Volume: 10 mls

VTSR: 11/13/92  
GPC Cleanup: Yes  
Alumina Cleanup: Yes  
Sulfur Cleanup: No  
Conc/Dil Factor: 1:1

CAS Number		µg/kg
319-84-6	Alpha-BHC	1.6 U
319-85-7	Beta-BHC	1.6 U
319-86-8	Delta-BHC	1.6 U
58-89-9	Gamma-BHC (Lindane)	1.6 U
76-44-8	Heptachlor	1.6 U
309-00-2	Aldrin	1.6 U
1024-57-3	Heptachlor Epoxide	1.6 U
959-98-8	Endosulfan I	1.6 U
60-57-1	Dieldrin	<del>3.2 U</del>
72-55-9	4,4'-DDE	3.0 J
72-20-8	Endrin	3.2 U
33212-65-9	Endosulfan II	3.2 U
72-54-8	4,4'-DDD	1.8 J
1031-07-8	Endosulfan Sulfate	3.2 U
50-29-3	4,4'-DDT	3.2 U
72-43-5	Methoxychlor	16 U
53494-70-5	Endrin Ketone	3.2 U
7421-36-3	Endrin Aldehyde	3.2 U
5103-74-2	Gamma-Chlordane	1.6 U
5103-71-9	Alpha-Chlordane	1.6 U
8001-35-2	Toxaphene	160 U
-	Aroclor-1242/1016	32 U
12672-29-6	Aroclor-1248	32 U
11097-69-1	Aroclor-1254	32 U
11096-82-5	Aroclor-1260	32 U
11104-28-2	Aroclor-1221	64 U
11141-16-5	Aroclor-1232	32 U

1.2 J KF

Pesticide Surrogate Recovery	% Rec.	QC Limits
Decachlorobiphenyl (DCBP)	103%	60-150
Tetrachlorometaxylene (TCMX)	94.9%	60-150

**Data Qualifiers**

- Value If the result is a value greater than or equal to the detection limit, report the value.
- J Indicates an estimated value when that value is less than the calculated detection limit.
  - X Indicates a value above the linear range of the detector. Dilution required.
  - S Indicates no value reported due to saturation of the detector.
  - D Indicates the surrogate was diluted out.
  - U Indicates compound was analyzed for, but not detected at the given detection limit.
  - NA Indicates compound not analyzed.



**ANALYTICAL  
RESOURCES  
INCORPORATED**

**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by GC/ECD**

Lab Sample ID: C230Ems  
Matrix: Soil

Sample No.: 468122  
MATRIX SPIKE  
QC Report No.: C230 - WDOE  
Project: Yakima RR

Analytical  
Chemists &  
Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Catherine M. Newman*  
Data Prepared: 12/11/92 - MAC: mb  
Date Extracted: 11/17/92  
Date Analyzed: 11/21/92  
Sample Amount: 32.6 g - (Dry Wt.)  
Final Ext. Volume: 10 ml

VTSR: 11/13/92  
GPC Cleanup: Yes  
Alumina Cleanup: Yes  
Sulfur Cleanup: No  
Conc/Dil Factor: 1:1

CAS Number		µg/kg
319-84-6	Alpha-BHC	1.6 U
319-85-7	Beta-BHC	1.6 U
319-86-8	Delta-BHC	1.6 U
58-89-9	Gamma-BHC (Lindane)	-
76-44-8	Heptachlor	-
309-00-2	Aldrin	-
1024-57-3	Heptachlor Epoxide	1.6 U
959-98-8	Endosulfan I	1.6 U
60-57-1	Dieldrin	-
72-55-9	4,4'-DDE	3.2
72-20-8	Endrin	-
33212-65-9	Endosulfan II	3.2 U
72-54-8	4,4'-DDD	1.9 J
1031-07-8	Endosulfan Sulfate	3.2 U
50-29-3	4,4'-DDT	-
72-43-5	Methoxychlor	16 U
53494-70-5	Endrin Ketone	3.2 U
7421-36-3	Endrin Aldehyde	3.2 U
5103-74-2	Gamma-Chlordane	1.6 U
5103-71-9	Alpha-Chlordane	1.6 U
8001-35-2	Toxaphene	160 U
-	Aroclor-1242/1016	32 U
12672-29-6	Aroclor-1248	32 U
11097-69-1	Aroclor-1254	32 U
11096-82-5	Aroclor-1260	32 U
11104-28-2	Aroclor-1221	64 U
11141-16-5	Aroclor-1232	32 U

Pesticide Surrogate Recovery	% Rec.	QC Limits
Decachlorobiphenyl (DCBP)	102%	60-150
Tetrachlorometaxylene (TCMX)	89.7%	60-150

**Data Qualifiers**

Value	If the result is a value greater than or equal to the detection limit, report the value.
J	Indicates an estimated value when that value is less than the calculated detection limit.
X	Indicates a value above the linear range of the detector. Dilution required.
S	Indicates no value reported due to saturation of the detector.
D	Indicates the surrogate was diluted out.
U	Indicates compound was analyzed for, but not detected at the given detection limit.
NA	Indicates compound not analyzed.



**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by GC/ECD**

Lab Sample ID: C230Emsd  
Matrix: Soil

Sample No.: 468122

**MATRIX SPIKE DUPLICATE**

QC Report No.: C230 - WDOE

Project: Yakima RR

Analytical  
Chemists &  
Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Catherine M. Newman*

Data Prepared: 12/11/92 - MAC: mb

Date Extracted: 11/17/92

Date Analyzed: 11/21/92

Sample Amount: 32.5 g - (Dry Wt.)

Final Ext. Volume: 10 ml

VISR: 11/13/92

GPC Cleanup: Yes

Alumina Cleanup: Yes

Sulfur Cleanup: No

Conc/Dil Factor: 1:1

CAS Number		µg/kg
319-84-6	Alpha-BHC	1.6 U
319-85-7	Beta-BHC	1.6 U
319-86-8	Delta-BHC	1.6 U
58-89-9	Gamma-BHC (Lindane)	-
76-44-8	Heptachlor	-
309-00-2	Aldrin	-
1024-57-3	Heptachlor Epoxide	1.6 U
959-98-8	Endosulfan I	1.6 U
60-57-1	Dieldrin	-
72-55-9	4,4'-DDE	3.6
72-20-8	Endrin	-
33212-65-9	Endosulfan II	3.2 U
72-54-8	4,4'-DDD	2.0 J
1031-07-8	Endosulfan Sulfate	3.2 U
50-29-3	4,4'-DDT	-
72-43-5	Methoxychlor	16 U
53494-70-5	Endrin Ketone	3.2 U
7421-36-3	Endrin Aldehyde	3.2 U
5103-74-2	Gamma-Chlordane	1.6 U
5103-71-9	Alpha-Chlordane	1.6 U
8001-35-2	Toxaphene	160 U
-	Aroclor-1242/1016	32 U
12672-29-6	Aroclor-1248	32 U
11097-69-1	Aroclor-1254	32 U
11096-82-5	Aroclor-1260	32 U
11104-28-2	Aroclor-1221	64 U
11141-16-5	Aroclor-1232	32 U

Pesticide Surrogate Recovery	% Rec.	QC Limits
Decachlorobiphenyl (DCBP)	104%	60-150
Tetrachlorometaxylene (TCMX)	95.3%	60-150

**Data Qualifiers**

Value	If the result is a value greater than or equal to the detection limit, report the value.
J	Indicates an estimated value when that value is less than the calculated detection limit.
X	Indicates a value above the linear range of the detector. Dilution required.
S	Indicates no value reported due to saturation of the detector.
D	Indicates the surrogate was diluted out.
U	Indicates compound was analyzed for, but not detected at the given detection limit.
NA	Indicates compound not analyzed.



**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by GC/ECD**

Sample No.: Method Blank

Analytical  
Chemists &  
Consultants

Lab Sample ID: C230mb  
Matrix: Soil

QC Report No.: C230 - WDOE  
Project: Yakima RR

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Calvin M. Kern*  
Data Prepared: 12/11/92 - MAC: mb  
Date Extracted: 11/17/92  
Date Analyzed: 11/20/92  
Sample Amount: 33.2 g - (Dry Wt.)  
Final Ext. Volume: 10 ml

VTSR: NA  
GPC Cleanup: Yes  
Alumina Cleanup: Yes  
Sulfur Cleanup: No  
Conc/Dil Factor: 1:1

CAS Number		µg/kg
319-84-6	Alpha-BHC	1.6 U
319-85-7	Beta-BHC	1.6 U
319-86-8	Delta-BHC	1.6 U
58-89-9	Gamma-BHC (Lindane)	1.6 U
76-44-8	Heptachlor	1.6 U
309-00-2	Aldrin	1.6 U
1024-57-3	Heptachlor Epoxide	1.6 U
959-98-8	Endosulfan I	1.6 U
60-57-1	Dieldrin	3.2 U
72-55-9	4,4'-DDE	3.2 U
72-20-8	Endrin	3.2 U
33212-65-9	Endosulfan II	3.2 U
72-54-8	4,4'-DDD	3.2 U
1031-07-8	Endosulfan Sulfate	3.2 U
50-29-3	4,4'-DDT	3.2 U
72-43-5	Methoxychlor	16 U
53494-70-5	Endrin Ketone	3.2 U
7421-36-3	Endrin Aldehyde	3.2 U
5103-74-2	Gamma-Chlordane	1.6 U
5103-71-9	Alpha-Chlordane	1.6 U
8001-35-2	Toxaphene	160 U
-	Aroclor-1242/1016	32 U
12672-29-6	Aroclor-1248	32 U
11097-69-1	Aroclor-1254	32 U
11096-82-5	Aroclor-1260	32 U
11104-28-2	Aroclor-1221	64 U
11141-16-5	Aroclor-1232	32 U

Pesticide Surrogate Recovery	% Rec.	QC Limits
Decachlorobiphenyl (DCBP)	106%	60-150
Tetrachloromelaxylene (TCMX)	95.1%	60-150

**Data Qualifiers**

Value	If the result is a value greater than or equal to the detection limit, report the value.
J	Indicates an estimated value when that value is less than the calculated detection limit.
X	Indicates a value above the linear range of the detector. Dilution required.
S	Indicates no value reported due to saturation of the detector.
D	Indicates the surrogate was diluted out.
U	Indicates compound was analyzed for, but not detected at the given detection limit.
NA	Indicates compound not analyzed.





**ANALYTICAL  
RESOURCES  
INCORPORATED**

Analytical  
Chemists &  
Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

**SOIL PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY**

ARI Job No: C230

Client: WDOE

Project: Yakima RR

Sample No: 468122

COMPOUND	SPIKE ADDED (µg/Kg)	SAMPLE CONC (µg/Kg)	MS CONC (µg/Kg)	MS % REC	QC LIMITS %REC
Lindane	15.3	0	12.3	80.4%	46-127
Heptachlor	15.3	0	9.7	63.1%	35-130
Aldrin	15.3	0	12.1	79.1%	34-132
Dieldrin	30.7	<del>81.2</del>	<del>26.7</del> <del>28.9</del>	<del>87.0%</del>	31-134
Endrin	30.7	0	26.1	85.0%	42-139
4,4'-DDT	30.7	0	22.6	73.6%	23-134

KF

COMPOUND	SPIKE ADDED (µg/Kg)	MSD CONC (µg/Kg)	MSD % REC	% RPD	QC LIMITS	
					RPD	%REC
Lindane	15.4	13.0	84.4%	4.9	50	46-127
Heptachlor	15.4	10.3	66.9%	5.8	31	35-130
Aldrin	15.4	12.8	83.1%	5.0	43	34-132
Dieldrin	30.8	27.8	<del>90.3%</del> <del>86.4</del>	<del>2.7</del> <del>3.9</del>	38	31-134
Endrin	30.8	26.8	87.0%	2.3	45	42-139
4,4'-DDT	30.8	24.3	78.9%	6.9	50	23-134

KF

RPD: 0 out of 6 outside limits  
Spike Recovery: 0 out of 12 outside limits

Asterisked values outside QC Limits

Comments: QC Limits taken from CLP OLM01.6 (June 1991)

Report prepared: 12/11/92 MAC:MB





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**PESTICIDE SOILS/SEDIMENT SURROGATE RECOVERY**

ARI Job Number: C230

Client: WDOE  
Project: 10-9210-039

GC Column (1): DB5ID: 0.53 mm GC Column (2): DB608 ID: 0.53 mm

	WDOE SAMPLE NO.	TCMX 1 %REC #	TCMX 2 %REC #	DCBP 1 %REC #	DCBP 2 %REC #	OTHER (1)	OTHER (2)	TOT OUT
01	Method Blank 11/17	95.1	102	106	110	0	0	0
02	Spike Blank 11/17	98.8	105	111	113	0	0	0
03	468105	NR *	85.9 *	98.3	99.7	0	0	0
04	468106	104	102	99.9	101	0	0	0
05	468107	89.6	97.9	101	104	0	0	0
06	468108	NR *	92.2 *	99.4	104	0	0	0
07	468122	94.9	99.2	103	105	0	0	0
08	Matrix Spike	89.7	96.0	102	102	0	0	0
09	Matrix Spike Dup.	95.3	102	104	106	0	0	0
10	468105 Dilution	NR *	86.0	67.4	81.8	0	0	0
11	468108 Dilution	NR *	83.0	67.7	81.8	0	0	0
12								
13								
14								
15								
16								
17								
18								
19								
20								

KF

ADVISORY  
QC LIMITS  
(60-150)  
(60-150)

TCMX = Tetrachloro-m-xylene  
DCBP = Decachlorobiphenyl

- # Column to be used to flag recovery values
- \* Values outside of QC limits
- D surrogate diluted out
- NR Not Reported due to chromatographic interference

State of Washington Department of Ecology  
Manchester Environmental Laboratory  
7411 Beach Dr. East Port Orchard WA. 98366

Data Review  
January 14, 1993

Project: **Yakima RR**  
Sample: 468126  
Laboratory: Sound Analytical Services 29323  
By: Stuart Magoon *SM*

**Case Summary**

This review is for the WTPH-418.1 Modified analysis.

This data was reviewed for qualitative and quantitative accuracy, validity, and usefulness.

There is no need to assimilate the "dilution factor" or "sample wt/vol" into the final values reported; these calculations have already been figured into the reported values.

**DATA QUALIFIER DEFINITIONS**

- U - The analyte was not detected at or above the reported result.
- UJ - The analyte was not detected at or above the reported estimated result.
- J - The associated numerical result is an estimated quantity.

## **WTPH-418.1 Modified**

### **Holding Times:**

This sample was extracted 41 days beyond the suggested maximum extraction holding time, and analyzed 24 days beyond the suggested maximum analytical holding time .

### **Method Blank:**

No petroleum hydrocarbons as heavy oils were detected in the method blank

### **Duplicate:**

A duplicate analysis was performed in accordance with the method. The duplicate analysis was performed on a sample from another project. Results from the duplicate analysis are acceptable and in good agreement with the original analysis.

### **Sample results:**

This data is acceptable for use as amended.

This sample has been stored in a properly cleaned and sealed jar at 4 degrees Celsius since collection. It is unlikely that exceeding the suggested maximum holding times has had a significant effect upon the results.

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

---

## ANALYTICAL NARRATIVE

Client: WA State Dept. of Ecology                      Date: January 13, 1993

Project: Yakima RR    Lab No.: 29323

Delivered By: WDOE

---

Sample 29323 was analyzed for total petroleum hydrocarbons in accordance with WA State DOE Method WTPH-418.1 Modified. The sample was extracted and analyzed on 01-04-93, which was outside of the method-required holding time. All other quality control parameters were within acceptable limits.

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: WA St. Dept. of Ecology      Date: January 6, 1993

Report On: Analysis of Soil              Lab No.: 29323

IDENTIFICATION:

Sample originally received on 12-01-92 under lab number 28745.

Project: Yakima RR

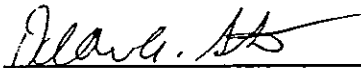
Client ID: 468126

-----  
ANALYSIS:

WTPH-418.1 Modified  
Date Extracted: 1-4-93  
Date Analyzed: 1-4-93

Heavy petroleum oils, mg/kg              170  
(C24+)

SOUND ANALYTICAL SERVICES

  
\_\_\_\_\_  
DEAN A. STROM

# SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

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## QUALITY CONTROL REPORT

WTPH-418.1 Heavy Petroleum Oils (C24+)

Client: WA St. Dept. of Ecology  
Lab No: 29323qc  
Units: mg/kg  
Date: January 6, 1993

### METHOD BLANK

Parameter	Blank Value
TPH	< 100

*mg/kg*  
*100 u*

### DUPLICATE

Dup No. 29222-8 Batch QC

Parameter	Sample (S)	Duplicate (D)	RPD
TPH	800,000	860,000	7.2

RPD = Relative Percent Difference  
=  $[(S - D) / ((S + D) / 2)] \times 100$

### MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

MSD No. 29222-8 Batch QC

Parameter	Sample Result (SR)	Spiked Sample Result (MS)	Spike Added (SA)	%R	Spike Dup Result (MSD)	RPD
TPH	940,000	800,000	36,000	113	940,000	15

%R = Percent Recovery  
=  $[(MS - SR) / SA] \times 100$

RPD = Relative Percent Difference  
=  $[(MS - MSD) / ((MS + MSD) / 2)] \times 100$



## **C.2. VOA and Water Quality Results - Ground Water**

21 December 1992



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(206) 621-7523 (FAX)

Karin Feddersen  
WA State Dept. of Ecology  
7411 Beach Drive East  
Port Orchard, WA 98366-8204

**RE: Yakima R.R. /ARI Job No. C290**

Dear Ms. Feddersen:

Please find enclosed original reports and sample deliverables for the above referenced project. Nine water samples and five soil samples were received intact on November 20, 1992. The following samples were analyzed for volatile organic compounds (VOC) and pesticide/PCBs, according to the laboratory service request form:

478241	478243	478247	478248	478249	478252
478253	478254	478255	478230	478233	478236
	478237	478238	478250		

The samples were analyzed within the required holding times, according to USEPA method SW-8260 and method SW-8080. The VOCs in water were analyzed on November 23, 1992, and the VOCs in soil were analyzed on November 24, 1992. All of the VOC samples were analyzed by GC/MS purge and trap methodology. The VOC analysis was completed using GC/MS instrument FINN #1 (soils) and Finn#5 (waters).

The pesticide analysis was initiated on November 23, 1992. Some of the pesticide and PCB-Aroclor detection limits have been raised due to the variation between the initial column and confirmation column results. This variation can be attributed to a sample matrix affect.

As always, a copy of these reports and all associated raw data will remain on file with ARI. If you have any questions or require additional information, please feel free to contact me at your convenience. I can be reached at the number above, or direct at (206)340-2866, ext. 116. You can also leave a message on voice mail if I am unavailable and I will return your call.

Sincerely,

ANALYTICAL RESOURCES, INC.

Bryan D. Anderson  
Project Coordinator

enclosures  
cc: File C290



**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**

Lab ID: C290A  
Matrix: Waters

Sample: 478241

QC Report No: C290 - WDOE  
Project: Yakima RR

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Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Ron B. Patton*  
Report: 12/04/92 MAC:D sk

VTSR: 11/20/92

Instrument: FINN 5  
Date Analyzed: 11/23/92

Amount Purged: 5.0 ml  
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	4.0
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	2.3
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	96.9%
Bromofluorobenzene	94.7%
d4-1,2-Dichloroethane	98.5%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478241

ARI Sample No.: C290A  
Matrix: Waters  
Instrument: FINN 5

QC Report No: C290 - WDOE  
Project No: Yakima RR

VTSR: 11/20/92

Data Release Authorized: *[Signature]*  
Report prepared: 12/04/92 MAC:D sk

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No UNKNOWN pks > 10% IS peak height	VOA	-
2				
3				
4				
5				
6				
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**  
Lab ID: C290B  
Matrix: Waters

Sample: 478243

QC Report No: C290 - WDOE  
Project: Yakima RR

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333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *[Signature]*  
Report: 12/04/92 MAC:Dsk

VTSR: 11/20/92

Instrument: FINN 5  
Date Analyzed: 11/23/92

Amount Purged: 5.0 ml  
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.9
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.2
67-66-3	Chloroform	0.8 J
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.8
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	2.8
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	15
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	92.8%
Bromofluorobenzene	97.0%
d4-1,2-Dichloroethane	95.0%



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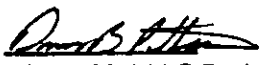
**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478243

ARI Sample No.: C290B  
Matrix: Waters  
Instrument: FINN 5

QC Report No: C290 - WDOE  
Project No: Yakima RR

VTSR: 11/20/92

Data Release Authorized:   
Report prepared: 12/04/92 MAC:D sk

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No UNKNOWN pks >10% IS peak height	VOA	-
2				
3				
4				
5				
6				
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**

Lab ID: C290C  
Matrix: Waters

Sample: 478247

QC Report No: C290 - WDOE  
Project: Yakima RR

Analytical  
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Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Russ B. Patton*  
Report: 12/04/92 MAC:D sk

VTSR: 11/20/92

Instrument: FINN 5  
Date Analyzed: 11/23/92

Amount Purged: 5.0 ml  
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.6
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	2.7
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	45
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.2
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	24
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	92.2%
Bromofluorobenzene	95.8%
d4-1,2-Dichloroethane	89.0%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478247

ARI Sample No.: C290C  
Matrix: Waters  
Instrument: FINN 5

QC Report No: C290 - WDOE  
Project No: Yakima RR

VTSR: 11/20/92

Data Release Authorized:   
Report prepared: 12/04/92 MAC:D sk

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No UNKNOWN pks >10% IS peak height	VOA	-
2				
3				
4				
5				
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**

Lab ID: C290D  
Matrix: Waters

Sample: 478248

QC Report No: C290 - WDOE  
Project: Yakima RR

Analytical  
Chemists &  
Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Ron B. Peter*  
Report: 12/04/92 MAC: D sk

VTSR: 11/20/92

Instrument: FINN 5  
Date Analyzed: 11/23/92

Amount Purged: 5.0 ml  
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	12
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0
75-34-3	1,1-Dichloroethane	10
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.6
67-66-3	Chloroform	0.9 J
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	100
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	2.7
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	37
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.3
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.5
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	6.8
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	11
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	93.8%
Bromofluorobenzene	96.0%
d4-1,2-Dichloroethane	97.0%



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(206) 621-7523 (FAX)

**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478248

ARI Sample No.: C290D  
Matrix: Waters  
Instrument: FINN 5

QC Report No: C290 - WDOE  
Project No: Yakima RR

VTSR: 11/20/92

Data Release Authorized: *[Signature]*  
Report prepared: 12/04/92 MAC:D sk

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	Unknown (bp m/e 105)	VOA	1061	5 J
2	C9.H10 Isomer (bp m/e 117)	VOA	1090	28 J NS
3	C9.H8 Isomer (bp m/e 116)	VOA	1106	52 J
4	C9.H8.O Isomer (bp m/e 131)	VOA	1152	38 J
5	Dihydromethylindene Isomer (bp m/e 117)	VOA	1174	5 J
6	C10.H10 Isomer (bp m/e 130)	VOA	1189	9 J
7	C10.H10 Isomer (bp m/e 130)	VOA	1196	7 J
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**ORGANICS ANALYSIS DATA SHEET**

**Volatiles by Purge & Trap GC/MS**

Lab ID: C290E  
Matrix: Waters

Sample: 478249

QC Report No: C290 - WDOE  
Project: Yakima RR

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(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *[Signature]*  
Report: 12/04/92 MAC:D sk

VTSR: 11/20/92

Instrument: FINN 5  
Date Analyzed: 11/23/92

Amount Purged: 5.0 ml  
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	8.7
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	0.7 J
75-34-3	1,1-Dichloroethane	4.7
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.3
67-66-3	Chloroform	1.1
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	45
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	3.5
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	5.9
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	94.4%
Bromofluorobenzene	91.7%
d4-1,2-Dichloroethane	94.8%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478249

ARI Sample No.: C290E  
Matrix: Waters  
Instrument: FINN 5

QC Report No: C290 - WDOE  
Project No: Yakima RR

VTSR: 11/20/92

Data Release Authorized: *David B. Pitter*  
Report prepared: 12/04/92 MAC:D sk

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No UNKNOWN pks > 10% IS peak height	VOA	-
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**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by method 608/8080**

Sample No.: 478250

Lab Sample ID: C2900  
Matrix: Waters

QC Report No.: C290-WDOE

Data Release Authorized: *P. M. Keph*  
Data Prepared: 12/11/92 - MAC: C pat

Project: Yakima RR  
VTSR: 11/20/92

Date Extracted: 11/23/92  
Date Analyzed: 11/26/92  
Vol. Extracted: 1000 mls  
Final Ext. Volume: 10 ml

GPC Cleanup: No  
Florisil Cleanup: Yes  
Sulfur Cleanup: No  
Conc/Dil Factor: 1:1

CAS Number		µg/L
319-84-6	Alpha-BHC	0.05 U
319-85-7	Beta-BHC	0.05 U
319-86-8	Delta-BHC	0.07 U
58-89-9	Gamma-BHC (Lindane)	0.05 U
76-44-8	Heptachlor	0.05 U
309-00-2	Aldrin	0.15 U
1024-57-3	Heptachlor Epoxide	0.08 U
959-98-8	Endosulfan I	0.05 U
60-57-1	Dieldrin	1.1
72-55-9	4,4'-DDE	0.50 U <i>KF</i>
72-20-8	Endrin	0.15 U
33212-65-9	Endosulfan II	0.10 U
72-54-8	4,4'-DDD	0.48
1031-07-8	Endosulfan Sulfate	0.10 U
50-29-3	4,4'-DDT	0.10 U
72-43-5	Methoxychlor	0.50 U
53494-70-5	Endrin Ketone	<del>0.10 U</del> <i>0.35 KF</i>
7421-36-3	Endrin Aldehyde	0.10 U
5103-74-2	Gamma-Chlordane	0.12 U
5103-71-9	Alpha-Chlordane	0.15 U
8001-35-2	Toxaphene	5.00 U
-	Aroclor-1242/1016	3.00 U
12672-29-6	Aroclor-1248	3.00 U
11097-69-1	Aroclor-1254	3.00 U
11096-82-5	Aroclor-1260	3.00 U
11104-28-2	Aroclor-1221	3.00 U
11141-16-5	Aroclor-1232	5.00 U

Pesticide Surrogate Recovery	% Rec.	Advisory QC Limits
Decachlorobiphenyl	118%	60-150
Tetrachlorometaxylene	67.3%	60-150



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**ORGANICS ANALYSIS DATA SHEET  
PESTICIDE/PCB by method 608/8080**

Sample No.: Method Blank

Lab Sample ID: 1123MB  
Matrix: Waters

QC Report No.: C290-WDOE

Data Release Authorized: *[Signature]*  
Data Prepared: 12/11/92 - MAC:C pat

Project: Yakima RR  
VTSR: NA

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(206) 621-7523 (FAX)

Date Extracted: 11/23/92  
Date Analyzed: 11/26/92  
Vol. Extracted: 1000 mls  
Final Ext. Volume: 10 mls

GPC Cleanup: No  
Florisil Cleanup: Yes  
Sulfur Cleanup: No  
Conc/Dil Factor: 1:1

CAS Number		µg/L
319-84-6	Alpha-BHC	0.05 U
319-85-7	Beta-BHC	0.05 U
319-86-8	Delta-BHC	0.05 U
58-89-9	Gamma-BHC (Lindane)	0.05 U
76-44-8	Heptachlor	0.05 U
309-00-2	Aldrin	0.05 U
1024-57-3	Heptachlor Epoxide	0.05 U
959-98-8	Endosulfan I	0.05 U
60-57-1	Dieldrin	0.10 U
72-55-9	4,4'-DDE	0.10 U
72-20-8	Endrin	0.10 U
33212-65-9	Endosulfan II	0.10 U
72-54-8	4,4'-DDD	0.10 U
1031-07-8	Endosulfan Sulfate	0.10 U
50-29-3	4,4'-DDT	0.10 U
72-43-5	Methoxychlor	0.50 U
53494-70-5	Endrin Ketone	0.10 U
7421-36-3	Endrin Aldehyde	0.10 U
5103-74-2	Gamma-Chlordane	0.05 U
5103-71-9	Alpha-Chlordane	0.05 U
8001-35-2	Toxaphene	5.00 U
-	Aroclor-1242/1016	1.00 U
12672-29-6	Aroclor-1248	1.00 U
11097-69-1	Aroclor-1254	1.00 U
11096-82-5	Aroclor-1260	1.00 U
11104-28-2	Aroclor-1221	2.00 U
11141-16-5	Aroclor-1232	1.00 U

Pesticide Surrogate Recovery	% Rec.	Advisory QC Limits
Decachlorobiphenyl	105%	60-150
Tetrachlorometaxylene	67.3%	60-150



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**PESTICIDE WATERS SURROGATE RECOVERY**

ARI Job Number: C290

Client: WDOE  
Project: Yakima RR

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(206) 621-6490  
(206) 621-7523 (FAX)

GC Column (1): DB5ID: 0.53 mm    GC Column (2): DB608    ID: 0.53 mm

	WDOE SAMPLE NO.	TCMX 1 %REC #	TCMX 2 %REC #	DCBP 1 %REC #	DCBP 2 %REC #	SURR. OUT (1)	SURR. OUT (2)	TOT OUT
01	Method Blank 11/23	67.3	64.6	105	102	0	0	0
02	Spike Blank 11/23	61.3	56.0*	101	96.7	1	0	1
03	478250	75.8	75.1	118	111	0	0	0
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ADVISORY  
QC LIMITS  
(60-150)  
(60-150)

TCMX = Tetrachloro-m-xylene  
DCBP = Decachlorobiphenyl

- # Column to be used to flag recovery values
- \* Values outside of QC limits
- D surrogate diluted out
- NR Not Reported due to chromatographic interference



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**PESTICIDE SPIKE BLANK RECOVERY**

ARI Job No: C290

Client: WDOE

Project: Yakima R.R.

**Matrix: Water**

COMPOUND	SPIKE ADDED ( $\mu\text{g/L}$ )	SAMPLE CONC. ( $\mu\text{g/L}$ )	MS CONC. ( $\mu\text{g/L}$ )	MS % REC	QC LIMITS REC
Lindane	0.50	0	0.464	92.8	56-123
Heptachlor	0.50	0	0.393	78.6	40-131
Aldrin	0.50	0	0.404	80.8	40-120
Dieldrin	1.00	0	0.942	94.2	52-126
Endrin	1.00	0	0.931	93.1	56-121
4,4'-DDT	1.00	0	0.891	89.1	38-127

	Surrogate % rec.	QC Limits
TCMX	61.3%	60-150
DCBP	101%	60-150

Spike Recovery: 0 out of 6 outside limits  
Surrogate Recovery: 0 out of 2 outside limits

Asterisked values outside QC Limits (advisory only)

**Comments:**







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**ORGANICS ANALYSIS DATA SHEET**

Volatiles by Purge & Trap GC/MS

Lab ID: C290F

Matrix: Waters

Sample: 478252

QC Report No: C290 - WDOE

Project: Yakima RR

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(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Rambert*

Report: 12/04/92 MAC:D sk

VTSR: 11/20/92

Instrument: FINN 5  
Date Analyzed: 11/23/92

Amount Purged: 5.0 ml  
Conc/Dilution: 1 to 5

CAS Number		µg/L
74-87-3	Chloromethane	10 U
74-83-9	Bromomethane	10 U
75-01-4	Vinyl Chloride	10 U
75-00-3	Chloroethane	10 U
75-09-2	Methylene Chloride	10 U
67-64-1	Acetone	25 U
75-15-0	Carbon Disulfide	5.0 U
75-35-4	1,1-Dichloroethene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U
156-60-5	Trans-1,2-Dichloroethene	16
156-59-2	Cis-1,2-Dichloroethene	270
57-66-3	Chloroform	5.0 U
107-06-2	1,2-Dichloroethane	5.0 U
78-93-3	2-Butanone	25 U
71-55-6	1,1,1-Trichloroethane	5.0 U
56-23-5	Carbon Tetrachloride	5.0 U
108-05-4	Vinyl Acetate	5.0 U
75-27-4	Bromodichloromethane	5.0 U
78-87-5	1,2-Dichloropropane	5.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	5.0 U
79-01-6	Trichloroethene	430
124-48-1	Dibromochloromethane	5.0 U
79-00-5	1,1,2-Trichloroethane	5.0 U
71-43-2	Benzene	5.0 U
10061-02-6	trans-1,3-Dichloropropene	5.0 U
110-75-8	2-Chloroethylvinylether	5.0 U
75-25-2	Bromoform	5.0 U
108-10-1	4-Methyl-2-Pentanone	25 U
591-78-6	2-Hexanone	25 U
127-18-4	Tetrachloroethene	420
79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
108-88-3	Toluene	5.0 U
108-90-7	Chlorobenzene	5.0 U
100-41-4	Ethylbenzene	9.1
100-42-5	Styrene	5.0 U
1330-20-7	Total Xylenes	10 U
75-69-4	Trichlorofluoromethane	10 U
76-13-1	1,1,2-Trichlorotrifluoroethane	10 U

**Surrogate Recoveries**

d8-Toluene	95.8%
Bromofluorobenzene	96.1%
d4-1,2-Dichloroethane	89.7%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478252

ARI Sample No.: C290F  
Matrix: Waters  
Instrument: FINN 5

QC Report No: C290 - WDOE  
Project No: Yakima RR

VTSR: 11/20/92

Data Release Authorized: \_\_\_\_\_  
Report prepared: 12/04/92 MAC:D sk

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No UNKNOWN pks >10% IS peak height	VOA	-
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**  
Lab ID: C290G  
Matrix: Waters

Sample: 478253

QC Report No: C290 - WDOE  
Project: Yakima RR

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(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *[Signature]*  
Report: 12/04/92 MAC:D sk

VTSR: 11/20/92

Instrument: FINN 5  
Date Analyzed: 11/23/92

Amount Purged: 5.0 ml  
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.1
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.7
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	5.7
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	98.9%
Bromofluorobenzene	90.7%
d4-1,2-Dichloroethane	97.8%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478253

ARI Sample No.: C290G  
Matrix: Waters  
Instrument: FINN 5

QC Report No: C290 - WDOE  
Project No: Yakima RR

VTSR: 11/20/92

Data Release Authorized: *James B. Little*  
Report prepared: 12/04/92 MAC:D sk

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No UNKNOWN pks >10% IS peak height	VOA	-
2				
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**

Lab ID: C290H  
Matrix: Waters

Sample: 478254

QC Report No: C290 - WDOE  
Project: Yakima RR

Analytical  
Chemists &  
Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *[Signature]*  
Report: 12/04/92 MAC: Dsk

VTSR: 11/20/92

Instrument: FINN 5  
Date Analyzed: 11/23/92

Amount Purged: 5.0 ml  
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-6	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.8
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	97.6%
Bromofluorobenzene	94.2%
d4-1,2-Dichloroethane	93.6%



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Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478254

ARI Sample No.: C290H  
Matrix: Waters  
Instrument: FINN 5

QC Report No: C290 - WDOE  
Project No: Yakima RR

VTSR: 11/20/92

Data Release Authorized: *Don B. Patton*  
Report prepared: 12/04/92 MAC:D sk

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No UNKNOWN pks >10% IS peak height	VOA	-
2				
3				
4				
5				
6				
7				
8				
9				
10				
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29				
30				



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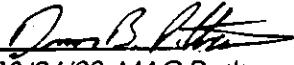
**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

**Sample No:** Method Blank

ARI Sample No.: 1123mb  
Matrix: Waters  
Instrument: FINN 5

QC Report No: C290 - WDOE  
Project No: Yakima RR

VTSR: NA

Data Release Authorized:   
Report prepared: 12/04/92 MAC:D sk

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	No UNKNOWN pks > 10% IS peak height	VOA	-	-
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
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**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET**

**Volatiles by Purge & Trap GC/MS**

Lab ID: C2901

Matrix: Waters

Sample: 478255

QC Report No: C290 - WDOE

Project: Yakima RR

Analytical  
Chemists &  
Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *[Signature]*

Report: 12/04/92 MAC:D sk

VTSR: 11/20/92

Instrument: FINN 5

Date Analyzed: 11/23/92

Amount Purged: 5.0 ml

Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.3
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	0.9 J
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	93.1%
Bromofluorobenzene	99.0%
d4-1,2-Dichloroethane	82.9%



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**ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds**

Sample No: 478255

ARI Sample No.: C290I  
Matrix: Waters  
Instrument: FINN 5

QC Report No: C290 - WDOE  
Project No: Yakima RR

VTSR: 11/20/92

Data Release Authorized: *[Signature]*  
Report prepared: 12/04/92 MAC:D sk

CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	VOA	-	-
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
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Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**  
Lab ID: 1128mb  
Matrix: Waters

Sample: Method Blank

QC Report No: C290 - WDOE  
Project: Yakima RR

VTSR: NA

Data Release Authorized: *Dave B. Peltier*  
Report: 12/04/92 MAC:D sk

Instrument: FINN 5  
Date Analyzed: 11/23/92

Amount Purged: 5.0 ml  
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	2.4 J
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	1.0 U
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	1.0 U
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	1.0 U
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	1.0 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	1.0 U
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	1.0 U
108-90-7	Chlorobenzene	1.0 U
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	99.9%
Bromofluorobenzene	94.6%
d4-1,2-Dichloroethane	89.3%





**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET**  
**Volatiles by Purge & Trap GC/MS**  
Lab ID: C290Ams  
Matrix: Waters

Sample: 478241  
Matrix Spike  
QC Report No: C290 - WDOE  
Project: Yakima RR

Analytical  
Chemists &  
Consultants

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *Dan B. Pitter*  
Report: 12/04/92 MAC:D sk

VTSR: 11/20/92

Instrument: FINN 5  
Date Analyzed: 11/23/92

Amount Purged: 5.0 ml  
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	-
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	3.6
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	-
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	-
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	2.0
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	-
108-90-7	Chlorobenzene	-
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	101%
Bromofluorobenzene	96.8%
d4-1,2-Dichloroethane	92.2%



**ANALYTICAL  
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**ORGANICS ANALYSIS DATA SHEET**

Volatiles by Purge & Trap GC/MS

Lab ID: C290Amsd

Matrix: Waters

Sample: 478241

Matrix Spike Dup.

QC Report No: C290 - WDOE

Project: Yakima RR

Analytical  
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333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Data Release Authorized: *[Signature]*  
Report: 12/04/92 MAC:D sk

VTSR: 11/20/92

Instrument: FINN 5  
Date Analyzed: 11/23/92

Amount Purged: 5.0 ml  
Conc/Dilution: 1 to 1

CAS Number		µg/L
74-87-3	Chloromethane	2.0 U
74-83-9	Bromomethane	2.0 U
75-01-4	Vinyl Chloride	2.0 U
75-00-3	Chloroethane	2.0 U
75-09-2	Methylene Chloride	2.0 U
67-64-1	Acetone	5.0 U
75-15-0	Carbon Disulfide	1.0 U
75-35-4	1,1-Dichloroethene	-
75-34-3	1,1-Dichloroethane	1.0 U
156-60-5	Trans-1,2-Dichloroethene	1.0 U
156-59-2	Cis-1,2-Dichloroethene	1.0 U
67-66-3	Chloroform	3.7
107-06-2	1,2-Dichloroethane	1.0 U
78-93-3	2-Butanone	5.0 U
71-55-6	1,1,1-Trichloroethane	1.0 U
56-23-5	Carbon Tetrachloride	1.0 U
108-05-4	Vinyl Acetate	1.0 U
75-27-4	Bromodichloromethane	1.0 U
78-87-5	1,2-Dichloropropane	1.0 U

CAS Number		µg/L
10061-01-5	cis-1,3-Dichloropropene	1.0 U
79-01-6	Trichloroethene	-
124-48-1	Dibromochloromethane	1.0 U
79-00-5	1,1,2-Trichloroethane	1.0 U
71-43-2	Benzene	-
10061-02-6	trans-1,3-Dichloropropene	1.0 U
110-75-8	2-Chloroethylvinylether	1.0 U
75-25-2	Bromoform	1.0 U
108-10-1	4-Methyl-2-Pentanone	5.0 U
591-78-6	2-Hexanone	5.0 U
127-18-4	Tetrachloroethene	2.1
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U
108-88-3	Toluene	-
108-90-7	Chlorobenzene	-
100-41-4	Ethylbenzene	1.0 U
100-42-5	Styrene	1.0 U
1330-20-7	Total Xylenes	2.0 U
75-69-4	Trichlorofluoromethane	2.0 U
76-13-1	1,1,2-Trichlorotrifluoroethane	2.0 U

**Surrogate Recoveries**

d8-Toluene	98.1%
Bromofluorobenzene	97.1%
d4-1,2-Dichloroethane	99.2%



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**WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY**

ARI Job No: C290

Client: WDOE  
Project: Yakima RR

333 Ninth Ave. North  
Seattle, WA 98109-5187  
(206) 621-6490  
(206) 621-7523 (FAX)

Sample No: 478241

COMPOUND	SPIKE ADDED ( $\mu\text{g/L}$ )	SAMPLE CONC ( $\mu\text{g/L}$ )	MS CONC ( $\mu\text{g/L}$ )	MS % REC	QC LIMITS REC
1,1-Dichloroethene	50.0	0	66.4	133	61-145
Trichloroethene	50.0	0	59.6	119	71-120
Benzene	50.0	0	60.9	122	76-127
Toluene	50.0	0	56.5	113	76-125
Chlorobenzene	50.0	0	57.0	114	75-130

COMPOUND	SPIKE ADDED ( $\mu\text{g/L}$ )	MSD CONC ( $\mu\text{g/L}$ )	MSD % REC	% RPD	QC LIMITS	
					RPD	REC
1,1-Dichloroethene	50.0	64.7	129	3.1	14	61-145
Trichloroethene	50.0	57.9	116	2.6	14	71-120
Benzene	50.0	57.6	115	5.9	11	76-127
Toluene	50.0	55.6	111	1.8	13	76-125
Chlorobenzene	50.0	57.2	114	0	13	75-130

RPD: 0 out of 5 outside limits  
Spike Recovery: 0 out of 10 outside limits

Asterisked values outside QC Limits

Comments: QC Limits taken from CLP OLM01.6 (June 1991)

*gfp*  
Report prepared: 12/04/92 MAC:D-sk





**Water Quality Data  
pH and Specific Conductance**

Transaction #: 11251152 Seq #: 01 (10) Gen Inorg/Phys-Specified  
(WE) Ecology, Manchester Lab  
Project: (DOE-520Y) YAKIMA R.R. J1K1C CSJ  
Sample: ( 403 S) pH LAB Meter Std Unts

QA Code: ( ) Normal Data  
Instrument: (PH-CORN ) Corning pH Meter 125 #14987 (DOE)  
Method: (EP1-150.1 ) pH, Electrometric  
Chemist: (CAB) Bickle, Kitty DOE Hours Worked:  
Lab Prep: ( ) Unspecified  
Matrix: (10) Water-Total Date Preprd:  
Units: (06) Std Unts Date Analyzd: 921120

Line	Sample #	Result	Sample Location/Description	#Days to Anl
1	92 478240	6.5	MMFAB	921118 ( 2)
2	92 478242	6.9J	RAINIER	921117 ( 3)
3	92 478244	6.8J	BNRR 3S	921117 ( 3)
4	92 478245	8.4J	BNRR 3I	921117 ( 3)
5	92 478246	7.6J	BNRR 3D	921117 ( 3)
6	92 478251	7.0J	YSTEEL	921117 ( 3)
7	92 478256	6.7J	CRESTL.	921116 ( 4)
8	92 478257	6.8	NW TRUCK	921118 ( 2)

Record Type: TRNIN2

Date Verified: 12-2-92 By: Debbie Larson

Transaction Status: Edited Transaction...First Printing...Unverified.

Processed: 1-DEC-92 17:08:52 Status: E Batch: (In CUR DB)

Transaction #: 11251210 Seq #: 01 (10) Gen Inorg/Phys-Specified  
(WE) Ecology, Manchester Lab  
Project: (DOE-520Y) YAKIMA R.R. J1K1C CSJ  
Parameter: ( 95 S) Cond@25C Meter umho/cm

QA Code: ( ) Normal Data  
Instrument: (CONDUCT ) Conductivity Meter #XXXXXXX  
Method: (EP1-120.1 ) Conductance, Specific  
Chemist: (CAB) Bickle, Kitty DOE Hours Worked:  
Lab Prep: ( ) Unspecified  
Matrix: (10) Water-Total Date Preprd:  
Units: (03) umho/cm Date Anlyzd: 921123

Line	Sample #	Result	Sample Location/Description	#Days to Anl
1	92 478240	196	MMFAB	921118 ( 5)
2	92 478242	238	RAINIER	921117 ( 6)
3	92 478244	184	BNRR 3S	921117 ( 6)
4	92 478245	282	BNRR 3I	921117 ( 6)
5	92 478246	264	BNRR 3D	921117 ( 6)
6	92 478251	798	YSTEEL	921117 ( 6)
7	92 478256	203	CRESTL.	921116 ( 7)
8	92 478257	281	NW TRUCK	921118 ( 5)

**Appendix D**

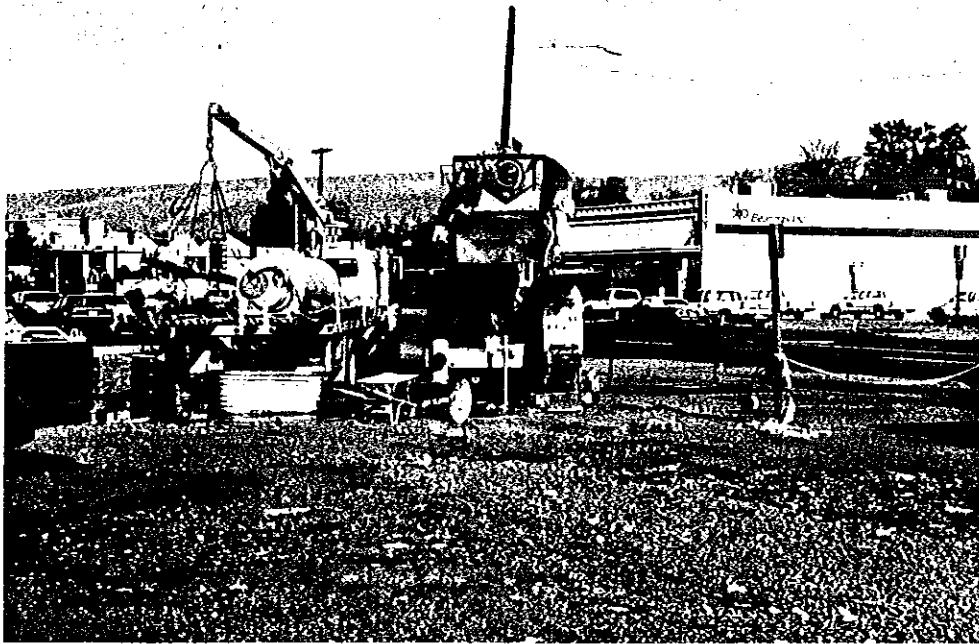
**Microtip Data**

**ole 12: Microtip Data - Yakima R.R. Site Investigation**

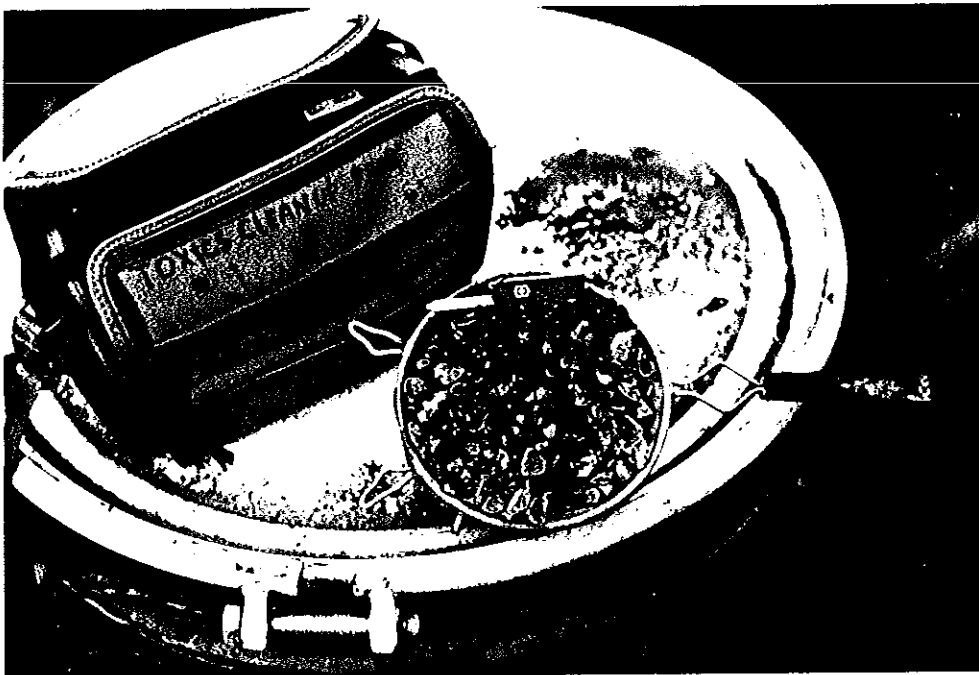
Facility	Event	Time	Date	Average Reading (PPM)	Approximate Depth (ft.)
Burrows Tractor	190	13:14	9 Nov 92	1.4	0 - 10
	193	14:06		1.4	0 - 10
Northwest Truck	194	14:56	9 Nov 92	0.0	0 - 4
B.N.R.R. 3D	196	07:19	10 Nov 92	8.2	0
	197	07:21		2.9	5
	198	08:40		2.5	
	203	08:40		4.7	
	205	08:41		5.2	20
	206	08:48		6.1	25
	207	10:00		2.4	
	208	10:04		2.6	36.5
	209	10:24		0.8	
	210	10:45		0.6	50
	211	10:50		0.3	60
	212	10:56		0.7	
	213	13:57		0.3	
	214	13:58		0.0	80
215	14:48		0.0	100	
CMX Corporation	217	10:17		0.0	5
	218	10:39		0.0	15
Southgate Laundry	219	15:16		0.0	1
	220	15:34		0.0	5
Martinizing Dry Cleaners	227	16:22		1.9	0 - 4
	233	16:22		2.1	0 - 4
	234	16:27		0.0	0 - 4
Van Cleave	235	07:36		8.4	0 - 2.5 ft.

**Appendix E**

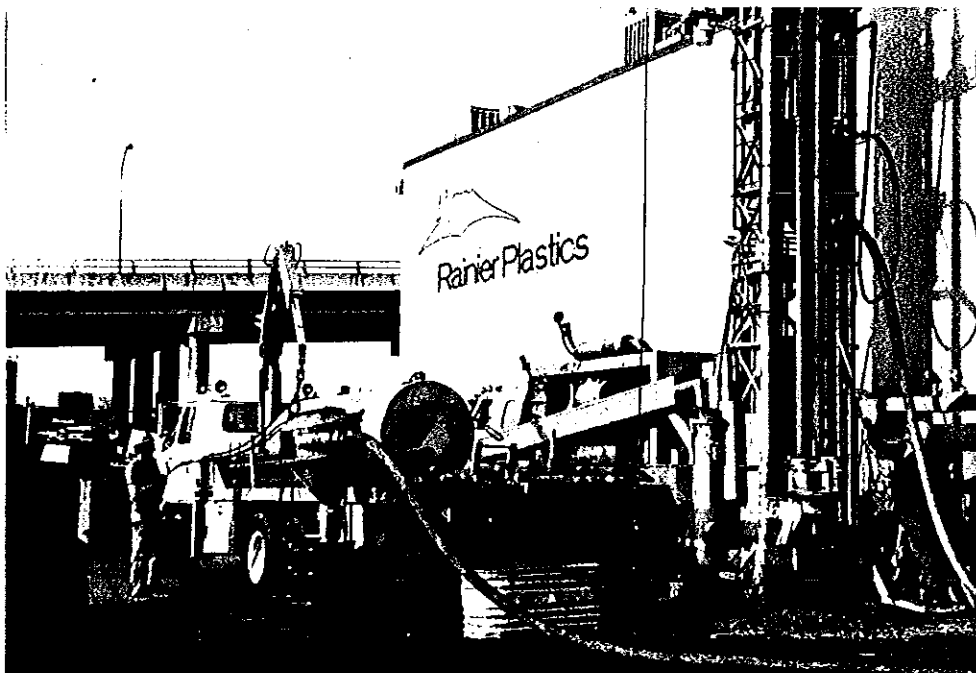
**Pictures**



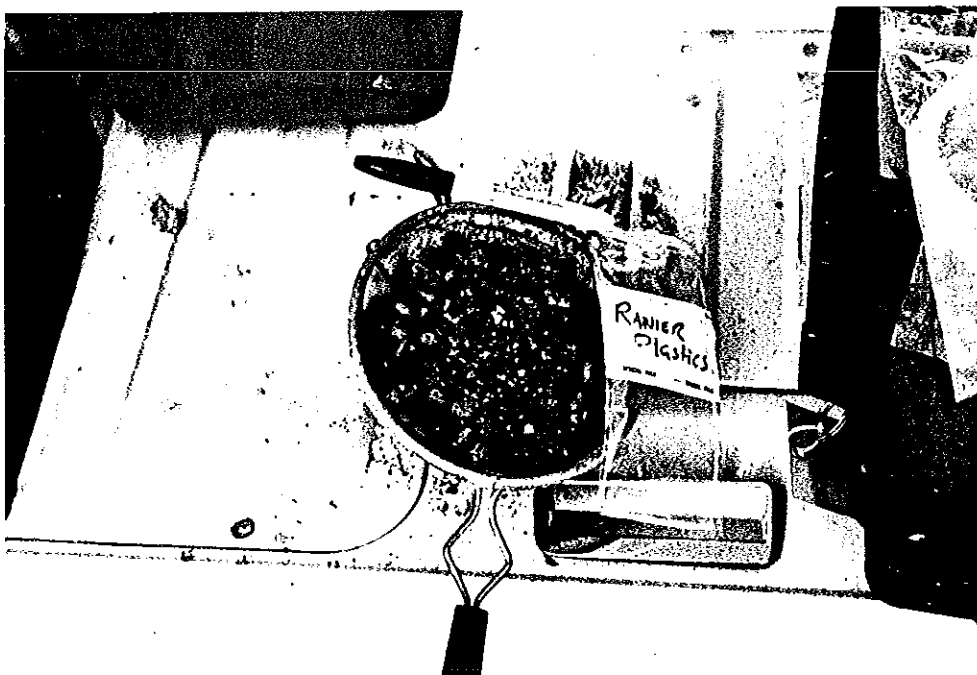
**Figure 8: Crest Linen site, North 1 St. & B St..**



**Figure 9: Typical grab sample from the "cyclone", Yakima R.R. Sample is from M & M Fabricators, 2004 S. 14th St.**

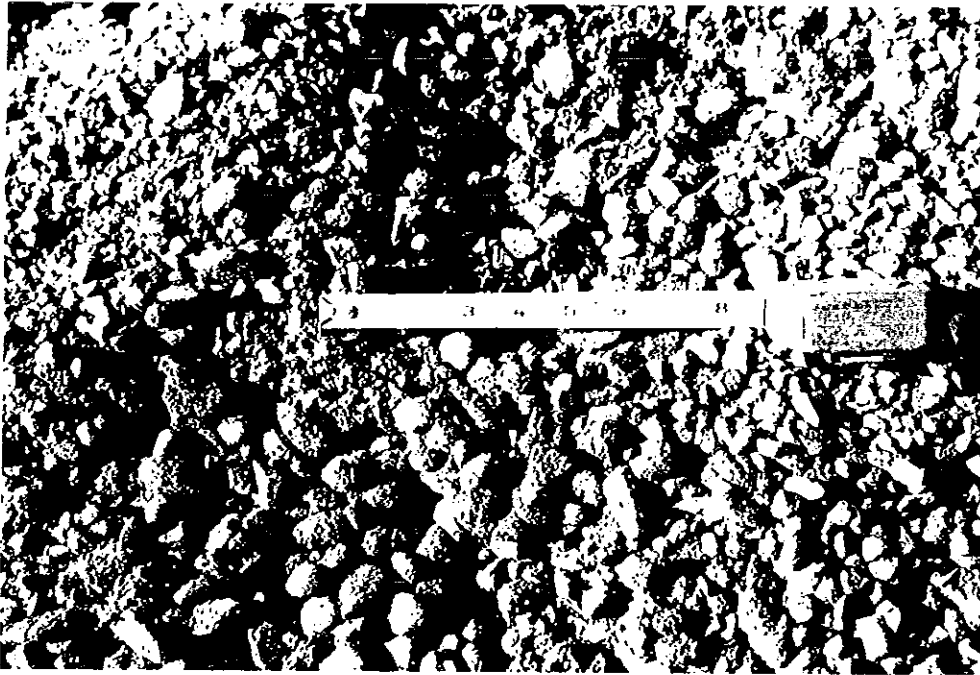


**Figure 10: Drilling at Rainier Plastics, 1101 Ledwich (3 Nov 92).**



**Figure 11: Cyclone grab sample, Rainier Plastics.**





**Figure 12: Coarse gravels, Burlington Northern Railroad.**



**Figure 13: Coarse Gravels, Burlington Northern Railroad. Clayey sand and gravel encountered at approximately 30 ft. while drilling WDOE-3D (total depth = 97 ft.).**



Figure 14: WDOE-3D, B.N.R.R., 0 - 18 ft. depth.

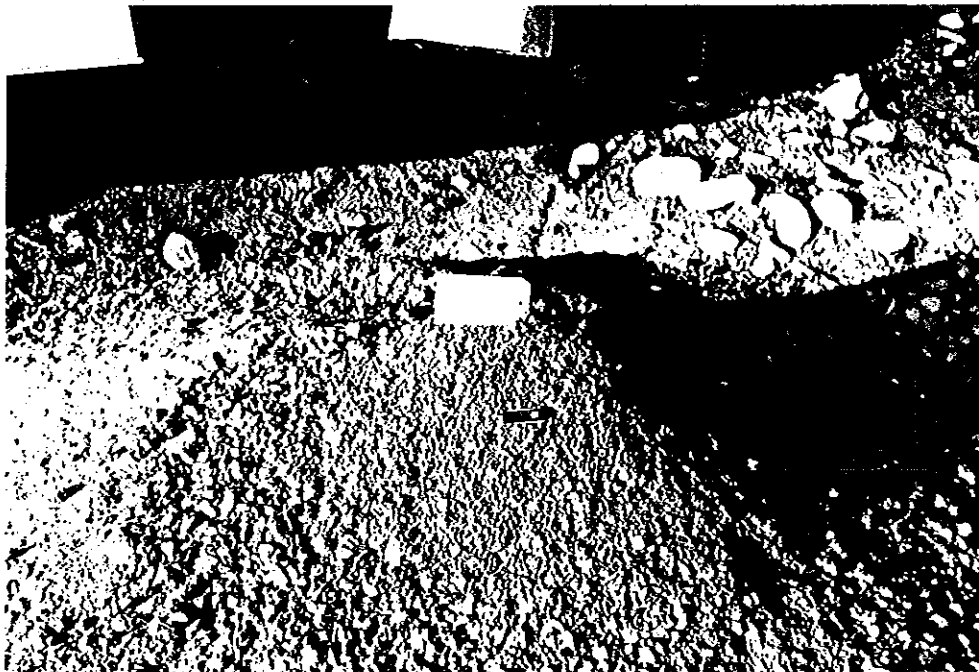


Figure 15: Clayey sand and gravel, WDOE-3D. B.N.R.R., 36 ft. depth.

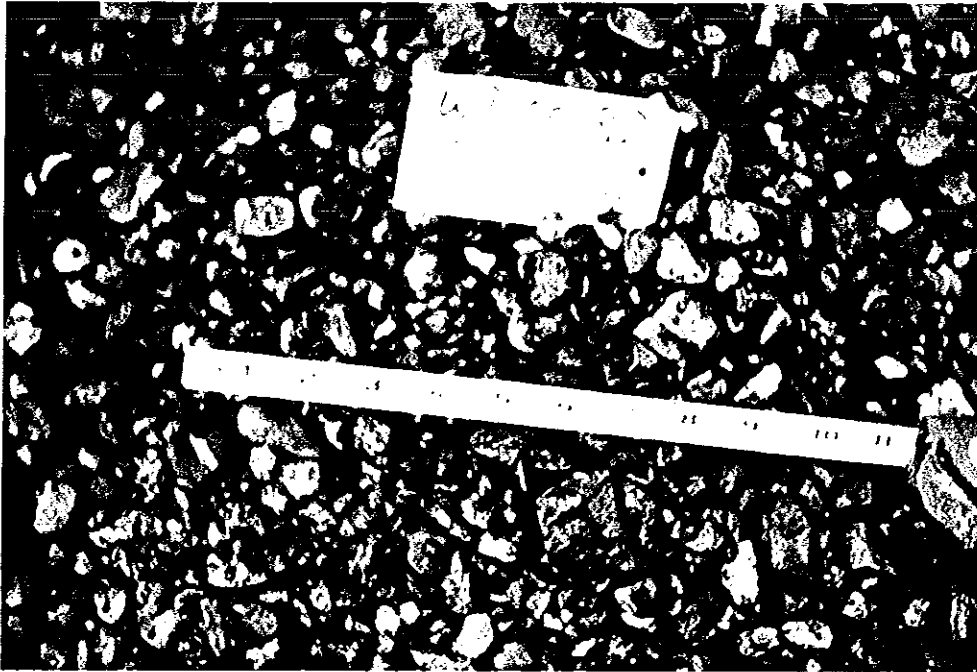


Figure 16: Clean gravel and cobbles, WDOE-3D, B.N.R.R., 78 ft. depth.

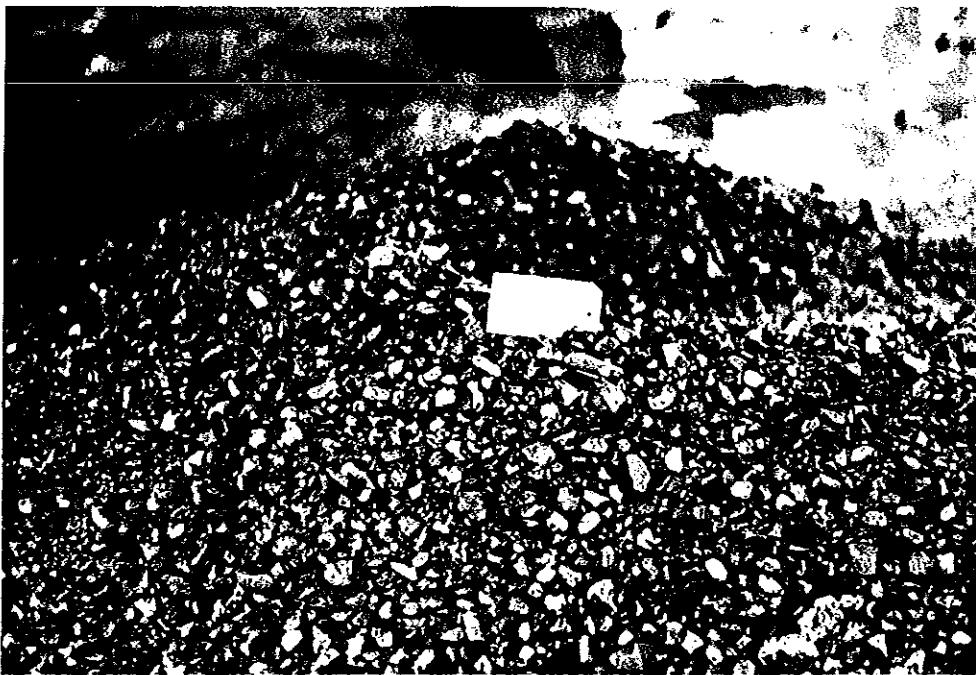
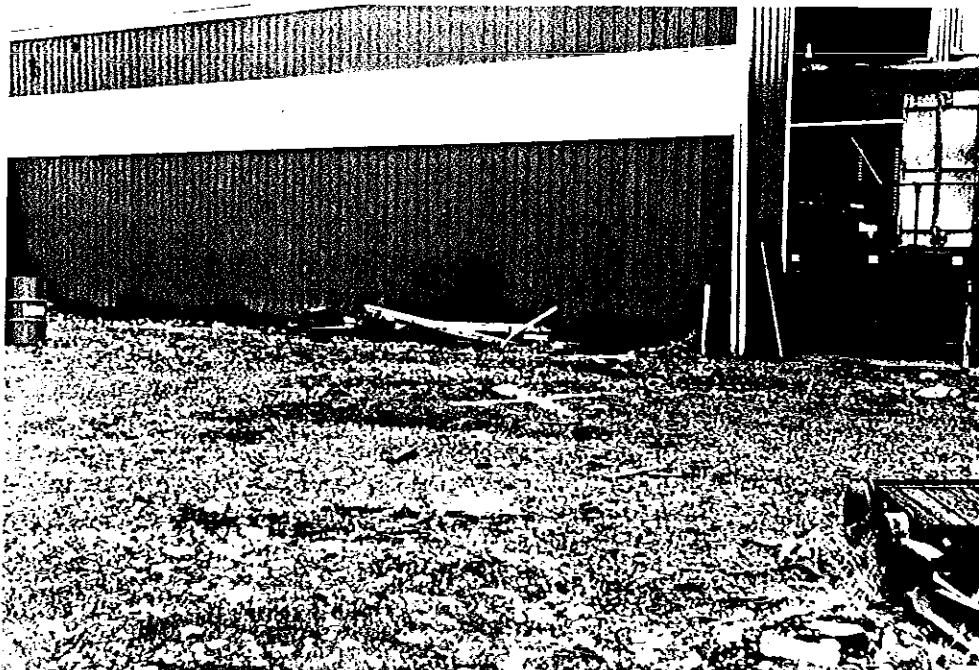


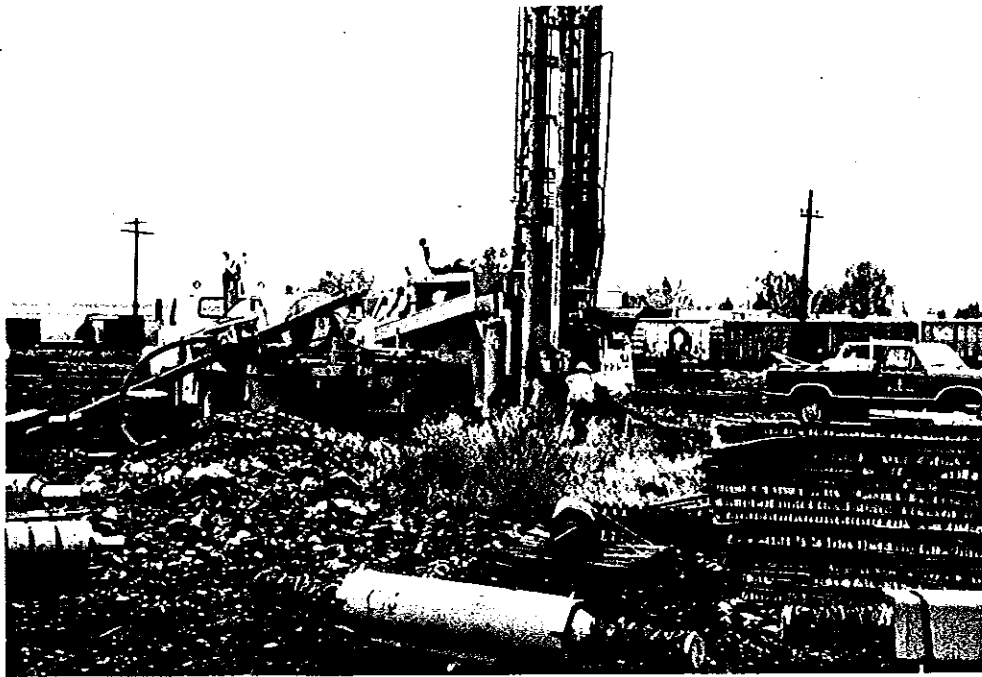
Figure 17: Clean gravels (USCS SW). Subangular and subrounded stones to 1". WDOE-3D, B.N.R.R., 78 ft. depth.



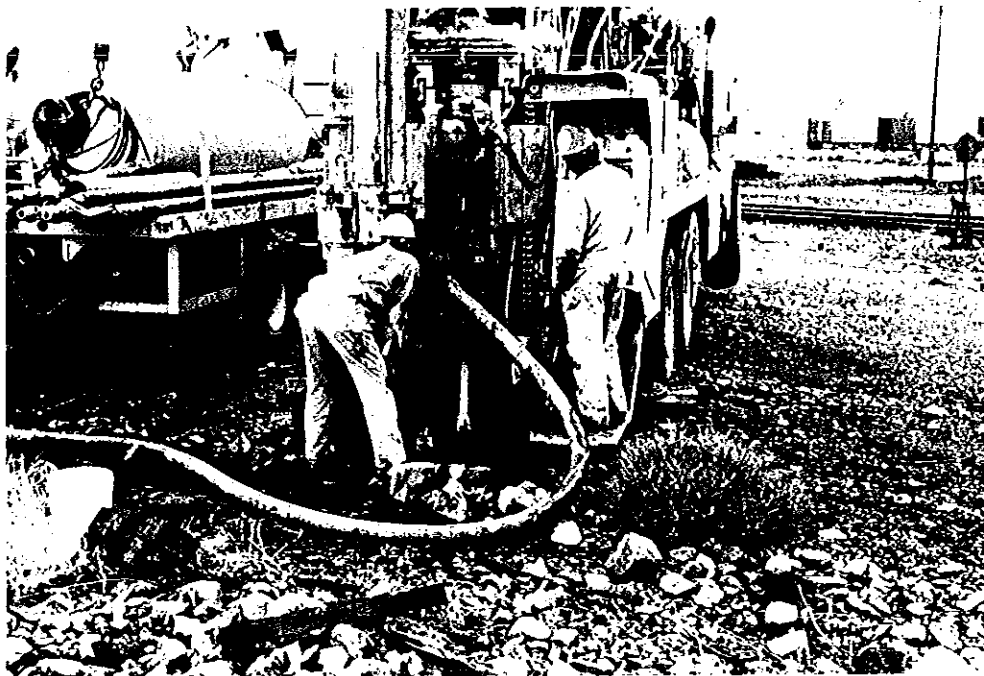
**Figure 18: B.N.R.R. Roundhouse Repair Shop.**



**Figure 19: B.N.R.R. Roundhouse Repair shop. White "X" on ground marks proposed original drilling location. Drilling location was relocated due to the extension of the foundation beneath the repair shop.**



**Figure 20: Starting WDOE-3s, B.N.R.R.**



**Figure 21: Drilling WDOE-3S, B.N.R.R. (4 Nov 92).**

**Appendix F**  
**Chain of Custody Records**

Field Identification	Date	Start Time	Sample Nos.	Number Collected	Analysis	Depth
Agri-Tech, 6 East Washington	5 Nov 92	16:00 hrs	468106 468107 468110	3	Pesticide/PCB Pesticide/PCB VOA	10 ft. 10 ft. 10 ft.
Martinizing Dry Cleaners, 812 Summitview	12 Nov 92	16:30 hrs	478230 478231 478232 478233	4	VOA TOC Metals VOA	4 ft. 1 ft. 4 ft. 4 ft.
Southgate Laundry	12 Nov 92	15:30 hrs	478234 478235 478236 478237	4	Metals TOC VOA VOA	1 ft. 1 ft. 4 ft. 4 ft.
Van Cleave Body, 305 Division	13 Nov 92	07:30 hrs	478238 478239	2	VOA TOC	2.5 ft. 2.5 ft.
N.W. Truck, 805 1/5 Ahtanum Road	9 Nov 92	15:00 hrs	468116 468117 468118 468119 468120 468121	6	VOA Metals VOA TOC VOA VOA	4 ft. 4 ft. 4 ft. 4 ft. 9 ft. 9 ft.
Burrows Tractor, 1308 East Mead	9 Nov 92	13:15 hrs	468111 468112 468113 468114 468115	5	Grain Size Metals TOC VOA VOA	30" 30" 30" 7 ft. 7 ft.
CMX Corporation, 206 West Mead	12 Nov 92	10:28 hrs	468129 468130 468131 468132	4	Metals TOC VOA VOA	3.5 ft. 3.5 ft. 3.5 ft. 3.5 ft.
Total Number of Soil Samples Collected				60		

**Table 14: Ground Water Sampling Summary - Location and Date**

Field Identification	Date	Sample No.	Number Collected	Analysis
WDOE-1 Crest Linen, North 1st & B St.	16 Nov 92	478255 478256	2	pH/Cond. VOA
WDOE-2 Rainier Plastics, 1101 Ledwich	17 Nov 92	478242 478243	2	VOA VOA
WDOE- 3s, B.N.R.R. 6 East Arlington	17 Nov 92	478244 478247	2	pH/Cond. VOA
WDOE-3d, B.N.R.R. 6 East Arlington	10 Nov 92 17 Nov 92	468133 478246 478249	3	pH/Cond. pH/Cond. VOA
WDOE-3i, B.N.R.R., 6 East Arlington	17 Nov 92	478245 478248	2	pH/Cond, VOA
WDOE-4, M & M Fabricators, 2004 S. 14th	18 Nov 92	478240 478241	2	pH/Cond. VOA
WDOE-5, CMX Corporation, 206 W. Mead	18 Nov 92	478254	1	VOA
WDOE-6, Agri-Tech/Yakima Steel, 6 East Washington	17 Nov 92	478250 478251 478252	3	Pest./PCB pH/Cond. VOA
WDOE-7, Northwest Truck, 805 1/5 Ahtanum Road	18 Nov 92	478253 478257	2	VOA pH/Cond.
Total Number of Ground Water Samples Collected			19	

















