SITE CONDITIONS TECHNICAL MEMORANDUM
February 1999 Groundwater Sampling Results
Frontier Hard Chrome
Vancouver, Washington

Prepared for
U.S. Environmental Protection Agency
Region X
1200 Sixth Avenue
Seattle, Washington 98101

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ARCS QUALITY ASSURANCE CONCURRENCE

Site Conditions Technical Memorandum
February 1999 Groundwater Sampling Results

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Contract Number:	68-W9-0046
Work Assignment Number:	46-38-027N
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SITE CONDITIONS TECHNICAL MEMORANDUM
FEBRUARY 1999 GROUNDWATER SAMPLING RESULTS
FRONTIER HARD CHROME SUPERFUND SITE
VANCOUVER, WASHINGTON

1. INTRODUCTION

This technical memorandum is a contract deliverable under the U.S. Environmental Protection Agency's (EPA's) Work Assignment No. 46-38-027N to Roy F. Weston, Inc. (WESTON®) under the Alternative Remedial Contracting Strategy (ARCS) Contract No. 68-W9-0046. This technical memorandum summarizes the results of monitoring well groundwater sampling and analysis activities completed in February 1999 at the Frontier Hard Chrome (FHC) Superfund site located in Vancouver, Washington.

2. FIELD ACTIVITIES

This work was performed on 3 and 4 February 1999 and in accordance with the procedures and methods specified in the Draft Sampling and Analysis Plan Long-Term Groundwater Monitoring (SAP) **(WESTON 1998)**. The services completed for this investigation consisted of measuring groundwater levels and collecting groundwater samples from selected groundwater monitoring wells at the site **(Figure 1)**. Samples collected from these monitoring wells were analyzed for unfiltered total chromium (as opposed to the filtered total chromium proposed in the SAP) and field water quality parameters.

2.1 Groundwater Sampling and Analysis

Groundwater samples were collected from 15 selected monitoring wells on 3 and 4 February 1999. A list of the wells sampled and the sample-specific groundwater analysis conducted are provided in **Table 1**. Monitoring wells were purged with a peristaltic pump and dedicated tubing using low-flow micro-purging techniques. Water quality parameters measured in the field include pH, temperature, dissolved oxygen, conductivity, turbidity, and oxidation/reduction potential (redox). Groundwater samples were collected directly from the peristaltic pump after water quality parameters stabilized. The Draft SAP stated that all groundwater samples collected would be filtered in the field and analyzed for total chromium using EPA SW-846 Method 6010. Based on direction from EPA, all samples were analyzed for unfiltered total chromium, and it was determined that for turbid groundwater samples a second sample would be filtered and analyzed for total chromium. No sediments or particulates were observed in the samples collected; therefore, only unfiltered groundwater samples were collected and analyzed for total chromium. Groundwater sampling record forms are presented in **Appendix A**. The laboratory data quality assurance/quality control report is presented in **Appendix B**.

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All laboratory analyses were performed by EPA's Manchester laboratory in accordance with procedures described in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA SW-846, 3rd edition; 1986). An equivalent analytical method to 6010, EPA 200.7 M, was used to analyze the groundwater samples collected.

2.2 Investigation-Derived Waste Handling

Wastewater (approximately 35 to 40 gallons) generated from groundwater monitoring well purging was placed in one 55-gallon drum and held in the yard behind the Angeles Metals facility at 116 "Y" Street in Vancouver, Washington. One composite wastewater sample was collected from this drum and analyzed for total chromium. Analytical results from this sample indicated that the wastewater was non-hazardous (4.2 mg/L chromium). The wastewater and drum will be transported to an off-site facility for proper disposal as non-hazardous waste.

3. RESULTS

Groundwater levels were measured in selected monitoring wells and presented in **Figures 2** and **3** and **Table 2**. Groundwater samples collected from 15 of the 23 wells were analyzed for unfiltered total chromium. Analytical results are summarized in **Table 3**.

3.1 Groundwater Elevations

Groundwater elevation data was collected from 23 selected monitoring wells from the existing monitoring network on 3 February 1999. The water levels were measured using an electronic water level indicator. Groundwater elevations measured at wells screened in the "A" zone aquifer ranged from 15.39 feet to 16.15 feet above mean sea level (MSL) **(Figure 2).** Groundwater elevation data collected from "B" zone wells ranged from 14.69 feet to 15.48 feet above MSL **(Figure 3)**. Groundwater elevation from the perched aquifer well (W92-14P) was 21.24 feet above MSL **(Figure 2)**.

No predominant groundwater flow directions could be determined from the groundwater elevation data collected during this sampling event. Therefore, groundwater elevation contours for the "A" and "B" aquifers were not produced.

3.2 Chromium

The highest concentration of unfiltered total chromium (19,400 µg/L) was detected in monitoring well W92-14A. Comparisons with previous sampling results indicate that this well has consistently had the highest chromium concentrations at the site. Concentrations of chromium greater than 50 µg/L (i.e., the Safe Drinking Water Act Maximum Contaminant Level [MCL] for chromium) were detected in five of the eleven "A" zone well samples and two of the four "B" zone well samples. The reported detection limit for chromium was 5.0 µg/L. The

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spatial distribution of unfiltered total chromium in the "A" and "B" zone wells is shown in **Figures 4 and 5**, respectively.

3.3 Field Water Quality Parameters

Water quality parameters pH, temperature, dissolved oxygen, conductivity, turbidity, and redox potential were measured in the field during groundwater sampling using a YSI 6820 multi-probe water quality meter with a closed flow-through cell. The results of field water quality parameter testing are summarized in **Table 4**. Results for turbidity were rejected and are not reported in this document because of problems with field measurement equipment and conflicting instrument readings (i.e., high and erratic readings).

The pH values measured in groundwater at the site ranged from 4.8 to 7.4 with a median value of 6.5. Conductivity in groundwater varied from 59 to 456 microsiemens (µS), with a median value of 216 µS. Oxidation/reduction (redox) potential values ranged from 245 to 354 millivolts (mV) with a median value of 278 mV. Dissolved oxygen readings ranged from 0 to 8.7 milligrams/liter (mg/L) with a median value of 3.1 mg/L. The lowest pH, conductivity, and dissolved oxygen values were recorded at W92-14P. The lowest redox value was recorded at W98-21A.

Field water quality parameters indicate that redox and dissolved oxygen readings appeared to be affected by hexavalent chromium concentrations in the wells. Typically, strongly oxidizing conditions will also have very high dissolved oxygen values. However, the February 1999 sampling results indicated that dissolved oxygen levels were low and redox levels were high in wells with high concentrations of chromium in groundwater. This effect is most likely produced by the high redox potential of hexavalent chromium in water.

4. REFERENCES

EPA (U.S. Environmental Protection Agency). 1981. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. SW-846, 3rd Edition.

WESTON (Roy F. Weston, Inc.). 1998. Draft Sampling and Analysis Plan Long-Term Groundwater Monitoring, Frontier Hard Chrome, Vancouver, Washington. Prepared for U.S. EPA Region X by Roy F. Weston, Inc., Seattle, WA. September.

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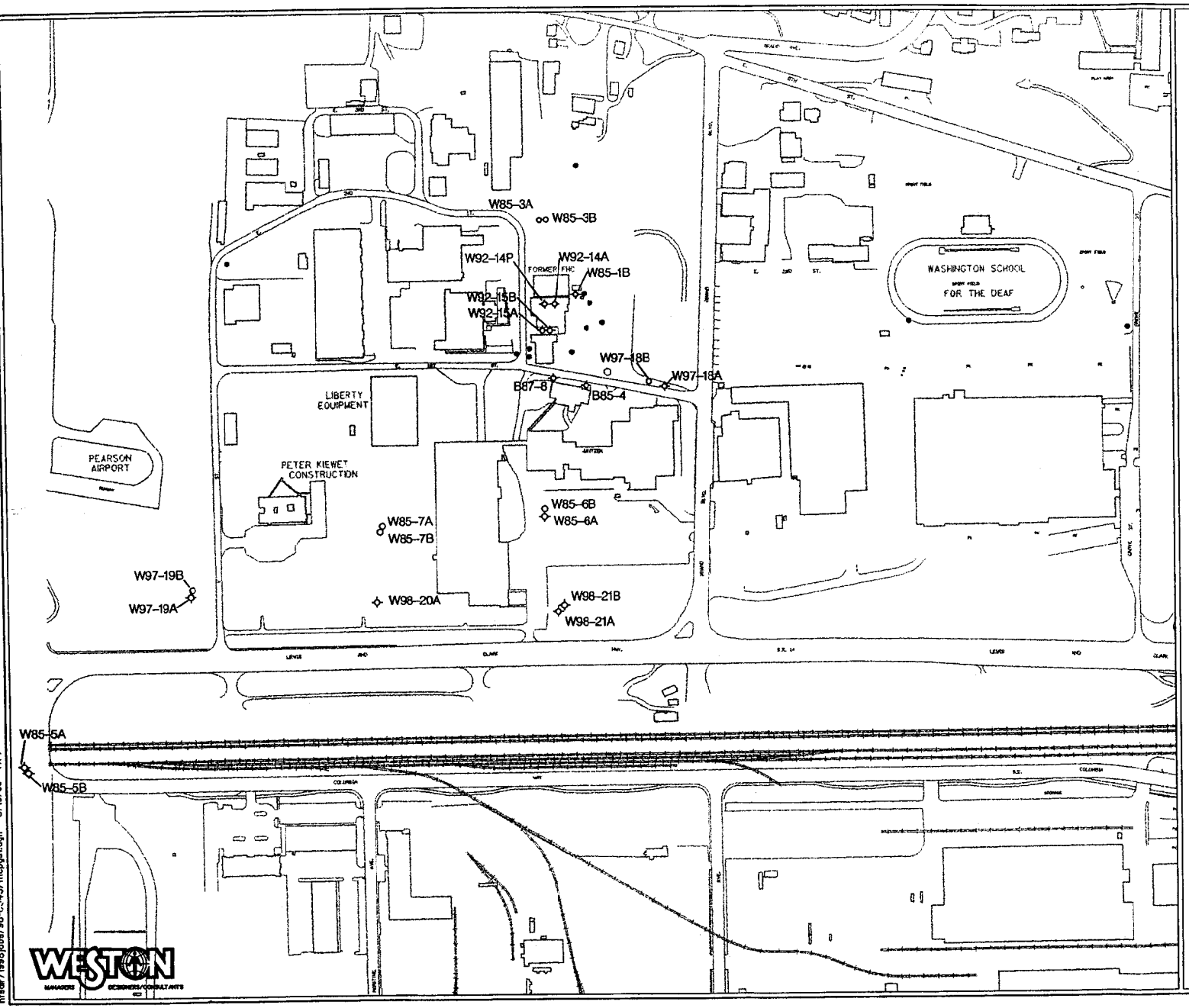
FIGURES



EXPLANATION

W92-14A — Groundwater Sample and Water Level Measurement Location

W97-19B — Water Level Measurement Location

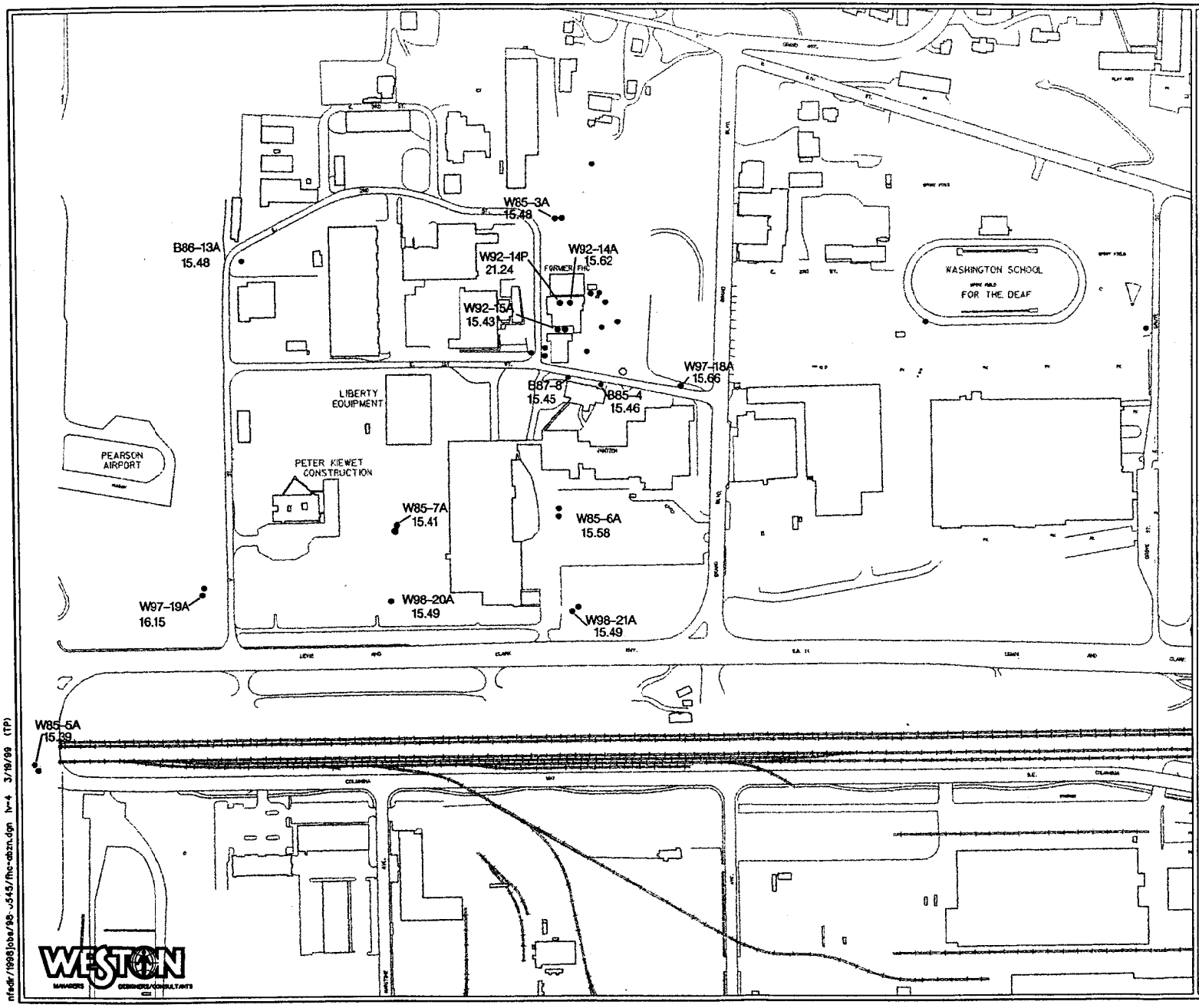
Other Existing Monitoring Well

0 100 200 300
Scale In Feet

Frontier Hard Chrome Groundwater Sample And Water Level Measurement Locations

FIGURE
1

WESTON
MANAGERS DESIGNERS/CONSULTANTS



EXPLANATION

W97-19A
16.15 ● Monitioring Well – February 1999
Water Level Elevation

Note:
No predominant groundwater flow directions could be determined from the data; therefore, no groundwater elevation contours were produced.

N

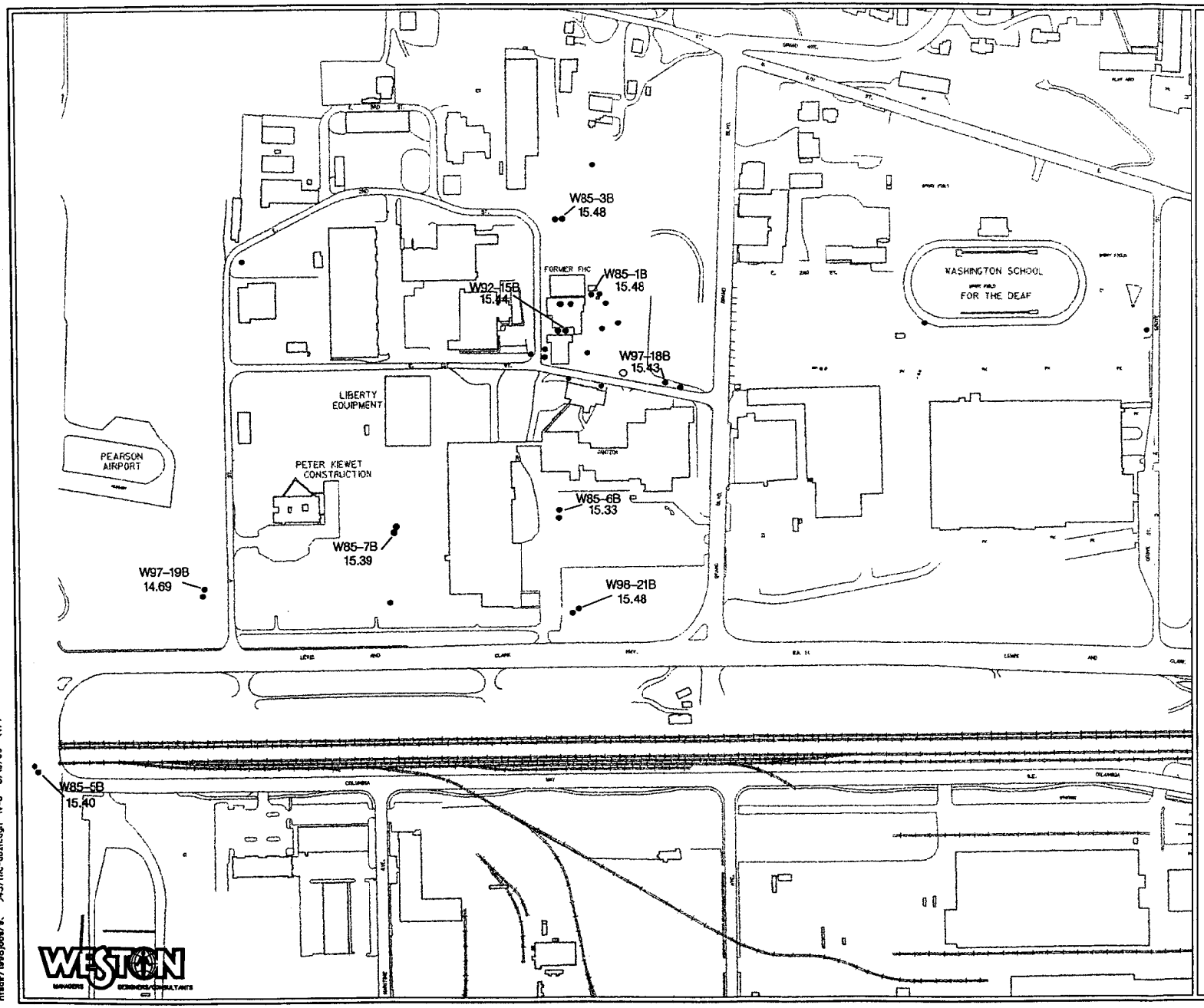
0 100 200 300
Scale In Feet

Frontier Hard Chrome
Water Level Elevation
"A" Zone And Perched Aquifers
3 February 1999

FIGURE
2

WESTON
MANAGERS DESIGNERS/CONSULTANTS

nfsdir/1998jobs/98-u545/fhc-atzn.dgn lv=4 3/10/99 (TP)



EXPLANATION

W97-19B 14.69 ● Monitoring Well – February 1999 Water Level Elevation

Note:
No predominant groundwater flow directions could be determined from the data; therefore, no groundwater elevation contours were produced.

N

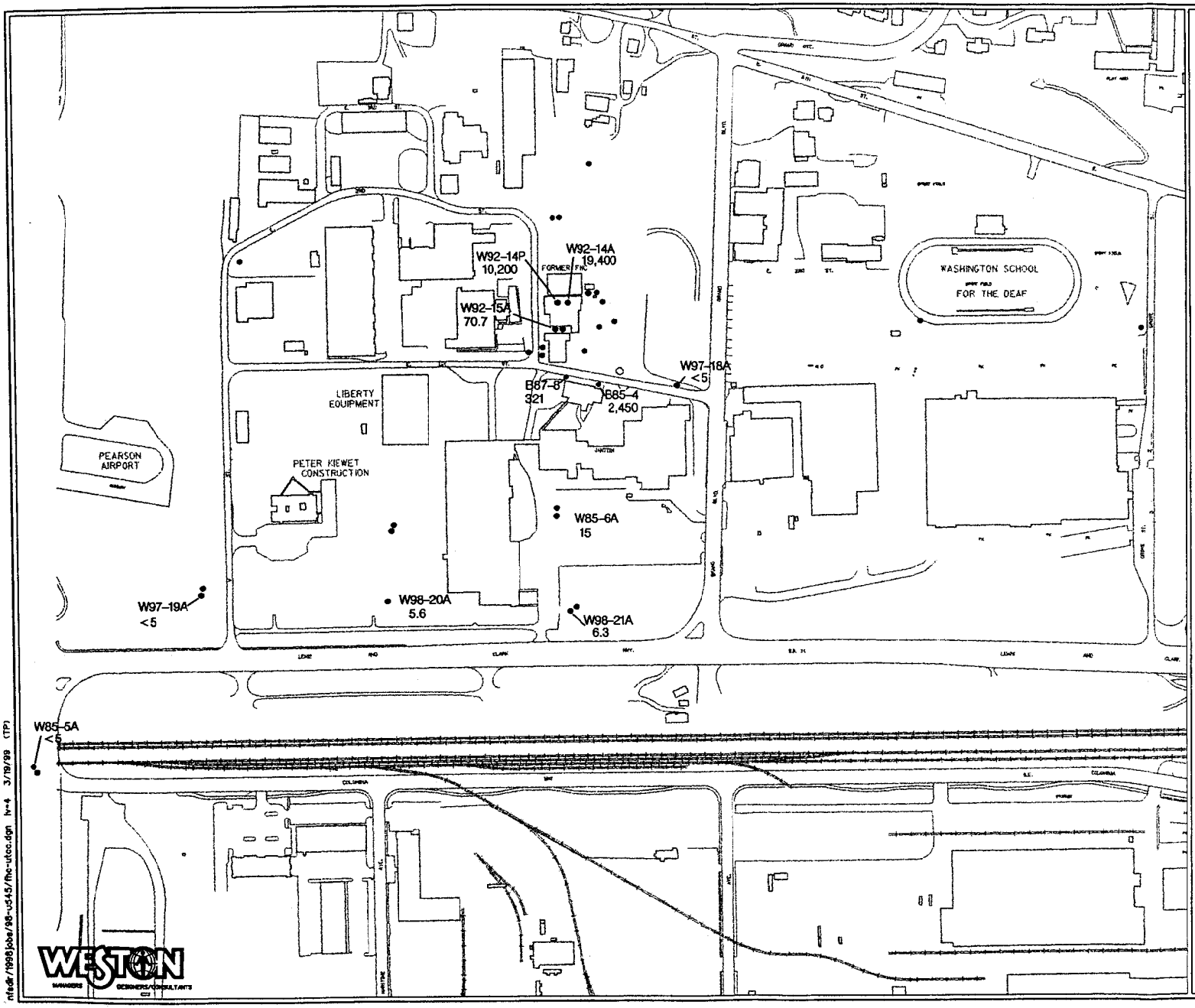
0 100 200 300
Scale in Feet

Frontier Hard Chrome Water Level Elevation "B" Zone Aquifer 3 February 1999

FIGURE
3

WESTON
MANAGERS SCIENTISTS/CONSULTANTS

nfadr/1998jobs/6. JA5/fhc-obzn.dgn lv-3 3/9/99 (TP)



EXPLANATION

W97-19A
<5 ● Monitoring Well – February 1999
Unfiltered Total Chromium
Concentration (ug/L)

N

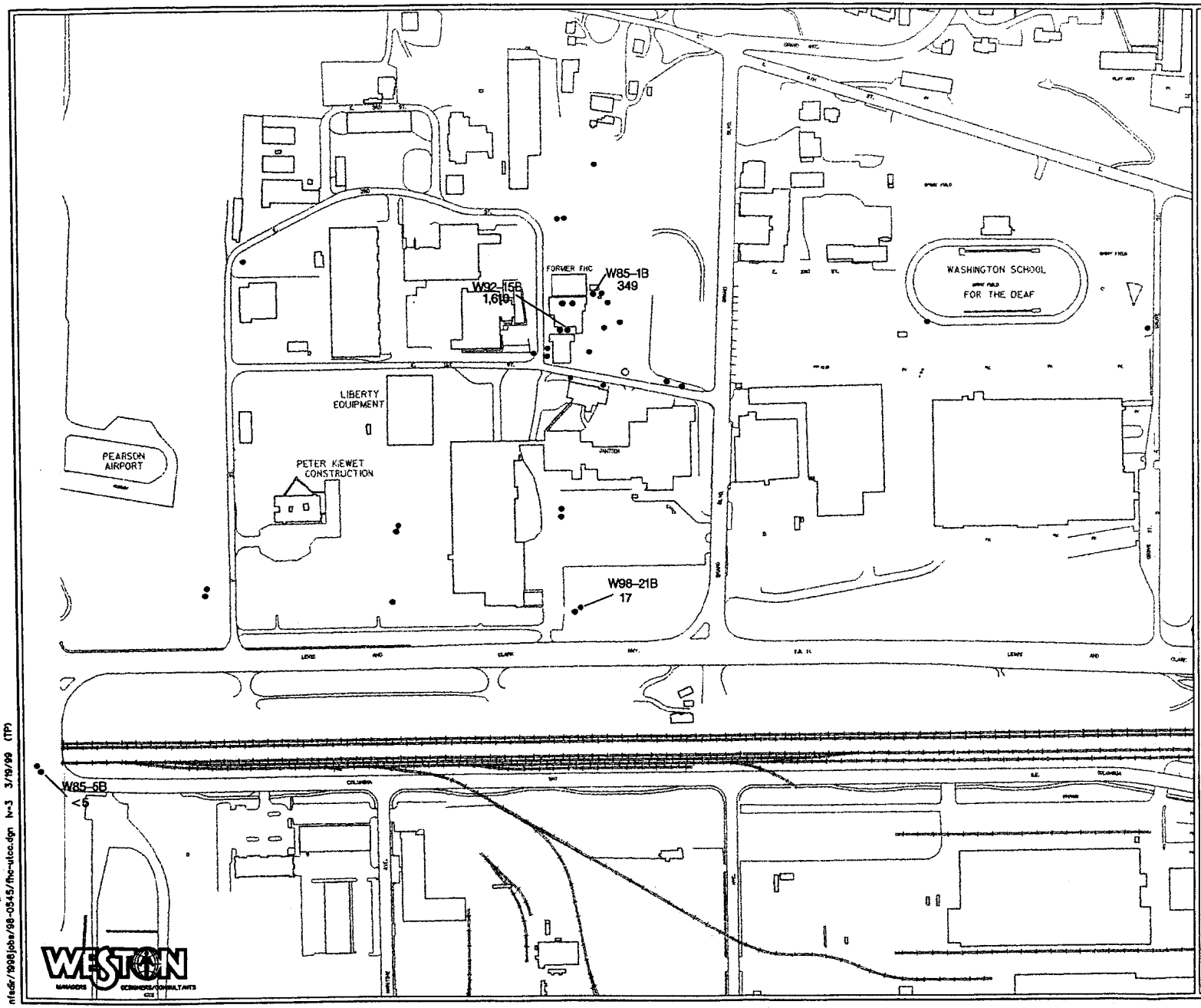
0 100 200 300
Scale In Feet

Frontier Hard Chrome
Unfiltered Total Chromium
Concentration In Groundwater
"A" Zone And Perched Aquifers
February 1999

FIGURE
4

WESTON
MANAGERS DESIGNERS/CONSULTANTS

nfadir/1998jobs/98-u545/fhc-utcc.dgn lv=4 3/19/99 (TP)



EXPLANATION

W98-21B
17 ● Monitoring Well – February 1999
Unfiltered Total Chromium
Concentration (ug/L)

N

0 100 200 300
Scale in Feet

Frontier Hard Chrome
Unfiltered Total Chromium
Concentration In Groundwater
"B" Zone Aquifer
February 1999

FIGURE
5

WESTON
MANAGERS ENGINEERS/CONSULTANTS

n:\adr/1998jobs/98-0545/fhc-utcc.dgn lv=3 3/19/99 (TP)

TABLES

Table 1—Frontier Hard Chrome—Groundwater Sample Analysis Summary—February 1999

Sample Location	Unfiltered Total Chromium	Groundwater Levels	Field Water Quality Parameters[1]
B85-4	X	X	X
B87-8	X	X	X
W85-1B	X	X	X
W85-5A	X	X	X
W85-5B	X	X	X
W85-6A	X	X	X
W92-14P	X	X	X
W92-14A	X	X	X
W92-15A	X	X	X
W92-15B	X	X	X
W97-18A	X	X	X
W97-19A	X	X	X
W98-20A	X	X	X
W98-21A	X	X	X
W98-21B	X	X	X
W97-19B		X	
W85-7A		X	
W85-7B		X	
W85-6B		X	
W97-18B		X	
W85-3A		X	
W85-3B		X	
B86-13A		X	

[1] Field water quality parameters include pH, temperature, dissolved oxygen, conductivity, turbidity, and redox.

Table 2—Frontier Hard Chrome—Groundwater Elevation Data

Station Name	Well Casing Elevation	Date	Time	Depth to Water	Groundwater Elevation
W92-14P	29.61	27-Feb-97	15:45	8.70	20.91
		28-Feb-97	12:35	8.71	20.90
		20-Mar-97	12:19	8.35	21.26
		18-Apr-97	15:39	9.04	20.57
		8-May-97	12:05	8.95	20.66
		26-Jun-97	11:52	7.66	21.95
		30-Jul-97	15:50	16.10	13.51
		8-Sep-97	15:30	9.69	19.92
		20-Oct-97	NM	9.57	20.04
		26-Nov-97	11:30	9.20	20.41
		10-Dec-97	12:15	9.37	20.24
		12-Feb-98	12:50	8.95	20.66
		26-Mar-98	11:05	8.95	20.66
		15-Jun-98	11:28	9.39	20.22
		3-Feb-99	12:23	8.37	21.24
W85-3A	30.19	25-Feb-97	15:19	13.90	16.29
		28-Feb-97	12:15	14.42	15.77
		20-Mar-97	12:59	12.68	17.51
		18-Apr-97	14:45	15.17	15.02
		26-Jul-97	NM	8.97	21.22
		30-Jul-97	NM	16.09	14.10
		8-Sep-97	13:42	19.49	10.70
		20-Oct-97	11:03	18.28	11.91
		29-Nov-97	12:05	18.24	11.95
		10-Dec-97	12:55	18.71	11.48
		12-Feb-98	13:57	16.71	13.48
		26-Mar-98	11:50	17.60	12.59
		15-Jun-98	12:21	14.42	15.77
		3-Feb-99	12:45	14.71	15.48
W85-5A	35.17	26-Feb-97	10:08	19.80	15.37
		28-Feb-97	10:30	19.45	15.72
		20-Mar-97	13:38	17.40	17.77
		18-Apr-97	16:20	20.65	14.52
		8-May-97	13:38	15.38	19.79
		26-Jun-97	NM	14.52	20.65
		30-Jul-97	NM	21.76	13.41
		8-Sep-97	16:30	25.06	10.11
		20-Oct-97	11:42	23.63	11.54
		26-Nov-97	13:55	23.38	11.79
		10-Dec-97	14:56	23.93	11.24
		12-Feb-98	15:40	21.90	13.27
		26-Mar-98	13:25	22.60	12.57
		15-Jun-98	13:30	19.74	15.43
		3-Feb-99	11:14	19.78	15.39
W85-6A	29.15	25-Feb-97	12:45	13.00	16.15
		28-Feb-97	10:40	13.65	15.50
		20-Mar-97	11:55	11.30	17.85

Table 2—Frontier Hard Chrome—Groundwater Elevation Data

Station Name	Well Casing Elevation	Date	Time	Depth to Water	Groundwater Elevation
		9-Apr-97	16:50	13.42	15.73
		18-Apr-97	13:38	14.46	14.69
		8-May-97	10:47	9.32	19.83
		30-Jul-97	NM	15.47	13.68
		8-Sep-97	16:40	18.84	10.31
		20-Oct-97	10:18	17.27	11.88
		10-Dec-97	15:00	17.85	11.30
		12-Feb-98	12:10	15.78	13.37
		26-Mar-98	10:10	16.46	12.69
		15-Jun-98	10:37	13.62	15.53
		3-Feb-99	11:45	13.57	15.58
W85-7A	26.72	26-Feb-97	16:55	10.80	15.92
		28-Feb-97	10:05	11.10	15.62
		20-Mar-97	13:26	8.98	17.74
		18-Apr-09	16:05	12.09	14.63
		8-May-97	10:33	6.97	19.75
		26-Jun-97	NM	6.10	20.62
		30-Jul-97	NM	13.07	13.65
		29-Aug-97	17:18	17.70	9.02
		8-Sep-97	14:51	16.43	10.29
		20-Oct-97	11:26	14.87	11.85
		10-Dec-97	7:55	15.30	11.42
		12-Feb-98	14:20	13.25	13.47
		26-Mar-98	NA	NM	NA
		15-Jun-98	12:48	11.21	15.51
		3-Feb-99	13:30	11.31	15.41
W86-13A	30.15	24-Feb-97	11:02	13.90	16.25
		28-Feb-97	12:05	14.45	15.70
		20-Mar-97	13:06	12.62	17.53
		18-Apr-97	14:40	15.28	14.87
		8-May-97	10:03	6.97	23.18
		26-Jun-97	9:25	9.07	21.08
		30-Jul-97	NM	16.19	13.96
		8-Sep-97	13:55	19.55	10.60
		20-Oct-97	11:11	18.32	11.83
		26-Nov-97	13:25	18.25	11.90
		12-Feb-98	14:10	16.71	13.44
		26-Mar-98	12:00	17.62	12.53
		15-Jun-98	12:39	14.45	15.70
		3-Feb-99	12:54	14.67	15.48
B86-2R	29.06	28-Feb-97	NM	14.23	14.83
		9-Apr-97	17:47	13.02	16.04
		18-Apr-97	15:15	14.23	14.83
		8-May-97	9:01	8.63	20.43
		26-Jun-97	10:46	8	21.06
		30-Jul-97	NM	15.24	13.82
		8-Sep-97	15:00	18.59	10.47

Table 2—Frontier Hard Chrome—Groundwater Elevation Data

Station Name	Well Casing Elevation	Date	Time	Depth to Water	Groundwater Elevation
		20-Oct-97	10:31	17.25	11.81
		26-Nov-97	10:05	17.11	11.95
		10-Dec-97	13:36	17.66	11.40
		12-Feb-98	13:10	15.63	13.43
		26-Mar-98	10:45	16.37	12.69
		15-Jun-98	11:35	13.38	15.68
		3-Feb-99	NM	NM	NM
B85-4	29.14	24-Feb-97	12:10	13.80	15.26
		28-Feb-97	11:50	13.64	15.50
		20-Mar-97	12:51	11.35	17.79
		18-Apr-97	15:10	14.43	14.71
		8-May-97	11:35	9.34	19.80
		26-Jun-97	11:09	8.20	20.94
		30-Jul-97	NM	16.14	13.00
		8-Sep-97	13:20	18.79	10.35
		20-Oct-97	10:25	17.42	11.72
		26-Nov-97	10:50	17.24	11.90
		10-Dec-97	12:05	17.82	11.32
		12-Feb-98	13:25	15.77	14.18
		26-Mar-98	11:15	16.47	12.67
		15-Jun-98	11:40	13.57	15.57
		3-Feb-99	13:48	13.68	15.46
B85-6	28.40	26-Feb-97	12:00	12.50	15.90
		28-Feb-97	12:30	12.73	15.67
		20-Mar-97	12:26	10.68	17.72
		8-May-97	9:09	8.63	19.77
		30-Jul-97	NM	14.51	13.89
		8-Sep-97	15:05	17.88	10.52
		20-Oct-97	10:34	16.58	11.82
		26-Nov-97	10:15	16.43	11.97
		10-Dec-97	13:40	16.99	11.41
		12-Feb-98	13:25	15.77	12.63
		26-Mar-98	10:55	15.72	12.68
		15-Jun-98	11:15	12.72	15.68
		3-Feb-99	NM	NM	NM
B87-8	29.71	24-Feb-97	12:50	13.35	16.36
		28-Feb-97	11:55	14.11	15.60
		20-Mar-97	12:47	12.02	17.69
		18-Apr-97	15:05	14.89	14.82
		8-May-97	11:50	9.95	19.76
		30-Jul-97	NM	15.89	13.82
		8-Sep-97	13:30	19.25	10.46
		20-Oct-97	10:40	17.93	11.78
		26-Nov-97	11:00	17.81	11.90
		10-Dec-97	12:10	18.35	11.36
		12-Feb-98	13:32	16.31	13.40
		26-Mar-98	11:21	17.10	12.61

Table 2—Frontier Hard Chrome—Groundwater Elevation Data

Station Name	Well Casing Elevation	Date	Time	Depth to Water	Groundwater Elevation
		15-Jun-98	11:42	14.08	15.63
		3-Feb-99	13:45	14.26	15.45
PW-1A	28.55	18-Apr-97	15:30	13.66	14.89
		8-May-97	11:18	8.75	19.80
W92-14A	29.57	27-Feb-97	14:45	13.20	16.37
		28-Feb-97	12:40	13.04	16.53
		20-Mar-97	12:16	12.25	17.32
		8-May-97	12:10	9.78	19.79
		26-Jun-97	10:57	8.38	21.19
		30-Jul-97	NM	15.48	14.09
		8-Sep-97	15:30	18.78	10.79
		20-Oct-97	NM	17.47	12.10
		26-Nov-97	11:35	17.39	12.18
		10-Dec-97	12:10	17.96	11.61
		12-Feb-98	12:45	15.96	13.61
		26-Mar-98	11:03	16.77	12.80
		15-Jun-98	11:25	13.74	15.83
		3-Feb-99	12:17	13.95	15.62
W92-15A	29.77	24-Feb-97	16:06	13.40	16.37
		28-Feb-97	13:00	14.16	15.61
		20-Mar-97	12:36	12.15	17.62
		9-Apr-97	16:06	13.72	16.05
		18-Apr-97	12:30	14.97	14.80
		8-May-97	11:57	10.05	19.72
		26-Jun-97	10:00	8.73	21.04
		30-Jul-97	NM	15.95	13.82
		29-Aug-97	12:30	18.40	11.37
		8-Sep-97	15:37	19.31	10.46
		20-Oct-97	10:54	17.98	11.79
		26-Nov-97	11:15	17.87	11.90
		10-Dec-97	11:50	18.40	11.37
		12-Feb-98	13:50	16.38	13.39
		26-Mar-98	11:30	17.17	12.60
		15-Jun-98	11:58	14.15	15.62
		3-Feb-99	12:03	14.34	15.43
W92-16A	29.36	26-Feb-97	14:10	13.45	15.91
		28-Feb-97	12:55	13.76	15.60
		20-Mar-97	12:40	11.75	17.61
		9-Apr-97	17:10	13.28	16.08
		18-Apr-97	12:40	14.57	14.79
		8-May-97	11:53	9.62	19.74
		26-Jun-97	10:14	8.33	21.03
		30-Jul-97	NM	15.55	13.81
		8-Sep-97	13:35	18.90	10.46
		20-Oct-97	10:45	17.59	11.77
		26-Nov-97	11:53	17.47	11.89
		10-Dec-97	11:10	17.99	11.37

Table 2—Frontier Hard Chrome—Groundwater Elevation Data

Station Name	Well Casing Elevation	Date	Time	Depth to Water	Groundwater Elevation
		12-Feb-98	13:43	15.98	13.38
		26-Mar-98	11:38	16.77	12.59
		15-Jun-98	11:45	13.73	15.63
		3-Feb-99	NM	NM	NM
W97-18A	29.23	28-Feb-97	11:20	14.75	14.48
		20-Mar-97	12:04	11.38	17.85
		9-Apr-97	16:48	13.28	15.95
		18-Apr-97	13:05	14.49	14.74
		8-May-97	11:10	9.40	19.83
		26-Jun-97	11:40	8.23	21.00
		30-Jul-97	NM	15.56	13.67
		8-Sep-97	16:48	18.87	10.36
		20-Oct-97	12:10	17.50	11.73
		26-Nov-97	10:30	17.28	11.95
		10-Dec-97	13:45	17.89	11.34
		12-Feb-98	12:28	15.73	13.50
		26-Mar-98	10:30	16.44	12.79
		15-Jun-98	11:00	13.63	15.60
		3-Feb-99	14:05	13.57	15.66
W97-19A	26.22	20-Mar-97	13:09	8.50	17.72
		18-Apr-97	14:20	11.63	14.59
		8-May-97	10:15	6.47	19.75
		26-Jun-97	9:40	5.68	20.54
		30-Jul-97	NM	12.69	13.53
		8-Sep-97	14:20	15.95	10.27
		20-Oct-97	11:33	14.55	11.67
		26-Nov-97	13:40	14.37	11.85
		10-Dec-97	14:45	14.96	11.26
		12-Feb-98	14:47	12.20	14.02
		26-Mar-98	12:45	12.90	13.32
		15-Jun-98	13:25	10.00	16.22
		3-Feb-99	13:04	10.07	16.15
W98-20A	27.34	15-Jun-98	13:14	11.75	15.59
		3-Feb-99	13:12	11.85	15.49
W98-21A	29.05	15-Jun-98	10:45	13.48	15.57
		3-Feb-99	11:35	13.56	15.49
W85-1B	29.06	24-Feb-97	14:10	12.65	16.41
		28-Feb-97	12:25	13.35	15.71
		20-Mar-97	13:03	11.42	17.64
		18-Apr-97	14:56	14.12	14.94
		8-May-97	9:56	9.32	19.74
		26-Jun-97	NM	7.87	21.19
		30-Jul-97	NM	15.08	13.98
		8-Sep-97	13:46	18.45	10.61
		20-Oct-97	11:05	17.19	11.87
		26-Nov-97	12:10	17.11	11.95
		10-Dec-97	12:47	17.60	11.46

Table 2—Frontier Hard Chrome—Groundwater Elevation Data

Station Name	Well Casing Elevation	Date	Time	Depth to Water	Groundwater Elevation
		12-Feb-98	14:05	15.61	13.45
		26-Mar-98	10:58	16.42	12.64
		15-Jun-98	12:33	13.32	15.74
		3-Feb-99	12:32	13.58	15.48
W85-3B	30.56	25-Feb-97	14:39	14.30	16.26
		28-Feb-97	12:20	14.80	15.76
		20-Mar-97	12:57	13.00	17.56
		18-Apr-97	14:50	15.55	15.01
		8-May-97	9:50	10.83	19.73
		26-Jun-97	NM	9.35	21.21
		30-Jul-97	NM	16.48	14.08
		8-Sep-97	13:40	19.88	10.68
		20-Oct-97	11:00	18.67	11.89
		26-Nov-97	12:00	18.59	11.97
		10-Dec-97	12:53	19.10	11.46
		12-Feb-98	13:56	17.08	13.48
		26-Mar-98	11:51	17.95	12.61
		15-Jun-98	12:20	14.79	15.77
		3-Feb-99	12:43	15.08	15.48
W85-5B	35.17	26-Feb-97	10:40	19.45	15.72
		28-Feb-97	10:25	19.78	15.39
		20-Mar-97	13:35	17.37	17.80
		18-Apr-97	16:25	20.63	14.54
		8-May-97	13:40	15.38	19.79
		26-Jun-97	13:15	14.52	20.65
		30-Jul-97	NM	21.75	13.42
		8-Sep-97	14:30	25.02	10.15
		20-Oct-97	11:41	23.59	11.58
		26-Nov-97	16:00	23.37	11.80
		10-Dec-97	14:53	23.92	11.25
		12-Feb-98	15:42	21.91	13.26
		26-Mar-98	13:10	22.56	12.61
		15-Jun-98	13:33	19.72	15.45
		3-Feb-99	11:17	19.77	15.40
W85-6B	29.03	25-Feb-97	11:20	12.85	16.18
		28-Feb-97	10:45	13.48	15.55
		20-Mar-97	11:57	11.25	17.78
		9-Apr-97	16:24	13.05	15.98
		18-Apr-97	13:49	14.30	14.73
		8-May-97	10:45	9.22	19.81
		26-Jun-97	NA	8.08	20.95
		30-Jul-97	NM	15.34	13.69
		8-Sep-97	16:05	18.66	10.37
		20-Oct-97	10:19	17.41	11.62
		10-Dec-97	15:05	17.66	11.37
		12-Feb-98	12:11	15.64	13.39
		26-Mar-98	10:13	16.36	12.67

Table 2—Frontier Hard Chrome—Groundwater Elevation Data

Station Name	Well Casing Elevation	Date	Time	Depth to Water	Groundwater Elevation
		15-Jun-98	10:35	13.41	15.62
		3-Feb-99	11:44	13.70	15.33
W85-7B	26.54	28-Feb-97	9:00	11.25	15.29
		28-Feb-97	10:00	11.23	15.31
		20-Mar-97	13:28	8.80	17.74
		18-Apr-97	15:56	11.94	14.60
		8-May-97	10:37	6.79	19.75
		26-Jun-97	NM	5.68	20.86
		30-Jul-97	NM	12.89	13.65
		8-Sep-97	14:50	16.27	10.27
		20-Oct-97	11:25	14.98	11.56
		26-Nov-97	13:15	16.35	10.19
		10-Dec-97	14:36	15.46	11.08
		12-Feb-98	14:19	13.27	13.27
		26-Mar-98	NA	NM	NA
		15-Jun-98	12:51	11.04	15.50
		3-Feb-99	13:28	11.15	15.39
W87-8B	29.90	26-Feb-97	15:45	13.80	16.10
		28-Feb-97	11:35	14.10	15.80
		18-Apr-97	14:06	14.84	15.06
		8-May-97	10:59	10.19	19.71
		26-Jun-97	11:30	8.69	21.21
		30-Jul-97	NM	15.75	14.15
		20-Oct-97	11:54	17.98	11.92
		26-Nov-97	12:25	17.94	11.96
		10-Dec-97	12:35	18.41	11.49
		12-Feb-98	14:30	16.42	13.48
		26-Mar-98	12:20	17.28	12.62
		15-Jun-98	13:01	14.12	15.78
		3-Feb-99	NM	NM	NA
W86-10B	29.55	25-Feb-97	NM	14.40	NA
		20-Mar-97	11:45	12.58	16.97
		18-Apr-97	14:10	15.70	13.85
		8-May-97	10:53	10.57	18.98
		30-Jul-97	16:10	16.95	12.60
		8-Sep-97	14:11	20.29	9.26
		20-Oct-97	11:47	18.92	10.63
		26-Nov-97	12:35	17.64	11.91
		12-Feb-98	14:35	17.17	12.38
		26-Mar-98	12:30	17.61	11.94
		15-Jun-98	13:05	14.96	14.59
		3-Feb-99	NM	NM	NA
PW-1B	28.38	18-Apr-97	15:20	13.44	14.94
		8-May-97	11:25	8.63	19.75
		26-Jun-97	10:30	7.25	21.13
		30-Jul-97	NM	14.42	13.96
		8-Sep-97	15:10	17.77	10.61

Table 2—Frontier Hard Chrome—Groundwater Elevation Data

Station Name	Well Casing Elevation	Date	Time	Depth to Water	Groundwater Elevation
		20-Oct-97	10:35	16.52	11.86
		26-Nov-97	10:22	16.42	11.96
		12-Feb-98	13:05	14.92	13.46
		26-Mar-98	11:57	15.75	12.63
		15-Jun-98	11:20	12.66	15.72
		3-Feb-99	NM	NM	NA
W92-15B	29.64	24-Feb-97	NM	13.30	16.34
		28-Feb-97	NM	14.13	15.51
		20-Mar-97	12:32	12.02	17.62
		9-Apr-97	16:07	13.54	16.10
		18-Apr-97	12:12	14.82	14.82
		8-May-97	11:59	9.91	19.73
		26-Jun-97	10:06	8.58	21.06
		30-Jul-97	NM	15.80	13.84
		29-Aug-97	12:32	18.25	11.39
		8-Sep-97	15:40	19.16	10.48
		20-Oct-97	10:52	17.85	11.79
		26-Nov-97	11:20	17.74	11.90
		10-Dec-97	11:55	18.29	11.35
		12-Feb-98	13:48	16.25	13.39
		26-Mar-98	11:28	17.05	12.59
		15-Jun-98	11:55	14.00	15.64
		3-Feb-99	12:10	14.20	15.44
W92-16B	29.26	25-Feb-97	NM	13.10	16.16
		28-Feb-97	NM	13.66	15.60
		20-Mar-97	12:44	11.65	17.61
		18-Apr-97	12:45	14.46	14.80
		8-May-97	11:52	9.53	19.73
		26-Jun-97	10:19	8.22	21.04
		30-Jul-97	NM	15.44	13.82
		8-Sep-97	13:35	18.78	10.48
		20-Oct-97	10:48	17.48	11.78
		26-Nov-97	11:45	17.37	11.89
		10-Dec-97	11:00	17.91	11.35
		12-Feb-98	13:38	15.87	13.39
		26-Mar-98	11:35	16.66	12.60
		15-Jun-98	11:47	13.62	15.64
		3-Feb-99	NM	NM	NA
W97-18B	29.15	28-Feb-97	NM	14.75	14.40
		20-Mar-97	NM	11.55	17.60
		9-Apr-97	16:49	13.12	16.03
		18-Apr-97	13:20	14.34	14.81
		8-May-97	11:06	9.35	19.80
		26-Jun-97	11:36	8.10	21.05
		30-Jul-97	NM	15.36	13.79
		8-Sep-97	16:11	18.28	10.87
		20-Oct-97	12:09	17.26	11.89

Table 2—Frontier Hard Chrome—Groundwater Elevation Data

Station Name	Well Casing Elevation	Date	Time	Depth to Water	Groundwater Elevation
		26-Nov-97	10:35	17.36	11.79
		10-Dec-97	13:50	17.60	11.55
		12-Feb-98	12:23	15.81	13.34
		26-Mar-98	10:32	16.51	12.64
		15-Jun-98	11:06	13.51	15.64
		3-Feb-99	14:02	13.72	15.43
W97-19B	25.49	20-Mar-97	NM	7.75	17.74
		18-Apr-97	14:25	10.93	14.56
		8-May-97	10:16	5.74	19.75
		26-Jun-97	9:35	4.68	20.81
		30-Jul-97	9:35	11.99	13.50
		8-Sep-97	14:20	15.25	10.24
		20-Oct-97	11:33	13.85	11.64
		26-Nov-97	13:45	13.66	11.83
		10-Dec-97	14:50	14.22	11.27
		12-Feb-98	14:45	12.92	12.57
		26-Mar-98	12:50	13.61	11.88
		15-Jun-98	13:22	10.72	14.77
		3-Feb-99	13:02	10.80	14.69
W98-21B	29.27	26-Mar-98	10:47	13.7	15.57
		3-Feb-99	11:34	13.79	15.48

NM - Not measured
NA - Not applicable

Table 3—Frontier Hard Chrome—Unfiltered Total Chromium Concentrations in Groundwater (µg/L)—February 1999

Station ID	Total Chromium (µg/L)
B85-4	2,450
B87-8	321
W85-1B	349
W85-5A	5 U
W85-5B	5 U
W85-6A	15
W92-14P	10,200
W92-14A	19,400
W92-15A	71
W92-15B	1,610
W97-18A	5 U
W97-19A	5 U
W98-20A	5.6
W98-21A	6.3
W98-21B	17

U = The analyte was not detected at the stated quantitation limit.

Table 4—Frontier Hard Chrome—Field Water Quality Parameters for Groundwater—February 1999

Station ID	pH	Conductivity (µS)	Temperature (C)	Eh	Dissolved Oxygen
B85-4	6.4	456	14.1	286	0.4
B87-8	6.7	114	14.3	274	5.7
W85-1B	6.7	232	12.4	286	5.2
W85-5A	6.3	198	13.9	272	7.0
W85-5B	6.5	216	13.2	283	5.5
W85-6A	7.4	269	13.2	254	8.7
W92-14P	4.8	59	14.2	354	0.0
W92-14A	6.1	227	13.5	311	0.0
W92-15A	6.6	375	13.5	276	0.2
W92-15B	6.6	220	13.3	278	1.3
W97-18A	6.6	206	12.6	289	4.4
W97-19A	6.9	204	12.8	265	2.2
W98-20A	6.3	187	14.1	304	6.0
W98-21A	6.2	177	13.2	245	1.5
W98-21B	6.3	265	13.8	267	3.1

Results for turbidity were rejected due to inconsistent field instrument readings.