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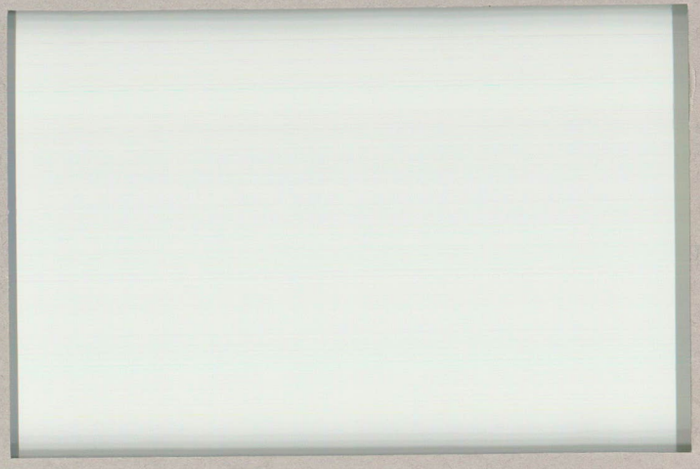

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JAMES RIVER CORPORATION

SECOND YEAR, SECOND QUARTER GROUNDWATER MONITORING RESULTS, COATED PRODUCTS DIVISION

NOVEMBER 19, 1992

26-89-064

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November 19, 1992

Mr. David Ernst
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James River Corporation
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13-5935-03

Subject: Second Year, Second Quarter, Groundwater Monitoring Results
Coated Products Division, James River Corporation,
North Portland Facility

Dear Mr. Ernst:

This report presents the results of the second year, second quarter, groundwater monitoring (QGWM) event conducted at the Coated Products Division (CPD) of the James River Corporation (JRC), North Portland facility (Figure 1). This round of QGWM is part of the continuing QGWM program which was initiated at the CPD by Brown and Caldwell Consultants (BCC) in February 1990. The purpose of the QGWM program is to monitor the degree and extent of shallow groundwater contamination beneath the Press Room and Gasoline UST areas of the CPD in connection with seasonal groundwater fluctuations.

The second year, second quarter, CPD sampling event was completed by BCC on August 8, 1991. The work was authorized under Purchase Order No. 90106761 and was performed in accordance with the July 6, 1989, contract between JRC and BCC.

This report includes a brief summary of previous investigations completed at the CPD followed by a detailed discussion of the second year, second quarter, groundwater monitoring results.

INVESTIGATIVE HISTORY

Previous investigations and remedial activities at the CPD have included the decommissioning of six USTs, a follow-up soil and groundwater investigation and one year of QGWM.

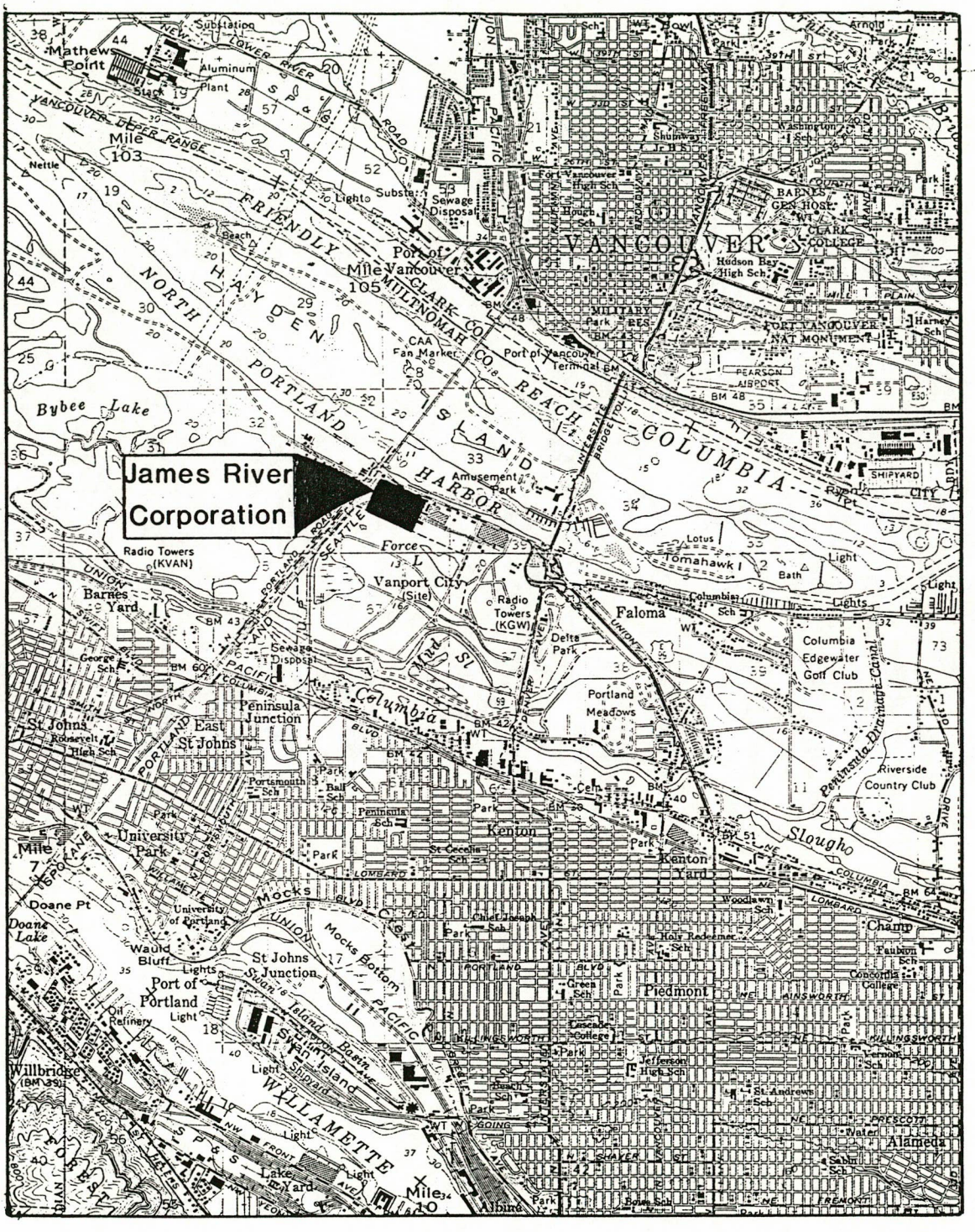

FIGURE 1

Vicinity Map
Portland, Oregon

CPD Tank Decommissioning - April 1989

In April 1989 five alcohol-solvent USTs were excavated from the Press Room UST area and one gasoline UST was excavated from the Gasoline UST area of the CPD (Figures 2 and 3). Laboratory analysis of soil samples collected from the Press Room UST excavation revealed elevated concentrations of methanol, ethanol, normal propanol, isopropanol, butanol, hexanol, acetone, toluene, methyl isobutyl ketone (MIBK), and ethyl acetate. Analysis of soil and groundwater samples collected from the Gasoline UST excavation indicated the presence of benzene, toluene, ethylbenzene, and xylene (BTEX). A detailed summary of this investigation is included in Appendix B-1 of the November 28, 1989, BCC report entitled, "Soil and Groundwater Investigation Coated Products Division Portland, Oregon"

Contaminated soils that were removed from each excavation were placed in separate piles and allowed to aerate until October 1989. Subsequent laboratory analysis of soil samples from each aeration pile confirmed the effectiveness of aeration, and upon approval by the Oregon DEQ, the soils were used to backfill the respective UST excavations.

Follow-Up CPD Soil and Groundwater Investigation - September 1989

In response to the soil and groundwater contamination documented during CPD tank decommissioning procedures, BCC conducted a follow-up soil and groundwater investigation in the areas surrounding the former Press Room and Gasoline UST excavations. The investigation included a soil vapor survey, installation of six groundwater monitoring wells, soil and groundwater sampling and analysis, and measurement of groundwater elevations to determine the shallow groundwater gradient. A detailed discussion of this investigation is included in the November 28, 1989, BCC report entitled, "Soil and Groundwater Investigation Coated Products Division, Portland, Oregon"

Press Room UST Area. Based on the results of the soil vapor survey, groundwater monitoring wells JR-1, JR-2 and JR-3 were installed near the former Press Room UST excavation (Figure 2). JR-1 and JR-3 were completed at a depth of 25 feet below grade (bg) and screened from 10 to 25 feet bg; JR-2 was completed at a depth of 23 feet bg and screened from 8 to 23 feet bg.

Laboratory analysis of soil samples collected during the construction of these wells detected toluene concentrations between 0.2 ppm and 0.3 ppm in samples collected at 2 feet bg from JR-1 and JR-3, and 10 feet bg from JR-2. The JR-2 sample also contained isopropyl alcohol, acetone, MIBK, and methyl ethyl ketone (MEK) at concentrations of 1,333 ppm, 14 ppm , 9 ppm, and 1 ppm respectively.

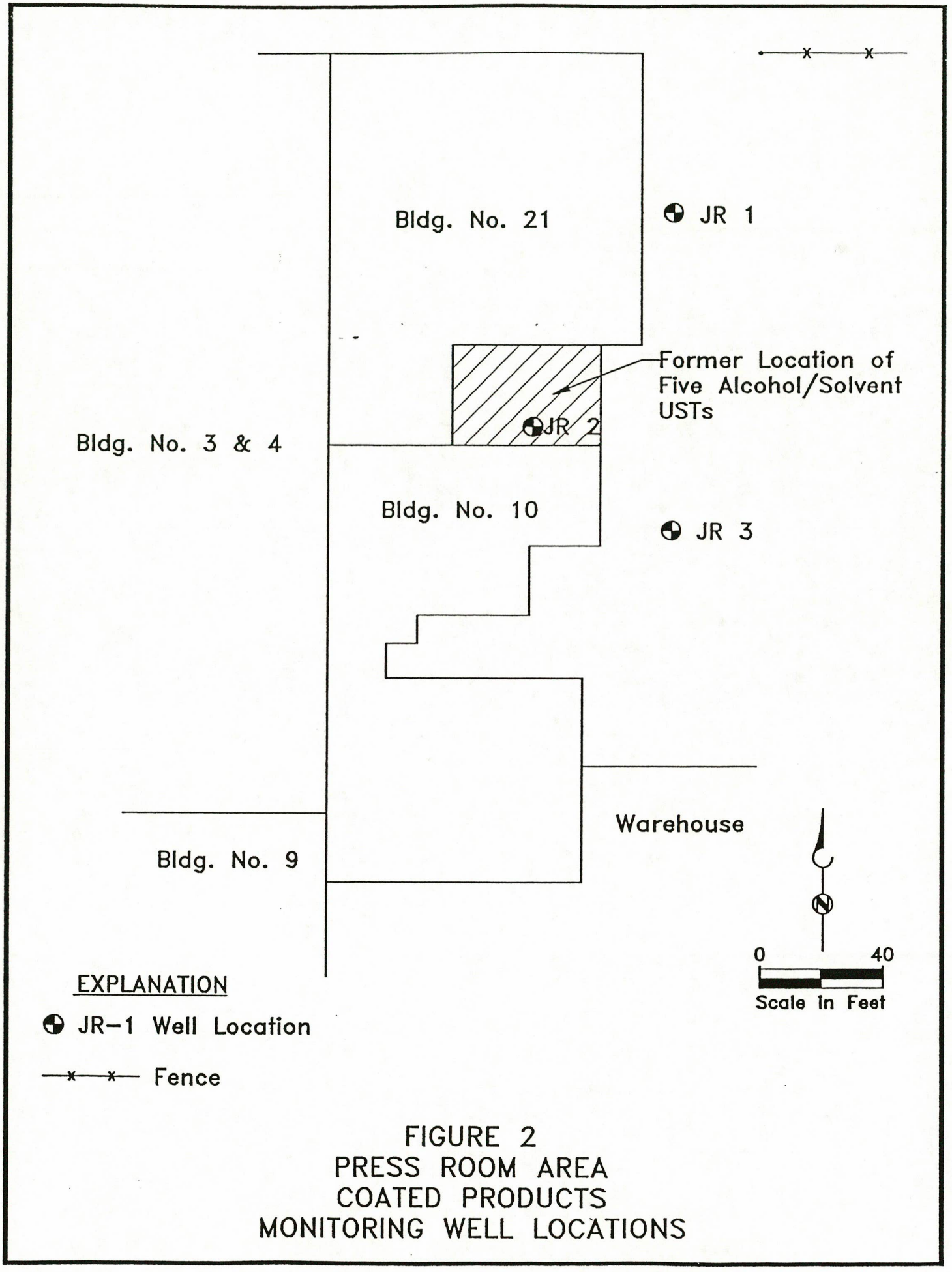

FIGURE 2
PRESS ROOM AREA
COATED PRODUCTS
MONITORING WELL LOCATIONS

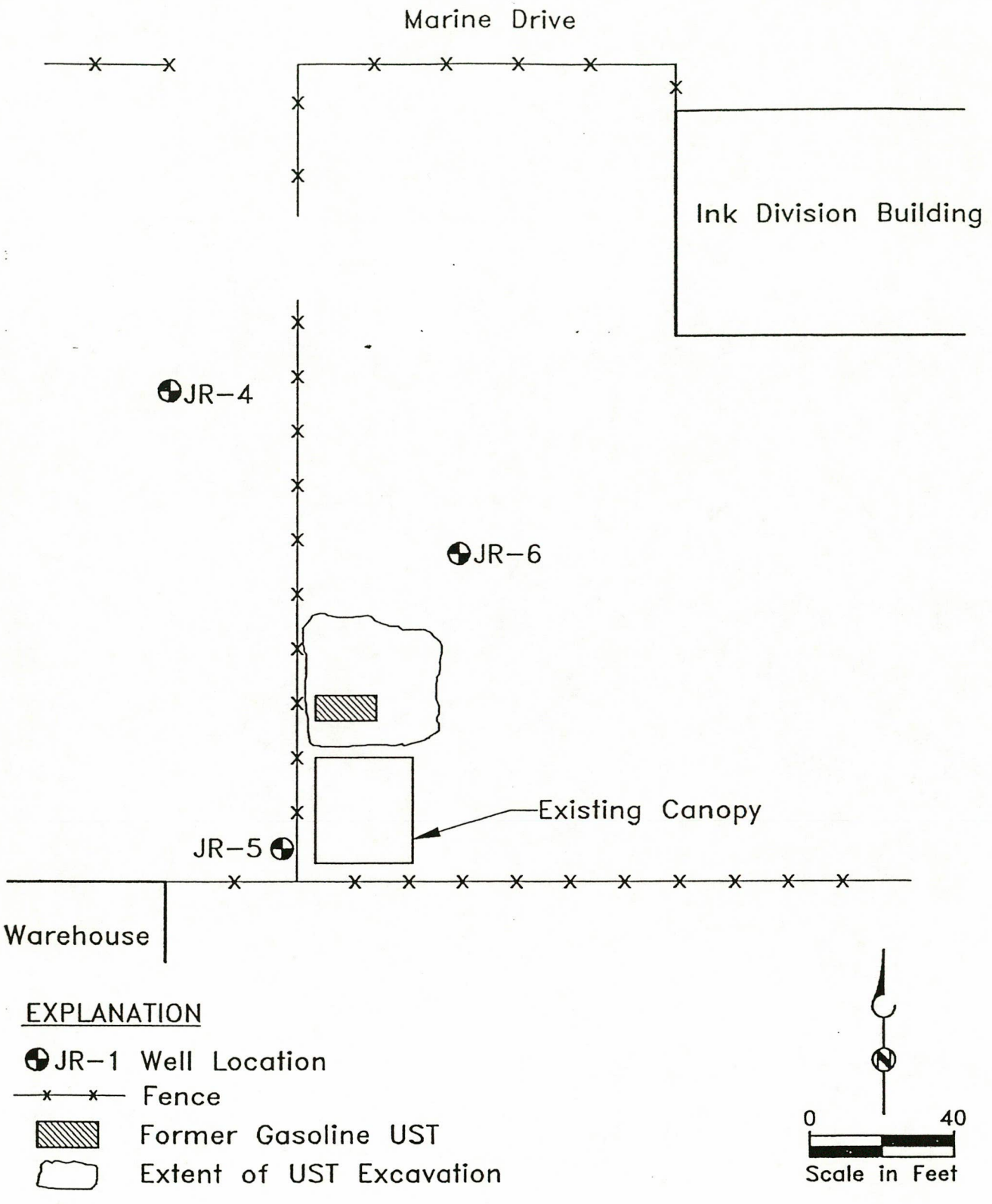

FIGURE 3
GASOLINE UST AREA
COATED PRODUCTS
MONITORING WELL LOCATIONS

Laboratory analysis of groundwater samples collected from JR-1, JR-2, and JR-3, revealed elevated concentrations of isopropyl alcohol (7,800 ppb), acetone (1,500 ppb), and MIBK (440 ppb) in JR-2. No compounds were identified above laboratory method detection limits (MDL) in groundwater samples from JR-1 and JR-3.

Groundwater elevations in the three Press Room monitoring wells were 11.98 feet in JR-1, 12.24 feet in JR-2, and 12.30 feet in JR-3. These measurements indicated a gently sloping groundwater gradient of 0.23 feet per 100 feet with groundwater flowing from south-southwest to north-northeast (N18°E).

Gasoline UST Area. Groundwater monitoring wells JR-4, JR-5 and JR-6 were installed near the former gasoline UST excavation (Figure 3). Each of these wells were completed at a depth of 20 feet bg and screened from 5 to 15 feet bg.

Laboratory analysis of soil samples collected during the construction of these wells detected TPH concentrations of 140 ppm and 360 ppm in samples collected at 2 feet bg from JR-5 and JR-6 respectively. Samples collected from JR-4, JR-5 and JR-6 at 5 feet bg had lower TPH concentrations of 17 ppm, 100 ppm and 17 ppm respectively. The hydrocarbon identification (HCID) analysis, performed on samples from JR-5 and JR-6 did not indicate the presence of hydrocarbons within a carbon range of C_6 - C_{25}.

Laboratory analysis of groundwater samples collected from JR-4, JR-5, and JR-6, revealed elevated concentrations of benzene (120 ppb), ethylbenzene (14 ppb), and xylene (960 ppb) in JR-5. No BTEX constituents were identified above laboratory MDLs in groundwater samples from JR-4 and JR-6.

Groundwater elevations in the three Gasoline UST area monitoring wells were 16.55 feet in JR-4, 16.83 feet in JR-6, and 17.53 feet in JR-5. These measurements indicated a gently sloping groundwater gradient of 0.70 feet per 100 feet with groundwater flowing from south-southwest to north-northeast (N10°E).

Quarterly Groundwater Monitoring

QGWM at the Press Room and Gasoline UST areas consisted of five sampling events conducted in February, June, and September 1990, and January and April 1991. During each sampling event, groundwater elevations were recorded, and groundwater samples were collected and analyzed from JR-1, JR-2, JR-3, JR-4, JR-5, and JR-6. Groundwater elevations measured during each of the QGWM events are listed in Appendix A. Analytical results for previous QGWM events are included in the August 16, 1991, BCC report entitled, "Second Year, First Quarter, Monitoring Results Coated Products Division, Portland, Oregon", and are discussed in conjunction with the second year, second quarter, results at the end of this report.

SECOND YEAR, SECOND QUARTER, GROUNDWATER MONITORING EVENT APRIL - 1991

Fieldwork and Sampling Methodology

The second year, second quarter, groundwater monitoring event was conducted by BCC on August 6, 1991. Field activities included the measurement of static water levels (SWL), and the purging and sampling of groundwater from the monitoring wells in the Press Room UST area (JR-1, JR-2 and JR-3) and the Gasoline UST area (JR-4, JR-5 and JR-6). In addition, five quality control samples (QC) samples including duplicate samples from JR-2 and JR-5, a trip blank, and two rinsate blanks were collected.

Sampling was performed according to EPA guide lines described in the *Compendium of Superfund Field Operations Methods* (EPA 1987). After SWLs in all of the monitoring wells were recorded, 3 to 6 well volumes were purged from each well using a stainless steel bailer. Purging was continued until groundwater parameters (temperature, pH, and specific conductance) stabilized to within a 10 percent variance. A record of the groundwater parameters measured during the purging and sampling of each well is included in Appendix B.

After purging was completed, groundwater samples were collected with a teflon bailer and then transferred into 40 milliliter VOA vials using a controlled flow valve. The temperature, pH and specific conductance of each sample were measured once again immediately after collection. Excess water generated during purging and sampling was stored in 30-gallon fiber drums for subsequent disposal by JRC.

Teflon and stainless steel bailers were decontaminated prior to sampling each well. The decontamination procedure included an Alconox detergent wash followed by a tap water rinse and a deionized water rinse. Two QC rinsate blanks were collected to test the effectiveness of the decontamination process. The rinsate blanks were prepared from laboratory grade deionized water which had been passed through a freshly decontaminated teflon bailer.

A QC trip blank, which consisted of two 40 milliliter VOA vials filled with laboratory grade deionized water, was prepared by Pacific Environmental Laboratory Inc., (PEL) in Beaverton, Oregon. The trip blank was transported to the site in the sample cooler, and remained on site throughout the QGWM event. After sampling was completed, the trip blank was returned to PEL with the rest of the QGWM samples.

All QGWM samples were preserved in ice immediately after collection and delivered to PEL for analysis. A copy of the sample chain-of-custody document is included in Appendix C.

Analytical Program

The analytical program for this investigation was designed in accordance with EPA handling and analytical requirements outlined in the *User's Guide to the Contract Laboratory Program* (EPA 1986). Gasoline UST area samples 1002 (rinsate blank), 1003 (JR-4), 1004 (JR-6), 1005 (JR-5), and 1006 (JR-5 duplicate) were analyzed for aromatic volatile organic compounds (BTEX) using EPA Method 8020. Press Room UST area samples 1007 (JR-1), 1008 (JR-3), 1009 (JR-2), 1010 (JR-2 duplicate), and 1011 (rinsate blank), and the trip blank (sample 1001) were analyzed for volatile organic compounds using EPA Method 8240. Sampling handling and analytical requirements are summarized in Table 1.

Table 1. Sample Handling and Analytical Requirements

Sample	Sample Location	Sample Matrix	Analytical Method	Preservation and Storage Requirements	Maximum Holiday Time
1001	TB[a]	Deionized Water	EPA 8240	Cool to 4°C; HCL	14 days
1002	RB[b]	Deionized Water	EPA 8020	Cool to 4°C	14 days
1003	JR-4	Groundwater	EPA 8020	Cool to 4°C	14 days
1004	JR-6	Groundwater	EPA 8020	Cool to 4°C	14 days
1005	JR-5	Groundwater	EPA 8020	Cool to 4°C	14 days
1006	JR-5[c]	Groundwater	EPA 8020	Cool to 4°C	14 days
1007	JR-1	Groundwater	EPA 8240	Cool to 4°C; HCL	14 days
1008	JR-3	Groundwater	EPA 8240	Cool to 4°C; HCL	14 days
1009	JR-2[c]	Groundwater	EPA 8240	Cool to 4°C; HCL	14 days
1010	JR-2	Groundwater	EPA 8240	Cool to 4°C; HCL	14 days
1011	RB[b]	Deionized Water	EPA 8240	Cool to 4°C; HCL	14 days

[a] Trip blank.
[b] Rinsate blank.
[c] Duplicate sample.

Analytical Results

Press Room UST Area. The second year, second quarter analytical results for samples collected from the Press Room UST area are included in Appendix D and summarized in Table 2.

Table 2. Second Year, Second Quarter, Groundwater Analytical Results Summary
Press Room UST Area - August 1991

Sample No.	Volatile Organic Compound Analysis[a]				
	Sample Location	Acetone	MIBK[c]	Isopropyl Alcohol	Ethanol
1001	Trip Blank	<50	<50	<100	<100
1007	JR-1	<50	<50	<100	<100
1008	JR-3	<50	<50	<100	<100
1009	JR-2	2,900	430	<1,000	<1,000
1010	JR-2[b]	4,200	520	<2,000	<2,000
1011	Rinsate Blank	<50	8.1	<100	<100

[a] EPA Method 8240, concentrations in parts per billion (ppb).
[b] Duplicate sample.
[c] MIBK is reported as 4-methyl-2 pentanone in laboratory analytical report.

Analytical results identified acetone and MIBK at concentrations of 2,900 ppb, and 430 ppb respectively, in JR-2. Isopropyl alcohol and ethanol were not detected in JR-2 at or above laboratory MDLs of 1,000 ppb. No volatile organic compounds were detected at or above laboratory MDLs in groundwater samples from JR-1 and JR-3.

High isopropyl alcohol and ethanol MDLs for samples from JR-2 (1009 and 1010) reflect the high laboratory dilution factors that were necessary to bring the acetone concentrations in these samples within the calibration range of the GC/MS. The 45 percent difference in the concentration of acetone, and the 21 percent difference in the concentration of MIBK between samples 1009 and 1010 may also be an artifact of these high dilution factors.

Analysis of the trip blank did not indicate any apparent quality control problems resulting from sample handling. MIBK was detected at 8.1 ppb in the equipment rinsate blank (1011); however, this sample was prepared after sampling JR-2 which was the only well in the Press Room area that contained MIBK above the laboratory MDL.

Groundwater elevations in the three Press Room UST area wells during the second year, second QGWM event were 12.99 feet in JR-1, 12.36 feet in JR-2, and 13.45 feet in JR-3. These measurements indicated a relatively steep groundwater gradient of 2.50 feet per 100 feet with groundwater flowing from east to west (N82°W) (Figure 4).

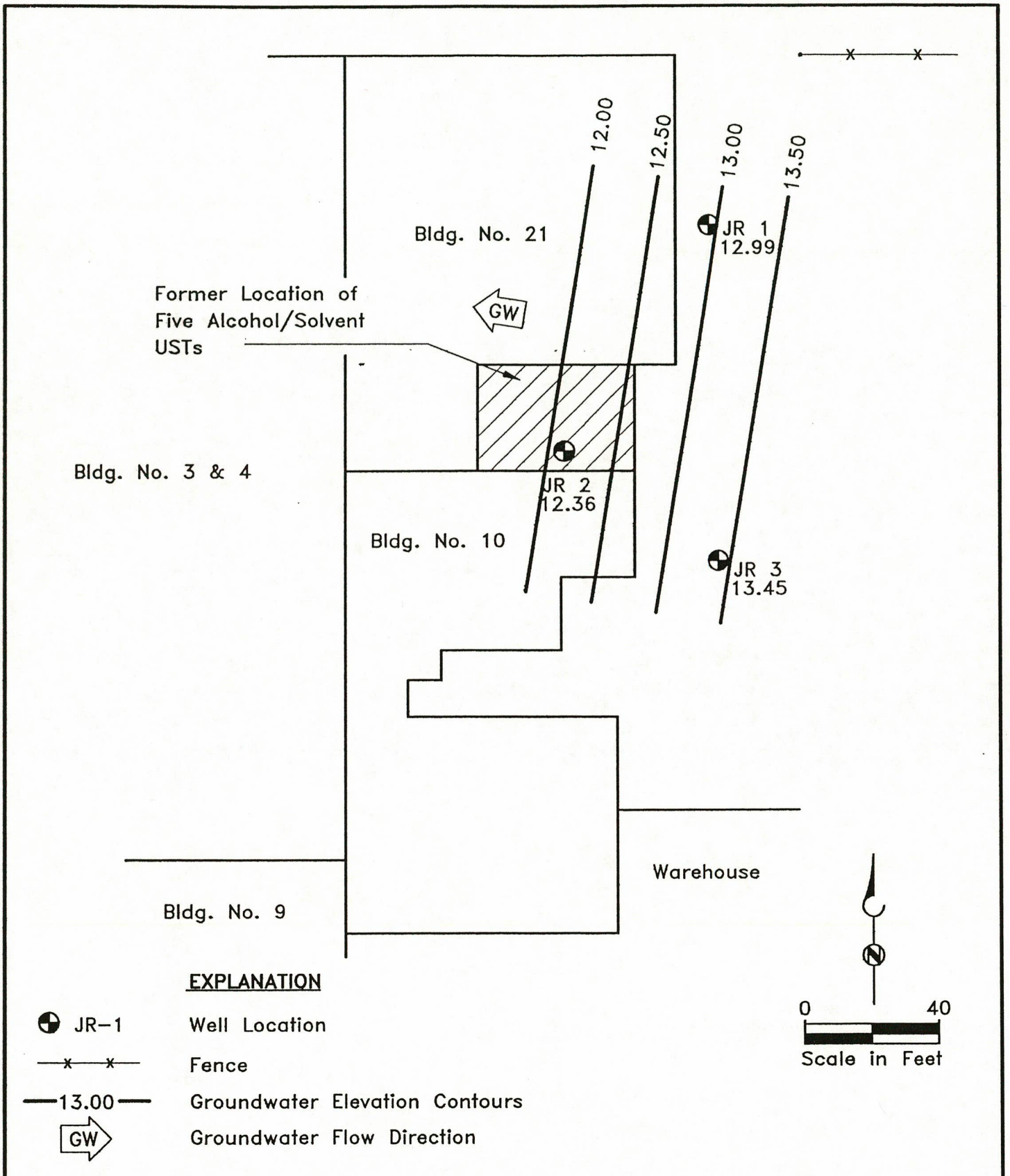

FIGURE 4
PRESS ROOM AREA
SECOND YEAR SECOND QUARTER
GROUNDWATER ELEVATION MAP

Gasoline UST Area. The second year, second quarter, analytical results for samples collected from the Gasoline UST area are included in Appendix D and summarized in Table 3.

Table 3. Second Year, Second Quarter, Groundwater Analytical Results Summary
Gasoline UST Area - August 1991

Sample No.	Sample Location	Aromatic Volatile Organic Compound Analysis[a]			
		Benzene	Toluene	Ethylbenzene	Xylene
1002	Rinsate Blank	<0.5	<0.99	<0.5	1.5
1003	JR-4	<10	<10	<10	<10
1004	JR-6	<5.0	<5.0	<5.0	<5.0
1005	JR-5	94	12	290	700
1006	JR-5[b]	99	15	390	920
DEQ MCLs[c]		5	2,000	700	10,000

[a] EPA Method 8020, concentrations in parts per billion (ppb).
[b] Duplicate sample.
[c] DEQ MCLs, based on EPA primary drinking water standards, concentrations in ppb.

Analytical results identified benzene, toluene, ethylbenzene, and xylene in JR-5 at concentrations of 94 ppb and 12 ppb, 290 ppb, and 700 ppb, respectively. Aromatic volatile organic compounds were not detected at or above laboratory MDLs in groundwater samples from JR-4 and JR-6. Variable laboratory MDLs for BETEX were due to variable dilution factors that were necessary to screen out matrix background interference in these samples.

Analysis of the trip blank, duplicate sample and rinsate blank did not indicate any apparent quality control problems resulting from sample handling, field decontamination, or analytical procedures. Toluene was detected at 0.99 ppb, and xylene was detected at 1.5 ppb in the equipment rinsate blank (1002); however, the rinsate blank was prepared after sampling JR-5 which was the only well in the Gasoline UST area that contained BTEX above laboratory MDLs.

Groundwater elevations in the three Gasoline UST area wells during the second year, second QGWM event, were 16.34 feet in JR-4, 17.32 feet in JR-5, and 18.50 feet in JR-6. These measurements indicated a relatively steep groundwater gradient of 2.88 feet per 100 feet with groundwater flowing from east to west (N87°W). (Figure 5).

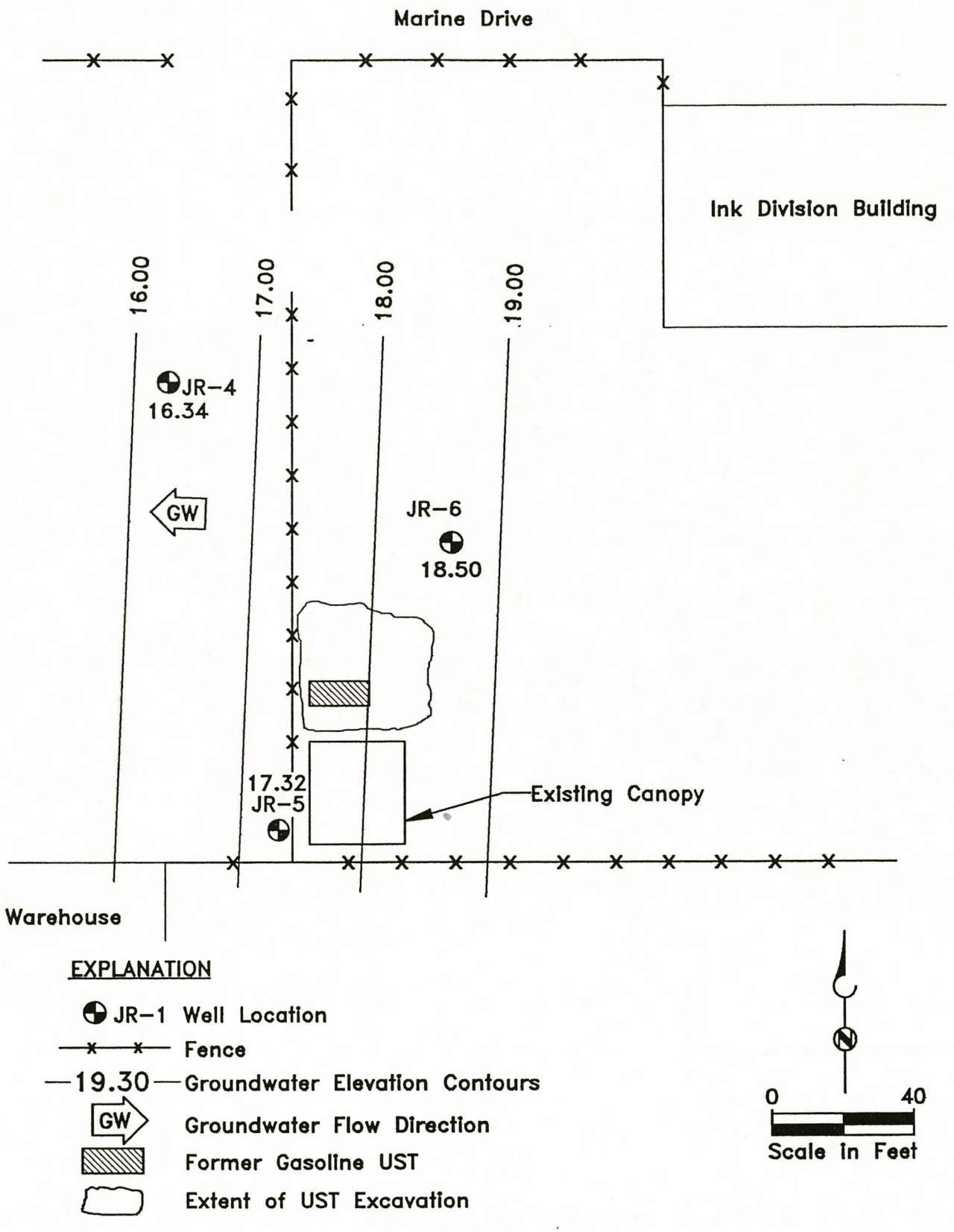

FIGURE 5
GASOLINE UST AREA
SECOND YEAR SECOND QUARTER
GROUNDWATER ELEVATION MAP

Discussion

Press Room UST Area. Since the initiation of groundwater monitoring in the Press Room UST area, significant groundwater contamination has only been identified in samples collected from JR-2. Table 4 contains a list of the analytical results from all the JR-2 groundwater samples collected to date. Although the compounds detected in JR-2 have generally remained consistent throughout the monitoring period, the concentrations of these compounds has fluctuated dramatically.

The second year, second quarter, analytical results indicate a 53 percent increase in the concentration of acetone, and a 95 percent increase in the concentration of MIBK compared to the previous QGWM event. Isopropyl alcohol concentrations appear to have stabilized below laboratory MDLs as compared to the relatively high levels detected in the first year QGWM events. Ethanol remained below laboratory MDLs despite its occurrence during the second and third quarters of the first year at concentrations of 22,000 ppb and 23,000 ppb respectively (Table 4).

Table 4. Groundwater Analytical Results Summary
Well No. JR-2 Press Room UST Area

Investigation	Date	Volatile Organic Compound Analysis[a]			
		Acetone	MIBK[c]	Isopropyl Alcohol	Ethanol
Initial Investigation	9/89	1,500[d]	440[d]	7,800[d]	<100[d]
(Duplicate)[b]		(1,700)[d]	(430)[d]	(7,600)[d]	(<100)[d]
1st year, 1st quarter	2/90	8,000	900	14,400	<100
(Duplicate)		(6,200)	(920)	(14,100)	(<100)
1st year, 2nd quarter	6/90	620	130	5,100	22,000
(Duplicate)		(360)	(95)	(3,900)	(15,000)
1st year, 3rd quarter	9/90	6,200	1,400	69,000	23,000
(Duplicate)		(7,100)	(1,400)	(50,000)	(25,000)
1st year, 4th quarter	1/91	1,500	150	2,900	<500
(Duplicate)		(2,900)	(260)	(5,600)	(<500)
2nd year, 1st quarter	4/91	1,900	220	<100	<100
(Duplicate)		(1,900)	(220)	(<100)	(<100)
2nd year, 2nd quarter	8/91	2,900	430	<1,000	(<1,000)
(Duplicate)		(4,200)	(520)	(<2,000)	(<2,000)

[a] EPA method 8240, concentration in parts per billion (ppb).
[b] QAQC duplicate sample collected from JR-2.
[c] MIBK reported as 4-Methyl-2-Pentanone in laboratory reports.
[d] EPA Method 8310, concentrations in parts per billion (ppb).

Fluctuations in groundwater elevation during the monitoring period (see Appendix A) appear to lag behind seasonal variations in precipitation; the rainy season lasting from October through May, and the dry season from June through September. Table 5 shows that groundwater elevations steadily increased through the rainy season of 1989-90 and into the dry season of 1990, and then steadily decreased through the remainder of the dry season and into the rainy season of 1990-91. Since most of the JRC facility is paved, the lagging groundwater elevations in the Press Room area may reflect a recharge lag. The nearest local recharge point is the four acre grass field which occupies the southwest corner of the JRC site and is separated from the Press Room wells by over 500 feet of pavement.

Table 5. Groundwater Gradient Summary Press Room UST Area

Investigation	Date	Flow Direction	Gradient (feet/100 feet)	Elevation Change[a]
Initial Investigation	9/89	N18°E	0.23	--
1st year, 1st quarter	2/90	N2°W	0.23	Increase
1st year, 2nd quarter	6/90	N51°W	0.01	Increase[b]
1st year, 3rd quarter	9/90	N7°W	0.63	Decrease
1st year, 4th quarter	1/91	N0°W	0.28	Decrease[c]
2nd year, 1st quarter	4/91	N7°W	0.24	Increase
2nd year, 1st quarter	8/91	N82°W	2.50	Decrease

[a] Change in groundwater elevation relative to previous monitoring event.
[b] Highest groundwater elevation recorded during the first year of QGWM.
[c] Lowest groundwater elevation recorded during the first year of QGWM.

Groundwater flow direction and gradient have remained relatively consistent during wet months (October through May). Flow directions during the first and fourth quarters of the first year, and the first quarter of the second year, stayed within 0 and 7 degrees west of north with an average gradient of 0.25 feet/100 feet. In contrast, the dry months (June through September) were characterized by dramatic shifts in flow direction and gradient. During the second quarter of the second year, groundwater flow shifted 75 degrees to the west and the gradient increased to 2.50 feet/100 feet. Groundwater flow also shifted to the west during the second quarter of the first year, but this shift was associated with a decrease in gradient to 0.01 feet/100 feet (Table 5).

Unfortunately, there is not enough QGWM data at this time to show any detailed relationships between groundwater dynamics and the concentrations of acetone, MIBK, and isopropyl alcohol documented in the groundwater beneath the Press Room UST area.

Gasoline UST Area. Since the initiation of groundwater monitoring in the Gasoline UST area, significant groundwater contamination has only been identified in samples collected from JR-5. Table 6 contains a list of the analytical results from all the JR-5 groundwater samples collected to date. Compared to the previous QGWM event, the second year, second quarter, analytical results indicate an 84 percent and 16 percent increase in the concentrations of benzene and ethylbenzene, respectively; and decreases in the concentrations of toluene and xylene by 56 percent and 42 percent, respectively.

Table 6. Groundwater Analytical Results Summary
Well No. JR-5 Gasoline UST Area

Investigation	Date	Aromatic Volatile Organic Compound Analysis[a]			
		Benzene	Toluene	Ethylbenzene	Xylene
Initial Investigation	9/89	120	<1	14	960
1st year, 1st quarter	2/90	120	11	<1	500
(Duplicate)[b]		(140)	(14)	(<1)	(580)
1st year, 2nd quarter	6/90	89	5	<1	230
(Duplicate)		(76)	(5)	(<1)	(220)
1st year, 3rd quarter	9/90	160	19	95	400
(Duplicate)		(150)	(18)	(88)	(400)
1st year, 4th quarter	1/91	180	22	85	820
2nd year, 1st quarter	4/91	51	27	250	1,200
(Duplicate)		(57)	(27)	(250)	(1,200)
2nd year, 2nd quarter	8/91	94	12	290	700
(Duplicate)		(99)	(15)	(390)	(920)
DEQ MCLs[c]		5	2,000	700	10,000

[a] EPA method 8020, concentration in parts per billion (ppb).
[b] QAQC duplicate sample collected from JR-5.
[c] DEQ maximum contaminant levels, based on EPA's primary drinking water standards, concentrations in ppb.

General trends throughout the monitoring period are as follows. Benzene and xylene have been detected above laboratory MDLs during all of the sampling events completed to date. Benzene concentrations fluctuated from a minimum of 51 ppb to a maximum of 180 ppb and have remained above the Oregon DEQ's Maximum Contaminant Level of 5 ppb since the initiation of monitoring. Xylene concentrations have also fluctuated during the monitoring period but have never exceeded the MCL of 10,000 ppb.

Toluene was not identified in JR-5 during the initial soil and groundwater investigation but occurred during all of the subsequent QGWM events at concentrations well below the MCL of 2,000 ppb. Ethylbenzene occurred at 14 ppb during the initial investigation,

dropped below the laboratory MDL in the first and second quarters and then increased through the remaining QGWM events to a maximum of 290 ppb during the second quarter of the second year. Ethylbenzene concentrations in JR-5 have not, however, exceed the MCL of 700 ppb.

Fluctuations in groundwater elevation in the Gasoline UST area (see Appendix A) appear to be consistent with seasonal variations in precipitation. Table 7 shows that steady increases in groundwater elevation occur through the rainy season (October through May), and steady decreases occur through the dry season (June through September). Furthermore, as groundwater elevation increase, the groundwater gradient increases and flow direction shifts from north to west. As groundwater level decreases, the opposite occurs.

Table 7. Groundwater Gradient Summary Gasoline UST Area

Investigation	Date	Flow Direction	Gradient (feet/100 feet)	Elevation Change[a]
Initial Investigation	9/89	N10°E	0.70	--
1st year, 1st quarter	2/90	N65°W	2.61	Increase
1st year, 2nd quarter	6/90	N84°W	1.40	Decrease
1st year, 3rd quarter	9/90	N5°W	0.81	Decrease
1st year, 4th quarter	1/91	N73°W	2.29	Increase
2nd year, 1st quarter	4/91	N79°W	3.60	Increase
2nd year, 2nd quarter	8/91	N87°W	2.88	Decrease

[a] Change in groundwater elevation relative to previous monitoring event.

This apparent mounding of groundwater suggests the presence of a perched aquifer beneath the Gasoline UST area. Increased recharge during the rainy season causes groundwater mounding, steeper groundwater gradients, and an eventual westerly shift in groundwater flow in the perched aquifer. As the mound recedes during the dry season, the groundwater gradient decreases and flow shifts back to the north. Groundwater mounding in the area is probably also greatly influenced by recharge from the vacant grass field, located immediately south of the Gasoline UST area.

The existence of this perched aquifer is supported by boring logs from JR-4, JR-5 and JR-6 which indicate the presence of a sandy clay bed at the base of each well. The boring logs are included in Appendix C of the November 28, 1989, BCC report referenced earlier in this report.

Unfortunately, there is not enough QGWM data at this time to show detailed relationships between groundwater dynamics and the concentrations of BTEX in the groundwater beneath the Gasoline UST area.

CONCLUSIONS

The results of the second year, second quarter, groundwater monitoring event provided an evaluation of the degree and extent of shallow groundwater contamination beneath the Press Room and Gasoline UST areas of the CPD in connection with seasonal groundwater fluctuations.

Since the initiation of the groundwater monitoring program in September of 1989, significant groundwater contamination in the Press Room area has only been documented in samples collected from JR-2. During the second year, second quarter monitoring event, acetone and MIBK were detected in JR-2 at concentrations of 2,900 ppb and 430 ppb, respectively. Compared to the previous quarterly monitoring event (April 1991) these results indicate a 53 percent increase in the concentration of acetone and a 95 percent increase in the concentration of MIBK. Ethanol, which was detected in JR-2 during the second and third quarters of the first year remained below laboratory MDLs during this sampling event. In addition, isopropyl alcohol, which was detected at concentrations ranging between 2,900 and 69,000 ppb during the first year of QGWM, was not detected at or above laboratory MDLs during this sampling event.

The DEQ has not established MCLs for acetone, MIBK, isopropyl alcohol or ethanol. However, the concentrations of these compounds in the groundwater beneath the Press Room UST area remain high enough to justify continued QGWM.

During wet months, groundwater flow direction in the Press Room area appears to stay within 0 and 7 degrees west of north with an average gradient of 0.25 feet/100 feet. In contrast, dry months are characterized by 48 to 75 degree westerly shifts in flow direction associated with gradients as low as 0.01 feet/ 100 feet or as high as 2.50 feet/100 feet. The 48 degree westerly shift in flow noted during the second quarter of the first year was associated with the maximum groundwater elevation and the first occurrence of ethanol in JR-2 suggesting the presence of ethanol contaminated soils in the unsaturated zone east of JR-2.

Fluctuations in groundwater elevation in the Press Room area lag behind seasonal variations in precipitation. The lag in groundwater recharge to this area is probably due to the extensive paved surfaces that surround the Press Room area. The nearest up gradient recharge point is a four acre grass field which is separated from the Press Room wells by over 500 feet of pavement.

Since the initiation of the groundwater monitoring program in the gasoline UST area, significant groundwater contamination has only been documented in samples collected from JR-5. During the second year, second quarter, monitoring event, benzene, toluene, ethylbenzene, and xylene were detected in JR-5 at concentrations of 94 ppb, 12 ppb, 290 ppb, and 700 ppb. Compared to the previous monitoring event, these results indicate an 84 percent and 16 percent increase in the concentrations of benzene and ethylbenzene, and decreases in the concentration of toluene and xylene by 56 percent and 42 percent.

The DEQ's MCLs for benzene, toluene, ethylbenzene, and xylene are 5 ppb, 2,000 ppb, 700 ppb, and 10,000 ppb. Benzene is the only compound that has consistently exceeded the MCL during all of the monitoring events. Concentrations of toluene, ethylbenzene, and xylene have not exceeded the MCLs during any of the monitoring events completed to date.

Fluctuations in groundwater elevation in the Gasoline UST area are consistent with seasonal variations in precipitation. Groundwater elevation and gradient data in conjunction with geologic information from boring logs indicate the presence of a perched aquifer beneath the Gasoline UST area. Recharge during the rainy season causes groundwater mounding, steeper groundwater gradients and an eventual westerly shift in groundwater flow in this perched aquifer. During the dry season, the mound recedes, groundwater gradient decrease and flow shifts back to the north.

Unfortunately, there is not enough QGWM data at this time to show detailed relationships between groundwater dynamics and the concentrations of BTEX in the groundwater beneath the Gasoline UST area.

Please contact me if you have any questions concerning the findings of this investigation.

Very truly yours,

BROWN AND CALDWELL

Timothy F. O'Gara, RG
Project Manager

TFO:ljw

A

APPENDIX A
GROUNDWATER ELEVATION SUMMARY
JAMES RIVER CORPORATION
COATED PRODUCTS DIVISION

Press Room UST Area

Well No.	Groundwater Elevation (feet)						
		1st Year				2nd Year	
	Initial Investigation	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter
	9/89	2/90	6/90	9/90	1/91	4/91	8/91
JR-1	11.98	12.49	13.96	12.47	12.48	13.60	12.99
JR-2	12.24	12.67	13.97	12.75	12.70	13.77	12.36
JR-3	12.30	12.76	14.03	12.92	12.81	13.88	13.45

Gasoline UST Area

Well No.	Groundwater Elevation (feet)						
		1st Year				2nd Year	
	Initial Investigation	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter
	9/89	2/90	6/90	9/90	1/91	4/91	8/91
JR-4	16.55	17.28	17.79	16.64	17.39	18.04	16.34
JR-5	17.53	19.29	18.49	17.76	19.16	20.28	17.32
JR-6	16.83	19.68	19.18	17.10	19.84	21.72	18.50

B

APPENDIX B
GROUNDWATER PARAMETERS

Monitoring Well JR-1

Cumulative Casing Volumes Purged	pH	Conductivity (Micromhos/cm)	Temperature °C
1.16	6.1	1,160	17.2
2.60	6.1	1,280	17.0
3.76	6.0	1,300	17.0
Sample 1007	6.0	1,460	18.6

Monitoring Well JR-2

Cumulative Casing Volumes Purged	pH	Conductivity (Micromhos/cm)	Temperature °C
1.15	6.3	1,950	20.3
2.69	6.3	1,920	19.8
3.85	6.4	1,860	20.1
Samples 1009, 1010	6.4	1,780	22.1

Monitoring Well JR-3

Cumulative Casing Volumes Purged	pH	Conductivity (Micromhos/cm)	Temperature °C
1.02	6.3	1,210	17.5
2.31	6.3	1,220	17.3
3.33	6.3	1,230	17.3
Sample 1008	6.3	1,230	18.1

Monitoring Well JR-4

Cumulative Casing Volumes Purged	pH	Conductivity (Micromhos/cm)	Temperature °C
1.23	7.5	4,980	18.2
2.46	7.5	5,100	17.4
4.10	7.5	5,060	17.8
Sample 1003	7.4	5,170	18.5

Monitoring Well JR-5

Cumulative Casing Volumes Purged	pH	Conductivity (Micromhos/cm)	Temperature °C
1.02	6.6	780	16.3
2.04	6.6	710	15.8
3.06	6.6	750	15.5
Samples 1005, 1006	6.8	750	17.0

Monitoring Well JR-6

Cumulative Casing Volumes Purged	pH	Conductivity (Micromhos/cm)	Temperature °C
1.10	6.8	1,010	18.6
2.20	6.9	1,030	17.7
3.30	7.0	1,060	17.6
Sample 1004	7.0	1,330	18.1

C

APPENDIX C
CHAIN-OF-CUSTODY DOCUMENTS

PACIFIC ENVIRONMENTAL LABORATORY INC.

9405 S.W. Nimbus Ave.
Beaverton, OR 97005
(503) 644- 0660
Fax (503) 644-2202

CHAIN OF CUSTODY RECORD

COMPANY Brown + Caldwell | PROJECT NAME JRC QAWM | LAB PROJECT NUMBER 91-2381

PROJECT MANAGER Russ Hamblin | PROJECT NUMBER 5935

COLLECTED BY Matt Tagett | P.O. NUMBER | RUSH ☐ YES ☐ NO

COMMENTS

SAMPLES RECEIVED AT 4°C ☐ YES ☐ NO

SAMPLES IN APPROPRIATE CONTAINERS ☒ YES ☐ NO

PROVIDE VERBAL RESULTS ☐ YES ☐ NO

PROVIDE PRELIMINARY FAX RESULTS ☐ YES ☐ NO

PROVIDE FINAL FAX RESULTS ☐ YES ☐ NO

PEL NO.	SAMPLE I.D.	DATE	TIME	SAMPLE DESCRIPTION	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	ANALYSES TO BE PERFORMED: TPH - HCID OAR/DEQ	TPH - Gasoline OAR/DEQ	TPH - Diesel OAR/DEQ	TPH - 418.1 Modified OAR/DEQ	HCID - Fuel Scan GC/FID	TPH 418.1	BTEX 602/8020	Halogenated Volatiles 601/8010	Volatiles 624/8240	Semivolatiles 625/8270	PCB's 608/8080	Chlorinated Pesticides 608/8080	TCLP (8) Metals						REMARKS
1	1001	8-6-91	0900			X											X										
2	1002	8-6-91	1620			X									X												
3	1003	8-6-91	1448			X									X												
4	1004	8-6-91	1528			X									X												
5	1005	8-6-91	1607			X									X												
6	1006	8-6-91	1607			X									X												
7	1007	8-6-91	1317			X											X										
8	1008	8-6-91	1224			X											X										
9	1009	8-6-91	1404			X											X										
10	1010	8-6-91	1404			X											X										
11	1011	8-6-91	1424			X											X										

ALL SAMPLES WILL BE DISPOSED OF 30 DAYS AFTER RECEIPT

RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY
Matthew Tagett	Brown + Caldwell	1708 / 8-6-91	Julie Reynolds	PEL 1708 8-6-91
RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY
RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY

APPENDIX D
LABORATORY ANALYTICAL REPORT

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

9405 S.W. Nimbus Ave. Beaverton, OR 97005 (503) 644-0660
FAX # (503) 644-2202

August 16, 1991

Brown & Caldwell
9620 S.W. Barbur Blvd.
Suite 200
Portland, OR 97219

Attn: Russ Hamblin

Re: JOB #5935
PROJECT - JRC QGWM
PEL #91-2381

Enclosed is the lab report for your samples which were received on August 3, 1991.

I. Sample Description

Eleven Water Samples

The samples were received under a chain of custody.

The samples were received in containers consistent with EPA protocol.

II. Quality Control

No project specific QC was requested. In-house QC data is available upon request.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Lab Manager

Howard Boorse
QA/QC Manager

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2381
CLIENT: Brown & Caldwell
JOB REFERENCE: 5935
PROJECT: JRC QGWM
DATE: August 16, 1991
ITEMS: Eleven Water Samples

METHOD: BTEX per EPA 8020
Water results in ug/L (ppb)

Sample I.D.	Benzene	Toluene	Ethyl Benzene	Total Xylene	Detection Limit
1002	ND	0.99	ND	1.5	0.50
1003	ND	ND	ND	ND	10
1004	ND	ND	ND	ND	5.0
1005	94	12	290	700	2.5
1006	99	15	390	920	5.0
Lab Blank	ND	ND	ND	ND	0.50

8020 Surrogate Recoveries (%) - 4-Bromofluorobenzene

Sample I.D.	(71-120)
1002	97
1003	95
1004	99
1005	97
1006	98
Lab Blank	95

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2381
CLIENT: Brown & Caldwell
JOB REFERENCE: 5935
PROJECT: JRC QGWM
DATE: August 16, 1991
ITEMS: Eleven Water Samples

METHOD: Volatiles per EPA 8240
Results in ug/L (ppb)

Compound	1001	1007	1008
Acetone	ND	ND	ND
Acrolein	ND	ND	ND
Acrylonitrile	ND	ND	ND
Benzene	ND	ND	ND
Bromodichloromethane	ND	ND	ND
Bromoform	ND	ND	ND
Bromomethane	ND	ND	ND
2-Butanone	ND	ND	ND
Carbon disulfide	ND	ND	ND
Carbon tetrachloride	ND	ND	ND
Chlorobenzene	ND	ND	ND
Chlorodibromomethane	ND	ND	ND
Chloroethane	ND	ND	ND
Chloroform	ND	ND	ND
Chloromethane	ND	ND	ND
Dibromomethane	ND	ND	ND
Dichlorobenzenes	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND
Ethylbenzene	ND	ND	ND
2-Hexanone	ND	ND	ND
Methylene chloride	ND	ND	ND
4-Methyl-2-pentanone	ND	ND	ND
Styrene	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND
Tetrachloroethene	ND	ND	ND
Toluene	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND
Trichloroethene	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND
1,2,3,-Trichloropropane	ND	ND	ND
Vinyl acetate	ND	ND	ND
Vinyl chloride	ND	ND	ND
Xylene	ND	ND	ND
Isopropyl Alcohol	ND	ND	ND
Ethanol	ND	ND	ND

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2381
CLIENT: Brown & Caldwell
JOB REFERENCE: 5935
PROJECT: JRC QGWM
DATE: August 16, 1991
ITEMS: Eleven Water Samples

METHOD: Volatiles per EPA 8240
Results in ug/L (ppb)

Compound	1011	Lab Blank	Detection Limit
Acetone	ND	ND	50
Acrolein	ND	ND	100
Acrylonitrile	ND	ND	50
Benzene	ND	ND	2.0
Bromodichloromethane	ND	ND	2.0
Bromoform	ND	ND	2.0
Bromomethane	ND	ND	10
2-Butanone	ND	ND	100
Carbon disulfide	ND	ND	2.0
Carbon tetrachloride	ND	ND	2.0
Chlorobenzene	ND	ND	2.0
Chlorodibromomethane	ND	ND	2.0
Chloroethane	ND	ND	10
Chloroform	ND	ND	2.0
Chloromethane	ND	ND	10
Dibromomethane	ND	ND	2.0
Dichlorobenzenes	ND	ND	2.0
Dichlorodifluoromethane	ND	ND	2.0
1,1-Dichloroethane	ND	ND	2.0
1,2-Dichloroethane	ND	ND	2.0
1,1-Dichloroethene	ND	ND	2.0
cis-1,2-Dichloroethene	ND	ND	2.0
trans-1,2-Dichloroethene	ND	ND	2.0
1,2-Dichloropropane	ND	ND	2.0
cis-1,3-Dichloropropene	ND	ND	2.0
trans-1,3-Dichloropropene	ND	ND	2.0
Ethylbenzene	ND	ND	2.0
2-Hexanone	ND	ND	2.0
Methylene chloride	ND	ND	2.0
4-Methyl-2-pentanone	8.1	ND	2.0
Styrene	ND	ND	2.0
1,1,2,2-Tetrachloroethane	ND	ND	2.0
Tetrachloroethene	ND	ND	2.0
Toluene	ND	ND	2.0
1,1,1-Trichloroethane	ND	ND	2.0
1,1,2-Trichloroethane	ND	ND	2.0
Trichloroethene	ND	ND	2.0
Trichlorofluoromethane	ND	ND	2.0
1,2,3,-Trichloropropane	ND	ND	2.0
Vinyl acetate	ND	ND	10
Vinyl chloride	ND	ND	10
Xylene	ND	ND	2.0
Isopropyl Alcohol	ND	ND	100
Ethanol	ND	ND	100

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2381
CLIENT: Brown & Caldwell
JOB REFERENCE: 5935
PROJECT: JRC QGWM
DATE: August 16, 1991
ITEMS: Eleven Water Samples

METHOD: Volatiles per EPA 8240
Results in ug/L (ppb)

Compound	1009	Detection Limit
Acetone	2,900	500
Acrolein	ND	1,000
Acrylonitrile	ND	500
Benzene	ND	20
Bromodichloromethane	ND	20
Bromoform	ND	20
Bromomethane	ND	100
2-Butanone	ND	1,000
Carbon disulfide	ND	20
Carbon tetrachloride	ND	20
Chlorobenzene	ND	20
Chlorodibromomethane	ND	20
Chloroethane	ND	100
Chloroform	ND	20
Chloromethane	ND	100
Dibromomethane	ND	20
Dichlorobenzenes	ND	20
Dichlorodifluoromethane	ND	20
1,1-Dichloroethane	ND	20
1,2-Dichloroethane	ND	20
1,1-Dichloroethene	ND	20
cis-1,2-Dichloroethene	ND	20
trans-1,2-Dichloroethene	ND	20
1,2-Dichloropropane	ND	20
cis-1,3-Dichloropropene	ND	20
trans-1,3-Dichloropropene	ND	20
Ethylbenzene	ND	20
2-Hexanone	ND	20
Methylene chloride	ND	20
4-Methyl-2-pentanone	430	20
Styrene	ND	20
1,1,2,2-Tetrachloroethane	ND	20
Tetrachloroethene	ND	20
Toluene	ND	20
1,1,1-Trichloroethane	ND	20
1,1,2-Trichloroethane	ND	20
Trichloroethene	ND	20
Trichlorofluoromethane	ND	20
1,2,3,-Trichloropropane	ND	20
Vinyl acetate	ND	100
Vinyl chloride	ND	100
Xylene	ND	20
Isopropyl Alcohol	ND	1,000
Ethanol	ND	1,000

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2381
CLIENT: Brown & Caldwell
JOB REFERENCE: 5935
PROJECT: JRC QGWM
DATE: August 16, 1991
ITEMS: Eleven Water Samples

METHOD: Volatiles per EPA 8240
Results in ug/L (ppb)

Compound	1010	Detection Limit
Acetone	4,200	1,000
Acrolein	ND	2,000
Acrylonitrile	ND	1,000
Benzene	ND	40
Bromodichloromethane	ND	40
Bromoform	ND	40
Bromomethane	ND	200
2-Butanone	ND	2,000
Carbon disulfide	ND	40
Carbon tetrachloride	ND	40
Chlorobenzene	ND	40
Chlorodibromomethane	ND	40
Chloroethane	ND	200
Chloroform	ND	40
Chloromethane	ND	200
Dibromomethane	ND	40
Dichlorobenzenes	ND	40
Dichlorodifluoromethane	ND	40
1,1-Dichloroethane	ND	40
1,2-Dichloroethane	ND	40
1,1-Dichloroethene	ND	40
cis-1,2-Dichloroethene	ND	40
trans-1,2-Dichloroethene	ND	40
1,2-Dichloropropane	ND	40
cis-1,3-Dichloropropene	ND	40
trans-1,3-Dichloropropene	ND	40
Ethylbenzene	ND	40
2-Hexanone	ND	40
Methylene chloride	ND	40
4-Methyl-2-pentanone	520	40
Styrene	ND	40
1,1,2,2-Tetrachloroethane	ND	40
Tetrachloroethene	ND	40
Toluene	ND	40
1,1,1-Trichloroethane	ND	40
1,1,2-Trichloroethane	ND	40
Trichloroethene	ND	40
Trichlorofluoromethane	ND	40
1,2,3,-Trichloropropane	ND	40
Vinyl acetate	ND	200
Vinyl chloride	ND	200
Xylene	ND	40
Isopropyl Alcohol	ND	2,000
Ethanol	ND	2,000

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2381
CLIENT: Brown & Caldwell
JOB REFERENCE: 5935
PROJECT: JRC QGWM
DATE: August 16, 1991
ITEMS: Eleven Water Samples

8240 Surrogate Recoveries (%)

Sample I.D.	1,2-Dichloro-ethane-d4	Toluene-d8	4-Bromo-fluorobenzene
1001	105	101	95
1007	107	100	93
1008	108	100	95
1009	88	98	97
1010	97	101	95
1011	100	97	96
EPA Limits	76-114	88-110	86-115