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WASHINGTON STATE DEPARTMENT OF ECOLOGY

Frontier Hard Chrome Event 16 Long-Term Monitoring Report (September 2010 Results)

Authorization/Contract: 7.1.b.7/10.3

December 2010

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FRONTIER HARD CHROME
LONG-TERM MONTORING REPORT
EVENT 16—SEPTEMBER 2010
VANCOUVER, WASHINGTON

Prepared for

Washington State Department of Ecology
PO Box 47600
Olympia, Washington 98504

Authorization/Contract No. 7.1.b.7/10.3

Weston Work Order No. 10799.004.003.0001

December 2010

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Prepared and Approved By:

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Date: 12/15/2010

10-0023

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SECTION 1

INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This Long-Term Monitoring Report has been prepared under Authorization/Contract No. 7.1.b.7/10.3 to the State of Washington Department of Ecology (Ecology) for Long-Term Monitoring of the Frontier Hard Chrome (FHC) site located in Vancouver, Washington.

This report describes the sampling activities performed and analytical results obtained during "Event 16" of the Long-Term Groundwater Monitoring program at FHC. Sampling activities for Event 16 were conducted during September 2010.

The FHC site was the subject of a remedial action conducted during the summer of 2003. The purpose of the remedial action (RA) was to treat the site's chromium-contaminated soil and groundwater to cleanup levels specified in the Record of Decision. Long-term monitoring is required to track offsite plume concentrations as well as show that the remedy is maintaining its operational functionality.

The first three groundwater monitoring events (Events 1 through 3) were conducted for the United States Environmental Protection Agency (EPA). In October 2004, responsibility for this site was turned over to Ecology. Ecology contracted Weston Solutions, Inc. (WESTON®) to perform the next 2 rounds of monitoring (Events 4 and 5) as a result of WESTON's familiarity with this site and the associated property owners. Ecology amended WESTON's contract in February 2006 and again in July 2007 to perform 14 additional rounds of quarterly monitoring with the last to be completed in June 2009.

In the summer and fall of 2007, EPA conducted a Long-Term Monitoring Optimization (LTMO) study to assess monitoring requirements at Frontier Hard Chrome. As a result of this study, ten wells were deleted from the monitoring program (EPA 2008). Ecology amended WESTON's contract to delete the remaining monitoring events except one event to be completed in September 2008 (Event 14). The work conducted in September 2009 (Event 15) was completed under an individual Authorization/Contract No. 7.1.b.7/10.3. The work conducted in September 2010 (Event 16) was completed under an individual Authorization/Contract No. 7.1.b.7/10.3.

This report documents the results of sampling under the new Authorization/Contract between Ecology and WESTON.

All Event 16 work was performed in accordance with project work plan titled *Frontier Hard Chrome, Long Term Monitoring Plan* (Weston 2004).

1.2 BACKGROUND AND PROBLEM DEFINITION

1.2.1 Site Background

The FHC site is located in southeastern Vancouver, Washington (Figure 1). The facility address is 113 "Y" Street, Vancouver, Washington. The site is located in the Section 25, Township 2 north, Range 1 east, Willamette Meridian in Clark County, Washington. The location in latitude and longitude coordinates is 45 degrees, 37 minutes, 19 seconds north by 122 degrees, 38 minutes 45 seconds east (Degrees, Minutes, Seconds [DMS]). The site was previously occupied by several metals fabricating businesses and was used for storage and as a staging area for a neighboring business. Currently, no buildings exist on the site and the site is vacant. A truck driving school is operating on the parcel south of the site.

The FHC site proper covers approximately 0.5 acres and is bordered to the east by Grand Avenue, to the south by Test-U, and to the west by "Y" Street.

Work began on the remedial design in October 2001. The remedial design was completed in February 2003. The remedial action, consisting of building demolition, treatment of source area soil and groundwater, and installation of an in-situ redox manipulation (ISRM) treatment wall (to treat hexavalent chromium), was completed in September 2003.

1.2.2 Problem Definition

The goal of the remedial action was to treat source area soil and groundwater to reduce hexavalent chromium concentrations such that groundwater down gradient of the site would attenuate to chromium concentrations less than 50 micrograms per liter (µg/L). To demonstrate this, groundwater quality was monitored in two areas. The first area consisted of locations immediately within and down gradient of the ISRM wall. Wells located within and just down gradient of the wall were monitored to ensure the continued operational functionality of the ISRM Treatment Wall. The second area monitored consisted of the historical chromium contaminated groundwater plume located down gradient of the ISRM wall. This down gradient plume did not receive treatment during the remedial action and was monitored to track the long-term expected reduction in chromium concentration as a result of completing the remedial action and elimination of the source of hexavalent chromium.

Long-term groundwater monitoring is required by the site's Record of Decision.

1.3 MONITORING SCHEDULE

Sampling events performed for EPA were conducted approximately quarterly for the first year after completion of the remedial action. Planned sampling events were completed in February, April, and August 2004. The sampling event performed the week of 16 August 2004 concluded monitoring for approximately one year after the remedial action was completed.

In September/October 2004, monitoring of the FHC site was turned over to the Washington State Department of Ecology. Sampling of the site groundwater for Ecology (Original Contract).

occurred in May 2005 and again in December 2005. In February 2006, Ecology amended WESTON's contract (Amendment #1) to perform 6 additional rounds of monitoring to be done quarterly: March 2006, June 2006, September 2006, December 2006, March 2007 and June 2007.

In July 2007, additional funding was received from Ecology for an additional 8 quarters of groundwater monitoring (Amendment #3). These additional 8 quarters of monitoring were scheduled for September 2007, December 2007, March 2008, June 2008, September 2008, December 2008, March 2009 and June 2009.

In June 2008 as a result of the recommendations of the LTMO study (EPA 2008), Ecology issued amendment #4 to WESTON which removed the remaining rounds of sampling from the contract with the exception of one round which was to be completed in September 2008. The work conducted in September 2009 (Event 15) was completed under an individual Authorization/Contract No. 7.1.b.7/10.3. The work conducted in September 2010 (Event 16) was completed under an individual Authorization/Contract No. 7.1.b.7/10.3

This report documents the results of the September 2010 sampling event.

SECTION 2

SAMPLING ACTIVITIES AND RESULTS

2.1 MONITORING WELL SAMPLING PROCEDURES

During September 2010, 22 wells were sampled. These wells consisted of the following:

Shallow Wells	Deep Wells
B85-4	B85-3
RA-MW-16A	B87-8
W85-6A	RA-MW-12B
W92-16A	RA-MW-12C
RA-MW-12A	RA-MW-15B
RA-MW-17A	RA-MW-16B
W97-18A	W85-6B
RA-MW-15A	W92-16B
W97-19A	W97-19B
W98-21A	W98-21B
W99-R5A	W99-R5B

Sampling activities for Event 16 were conducted on September 13 through September 16, 2010 by WESTON staff.

The monitoring wells in the vicinity of the FHC site are shown on Figure 2. A total of 22 wells were sampled for metals in accordance with the *Long Term Monitoring Plan* (Weston 2004).

Well purging and sampling were performed according to sampling guidelines and WESTON standard operating procedures. The wells were sampled with a peristaltic pump equipped with new polyethylene tubing deployed to mid-screen depth at each well. The wells were purged prior to sampling until monitored field parameters (turbidity, conductivity, pH, dissolved oxygen, ORP, and temperature) stabilized. The field parameter readings were recorded on field sampling forms.

Groundwater samples were analyzed for total analyte list (TAL) metals. In cases where groundwater turbidity was greater than 10 nephalometric turbidity units (NTUs), samples were passed through a 0.45-micron filter in the field and submitted for dissolved TAL metals. Qualitative, visual observation was used to estimate turbidity in samples collected from the following wells due to a malfunction in the turbidity meter instrument: W97-18A, RA-MW-16B,

RA-MW-15A, RA-MW-15B, RA-MW-12A, RA-MW-12B, RA-MW-12C, groundwater samples collected from these wells was documented as "clear" and appeared to be less than 10 NTU at the time the groundwater samples were collected. No groundwater samples were filtered due to high turbidity.

Field filtered samples (using a 0.45-micron in-line filter) were collected from Wells RA-MW-15B, W85-6A, W99-R5A, B85-4, and B87-8 and hand couriered the morning of September 15, 2010 to Columbia Analytical Services in Kelso, Washington for analysis of dissolved sulfur (Wells RA-MW-15B, W85-6A, W99-R5A, B85-4, and B87-8) and hexavalent chromium (Well B87-8).

Selected samples were analyzed for total sulfur and sulfate to provide an assessment of the distribution of byproducts from the reducing agent used during ISRM wall installation.

Groundwater chromium concentrations are provided in Table 1. Measured field parameters are provided in Table 2.

2.2 ANALYTICAL RESULTS

2.2.1 Chromium

Chromium was detected in 17 of the 22 wells sampled. The detection limit for chromium was 0.5 µg/L.

Total detected chromium concentrations in the "A" zone ranged from a maximum concentration of 7.26 µg/L in Well RA-MW-12A to 0.86 µg/L in Well B85-4. All "A" zone wells, except RA-MW-12A (7.26 µg/L), had total chromium concentrations less than 5 µg/L.

Samples collected from Monitoring Wells RA-MW-12A, RA-MW-15B, and B87-8 were field filtered and had dissolved chromium concentrations of 7.77 µg/L, 2.02 µg/L, and 2.71 µg/L, respectively. Filtered samples (in addition to unfiltered samples) have been routinely collected from Well RA-MW-12A due to its high turbidity.

Hexavalent chromium was not detected at a concentration greater than the method reporting limit of 50 µg/L in a groundwater sample collected from Well B87-8.

"A" zone chromium concentrations and plume contours are shown in Figure 3. Filtered sample data were used in preparing Figure 3 where available.

Total detected chromium concentrations in "B" zone groundwater ranged from a maximum concentration of 3.02 µg/L (Well B87-8) to 0.62 µg/L (Well RA-MW-15B). All "B" zone wells contained total chromium concentrations less than 5 µg/L.

"B" zone chromium concentrations and plume contours are shown in Figure 4. Filtered sample data were used in preparing Figure 4 where available.

Figures showing the chromium concentration trends in groundwater over time are included in Appendix A. Data from wells sampled during Operational and Functional monitoring in November and December 2003 are included in these figures where available to assist in determining trends. Laboratory chromium data sheets for the September 2010 sampling event are provided in Appendix B.

Figures 3, 4, and those in Appendix A used filtered chromium values where available.

2.2.2 Water Quality

Dissolved oxygen (DO) concentrations ranged from a low of 0.17 mg/L to a high of 10.90 mg/L. DO averaged 0.80 mg/L in samples collected from wells within the ISRM Treatment Wall (RA-MW-12A [1.96 mg/L], RA-MW-12B [0.23 mg/L], RA-MW-12C [0.20 mg/L]). The DO concentrations indicate the wall is still reductive which is necessary for treatment of hexavalent chromium. Samples of groundwater collected down gradient of the ISRM Treatment Wall had similar concentrations of DO compared to those within the treatment wall.

pH ranged from 6.25 to 9.12. The highest pH during this round was located in Well W85-6B.

The highest sulfur and sulfate concentrations were located downgradient of the treatment wall across 1st Street in Well B87-8. No sulfur or sulfate samples were collected from wells within the treatment wall. Maximum sulfur and sulfate concentrations in groundwater were 35.3 mg/L and 102 mg/L, respectively, and occurred in Well B87-8.

2.3 GROUNDWATER FLOW DIRECTION AND ELEVATION

Groundwater surface elevations were determined using the known elevation of the top of each well casing and the depth to groundwater measured in each long-term monitoring well. The depth to groundwater measurements were collected during the afternoon on 13 September 2010. Groundwater elevations could not be measured in Well W85-3A because it was likely covered with metal debris.

The Columbia River elevation at the United State Geological Survey (USGS) gauging station 14144700 located at the nearby I-5 Bridge was obtained for use in determining flow direction. The elevation of the river ranged from 3.49 feet at 1245 hours to 2.80 feet at 1430 hours on 13 September 2009 (corrected to NGVD 1929 by adding 1.82 feet to the measured river elevation). The river elevation information can be obtained from http://waterdata.usgs.gov/wa/nwis/

Groundwater surface elevations for each well measured are shown in Table 4. The groundwater flow direction (as determined using groundwater surface elevations measured in each well within a period of approximately 2 hours) is heading away from the FHC site. A horizontal gradient was calculated for 13 September 2010 with a result of 0.00007 ft/ft with a flow direction towards the Columbia River. The groundwater table during this period had a drop in elevation of 0.18 feet over a distance of approximately 2,600 feet.

Groundwater elevation and gradient information is graphically shown in Figure 5.

2.4 QUALITY ASSURANCE

Data quality was checked by running field duplicates. Laboratory duplicates and matrix spike analyses were performed by the lab. Table 5 shows the quality control results.

Field duplicates were run on both filtered (RA-MW-15B) and unfiltered (RA-MW-15B and B85-4) samples during this sampling event. The filtered duplicate result had good correlation with the original sample result (relative percent difference of -1.0%). The unfiltered duplicate result for B85-4 had a good correlation with a relative percent difference of 0%. However, the unfiltered duplicate for RA-MW-15Bdid not correlate well with the original field sample (relative percent difference = -37.9%).

2.5 INVESTIGATION-DERIVED WASTES

Investigation-derived waste (IDW) generated during the sampling event consisted of well purge water, used PPE, and disposable sampling supplies. During sampling, purge water was stored on site in 5-gallon buckets. At the completion of sampling, the water was transported to the City of Vancouver's operations center and disposed of in accordance with the Special Wastewater Discharge Authorization (authorization number 2010.06; effective 7 September 2010 through 7 September 2015) issued to WESTON by the city. Approximately 77 gallons of water was disposed. Personnel protective equipment and other solid wastes were disposed of in a dumpster.

2.6 DISCUSSION AND CONCLUSIONS

Chromium concentrations in onsite "A" zone groundwater in and around the ISRM Treatment Wall were generally less than 5 µg/L (using dissolved chromium concentrations where available), with the exception of RA-MW-12A (7.77 µg/L). Well RA-MW-12A produced purge water that was dark brown with particulate and never cleared up with purging. This particulate is thought to consist of insoluble chromium compounds.

Concentrations of chromium in samples collected during this round of sampling were similar to those collected in September 2009 round with the exception of Well B87-8 where the concentrations of total and dissolved chromium were lower. The dissolved chromium concentration in Well B87-8, located south of East 1st Street, was 2.71 µg/L. The form of chromium was determined to be hexavalent chromium.

The deeper "B" zone groundwater downgradient of the site contained chromium in concentrations similar to that in the "A" zone. Chromium concentrations in "B" zone groundwater on and downgradient of the site were all less than 5 µg/L.

Wells RA-MW-15B and RA-MW-16B have had anomalously elevated chromium concentrations in unfiltered samples beginning in May 2005. Therefore, both unfiltered and filtered samples

were collected from Well RA-MW-15B during this sampling event regardless of turbidity. The unfiltered sample from Well RA-MW-15B had a chromium concentration of 0.62 µg/L whereas the filtered sample had a chromium concentration of 2.02 µg/L.

Dissolved oxygen data collected from wells located within the ISRM Treatment Wall indicates that an area of reducing conditions still exists implying the hexavalent chromium treatment zone is still active. Most locations within the treatment wall contain dissolved oxygen at concentrations less than 1.96 mg/L and negative oxygen reduction potential (ORP) implying reducing conditions are present within the treatment wall.

Sulfur and Sulfate concentrations in the wells sampled were similar to previous rounds of sampling; with the exception of Well B87-8, where the concentration of Sulfur increased to 35.3 mg/L in 2010 from 17 mg/L in 2009 and the concentration of Sulfate increased to 102 mg/L in 2010 from 53.7 mg/L in 2009.

SECTION 3

ANALYTICAL METHODS AND DATA VALIDATION

3.1 ANALYTICAL METHODS REQUIREMENTS AND DATA VALIDATION

The laboratory data quality assurance review and validation of analytical results for 25 water samples has been completed (22 field samples and three field duplicate samples). Samples were collected between 13 September 2010 and 16 September 2010 from monitoring wells at the Frontier Hard Chrome site and were analyzed for dissolved and total recoverable chromium. One sample was analyzed for hexavalent chromium.

The quality assurance review was performed on the laboratory data sheets and the WDOE memorandum to ensure that the analytical results met data quality objectives for the project. All laboratory quality assurance results as applicable (e.g., holding times, blank sample analysis, matrix spike/duplicate analysis, laboratory control sample analysis) supplied to WESTON for the analyses met acceptance criteria specified in the work plan (Weston 2004), with no exceptions noted.

Samples **RA-MW-12A, RA-MW-15B,** and **B87-8** were collected both as total recoverable (unfiltered) and dissolved (field-filtered) fractions – with one fraction submitted for total recoverable chromium analysis and the other filtered at the time of collection and submitted for dissolved chromium analysis. Samples **RA-MW-12A** and **RA-MW-15B** were collected as field duplicates for total recoverable and dissolved chromium analyses (the field duplicate sample taken from RA-MW-12A was not analyzed for the dissolved fraction). Sample **B87-8** was the parent sample for hexavalent chromium analysis.

Data validation documentation is provided in Appendix D.

SECTION 4

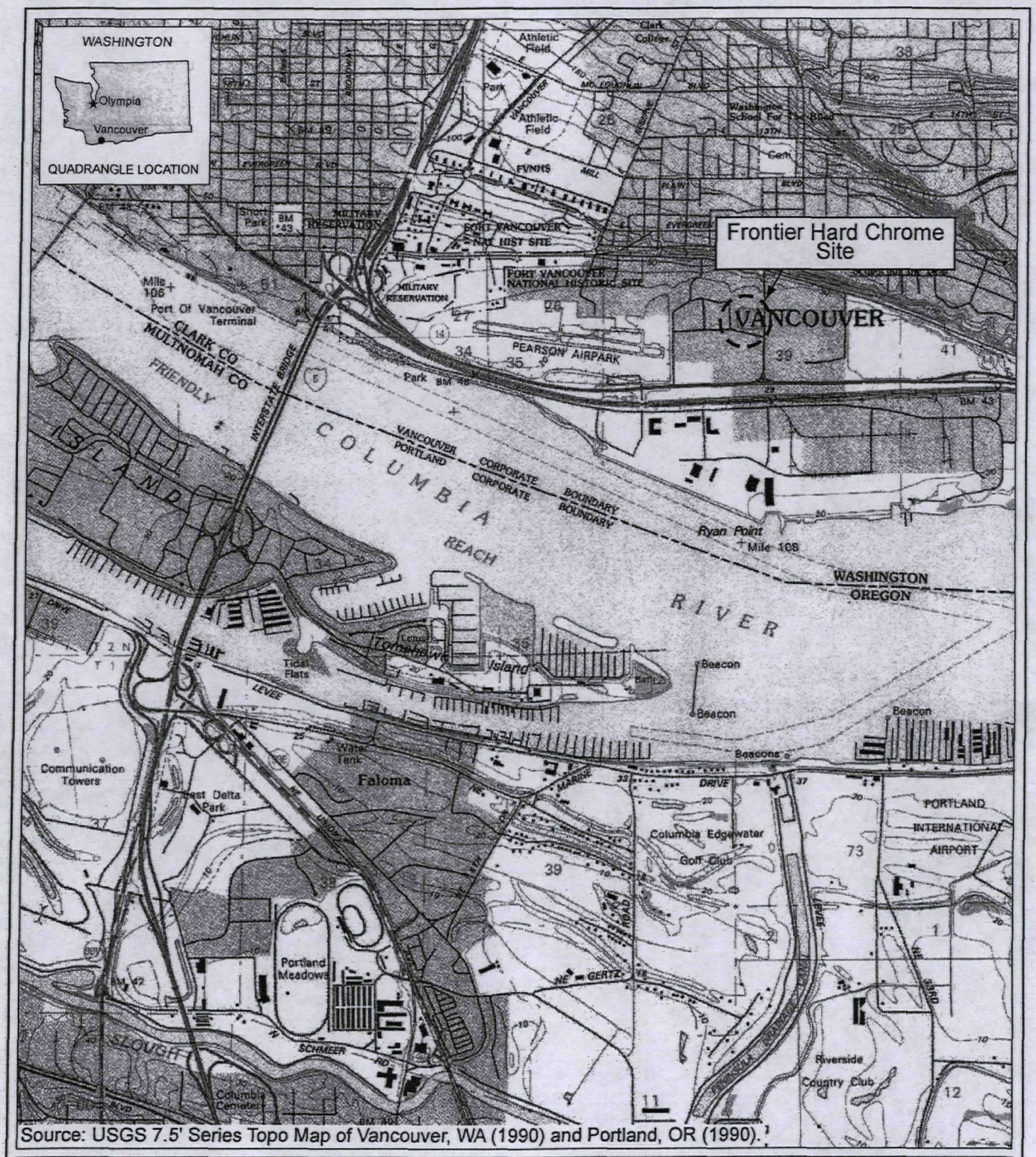
REFERENCES

EPA (United States Environmental Protection Agency), 2008. Five Year Review Report for Frontier Hard Chrome Superfund Site. January, 2008.

EPA (United States Environmental Protection Agency), 2003. Statement of Work for Long Term Response Action. Frontier Hard Chrome, Vancouver, WA. December 30th, 2003.

Weston (Weston Solutions, Inc.), 2004. Frontier Hard Chrome Long Term Monitoring Plan. Prepared for the U.S. Environmental Protection Agency, Region 10, Seattle, Washington. February.

FIGURES



Source: USGS 7.5' Series Topo Map of Vancouver, WA (1990) and Portland, OR (1990).

0 1000 2000

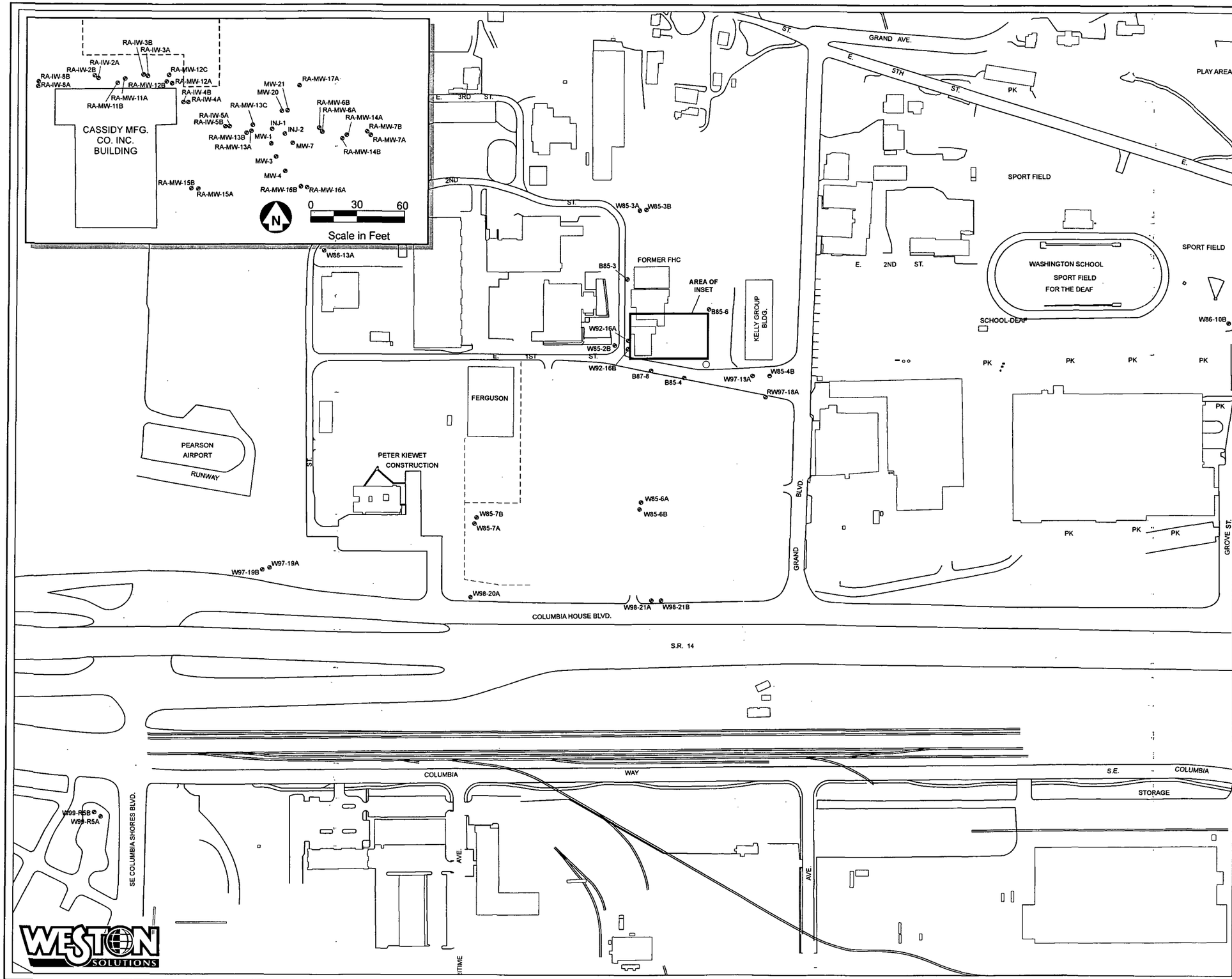
Scale in Feet

WESTON SOLUTIONS

Frontier Hard Chrome
Vancouver, Washington
Vicinity Map

Figure 1

10-0023 Fig1.ai



LEGEND

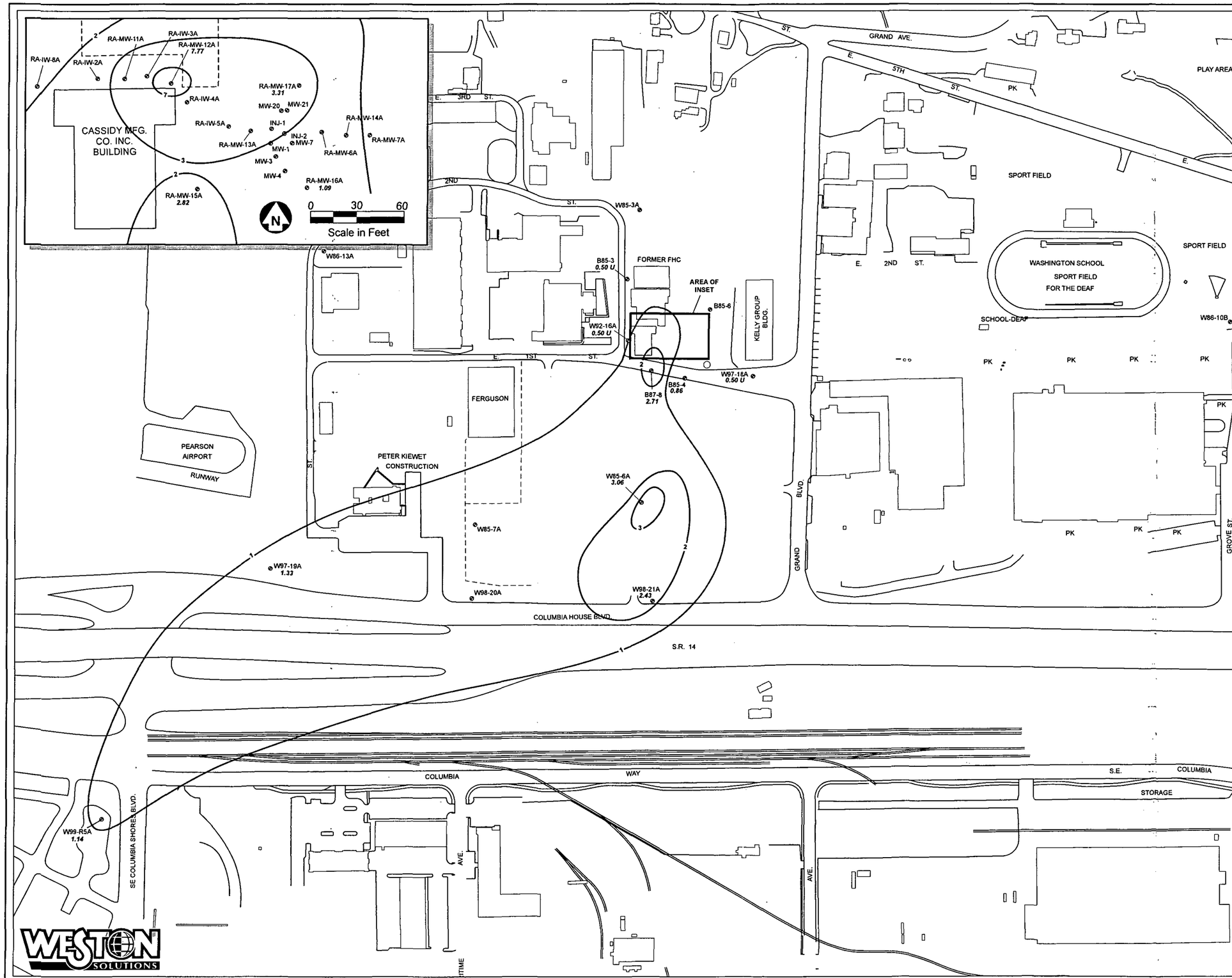
- W85-5B Monitoring Well Location and ID
- W85-4B Abandoned Well Location and ID
- Fence

0 150 300
Scale in Feet

Frontier Hard Chrome
Vancouver, Washington
Monitoring Well Locations

Figure
2

10-0023 Fig2.ai



LEGEND

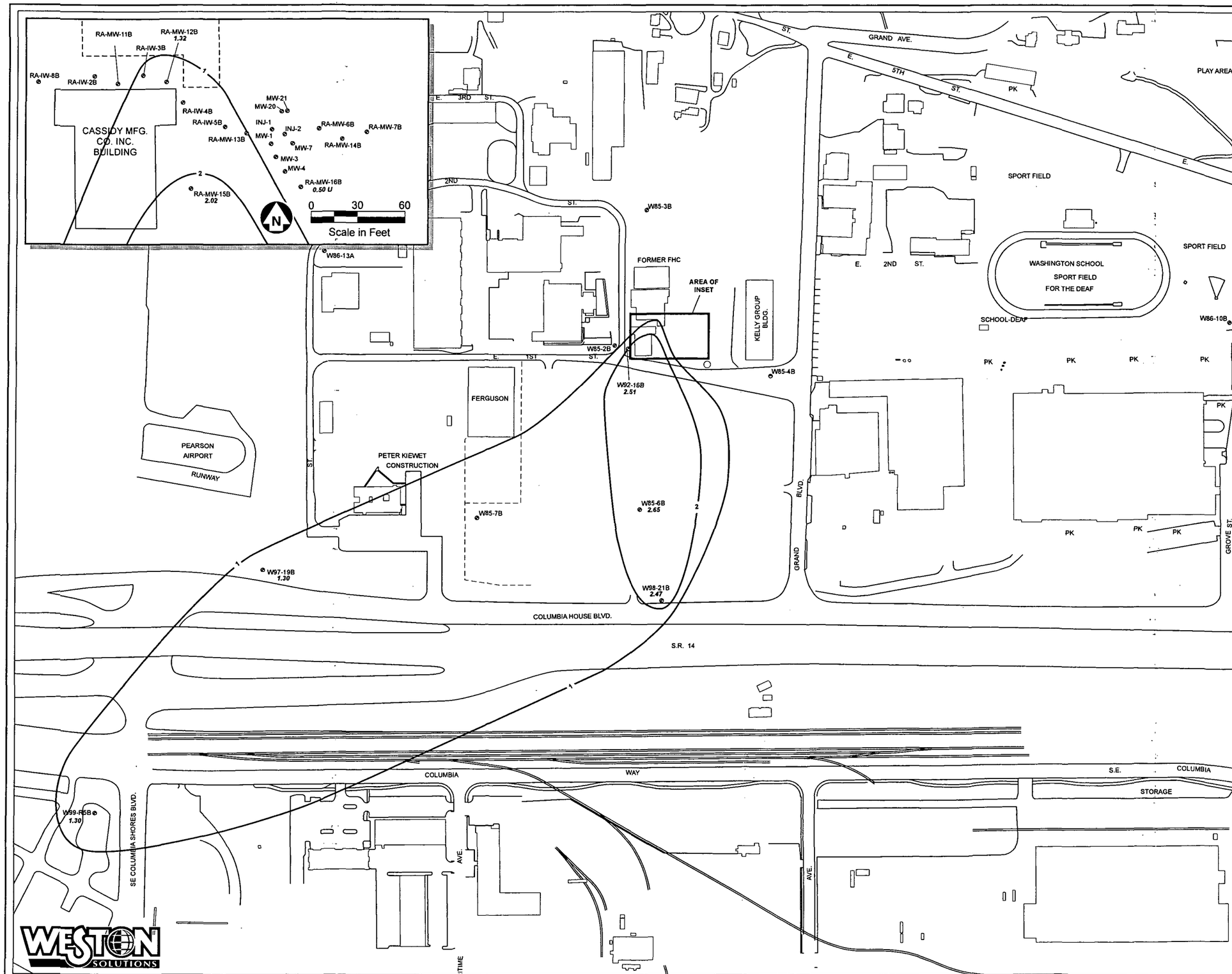
W85-7A	Monitoring Well Location and ID
2.82	Chromium Concentration (µg/L)
—1—	Concentration Contour (µg/L)
U	Analyte not detected at given concentration

0 150 300
Scale in Feet

Frontier Hard Chrome
Vancouver, Washington
Chromium Concentrations
in Zone A Groundwater
September 2010

Figure
3

10-0023 Fig3.ai



LEGEND

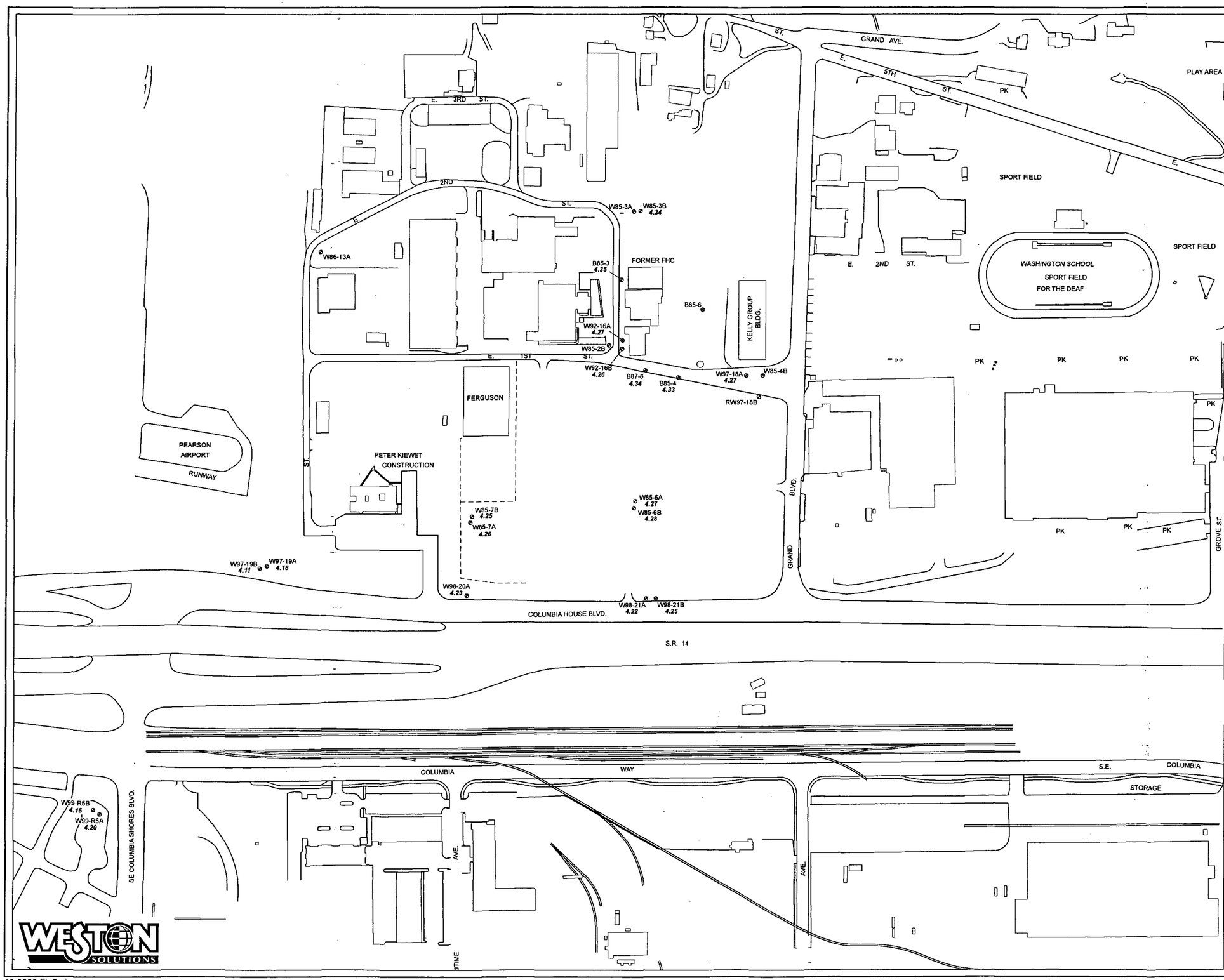
- W85-7A — Monitoring Well Location and ID
- W85-4B — Abandoned Well Location and ID
- 2.02 — Chromium Concentration (µg/L)
- 1 — Concentration Contour (µg/L)
- U — Analyte not detected at given concentration

0 150 300
Scale in Feet

Frontier Hard Chrome Vancouver, Washington Chromium Concentrations in Zone B Groundwater September 2010

Figure **4**

10-0023 Fig4.ai



LEGEND

- W85-7A — Monitoring Well Location and ID
- W85-4B — Abandoned Well Location and ID
- 3.93 — Groundwater Elevation (ft. AMSL)
- 3.9 — Groundwater Elevation Contour
- Fence
- Not Measured

N

0 150 300

Scale in Feet

Frontier Hard Chrome
Vancouver, Washington
A Zone
Groundwater Elevations
September 13, 2010

Figure
5

WESTON SOLUTIONS

10-0023 Fig5.ai

TABLES

Table 1—Frontier Hard Chrome—Event 16 Chromium Results

Well Number	Concentration (µg/L)		Sample Observations
	Total	Dissolved	
RA-MW-12A	7.26	7.77	Slightly cloudy, yellow with strong sulfur odor
RA-MW-12B	1.32	—	Slightly cloudy, yellow with strong sulfur odor
RA-MW-12C	0.66	—	
RA-MW-11A	—	—	
RA-MW-11B	—	—	
RA-MW-13A	—	—	
RA-MW-13B	—	—	
RA-MW-13C	—	—	
RA-MW-17A	3.31	—	
RA-MW-14A	—	—	
RA-MW-14B	—	—	
RA-MW-16A	1.09	—	
RA-MW-16B	0.50 U	—	
RA-MW-15A	2.82	—	
RA-MW-15B	0.62	2.02	
B87-8	3.02	2.71	
B85-3	0.50 U	—	
W92-16A	0.50 U	—	
W92-16B	2.51	—	
B85-4	0.86	—	
W97-18A	0.50 U	—	
W97-18B	—	—	
W85-7A	—	—	
W85-7B	—	—	
W97-19A	1.33	—	
W97-19B	1.30	—	
W98-20A	—	—	
W99-R5A	1.14	—	
W99-R5B	1.30	—	
W98-21A	2.43	—	
W98-21B	2.47	—	
W85-6A	3.06	—	
W85-6B	2.65	—	

— denotes no sample collected

U: denotes analyte was not detected

Table 2—Frontier Hard Chrome—Event 16 Monitoring Field Parameters[1]

Well Number	Temp C	Spec. Cond. (µS/cm)	DO (mg/L)	pH	ORP (mV)	Sulfur[2] (mg/L)	Sulfate[2] (mg/L)	Turbidity (NTU)
RA-MW-12A	13.45	2,593	1.96	7.79	-304.2	—	—	Cloudy
RA-MW-12B	13.69	1,112	0.23	7.31	-283.2	—	—	Clear
RA-MW-12C	13.21	718	0.20	7.70	-233.4	—	—	Clear
RA-MW-11A	—	—	—	—	—	—	—	—
RA-MW-11B	—	—	—	—	—	—	—	—
RA-MW-13A	—	—	—	—	—	—	—	—
RA-MW-13B	—	—	—	—	—	—	—	—
RA-MW-13C	—	—	—	—	—	—	—	—
RA-MW-17A	13.75	1,234	0.32	6.55	-38.5	—	—	1.10
RA-MW-14A	—	—	—	—	—	—	—	
RA-MW-14B	—	—	—	—	—	—	—	
RA-MW-16A	13.84	889	0.31	6.56	95.7	—	—	Clear (<10)
RA-MW-16B	13.95	488	0.25	7.28	21.1	—	—	Clear
RA-MW-15A	14.06	988	0.32	6.51	49.7	—	—	Clear
RA-MW-15B	13.95	485	0.26	7.01	74.7	—	—	Clear
B87-8	13.70	446	0.17	6.63	12.1	35.3	102	6.60
B85-3	13.15	715	0.27	6.85	-60.7	—	—	0.55
W92-16A	14.31	362	0.28	6.56	117.9	—	—	0.50
W92-16B	14.04	207	10.90	7.17	150.6	—	—	0.55
B85-4	17.01	547	0.34	6.41	219.7	33.3	97.1	0.25
W97-18A	13.55	191	0.19	6.30	140.3	—	—	Clear
W97-18B	—	—	—	—	—	—	—	—
W85-7A	—	—	—	—	—	—	—	—
W85-7B	—	—	—	—	—	—	—	—
W97-19A	14.28	263	2.42	6.53	154.8	—	—	3.00
W97-19B	14.23	261	1.67	6.78	163.3	—	—	0.20
W98-20A	—	—	—	—	—	—	—	
W99-R5A	14.29	256	5.10	6.35	174.4	5.09	15.1	0.10
W99-R5B	14.17	249	5.03	6.67	162.2	—	—	0.20
W98-21A	14.05	275	2.81	6.25	196.3	—	—	0.15
W98-21B	13.82	302	2.60	6.38	193.7	—	—	0.45
W85-6A	14.42	264	2.97	6.52	143.9	6.78	19.9	0.15
W85-6B	14.50	188	10.48	9.12	117.3	—	—	0.30

— denotes no parameters measured
[1]Parameters measured after readings stabilized.
[2]Sulfur and sulfate data obtained from laboratory analyses.

Table 3—Comparison of Conventional Parameters

Well #	Temp (°C)															
	Feb-04	Apr-04	Aug-04	May-05	Dec-05	Mar-06	Jun-06	Sep-06	Dec-06	Mar-07	Jun-07	Sep-07	Dec-07	Sept-08	Sept-09	Sept-10
RA-MW-12A	14.9	15.9	17.9	15.2	14.9	14.6	14.3	14.9	13.9	14.0	13.9	14.4	13.8	8.7	15.5	13.45
RA-MW-12B	14.4	16.6	16.7	15.6	14.3	14.9	14.4	14.5	13.4	14.3	14.1	14.4	13.3	8.5	14.2	13.69
RA-MW-12C	14.4	16.5	16.6	15.1	14.2	14.3	14.2	14.2	13.1	13.3	14.1	14.1	13.2	8.5	14.4	13.21
RA-MW-11A	15.7	16.5	17.4	15.7	15.0	15.1	15.1	14.9	13.7	13.8	14.0	14.0	13.5	—	—	—
RA-MW-11B	14.9	16.3	17	15.6	14.9	14.7	14.7	14.7	13.4	13.6	14.1	14.3	13.2	—	—	—
RA-MW-13A	15	14.6	15.73	14.9	14.5	14.3	13.7	14.1	12.8	13.8	14.3	14.3	13.2	—	—	—
RA-MW-13B	14.8	14.7	15.4	14.9	14.2	14.3	14.1	14.2	13.0	13.9	14.2	13.8	13.2	—	—	—
RA-MW-13C	14.2	15	14.9	14.5	14.3	13.8	13.8	14.1	12.4	13.9	14.0	14.0	12.9	—	—	—
RA-MW-17A	14.3	15.3	16.7	15.1	14.5	13.7	—	13.9	13.4	13.1	14.1	13.8	13.4	8.5	13.7	13.75
RA-MW-14A	13.9	14.3	15.3	14.6	14.7	10.8	—	13.6	12.7	10.8	13.0	13.2	12.9	—	—	—
RA-MW-14B	14	14.9	15.5	14.5	14.1	12.3	—	14.0	12.8	11.3	13.8	13.5	12.9	—	—	—
RA-MW-16A	14.3	14.9	16	14.9	15.1	13.3	13.4	14.8	13.8	14.0	13.9	14.1	—	8.6	14.2	13.84
RA-MW-16B	14.3	14.6	16	14.7	13.9	13.7	13.8	15.2	13.4	14.3	13.8	14.1	—	8.8	14.4	13.95
RA-MW-15A	14.3	14.5	15	15	14.7	14.8	14.7	15.1	14.7	15.3	15.1	14.7	13.6	9.0	14.6	14.06
RA-MW-15B	13.9	14.4	15.4	14.7	14.1	14.0	14.5	17.2	14.1	14.8	14.9	14.3	13.4	8.8	14.6	13.95
B87-8	14.5	14.7	15.8	15.2	14.7	14.4	14.5	14.4	13.8	14.4	14.3	14.5	13.6	8.8	14.3	13.70
B85-3	14.6	14.8	15.2	15.8	14.4	14.1	13.6	14.6	12.4	12.5	13.6	13.7	13.1	8.0	14.0	13.15
W92-16A	14.2	15.6	16.1	15.3	14.0	13.8	14.1	15.5	13.6	13.3	14.5	14.5	13.3	8.6	14.8	14.31
W92-16B	14.1	14.7	16.2	15.2	13.7	13.7	13.8	15.4	13.1	13.3	14.4	14.6	13.0	8.7	14.6	14.04
B85-4	14.1	14.4	15.1	14.4	13.9	13.5	14.3	14.5	13.8	14.6	14.4	—	13.5	8.7	14.7	17.01
W97-18A	11.3	11.0	15.0	12.7	13.9	12.0	—	13.8	13.0	11.6	12.5	13.2	13.0	7.8	13.7	13.55
W97-18B	11.4	12.4	14.4	13.5	13.0	10.7	—	13.8	12.6	12.0	13.6	—	—	—	—	—
W85-7A	11.4	12.6	14.9	13.9	14.5	12.3	13.7	15.9	13.4	12.7	13.4	—	14.5	—	—	—
W85-7B	12.1	13.0	14.5	13.6	14.1	12.8	13.4	14.4	13.0	13.0	13.4	—	13.4	—	—	—
W97-19A	12.5	13.3	16	14.3	13.8	12.9	—	15.3	13.9	13.8	14.1	14.3	13.3	8.7	14.9	14.28
W97-19B	12.7	13.3	15.9	15.3	13.3	12.4	—	15.2	13.0	14.2	14.4	14.5	12.9	8.8	14.1	14.23
W98-20A	13.8	12.5	15.4	14.3	14.3	13.1	—	15.3	14.0	13.1	13.6	—	13.2	—	—	—
W99-R5A	14.2	14.9	15.7	14.8	14.8	14.7	15.1	—	13.9	13.9	15.5	15.4	14.1	10.0	14.7	14.29
W99-R5B	13.9	14.4	15.6	14.4	14.5	13.9	14.7	—	13.5	13.5	15.0	15.2	13.6	9.5	15.1	14.17
W98-21A	13.1	14.3	14.2	13.8	13.9	13.8	13.7	15.0	13.7	13.7	14.0	14.5	12.3	8.4	17.1	14.05
W98-21B	13.1	13.6	14	13.8	13.7	13.0	13.7	14.7	13.4	13.5	14.2	14.5	13.2	8.5	16.7	13.82
W85-6A	14.1	14.1	15.5	14	—	—	13.7	15.3	13.9	13.2	13.6	14.1	13.2	8.7	15.7	14.42
W85-6B	13.6	13.8	16.3	13.7	—	—	13.8	15.1	13.1	13.1	13.8	15.0	12.9	8.6	16.6	14.50

Table 3—Comparison of Conventional Parameters (continued)

Well #	Conductivity (µS/cm)															
	Feb-04	Apr-04	Aug-04	May-05	Dec-05	Mar-06	Jun-06	Sep-06	Dec-06	Mar-07	Jun-07	Sep-07	Dec-07	Sept-08	Sept-09	Sept-10
RA-MW-12A	6.01	5.4	4	3.32	2.52	2.47	2.37	2.26	2.95	0.85	1.11	1.98	2.34	2.55	2.92	0.259
RA-MW-12B	2.25	1.19	1.52	2.56	2.47	1.34	1.39	1.19	2.12	1.12	0.89	1.55	1.49	1.55	1.74	1.112
RA-MW-12C	2.18	1.34	1.13	0.68	1.09	0.69	0.88	0.53	1.05	0.65	0.49	0.58	0.81	0.8	0.97	0.718
RA-MW-11A	1.67	1.89	2.02	1.48	1.82	2.01	1.46	1.7	2.21	1.75	1.22	1.62	1.99	—	—	—
RA-MW-11B	1.49	2.08	2.02	1.72	2.25	1.17	0.94	1.1	1.5	1.21	0.77	1.05	1.59	—	—	—
RA-MW-13A	5.21	2.42	3.29	2.83	2.49	2.17	1.66	1.13	2.33	1.34	1.23	1.47	1.69	—	—	—
RA-MW-13B	3.73	1.38	2.15	2.41	2.16	0.81	0.82	0.5	2.22	1.23	0.5	0.98	1.34	—	—	—
RA-MW-13C	3.07	1.82	1.41	1.28	0.71	0.79	0.82	0.57	1.36	0.93	0.51	0.6	0.93	—	—	—
RA-MW-17A	1.8	1.8	1.8	1.39	1.18	1.3	—	1.18	1.3	1.04	1.03	1.16	1.47	1.46	1.43	1.234
RA-MW-14A	1.43	1.71	1.96	1.08	0.88	0.87	—	0.92	0.77	0.87	0.74	0.89	0.95	—	—	—
RA-MW-14B	1.56	1.21	0.98	1.08	1	0.78	—	0.69	0.89	0.87	0.68	0.85	1.02	—	—	—
RA-MW-16A	2.95	1.46	2	1.7	1.07	1.04	1.01	0.8	1.13	1.02	0.83	0.91	—	0.93	1.04	0.889
RA-MW-16B	2.42	1.19	1.4	1.81	0.92	0.67	0.51	0.43	1.34	1.05	0.32	0.48	—	0.74	0.66	0.488
RA-MW-15A	1.88	1.04	1.08	1.3	1.42	1.53	1.44	1.27	1.74	1.1	1.06	1.06	1.28	1.03	1.04	0.988
RA-MW-15B	0.47	0.86	0.68	0.64	0.91	0.92	0.8	0.46	1.6	1.16	0.494	0.81	1.22	0.93	0.85	0.485
B87-8	0.26	0.55	0.36	0.29	0.24	0.38	0.27	0.36	0.44	0.39	0.19	0.33	0.36	0.27	0.32	0.446
B85-3	0.99	0.90	0.98	0.81	0.54	0.74	0.64	0.72	0.97	0.84	0.68	0.77	0.9	0.81	0.77	0.715
W92-16A	0.33	0.25	0.27	0.23	0.24	0.28	0.28	0.37	0.47	0.57	0.47	0.53	0.64	0.61	0.48	0.362
W92-16B	1.17	1.37	0.95	0.66	0.09	0.34	0.42	0.32	0.61	0.57	0.25	0.44	0.6	0.5	0.15	0.207
B85-4	0.41	1.17	0.51	0.71	0.28	0.74	0.33	0.56	0.92	739	0.6	—	0.43	0.63	0.58	0.547
W97-18A	0.11	0.09	0.11	0.08	0.1	0.19	—	0.15	0.16	0.16	0.1	0.14	0.18	0.23	0.21	0.191
W97-18B	0.26	0.24	0.27	0.22	0.19	0.19	—	0.19	0.28	0.23	0.17	—	—	—	—	—
W85-7A	0.13	0.14	0.21	0.12	0.11	0.1	0.16	0.16	0.13	219	0.112	—	0.27	—	—	—
W85-7B	0.28	0.31	0.32	0.01	0.01	0.01	0.02	0.01	0.03	0.01	0.02	—	0.02	—	—	—
W97-19A	0.25	0.26	0.28	0.23	0.23	0.19	—	0.21	0.26	0.24	0.19	0.22	0.26	0.3	0.30	0.263
W97-19B	0.26	0.26	0.29	0.22	0.06	0.19	—	0.2	0.28	0.23	0.19	0.21	0.25	0.3	0.09	0.261
W98-20A	0.16	0.15	0.23	0.12	0.12	0.13	—	0.18	0.25	0.18	0.16	—	0.26	—	—	—
W99-R5A	0.24	0.25	0.24	0.22	0.21	0.2	0.2	—	0.27	0.22	0.21	0.21	0.2	0.27	0.28	0.256
W99-R5B	0.26	0.26	0.27	0.23	0.22	0.22	0.22	—	0.28	0.24	0.21	0.22	0.26	0.29	0.27	0.249
W98-21A	0.16	0.23	0.29	0.45	0.19	0.19	0.22	0.25	0.29	0.29	0.27	0.27	0.09	0.29	0.30	0.275
W98-21B	0.24	0.27	0.27	0.25	0.18	0.22	0.21	0.24	0.32	0.31	0.21	0.26	0.27	0.29	0.26	0.302
W85-6A	0.11	0.33	0.34	299	—	—	0.23	0.24	0.24	0.36	0.27	0.32	0.3	0.27	0.24	0.264
W85-6B	0.31	0.41	0.33	0.26	—	—	0.1	0.11	0.17	0.24	0.19	0.2	0.26	0.32	0.22	0.188

Table 3—Comparison of Conventional Parameters (continued)

Well #	DO (mg/L)															
	Feb-04	Apr-04	Aug-04	May-05	Dec-05	Mar-06	Jun-06	Sep-06	Dec-06	Mar-07	Jun-07	Sep-07	Dec-07	Sept-08	Sept-09	Sept-10
RA-MW-12A	0.24	0.09	0.2	0.13	0.04	0	52.7	17	56.41	0	0	-0.47	0	0	0.51	1.96
RA-MW-12B	0.27	0.07	0.27	0.07	0.05	1.26	45.1	12.16	73.22	0	9.82	-0.39	0	0	0.40	0.23
RA-MW-12C	0.2	0.14	0.42	0.25	0.07	1.1	5.16	4.93	3.33	0.01	0.4	0.23	0	0.28	0.53	0.20
RA-MW-11A	0.32	0.10	0.66	6.69	0.16	0	24.2	22.5	1.8	0	0.13	-0.12	0	—	—	—
RA-MW-11B	0.19	0.15	0.5	0.14	0.1	0.19	26.6	4.44	2.5	0	0.81	0.15	0	—	—	—
RA-MW-13A	1.63	0.17	1.13	0.53	0.11	0.38	0.27	1	0	0.04	0.24	0.2	0.11	—	—	—
RA-MW-13B	0.73	0.16	0.73	0.51	0.21	0.45	0.35	0.49	0	0.09	0.14	0.51	0.09	—	—	—
RA-MW-13C	0.22	0.15	0.43	1.4	2.98	0.96	0.41	0.8	0	0.06	0.46	0.26	0.07	—	—	—
RA-MW-17A	0.6	0.19	1.99	0.6	0.2	3.69	—	0.74	0.35	0.11	0.14	0.22	0.1	0.19	0.51	0.32
RA-MW-14A	0.89	0.22	5.96	0.51	0.22	6.74	—	0.88	1.75	0.6	0.21	0.17	0.11	—	—	—
RA-MW-14B	1.08	0.10	2.77	0.42	0.12	2.58	—	0.52	1.73	0.9	0.13	0.2	0.1	—	—	—
RA-MW-16A	0.73	0.27	1.39	1.6	0.11	5.4	0.54	0.49	0.31	0.05	0.36	0.31	—	0.15	0.43	0.31
RA-MW-16B	0.75	0.15	0.86	0.75	0.33	1.85	0.27	0.27	0.21	0.05	0.24	0.16	—	0.19	0.33	0.25
RA-MW-15A	0.33	0.21	1.53	0.47	0.15	8.34	0.47	2.89	0.29	0.04	0.19	0.48	0.1	0.32	0.48	0.32
RA-MW-15B	0.22	0.10	0.74	0.44	0.18	0.79	0.3	1.25	0.3	0.06	0.15	0.18	0.12	0.3	0.60	0.26
B87-8	0.13	1.03	1.06	0.35	0.28	0.53	0.37	0.52	0.25	0.01	7	0.19	0.11	0.24	0.40	0.17
B85-3	1.11	0.16	1.57	4.5	0.12	2.97	0.22	1.04	0.8	0.02	0.24	0.15	0.21	0.18	0.39	0.27
W92-16A	0.98	0.13	2.49	3.1	0.28	0.15	0.45	0.32	0.33	0.13	0.32	0.22	0.11	0.15	0.54	0.28
W92-16B	0.14	0.53	1.97	3.4	5.4	1.02	0.54	2.12	0.23	0.8	4.16	1.6	0.11	1.31	14.02	10.90
B85-4	0.65	1.37	1.5	0.33	0.2	0.22	0.52	1.61	0.3	0.03	0.27	—	0.24	0.26	0.40	0.34
W97-18A	1.27	0.74	1.09	0.5	1.1	4	—	1.45	0.9	0.9	0.67	0.69	0.69	0.64	0.33	0.19
W97-18B	2.01	5.56	4.52	4.9	2	1.17	—	4.25	4.59	1.09	4.72	—	—	—	—	—
W85-7A	4.05	3.17	2.18	4.3	2.2	6.7	5.89	3.09	2.39	0.18	3.29	—	2.6	—	—	—
W85-7B	2.78	5.11	6.1	8.7	4	10.3	10.96	3.77	0.06	0.1	8.79	—	7.85	—	—	—
W97-19A	4.72	1.79	22.73	4.6	0.97	3.51	—	3.5	9.37	1	3.74	3.57	4.69	3.92	6.56	2.42
W97-19B	1.81	1.31	2.6	2.6	1.1	2.99	—	3.43	4.13	0.52	2.83	3.55	3.44	3.01	9.81	1.67
W98-20A	4.92	3.76	5.5	5	3.2	5.1	—	3.63	9.14	5.7	3.03	—	4.87	—	—	—
W99-R5A	4.72	4.26	5.6	5.3	3.3	1.83	5.1	—	6.26	4.9	4.53	4.55	5.38	5.4	6.33	5.10
W99-R5B	3.97	2.71	4.7	5.1	1.9	2.03	4.2	—	4.9	3.4	3.49	3.86	4.66	4.34	5.76	5.03
W98-21A	1.29	1.49	3.03	13.3	1.2	1.05	3.26	2.59	4.97	0.07	0.8	2.44	2.53	2.58	3.18	2.81
W98-21B	1.24	3.29	2.82	17.7	3.9	1.08	3.37	2.42	4.9	0.02	3.52	1.98	2.73	2.58	8.21	2.60
W85-6A	4.92	0.43	0.85	4.9	—	—	1.86	2.06	2.63	0.09	0.51	0.93	2.52	2.08	4.01	2.97
W85-6B	3.46	6.13	6.54	5.5	—	—	7.87	3.83	5.15	0.05	4.96	5.95	6.1	4.87	13.98	10.48

*: Denotes sulfur/sulfate interference with dissolved oxygen readings.

Table 3—Comparison of Conventional Parameters (continued)

Well #	pH															
	Feb-04	Apr-04	Aug-04	May-05	Dec-05	Mar-06	Jun-06	Sep-06	Dec-06	Mar-07	Jun-07	Sep-07	Dec-07	Sept-08	Sept-09	Sept-10
RA-MW-12A	8.86	8.73	8.86	8.98	8.41	8.19	8.46	8.54	7.59	7.86	7.97	7.97	8.53	7.16	7.64	7.79
RA-MW-12B	7.77	7.83	7.92	8.3	8.68	8.16	7.76	7.83	8.06	7.94	7.55	7.79	8.28	7.75	7.25	7.31
RA-MW-12C	8.13	7.92	8.09	7.95	8.14	7.89	7.92	7.9	7.74	7.8	7.79	8.14	8.57	7.99	7.81	7.70
RA-MW-11A	7.51	7.53	7	6.52	6.64	6.64	6.46	6.48	6.43	6.69	6.68	6.86	7.26	—	—	—
RA-MW-11B	7.66	7.9	7.2	6.7	6.73	7	6.69	6.85	6.86	7.01	6.94	7.17	7.61	—	—	—
RA-MW-13A	7.15	7.15	7.03	6.7	6.86	6.82	6.82	6.96	7.02	7.08	6.95	7.11	7.21	—	—	—
RA-MW-13B	7.23	7.56	7.3	6.86	6.99	7.15	6.95	7.52	7.04	7.06	7.43	7.35	7.27	—	—	—
RA-MW-13C	7.36	7.35	7.44	7.33	7.48	7.25	7.25	7.45	7.45	7.44	7.53	7.81	7.62	—	—	—
RA-MW-17A	6.55	6.43	6.61	6.2	6.39	6.5	—	6.42	6.66	6.59	6.47	6.69	7.26	6.65	6.68	6.55
RA-MW-14A	6.64	6.81	6.99	6.5	6.6	6.6	—	5.98	6.76	6.65	6.62	6.89	6.85	—	—	—
RA-MW-14B	6.9	7.14	7.33	6.75	6.78	6.87	—	6.4	6.98	6.82	6.89	7.06	7.04	—	—	—
RA-MW-16A	6.61	6.61	6.75	6.42	6.44	6.62	6.44	5.96	6.68	6.71	6.64	6.82	—	6.74	6.62	6.56
RA-MW-16B	6.42	7.12	7.09	6.31	7.12	7.06	6.85	6.09	6.62	6.78	7.27	7.41	—	7.11	7.18	7.28
RA-MW-15A	6.35	6.37	6.74	6.2	6.3	6.47	6.28	6.09	6.53	6.61	6.5	6.68	7.19	6.63	6.53	6.51
RA-MW-15B	6.35	6.83	7.18	6.39	6.39	6.51	6.26	6.61	6.39	6.48	6.84	6.73	7.18	6.66	6.52	7.01
B87-8	6.55	6.31	6.73	6.54	6.68	6.57	6.35	6.61	6.71	6.71	6.89	6.99	7.44	6.9	6.9	6.63
B85-3	6.49	6.68	6.91	6.39	6.7	6.64	6.42	6.33	6.73	6.68	6.66	6.88	7.02	6.88	6.74	6.85
W92-16A	6.42	6.42	6.72	6.6	6.56	6.6	6.67	5.87	6.59	6.52	6.44	6.75	7.41	6.61	6.4	6.56
W92-16B	7.51	7.58	7.63	7.59	6.88	7.54	7.38	6.35	7.46	7.62	7.51	7.7	8.23	7.21	7.22	7.17
B85-4	6.14	6.26	6.53	6.22	6.51	6.49	6.21	6.28	6.47	6.53	6.53	—	7.21	6.62	6.28	6.41
W97-18A	5.83	5.96	6.19	6.17	6.78	6.57	—	5.08	6.29	6.32	6.23	6.54	7.07	6.33	6.33	6.30
W97-18B	6.57	6.35	6.67	6.41	6.6	6.16	—	6.25	6.55	6.61	6.68	—	—	—	—	—
W85-7A	6.24	6.04	6.26	6.2	6.3	6.35	6.24	5.69	6.45	6.33	6.4	—	6.61	—	—	—
W85-7B	6.63	6.51	6.71	5.91	6.18	6.14	6.37	5.39	6.57	6.23	6.3	—	6.71	—	—	—
W97-19A	6.35	6.24	6.28	6.35	6.59	6.41	—	5.53	6.55	6.58	6.57	6.91	7.33	6.51	6.35	6.53
W97-19B	6.68	6.49	6.3	6.47	6.68	6.68	—	5.89	6.83	6.76	6.72	6.95	7.5	6.65	7.14	6.78
W98-20A	6.01	5.91	6.32	5.97	6.29	6.18	—	4.9	6.26	6.41	6.19	—	7.02	—	—	—
W99-R5A	6.03	5.98	6.28	6.21	6.22	6.28	6.23	—	6.4	6.3	6.18	6.58	6.73	6.31	6.52	6.35
W99-R5B	6.2	6.23	6.55	6.33	6.63	6.55	6.26	—	6.62	6.63	6.54	6.9	6.92	6.54	6.66	6.67
W98-21A	5.92	6.07	6.68	6.18	6.3	6.25	6.11	4.8	6.16	6.43	6.34	6.53	6.81	6.48	6.07	6.25
W98-21B	6.04	6.07	6.9	6.24	6.64	6.36	6.07	5.55	6.38	6.39	6.46	6.48	7.08	6.44	6.19	6.38
W85-6A	6.23	6.22	6.4	6.36	—	—	6.25	5.47	6.63	6.47	6.5	6.77	6.85	6.71	6.24	6.52
W85-6B	6.4	6.42	6.68	6.62	—	—	8.93	7.16	8.05	6.83	6.76	7.15	7.09	6.87	8.50	9.12

Table 3—Comparison of Conventional Parameters (continued)

Well #	ORP (mV)															
	Feb-04	Apr-04	Aug-04	May-05	Dec-05	Mar-06	Jun-06	Sep-06	Dec-06	Mar-07	Jun-07	Sep-07	Dec-07	Sept-08	Sept-09	Sept-10
RA-MW-12A	-468	-466	-430	-417	-403	-393	-363	-311	-373	-324	-374	-369	-396	-310	-154	-304.2
RA-MW-12B	-363	-321	-315	-415	-414	-345	-327	-355	-374	-313	-363	-361	-379	-318	-215	-283.2
RA-MW-12C	-282	-179	-154	-239	-314	-234	-191	-164	-217	-137	-129	-235	-289	-219	-167	-233.4
RA-MW-11A	-384	-391	-316	-110	-241	-246	-216	-294	-671	-260	-263	-258	-259	—	—	—
RA-MW-11B	-394	-393	-332	-296	-289	-301	-278	-317	-303	-261	-287	-276	-313	—	—	—
RA-MW-13A	-155	-102	-97	-94	-204	-176	-93	-153	-121	-125	-144	-69	-101	—	—	—
RA-MW-13B	-129	-123	-104	-105	-125	-197	-85	-152	-125	-144	-166	-79	-99	—	—	—
RA-MW-13C	-136	-126	-116	-142	-33	-175	-112	-135	-137	-133	-143	-100	-140	—	—	—
RA-MW-17A	-91	-40	-7	-5	-27	-89	—	-106	-34	-128	-79	74	-25	-11	-6	-38.5
RA-MW-14A	-77	-41	-54	-75	-82	-136	—	-80	-64	-104	-154	-25	-14	—	—	—
RA-MW-14B	-112	-95	-102	-112	-134	-133	—	-98	-144	-141	-129	-57	-64	—	—	—
RA-MW-16A	-94	-45	-58	-156	-103	-160	-93	-125	-125	-112	-109	-21	—	-30	120	95.7
RA-MW-16B	-57	-70	-60	-85	-130	-131	-66	-155	-113	-88	-112	-43	—	-46	29	21.1
RA-MW-15A	-47	4	39	10	-12	-137	-28	-52	-24	13	-58	41	7	47	93	49.7
RA-MW-15B	-5	28	15	17	-11	16	34	76	32	48	-15	64	29	82	122	74.7
B87-8	-8	31	17	199	2	73	86	160	167	170	87	95	106	96	107	12.1
B85-3	-7.3	-107	-37	-47	-93	-62	-43	-53	-59	-43	-66	-30	-52	-39	27	-60.7
W92-16A	1	-14	30	110	110	-32	61	129	127	76	100	98	112	113	154	117.9
W92-16B	-116	-61	-60	73	119	-103	30	253	113	71	60	116	114	121	152	150.6
B85-4	10	41	59	218	-26	75	86	179	161	182	90	—	123	108	162	219.7
W97-18A	32	57	67	103	58	137	—	317	192	119	135	133	130	147	60	140.3
W97-18B	57	63	60	188	83	152	—	233	187	123	118	—	—	—	—	—
W85-7A	68	83	57	197	116	113	127	246	131	186	160	—	175	—	—	—
W85-7B	59	73	66	215	132	146	167	259	141	187	161	—	189	—	—	—
W97-19A	71	94	72	218	69	149	—	311	96	71	156	233	128	205	127	154.8
W97-19B	56	86	56	52	76	142	—	295	88	74	153	240	121	193	138	163.3
W98-20A	52	116	84	219	116	171	—	366	143	91	166	—	153	—	—	—
W99-R5A	58	96	97	153	123	197	116	—	131	100	81	237	186	226	134	174.4
W99-R5B	58	78	74	201	92	204	111	—	122	92	90	239	180	213	167	162.2
W98-21A	28	69	79	182	113	160	114	484	157	-55	165	243	135	228	183	196.3
W98-21B	33	72	47	202	121	161	117	471	148	111	161	249	140	226	188	193.7
W85-6A	17	57	86	163	—	—	107	356	123	172	168	240	176	218	200	143.9
W85-6B	19	76	72	159	—	—	79	340	70	164	161	236	177	229	165	117.3

Table 3—Comparison of Conventional Parameters (continued)

Well #	Sulfur (mg/L)															
	Feb-04	Apr-04	Aug-04	May-05	Dec-05	Mar-06	Jun-06	Sep-06	Dec-06	Mar-07	Jun-07	Sep-07	Dec-07	Sept-08	Sept-09	Sept-10
RA-MW-12A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-12B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-12C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-11A	286	296	304	285	460	448	322	402	342	311	304	311	345	—	—	—
RA-MW-11B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-13A	743	246	324	372	363	310	213	111	207	107	130	148	122	—	—	—
RA-MW-13B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-13C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-17A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-14A	189	228	214	136	122	158	124	140	72	107	117	113	103	—	—	—
RA-MW-14B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-16A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-16B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-15A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-15B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B87-8	9	52	22	17	23	48	21	42	31	34	43	28	24	14	17	35.3
B85-3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W92-16A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W92-16B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B85-4	23	150	31	87	20	103	21	59	67	59	75	—	23	39	32	33.3
W97-18A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W97-18B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W85-7A	3	4	5	4	4	3	5	6	3	10	4	—	7	—	—	—
W85-7B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W97-19A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W97-19B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W98-20A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W99-R5A	5	6	4	5	6	7	6	5	5	5	5	5	6	6	6	5.09
W99-R5B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W98-21A	—	—	—	—	8	10	—	—	—	—	—	—	—	—	—	—
W98-21B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W85-6A	—	15	14	18	—	—	12	15	7	26	19	19	10	9	6	6.78
W85-6B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 3—Comparison of Conventional Parameters (continued)

Well #	Sulfate (mg/L)															
	Feb-04	Apr-04	Aug-04	May-05	Dec-05	Mar-06	Jun-06	Sep-06	Dec-06	Mar-07	Jun-07	Sep-07	Dec-07	Sept-08	Sept-09	Sept-10
RA-MW-12A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-12B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-12C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-11A	620	751	1040	736	1200	3040	993	1170	1120	954	795	995	989	—	—	—
RA-MW-11B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-13A	1960	712	1056	985	971	1980	682	323	657	362	331	451	342	—	—	—
RA-MW-13B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-13C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-17A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-14A	477	635	697	357	351	429	396	400	225	358	283	347	284	—	—	—
RA-MW-14B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-16A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-16B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-15A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RA-MW-15B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B87-8	21	137	73	170	63	125	74	117	98	113	120	87	61	38.8	54	102
B85-3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W92-16A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W92-16B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
B85-4	58	410	104	222	50	253	75	169	212	201	195	—	60	107	95	97.1
W97-18A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W97-18B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W85-7A	6	9	15	13	8	8	18	16	7	30	10	—	18	—	—	—
W85-7B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W97-19A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W97-19B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W98-20A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W99-R5A	12	12	13	15	13	15	18	14	14	16	14	15	16	17.2	19	15.1
W99-R5B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W98-21A	—	—	—	—	19	25	—	—	—	—	—	—	—	—	—	—
W98-21B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
W85-6A	5	36	44	44	—	—	35	41	21	85	51	59	27	20.3	19	19.9
W85-6B	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 4—Frontier Hard Chrome—Event 16 Ground Water Elevations—13 September 2010

Well No.	Time	Casing Elevation (feet)	Depth to Water (feet)	Water level Elevation (AMSL)
W85-3A	—	26.40	—	—
W85-3B	1347	26.77	22.43	4.34
W97-18A[1]	1427	24.66	20.39	4.27
B85-4[1]	1421	25.64	20.80	4.33
B87-8[1]	1417	25.13	21.45	4.34
W92-16B	1358	25.79	21.25	4.26
W92-16A	1400	25.51	21.35	4.27
B85-3[3]	1410	25.62	20.55	4.35
W85-7A[1]	1316	24.90	21.96	4.26
W85-7B[1]	1318	26.22	22.16	4.25
W97-19A	1258	26.41	18.27	4.18
W97-19B	1300	22.45	17.61	4.11
W98-20A[1]	1310	21.72	22.39	4.23
W85-6A[1]	1339	26.62	21.63	4.27
W85-6B[1]	1337	25.90	21.57	4.28
W98-21B[1]	1331	25.85	22.80	4.25
W98-21A[1]	1328	27.05	22.57	4.22
W99-R5A	1243	26.79	28.06	4.20
W99-R5B	1246	32.26	28.17	4.16
USGS 14144700 (Stage height of the Columbia River corrected to NGVD 1929)				3.46

[1] Casing elevation surveyed by Minister-Glaeser Surveying Inc, on November 30, 2007.

[2] Two different elevation datum's have been used at Frontier Hard Chrome. Weston (12/03) Long-Term Monitoring

— Could not measure water level elevation due to obstruction covering well.

Table 5—Quality Assurance Sample Results—Chromium

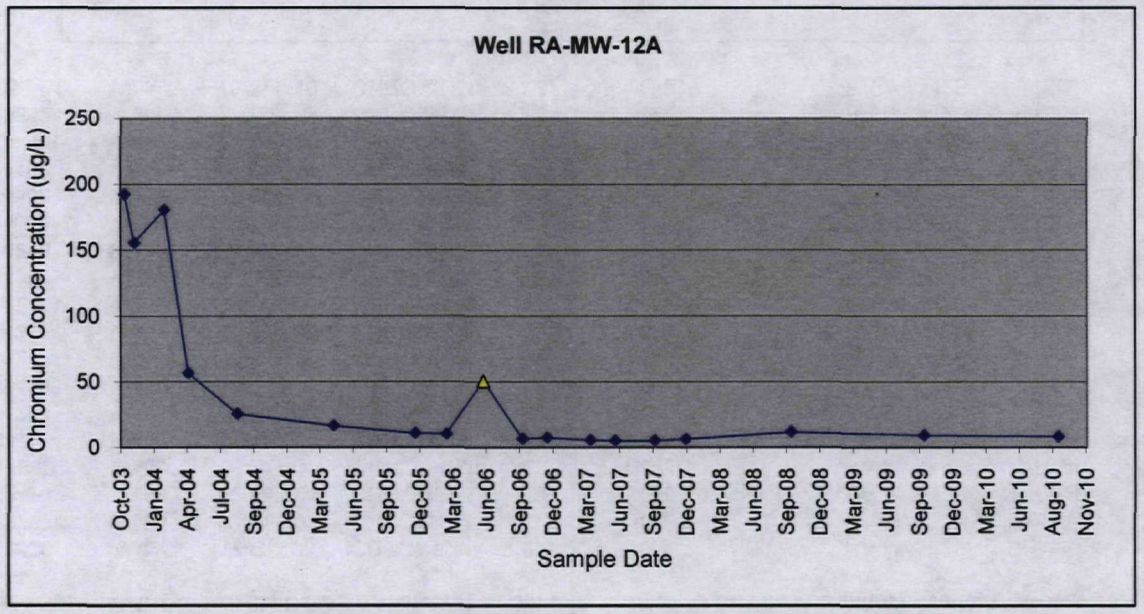
Well #	Sample Type	Original Sample Chromium Concentration (µg/L)	Duplicate Sample Chromium Concentration (µg/L)	Relative Percent Difference
B85-4 (total)	Field Duplicate (QA-2)	0.86	0.86	0%
RA-MW-15B (total)	Field Duplicate (QA-3)	0.62	0.91	-37.9%
RA-MW-15B (dissolved)	Field Duplicate (QA-3)	2.02	2.04	-1.0%

APPENDIX A

GROUNDWATER CHROMIUM CONCENTRATION TRENDS

Well RA-MW-12A

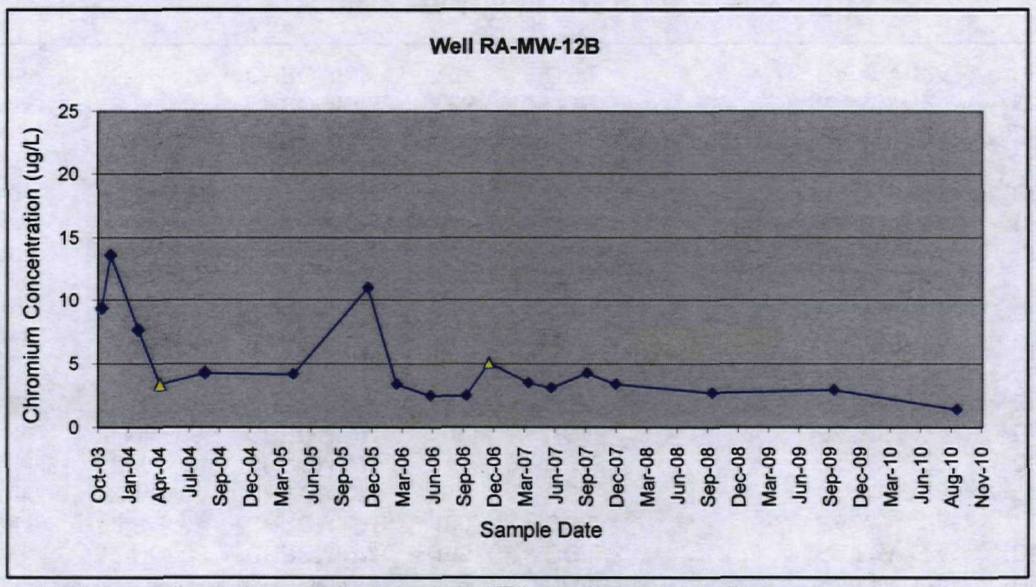
Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2524	Water	17-Oct-03	CHROMIUM	192	UG/L		RA-MW-12A	Dissolved	>10
MJ27F5	Water	12-Nov-03	CHROMIUM	155	UG/L		RA-MW-12A	Dissolved	>10
MJ2AF0	Water	02-Feb-04	CHROMIUM	180	UG/L		RA-MW-12A	Total	7
MJ2BH9	Water	06-Apr-04	CHROMIUM	55.8	UG/L		RA-MW-12A	Dissolved	17
MJ4725	Water	17-Aug-04	CHROMIUM	24.9	UG/L		RA-MW-12A	Dissolved	12
184253	Water	5-May-05	CHROMIUM	16	UG/L		RA-MW-12A	Dissolved	32
05504282	Water	12-Dec-05	CHROMIUM	10.2	UG/L		RA-MW-12A	Dissolved	86
104243	Water	7-Mar-06	CHROMIUM	9.6	UG/L		RA-MW-12A	Dissolved	60
244313	Water	15-Jun-06	CHROMIUM	50	UG/L	U	RA-MW-12A	Dissolved	47
394218	Water	28-Sep-06	CHROMIUM	6.0	UG/L		RA-MW-12A	Dissolved	80
494110	Water	4-Dec-06	CHROMIUM	6.8	UG/L		RA-MW-12A	Dissolved	12
134255	Water	30-Mar-07	CHROMIUM	5.0	UG/L		RA-MW-12A	Dissolved	85
234081	Water	5-Jun-07	CHROMIUM	4.6	UG/L		RA-MW-12A	Dissolved	55
384560	Water	19-Sep-07	CHROMIUM	4.7	UG/L		RA-MW-12A	Dissolved	11
504161	Water	12-Dec-07	CHROMIUM	5.7	UG/L		RA-MW-12A	Dissolved	60
8394103	Water	22-Sep-08	CHROMIUM	11.2	UG/L		RA-MW-12A	Dissolved	200
90906523	Water	16-Sep-09	CHROMIUM	8.68	UG/L		RA-MW-12A	Dissolved	102
1009065-25	Water	15-Sep-10	CHROMIUM	7.77	UG/L		RA-MW-12A	Dissolved	>10



Note: Where a dissolved concentration is used, the NTU value listed is the pre-filtering value.

Well RA-MW-12B

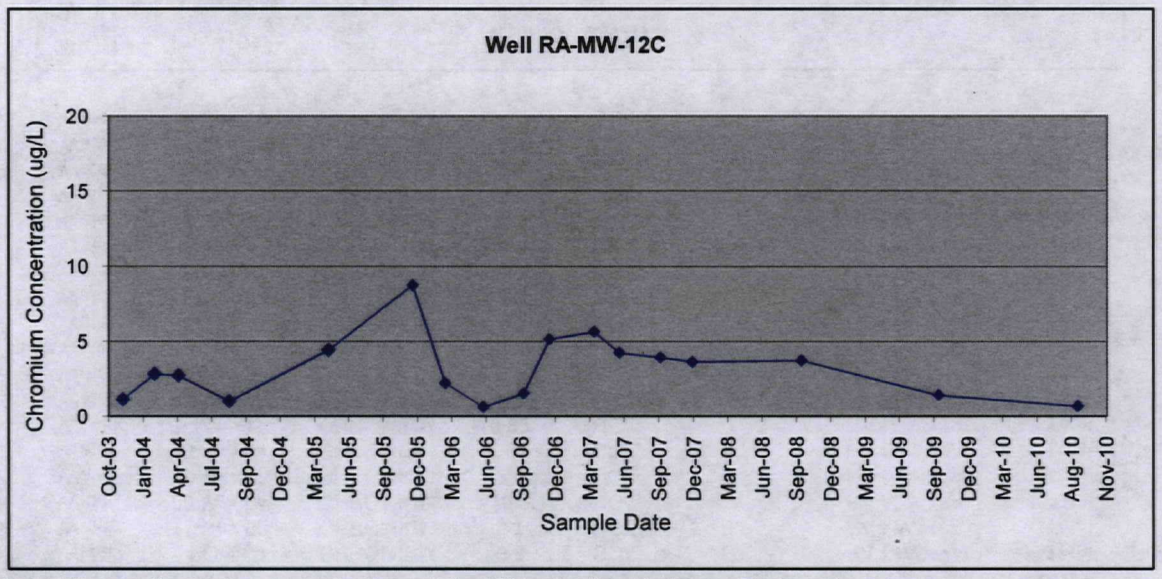
Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2526	Water	17-Oct-03	CHROMIUM	9.3	UG/L	BJ	RA-MW-12B	Dissolved	>10
MJ27F7	Water	12-Nov-03	CHROMIUM	13.5	UG/L		RA-MW-12B	Dissolved	>10
MJ2AF1	Water	02-Feb-04	CHROMIUM	7.6	UG/L	J	RA-MW-12B	Total	6
MJ2BJ0	Water	06-Apr-04	CHROMIUM	3.3	UG/L	U	RA-MW-12B	Total	0
MJ4726	Water	17-Aug-04	CHROMIUM	4.2	UG/L	J	RA-MW-12B	Total	2
184254	Water	5-May-05	CHROMIUM	4.1	UG/L		RA-MW-12B	Total	4.5
05504283	Water	12-Dec-05	CHROMIUM	10.9	UG/L		RA-MW-12B	Total	8
104242	Water	7-Mar-06	CHROMIUM	3.3	UG/L		RA-MW-12B	Total	1.7
244315	Water	15-Jun-06	CHROMIUM	2.4	UG/L		RA-MW-12B	Total	14
394216	Water	28-Sep-06	CHROMIUM	2.4	UG/L		RA-MW-12B	Total	1
494108	Water	4-Dec-06	CHROMIUM	5	UG/L	U	RA-MW-12B	Total	2
134253	Water	30-Mar-07	CHROMIUM	3.4	UG/L		RA-MW-12B	Total	2.2
234082	Water	5-Jun-07	CHROMIUM	3.0	UG/L		RA-MW-12B	Total	1.1
384562	Water	19-Sep-07	CHROMIUM	4.2	UG/L		RA-MW-12B	Total	0.8
504162	Water	12-Dec-07	CHROMIUM	3.3	UG/L		RA-MW-12B	Total	0.6
8394105	Water	22-Sep-08	CHROMIUM	2.6	UG/L		RA-MW-12B	Total	0.9
90906524	Water	17-Sep-09	CHROMIUM	2.84	UG/L		RA-MW-12B	Total	0.97
1009065-24	Water	16-Sep-10	CHROMIUM	1.32	UG/L		RA-MW-12B	Total	<10



Note: Where a dissolved concentration is used, the NTU value listed is the pre-filtering value.

Well RA-MW-12C

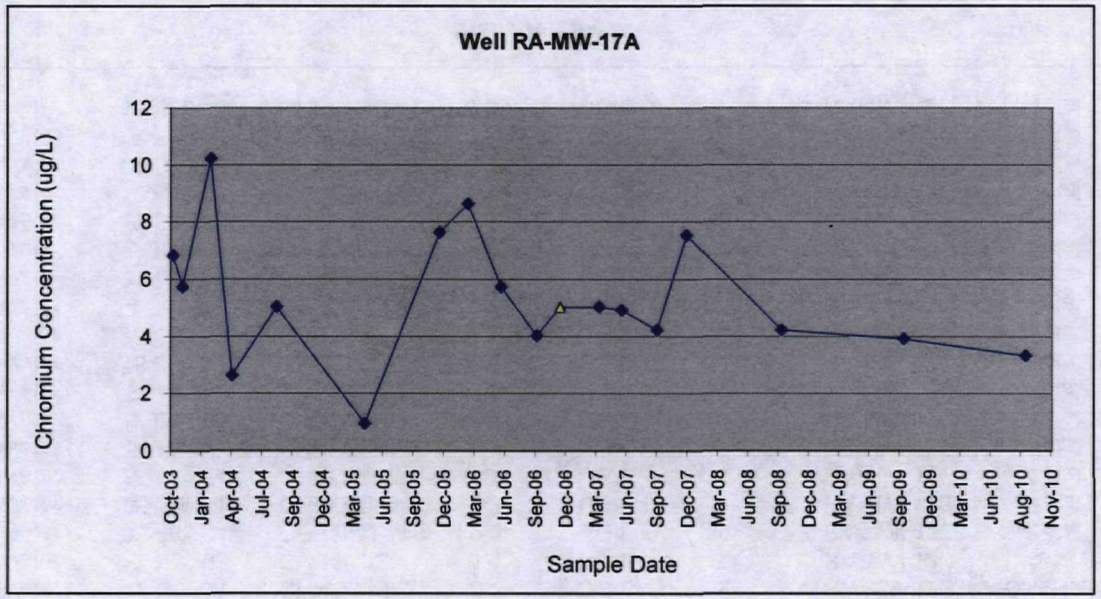
Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2528	Water	17-Oct-03	CHROMIUM	3.3	UG/L	BJ	RA-MW-12C	Dissolved	>10
MJ27F9	Water	12-Nov-03	CHROMIUM	1.1	UG/L	BJ	RA-MW-12C	Dissolved	>10
MJ2AF2	Water	03-Feb-04	CHROMIUM	2.8	UG/L	J	RA-MW-12C	Total	1
MJ2BJ1	Water	06-Apr-04	CHROMIUM	2.7	UG/L	J	RA-MW-12C	Total	0
MJ4727	Water	17-Aug-04	CHROMIUM	0.98	UG/L	J	RA-MW-12C	Total	2
184255	Water	5-May-05	CHROMIUM	4.4	UG/L		RA-MW-12C	Total	5.2
05504284	Water	12-Dec-05	CHROMIUM	8.7	UG/L		RA-MW-12C	Total	3
104245	Water	7-Mar-06	CHROMIUM	2.2	UG/L		RA-MW-12C	Total	1
244317	Water	15-Jun-06	CHROMIUM	0.6	UG/L	J	RA-MW-12C	Total	0.3
394215	Water	28-Sep-06	CHROMIUM	1.5	UG/L		RA-MW-12C	Total	0.4
494117	Water	4-Dec-06	CHROMIUM	5.1	UG/L		RA-MW-12C	Total	3
134256	Water	31-Mar-07	CHROMIUM	5.6	UG/L		RA-MW-12C	Total	3.4
234079	Water	5-Jun-07	CHROMIUM	4.2	UG/L		RA-MW-12C	Total	1.9
384563	Water	19-Sep-07	CHROMIUM	3.9	UG/L		RA-MW-12C	Total	2.9
504163	Water	12-Dec-07	CHROMIUM	3.6	UG/L		RA-MW-12C	Total	3.3
8394106	Water	22-Sep-08	CHROMIUM	3.7	UG/L		RA-MW-12C	Total	1.9
90906525	Water	17-Sep-09	CHROMIUM	1.4	UG/L		RA-MW-12C	Total	1.55
1009065-23	Water	16-Sep-10	CHROMIUM	0.66	UG/L		RA-MW-12C	Total	<10



Note: Where a dissolved concentration is used, the NTU value listed is the pre-filtering value.

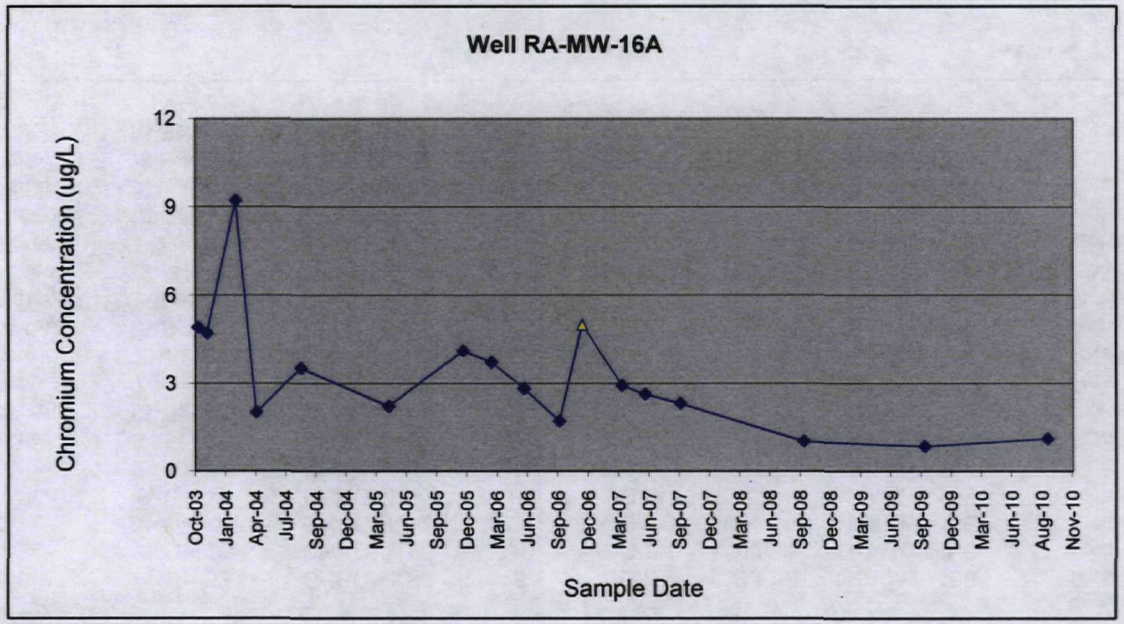
Well RA-MW-17A

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2501	Water	14-Oct-03	CHROMIUM	6.8	UG/L	BJ	RA-MW-17A	Total	<10
MJ27E5	Water	11-Nov-03	CHROMIUM	5.7	UG/L	BJ	RA-MW-17A	Total	<10
MJ2AG0	Water	03-Feb-04	CHROMIUM	10.2	UG/L	J	RA-MW-17A	Total	1
MJ2BH7	Water	6-Apr-04	CHROMIUM	2.6	UG/L	J	RA-MW-17A	Total	0
MJ4715	Water	16-Aug-04	CHROMIUM	5	UG/L	J	RA-MW-17A	Total	1
184260	Water	5-May-05	CHROMIUM	0.92	UG/L		RA-MW-17A	Total	10
05504299	Water	13-Dec-05	CHROMIUM	7.6	UG/L		RA-MW-17A	Total	3.1
104240	Water	7-Mar-06	CHROMIUM	8.6	UG/L		RA-MW-17A	Total	7
244293	Water	13-Jun-06	CHROMIUM	5.7	UG/L		RA-MW-17A	Total	1
394193	Water	26-Sep-06	CHROMIUM	4.0	UG/L		RA-MW-17A	Total	1
494105	Water	4-Dec-06	CHROMIUM	5.0	UG/L	U	RA-MW-17A	Total	0.8
134232	Water	29-Mar-07	CHROMIUM	5.0	UG/L		RA-MW-17A	Total	1.2
234064	Water	4-Jun-07	CHROMIUM	4.9	UG/L		RA-MW-17A	Total	2.7
384532	Water	17-Sep-07	CHROMIUM	4.2	UG/L		RA-MW-17A	Total	1.7
504157	Water	12-Dec-07	CHROMIUM	7.5	UG/L		RA-MW-17A	Total	0.9
8394090	Water	20-Sep-08	CHROMIUM	4.2	UG/L		RA-MW-17A	Total	1.6
90906511	Water	17-Sep-09	CHROMIUM	3.9	UG/L		RA-MW-17A	Total	0.57
1009065-15	Water	15-Sep-10	CHROMIUM	3.31	UG/L		RA-MW-17A	Total	1.10



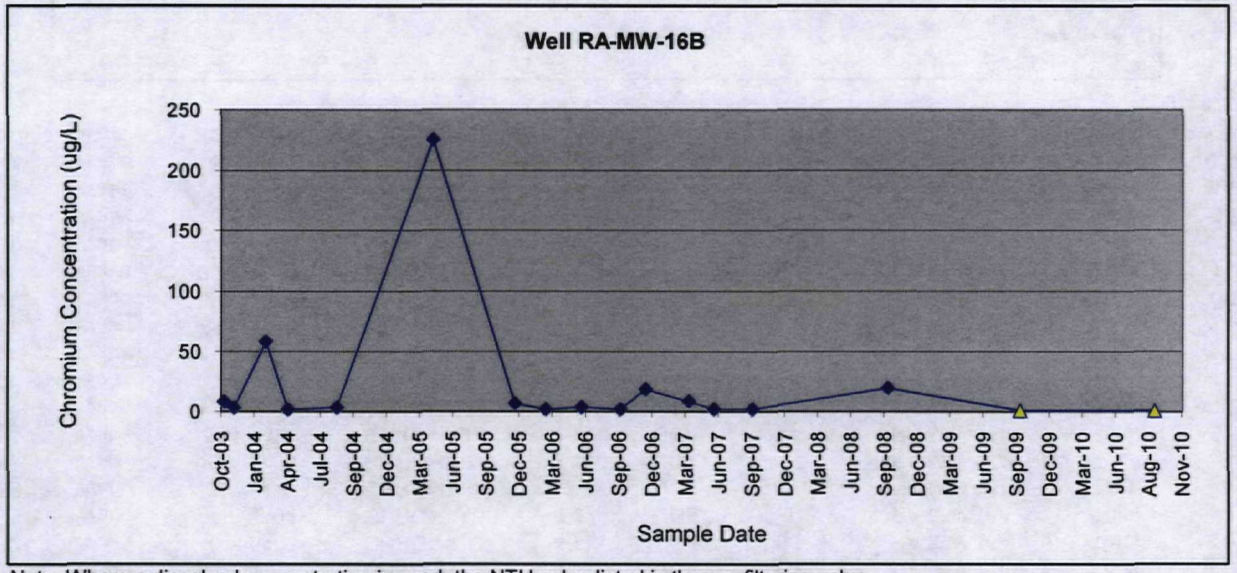
Well RA-MW-16A

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2502	Water	14-Oct-03	CHROMIUM	4.9	UG/L	BJ	RA-MW-16A	Total	<10
MJ27E0	Water	10-Nov-03	CHROMIUM	4.7	UG/L	BJ	RA-MW-16A	Total	<10
MJ2AG5	Water	04-Feb-04	CHROMIUM	9.2	UG/L	J	RA-MW-16A	Total	1
MJ2BG8	Water	5-Apr-04	CHROMIUM	2	UG/L	J	RA-MW-16A	Total	1
MJ4716	Water	16-Aug-04	CHROMIUM	3.5	UG/L	J	RA-MW-16A	Total	2
184257	Water	5-May-05	CHROMIUM	2.2	UG/L		RA-MW-16A	Total	8.5
05504293	Water	13-Dec-05	CHROMIUM	4.1	UG/L		RA-MW-16A	Total	1.2
104238	Water	7-Mar-06	CHROMIUM	3.7	UG/L		RA-MW-16A	Total	1.7
244304	Water	12-Jun-06	CHROMIUM	2.8	UG/L		RA-MW-16A	Total	1
394189	Water	25-Sep-06	CHROMIUM	1.7	UG/L		RA-MW-16A	Total	1
494087	Water	2-Dec-06	CHROMIUM	5	UG/L	U	RA-MW-16A	Total	0.1
134236	Water	29-Mar-07	CHROMIUM	2.9	UG/L		RA-MW-16A	Total	1.7
234085	Water	6-Jun-07	CHROMIUM	2.6	UG/L		RA-MW-16A	Total	1
384538	Water	18-Sep-07	CHROMIUM	2.3	UG/L		RA-MW-16A	Total	0.7
8394088	Water	20-Sep-08	CHROMIUM	1	UG/L		RA-MW-16A	Total	1.3
90906509	Water	16-Sep-09	CHROMIUM	0.83	UG/L		RA-MW-16A	Total	0.48
1009065-17	Water	16-Sep-10	CHROMIUM	1.09	UG/L		RA-MW-16A	Total	<10



Well RA-MW-16B

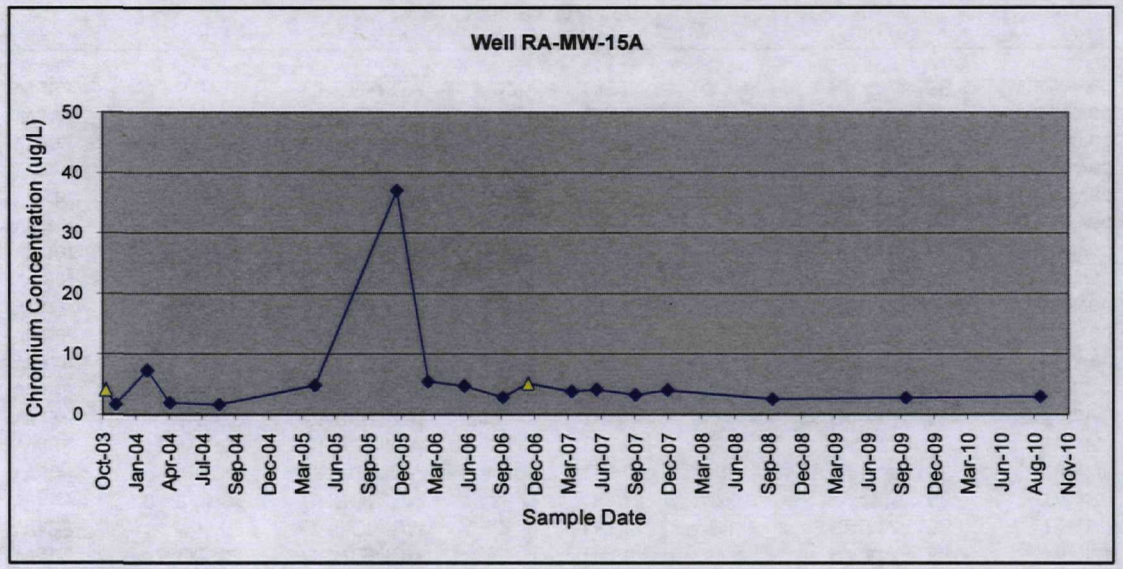
Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2503	Water	14-Oct-03	CHROMIUM	7.6	UG/L	BJ	RA-MW-16B	Total	<10
MJ27E1	Water	10-Nov-03	CHROMIUM	2.5	UG/L	BJ	RA-MW-16B	Total	<10
MJ2AG6	Water	04-Feb-04	CHROMIUM	57.4	UG/L	BJ	RA-MW-16B	Total	1
MJ2BH0	Water	5-Apr-04	CHROMIUM	1	UG/L	J	RA-MW-16B	Dissolved	0
MJ4717	Water	16-Aug-04	CHROMIUM	2.8	UG/L	J	RA-MW-16B	Total	3.6
184256	Water	5-May-05	CHROMIUM	225	UG/L		RA-MW-16B	Total	5.7
05504291	Water	13-Dec-05	CHROMIUM	6.1	UG/L		RA-MW-16B	Dissolved	3.9
104239	Water	7-Mar-06	CHROMIUM	1.3	UG/L		RA-MW-16B	Total	0
244305	Water	12-Jun-06	CHROMIUM	3.2	UG/L		RA-MW-16B	Total	0.3
394187	Water	25-Sep-06	CHROMIUM	1.3	UG/L		RA-MW-16B	Dissolved	0.7
494089	Water	2-Dec-06	CHROMIUM	18	UG/L		RA-MW-16B	Dissolved	0.2
134238	Water	29-Mar-07	CHROMIUM	7.9	UG/L		RA-MW-16B	Dissolved	3.7
234087	Water	6-Jun-07	CHROMIUM	1.4	UG/L		RA-MW-16B	Dissolved	0.3
384540	Water	18-Sep-07	CHROMIUM	1.4	UG/L		RA-MW-16B	Dissolved	3.0
8394089	Water	20-Sep-08	CHROMIUM	19.2	UG/L		RA-MW-16B	Total	0.3
90906510	Water	16-Sep-09	CHROMIUM	0.5	UG/L	U	RA-MW-16B	Total	0.9
1009065-18	Water	16-Sep-10	CHROMIUM	0.5	UG/L	U	RA-MW-16B	Total	<10



Note: Where a dissolved concentration is used, the NTU value listed is the pre-filtering value.

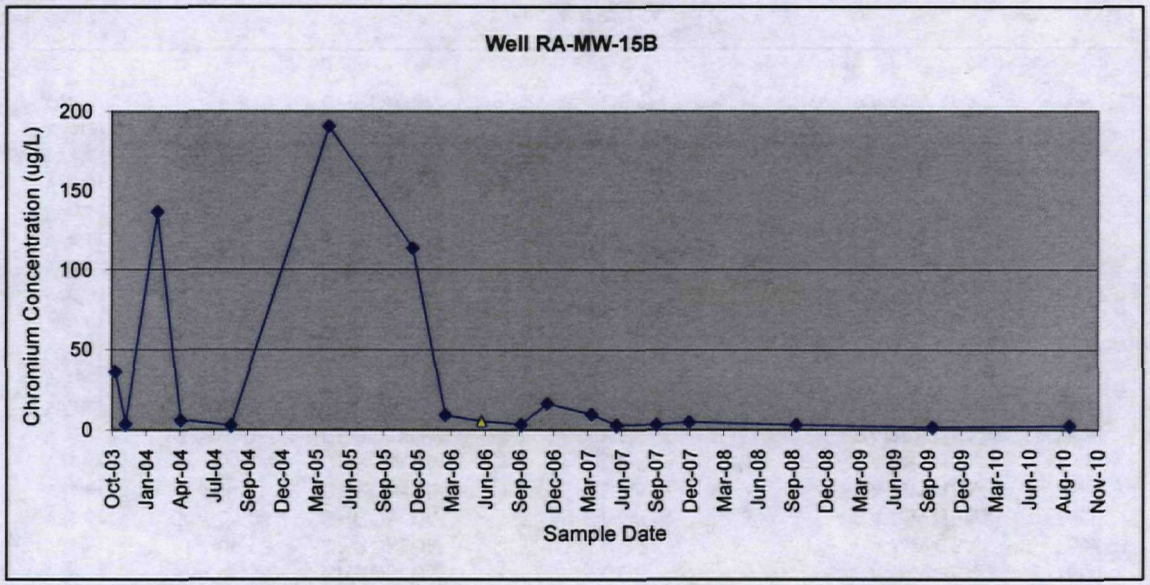
Well RA-MW-15A

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2506	Water	15-Oct-03	CHROMIUM	4	UG/L	U	RA-MW-15A	Total	<10
MJ27E8	Water	11-Nov-03	CHROMIUM	1.5	UG/L	BJ	RA-MW-15A	Total	<10
MJ2AG7	Water	04-Feb-04	CHROMIUM	7.2	UG/L	J	RA-MW-15A	Total	1
MJ2BH1	Water	5-Apr-04	CHROMIUM	1.8	UG/L	J	RA-MW-15A	Total	0
MJ4722	Water	17-Aug-04	CHROMIUM	1.5	UG/L	J	RA-MW-15A	Total	0
184248	Water	4-May-05	CHROMIUM	4.7	UG/L		RA-MW-15A	Total	2
05504290	Water	13-Dec-05	CHROMIUM	37	UG/L		RA-MW-15A	Total	1.3
104251	Water	7-Mar-06	CHROMIUM	5.3	UG/L		RA-MW-15A	Total	0
244290	Water	12-Jun-06	CHROMIUM	4.6	UG/L		RA-MW-15A	Total	0.6
394192	Water	25-Sep-06	CHROMIUM	2.7	UG/L		RA-MW-15A	Total	0.2
494090	Water	2-Dec-06	CHROMIUM	5.0	UG/L	U	RA-MW-15A	Total	2
134241	Water	29-Mar-07	CHROMIUM	3.7	UG/L		RA-MW-15A	Total	0.3
234068	Water	4-Jun-07	CHROMIUM	4.0	UG/L		RA-MW-15A	Total	0.5
384541	Water	17-Sep-07	CHROMIUM	3.1	UG/L		RA-MW-15A	Total	0.4
504153	Water	12-Dec-07	CHROMIUM	3.9	UG/L		RA-MW-15A	Total	1.1
8394093	Water	21-Sep-08	CHROMIUM	2.4	UG/L		RA-MW-15A	Total	0.3
90906514	Water	17-Sep-09	CHROMIUM	2.62	UG/L		RA-MW-15A	Total	1.32
1009065-19	Water	16-Sep-10	CHROMIUM	2.82	UG/L		RA-MW-15A	Total	<10



Well RA-MW-15B

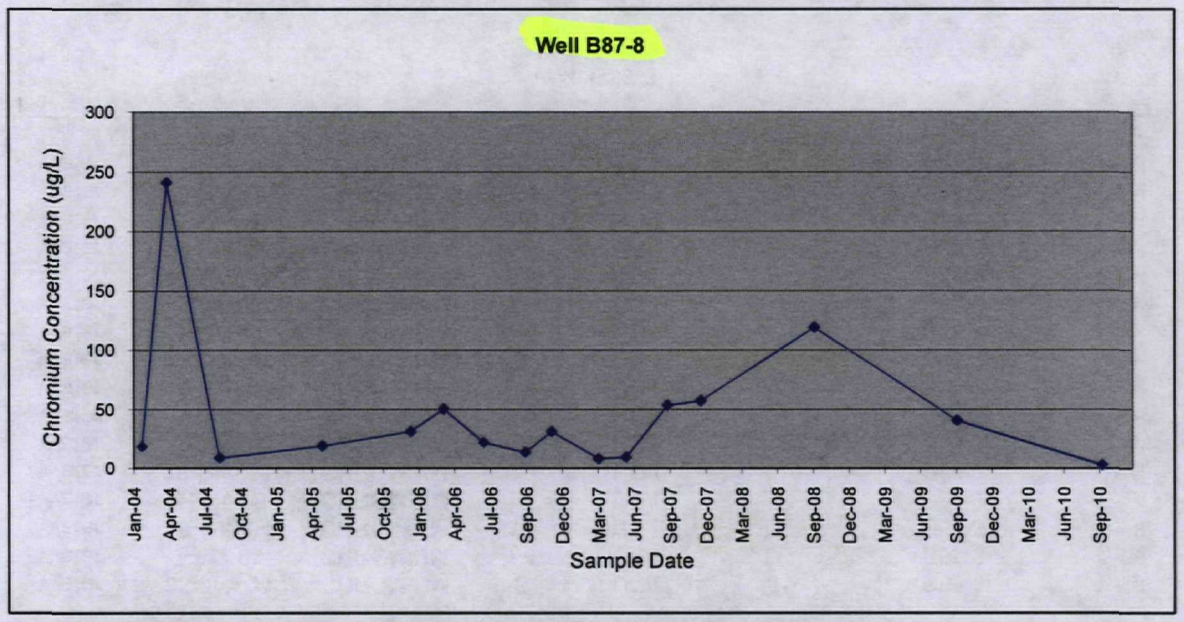
Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2507	Water	15-Oct-03	CHROMIUM	35.8	UG/L		RA-MW-15B	Total	<10
MJ27E9	Water	11-Nov-03	CHROMIUM	3.2	UG/L	BJ	RA-MW-15B	Total	<10
MJ2AG8	Water	04-Feb-04	CHROMIUM	136	UG/L		RA-MW-15B	Total	2
MJ2BH2	Water	5-Apr-04	CHROMIUM	5.5	UG/L	J	RA-MW-15B	Total	0
MJ4723	Water	17-Aug-04	CHROMIUM	2.2	UG/L	J	RA-MW-15B	Total	1
184249	Water	4-May-05	CHROMIUM	190	UG/L		RA-MW-15B	Total	9.7
05504288	Water	13-Dec-05	CHROMIUM	113	UG/L		RA-MW-15B	Total	3.5
104252	Water	8-Mar-06	CHROMIUM	8.7	UG/L		RA-MW-15B	Dissolved	5
244292	Water	12-Jun-06	CHROMIUM	5	UG/L	U	RA-MW-15B	Dissolved	4
394190	Water	25-Sep-06	CHROMIUM	2.8	UG/L		RA-MW-15B	Dissolved	4
494092	Water	2-Dec-06	CHROMIUM	16	UG/L		RA-MW-15B	Dissolved	7
134243	Water	29-Mar-07	CHROMIUM	9.2	UG/L		RA-MW-15B	Dissolved	2.4
234069	Water	4-Jun-07	CHROMIUM	2.4	UG/L		RA-MW-15B	Dissolved	3.4
384543	Water	17-Sep-07	CHROMIUM	2.8	UG/L		RA-MW-15B	Dissolved	2.6
504155	Water	12-Dec-07	CHROMIUM	4.4	UG/L		RA-MW-15B	Dissolved	4.5
8394094	Water	21-Sep-08	CHROMIUM	2.7	UG/L		RA-MW-15B	Dissolved	1.3
90906515	Water	17-Sep-09	CHROMIUM	1.13	UG/L		RA-MW-15B	Dissolved	0.32
1009065-21	Water	16-Sep-10	CHROMIUM	2.02	UG/L		RA-MW-15B	Dissolved	<10



Note: Where a dissolved concentration is used, the NTU value listed is the pre-filtering value.

Well B87-8

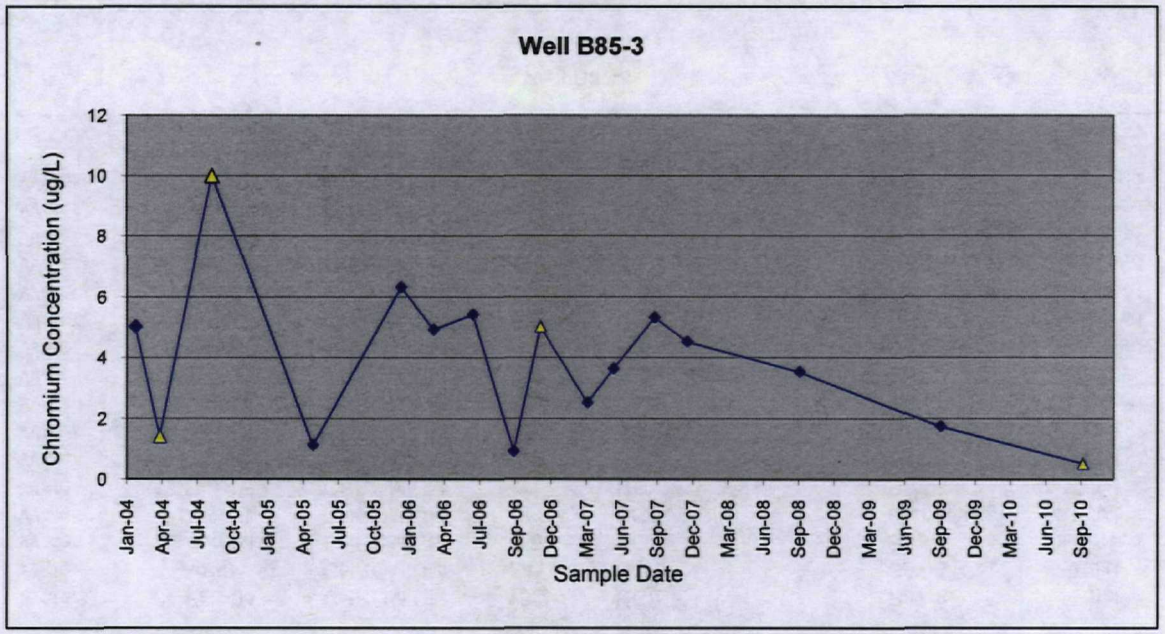
Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AG9	Water	04-Feb-04	CHROMIUM	18.2	UG/L		B87-8	Total	2
MJ2BK0	Water	7-Apr-04	CHROMIUM	241	UG/L		B87-8	Total	8
MJ4737	Water	18-Aug-04	CHROMIUM	8.5	UG/L	J	B87-8	Dissolved	36
184247	Water	4-May-05	CHROMIUM	18.8	UG/L		B87-8	Total	6.5
05504297	Water	13-Dec-05	CHROMIUM	31	UG/L		B87-8	Total	5.1
104236	Water	6-Mar-06	CHROMIUM	50	UG/L		B87-8	Total	8
244308	Water	14-Jun-06	CHROMIUM	21.8	UG/L		B87-8	Total	3
394204	Water	27-Sep-06	CHROMIUM	13.4	UG/L		B87-8	Dissolved	13
494082	Water	2-Dec-06	CHROMIUM	31	UG/L		B87-8	Total	0.1
134251	Water	30-Mar-07	CHROMIUM	7.8	UG/L		B87-8	Dissolved	11
234089	Water	6-Jun-07	CHROMIUM	9.2	UG/L		B87-8	Dissolved	0.9
384552	Water	18-Sep-07	CHROMIUM	53.3	UG/L		B87-8	Dissolved	2.1
504144	Water	11-Dec-07	CHROMIUM	56.9	UG/L		B87-8	Dissolved	8.4
8394098	Water	21-Sep-08	CHROMIUM	119	UG/L		B87-8	Dissolved	13
90906520	Water	16-Sep-09	CHROMIUM	40.5	UG/L		B87-8	Dissolved	16.7
1009065-20	Water	15-Sep-10	CHROMIUM	2.71	UG/L		B87-8	Dissolved	6.60



Note: Where a dissolved concentration is used, the NTU value listed is the pre-filtering value.

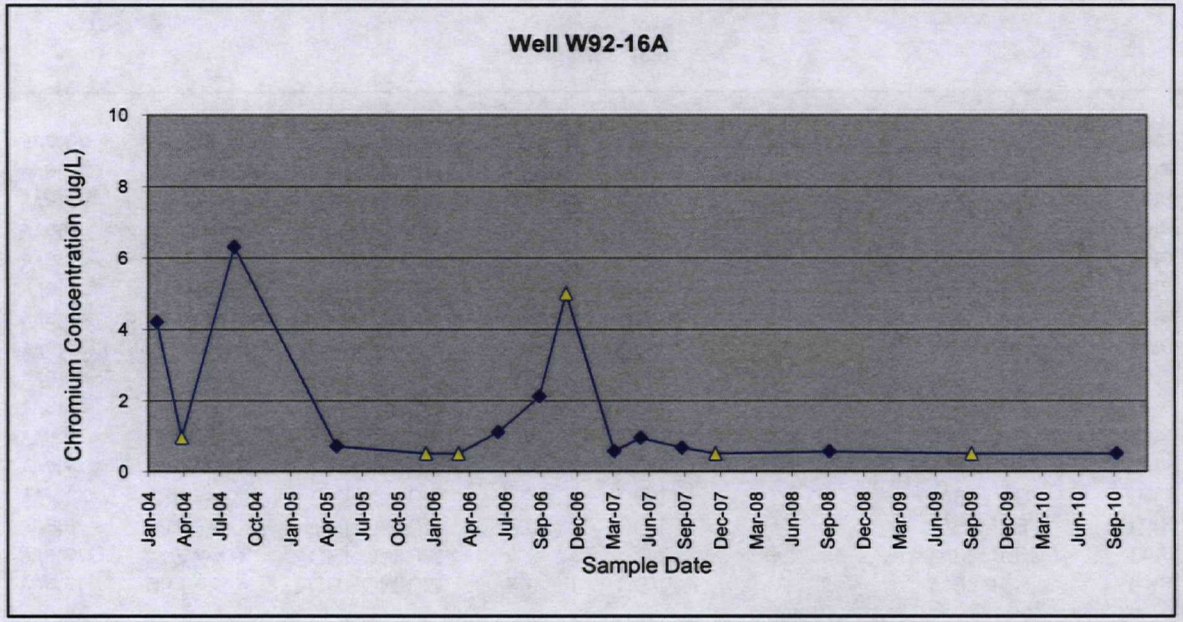
Well B85-3

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AH0	Water	05-Feb-04	CHROMIUM	5	UG/L	J	B85-3	Total	1
MJ2BJ6	Water	7-Apr-04	CHROMIUM	1.4	UG/L	U	B85-3	Total	3
MJ4732	Water	18-Aug-04	CHROMIUM	10	UG/L	U	B85-3	Total	0
184232	Water	3-May-05	CHROMIUM	1.1	UG/L		B85-3	Total	2.8
05504298	Water	13-Dec-05	CHROMIUM	6.3	UG/L		B85-3	Total	8.1
104235	Water	6-Mar-06	CHROMIUM	4.9	UG/L		B85-3	Total	7
244311	Water	14-Jun-06	CHROMIUM	5.4	UG/L		B85-3	Total	6
394197	Water	26-Sep-06	CHROMIUM	0.9	UG/L		B85-3	Total	1
494094	Water	3-Dec-06	CHROMIUM	5	UG/L	U	B85-3	Total	7
134266	Water	1-Apr-07	CHROMIUM	2.5	UG/L		B85-3	Total	5.1
234092	Water	6-Jun-07	CHROMIUM	3.6	UG/L		B85-3	Total	4
384551	Water	18-Sep-07	CHROMIUM	5.3	UG/L		B85-3	Total	9.0
504141	Water	10-Dec-07	CHROMIUM	4.5	UG/L		B85-3	Total	7.7
8394092	Water	21-Sep-08	CHROMIUM	3.5	UG/L		B85-3	Total	7.1
90906513	Water	16-Sep-09	CHROMIUM	1.73	UG/L		B85-3	Total	2.34
1009065-10	Water	14-Sep-10	CHROMIUM	0.5	UG/L	U	B85-3	Total	0.55



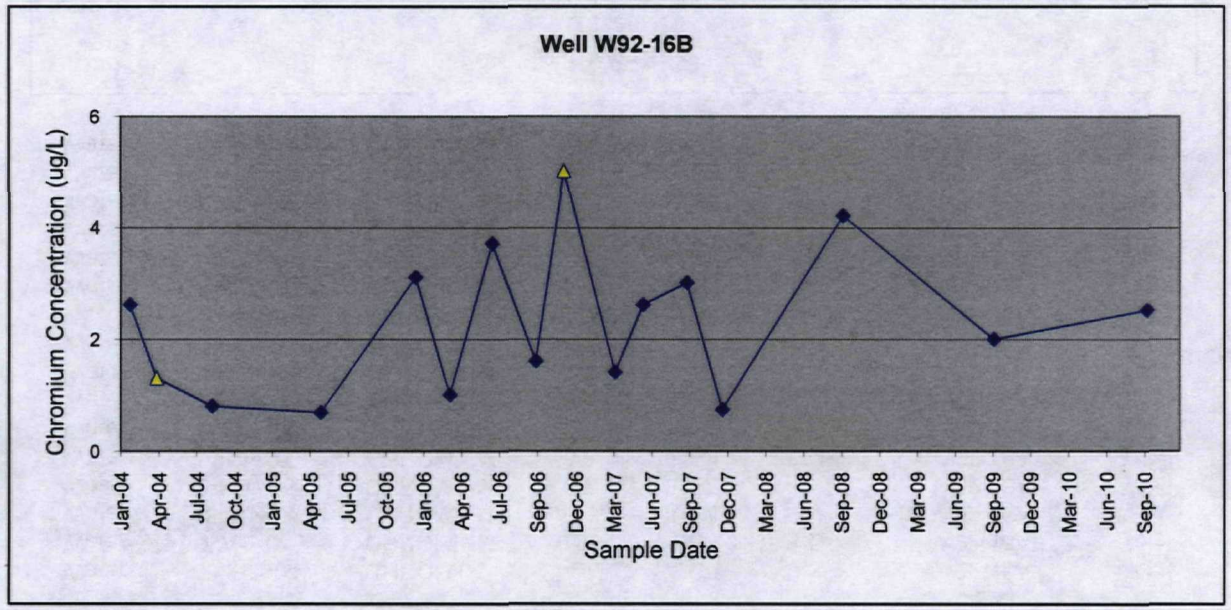
Well W92-16A

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AH1	Water	05-Feb-04	CHROMIUM	4.2	UG/L	J	W92-16A	Total	2
MJ2BJ7	Water	7-Apr-04	CHROMIUM	0.95	UG/L	U	W92-16A	Total	0
MJ4734	Water	18-Aug-04	CHROMIUM	6.3	UG/L	J	W92-16A	Total	0
184234	Water	3-May-05	CHROMIUM	0.7	UG/L		W92-16A	Total	0.7
05504311	Water	14-Dec-05	CHROMIUM	0.5	UG/L	U	W92-16A	Total	0.7
104234	Water	6-Mar-06	CHROMIUM	0.5	UG/L	U	W92-16A	Total	0.7
244304	Water	14-Jun-06	CHROMIUM	1.1	UG/L		W92-16A	Total	2
394200	Water	26-Sep-06	CHROMIUM	2.1	UG/L		W92-16A	Total	4
494085	Water	2-Dec-06	CHROMIUM	5	UG/L	U	W92-16A	Total	0.1
134267	Water	1-Apr-07	CHROMIUM	0.56	UG/L		W92-16A	Total	2.5
234093	Water	6-Jun-07	CHROMIUM	0.94	UG/L		W92-16A	Total	1.8
384549	Water	18-Sep-07	CHROMIUM	0.66	UG/L		W92-16A	Total	1.3
504152	Water	11-Dec-07	CHROMIUM	0.5	UG/L	U	W92-16A	Total	0.4
8394091	Water	22-Sep-08	CHROMIUM	0.55	UG/L		W92-16A	Total	1.5
90906521	Water	16-Sep-09	CHROMIUM	0.5	UG/L	U	W92-16A	Total	0.48
1009065-12	Water	15-Sep-10	CHROMIUM	0.5	UG/L	U	W92-16A	Total	0.50



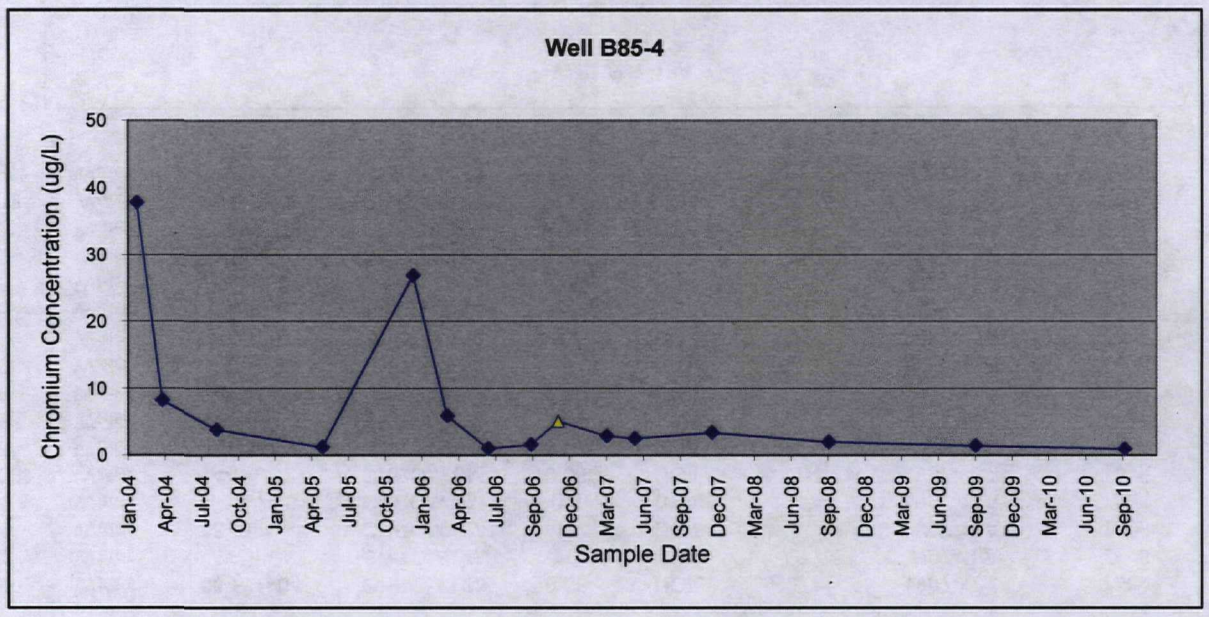
Well W92-16B

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AH3	Water	05-Feb-04	CHROMIUM	2.6	UG/L	J	W92-16B	Total	7
MJ2BJ8	Water	7-Apr-04	CHROMIUM	1.3	UG/L	U	W92-16B	Total	2
MJ4735	Water	18-Aug-04	CHROMIUM	0.79	UG/L	J	W92-16B	Total	<10
184233	Water	3-May-05	CHROMIUM	0.68	UG/L		W92-16B	Total	3.9
05504312	Water	14-Dec-05	CHROMIUM	3.1	UG/L		W92-16B	Total	5.1
104233	Water	6-Mar-06	CHROMIUM	1	UG/L		W92-16B	Total	8.7
244305	Water	14-Jun-06	CHROMIUM	3.7	UG/L		W92-16B	Total	7
394201	Water	26-Sep-06	CHROMIUM	1.6	UG/L		W92-16B	Total	0.7
494086	Water	2-Dec-06	CHROMIUM	5	UG/L	U	W92-16B	Total	1
134268	Water	1-Apr-07	CHROMIUM	1.4	UG/L		W92-16B	Total	6.8
234094	Water	6-Jun-07	CHROMIUM	2.6	UG/L		W92-16B	Total	0.6
384550	Water	18-Sep-07	CHROMIUM	3.0	UG/L		W92-16B	Total	2.2
504151	Water	11-Dec-07	CHROMIUM	0.73	UG/L		W92-16B	Total	2.2
8394092	Water	22-Sep-08	CHROMIUM	4.2	UG/L		W92-16B	Total	3.8
90906522	Water	16-Sep-09	CHROMIUM	1.99	UG/L		W92-16B	Total	0.85
1009065-11	Water	15-Sep-10	CHROMIUM	2.51	UG/L		W92-16B	Total	0.55



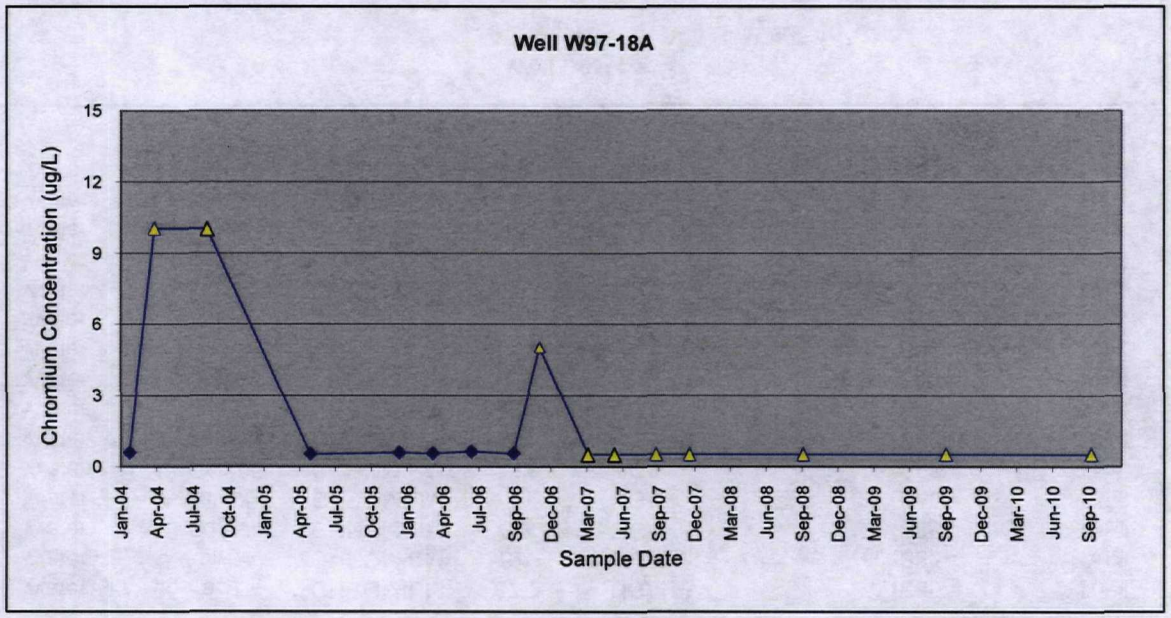
Well B85-4

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AH4	Water	05-Feb-04	CHROMIUM	37.7	UG/L		B85-4	Total	1
MJ2BK1	Water	7-Apr-04	CHROMIUM	8.1	UG/L	J	B85-4	Total	0
MJ4738	Water	18-Aug-04	CHROMIUM	3.7	UG/L	J	B85-4	Total	4
184246	Water	4-May-05	CHROMIUM	1.1	UG/L		B85-4	Total	2
05504296	Water	13-Dec-05	CHROMIUM	26.8	UG/L		B85-4	Total	5.7
104237	Water	6-Mar-06	CHROMIUM	5.8	UG/L		B85-4	Total	3.9
244310	Water	14-Jun-06	CHROMIUM	0.9	UG/L		B85-4	Total	0.3
394207	Water	27-Sep-06	CHROMIUM	1.5	UG/L		B85-4	Total	1
494084	Water	2-Dec-06	CHROMIUM	5	UG/L	U	B85-4	Total	0
134252	Water	30-Mar-07	CHROMIUM	2.8	UG/L		B85-4	Total	1.4
234091	Water	6-Jun-07	CHROMIUM	2.4	UG/L		B85-4	Total	2.1
504143	Water	11-Dec-07	CHROMIUM	3.3	UG/L		B85-4	Total	1.4
8394097	Water	21-Sep-08	CHROMIUM	1.9	UG/L		B85-4	Total	3.3
90906517	Water	15-Sep-09	CHROMIUM	1.31	UG/L		B85-4	Total	0.71
1009065-08	Water	14-Sep-10	CHROMIUM	0.86	UG/L		B85-4	Total	0.25



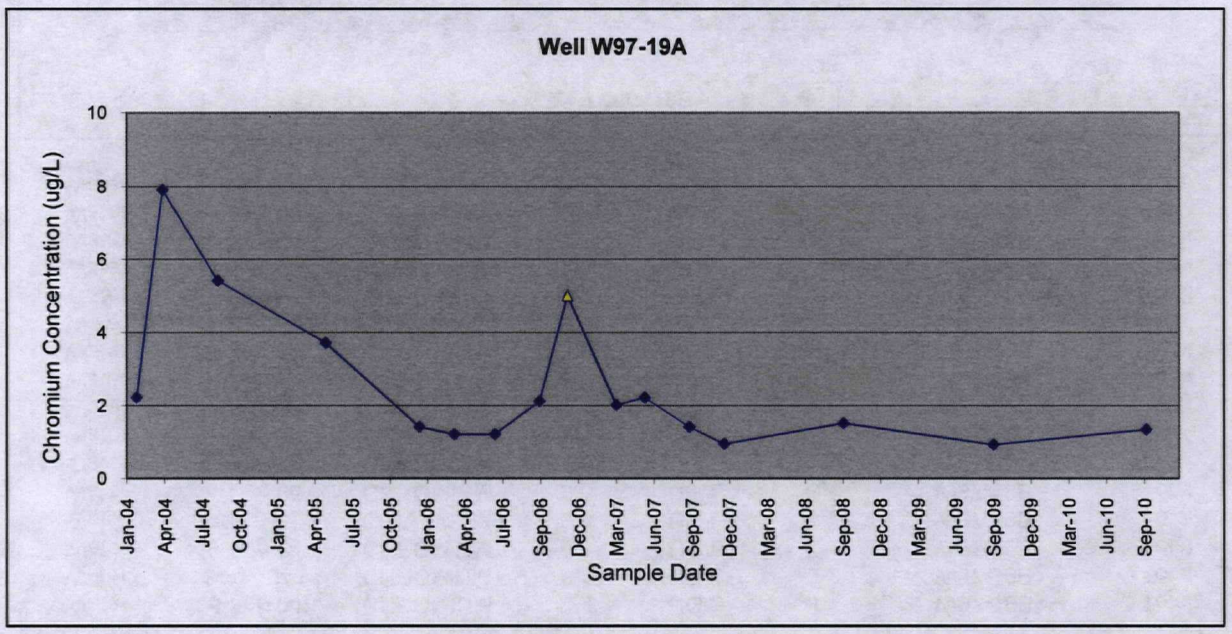
Well W97-18A

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AH5	Water	05-Feb-04	CHROMIUM	0.56	UG/L	J	W97-18A	Total	14
MJ2BK2	Water	7-Apr-04	CHROMIUM	10	UG/L	U	W97-18A	Total	0
MJ4739	Water	18-Aug-04	CHROMIUM	10	UG/L	U	W97-18A	Total	5
184244	Water	4-May-05	CHROMIUM	0.5	UG/L		W97-18A	Total	1
05504300	Water	14-Dec-05	CHROMIUM	0.56	UG/L		W97-18A	Total	4
104256	Water	8-Mar-06	CHROMIUM	0.53	UG/L		W97-18A	Total	0
244298	Water	13-Jun-06	CHROMIUM	0.6	UG/L		W97-18A	Total	9
394209	Water	27-Sep-06	CHROMIUM	0.53	UG/L		W97-18A	Total	6
494080	Water	2-Dec-06	CHROMIUM	5	UG/L	U	W97-18A	Total	1
134269	Water	1-Apr-07	CHROMIUM	0.5	UG/L	U	W97-18A	Total	8.5
234095	Water	6-Jun-07	CHROMIUM	0.5	UG/L	U	W97-18A	Total	0.6
384555	Water	18-Sep-07	CHROMIUM	0.5	UG/L	U	W97-18A	Total	7.7
504142	Water	11-Dec-07	CHROMIUM	0.5	UG/L	U	W97-18A	Total	3.1
8394097	Water	21-Sep-08	CHROMIUM	0.5	UG/L	U	W97-18A	Total	0.9
90906512	Water	16-Sep-09	CHROMIUM	0.5	UG/L	U	W97-18A	Total	0.35
1009065-16	Water	16-Sep-10	CHROMIUM	0.5	UG/L	U	W97-18A	Total	<10



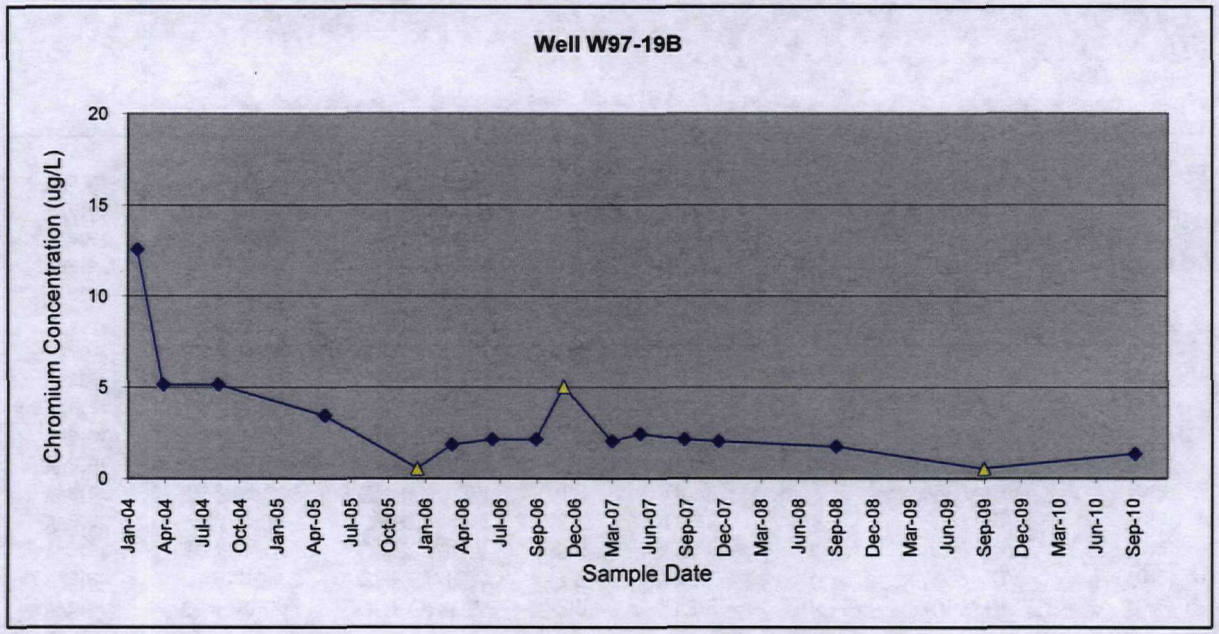
Well W97-19A

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AJ0	Water	06-Feb-04	CHROMIUM	2.2	UG/L	J	W97-19A	Total	7
MJ2BK4	Water	8-Apr-04	CHROMIUM	7.9	UG/L	J	W97-19A	Total	2
MJ4749	Water	19-Aug-04	CHROMIUM	5.4	UG/L	J	W97-19A	Total	8
184242	Water	4-May-05	CHROMIUM	3.7	UG/L		W97-19A	Total	1.8
05504303	Water	14-Dec-05	CHROMIUM	1.4	UG/L		W97-19A	Total	0
104259	Water	8-Mar-06	CHROMIUM	1.2	UG/L		W97-19A	Total	1
244296	Water	13-Jun-06	CHROMIUM	1.2	UG/L		W97-19A	Total	1
394211	Water	27-Sep-06	CHROMIUM	2.1	UG/L		W97-19A	Total	0.4
494095	Water	3-Dec-06	CHROMIUM	5.0	UG/L	U	W97-19A	Total	1
134239	Water	29-Mar-07	CHROMIUM	2.0	UG/L		W97-19A	Total	3.3
234077	Water	5-Jun-07	CHROMIUM	2.2	UG/L		W97-19A	Total	1.8
384556	Water	19-Sep-07	CHROMIUM	1.4	UG/L		W97-19A	Total	1.9
504149	Water	11-Dec-07	CHROMIUM	0.94	UG/L		W97-19A	Total	1
8394084	Water	20-Sep-08	CHROMIUM	1.5	UG/L		W97-19A	Total	1.9
90906505	Water	14-Sep-09	CHROMIUM	0.92	UG/L		W97-19A	Total	3.23
1009065-01	Water	14-Sep-10	CHROMIUM	1.33	UG/L		W97-19A	Total	3.00



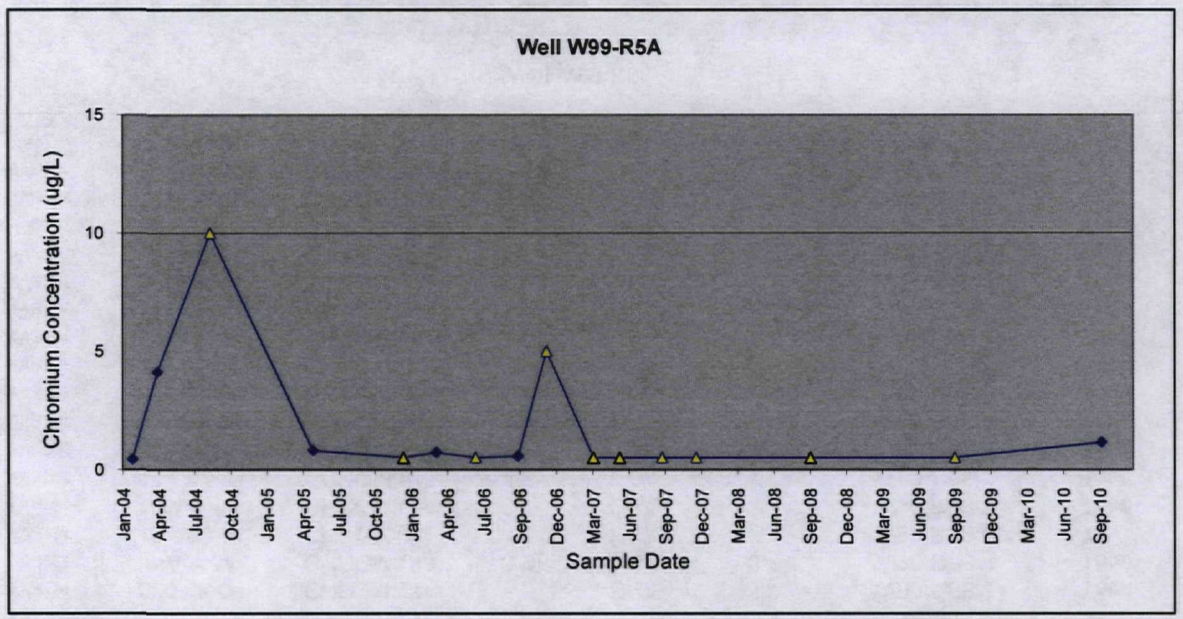
Well W97-19B

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AJ1	Water	06-Feb-04	CHROMIUM	12.5	UG/L	J	W97-19B	Total	0
MJ2BK5	Water	8-Apr-04	CHROMIUM	5.1	UG/L	J	W97-19B	Total	1
MJ4750	Water	19-Aug-04	CHROMIUM	5.1	UG/L	J	W97-19B	Total	3
184243	Water	4-May-05	CHROMIUM	3.4	UG/L		W97-19B	Total	1
05504304	Water	14-Dec-05	CHROMIUM	0.5	UG/L	U	W97-19B	Total	0
104260	Water	8-Mar-06	CHROMIUM	1.8	UG/L		W97-19B	Total	5
244297	Water	13-Jun-06	CHROMIUM	2.1	UG/L		W97-19B	Total	0.5
394212	Water	27-Sep-06	CHROMIUM	2.1	UG/L		W97-19B	Total	1
494096	Water	3-Dec-06	CHROMIUM	5.0	UG/L	U	W97-19B	Total	1
134240	Water	29-Mar-07	CHROMIUM	2.0	UG/L		W97-19B	Total	6.9
234078	Water	5-Jun-07	CHROMIUM	2.4	UG/L		W97-19B	Total	1.9
384557	Water	19-Sep-07	CHROMIUM	2.1	UG/L		W97-19B	Total	0.2
504150	Water	11-Dec-07	CHROMIUM	2.0	UG/L		W97-19B	Total	4.7
8394085	Water	20-Sep-08	CHROMIUM	1.7	UG/L		W97-19B	Total	0.2
90906506	Water	14-Sep-09	CHROMIUM	0.5	UG/L	U	W97-19B	Total	0.5
1009065-02	Water	14-Sep-10	CHROMIUM	1.3	UG/L		W97-19B	Total	0.2



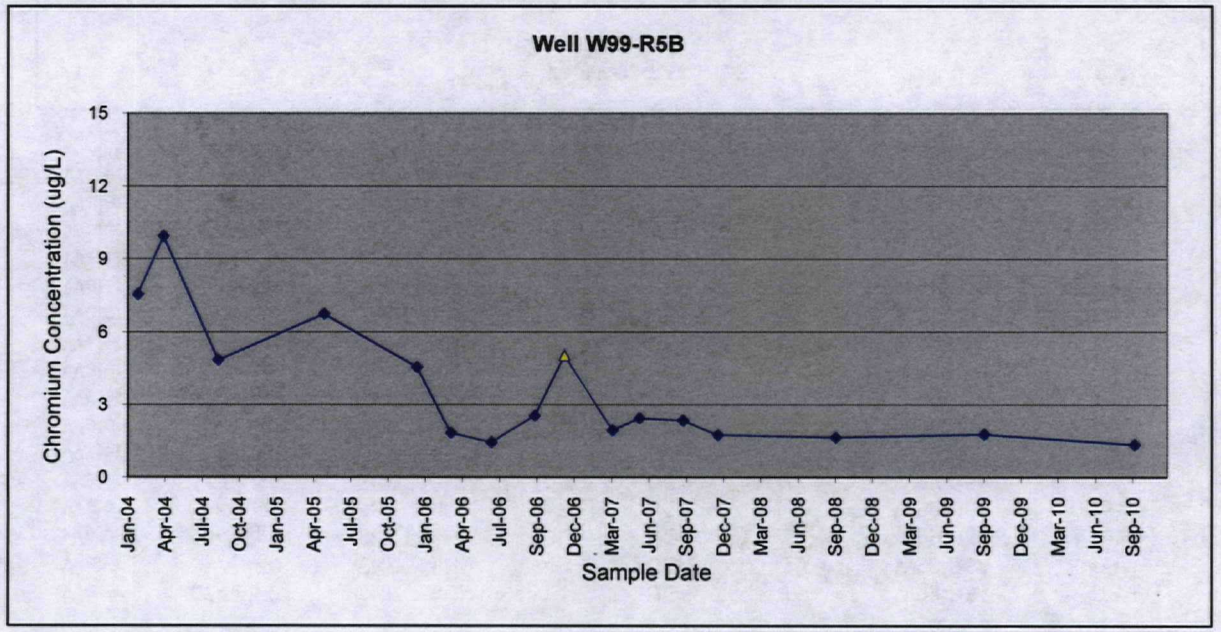
Well W99-R5A

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AJ3	Water	07-Feb-04	CHROMIUM	0.41	UG/L	J	W99-R5A	Total	0
MJ2BL3	Water	9-Apr-04	CHROMIUM	4.1	UG/L	J	W99-R5A	Total	0
MJ4745	Water	19-Aug-04	CHROMIUM	10	UG/L	U	W99-R5A	Total	10
184230	Water	3-May-05	CHROMIUM	0.79	UG/L		W99-R5A	Total	1
05504305	Water	14-Dec-05	CHROMIUM	0.5	UG/L	U	W99-R5A	Total	0
104230	Water	6-Mar-06	CHROMIUM	0.7	UG/L		W99-R5A	Total	0
244280	Water	12-Jun-06	CHROMIUM	0.5	UG/L	U	W99-R5A	Total	1
394180	Water	25-Sep-06	CHROMIUM	0.55	UG/L		W99-R5A	Total	1
494115	Water	5-Dec-06	CHROMIUM	5	UG/L	U	W99-R5A	Total	1
134264	Water	31-Mar-07	CHROMIUM	0.5	UG/L	U	W99-R5A	Total	0.3
234060	Water	4-Jun-07	CHROMIUM	0.5	UG/L	U	W99-R5A	Total	0.4
384530	Water	17-Sep-07	CHROMIUM	0.5	UG/L	U	W99-R5A	Total	1.0
504130	Water	10-Dec-07	CHROMIUM	0.5	UG/L	U	W99-R5A	Total	0.5
8394086	Water	20-Sep-08	CHROMIUM	0.5	UG/L	U	W99-R5A	Total	0.4
90906507	Water	15-Sep-09	CHROMIUM	0.5	UG/L	U	W99-R5A	Total	0.22
1009065-07	Water	14-Sep-10	CHROMIUM	1.14	UG/L		W99-R5A	Total	0.10



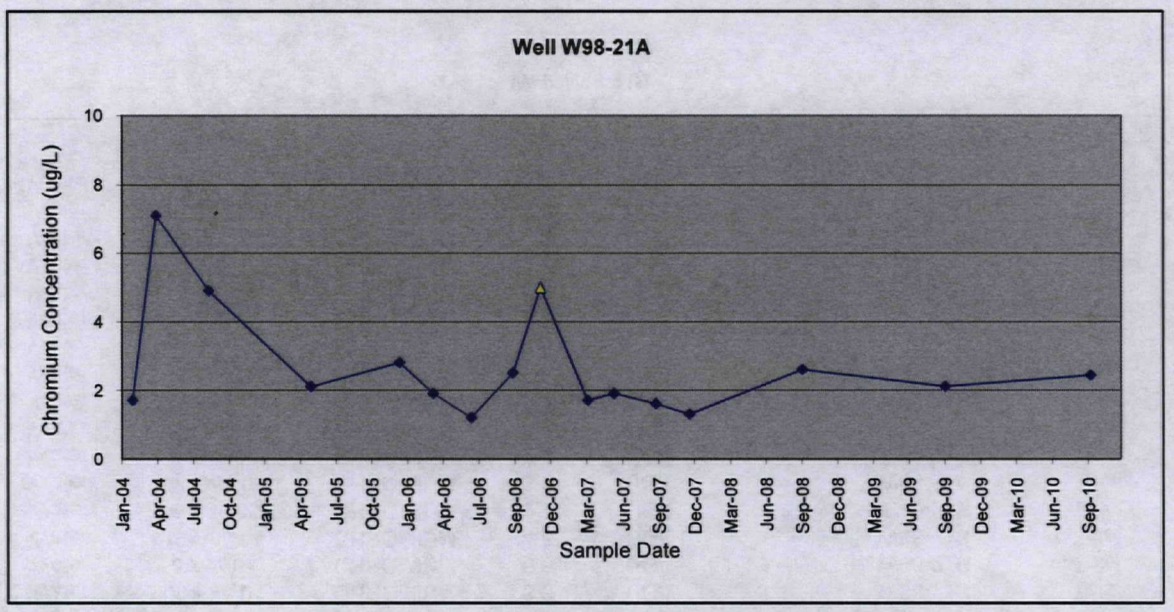
Well W99-R5B

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AJ5	Water	07-Feb-04	CHROMIUM	7.5	UG/L	J	W99-R5B	Total	0
MJ2BL4	Water	9-Apr-04	CHROMIUM	9.9	UG/L	J	W99-R5B	Total	0
MJ4746	Water	19-Aug-04	CHROMIUM	4.8	UG/L	J	W99-R5B	Total	8
184231	Water	3-May-05	CHROMIUM	6.7	UG/L		W99-R5B	Total	2.3
05504306	Water	14-Dec-05	CHROMIUM	4.5	UG/L		W99-R5B	Total	2.1
104231	Water	6-Mar-06	CHROMIUM	1.8	UG/L		W99-R5B	Total	0
244281	Water	12-Jun-06	CHROMIUM	1.4	UG/L		W99-R5B	Total	3
394181	Water	25-Sep-06	CHROMIUM	2.5	UG/L		W99-R5B	Total	1
494116	Water	5-Dec-06	CHROMIUM	5	UG/L	U	W99-R5B	Total	1
134265	Water	31-Mar-07	CHROMIUM	1.9	UG/L		W99-R5B	Total	10
234061	Water	4-Jun-07	CHROMIUM	2.4	UG/L		W99-R5B	Total	0.7
384531	Water	17-Sep-07	CHROMIUM	2.3	UG/L		W99-R5B	Total	1.6
504130	Water	10-Dec-07	CHROMIUM	1.7	UG/L		W99-R5B	Total	2
8394087	Water	20-Sep-08	CHROMIUM	1.6	UG/L		W99-R5B	Total	0.8
90906508	Water	15-Sep-09	CHROMIUM	1.73	UG/L		W99-R5B	Total	0.24
1009065-06	Water	14-Sep-10	CHROMIUM	1.3	UG/L		W99-R5B	Total	0.20



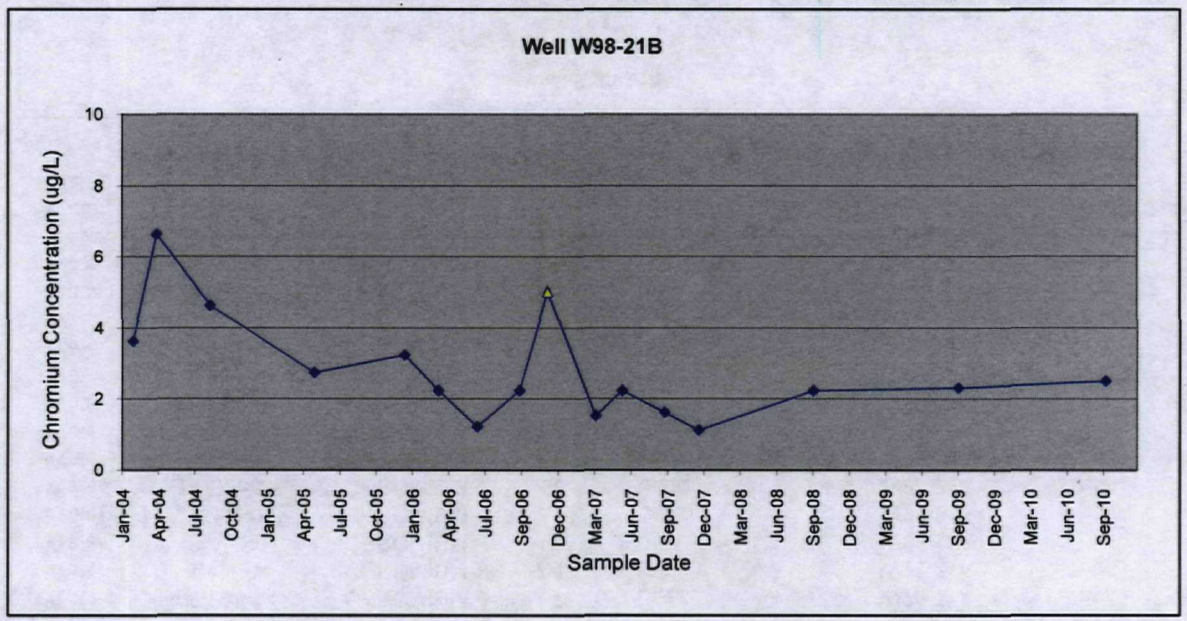
Well W98-21A

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AJ6	Water	09-Feb-04	CHROMIUM	1.7	UG/L	J	W98-21A	Total	No Data
MJ2BK8	Water	8-Apr-04	CHROMIUM	7.1	UG/L	J	W98-21A	Total	0
MJ4743	Water	19-Aug-04	CHROMIUM	4.9	UG/L	J	W98-21A	Total	0
184237	Water	4-May-05	CHROMIUM	2.1	UG/L		W98-21A	Total	1.3
05504309	Water	14-Dec-05	CHROMIUM	2.8	UG/L		W98-21A	Total	0.1
104261	Water	8-Mar-06	CHROMIUM	1.9	UG/L		W98-21A	Total	0
244282	Water	12-Jun-06	CHROMIUM	1.2	UG/L		W98-21A	Total	0.3
394185	Water	25-Sep-06	CHROMIUM	2.5	UG/L		W98-21A	Total	0.2
494098	Water	3-Dec-06	CHROMIUM	5	UG/L	U	W98-21A	Total	0.1
134261	Water	31-Mar-07	CHROMIUM	1.7	UG/L		W98-21A	Total	0.2
234074	Water	5-Jun-07	CHROMIUM	1.9	UG/L		W98-21A	Total	0.9
384547	Water	18-Sep-07	CHROMIUM	1.6	UG/L		W98-21A	Total	0.2
504146	Water	11-Dec-07	CHROMIUM	1.3	UG/L		W98-21A	Total	2.6
8394082	Water	20-Sep-08	CHROMIUM	2.6	UG/L		W98-21A	Total	0.1
90906503	Water	15-Sep-09	CHROMIUM	2.11	UG/L		W98-21A	Total	0.72
1009065-13	Water	15-Sep-10	CHROMIUM	2.43	UG/L		W98-21A	Total	0.15



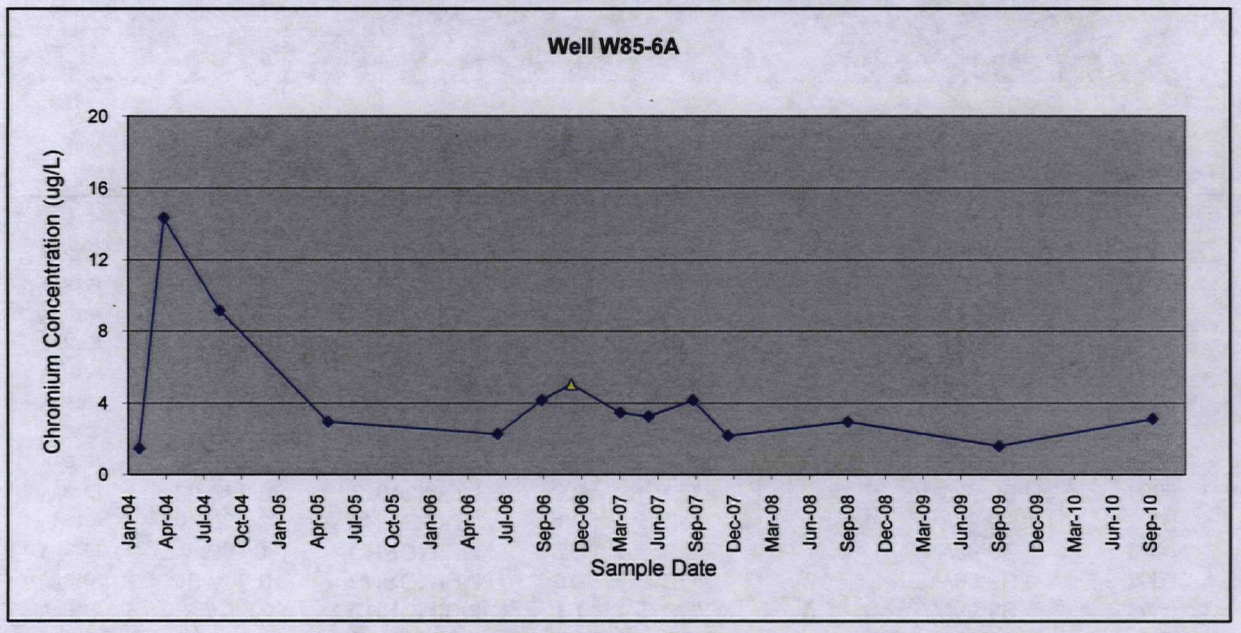
Well W98-21B

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AJ7	Water	09-Feb-04	CHROMIUM	3.6	UG/L	J	W98-21B	Total	No Data
MJ2BK9	Water	8-Apr-04	CHROMIUM	6.6	UG/L	J	W98-21B	Total	0
MJ4744	Water	19-Aug-04	CHROMIUM	4.6	UG/L	J	W98-21B	Total	5
184238	Water	4-May-05	CHROMIUM	2.7	UG/L		W98-21B	Total	0.5
05504310	Water	14-Dec-05	CHROMIUM	3.2	UG/L		W98-21B	Total	0
104262	Water	8-Mar-06	CHROMIUM	2.2	UG/L		W98-21B	Total	0
244283	Water	12-Jun-06	CHROMIUM	1.2	UG/L		W98-21B	Total	0.3
394186	Water	25-Sep-06	CHROMIUM	2.2	UG/L		W98-21B	Total	0.1
494099	Water	3-Dec-06	CHROMIUM	5	UG/L	U	W98-21B	Total	0.2
134262	Water	31-Mar-07	CHROMIUM	1.5	UG/L		W98-21B	Total	0.1
234075	Water	5-Jun-07	CHROMIUM	2.2	UG/L		W98-21B	Total	0.2
384548	Water	18-Sep-07	CHROMIUM	1.6	UG/L		W98-21B	Total	0.2
504147	Water	11-Dec-07	CHROMIUM	1.1	UG/L		W98-21B	Total	1.7
8394083	Water	20-Sep-08	CHROMIUM	2.2	UG/L		W98-21B	Total	0.4
90906504	Water	15-Sep-09	CHROMIUM	2.28	UG/L		W98-21B	Total	0.76
1009065-14	Water	15-Sep-10	CHROMIUM	2.47	UG/L		W98-21B	Total	0.45



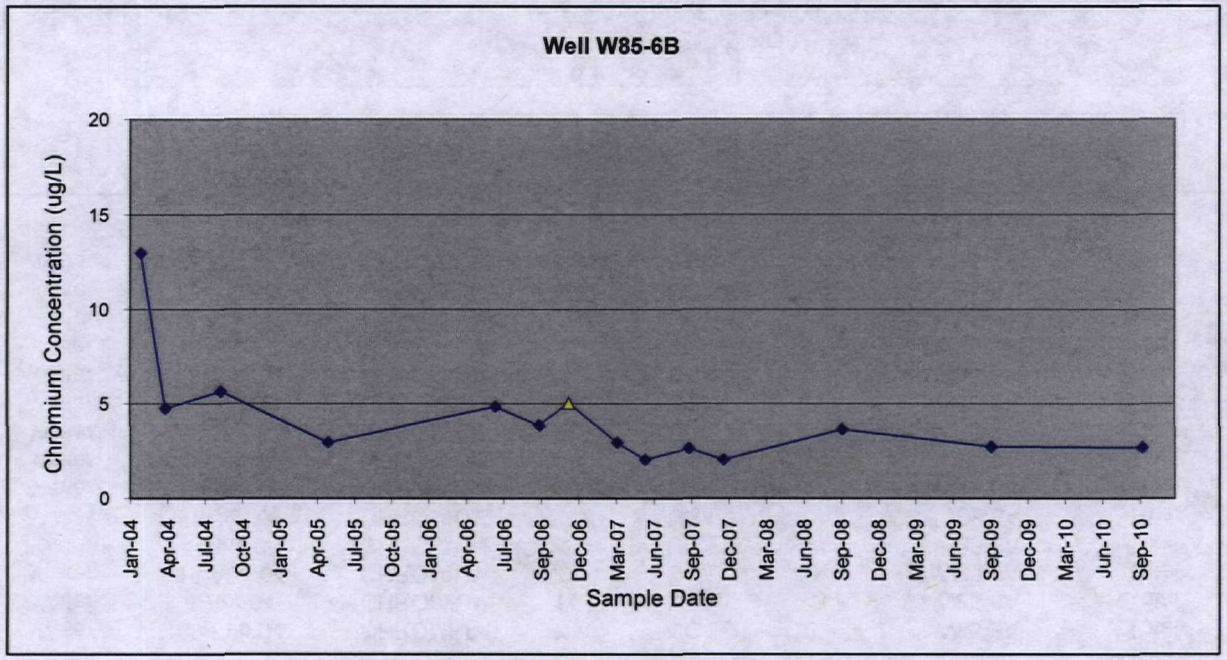
Well W85-6A

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AJ8	Water	09-Feb-04	CHROMIUM	1.4	UG/L	J	W85-6A	Total	No Data
MJ2BL0	Water	8-Apr-04	CHROMIUM	14.3	UG/L		W85-6A	Total	0
MJ4747	Water	19-Aug-04	CHROMIUM	9.1	UG/L	J	W85-6A	Total	<10
184235	Water	4-May-05	CHROMIUM	2.9	UG/L		W85-6A	Total	1
244284	Water	12-Jun-06	CHROMIUM	2.2	UG/L		W85-6A	Total	0.7
394182	Water	25-Sep-06	CHROMIUM	4.1	UG/L		W85-6A	Total	0.1
494113	Water	5-Dec-06	CHROMIUM	5	UG/L	U	W85-6A	Total	2
134245	Water	30-Mar-07	CHROMIUM	3.4	UG/L		W85-6A	Total	0.5
234072	Water	5-Jun-07	CHROMIUM	3.2	UG/L		W85-6A	Total	0.2
384545	Water	18-Sep-07	CHROMIUM	4.1	UG/L		W85-6A	Total	0.6
504132	Water	10-Dec-07	CHROMIUM	2.1	UG/L		W85-6A	Total	0.5
8394083	Water	20-Sep-08	CHROMIUM	2.9	UG/L		W85-6A	Total	0.2
90906501	Water	15-Sep-09	CHROMIUM	1.53	UG/L		W85-6A	Total	0.64
1009065-03	Water	15-Sep-10	CHROMIUM	3.06	UG/L		W85-6A	Total	0.15



Well W85-6B

Sample No.	Matrix	Sample Date	Analyte	Conc.	Units	Qualifier	Station Location	Notes	NTU
MJ2AJ9	Water	09-Feb-04	CHROMIUM	12.9	UG/L		W85-6B	Total	No Data
MJ2BL1	Water	8-Apr-04	CHROMIUM	4.7	UG/L	J	W85-6B	Total	0
MJ4748	Water	19-Aug-04	CHROMIUM	5.6	UG/L	J	W85-6B	Total	5
184236	Water	4-May-05	CHROMIUM	2.9	UG/L		W85-6B	Total	1
244286	Water	12-Jun-06	CHROMIUM	4.8	UG/L		W85-6B	Total	49
394183	Water	25-Sep-06	CHROMIUM	3.8	UG/L		W85-6B	Total	14
494114	Water	5-Dec-06	CHROMIUM	5	UG/L	U	W85-6B	Total	9
134246	Water	30-Mar-07	CHROMIUM	2.9	UG/L		W85-6B	Total	4.6
234073	Water	5-Jun-07	CHROMIUM	2.0	UG/L		W85-6B	Total	1.8
384546	Water	18-Sep-07	CHROMIUM	2.6	UG/L		W85-6B	Total	1.3
504133	Water	10-Dec-07	CHROMIUM	2	UG/L		W85-6B	Total	0.3
8394081	Water	20-Sep-08	CHROMIUM	3.6	UG/L		W85-6B	Total	0.2
90906502	Water	15-Sep-09	CHROMIUM	2.69	UG/L		W85-6B	Total	0.35
1009065-05	Water	14-Sep-10	CHROMIUM	2.65	UG/L		W85-6B	Total	0.30



APPENDIX B

LABORATORY DATA SHEETS
CHROMIUM

Manchester Environmental Laboratory

7411 Beach Drive E, Port Orchard, Washington 98366

Case Narrative

October 7, 2010

Project: Metals Frontier Hardchrome

Work Order: 1009065

Project Manager: Barrett, Guy

By: Dean Momohara

Summary

The laboratory followed EPA 200.8 for the preparation and analysis of trace metals.

All analyses requested were evaluated by established regulatory quality assurance guidelines.

Sample Information

The samples were received at the Manchester Laboratory on 9/21/2010. The samples were received in good condition and were properly preserved. Twenty four samples were received and assigned laboratory identification numbers 1009065-01 to 1009065-03 and 1009065-05 to 1009065-25.

Holding Times

The laboratory performed all analyses within their hold times.

Calibration

The instruments were calibrated following the appropriate methods. All initial calibration verification checks were within the acceptance limits.

All continuing calibration verification checks were within the acceptance limits except for dissolved silver. The continuing calibration verification check for sample 1009065-25 for dissolved silver failed low. The result was qualified as an estimate.

The initial calibration blank check was within the acceptance limits.

All continuing calibration blank checks were within the acceptance limits except for nickel and arsenic. The results for samples 1009065-11 and 1009065-16 for nickel, samples 1009065-11 to 1009065-16 and 1009065-19 to 1009065-22 for arsenic were qualified as estimates.

All standard residuals were within acceptance limits. All r-values were within acceptance limits. The instruments were calibrated with NIST traceable standards and verified to be in calibration with a second source NIST traceable standard.

Method Blanks

All method blanks were within the acceptance limits except for the blanks associated with selenium and arsenic. The results for sample 1009065-10 for selenium, samples 1009065-11, 1009065-12, 1009065-16, 1009065-17, 1009065-19, 1009065-20 and 1009065-24 for arsenic were qualified as estimates.

Laboratory Control Samples

All laboratory control sample recoveries were within the acceptance limits.

Replicates

All associated duplicate relative percent differences of samples with concentrations greater than 5 times the reporting limit were within the acceptance limits.

Matrix Spikes

All matrix spike (MS) recoveries were within the acceptance limits except for zinc and dissolved silver.

Both MS/MSD recoveries for sample 1009065-10 for zinc and sample 1009065-22 for dissolved silver were outside of the acceptance limits due to matrix interference. The source samples were qualified as estimates.

Internal Standards

All internal standard recoveries were within the acceptance limits.

Other Quality Assurance Measures and Issues

The reporting limits for dissolved and total selenium for sample 1009065-25 were raised due to matrix interference.

U - The analyte was not detected at or above the reported result.

J - The analyte was positively identified. The associated numerical result is an estimate.

UJ - The analyte was not detected at or above the reported estimated result.

bold - The analyte was present in the sample. (Visual Aid to locate detected compounds on report sheet.)

Please call Deans Momohara at (360) 871-8808 to further discuss this project.

cc: Project File

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Silver

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/13/2010
Date Analyzed: 10/04/2010

Analyte: Silver
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-01	W97-19A	0.10	U	0.10	0.02	09/13/10	10/04/10	B10I278
1009065-02	W97-19B	0.10	U	0.10	0.02	09/13/10	10/04/10	B10I278
1009065-03	W85-6A	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278
1009065-05	W85-6B	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278
1009065-06	W99-R5B	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278
1009065-07	W99-R5A	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278
1009065-08	B85-4	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278
1009065-09	QA-2	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278
1009065-10	B85-3	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278

QC Results for Batch ID: B10I278

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I278-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I278-BS1	LCS	19.8	20			99	85-115		
B10I278-MS1	Matrix Spike	18.5	20	1009065-10	0.10 U	92	75-125		
B10I278-MSD1	Matrix Spike Dup	18.6	20	1009065-10	0.10 U	93	75-125	0.6	20

Authorized by: DM

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Silver

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 10/04/2010

Analyte: Silver
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-11	W92-16B	0.10	U	0.10	0.02	09/15/10	10/04/10	B10I279
1009065-12	W92-16A	0.10	U	0.10	0.02	09/15/10	10/04/10	B10I279
1009065-13	W98-21A	0.10	U	0.10	0.02	09/15/10	10/04/10	B10I279
1009065-14	W98-21B	0.10	U	0.10	0.02	09/15/10	10/04/10	B10I279
1009065-15	RA-MW-17A	0.10	U	0.10	0.02	09/15/10	10/04/10	B10I279
1009065-16	W97-18A	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-17	RA-MW-16A	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-18	RA-MW-16B	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-19	RA-MW-15A	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-20	B87-8	0.10	U	0.10	0.02	09/15/10	10/04/10	B10I279
1009065-21	RA-MW-15B	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-22	QA-3	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-23	RA-MW-12C	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-24	RA-MW-12B	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-25	RA-MW-12A	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279

QC Results for Batch ID: B10I279

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I279-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I279-BS1	LCS	19.8	20			99	85-115		
B10I279-MS1	Matrix Spike	18.4	20	1009065-22	0.10 U	92	75-125		
B10I279-MSD1	Matrix Spike Dup	18.3	20	1009065-22	0.10 U	92	75-125	0.5	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Silver, Dissolved

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 09/24/2010

Analyte: Silver
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-20	B87-8	0.020	U	0.020	0.002	09/15/10	09/24/10	B10I219
1009065-21	RA-MW-15B	0.020	U	0.020	0.002	09/16/10	09/24/10	B10I219
1009065-22	QA-3	0.020	UJ	0.020	0.002	09/16/10	09/24/10	B10I219
1009065-25	**RA-MW-12A**	**6.32**	**J**	2.00	0.153	09/16/10	09/24/10	B10I219

QC Results for Batch ID: B10I219

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I219-BLK1	Blank	0.020	U	0.020	09/24/10

Sample #	QC Sample	Result		Spike Level	Source Sample	Source Result		%Rec	%Rec Limits	RPD	RPD Limit
B10I219-BS1	LCS	0.049		0.05				97	85-115		
B10I219-MS1	Matrix Spike	0.020	U	0.05	1009065-22	0.020	U	35	75-125		
B10I219-MSD1	Matrix Spike Dup	0.022		0.05	1009065-22	0.020	U	44	75-125	23	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Arsenic

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/13/2010
Date Analyzed: 10/05/2010

Analyte: Arsenic
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-01	W97-19A	0.49		0.10	0.01	09/13/10	10/05/10	B10I278
1009065-02	W97-19B	0.47		0.10	0.01	09/13/10	10/05/10	B10I278
1009065-03	W85-6A	0.37		0.10	0.01	09/14/10	10/05/10	B10I278
1009065-05	W85-6B	0.61		0.10	0.01	09/14/10	10/05/10	B10I278
1009065-06	W99-R5B	0.48		0.10	0.01	09/14/10	10/05/10	B10I278
1009065-07	W99-R5A	0.33		0.10	0.01	09/14/10	10/05/10	B10I278
1009065-08	B85-4	0.25		0.10	0.01	09/14/10	10/05/10	B10I278
1009065-09	QA-2	0.23		0.10	0.01	09/14/10	10/05/10	B10I278
1009065-10	B85-3	1.51		0.10	0.01	09/14/10	10/05/10	B10I278

QC Results for Batch ID: B10I278

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I278-BLK1	Blank	0.10	U	0.10	10/05/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I278-BS1	LCS	20.0	20			100	85-115		
B10I278-MS1	Matrix Spike	20.3	20	1009065-10	1.51	94	75-125		
B10I278-MSD1	Matrix Spike Dup	20.3	20	1009065-10	1.51	94	75-125	0.05	20

Authorized by: DM

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Arsenic

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 10/05/2010

Analyte: Arsenic
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-11	W92-16B	0.19	J	0.10	0.01	09/15/10	10/05/10	B10I279
1009065-12	W92-16A	0.10	J	0.10	0.01	09/15/10	10/05/10	B10I279
1009065-13	W98-21A	0.39	J	0.10	0.01	09/15/10	10/05/10	B10I279
1009065-14	W98-21B	0.44	J	0.10	0.01	09/15/10	10/05/10	B10I279
1009065-15	RA-MW-17A	0.38	J	0.10	0.01	09/15/10	10/05/10	B10I279
1009065-16	W97-18A	0.20	J	0.10	0.01	09/16/10	10/05/10	B10I279
1009065-17	RA-MW-16A	0.10	U	0.10	0.01	09/16/10	10/05/10	B10I279
1009065-18	RA-MW-16B	0.60		0.10	0.01	09/16/10	10/05/10	B10I279
1009065-19	RA-MW-15A	0.29	J	0.10	0.01	09/16/10	10/05/10	B10I279
1009065-20	B87-8	0.32	J	0.10	0.01	09/15/10	10/05/10	B10I279
1009065-21	RA-MW-15B	0.38	J	0.10	0.01	09/16/10	10/05/10	B10I279
1009065-22	QA-3	0.46	J	0.10	0.01	09/16/10	10/05/10	B10I279
1009065-23	RA-MW-12C	2.01		0.10	0.01	09/16/10	10/05/10	B10I279
1009065-24	RA-MW-12B	0.10	U	0.10	0.01	09/16/10	10/05/10	B10I279
1009065-25	RA-MW-12A	4.58		0.10	0.01	09/16/10	10/05/10	B10I279

QC Results for Batch ID: B10I279

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I279-BLK1	Blank	0.10	U	0.10	10/05/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I279-BS1	LCS	19.3	20			97	85-115		
B10I279-MS1	Matrix Spike	19.8	20	1009065-22	0.465	97	75-125		
B10I279-MSD1	Matrix Spike Dup	19.8	20	1009065-22	0.465	97	75-125	0.2	20

Authorized by: DM

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Arsenic, Dissolved

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 09/22/2010

Analyte: Arsenic
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-20	B87-8	0.51		0.10	0.01	09/15/10	09/22/10	B10I194
1009065-21	RA-MW-15B	0.69		0.10	0.01	09/16/10	09/22/10	B10I194
1009065-22	QA-3	0.68		0.10	0.01	09/16/10	09/22/10	B10I194
1009065-25	RA-MW-12A	4.89		1.00	0.10	09/16/10	09/22/10	B10I194

QC Results for Batch ID: B10I194

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I194-BLK1	Blank	0.10	U	0.10	09/22/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I194-BS1	LCS	19.6	20			98	85-115		
B10I194-MS1	Matrix Spike	23.9	20	1009065-22	0.679	116	75-125		
B10I194-MSD1	Matrix Spike Dup	23.8	20	1009065-22	0.679	115	75-125	0.6	20

Authorized by: DM

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Beryllium

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/13/2010
Date Analyzed: 10/04/2010

Analyte: Beryllium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-01	W97-19A	0.10	U	0.10	0.02	09/13/10	10/04/10	B10I278
1009065-02	W97-19B	0.10	U	0.10	0.02	09/13/10	10/04/10	B10I278
1009065-03	W85-6A	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278
1009065-05	W85-6B	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278
1009065-06	W99-R5B	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278
1009065-07	W99-R5A	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278
1009065-08	B85-4	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278
1009065-09	QA-2	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278
1009065-10	B85-3	0.10	U	0.10	0.02	09/14/10	10/04/10	B10I278

QC Results for Batch ID: B10I278

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I278-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I278-BS1	LCS	20.4	20			102	85-115		
B10I278-MS1	Matrix Spike	19.3	20	1009065-10	0.10 U	96	75-125		
B10I278-MSD1	Matrix Spike Dup	19.7	20	1009065-10	0.10 U	98	75-125	2	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Beryllium

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 10/04/2010

Analyte: Beryllium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-11	W92-16B	0.10	U	0.10	0.02	09/15/10	10/04/10	B10I279
1009065-12	W92-16A	0.10	U	0.10	0.02	09/15/10	10/04/10	B10I279
1009065-13	W98-21A	0.10	U	0.10	0.02	09/15/10	10/04/10	B10I279
1009065-14	W98-21B	0.10	U	0.10	0.02	09/15/10	10/04/10	B10I279
1009065-15	RA-MW-17A	0.10	U	0.10	0.02	09/15/10	10/04/10	B10I279
1009065-16	W97-18A	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-17	RA-MW-16A	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-18	RA-MW-16B	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-19	RA-MW-15A	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-20	B87-8	0.10	U	0.10	0.02	09/15/10	10/04/10	B10I279
1009065-21	RA-MW-15B	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-22	QA-3	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-23	RA-MW-12C	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-24	RA-MW-12B	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279
1009065-25	RA-MW-12A	0.10	U	0.10	0.02	09/16/10	10/04/10	B10I279

QC Results for Batch ID: B10I279

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I279-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I279-BS1	LCS	20.3	20			101	85-115		
B10I279-MS1	Matrix Spike	18.7	20	1009065-22	0.10 U	94	75-125		
B10I279-MSD1	Matrix Spike Dup	19.0	20	1009065-22	0.10 U	95	75-125	1	20

Authorized by: Dr **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Beryllium, Dissolved

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 09/22/2010

Analyte: Beryllium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-20	B87-8	0.10	U	0.10	0.01	09/15/10	09/22/10	B10I194
1009065-21	RA-MW-15B	0.10	U	0.10	0.01	09/16/10	09/22/10	B10I194
1009065-22	QA-3	0.10	U	0.10	0.01	09/16/10	09/22/10	B10I194
1009065-25	RA-MW-12A	1.00	U	1.00	0.10	09/16/10	09/22/10	B10I194

QC Results for Batch ID: B10I194

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I194-BLK1	Blank	0.10	U	0.10	09/22/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I194-BS1	LCS	19.3	20			96	85-115		
B10I194-MS1	Matrix Spike	19.9	20	1009065-22	0.10 U	99	75-125		
B10I194-MSD1	Matrix Spike Dup	20.2	20	1009065-22	0.10 U	101	75-125	2	20

Authorized by: DN

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Cadmium

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/13/2010
Date Analyzed: 10/04/2010

Analyte: Cadmium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-01	W97-19A	0.10	U	0.10	0.004	09/13/10	10/04/10	B10I278
1009065-02	W97-19B	0.10	U	0.10	0.004	09/13/10	10/04/10	B10I278
1009065-03	W85-6A	0.10	U	0.10	0.004	09/14/10	10/04/10	B10I278
1009065-05	W85-6B	0.10	U	0.10	0.004	09/14/10	10/04/10	B10I278
1009065-06	W99-R5B	0.10	U	0.10	0.004	09/14/10	10/04/10	B10I278
1009065-07	W99-R5A	0.10	U	0.10	0.004	09/14/10	10/04/10	B10I278
1009065-08	B85-4	0.10	U	0.10	0.004	09/14/10	10/04/10	B10I278
1009065-09	QA-2	0.10	U	0.10	0.004	09/14/10	10/04/10	B10I278
1009065-10	B85-3	0.10	U	0.10	0.004	09/14/10	10/04/10	B10I278

QC Results for Batch ID: B10I278

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I278-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I278-BS1	LCS	19.8	20			99	85-115		
B10I278-MS1	Matrix Spike	18.7	20	1009065-10	0.015	94	75-125		
B10I278-MSD1	Matrix Spike Dup	19.0	20	1009065-10	0.015	95	75-125	1	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Cadmium

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 10/04/2010

Analyte: Cadmium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-11	**W92-16B**	**0.28**		0.10	0.004	09/15/10	10/04/10	B10I279
1009065-12	W92-16A	0.10	U	0.10	0.004	09/15/10	10/04/10	B10I279
1009065-13	W98-21A	0.10	U	0.10	0.004	09/15/10	10/04/10	B10I279
1009065-14	W98-21B	0.10	U	0.10	0.004	09/15/10	10/04/10	B10I279
1009065-15	RA-MW-17A	0.10	U	0.10	0.004	09/15/10	10/04/10	B10I279
1009065-16	W97-18A	0.10	U	0.10	0.004	09/16/10	10/04/10	B10I279
1009065-17	**RA-MW-16A**	**0.18**		0.10	0.004	09/16/10	10/04/10	B10I279
1009065-18	RA-MW-16B	0.10	U	0.10	0.004	09/16/10	10/04/10	B10I279
1009065-19	RA-MW-15A	0.10	U	0.10	0.004	09/16/10	10/04/10	B10I279
1009065-20	**B87-8**	**0.11**		0.10	0.004	09/15/10	10/04/10	B10I279
1009065-21	RA-MW-15B	0.10	U	0.10	0.004	09/16/10	10/04/10	B10I279
1009065-22	QA-3	0.10	U	0.10	0.004	09/16/10	10/04/10	B10I279
1009065-23	RA-MW-12C	0.10	U	0.10	0.004	09/16/10	10/04/10	B10I279
1009065-24	RA-MW-12B	0.10	U	0.10	0.004	09/16/10	10/04/10	B10I279
1009065-25	RA-MW-12A	0.10	U	0.10	0.004	09/16/10	10/04/10	B10I279

QC Results for Batch ID: B10I279

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I279-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I279-BS1	LCS	19.7	20			99	85-115		
B10I279-MS1	Matrix Spike	18.9	20	1009065-22	0.050	94	75-125		
B10I279-MSD1	Matrix Spike Dup	18.7	20	1009065-22	0.050	93	75-125	1	20

Authorized by: DN

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Cadmium, Dissolved

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 09/22/2010

Analyte: Cadmium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-20	**B87-8**	**0.084**		0.020	0.002	09/15/10	09/22/10	B10I194
1009065-21	**RA-MW-15B**	**0.042**		0.020	0.002	09/16/10	09/22/10	B10I194
1009065-22	**QA-3**	**0.040**		0.020	0.002	09/16/10	09/22/10	B10I194
1009065-25	RA-MW-12A	0.200	U	0.200	0.025	09/16/10	09/22/10	B10I194

QC Results for Batch ID: B10I194

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I194-BLK1	Blank	0.020	U	0.020	09/22/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I194-BS1	LCS	19.2	20			96	85-115		
B10I194-MS1	Matrix Spike	18.5	20	1009065-22	0.040	92	75-125		
B10I194-MSD1	Matrix Spike Dup	18.3	20	1009065-22	0.040	91	75-125	0.9	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Chromium

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/13/2010
Date Analyzed: 10/05/2010

Analyte: Chromium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-01	W97-19A	1.33		0.50	0.11	09/13/10	10/05/10	B10I278
1009065-02	W97-19B	1.30		0.50	0.11	09/13/10	10/05/10	B10I278
1009065-03	W85-6A	3.06		0.50	0.11	09/14/10	10/05/10	B10I278
1009065-05	W85-6B	2.65		0.50	0.11	09/14/10	10/05/10	B10I278
1009065-06	W99-R5B	1.30		0.50	0.11	09/14/10	10/05/10	B10I278
1009065-07	W99-R5A	1.14		0.50	0.11	09/14/10	10/05/10	B10I278
1009065-08	B85-4	0.86		0.50	0.11	09/14/10	10/05/10	B10I278
1009065-09	QA-2	0.86		0.50	0.11	09/14/10	10/05/10	B10I278
1009065-10	B85-3	0.50	U	0.50	0.11	09/14/10	10/05/10	B10I278

QC Results for Batch ID: B10I278

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I278-BLK1	Blank	0.50	U	0.50	10/05/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I278-BS1	LCS	20.4	20			102	85-115		20
B10I278-MS1	Matrix Spike	19.9	20	1009065-10	0.322	98	75-125		20
B10I278-MSD1	Matrix Spike Dup	20.2	20	1009065-10	0.322	99	75-125	1	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Chromium

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 10/05/2010

Analyte: Chromium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-11	**W92-16B**	**2.51**		0.50	0.11	09/15/10	10/05/10	B10I279
1009065-12	W92-16A	0.50	U	0.50	0.11	09/15/10	10/05/10	B10I279
1009065-13	**W98-21A**	**2.43**		0.50	0.11	09/15/10	10/05/10	B10I279
1009065-14	**W98-21B**	**2.47**		0.50	0.11	09/15/10	10/05/10	B10I279
1009065-15	**RA-MW-17A**	**3.31**		0.50	0.11	09/15/10	10/05/10	B10I279
1009065-16	W97-18A	0.50	U	0.50	0.11	09/16/10	10/05/10	B10I279
1009065-17	**RA-MW-16A**	**1.09**		0.50	0.11	09/16/10	10/05/10	B10I279
1009065-18	RA-MW-16B	0.50	U	0.50	0.11	09/16/10	10/05/10	B10I279
1009065-19	**RA-MW-15A**	**2.82**		0.50	0.11	09/16/10	10/05/10	B10I279
1009065-20	**B87-8**	**3.02**		0.50	0.11	09/15/10	10/05/10	B10I279
1009065-21	**RA-MW-15B**	**0.62**		0.50	0.11	09/16/10	10/05/10	B10I279
1009065-22	**QA-3**	**0.91**		0.50	0.11	09/16/10	10/05/10	B10I279
1009065-23	**RA-MW-12C**	**0.66**		0.50	0.11	09/16/10	10/05/10	B10I279
1009065-24	**RA-MW-12B**	**1.32**		0.50	0.11	09/16/10	10/05/10	B10I279
1009065-25	**RA-MW-12A**	**7.26**		0.50	0.11	09/16/10	10/05/10	B10I279

QC Results for Batch ID: B10I279

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I279-BLK1	Blank	0.50	U	0.50	10/05/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I279-BS1	LCS	19.8	20			99	85-115		20
B10I279-MS1	Matrix Spike	21.2	20	1009065-22	0.907	101	75-125		20
B10I279-MSD1	Matrix Spike Dup	20.3	20	1009065-22	0.907	97	75-125	4	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Chromium, Dissolved

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 09/22/2010

Analyte: Chromium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-20	B87-8	2.71		0.25	0.03	09/15/10	09/22/10	B10I194
1009065-21	RA-MW-15B	2.02		0.25	0.03	09/16/10	09/22/10	B10I194
1009065-22	QA-3	2.04		0.25	0.03	09/16/10	09/22/10	B10I194
1009065-25	RA-MW-12A	7.77		2.50	0.27	09/16/10	09/22/10	B10I194

QC Results for Batch ID: B10I194

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I194-BLK1	Blank	0.25	U	0.25	09/22/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I194-BS1	LCS	20.1	20			100	85-115		
B10I194-MS1	Matrix Spike	22.5	20	1009065-22	2.04	102	75-125		
B10I194-MSD1	Matrix Spike Dup	22.2	20	1009065-22	2.04	101	75-125	1	20

Authorized by: DM

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Copper

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/13/2010
Date Analyzed: 10/04/2010

Analyte: Copper
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-01	W97-19A	1.09		0.10	0.03	09/13/10	10/04/10	B10I278
1009065-02	W97-19B	1.10		0.10	0.03	09/13/10	10/04/10	B10I278
1009065-03	W85-6A	1.06		0.10	0.03	09/14/10	10/04/10	B10I278
1009065-05	W85-6B	2.48		0.10	0.03	09/14/10	10/04/10	B10I278
1009065-06	W99-R5B	0.64		0.10	0.03	09/14/10	10/04/10	B10I278
1009065-07	W99-R5A	0.54		0.10	0.03	09/14/10	10/04/10	B10I278
1009065-08	B85-4	8.69		0.10	0.03	09/14/10	10/04/10	B10I278
1009065-09	QA-2	8.48		0.10	0.03	09/14/10	10/04/10	B10I278
1009065-10	B85-3	0.48		0.10	0.03	09/14/10	10/04/10	B10I278

QC Results for Batch ID: B10I278

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I278-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I278-BS1	LCS	20.5	20			103	85-115		
B10I278-MS1	Matrix Spike	18.2	20	1009065-10	0.480	89	75-125		
B10I278-MSD1	Matrix Spike Dup	18.4	20	1009065-10	0.480	90	75-125	1	20

Authorized by: DM

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Copper

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 10/04/2010

Analyte: Copper
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-11	W92-16B	1.62		0.10	0.03	09/15/10	10/04/10	B10I279
1009065-12	W92-16A	1.20		0.10	0.03	09/15/10	10/04/10	B10I279
1009065-13	W98-21A	1.05		0.10	0.03	09/15/10	10/04/10	B10I279
1009065-14	W98-21B	0.94		0.10	0.03	09/15/10	10/04/10	B10I279
1009065-15	RA-MW-17A	0.78		0.10	0.03	09/15/10	10/04/10	B10I279
1009065-16	W97-18A	0.69		0.10	0.03	09/16/10	10/04/10	B10I279
1009065-17	RA-MW-16A	11.3		0.10	0.03	09/16/10	10/04/10	B10I279
1009065-18	RA-MW-16B	2.07		0.10	0.03	09/16/10	10/04/10	B10I279
1009065-19	RA-MW-15A	1.10		0.10	0.03	09/16/10	10/05/10	B10I279
1009065-20	B87-8	5.03		0.10	0.03	09/15/10	10/05/10	B10I279
1009065-21	RA-MW-15B	1.95		0.10	0.03	09/16/10	10/05/10	B10I279
1009065-22	QA-3	2.91		0.10	0.03	09/16/10	10/05/10	B10I279
1009065-23	RA-MW-12C	0.25		0.10	0.03	09/16/10	10/05/10	B10I279
1009065-24	RA-MW-12B	0.49		0.10	0.03	09/16/10	10/05/10	B10I279
1009065-25	RA-MW-12A	1.28		0.10	0.03	09/16/10	10/05/10	B10I279

QC Results for Batch ID: B10I279

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I279-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I279-BS1	LCS	20.6	20			103	85-115		
B10I279-MS1	Matrix Spike	20.2	20	1009065-22	2.91	86	75-125		
B10I279-MSD1	Matrix Spike Dup	20.4	20	1009065-22	2.91	87	75-125	1	20

Authorized by: DM

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Copper, Dissolved

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 09/22/2010

Analyte: Copper
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-20	B87-8	4.03		0.10	0.003	09/15/10	09/22/10	B10I194
1009065-21	RA-MW-15B	2.32		0.10	0.003	09/16/10	09/22/10	B10I194
1009065-22	QA-3	2.15		0.10	0.003	09/16/10	09/22/10	B10I194
1009065-25	RA-MW-12A	1.81		1.00	0.03	09/16/10	09/22/10	B10I194

QC Results for Batch ID: B10I194

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I194-BLK1	Blank	0.10	U	0.10	09/22/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I194-BS1	LCS	19.8	20			99	85-115		
B10I194-MS1	Matrix Spike	21.1	20	1009065-22	2.15	95	75-125		
B10I194-MSD1	Matrix Spike Dup	21.3	20	1009065-22	2.15	96	75-125	0.9	20

Authorized by: DK **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Nickel

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/13/2010
Date Analyzed: 10/04/2010

Analyte: Nickel
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-01	W97-19A	0.53		0.10	0.03	09/13/10	10/04/10	B10I278
1009065-02	W97-19B	0.82		0.10	0.03	09/13/10	10/04/10	B10I278
1009065-03	W85-6A	0.87		0.10	0.03	09/14/10	10/04/10	B10I278
1009065-05	W85-6B	0.76		0.10	0.03	09/14/10	10/04/10	B10I278
1009065-06	W99-R5B	0.34		0.10	0.03	09/14/10	10/04/10	B10I278
1009065-07	W99-R5A	0.35		0.10	0.03	09/14/10	10/04/10	B10I278
1009065-08	B85-4	13.7		0.10	0.03	09/14/10	10/04/10	B10I278
1009065-09	QA-2	13.4		0.10	0.03	09/14/10	10/04/10	B10I278
1009065-10	B85-3	1.21		0.10	0.03	09/14/10	10/04/10	B10I278

QC Results for Batch ID: B10I278

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I278-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I278-BS1	LCS	20.2	20			101	85-115		
B10I278-MS1	Matrix Spike	19.7	20	1009065-10	1.21	92	75-125		
B10I278-MSD1	Matrix Spike Dup	19.9	20	1009065-10	1.21	93	75-125	1	20

Authorized by: DM

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Nickel

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 10/04/2010

Analyte: Nickel
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-11	W92-16B	0.51	J	0.10	0.03	09/15/10	10/04/10	B10I279
1009065-12	W92-16A	0.61		0.10	0.03	09/15/10	10/04/10	B10I279
1009065-13	W98-21A	0.76		0.10	0.03	09/15/10	10/04/10	B10I279
1009065-14	W98-21B	1.46		0.10	0.03	09/15/10	10/04/10	B10I279
1009065-15	RA-MW-17A	47.6		0.10	0.03	09/15/10	10/04/10	B10I279
1009065-16	W97-18A	0.51	J	0.10	0.03	09/16/10	10/04/10	B10I279
1009065-17	RA-MW-16A	31.9		0.10	0.03	09/16/10	10/04/10	B10I279
1009065-18	RA-MW-16B	5.13		0.10	0.03	09/16/10	10/04/10	B10I279
1009065-19	RA-MW-15A	52.8		0.10	0.03	09/16/10	10/04/10	B10I279
1009065-20	B87-8	9.68		0.10	0.03	09/15/10	10/04/10	B10I279
1009065-21	RA-MW-15B	4.02		0.10	0.03	09/16/10	10/04/10	B10I279
1009065-22	QA-3	5.14		0.10	0.03	09/16/10	10/04/10	B10I279
1009065-23	RA-MW-12C	4.02		0.10	0.03	09/16/10	10/04/10	B10I279
1009065-24	RA-MW-12B	12.7		0.10	0.03	09/16/10	10/04/10	B10I279
1009065-25	RA-MW-12A	9.67		0.10	0.03	09/16/10	10/04/10	B10I279

QC Results for Batch ID: B10I279

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I279-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I279-BS1	LCS	20.5	20			103	85-115		
B10I279-MS1	Matrix Spike	26.2	20	1009065-22	5.14	105	75-125		
B10I279-MSD1	Matrix Spike Dup	24.3	20	1009065-22	5.14	96	75-125	8	20

Authorized by: DM

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Nickel, Dissolved

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 09/22/2010

Analyte: Nickel
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-20	B87-8	9.49		0.10	0.01	09/15/10	09/22/10	B10I194
1009065-21	RA-MW-15B	4.31		0.10	0.01	09/16/10	09/22/10	B10I194
1009065-22	QA-3	4.59		0.10	0.01	09/16/10	09/22/10	B10I194
1009065-25	RA-MW-12A	9.33		1.00	0.10	09/16/10	09/22/10	B10I194

QC Results for Batch ID: B10I194

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I194-BLK1	Blank	0.10	U	0.10	09/22/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I194-BS1	LCS	19.7	20			99	85-115		
B10I194-MS1	Matrix Spike	23.8	20	1009065-22	4.59	96	75-125		
B10I194-MSD1	Matrix Spike Dup	24.1	20	1009065-22	4.59	97	75-125	1	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Lead

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/13/2010
Date Analyzed: 10/04/2010

Analyte: Lead
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-01	W97-19A	0.10	U	0.10	0.01	09/13/10	10/04/10	B10I278
1009065-02	W97-19B	0.10	U	0.10	0.01	09/13/10	10/04/10	B10I278
1009065-03	W85-6A	0.10	U	0.10	0.01	09/14/10	10/04/10	B10I278
1009065-05	W85-6B	0.10	U	0.10	0.01	09/14/10	10/04/10	B10I278
1009065-06	W99-R5B	0.10	U	0.10	0.01	09/14/10	10/04/10	B10I278
1009065-07	W99-R5A	0.10	U	0.10	0.01	09/14/10	10/04/10	B10I278
1009065-08	B85-4	0.10	U	0.10	0.01	09/14/10	10/04/10	B10I278
1009065-09	QA-2	0.10	U	0.10	0.01	09/14/10	10/04/10	B10I278
1009065-10	B85-3	0.10	U	0.10	0.01	09/14/10	10/04/10	B10I278

QC Results for Batch ID: B10I278

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I278-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I278-BS1	LCS	20.5	20			102	85-115		
B10I278-MS1	Matrix Spike	22.1	20	1009065-10	0.060	110	75-125		
B10I278-MSD1	Matrix Spike Dup	22.2	20	1009065-10	0.060	111	75-125	0.6	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for

Lead

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 10/04/2010

Analyte: Lead
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-11	**W92-16B**	**0.23**		0.10	0.01	09/15/10	10/04/10	B10I279
1009065-12	W92-16A	0.10	U	0.10	0.01	09/15/10	10/04/10	B10I279
1009065-13	W98-21A	0.10	U	0.10	0.01	09/15/10	10/04/10	B10I279
1009065-14	W98-21B	0.10	U	0.10	0.01	09/15/10	10/04/10	B10I279
1009065-15	RA-MW-17A	0.10	U	0.10	0.01	09/15/10	10/04/10	B10I279
1009065-16	W97-18A	0.10	U	0.10	0.01	09/16/10	10/04/10	B10I279
1009065-17	**RA-MW-16A**	**0.19**		0.10	0.01	09/16/10	10/04/10	B10I279
1009065-18	RA-MW-16B	0.10	U	0.10	0.01	09/16/10	10/04/10	B10I279
1009065-19	RA-MW-15A	0.10	U	0.10	0.01	09/16/10	10/04/10	B10I279
1009065-20	**B87-8**	**0.99**		0.10	0.01	09/15/10	10/04/10	B10I279
1009065-21	RA-MW-15B	0.10	U	0.10	0.01	09/16/10	10/04/10	B10I279
1009065-22	**QA-3**	**0.15**		0.10	0.01	09/16/10	10/04/10	B10I279
1009065-23	RA-MW-12C	0.10	U	0.10	0.01	09/16/10	10/04/10	B10I279
1009065-24	RA-MW-12B	0.10	U	0.10	0.01	09/16/10	10/04/10	B10I279
1009065-25	RA-MW-12A	0.10	U	0.10	0.01	09/16/10	10/04/10	B10I279

QC Results for Batch ID: B10I279

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I279-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I279-BS1	LCS	20.5	20			102	85-115		
B10I279-MS1	Matrix Spike	22.1	20	1009065-22	0.155	110	75-125		
B10I279-MSD1	Matrix Spike Dup	21.9	20	1009065-22	0.155	109	75-125	0.9	20

Authorized by: DM

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Lead, Dissolved

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 09/22/2010

Analyte: Lead
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-20	**B87-8**	**0.051**		0.020	0.002	09/15/10	09/22/10	B10I194
1009065-21	RA-MW-15B	0.020	U	0.020	0.002	09/16/10	09/22/10	B10I194
1009065-22	QA-3	0.020	U	0.020	0.002	09/16/10	09/22/10	B10I194
1009065-25	RA-MW-12A	0.200	U	0.200	0.015	09/16/10	09/23/10	B10I194

QC Results for Batch ID: B10I194

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I194-BLK1	Blank	0.020	U	0.020	09/22/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I194-BS1	LCS	18.8	20			94	85-115		
B10I194-MS1	Matrix Spike	19.4	20	1009065-22	0.010	97	75-125		
B10I194-MSD1	Matrix Spike Dup	19.4	20	1009065-22	0.010	97	75-125	0.2	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Antimony

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/13/2010
Date Analyzed: 10/04/2010

Analyte: Antimony
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-01	W97-19A	0.20	U	0.20	0.02	09/13/10	10/04/10	B10I278
1009065-02	W97-19B	0.20	U	0.20	0.02	09/13/10	10/04/10	B10I278
1009065-03	W85-6A	0.20	U	0.20	0.02	09/14/10	10/04/10	B10I278
1009065-05	**W85-6B**	**1.00**		0.20	0.02	09/14/10	10/04/10	B10I278
1009065-06	W99-R5B	0.20	U	0.20	0.02	09/14/10	10/04/10	B10I278
1009065-07	W99-R5A	0.20	U	0.20	0.02	09/14/10	10/04/10	B10I278
1009065-08	B85-4	0.20	U	0.20	0.02	09/14/10	10/04/10	B10I278
1009065-09	QA-2	0.20	U	0.20	0.02	09/14/10	10/04/10	B10I278
1009065-10	B85-3	0.20	U	0.20	0.02	09/14/10	10/04/10	B10I278

QC Results for Batch ID: B10I278

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I278-BLK1	Blank	0.20	U	0.20	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I278-BS1	LCS	19.7	20			99	85-115		
B10I278-MS1	Matrix Spike	19.8	20	1009065-10	0.028	99	75-125		
B10I278-MSD1	Matrix Spike Dup	19.9	20	1009065-10	0.028	100	75-125	0.5	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Antimony

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 10/04/2010

Analyte: Antimony
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-11	**W92-16B**	**0.24**		0.20	0.02	09/15/10	10/04/10	B10I279
1009065-12	W92-16A	0.20	U	0.20	0.02	09/15/10	10/04/10	B10I279
1009065-13	W98-21A	0.20	U	0.20	0.02	09/15/10	10/04/10	B10I279
1009065-14	W98-21B	0.20	U	0.20	0.02	09/15/10	10/04/10	B10I279
1009065-15	RA-MW-17A	0.20	U	0.20	0.02	09/15/10	10/04/10	B10I279
1009065-16	W97-18A	0.20	U	0.20	0.02	09/16/10	10/04/10	B10I279
1009065-17	RA-MW-16A	0.20	U	0.20	0.02	09/16/10	10/04/10	B10I279
1009065-18	RA-MW-16B	0.20	U	0.20	0.02	09/16/10	10/04/10	B10I279
1009065-19	RA-MW-15A	0.20	U	0.20	0.02	09/16/10	10/04/10	B10I279
1009065-20	**B87-8**	**0.29**		0.20	0.02	09/15/10	10/05/10	B10I279
1009065-21	RA-MW-15B	0.20	U	0.20	0.02	09/16/10	10/04/10	B10I279
1009065-22	QA-3	0.20	U	0.20	0.02	09/16/10	10/04/10	B10I279
1009065-23	RA-MW-12C	0.20	U	0.20	0.02	09/16/10	10/04/10	B10I279
1009065-24	RA-MW-12B	0.20	U	0.20	0.02	09/16/10	10/04/10	B10I279
1009065-25	**RA-MW-12A**	**0.53**		0.20	0.02	09/16/10	10/05/10	B10I279

QC Results for Batch ID: B10I279

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I279-BLK1	Blank	0.20	U	0.20	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I279-BS1	LCS	20.0	20			100	85-115		
B10I279-MS1	Matrix Spike	20.4	20	1009065-22	0.054	101	75-125		
B10I279-MSD1	Matrix Spike Dup	20.1	20	1009065-22	0.054	100	75-125	1	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Antimony, Dissolved

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 09/22/2010

Analyte: Antimony
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-20	**B87-8**	**0.22**		0.20	0.004	09/15/10	09/22/10	B10I194
1009065-21	RA-MW-15B	0.20	U	0.20	0.004	09/16/10	09/22/10	B10I194
1009065-22	QA-3	0.20	U	0.20	0.004	09/16/10	09/22/10	B10I194
1009065-25	RA-MW-12A	2.00	U	2.00	0.04	09/16/10	09/22/10	B10I194

QC Results for Batch ID: B10I194

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I194-BLK1	Blank	0.20	U	0.20	09/22/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I194-BS1	LCS	19.6	20			98	85-115		
B10I194-MS1	Matrix Spike	20.0	20	1009065-22	0.040	100	75-125		
B10I194-MSD1	Matrix Spike Dup	19.7	20	1009065-22	0.040	98	75-125	2	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Selenium

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/13/2010
Date Analyzed: 10/04/2010

Analyte: Selenium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-01	W97-19A	0.50	U	0.50	0.10	09/13/10	10/04/10	B10I278
1009065-02	W97-19B	0.50	U	0.50	0.10	09/13/10	10/04/10	B10I278
1009065-03	W85-6A	0.50	U	0.50	0.10	09/14/10	10/04/10	B10I278
1009065-05	W85-6B	0.50	U	0.50	0.10	09/14/10	10/04/10	B10I278
1009065-06	W99-R5B	0.50	U	0.50	0.10	09/14/10	10/04/10	B10I278
1009065-07	W99-R5A	0.50	U	0.50	0.10	09/14/10	10/04/10	B10I278
1009065-08	B85-4	0.50	U	0.50	0.10	09/14/10	10/04/10	B10I278
1009065-09	QA-2	0.50	U	0.50	0.10	09/14/10	10/04/10	B10I278
1009065-10	B85-3	0.50	UJ	0.50	0.10	09/14/10	10/04/10	B10I278

QC Results for Batch ID: B10I278

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I278-BLK1	Blank	0.50	U	0.50	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I278-BS1	LCS	19.6	20			98	85-115		
B10I278-MS1	Matrix Spike	19.1	20	1009065-10	0.209	94	75-125		
B10I278-MSD1	Matrix Spike Dup	19.0	20	1009065-10	0.209	94	75-125	0.3	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Selenium

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 10/04/2010

Analyte: Selenium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-11	W92-16B	0.50	U	0.50	0.10	09/15/10	10/04/10	B10I279
1009065-12	W92-16A	0.50	U	0.50	0.10	09/15/10	10/04/10	B10I279
1009065-13	W98-21A	0.50	U	0.50	0.10	09/15/10	10/04/10	B10I279
1009065-14	W98-21B	0.50	U	0.50	0.10	09/15/10	10/04/10	B10I279
1009065-15	RA-MW-17A	0.50	U	0.50	0.10	09/15/10	10/04/10	B10I279
1009065-16	W97-18A	0.50	U	0.50	0.10	09/16/10	10/04/10	B10I279
1009065-17	RA-MW-16A	0.50	U	0.50	0.10	09/16/10	10/04/10	B10I279
1009065-18	RA-MW-16B	0.50	U	0.50	0.10	09/16/10	10/04/10	B10I279
1009065-19	RA-MW-15A	0.50	U	0.50	0.10	09/16/10	10/04/10	B10I279
1009065-20	B87-8	0.50	U	0.50	0.10	09/15/10	10/04/10	B10I279
1009065-21	RA-MW-15B	0.50	U	0.50	0.10	09/16/10	10/04/10	B10I279
1009065-22	QA-3	0.50	U	0.50	0.10	09/16/10	10/04/10	B10I279
1009065-23	RA-MW-12C	0.50	U	0.50	0.10	09/16/10	10/04/10	B10I279
1009065-24	RA-MW-12B	0.50	U	0.50	0.10	09/16/10	10/04/10	B10I279
1009065-25	RA-MW-12A	1.00	U	1.00	0.10	09/16/10	10/04/10	B10I279

QC Results for Batch ID: B10I279

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I279-BLK1	Blank	0.50	U	0.50	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I279-BS1	LCS	19.8	20			99	85-115		
B10I279-MS1	Matrix Spike	19.8	20	1009065-22	0.50 U	99	75-125		
B10I279-MSD1	Matrix Spike Dup	19.7	20	1009065-22	0.50 U	98	75-125	0.7	20

Authorized by: DN **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Selenium, Dissolved

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 09/22/2010

Analyte: Selenium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-20	B87-8	0.50	U	0.50	0.09	09/15/10	09/22/10	B10I194
1009065-21	RA-MW-15B	0.50	U	0.50	0.09	09/16/10	09/22/10	B10I194
1009065-22	QA-3	0.50	U	0.50	0.09	09/16/10	09/22/10	B10I194
1009065-25	RA-MW-12A	10.0	U	10.0	0.87	09/16/10	09/22/10	B10I194

QC Results for Batch ID: B10I194

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I194-BLK1	Blank	0.50	U	0.50	09/22/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I194-BS1	LCS	19.3	20			97	85-115		
B10I194-MS1	Matrix Spike	24.1	20	1009065-22	0.494	118	75-125		
B10I194-MSD1	Matrix Spike Dup	23.7	20	1009065-22	0.494	116	75-125	2	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Thallium

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/13/2010
Date Analyzed: 10/04/2010

Analyte: Thallium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-01	W97-19A	0.10	U	0.10	0.009	09/13/10	10/04/10	B10I278
1009065-02	W97-19B	0.10	U	0.10	0.009	09/13/10	10/04/10	B10I278
1009065-03	W85-6A	0.10	U	0.10	0.009	09/14/10	10/04/10	B10I278
1009065-05	W85-6B	0.10	U	0.10	0.009	09/14/10	10/04/10	B10I278
1009065-06	W99-R5B	0.10	U	0.10	0.009	09/14/10	10/04/10	B10I278
1009065-07	W99-R5A	0.10	U	0.10	0.009	09/14/10	10/04/10	B10I278
1009065-08	B85-4	0.10	U	0.10	0.009	09/14/10	10/04/10	B10I278
1009065-09	QA-2	0.10	U	0.10	0.009	09/14/10	10/04/10	B10I278
1009065-10	B85-3	0.10	U	0.10	0.009	09/14/10	10/04/10	B10I278

QC Results for Batch ID: B10I278

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I278-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I278-BS1	LCS	19.4	20			97	85-115		
B10I278-MS1	Matrix Spike	21.8	20	1009065-10	0.10 U	109	75-125		
B10I278-MSD1	Matrix Spike Dup	22.0	20	1009065-10	0.10 U	110	75-125	0.9	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Thallium

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 10/04/2010

Analyte: Thallium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-11	W92-16B	0.10	U	0.10	0.009	09/15/10	10/04/10	B10I279
1009065-12	W92-16A	0.10	U	0.10	0.009	09/15/10	10/04/10	B10I279
1009065-13	W98-21A	0.10	U	0.10	0.009	09/15/10	10/04/10	B10I279
1009065-14	W98-21B	0.10	U	0.10	0.009	09/15/10	10/04/10	B10I279
1009065-15	RA-MW-17A	0.10	U	0.10	0.009	09/15/10	10/04/10	B10I279
1009065-16	W97-18A	0.10	U	0.10	0.009	09/16/10	10/04/10	B10I279
1009065-17	RA-MW-16A	0.10	U	0.10	0.009	09/16/10	10/04/10	B10I279
1009065-18	RA-MW-16B	0.10	U	0.10	0.009	09/16/10	10/04/10	B10I279
1009065-19	RA-MW-15A	0.10	U	0.10	0.009	09/16/10	10/04/10	B10I279
1009065-20	B87-8	0.10	U	0.10	0.009	09/15/10	10/04/10	B10I279
1009065-21	RA-MW-15B	0.10	U	0.10	0.009	09/16/10	10/04/10	B10I279
1009065-22	QA-3	0.10	U	0.10	0.009	09/16/10	10/04/10	B10I279
1009065-23	RA-MW-12C	0.10	U	0.10	0.009	09/16/10	10/04/10	B10I279
1009065-24	RA-MW-12B	0.10	U	0.10	0.009	09/16/10	10/04/10	B10I279
1009065-25	RA-MW-12A	0.10	U	0.10	0.009	09/16/10	10/04/10	B10I279

QC Results for Batch ID: B10I279

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I279-BLK1	Blank	0.10	U	0.10	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I279-BS1	LCS	19.5	20			97	85-115		
B10I279-MS1	Matrix Spike	21.7	20	1009065-22	0.020	108	75-125		
B10I279-MSD1	Matrix Spike Dup	21.5	20	1009065-22	0.020	108	75-125	0.6	20

Authorized by: DN **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Thallium, Dissolved

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 09/22/2010

Analyte: Thallium
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-20	B87-8	0.10	U	0.10	0.002	09/15/10	09/22/10	B10I194
1009065-21	RA-MW-15B	0.10	U	0.10	0.002	09/16/10	09/22/10	B10I194
1009065-22	QA-3	0.10	U	0.10	0.002	09/16/10	09/22/10	B10I194
1009065-25	RA-MW-12A	1.00	U	1.00	0.02	09/16/10	09/23/10	B10I194

QC Results for Batch ID: B10I194

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I194-BLK1	Blank	0.10	U	0.10	09/22/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I194-BS1	LCS	18.0	20			90	85-115		
B10I194-MS1	Matrix Spike	19.0	20	1009065-22	0.011	95	75-125		
B10I194-MSD1	Matrix Spike Dup	19.1	20	1009065-22	0.011	95	75-125	0.3	20

Authorized by: DM

Release Date: 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Zinc

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/13/2010
Date Analyzed: 10/04/2010

Analyte: Zinc
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-01	W97-19A	5.0	U	5.0	1.5	09/13/10	10/04/10	B10I278
1009065-02	**W97-19B**	**7.2**		5.0	1.5	09/13/10	10/04/10	B10I278
1009065-03	W85-6A	5.0	U	5.0	1.5	09/14/10	10/04/10	B10I278
1009065-05	W85-6B	5.0	U	5.0	1.5	09/14/10	10/04/10	B10I278
1009065-06	W99-R5B	5.0	U	5.0	1.5	09/14/10	10/04/10	B10I278
1009065-07	W99-R5A	5.0	U	5.0	1.5	09/14/10	10/04/10	B10I278
1009065-08	**B85-4**	**7.0**		5.0	1.5	09/14/10	10/04/10	B10I278
1009065-09	**QA-2**	**5.6**		5.0	1.5	09/14/10	10/04/10	B10I278
1009065-10	**B85-3**	**9.5**	**J**	5.0	1.5	09/14/10	10/04/10	B10I278

QC Results for Batch ID: B10I278

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I278-BLK1	Blank	5.0	U	5.0	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I278-BS1	LCS	20.9	20			104	85-115		
B10I278-MS1	Matrix Spike	23.4	20	1009065-10	9.54	69	75-125		
B10I278-MSD1	Matrix Spike Dup	19.3	20	1009065-10	9.54	49	75-125	19	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Zinc

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 10/04/2010

Analyte: Zinc
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-11	**W92-16B**	**13.5**		5.0	1.5	09/15/10	10/04/10	B10I279
1009065-12	W92-16A	5.0	U	5.0	1.5	09/15/10	10/04/10	B10I279
1009065-13	W98-21A	5.0	U	5.0	1.5	09/15/10	10/04/10	B10I279
1009065-14	W98-21B	5.0	U	5.0	1.5	09/15/10	10/04/10	B10I279
1009065-15	RA-MW-17A	5.0	U	5.0	1.5	09/15/10	10/04/10	B10I279
1009065-16	W97-18A	5.0	U	5.0	1.5	09/16/10	10/04/10	B10I279
1009065-17	**RA-MW-16A**	**14.1**		5.0	1.5	09/16/10	10/04/10	B10I279
1009065-18	**RA-MW-16B**	**10.9**		5.0	1.5	09/16/10	10/04/10	B10I279
1009065-19	**RA-MW-15A**	**6.5**		5.0	1.5	09/16/10	10/04/10	B10I279
1009065-20	**B87-8**	**29.8**		5.0	1.5	09/15/10	10/04/10	B10I279
1009065-21	RA-MW-15B	5.0	U	5.0	1.5	09/16/10	10/04/10	B10I279
1009065-22	QA-3	5.0	U	5.0	1.5	09/16/10	10/04/10	B10I279
1009065-23	RA-MW-12C	5.0	U	5.0	1.5	09/16/10	10/04/10	B10I279
1009065-24	RA-MW-12B	5.0	U	5.0	1.5	09/16/10	10/04/10	B10I279
1009065-25	RA-MW-12A	5.0	U	5.0	1.5	09/16/10	10/04/10	B10I279

QC Results for Batch ID: B10I279

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I279-BLK1	Blank	5.0	U	5.0	10/04/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I279-BS1	LCS	21.3	20			107	85-115		
B10I279-MS1	Matrix Spike	22.5	20	1009065-22	4.71	89	75-125		
B10I279-MSD1	Matrix Spike Dup	20.4	20	1009065-22	4.71	78	75-125	10	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Zinc, Dissolved

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/15/2010
Date Analyzed: 09/22/2010

Analyte: Zinc
Method: EPA200.8
Matrix: Water
Units: ug/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-20	**B87-8**	**22.7**		1.0	0.03	09/15/10	09/22/10	B10I194
1009065-21	**RA-MW-15B**	**2.6**		1.0	0.03	09/16/10	09/22/10	B10I194
1009065-22	**QA-3**	**1.2**		1.0	0.03	09/16/10	09/22/10	B10I194
1009065-25	RA-MW-12A	10.0	U	10.0	0.3	09/16/10	09/22/10	B10I194

QC Results for Batch ID: B10I194

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I194-BLK1	Blank	1.0	U	1.0	09/22/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I194-BS1	LCS	19.7	20			99	85-115		
B10I194-MS1	Matrix Spike	20.3	20	1009065-22	1.21	95	75-125		
B10I194-MSD1	Matrix Spike Dup	20.6	20	1009065-22	1.21	97	75-125	2	20

Authorized by: DM **Release Date:** 10/20/10

Washington State Department of Ecology
Manchester Environmental Laboratory
Final Analysis Report for
Sulfate

Project Name: Frontier Hardchrome
Work Order: 1009065
Project Officer: Barrett, Guy

Date Collected: 09/14/2010
Date Analyzed: 09/27/2010

Analyte: Sulfate
Method: EPA300.0
Matrix: Water
Units: mg/L

Sample #	Sample ID	Result	Qualifier	RL	MDL	Collected	Analyzed	Batch ID
1009065-03	W85-6A	19.9		1.20	0.36	09/14/10	09/27/10	B10I193
1009065-04	QA-1	19.2		1.20	0.36	09/14/10	09/27/10	B10I193
1009065-07	W99-R5A	15.1		1.20	0.36	09/14/10	09/27/10	B10I193
1009065-08	B85-4	97.1		1.25	0.38	09/14/10	09/27/10	B10I193
1009065-20	B87-8	102		1.20	0.36	09/15/10	09/27/10	B10I193

QC Results for Batch ID: B10I193

Method Blank	Sample ID	Result	Qualifer	RL	Analyzed
B10I193-BLK1	Blank	0.30	U	0.30	09/27/10

Sample #	QC Sample	Result	Spike Level	Source Sample	Source Result	%Rec	%Rec Limits	RPD	RPD Limit
B10I193-BS1	LCS	4.91	5			98	90-110		
B10I193-DUP1	Duplicate	2.41		1009019-04	2.29			5	20
B10I193-MS1	Matrix Spike	7.86	5	1009020-01	2.85	100	75-125		

Authorized by: DM

Release Date: 10/20/10

APPENDIX D

DATA VALIDATION MEMORANDUM

APPENDIX D
EXCEPTION SUMMARY FOR LABORATORY DATA QUALITY ASSURANCE REVIEW

DATA SUMMARY

The laboratory data quality assurance review and validation of analytical results for 28 water samples, Project Number 1009065, collected between 13 and 16 September 2010 from the Frontier Hard Chrome site has been completed. This review incorporates sample results for other metals for assessment purposes, but applies only to the following analyses:

- Total recoverable and dissolved chromium by Washington State Department of Ecology's (WDOE) Manchester Environmental Laboratory (MEL), of Port Orchard, Washington, following EPA Method 200.8 – inductively-coupled plasma/mass spectrometry (IC/MS).

- Hexavalent chromium by Columbia Analytical Services (CAS) of Kelso, Washington, following EPA SW-846 Method 7196A – DPC colorimetry.

Quality assurance/quality control (QA/QC) reviews of laboratory procedures were performed on an ongoing basis by MEL. A data review was performed by MEL's QA section on laboratory quality control results to ensure they met method quality objectives for the project. Data review followed the format outlined in the *National Functional Guidelines for Inorganic Data Review* (EPA 2004), modified to include specific criteria specified in the *Frontier Hard Chrome Long-Term Monitoring Plan* (Work Plan; Weston 2004). Raw laboratory data including calibrations, sample login forms, sample preparation logs and bench sheets, mass spectral tuning data, and raw instrument data were not available for this review.

This is an exception summary. All laboratory quality assurance results as applicable (e.g., holding times; blank sample analysis, matrix spike/duplicate spike analysis, and laboratory control sample analysis results) supplied to WESTON for the analyses met acceptance criteria specified in the Work Plan (Weston 2004), with no exceptions.

Precision was evaluated as relative percent differences (RPD) between duplicate, split-sample, and total/dissolved concentrations. Samples 1009065-08 (collected from monitoring Well B85-4) and 1009065-21 (collected from monitoring Well RA-MW-15B), were analyzed for both total recoverable and dissolved chromium. Field duplicates for total recoverable chromium were collected from monitoring Wells B85-4 and RA-MW-15B and a dissolved sample was collected from monitoring Well RA-MW-15B. Acceptance criteria specified in the QAPP were met for all duplicate analyses; with the exception of the Relative Percent Difference (RPD) in a sample collected from RA-MW-15B and analyzed for total chromium (-37.9%). Agreement between detected total recoverable and dissolved results was acceptable.

Sample 1009065-20 (collected from monitoring Well B87-8) was analyzed for total recoverable chromium (3.02 µg/L), dissolved chromium (2.71 µg/L), and hexavalent chromium (not detected at 50 µg/L).

DATA QUALIFICATION

No QA/QC exceptions were noted in the data review associated with the analysis of total recoverable, dissolved, and hexavalent chromium. Upon consideration of the data qualifications noted above and the project data quality objectives specified in the QAPP, the data are ACCEPTABLE for use.

DATA QUALIFIERS

If required, any data qualifiers applied by the laboratory have been removed from the data summary sheets and superseded by data validation qualifiers.

The following data validation qualifiers were used to modify the data quality and usefulness of individual analytical results.

U - The analyte was not detected at the given quantitation limit.

METALS

-7-

LABORATORY CONTROL SAMPLE

Client: Washington State Department of E **Service Request:** K1010073

Project No.: NA

Project Name: Frontier Hard Chrome (FHC)

Aqueous LCS Source: Inorganic Ventures **Solid LCS Source:**

Analyte	Aqueous: ug/L True	Found	%R	Solid: mg/kg True	Found	C	Limits	%R
Sulfur	10000	10600	106.0					

METALS

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ICP SERIAL DILUTIONS

Client: Washington State Department of E **Service Request:** K1010073

Project No.: NA **Units:** UG/L

Project Name: Frontier Hard Chrome (FHC)

Sample Name: 1009065-08L **Lab Code:** K1010073-003LDISS

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Differ-ence	Q	M
Sulfur	3207.0		3287.5		2.5		P

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Washington State Department of Ecology	**Service Request No.:**	K1010073
Project:	Frontier Hard Chrome	**Date Received:**	9/15/10
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Four water samples were received for analysis at Columbia Analytical Services on 9/15/10. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

No anomalies associated with the analysis of these samples were observed.

Dissolved Metals

Matrix Spike Recovery Exceptions:
The control criteria for matrix spike recovery of Sulfur for sample 1009065-08 were not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

No other anomalies associated with the analysis of these samples were observed.

Approved by Howard Holmes **Date** 10-18-10

Manchester Environmental Laboratory

7411 Beach Drive East, Port Orchard, Washington 98366

October 26, 2010

Subject:	**Frontier Hardchrome**
Sample ID:	1009065-20
Laboratory:	Columbia Analytical Services
Project Officer:	Guy Barrett
By:	Karin Feddersen

Hexachrome

Summary

The sample was hand-delivered to the laboratory within 30 minutes of collection. The sample arrived at a temperature less than 6°C and was stored at 4°C upon arrival.

Analytical Methods

This sample was prepared and analyzed using EPA SW-846 method 7196A. Routine QA/QC procedures were performed.

Blanks

No hexachrome was detected in the method blank.

Holding Times

The sample was analyzed within the method holding time of 24 hours from collection.

Duplicate Samples

Duplicate analyses were performed on this sample. Both results were below the reporting limit.

Matrix Spike and Matrix Spike Duplicate

A matrix spike analysis was performed on the sample. Recoveries were within laboratory limits of 85% to 115%.

Laboratory Control Sample (LCS)

Recovery was within laboratory limits of 85% to 115%.

Data Qualifier Codes

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	Washington State Department of Ecology	**Service Request :**	K1010073
Project Name :	Frontier Hard Chrome (FHC)	**Date Collected :**	09/15/10
Project Number :	NA	**Date Received :**	09/15/10
Sample Matrix :	WATER		

Chromium, Hexavalent

Units : mg/L
Basis : NA

Analysis Method 7196A
Test Notes :

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
1009065-20	K1010073-004	0.050	0.004	1	09/16/10	ND	
Method Blank	K1010073-MB	0.050	0.004	1	09/16/10	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Washington State Department of Ecology	**Service Request :**	K1010073
Project Name :	Frontier Hard Chrome (FHC)	**Date Collected :**	9/15/2010
Project Number :	NA	**Date Received :**	9/15/2010
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/16/10

Duplicate Summary
Inorganic Parameters

Sample Name : 1009065-20
Lab Code : K1010073-004DUP
Test Notes :

Units : mg/L
Basis : NA

Analyte	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Chromium, Hexavalent	7196A	0.050	ND	ND	ND	-	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Washington State Department of Ecology	**Service Request :**	K1010073
Project Name :	Frontier Hard Chrome (FHC)	**Date Collected :**	9/15/2010
Project Number :	NA	**Date Received :**	9/15/2010
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/16/10

Matrix Spike Summary
Inorganic Parameters

Sample Name :	1009065-20	Units :	mg/L
Lab Code :	K1010073-004MS	Basis :	NA
Test Notes :			

Analyte	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Chromium, Hexavalent	7196A	0.050	0.400	ND	0.360	90	85-115	

COLUMBIA ANALYTICAL SERVICES, INC.
QA/QC Report

Client :	Washington State Department of Ecology	**Service Request :**	K1010073
Project Name :	Frontier Hard Chrome (FHC)	**Date Collected :**	9/15/2010
Project Number :	NA	**Date Received :**	9/15/2010
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/16/10

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name :	1009065-20		Units :	mg/L
Lab Code :	K1010073-004MS	K1010073-004DMS	Basis :	NA
Test Notes :				

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Spike Recovery MS	Spike Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Chromium, Hexavalent	NONE	7196A	0.050	0.400	0.400	ND	0.360	0.342	90	85	85-115	5	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Washington State Department of Ecology	**Service Request :**	K1010073
Project Name :	Frontier Hard Chrome (FHC)	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/16/10

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K1010073-LCS	Basis :	NA
Test Notes :			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Chromium, Hexavalent	NONE	7196A	0.278	0.258	93	85-115	

Manchester Environmental Laboratory

7411 Beach Drive East, Port Orchard, Washington 98366

October 26, 2010

Subject:	**Frontier Hardchrome**
Sample ID:	1009065-03, -07, -08, -20
Laboratory:	Columbia Analytical Services
Project Officer:	Guy Barrett
By:	Karin Feddersen

Sulfur

Summary

The sample was hand-delivered to the laboratory within 30 minutes of collection. The sample arrived at a temperature less than 6°C and was stored at 4°C upon arrival.

Analytical Methods

These samples were prepared and analyzed using EPA method 200.7. Routine QA/QC procedures were performed.

Blanks

No sulfur was detected in the method blank.

Holding Times

The sample was analyzed within the method holding time of 24 hours from collection.

Duplicate Samples

Duplicate analyses were performed on sample 1009065-08. The RPD was 1.2%.

Matrix Spike and Matrix Spike Duplicate

A matrix spike analysis was performed on sample1009065-08. The recovery was 214%. The concentration native to the source sample was greater than 5 times the spike value. A serial dilution was performed on this sample, with a percent difference of only 2.5%. No qualification of the data was warranted.

Laboratory Control Sample (LCS)

Recovery was within laboratory limits of 85% to 115%.

Data Qualifier Codes

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

Columbia Analytical Services

- Cover Page -
INORGANIC ANALYSIS DATA PACKAGE

Client: Washington State Department of Ecology
Project Name: Frontier Hard Chrome (FHC)
Project No.:

Service Request: K1010073

Sample Name:	Lab Code:
1009065-03	K1010073-001DISS
1009065-07	K1010073-002DISS
1009065-08D	K1010073-003DDISS
1009065-08	K1010073-003DISS
1009065-08S	K1010073-003SDISS
1009065-20	K1010073-004DISS
Method Blank	K1010073-MB

Comments:

Approved By: _____ **Date:** 10/6/10

METALS

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INORGANIC ANALYSIS DATA PACKAGE

Client:	Washington State Department of E	**Service Request:**	K1010073
Project No.:	NA	**Date Collected:**	9/14/2010
Project Name:	Frontier Hard Chrome (FHC)	**Date Received:**	9/15/2010
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: 1009065-03 **Lab Code:** K1010073-001DISS

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Sulfur	200.7	500	50.0	1.0	09/29/10	09/28/10	6780		

% Solids: 0.0

Comments:

METALS

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INORGANIC ANALYSIS DATA PACKAGE

Client:	Washington State Department of E	**Service Request:**	K1010073
Project No.:	NA	**Date Collected:**	9/14/2010
Project Name:	Frontier Hard Chrome (FHC)	**Date Received:**	9/15/2010
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: 1009065-07 **Lab Code:** K1010073-002DISS

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Sulfur	200.7	500	50.0	1.0	09/29/10	09/28/10	5090		

% Solids: 0.0

Comments:

METALS

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INORGANIC ANALYSIS DATA PACKAGE

Client:	Washington State Department of E	**Service Request:**	K1010073
Project No.:	NA	**Date Collected:**	9/14/2010
Project Name:	Frontier Hard Chrome (FHC)	**Date Received:**	9/15/2010
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: 1009065-08 **Lab Code:** K1010073-003DISS

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Sulfur	200.7	5000	500	10.0	09/24/10	09/29/10	33300		

% Solids: 0.0

Comments:

METALS

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	Washington State Department of E	**Service Request:**	K1010073
Project No.:	NA	**Date Collected:**	9/15/2010
Project Name:	Frontier Hard Chrome (FHC)	**Date Received:**	9/15/2010
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: 1009065-20 **Lab Code:** K1010073-004DISS

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Sulfur	200.7	5000	500	10.0	09/24/10	09/29/10	35300		

% Solids: 0.0

Comments:

METALS

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Washington State Department of E **Service Request:** K1010073

Project No.: NA **Date Collected:**

Project Name: Frontier Hard Chrome (FHC) **Date Received:**

Matrix: WATER **Units:** ug/L

Basis: N/A

Sample Name: Method Blank **Lab Code:** K1010073-MB

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Sulfur	200.7	500	50.0	1.0	09/29/10	09/28/10	50.0	U	

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

- 5A -

SPIKE SAMPLE RECOVERY

Client: Washington State Department of E **Service Request:** K1010073

Project No.: NA **Units:** UG/L

Project Name: Frontier Hard Chrome (FHC) **Basis:** N/A

Matrix: WATER **% Solids:** 0.0

Sample Name: 1009065-08S **Lab Code:** K1010073-003SDISS

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Sulfur		44000		33300		5000.00	214.0		200.7

An empty field in the Control Limit column indicates the control limit is not applicable

METALS

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DUPLICATES

Client:	Washington State Department of E	**Service Request:**	K1010073
Project No.:	NA	**Units:**	UG/L
Project Name:	Frontier Hard Chrome (FHC)	**Basis:**	N/A
Matrix:	WATER	**% Solids:**	0.0

Sample Name: 1009065-08D **Lab Code:** K1010073-003DDISS

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Sulfur	20	33300		33700		1.2		200.7

An empty field in the Control Limit column indicates the control limit is not applicable.

METALS

-7-

LABORATORY CONTROL SAMPLE

Client: Washington State Department of E **Service Request:** K1010073

Project No.: NA

Project Name: Frontier Hard Chrome (FHC)

Aqueous LCS Source: Inorganic Ventures **Solid LCS Source:**

Analyte	Aqueous: ug/L			Solid: mg/kg				
	True	Found	%R	True	Found	C	Limits	%R
Sulfur	10000	10600	106.0					

METALS

- 9 -

ICP SERIAL DILUTIONS

Client: Washington State Department of E **Service Request:** K1010073

Project No.: NA **Units:** UG/L

Project Name: Frontier Hard Chrome (FHC)

Sample Name: 1009065-08L **Lab Code:** K1010073-003LDISS

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Differ-ence	Q	M
Sulfur	3207.0		3287.5		2.5		P

APPENDIX C

RECONSTRUCTED MONITORING WELL ELEVATIONS

MONITORING WELL ASBUILT

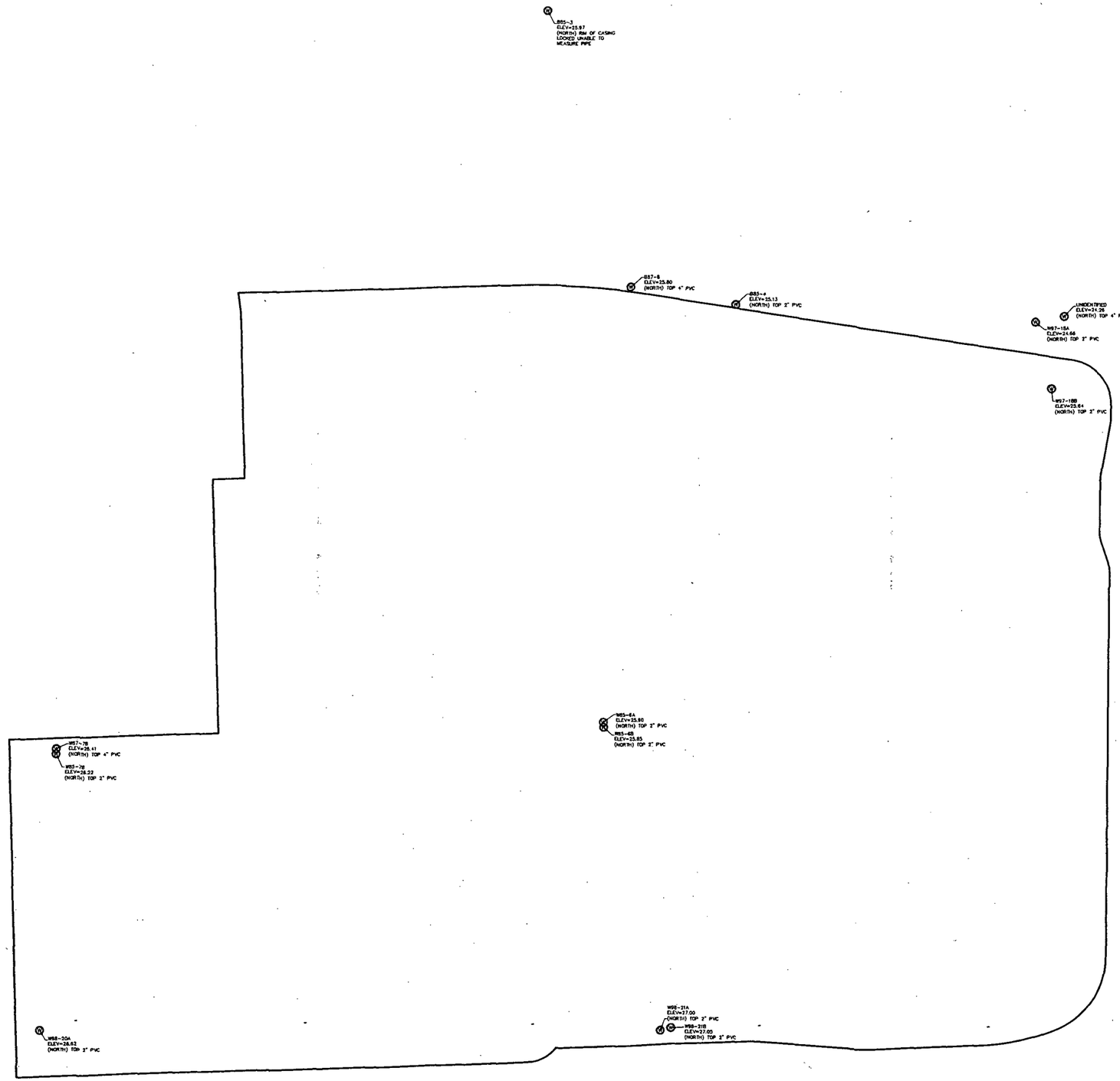
FOR

"GRAND CENTRAL"

JOB NO.: 07-231
DATA COLLECT: 11-30-07
DRAWING DATE: 12-06-07

LEGEND:

⊗ INDICATES MONITORING WELL



BENCH MARK:
VERTICAL DATUM IS CITY OF VANCOUVER BENCH MARK 108, A BRASS DISC ON THE NORTHEAST CURB AT THE INTERSECTION OF E. 5TH STREET AND GRAND BOULEVARD. ELEVATION = 53.76 (NAVD 29)

N

EDMUND DENNY JR.
STATE OF WASHINGTON
32451
REGISTERED
PROFESSIONAL LAND SURVEYOR
EXPIRES:

50 25 0 50 75 100
SCALE 1 INCH = 50 FEET

MINISTER-GLAESER
SURVEYING INC.
2200 E. EVERGREEN BLVD.
VANCOUVER, WA 98661
(360) 694-3313

DRAWING FILE: 07231AB-MW2.DWG DRAWN BY: JAG PROJECT MGR: ED

APPENDIX D

DATA VALIDATION MEMORANDUM

APPENDIX D
EXCEPTION SUMMARY FOR LABORATORY DATA QUALITY ASSURANCE REVIEW

DATA SUMMARY

The laboratory data quality assurance review and validation of analytical results for 28 water samples, Project Number 1009065, collected between 13 and 16 September 2010 from the Frontier Hard Chrome site has been completed. This review incorporates sample results for other metals for assessment purposes, but applies only to the following analyses:

- Total recoverable and dissolved chromium by Washington State Department of Ecology's (WDOE) Manchester Environmental Laboratory (MEL), of Port Orchard, Washington, following EPA Method 200.8 – inductively-coupled plasma/mass spectrometry (IC/MS).

- Hexavalent chromium by Columbia Analytical Services (CAS) of Kelso, Washington, following EPA SW-846 Method 7196A – DPC colorimetry.

Quality assurance/quality control (QA/QC) reviews of laboratory procedures were performed on an ongoing basis by MEL. A data review was performed by MEL's QA section on laboratory quality control results to ensure they met method quality objectives for the project. Data review followed the format outlined in the *National Functional Guidelines for Inorganic Data Review* (EPA 2004), modified to include specific criteria specified in the *Frontier Hard Chrome Long-Term Monitoring Plan* (Work Plan; Weston 2004). Raw laboratory data including calibrations, sample login forms, sample preparation logs and bench sheets, mass spectral tuning data, and raw instrument data were not available for this review.

This is an exception summary. All laboratory quality assurance results as applicable (e.g., holding times; blank sample analysis, matrix spike/duplicate spike analysis, and laboratory control sample analysis results) supplied to WESTON for the analyses met acceptance criteria specified in the Work Plan (Weston 2004), with no exceptions.

Precision was evaluated as relative percent differences (RPD) between duplicate, split-sample, and total/dissolved concentrations. Samples 1009065-08 (collected from monitoring Well B85-4) and 1009065-21 (collected from monitoring Well RA-MW-15B), were analyzed for both total recoverable and dissolved chromium. Field duplicates for total recoverable chromium were collected from monitoring Wells B85-4 and RA-MW-15B and a dissolved sample was collected from monitoring Well RA-MW-15B. Acceptance criteria specified in the QAPP were met for all duplicate analyses; with the exception of the Relative Percent Difference (RPD) in a sample collected from RA-MW-15B and analyzed for total chromium (-37.9%). Agreement between detected total recoverable and dissolved results was acceptable.

Sample 1009065-20 (collected from monitoring Well B87-8) was analyzed for total recoverable chromium (3.02 µg/L), dissolved chromium (2.71 µg/L), and hexavalent chromium (not detected at 50 µg/L).

DATA QUALIFICATION

No QA/QC exceptions were noted in the data review associated with the analysis of total recoverable, dissolved, and hexavalent chromium. Upon consideration of the data qualifications noted above and the project data quality objectives specified in the QAPP, the data are ACCEPTABLE for use.

DATA QUALIFIERS

If required, any data qualifiers applied by the laboratory have been removed from the data summary sheets and superseded by data validation qualifiers.

The following data validation qualifiers were used to modify the data quality and usefulness of individual analytical results.

U - The analyte was not detected at the given quantitation limit.

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206-521-7600 • Fax 206-521-7601
www.westonsolutions.com

RECEIVED
DEC 20 2010
Environmental
Cleanup Office

17 December 2010

Guy Barrett
Washington State Department of Ecology
Toxics Cleanup Program
P.O. Box 47600
Olympia, WA 98504-7600

SUBJECT: EVENT 16 LONG TERM MONITORING REPORT FRONTIER HARD CHROME SITE, VANCOUVER, WASHINGTON

Dear Mr. Barrett,

Weston Solutions, Inc. (WESTON®) is pleased to submit one copy of the Frontier Hard Chrome Event 16 Long Term Monitoring Report. This report discusses the groundwater monitoring results that were obtained from site sampling on 13 September through 16 September 2010. During this sampling event, Well B87-8 was sampled for hexavalent chromium.

Please feel free to contact me if you have any questions.

Sincerely,
Weston Solutions, Inc.

Kevin Broom

Kevin Broom, LG, LEED® AP
Senior Project Leader
(206) 521-7607
Kevin.Broom@westonsolutions.com

Cc:
Claire Hong (U.S. EPA)
Project File