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Technical Memorandum

Operable Unit 1 Source Area Treatment System Progress Report
September 2008 through February 2009
National Aeronautics and Space Administration
Jet Propulsion Laboratory, Pasadena, California

Final April 2009

This technical memorandum provides a summary of field, analytical, and operational data collected from September 1, 2008 through February 28, 2009, for the Operable Unit 1 (OU-1) source area treatment system. The OU-1 system is being implemented as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program at the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL) in Pasadena, CA.

This memorandum summarizes system performance based on the extracted and reinjected groundwater volumes, volatile organic compound (VOC) removal, and perchlorate removal. Other operational issues discussed in this memorandum include the performance of the biomass removal and backwash recovery system, reinjection well performance and rehabilitation, and an evaluation of the water levels and water quality data collected within the OU-1 source area treatment zone. In addition, the following attachments are included:

- Attachment A: Field Monitoring Results
- Attachment B: Laboratory Analytical Results

SYSTEM PERFORMANCE SUMMARY

Table 1 summarizes the performance of the OU-1 system through February 28, 2009. Figure 1 is a treatment process flow diagram.

Table 1. OU-1 System Operational Summary (through February 28, 2009)

Parameter	Units	EW-1	EW-2	EW-3	Total
Total Volume of Groundwater Extracted	Acre Feet	134	512	376	1022
Total Volume of Wastewater to Sewer	Acre Feet	–	–	–	1.09
Mass of Perchlorate Removed	lb	227	593	320	1140
Mass of CCl_4 Removed	lb	2.5	20.0	3.3	25.8
Mass of TCE Removed	lb	0.60	2.9	1.0	4.5

CCl_4 = carbon tetrachloride; TCE = trichloroethylene

Additional information regarding system performance is summarized below and discussed in more detail in the subsequent sections.

- **Extraction.** The OU-1 system operated at an average extraction flow rate of 258 gallons per minute (gpm) and has extracted approximately 1,022 acre-feet of water through February 28, 2009. EW-1 was operated for sampling purposes only due to the low concentrations of VOCs and perchlorate. Over the past six months, the flow rate from EW-2 has varied from 0 to 102 gpm, with an average value of 91 gpm. The flow rate from EW-3 has varied from 0 to 281 gpm, with an average value of 192 gpm during the past six months.

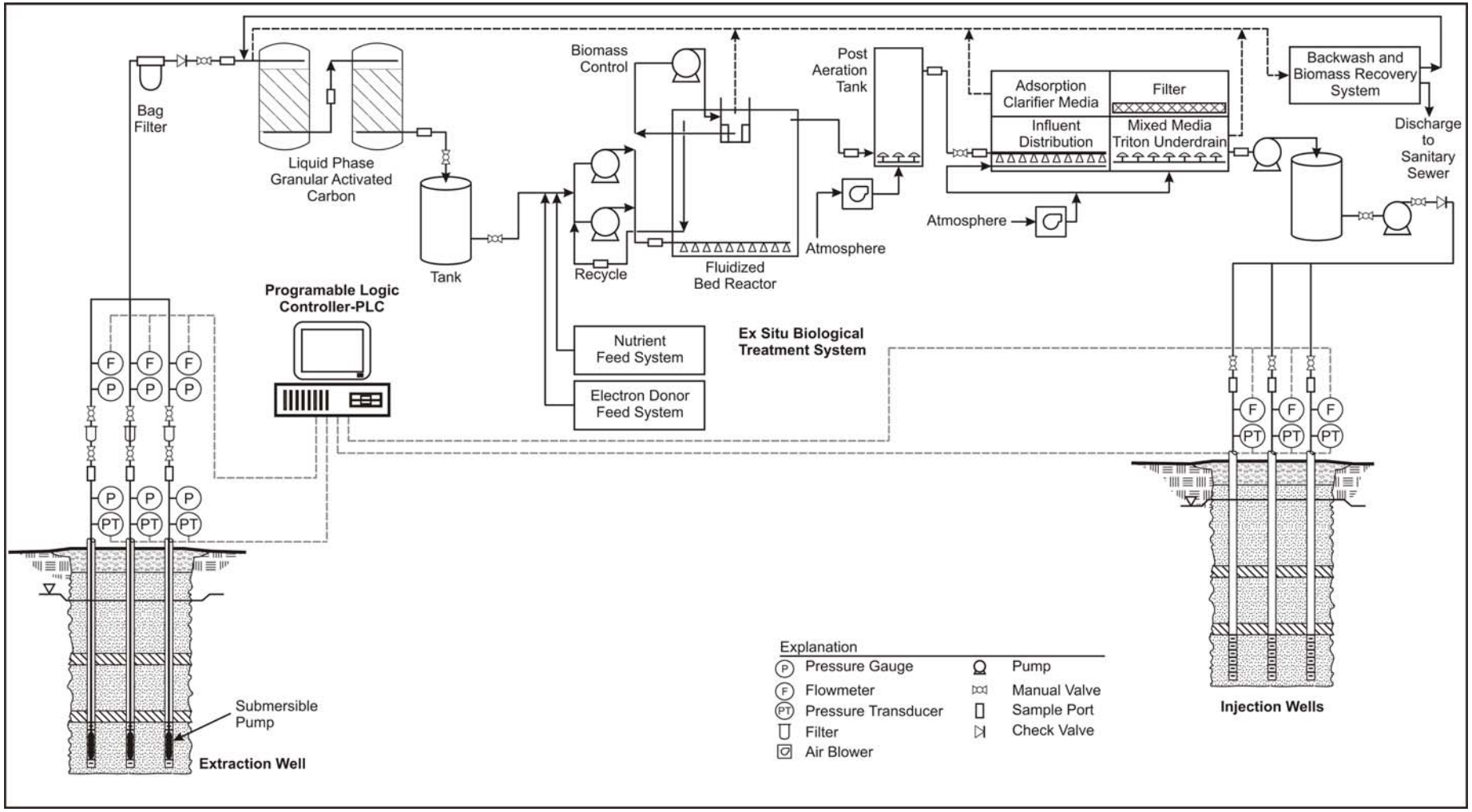

Figure 1. Process Flow Diagram

- **Reinjection.** During the past six months, sustained reinjection flow rates as high as 206 gpm have been achieved at IW-1 (averaging 71 gpm), as high as 158 gpm at IW-2 (averaging 59 gpm), and as high as 282 gpm at IW-3 (averaging 161 gpm). IW-3 has been in operation since January 2008 and is equipped with a 300 gpm extraction pump so that flow can be reversed periodically to help maintain well injection capacity.

- **Injection Well Rehabilitation.** Routine rehabilitation of IW-1 and IW-2 was completed in November/December 2008, and January 2009. This rehabilitation event included combined methods of chemical (i.e., hydrochloric acid, glycolic acid, and Aquafreed [CO_2]), and mechanical (i.e., brushing, open-ended air lift pumping, dual-swab air lift pumping, and conventional pumping). These rehabilitation efforts yielded greater than 100% increase in flow to IW-1 and IW-2. In November 2008, a new well head was installed in IW-3 which included the replacement of the submersible pump wiring and the installation of Aquaguard piping (allows well cleaning with CO_2 without removing the down-hole equipment).

- **Chlorination.** Chlorination of treated groundwater prior to reinjection was initiated on December 15, 2006, and has been successful in extending the time period between well rehabilitation events. During the reporting period, chlorine injection levels have ranged from 0.0 to 5.8 mg/L, with an average of 2.5 mg/L. Chlorination was temporarily stopped in the beginning of October 2008 until January 2009 for pump repair. As a result of chlorination, low levels of disinfection byproducts have been reported at the OU-1 extraction wells. The disinfection byproducts are removed by the treatment system, but will continue to be monitored and evaluated over time.

- **Wastewater Discharges.** The amount of wastewater discharged to the sanitary sewer during this reporting period was 48,000 gallons, or approximately 0.15 acre-feet. The total amount of wastewater discharged since startup of the OU-1 system is 355,000 gallons or approximately 1.09 acre-feet. Discharges to the sanitary sewer occur, on average, once every four weeks. The self monitoring sampling requirement was conducted in January 2009, with the next sampling event scheduled for July 2009. The January sample results complied with the appropriate discharge permit and were provided to JPL for submittal.

- **Mass Removal.** The cumulative chemical mass removed by the OU-1 system through the end of February 2009 was estimated at approximately 1140 lb of perchlorate, 25.8 lb of CCl_4, and 4.5 lb of TCE. Between September 1, 2008 and February 28, 2009, the chemical mass removed by the OU-1 system was 74 lb of perchlorate, 0.9 of CCl_4, and approximately 0.18 lb of TCE. The newest extraction well (EW-3) contributed significantly to the mass removal. Figure 2 shows the cumulative perchlorate removal for the OU-1 system since startup.

VOC REMOVAL BY LIQUID-PHASE GRANULAR ACTIVATED CARBON

Liquid-phase granular activated carbon (LGAC) vessels arranged in a lead-lag configuration are used to remove VOCs from the extracted groundwater. Samples were collected on a weekly basis at the LGAC influent, the LGAC lead vessel effluent, and LGAC lag vessel effluent (see Attachment B).

The total VOCs at the LGAC influent ranged from 9 to 31 μg/L during September 2008 through February 2009. Figure 3 shows an overall declining trend in the influent total VOCs over time until EW-3 was placed online (October 2007). In January 2009, the lead LGAC vessel was changed out due to VOC breakthrough, and the lag vessel was moved to the lead configuration.

Since May 2007 concentrations of several VOCs, termed disinfection byproducts, have been reported at the OU-1 extraction wells. The disinfection byproducts include chloroform, bromodichloromethane, dibromochloromethane, and bromoform, and are associated with chlorination of injected water to control biofouling at the injection wells. Chloroform concentrations were also detected prior to the start of chlorination and concentrations have increased over time. The concentration of the disinfection byproducts has ranged from < 1.0 to 10.5 µg/L since initiating chlorination. The current concentration levels of the disinfection byproduct are low due to the three month time period when chlorination was not taking place. The EPA has published the Stage 1 Disinfectants/Disinfection Byproducts Rule[1] to regulate total trihalomethanes (disinfection byproducts) at a maximum allowable annual average level of 80 µg/L. The current annual average level of trihalomethanes being recorded at the OU-1 extraction wells is 7.5 µg/L. The treatment system removes the disinfection byproducts and all finished water concentrations have been non-detect. The disinfection byproducts will continue to be monitored and evaluated over time based on the concentrations detected at the systems extraction wells.

Over the past three years of operation, the LGAC vessels were changed out every five to seven months on average.

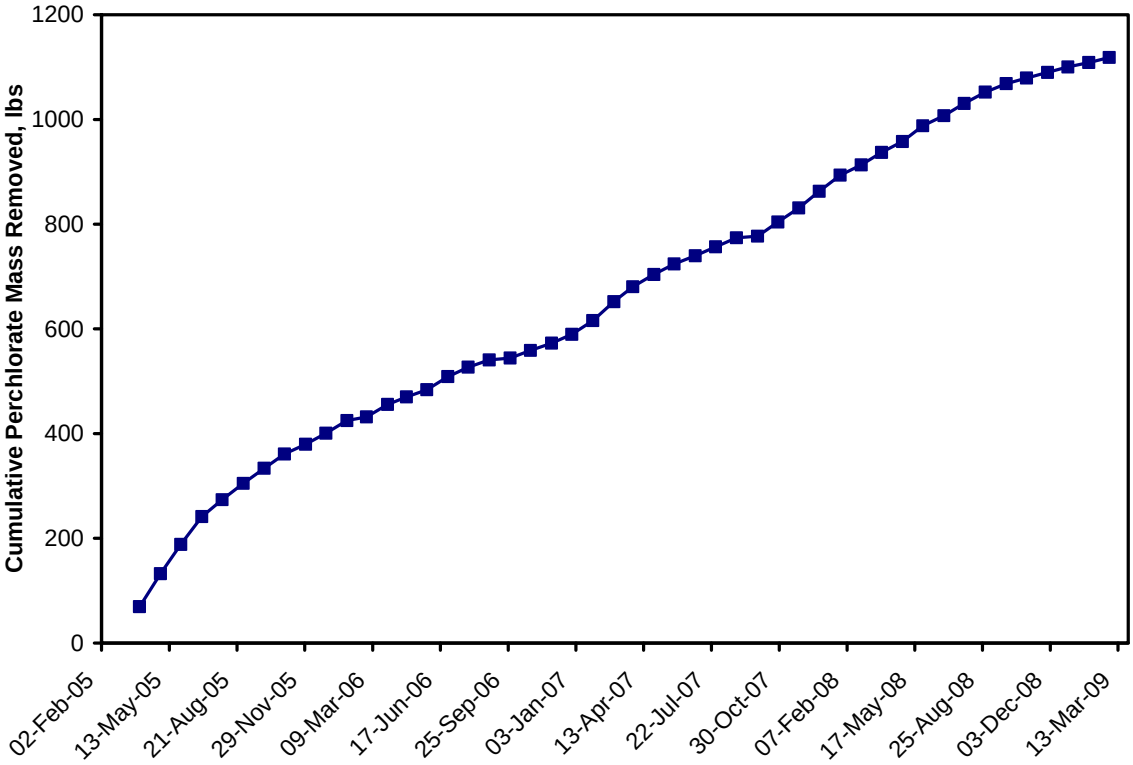

Figure 2. Cumulative Mass of Perchlorate Removed by the OU-1 System

[1] Environmental Protection Agency. 2003. *National Primary Drinking Water Regulations: Disinfectants and Disinfection Byproducts, Volume 63 Number 241*. December

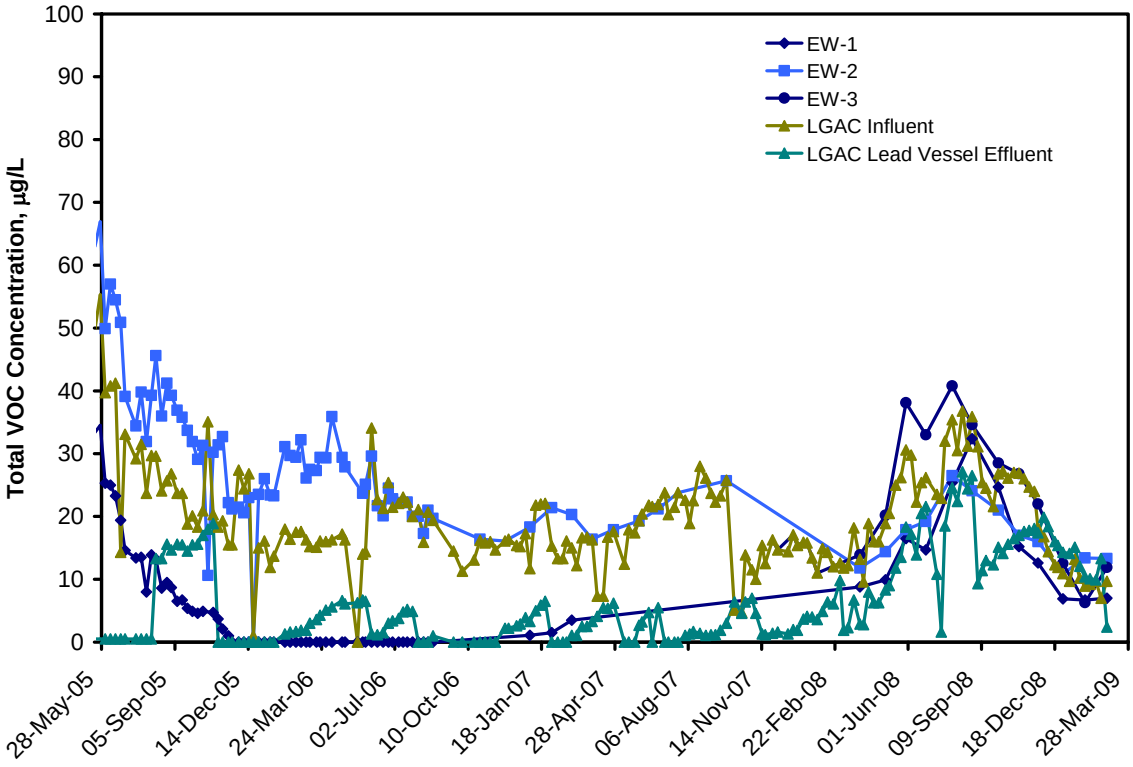

Figure 3. Total VOC Influent and Effluent Concentrations

NITRATE AND PERCHLORATE REMOVAL BY THE FLUIDIZED BED REACTOR

Nitrate and perchlorate biodegradation occur within the fluidized bed reactor (FBR) when the dissolved oxygen (DO) concentrations are low (<1 mg/L), the oxidation reduction potential (ORP) indicates reducing conditions, and there is an adequate supply of electron donor (acetic acid) and nutrients (urea/diammonium phosphate). The end products of treatment within the FBR are biomass, carbon dioxide, water, nitrogen, and chloride. A summary is provided below of nitrate and perchlorate removal in the FBR through February 28, 2009.

*Nitrate Removal***.** Figure 4 shows the nitrate concentrations in the extracted groundwater from EW-1, EW-2, EW-3, and the combined plant influent over time. The figure shows an overall declining trend in the plant influent nitrate concentration from more than 9 mg/L at the start of system operations in February 2005 to approximately 1.5 mg/L in February 2009. A significant increase in nitrate concentration occurred in October 2007, which was associated with processing groundwater extracted from EW-3; however, those concentrations have since decreased. The nitrate concentrations detected in samples from EW-3 are currently around 1.8 mg/L. The current influent levels have remained fairly consistent since the last reporting period in August 2008.

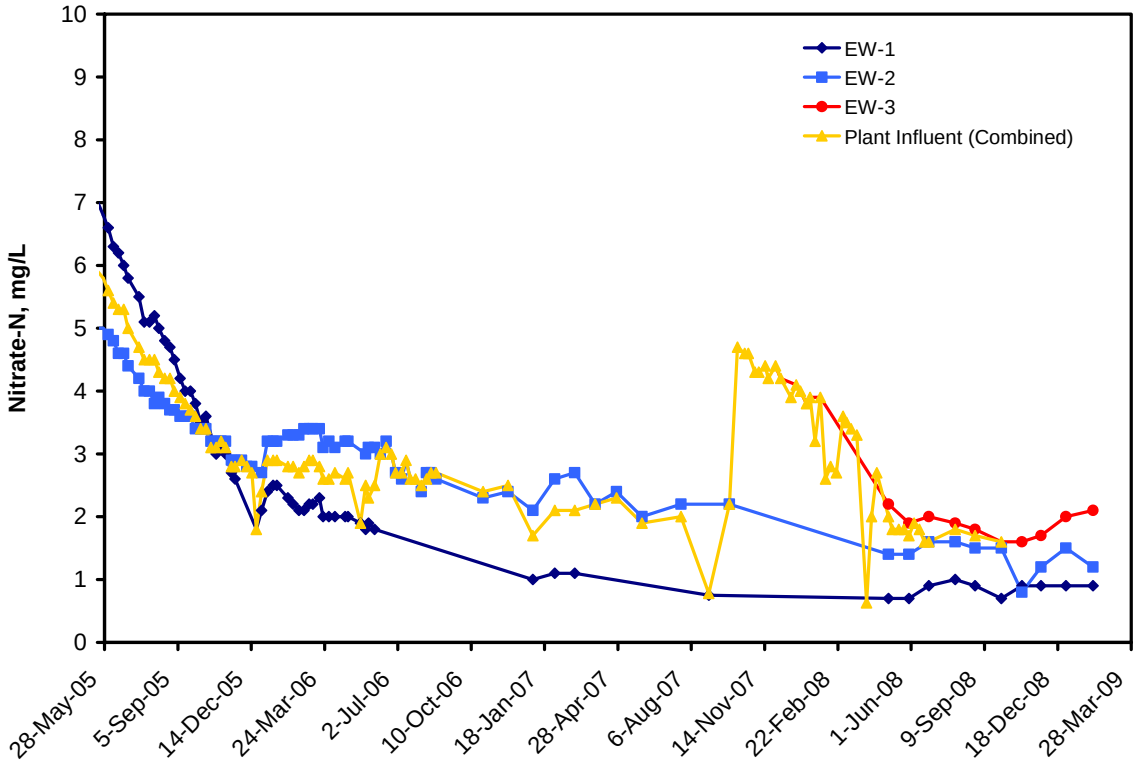

Figure 4. Influent Nitrate Concentrations at EW-1, EW-2, and Combined Plant Influent

The DO, nitrate, and perchlorate concentrations in the extracted groundwater are the parameters that determine the acetic acid demand within the FBR. As these parameters have changed over time, the acetic acid concentrations have been manually adjusted on a weekly basis to match the influent conditions. The acetic acid dosage during this reporting period ranged from 4 to 12 gallons per day (gpd), with an average of 8 gpd.

It is important to optimize nitrate removal because nitrate-reducing conditions must be achieved before perchlorate removal occurs. As shown in Figure 5, the nitrate concentration at the FBR effluent was <0.25 mg/L for all sampling events.

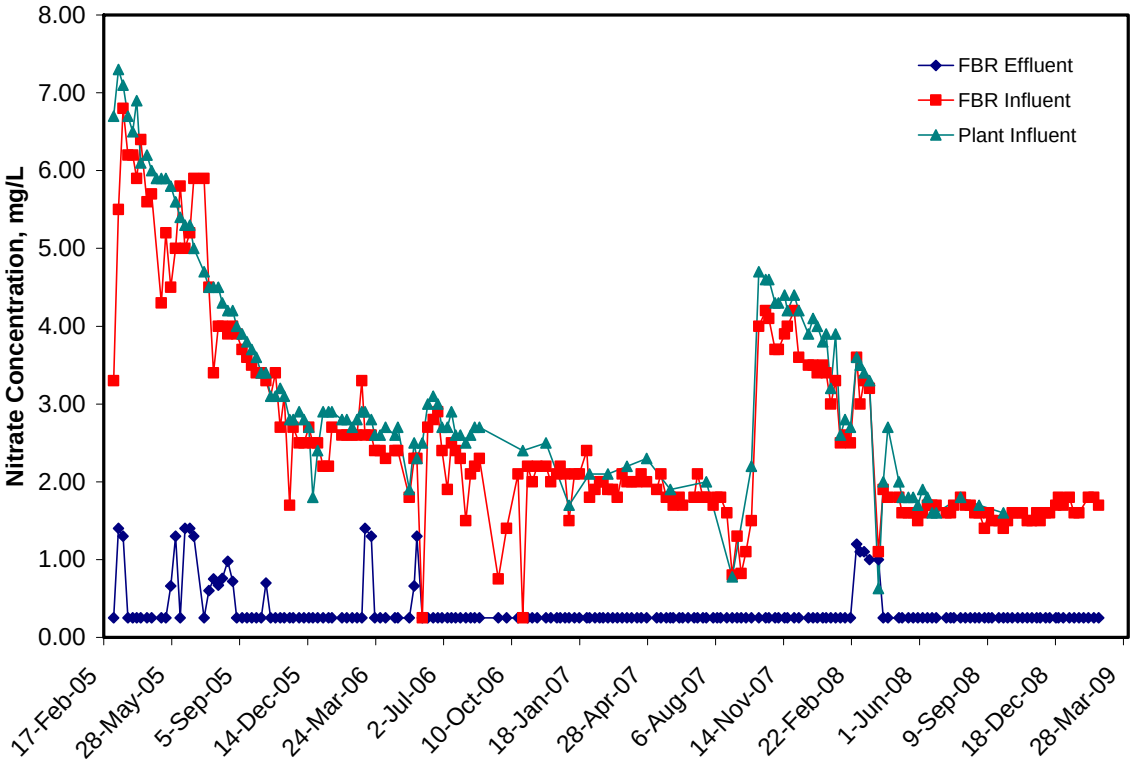

Figure 5. Nitrate Removal by the FBR

*Perchlorate Removal***.** Figure 6 shows the perchlorate concentrations in the extracted groundwater from EW-1, EW-2, EW-3, and the combined plant influent over time. Overall, there has been a declining trend in influent perchlorate concentrations from approximately 2,300 µg/L in February 2005 to approximately 166 µg/L in February 2009. Concentrations increased when EW-3 was brought online in late 2007, but have since decreased. Perchlorate concentrations have declined approximately by over 100 µg/L since the end of the last reporting period (August 2008).

Currently, perchlorate concentrations in EW-1 are 5.0 µg/L. These low levels of perchlorate are the reason that water is not being extracted from EW-1 at this time. EW-2 and EW-3 continue to have elevated levels of perchlorate, approximately 50 µg/L and 239 µg/L, respectively. These data will continue to be monitored in the coming months of operation along with data collected from the groundwater monitoring program to better understand the trend.

Figure 7 shows the influent and effluent perchlorate concentrations across the FBR over time. The 25 sampling events over the past six months indicated no perchlorate breakthrough at the FBR.

Figure 8 represents the correlation between the acetic acid dosing and the perchlorate concentrations leaving the FBR. As shown in Figure 9, the ORP values within the FBR averaged -181 mV during this time period.

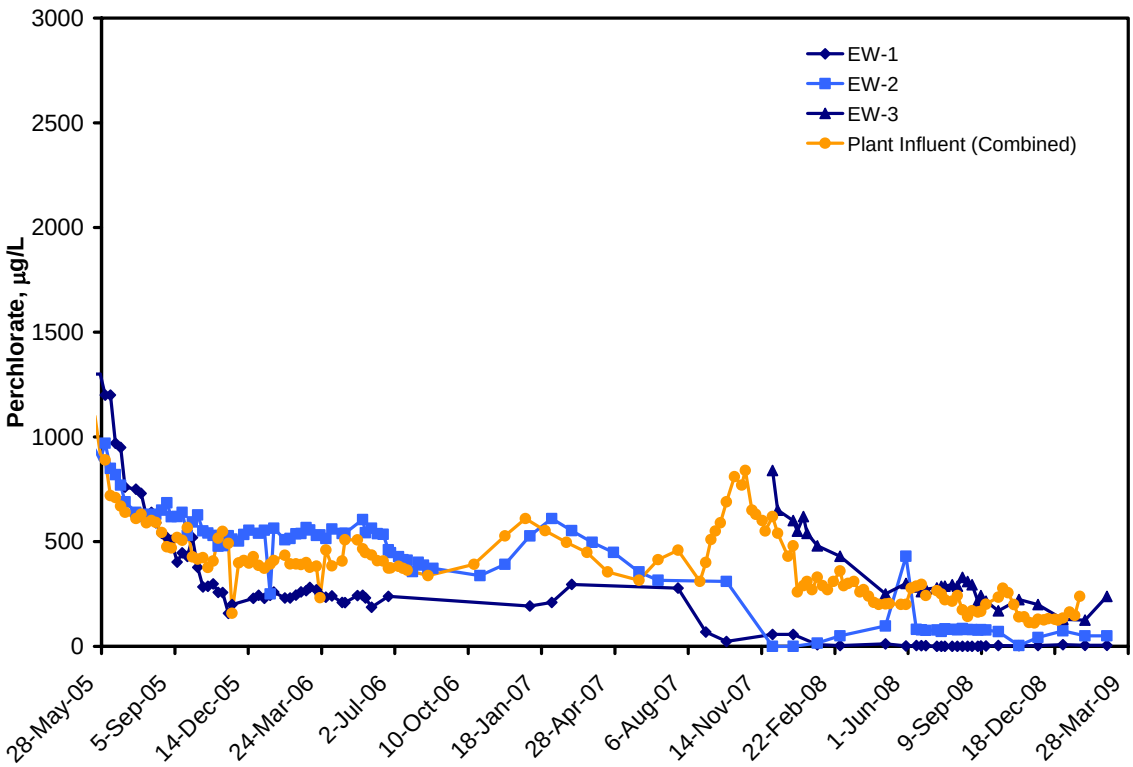

Figure 6. Influent Perchlorate Concentrations at EW-1, EW-2, and the Combined Plant Influent

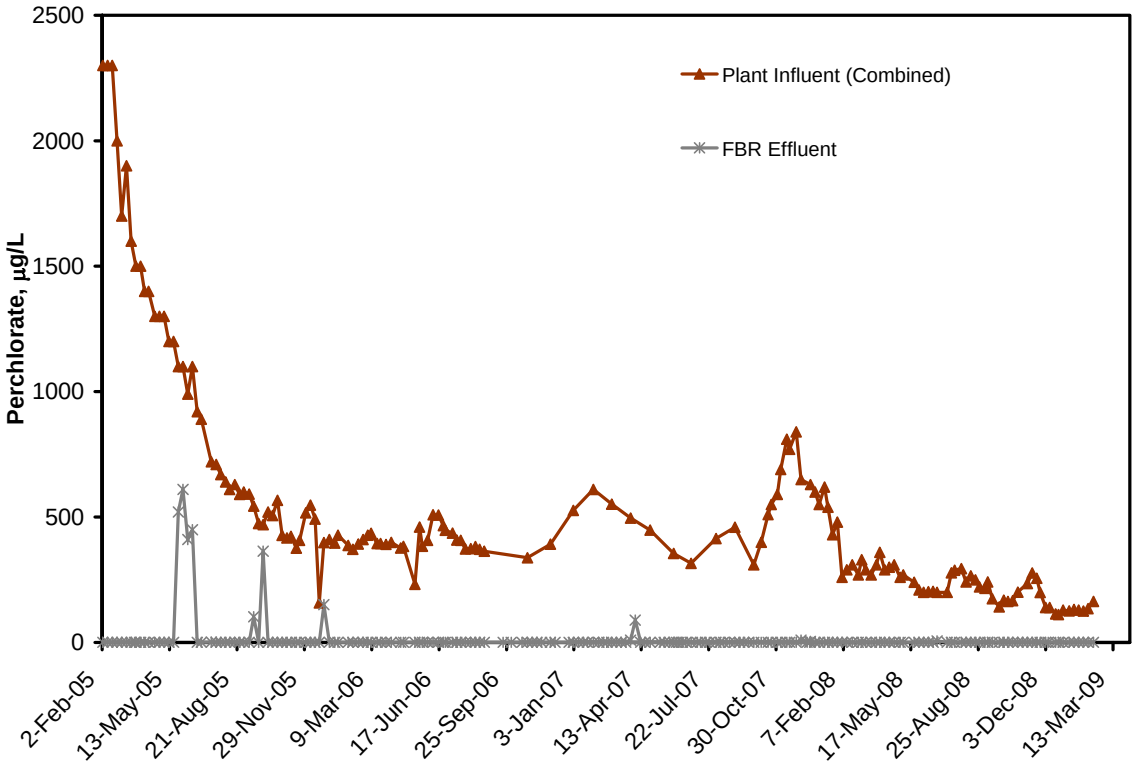

Figure 7. Perchlorate Removal by the FBR

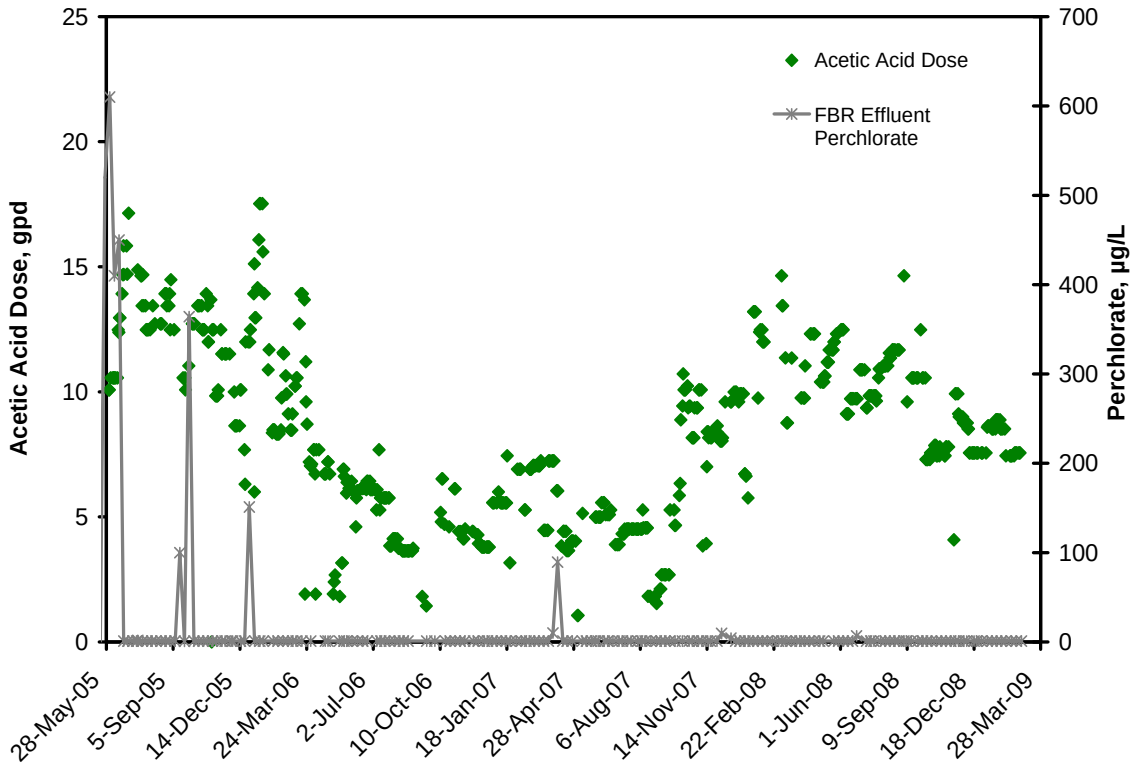

Figure 8. Acetic Acid Dosage Rate and FBR Effluent Perchlorate Concentrations

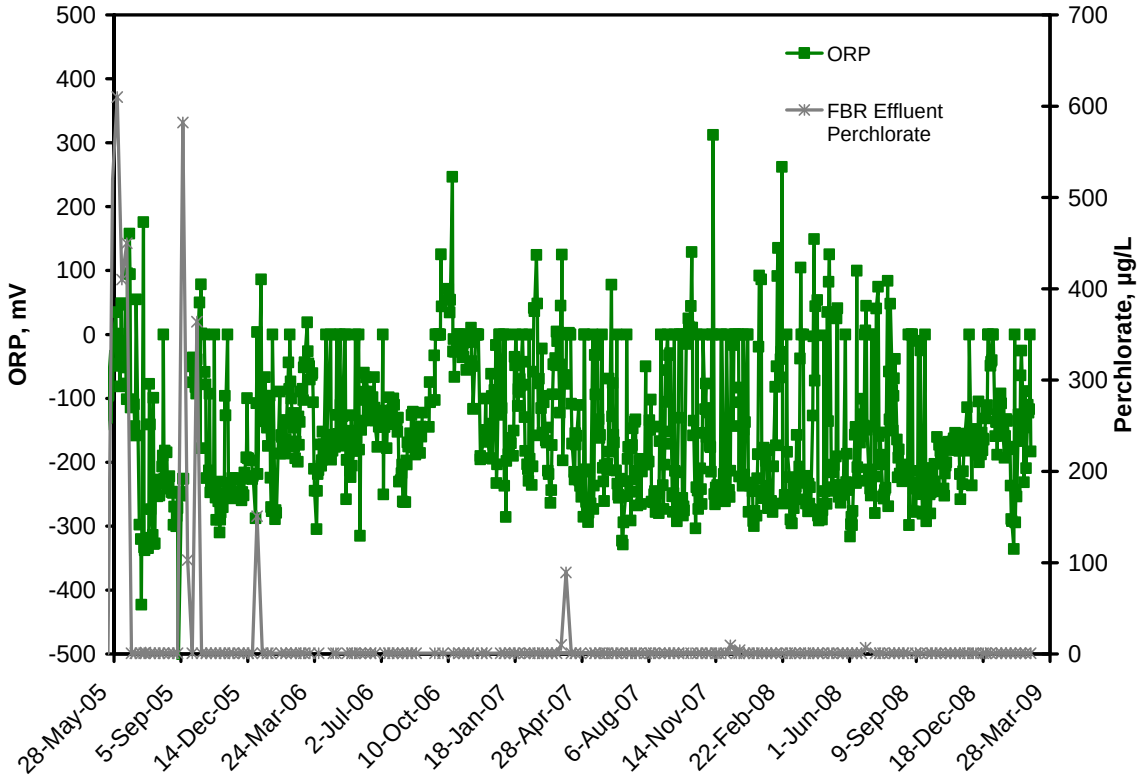

Figure 9. ORP Conditions and FBR Effluent Perchlorate Concentrations

ORP Conditions and Sulfate Reduction. Under normal operations, the FBR will convert small amounts of natural sulfate in the groundwater to dissolved hydrogen sulfide (H_2S). During certain non-optimal conditions, larger amounts of H_2S can be generated. Hydrogen sulfide has a noticeable odor at a threshold value of 0.0005 parts per million by volume (ppmv) in the ambient air based on data from the Agency for Toxic Substances and Disease Registry (ATSDR).

Figure 10 illustrates the relationship between ORP concentrations and total sulfide in the FBR effluent, which is a product of sulfate reduction. The total sulfide measurement is completed on-site using a Hach™ spectrophotometer which indicates the total quantity of H_2S, HS-, and metal sulfides in a sample. Based on the neutral pH of the treated water, it is assumed that the majority of the total sulfide is present in the form of H_2S.

Sulfide levels in the FBR effluent water reached a concentration higher than the threshold level of 100 µg/L on one occasion (111 µg/L) and averaged 10 µg/L over the past six months. The maximum concentration measured during this reporting period was 111 µg/L on September 4, 2008. This elevated level coincides with an increase in acetic acid dosage following filling the acetic acid reservoir tank, resulting in a decreased ORP level (-277 mV). The dosing of acetic acid into the FBR was subsequently adjusted and ORP and sulfide levels returned to normal.

The daily H_2S monitoring at the OU-1 treatment plant yielded no detectable concentrations (i.e., <1 ppmv) in the aeration tank effluent air between September 2008 and February 2009. As a precautionary measure, two carbon vessels are in place (in a lead/lag configuration) to ensure no H_2S releases into the ambient air. These vessels are located at the air exhaust of the aeration tank and typically need changed out due to moisture content rather than H_2S saturation of the media.

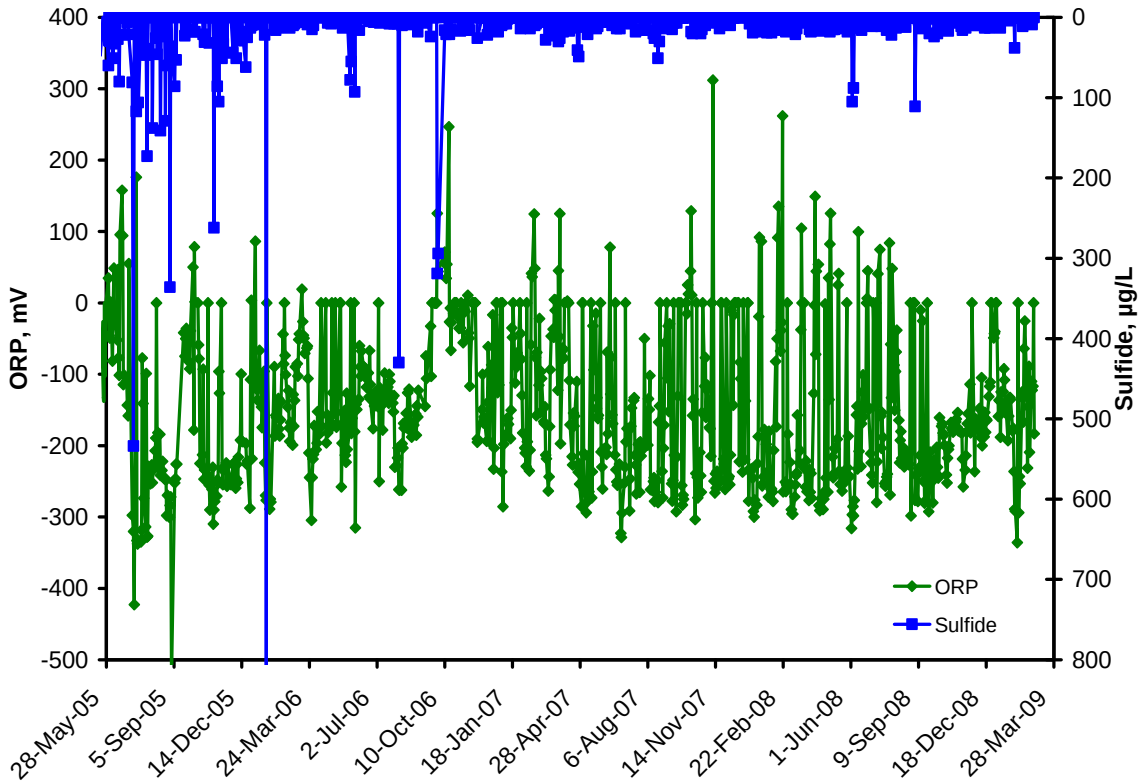

Figure 10. ORP Conditions and Sulfide Concentration within the FBR

BIOMASS REMOVAL AND BACKWASH WATER RECOVERY

The biomass removal and backwash recovery system consists of a Trimite™ filter, backwash sump, and clarifier. The filter helps recover biomass solids and reduce the turbidity of the treated water to protect the injection wells. Figure 11 shows the effluent turbidity over time from the filter based on Hach™ turbidimeter readings. The effluent turbidity from the filter ranged from 0.06 to 11 nephelometric turbidity units (NTU), with an average value of 0.50 NTU, which is a decrease from the previous six month average of 0.9 NTU. The decrease was attributed to the FBR biomass control equipment being adjusted, resulting in lower turbidity levels. The turbidity levels will continue to be closely monitored to ensure that levels are not increasing. For comparison, wells are typically developed until the recovered groundwater maintains a turbidity of less than 5 NTU.

The total suspended solid (TSS) concentrations entering the filter ranged from 2.5 to 12 mg/L, with values averaging 5.3 mg/L over the past six months. The TSS concentrations in the filter effluent were consistently <2.5 mg/L during this reporting period, representing effective TSS removal.

The backwash water from the Trimite™ filter is sent to the sump, and pumped to the clarifier. After the biomass solids settle out in the clarifier, the clarified (supernatant) water is returned to the FBR inlet. Currently, no polymers and/or coagulant aids are being used in the clarifier. The clarifier solids are being discharged to the sanitary sewer at a rate of approximately once every four weeks.

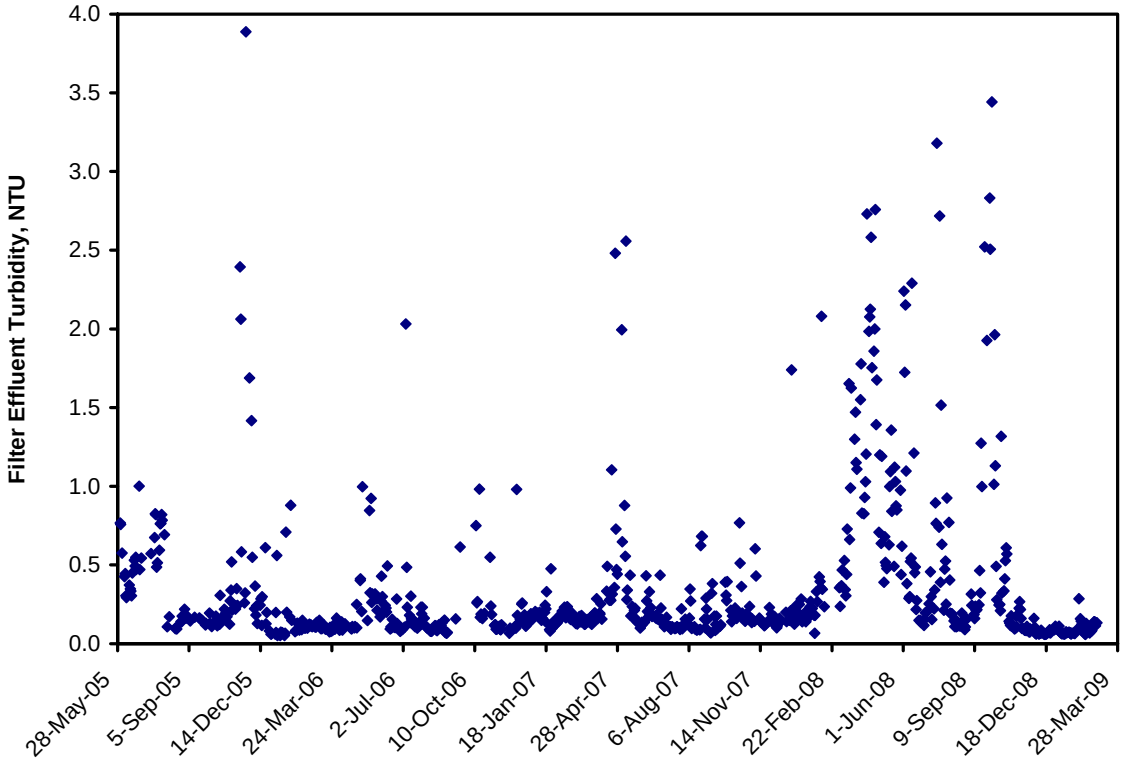

Figure 11. Trimite™ Filter Effluent Turbidity

WATER LEVEL AND WATER QUALITY ASSESSMENT

Groundwater level elevation and chemical data were used to evaluate the impact of the OU-1 system operations on local aquifer conditions. Groundwater level elevation data have been collected from the NASA JPL monitoring wells on a quarterly basis and transducers are used to record data from the extraction wells. In addition, groundwater levels are collected on a weekly basis from NASA JPL monitoring wells MW-7, MW-8, MW-13, MW-16, and IRZ-IW2 as part of the OU-1 system operations.

Historic elevation data (April 2004) indicate a steep southwest gradient from the mouth of the Arroyo Seco to the OU-1 system area coupled with a southeastern gradient from the northwestern portion of the JPL facility. Flow converges to the south of the treatment zone and migrates toward the south/southeast under a reduced gradient (Figure 12). The groundwater elevation contour map showing conditions in October/November 2008 (Figure 13) demonstrates groundwater flow is significantly affected by operation of the system, with a drawdown of roughly 25 to 30 ft observed in the extraction wells. Data indicate that the extraction wells effectively influence groundwater within a greater than 160-ft radius of the extraction wells.

Isoconcentration contour maps are provided for TCE, CCl_4, and perchlorate for baseline conditions before extraction (October/November 2004) and after extraction (October/November 2008) as Figures 14 through 16, respectively. These data indicate the following:

- The concentration of VOCs and perchlorate in the treatment zone (i.e., MW-7, MW-16, and MW-24) has decreased significantly since system startup.
- Concentrations of TCE in the treatment zone are below 1 μg/L in all wells.
- Concentrations of CCl_4 were below 0.5 μg/L in all source area wells in Oct./Nov. 2008.
- Perchlorate concentrations in MW-7 and MW-24 have declined from 4,810 and 4,880 μg/L to concentrations of less than 1.0 μg/L and 5.8 μg/L, respectively.
- Perchlorate levels in MW-13 were measured at 431 μg/L in Oct./Nov. 2008. Perchlorate concentrations in MW-13 have been sporadic since initiating operation of the OU-1 treatment system. It is believed that this is a result of changes in groundwater flow paths during system operation.
- Concentrations of VOCs and perchlorate have declined or remained the same in the wells near the facility's eastern (MW-11) and western boundary (MW-22 and MW-23).

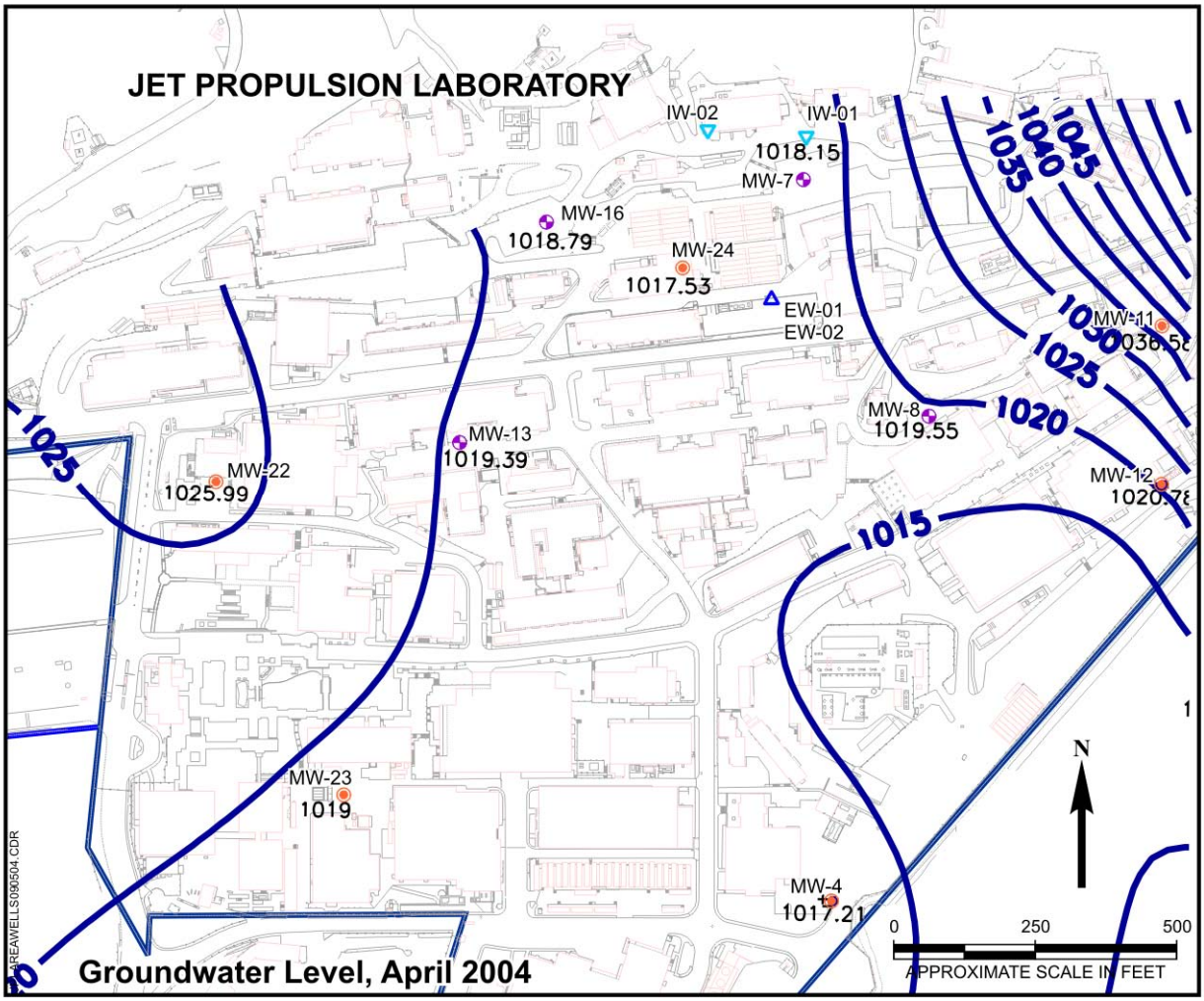

Figure 12. Groundwater Contour Map, April 2004 (Baseline Before Extraction)

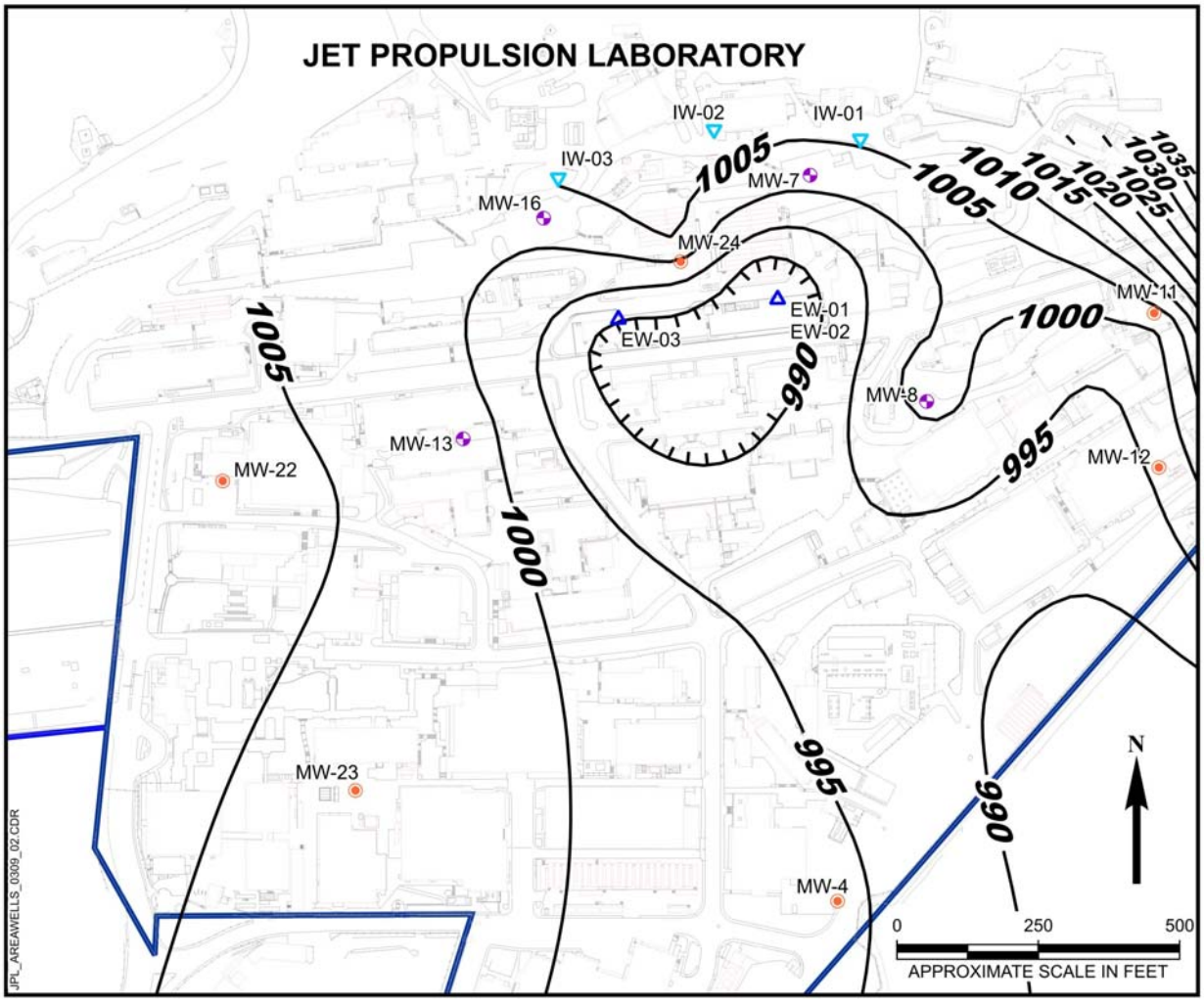

Figure 13. Groundwater Contour Map, October/November 2008 (With Extraction)

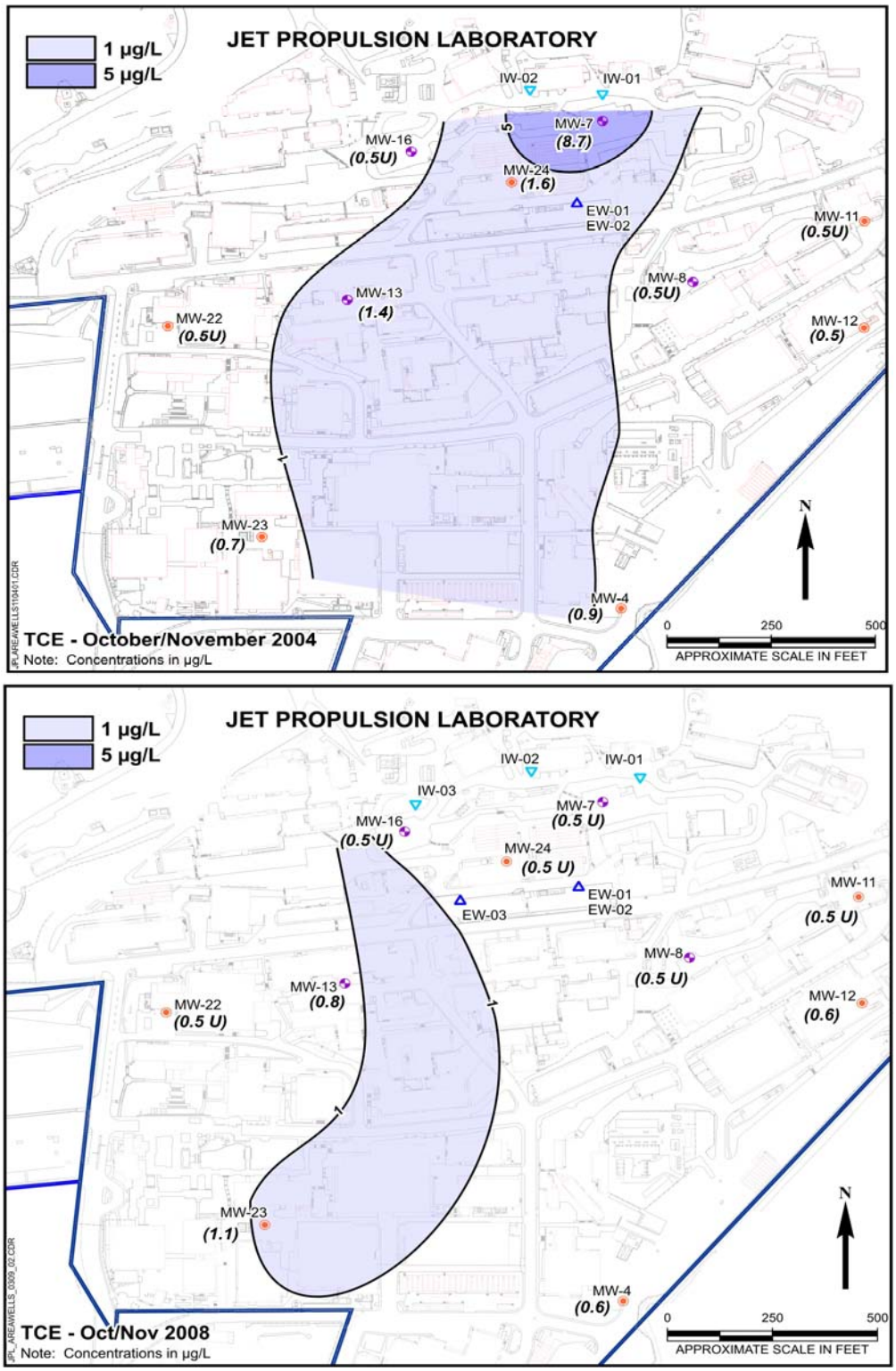

Figure 14. TCE in Groundwater Before (October/November 2004) and After (October/November 2008) System Implementation

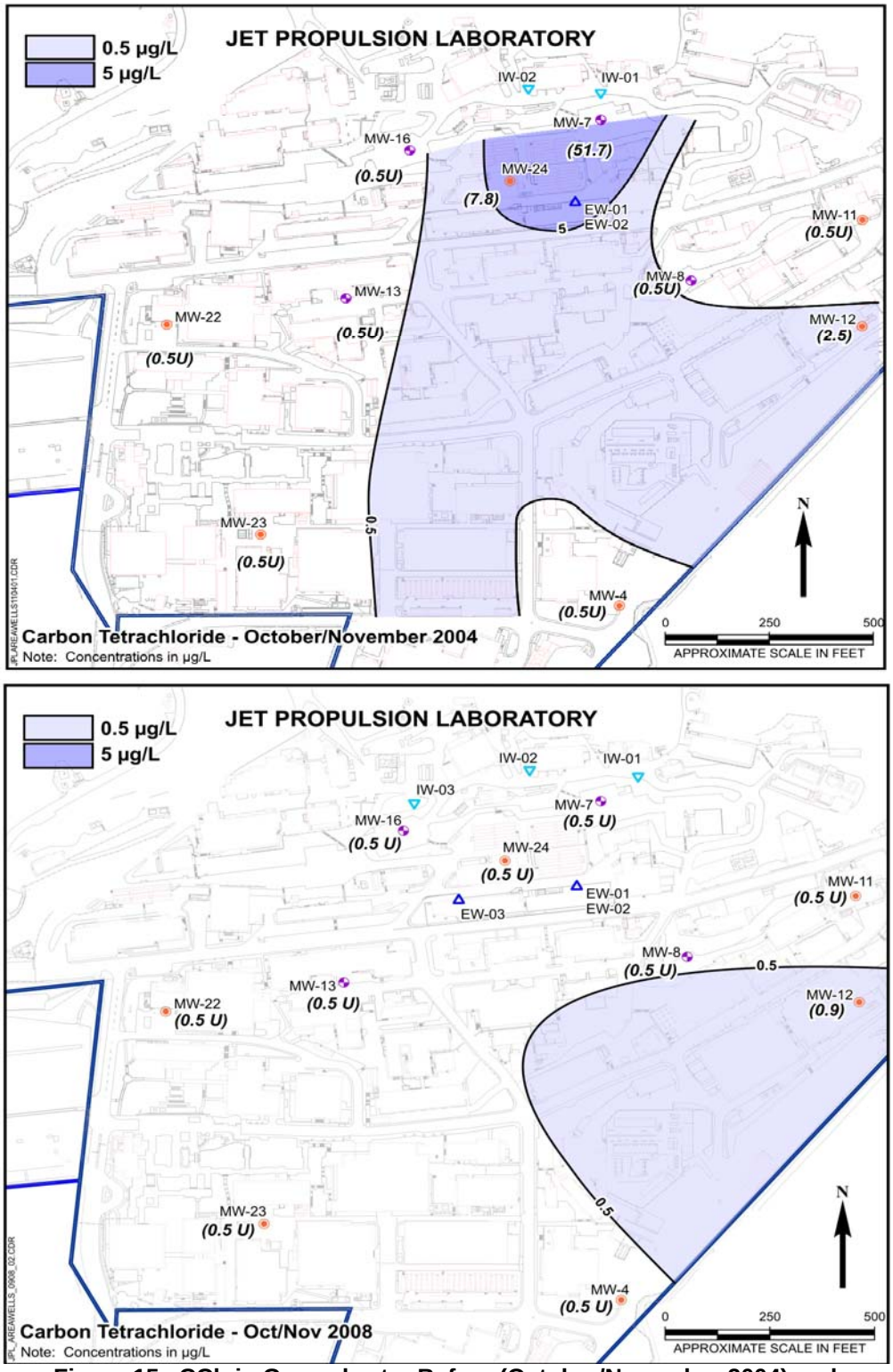

Figure 15. CCl_4 in Groundwater Before (October/November 2004) and After (October/November 2008) System Implementation

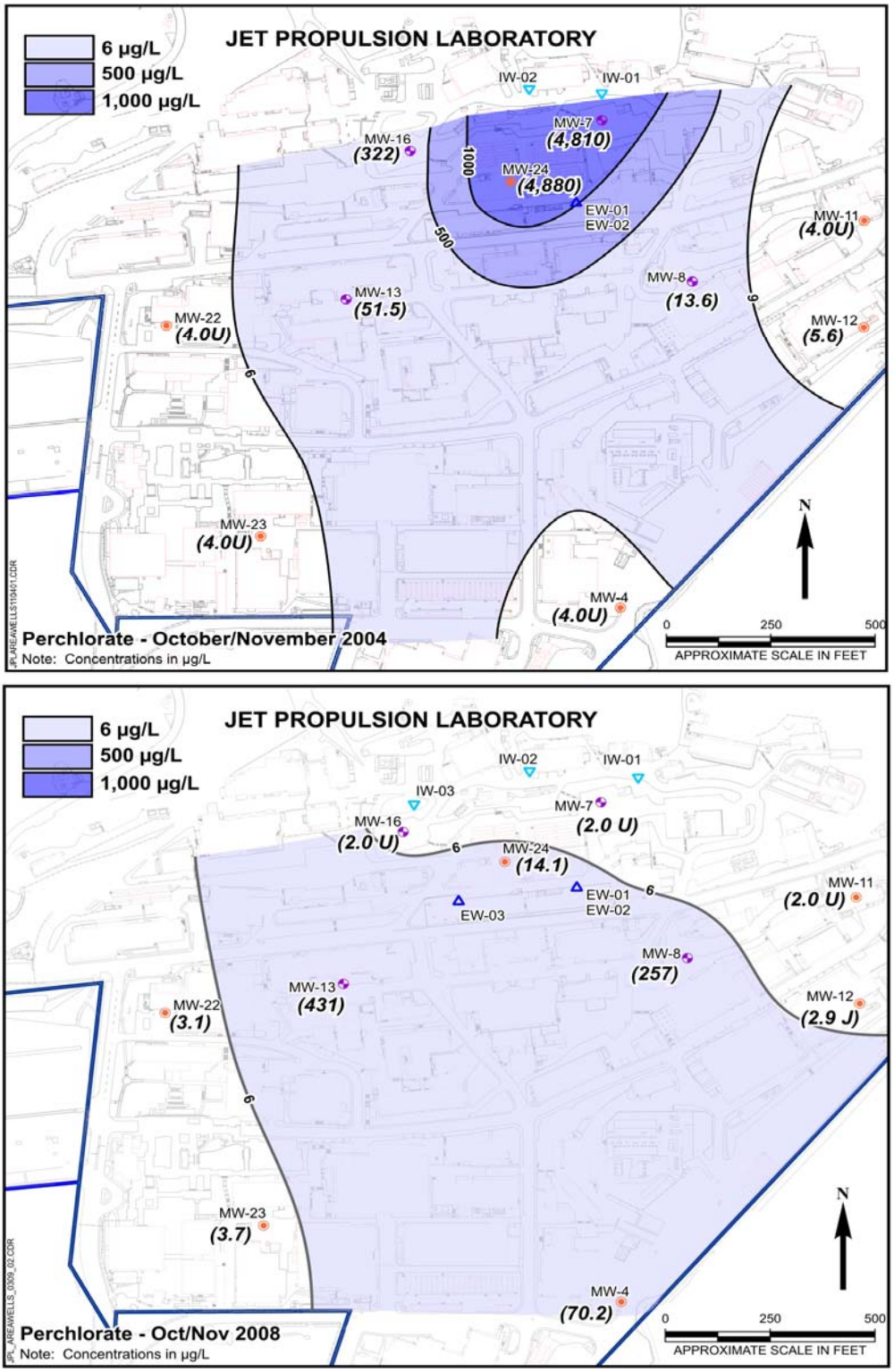

Figure 16. Perchlorate in Groundwater Before (October/November 2004) and After (October/November 2008) System Implementation

CONCLUSIONS AND RECOMMENDATIONS

Conclusions and recommendations associated with the performance of the OU-1 system are as follows:

- Approximately 25.8 lb of CCl_4 and 4.5 lb of TCE have been removed by the source area treatment system through February 28, 2009.
- Approximately 1140 lb of perchlorate has been removed since the startup of the OU-1 system. The perchlorate laboratory results from the FBR effluent will continue on a 24-hour turnaround basis to allow rapid response time to changing conditions.
- Between September 2006 and February 2009, sulfide production has been effectively controlled. In addition, the vapor phase treatment system ensures that the system does not release any nuisance odors to the ambient air. H_2S concentrations in the ambient air are measured daily at locations within and nearby the OU-1 plant and continue to be below detection limits.
- Only 3055,000 gallons, or approximately 1.09 acre-feet, of wastewater has been sent to the sanitary sewer to date.
- Rehabilitation of IW-1 and IW-2 successfully occurred in November 2008-January 2009.
- The addition of the rehabilitation equipment to IW-3 in November 2008 will allow for easier, less costly rehabilitation to take place.
- A significant decrease in chemical concentrations has been observed in the vicinity of MW-7, MW-16, and MW-24, which are located within the OU-1 source area system treatment zone.
- It is recommended that the OU-1 System Performance Compliance Monitoring be reviewed for optimization and reduction of sampling efforts, where appropriate.

Attachment A
Field Monitoring Results

Table A-1. OU-1 On Site Water Quality Log Comparison Sheet FBR Inlfluent and Effluent

Date	DO In	DO Out	ORP In	ORP Out	ClO4 In[a]	ClO4 Out[a]	Nitrate-N In	Nitrate-N Out
d/m/y	mg/L	mg/L	mV	mV	mg/L	mg/L	mg/L	mg/L
Avg.	2.6	0.0	281.6	-181.0	0.2	0.1	0.7	0.2
Std.	0.8	0.1	233.6	60.8	0.1	0.1	0.8	0.2
Max.	4.1	0.4	2731.0	-10.1	0.4	0.7	1.9	0.7
Min.	0.3	0.0	72.1	-335.9	0.1	0.1	0.0	0.0
4-Sep-08	–	–	72.1	-276.50	0.11	0.16	1.2	0
5-Sep-08	–	–	147.6	-241.30	0.11	0.16	1.3	–
8-Sep-08	–	–	166.2	-278.00	0.12	0.14	1.5	–
9-Sep-08	–	–	154.8	-231.70	0.13	0.07	0.7	0.5
10-Sep-08	–	–	155.7	-238.00	0.13	0.07	1.4	–
11-Sep-08	–	–	252.3	-213.60	0.14	0.07	1.2	0.3
12-Sep-08	–	–	232.5	-10.10	0.16	0.07	1.3	–
15-Sep-08	–	–	172.3	-25.20	0.22	0.07	1.5	–
16-Sep-08	–	–	303.2	-250.00	0.22	0.07	1.6	0.3
17-Sep-08	–	–	320.7	-223.80	0.22	0.07	1.6	–
18-Sep-08	–	–	245.4	-280.60	0.22	0.07	1.6	0.4
19-Sep-08	–	–	250.2	-277.30	0.22	0.07	1.6	–
23-Sep-08	–	–	154.4	-224.80	0.28	0.08	1.4	0.3
24-Sep-08	–	–	235.4	-292.40	0.22	0.07	1.4	–
25-Sep-08	3.05	–	233.5	-249.40	0.21	0.07	1.4	0
26-Sep-08	3.37	–	263.9	-209.00	0.22	0.07	1.4	–
29-Sep-08	3.01	–	250.2	-250.30	0.22	0.07	1.8	–
30-Sep-08	3.11	–	280.1	-280.10	0.22	0.07	1.9	0.03
1-Oct-08	2.91	–	246.3	-247.10	0.21	0.07	1.8	–
2-Oct-08	4.13	0.43	250.3	-220.20	0.22	0.07	1.4	0
3-Oct-08	2.14	–	255.1	-238.80	0.24	0.14	1.5	–
6-Oct-08	4.10	0.17	240.6	-202.50	0.24	0.07	1.5	–
7-Oct-08	3.81	0.07	286.3	-230.10	0.23	0.07	0.9	0
8-Oct-08	3.36	0.00	296.4	-245.40	0.23	0.07	1.6	–
9-Oct-08	3.20	0.00	340.1	-243.00	0.23	0.07	1.6	0.1
10-Oct-08	3.28	0.13	316.3	-160.60	0.25	0.09	1.6	–
13-Oct-08	3.02	–	304.6	-172.80	0.26	0.08	1.6	–
14-Oct-08	2.82	–	325.9	-169.30	0.25	0.08	1.5	0.2
15-Oct-08	3.22	–	329.8	-182.40	0.25	0.09	1.5	–
16-Oct-08	3.10	–	314.8	-185.70	0.26	0.09	–	0.1
17-Oct-08	3.14	–	316.1	-199.20	0.26	0.08	1.6	–
20-Oct-08	3.86	0.01	243.5	-241.00	0.26	0.08	1.6	–
21-Oct-08	2.92	–	298.2	-252.30	0.28	0.15	1.5	0.2
22-Oct-08	2.23	–	301.4	-217.40	0.25	0.09	1.5	–
23-Oct-08	3.30	–	283.6	-205.30	0.25	0.09	1.7	0.1
24-Oct-08	3.16	–	290.4	-200.10	0.25	0.09	1.7	–
27-Oct-08	3.36	0.03	283.4	-167.80	0.26	0.09	1.6	–
28-Oct-08	2.82	0.00	291.9	-175.80	0.27	0.09	1.7	0.2

Date	DO In	DO Out	ORP In	ORP Out	ClO4 In[a]	ClO4 Out[a]	Nitrate-N In	Nitrate-N Out
29-Oct-08	2.75	0.00	274.5	-177.80	0.27	0.09	1.5	–
30-Oct-08	2.89	0.00	283.4	-181.00	0.27	0.09	1.6	0.2
31-Oct-08	2.91	0.00	290.1	-178.10	0.27	0.09	1.5	–
3-Nov-08	3.57	0.00	282.8	-166.90	0.30	0.11	1.6	–
4-Nov-08	3.35	0.00	261.2	-162.80	0.32	0.11	1.6	0
5-Nov-08	3.35	0.00	276.4	-174.20	0.31	0.11	1.6	–
6-Nov-08	3.41	0.00	291.4	-153.90	0.31	0.11	1.6	0
7-Nov-08	3.42	0.00	269.1	-179.30	0.31	0.11	1.5	–
10-Nov-08	3.17	0.00	271.6	-181.10	0.30	0.11	1.7	–
11-Nov-08	1.38	0.00	260.4	-180.90	0.36	0.1	1.5	0.1
12-Nov-08	2.11	0.00	263.6	-182.30	0.36	0.1	1.5	–
13-Nov-08	2.57	0.00	218.1	-218.50	0.34	0.09	–	0
14-Nov-08	2.60	0.00	249.8	-257.80	0.35	0.09	–	–
17-Nov-08	3.00	0.00	274.3	-234.20	0.22	0.11	1.5	–
18-Nov-08	2.93	0.00	284.3	-214.10	0.19	0.07	1.5	0.3
19-Nov-08	3.48	0.00	290.2	-180.60	0.19	0.07	1.5	0.6
20-Nov-08	3.69	0.00	290.2	-169.20	0.20	0.07	1.7	0.2
21-Nov-08	3.50	0.00	289.4	-155.30	0.20	0.07	1.8	–
24-Nov-08	3.60	0.00	328.9	-114.10	0.19	0.06	1.7	0.2
25-Nov-08	3.12	0.00	276.8	-181.80	0.19	0.06	1.9	0.7
26-Nov-08	3.15	0.00	270.1	-180.10	0.19	0.06	1.9	–
1-Dec-08	2.23	0.00	205.7	-162.50	0.20	0.7	0	0.3
2-Dec-08	2.44	0.00	268.3	-169.60	0.18	0.7	0	–
3-Dec-08	3.29	0.00	213.1	-166.50	0.18	0.6	0	0.4
4-Dec-08	2.91	0.00	233.9	-176.80	0.17	0.6	0	–
5-Dec-08	2.85	0.00	154.3	-147.90	0.17	0.07	0	–
8-Dec-08	3.35	0.00	270.7	-176.60	0.17	0.07	0	0.3
9-Dec-08	2.57	0.00	255.7	-188.40	0.16	0.07	0	–
10-Dec-08	3.42	0.00	258	-105.00	0.16	0.07	0	0.4
11-Dec-08	3.39	0.00	2731	-200.10	0.16	0.07	0	–
12-Dec-08	3.27	0.00	254.8	-187.70	0.16	0.07	0	–
15-Dec-08	3.35	0.00	223.7	-153.60	0.16	0.07	0	0.4
16-Dec-08	2.21	0.00	256.8	-181.20	0.17	0.07	0	–
17-Dec-08	1.54	0.00	251.4	-163.00	0.16	0.07	0	0.3
18-Dec-08	3.20	0.00	197.8	-164.60	0.16	0.07	0	–
19-Dec-08	2.81	0.00	245.2	-131.30	0.16	0.06	0	–
22-Dec-08	2.94	0.00	236.9	-117.10	0.15	0.06	0	0.3
23-Dec-08	3.47	0.00	215.8	-110.80	0.15	0.06	0	–
24-Dec-08	3.16	–	210.3	–	0.15	–	0	–
29-Dec-08	2.75	0.00	193.1	-43.00	0.15	0.06	0	0.4
30-Dec-08	3.18	0.00	242.9	-40.20	0.14	0.06	0	–
31-Dec-08	3.01	–	230.2	–	0.14	–	0	–
5-Jan-09	2.56	0.00	233.6	-136.50	0.14	0.06	0	0.2
6-Jan-09	2.57	0.00	256.3	-137.20	0.14	0.06	0	–
7-Jan-09	2.33	0.00	251.3	-188.30	0.14	0.06	0	0.1

Date	DO In	DO Out	ORP In	ORP Out	ClO4 In[a]	ClO4 Out[a]	Nitrate-N In	Nitrate-N Out
8-Jan-09	2.38	0.00	260.4	-124.90	0.14	0.06	0	–
9-Jan-09	2.88	0.00	261.1	-124.30	0.14	0.06	0	–
12-Jan-09	2.52	0.00	137.9	-92.40	0.15	0.06	0	0.2
13-Jan-09	2.68	0.00	261	-107.90	0.15	0.06	0	–
14-Jan-09	2.49	0.00	220.9	-152.00	0.15	0.07	0	0.2
15-Jan-09	0.35	0.00	197	-144.00	0.09	0.07	0	–
16-Jan-09	1.46	0.00	228.5	-192.80	0.10	0.06	0	–
19-Jan-09	0.97	0.00	218.4	-158.80	0.08	0.05	0	0.5
20-Jan-09	0.92	0.00	182.4	-132.90	0.08	0.05	0	–
21-Jan-09	0.84	0.00	174.4	-132.60	0.08	0.05	0	0.2
22-Jan-09	0.49	0.00	203.5	-135.20	0.07	0.05	0	–
23-Jan-09	0.89	0.00	210.4	-179.60	0.07	0.07	0	–
26-Jan-09	–	0.00	202.5	-175.80	0.09	0.05	0	0.4
27-Jan-09	1.02	0.00	223.3	-236.40	0.09	0.07	0	–
28-Jan-09	0.31	0.00	309.3	-288.90	0.09	0.07	0	0.1
29-Jan-09	1.31	0.00	329.7	-292.00	0.09	0.08	0	–
30-Jan-09	2.03	0.00	336.4	-335.90	0.11	0.11	0	–
2-Feb-09	1.54	–	322.7	–	0.12	–	0	–
4-Feb-09	2.11	0.00	210.7	-243.10	0.13	0.08	0	0.4
5-Feb-09	1.25	0.00	224.1	-253.50	0.14	0.08	0	–
6-Feb-09	1.74	0.00	310.6	-124.80	0.14	0.08	0	–
9-Feb-09	1.87	0.00	296.8	-133.60	0.18	0.08	0	0.02
10-Feb-09	1.94	0.00	305.9	-166.90	0.18	0.07	0	–
11-Feb-09	2.08	0.00	322.9	-64.10	0.18	0.06	0	0
12-Feb-09	2.29	0.00	330.6	-25.40	0.18	0.06	0	–
13-Feb-09	2.37	0.00	345.1	-126.10	0.18	0.07	0	–
16-Feb-09	2.35	0.00	320.8	-231.40	0.19	0.07	0	0.4
17-Feb-09	2.11	0.00	343	-145.60	0.19	0.07	0	–
18-Feb-09	2.02	0.00	327.6	-88.90	0.19	0.06	0	0.3
19-Feb-09	2.30	0.00	312.9	-209.30	0.18	0.06	0	–
20-Feb-09	2.57	0.00	332.6	-110.20	0.19	0.06	0	–
23-Feb-09	2.24	0.00	340.9	-122.30	0.20	0.06	0	0.5
24-Feb-09	2.69	0.00	334.9	-116.80	0.18	0.06	0	–
25-Feb-09	3.43	–	356.7	–	0.18	–	0	–
27-Feb-09	2.92	0.00	345.2	-183.20	0.18	0.06	0	–

Note:

(a) The ion selective probe for perchlorate is calibrated to <0.1 mg/L. Readings below this value are estimates or "J" values.

(b) Samples shaded red are possible monitoring/equipment errors and are not included in calculations.

(c) A dash signifies parmeters that were not read.

Table A-2. OU-1 On Site Water Quality Log Sheet Combined Well Influent

Date	Time	PH	Temperature	Conductivity	DO	ORP	ClO4	Nitrate-N
d/m/y			°C	µS/cm	mg/L	mV	mg/L	mg/L
Avg.		7.3	23.6	640.9	12.2	288.5	0.2	1.7
Std.		0.0	18.6	15.1	64.4	242.8	0.1	0.2
Max.		7.4	224.0	661.0	663.0	2816.0	0.4	2.4
Min.		7.2	20.4	591.0	4.6	34.3	0.1	1.3
4-Sep-08	1345	7.4	22.0	612	–	90.2	0.25	2
5-Sep-08	1350	7.3	21.9	611	–	183.9	0.25	–
8-Sep-08	1330	7.3	21.7	611	–	169.7	0.26	–
9-Sep-08	1300	7.3	21.8	610	–	152.6	0.26	2
10-Sep-08	1315	7.3	21.8	611	–	175.2	0.26	–
11-Sep-08	1335	7.4	21.4	610	–	267.8	0.26	2
12-Sep-08	1310	7.4	21.0	609	–	237.2	0.27	–
15-Sep-08	1115	7.3	21.9	614	–	169.1	0.24	–
16-Sep-08	1200	7.4	21.7	612	–	321.0	0.25	2
17-Sep-08	1240	7.3	21.0	618	–	338.6	0.25	–
18-Sep-08	1800	7.3	21.8	618	–	339.3	0.25	2
19-Sep-08	800	7.3	21.7	617	–	331.1	0.25	–
23-Sep-08	1315	7.3	22.0	613	–	332.5	0.23	2
24-Sep-08	1750	7.4	22.4	633	–	256.8	0.22	–
25-Sep-08	1330	7.3	22.3	591	6.03	227.0	0.22	1.6
26-Sep-08	1325	7.3	21.9	631	5.91	244.3	0.22	–
29-Sep-08	1000	7.3	21.8	619	5.99	235.6	0.23	
30-Sep-08	1200	7.3	21.8	620	6.05	240.2	0.22	1.6
1-Oct-08	1415	7.3	21.9	622	6.10	227.1	0.23	–
2-Oct-08	1225	7.3	22.0	617	6.81	243.0	0.23	1.7
3-Oct-08	1215	7.2	22.1	626	7.21	270.2	0.26	–
6-Oct-08	1330	7.3	22.0	597	6.57	295.8	0.26	–
7-Oct-08	1330	7.2	22.1	618	7.16	328.2	0.25	1.7
8-Oct-08	1345	7.3	22.5	626	6.26	346.6	0.26	–
9-Oct-08	1400	7.2	22.3	633	6.32	284.5	0.26	1.7
10-Oct-08	1100	7.3	21.8	639	6.31	341.1	0.27	–
13-Oct-08	1400	7.3	22.0	643	5.78	343.4	0.28	–
14-Oct-08	1500	7.2	22.0	638	6.15	340.1	0.27	1.6
15-Oct-08	1330	7.3	22.1	640	6.40	341.2	0.27	–
16-Oct-08	1220	7.2	22.2	641	6.20	341.9	0.27	1.6
17-Oct-08	1400	7.3	22.1	640	6.28	34.3	0.27	–
20-Oct-08	1430	7.2	21.9	644	5.92	321.8	0.31	–
21-Oct-08	1200	7.2	22.2	646	5.30	326.5	0.30	1.6
22-Oct-08	1330	7.2	22.3	649	5.54	315.1	0.27	–

Date	Time	PH	Temperature	Conductivity	DO	ORP	ClO4	Nitrate-N
23-Oct-08	1205	7.2	22.1	639	5.68	300.5	0.29	1.3
24-Oct-08	1240	7.2	22.2	629	5.77	310.3	0.29	–
27-Oct-08	1330	7.2	22.2	624	5.58	304.5	0.31	–
28-Oct-08	1300	7.3	22.3	650	5.07	296.5	0.30	1.6
29-Oct-08	1445	7.3	22.1	651	4.86	299.3	0.30	–
30-Oct-08	1430	7.2	22.1	621	5.69	305.9	0.30	1.6
31-Oct-08	1200	7.2	22.2	652	5.74	308.3	0.30	–
3-Nov-08	1410	7.3	22.0	651	5.96	286.6	0.34	–
4-Nov-08	1345	7.3	21.8	649	6.43	273.1	0.35	1.8
5-Nov-08	1330	7.3	22.0	650	6.43	283.9	0.35	–
6-Nov-08	1320	7.3	21.9	650	6.12	301.4	0.35	1.7
7-Nov-08	1300	7.3	21.9	651	6.63	284.2	0.34	–
10-Nov-08	1540	7.2	22.1	651	663.00	272.0	0.39	–
11-Nov-08	930	7.3	22.2	649	6.88	282.2	0.37	1.7
12-Nov-08	1400	7.3	22.6	651	6.91	285.1	0.37	–
13-Nov-08	1145	7.2	22.4	650	6.98	268.8	0.38	1.8
14-Nov-08	1445	7.2	22.5	650	6.34	305.7	0.38	–
17-Nov-08	1230	7.3	22.3	647	7.19	298.5	0.17	–
18-Nov-08	1145	7.3	224.0	647	6.61	309.4	0.24	1.7
19-Nov-08	1225	7.3	22.0	648	7.33	2816.0	0.21	–
20-Nov-08	1000	7.3	21.8	649	5.47	280.9	0.23	2.1
21-Nov-08	1030	7.3	21.8	648	6.13	283.1	0.23	–
24-Nov-08	1110	7.3	21.8	644	6.75	304.5	0.18	–
25-Nov-08	1120	7.2	21.8	642	6.19	249.0	0.18	1.7
26-Nov-08	1200	7.3	21.7	643	6.23	265.3	0.18	–
1-Dec-08	1515	7.3	22.0	640	5.26	221.8	0.17	–
2-Dec-08	1600	7.2	21.8	639	5.61	223.9	0.17	2.4
3-Dec-08	1320	7.3	21.9	642	6.16	202.3	0.17	–
4-Dec-08	1310	7.3	21.9	641	5.57	237.3	0.17	1.9
5-Dec-08	1400	7.3	21.9	642	4.98	254.8	0.17	–
8-Dec-08	1310	7.2	21.8	641	5.69	238.8	0.17	–
9-Dec-08	1300	7.3	21.8	642	5.40	224.1	0.16	1.4
10-Dec-08	1320	7.3	21.9	642	5.31	242.0	0.16	–
11-Dec-08	1500	7.3	22.1	642	5.83	250.1	0.16	1.5
12-Dec-08	1330	7.3	22.0	639	5.34	220.7	0.16	–
15-Dec-08	1450	7.3	21.1	637	6.24	190.2	0.16	–
16-Dec-08	1535	7.3	21.5	641	6.30	223.5	0.16	1.5
17-Dec-08	1400	7.3	20.4	642	5.92	192.8	0.16	–
18-Dec-08	1700	7.3	20.9	643	5.78	180.2	0.16	1.5
19-Dec-08	1600	7.3	21.4	639	5.78	208.9	0.16	–
22-Dec-08	1220	7.3	21.0	645	6.07	205.6	0.15	–
23-Dec-08	1235	7.3	21.6	644	7.63	186.3	0.15	1.7
24-Dec-08	1000	7.3	21.5	644	6.98	191.3	0.15	–

Date	Time	PH	Temperature	Conductivity	DO	ORP	ClO4	Nitrate-N
29-Dec-08	1750	7.2	21.5	648	4.80	234.8	0.15	–
30-Dec-08	1335	7.3	22.1	646	5.82	225.4	0.15	1.7
31-Dec-08	1200	7.3	22.2	645	6.06	225.9	0.15	–
5-Jan-09	1620	7.2	21.4	651	5.82	191.1	0.16	–
6-Jan-09	1220	7.3	21.7	650	6.06	225.9	0.15	1.9
7-Jan-09	1215	7.3	22.0	651	5.39	220.6	0.15	–
8-Jan-09	1210	7.3	21.9	650	5.62	249.5	0.15	2.0
9-Jan-09	1235	7.2	21.9	651	5.36	249.9	0.16	–
12-Jan-09	1140	7.2	22.4	653	5.62	211.5	0.16	–
13-Jan-09	1000	7.2	22.1	654	5.02	248.5	0.17	2.0
14-Jan-09	845	7.2	21.7	651	4.72	217.0	0.17	–
15-Jan-09	1400	7.2	22.5	651	4.59	227.0	0.17	2.1
16-Jan-09	1430	7.2	22.5	650	5.11	242.6	0.17	–
19-Jan-09	1310	7.2	21.8	653	4.57	213.4	0.15	–
20-Jan-09	1040	7.2	22.6	652	5.16	216.3	0.17	1.8
21-Jan-09	1330	7.3	22.2	651	4.58	203.7	0.17	–
22-Jan-09	1035	7.2	21.7	647	4.82	198.2	0.14	1.9
23-Jan-09	1300	7.2	21.6	650	4.79	200.1	0.15	–
26-Jan-09	1510	7.3	21.7	651	4.70	198.7	0.17	–
27-Jan-09	1015	7.3	21.8	651	5.16	216.4	0.17	1.7
28-Jan-09	1130	7.3	22.2	651	5.38	308.3	0.17	–
29-Jan-09	1100	7.2	22.5	651	5.22	341.7	0.17	1.9
30-Jan-09	1050	7.2	22.6	657	5.43	349.9	0.20	–
2-Feb-09	1340	7.2	22.3	653	5.02	337.1	0.16	–
4-Feb-09	1100	7.3	22.1	653	5.63	212.3	0.18	–
5-Feb-09	1105	7.3	21.5	653	5.48	216.3	0.20	1.7
6-Feb-09	1300	7.3	21.4	653	5.14	316.3	0.20	–
9-Feb-09	1200	7.3	21.5	653	5.28	303.4	0.20	–
10-Feb-09	1430	7.3	21.7	653	5.58	306.7	0.20	1.5
11-Feb-09	1240	7.2	21.7	655	6.03	346.7	0.20	–
12-Feb-09	1250	7.3	21.7	655	5.90	355.8	0.20	1.9
13-Feb-09	1040	7.3	20.7	656	5.34	354.3	0.21	–
16-Feb-09	1500	7.3	20.4	656	5.48	336.9	0.20	–
17-Feb-09	1225	7.3	21.0	656	5.30	366.3	0.20	2.1
18-Feb-09	1430	7.2	21.9	656	5.70	362.9	0.20	–
19-Feb-09	1340	7.3	22.5	658	5.72	335.6	0.20	1.8
20-Feb-09	1530	7.2	22.2	658	6.30	359.5	0.20	–
23-Feb-09	1235	7.2	22.0	661	5.33	338.7	0.26	–
24-Feb-09	1305	7.2	22.3	657	6.07	370.9	0.21	1.7
25-Feb-09	1350	7.2	22.0	658	7.06	371.8	0.21	–
27-Feb-09	1205	7.2	22.1	659	7.38	358.1	0.21	–

Note:

(a) The ion selective probe for perchlorate is calibrated to <0.1 mg/L. Readings below this value are estimates or "J" values.

(b) Samples shaded red are possible monitoring/equipment errors and are not included in calculations.

(c) A dash signifies parmeters that were not read.

Table A-3. OU-1 On Site Water Quality Log Sheet FBR Influent

Date	Time	PH	Temperature	Conductivity	DO	ORP	ClO4	Sulfide	Nitrate-N	Nitrite-N	Sulfate
d/m/y			°C	µS/cm	mg/L	mV	mg/L	µg/L	mg/L	mg/L	mg/L
Avg.		7.2	22.0	650.2	2.6	281.6	0.2	7.9	1.6	0.0	50.5
Std.		0.1	2.6	25.1	0.9	233.6	0.1	7.0	0.2	0.0	1.2
Max.		7.6	23.4	835.0	4.1	2731.0	0.4	39.0	2.4	0.0	52.0
Min.		7.1	2.6	610.0		72.1	0.1		0.7	0.0	47.0
4-Sep-08	1345	7.4	22.8	612	–	72.1	0.11	–	1.20	0.007	49
5-Sep-08	1350	7.3	22.4	612	–	147.6	0.11	–	1.20	–	–
8-Sep-08	1330	7.2	22.4	619	–	166.2	0.12	–	1.70	–	–
9-Sep-08	1300	7.2	22.4	611	–	154.8	0.13	3	1.70	0.008	50
10-Sep-08	1315	7.3	22.1	611	–	155.7	0.13	–	1.70	–	–
11-Sep-08	1335	7.3	2.7	610	–	252.3	0.14	–	1.40	0.007	51
12-Sep-08	1310	7.3	21.2	610	–	232.5	0.16	–	1.50	–	–
15-Sep-08	1115	7.3	22.6	615	–	172.3	0.22	–	1.40	–	–
16-Sep-08	1200	7.3	22.1	613	–	303.2	0.22	4	1.60	0.007	49
17-Sep-08	1240	7.3	2.6	614	–	320.7	0.22	–	1.60	–	–
18-Sep-08	1800	7.3	22.7	615	–	245.4	0.22	8	1.60	0.008	50
19-Sep-08	800	7.3	22.6	614	–	250.2	0.22	–	1.50	–	–
23-Sep-08	1315	7.3	22.5	624	–	154.4	0.28	9	1.50	0.012	51
24-Sep-08	1750	7.3	22.8	636	–	235.4	0.22	–	1.50	–	–
25-Sep-08	1330	7.3	22.8	631	3.05	233.5	0.21	8	1.40	0.007	49
26-Sep-08	1325	7.3	23.2	645	3.37	263.9	0.22	–	1.50	–	–
29-Sep-08	1000	7.3	22.9	630	3.01	250.2	0.22	–	1.60	–	–
30-Sep-08	1200	7.3	22.8	623	3.11	280.1	0.22	10	1.50	0.008	50
1-Oct-08	1415	7.3	23.0	634	2.91	246.3	0.21	–	1.50	–	–
2-Oct-08	1225	7.3	23.0	636	4.13	250.3	0.22	5	1.50	0.009	50
3-Oct-08	1215	7.2	22.5	644	2.14	255.1	0.24	–	1.60	–	–
6-Oct-08	1330	7.3	22.7	647	4.10	240.6	0.24	–	–	–	–
7-Oct-08	1330	7.2	23.0	650	3.81	286.3	0.23	3	1.40	0.023	51
8-Oct-08	1345	7.2	23.2	651	3.36	296.4	0.23	–	1.50	–	–
9-Oct-08	1400	7.2	22.9	651	3.20	340.1	0.23	5	1.60	0.012	51
10-Oct-08	1100	7.2	23.0	650	3.28	316.3	0.25	–	1.60	–	–
13-Oct-08	1400	7.2	23.3	651	3.02	304.6	0.26	–	1.50	–	–
14-Oct-08	1500	7.2	22.5	654	2.82	325.9	0.25	8	1.60	0.010	51
15-Oct-08	1330	7.2	22.9	655	3.22	329.8	0.25	–	1.40	–	–
16-Oct-08	1220	7.3	23.0	656	3.10	314.8	0.26	5	1.20	0.008	52
17-Oct-08	1400	7.2	22.8	655	3.14	316.1	0.26	–	1.30	–	–
20-Oct-08	1430	7.2	22.5	653	3.86	243.5	0.26	–	1.50	–	–
21-Oct-08	1200	7.2	22.9	653	2.92	298.2	0.28	39	0.70	0.003	50
22-Oct-08	1330	7.2	22.9	654	2.23	301.4	0.25	–	1.40		
23-Oct-08	1205	7.2	22.8	653	3.30	283.6	0.25	20	1.20	0.005	50
24-Oct-08	1240	7.2	23.1	653	3.16	290.4	0.25	–	1.30	–	–
27-Oct-08	1330	7.2	23.1	653	3.36	283.4	0.26	–	1.50	–	–
28-Oct-08	1300	7.3	23.4	655	2.82	291.9	0.27	–	1.60	0.004	52
29-Oct-08	1445	7.2	23.1	654	2.75	274.5	0.27	–	1.60		
30-Oct-08	1430	7.2	22.6	656	2.89	283.4	0.27	–	1.60	0.005	51
31-Oct-08	1200	7.3	22.2	655	2.91	290.1	0.27	–	1.60	–	–
3-Nov-08	1410	7.2	22.0	653	3.57	282.8	0.30	–	1.50	–	–
4-Nov-08	1345	7.2	22.1	652	3.35	261.2	0.32	–	1.40	0.004	51
5-Nov-08	1330	7.2	22.3	651	3.35	276.4	0.31	–	1.40	–	–
6-Nov-08	1320	7.2	22.6	652	3.41	291.4	0.31	–	1.40	0.005	51
7-Nov-08	1300	7.2	22.7	653	3.42	269.1	0.31	–	1.40	–	–
10-Nov-08	1540	7.2	22.5	657	3.17	271.6	0.30	–	1.80	–	–
11-Nov-08	930	7.2	22.3	660	1.38	260.4	0.36	–	1.90	0.009	51
12-Nov-08	1400	7.2	23.2	650	2.11	263.6	0.36	–	1.80		
13-Nov-08	1145	7.2	22.7	652	2.57	218.1	0.34	5	1.40	0.012	49
14-Nov-08	1445	7.2	22.9	653	2.60	249.8	0.35	–	1.50	–	–
17-Nov-08	1230	7.2	22.7	651	3.00	274.3	0.22	–	1.50	–	–
18-Nov-08	1145	7.3	23.0	654	2.93	284.3	0.19	–	0.90	0.008	52
19-Nov-08	1225	7.2	22.2	651	3.48	290.2	0.19	–	1.60	–	–
20-Nov-08	1000	7.2	22.1	651	3.69	290.2	0.20	–	1.60	0.006	52
21-Nov-08	1030	7.2	22.0	651	3.50	289.4	0.20	–	1.60	–	–
24-Nov-08	1110	7.3	21.9	645	3.60	328.9	0.19	–	1.60	–	–
25-Nov-08	1120	7.2	21.8	645	3.12	276.8	0.19	7	1.50	0.007	49
26-Nov-08	1200	7.2	21.7	645	3.15	270.1	0.19	–	1.50	–	–
1-Dec-08	1515	7.2	22.5	642	2.23	205.7	0.20	–	1.60	–	–
2-Dec-08	1600	7.2	21.8	642	2.44	268.3	0.18	5	1.50	0.005	50

Date	Time	PH	Temperature	Conductivity	DO	ORP	ClO4	Sulfide	Nitrate-N	Nitrite-N	Sulfate
3-Dec-08	1320	7.3	22.0	643	3.29	213.1	0.18	–	1.50	–	–
4-Dec-08	1310	7.3	22.2	642	2.91	233.9	0.17	–	1.70	0.007	48
5-Dec-08	1400	7.3	22.3	644	2.85	154.3	0.17	–	1.70	–	–
8-Dec-08	1310	7.2	21.7	642	3.35	270.7	0.17	–	1.60	–	–
9-Dec-08	1300	7.3	21.8	641	2.57	255.7	0.16	10	1.70	0.003	50
10-Dec-08	1320	7.3	22.1	641	3.42	258.0	0.16	–	1.50	–	–
11-Dec-08	1500	7.3	22.1	644	3.39	2731.0	0.16	7	1.60	0.003	50
12-Dec-08	1330	7.3	21.7	643	3.27	254.8	0.16	–	1.50	–	–
15-Dec-08	1450	7.3	21.3	639	3.35	223.7	0.16	–	1.60	–	–
16-Dec-08	1535	7.3	21.7	665	2.21	256.8	0.17	7	1.60	0.005	52
17-Dec-08	1400	7.1	21.4	735	1.54	251.4	0.16	–	1.60	–	–
18-Dec-08	1700	7.3	21.6	743	3.20	197.8	0.16	6	1.60	0.006	51
19-Dec-08	1600	7.3	21.8	677	2.81	245.2	0.16	–	1.50	–	–
22-Dec-08	1220	7.3	21.4	644	2.94	236.9	0.15	–	1.70	–	–
23-Dec-08	1235	7.3	21.7	644	3.47	215.8	0.15	5	1.50	0.006	49
24-Dec-08	1000	7.3	21.6	644	3.16	210.3	0.15	–	1.50	–	–
29-Dec-08	1750	7.3	21.7	650	2.75	193.1	0.15	–	1.50	–	–
30-Dec-08	1335	7.3	22.5	650	3.18	242.9	0.14	5	1.50	0.005	51
31-Dec-08	1200	7.3	22.5	651	3.01	230.2	0.14	–	1.50	–	–
5-Jan-09	1620	7.2	21.7	652	2.56	233.6	0.14	–	1.70	–	–
6-Jan-09	1220	7.3	22.1	652	2.57	256.3	0.14	–	1.80	0.003	52
7-Jan-09	1215	7.3	22.1	652	2.33	251.3	0.14	–	1.70	–	–
8-Jan-09	1210	7.2	22.2	651	2.38	260.4	0.14	5	1.90	0.009	49
9-Jan-09	1235	7.2	22.5	650	2.88	261.1	0.14	–	1.90	–	–
12-Jan-09	1140	7.2	22.6	653	2.52	137.9	0.15	–	1.40	–	–
13-Jan-09	1000	7.2	22.2	653	2.68	261.0	0.15	–	1.60	0.005	50
14-Jan-09	845	7.2	21.9	652	2.49	220.9	0.15	–	1.50	–	–
15-Jan-09	1400	7.6	22.6	663	0.35	197.0	0.09	10	1.20	0.006	47
16-Jan-09	1430	7.3	22.3	659	1.46	228.5	0.10	–	1.20	–	–
19-Jan-09	1310	7.3	22.0	657	0.97	218.4	0.08	–	1.70	–	–
20-Jan-09	1040	7.3	22.8	654	0.92	182.4	0.08	–	1.60	0.005	51
21-Jan-09	1330	7.3	22.4	656	0.84	174.4	0.08	–	1.60	–	–
22-Jan-09	1035	7.2	21.8	654	0.49	203.5	0.07		1.90	0.006	51
23-Jan-09	1300	7.2	21.7	652	0.89	210.4	0.07	–	–	–	–
26-Jan-09	1510	7.2	22.1	652		202.5	0.09	–	1.80	–	–
27-Jan-09	1015	7.2	22.3	653	1.02	223.3	0.09	4	1.80	0.007	50
28-Jan-09	1130	7.2	21.5	835	0.31	309.3	0.09	–	2.40	–	–
29-Jan-09	1100	7.1	22.5	654	1.31	329.7	0.09	11	1.90	0.006	51
30-Jan-09	1050	7.2	22.5	663	2.03	336.4	0.11	–	2.00	–	–
2-Feb-09	1340	7.2	22.7	656	1.54	322.7	0.12	–	1.70	–	–
4-Feb-09	1100	7.3	22.2	654	2.11	210.7	0.13	–	1.50	–	–
5-Feb-09	1105	7.3	21.8	656	1.25	224.1	0.14	–	1.60	0.008	52
6-Feb-09	1300	7.2	21.6	656	1.74	310.6	0.14	–	1.60	–	–
9-Feb-09	1200	7.3	21.8	656	1.87	296.8	0.18	–	1.90	–	–
10-Feb-09	1430	7.3	22.0	657	1.94	305.9	0.18	8	2.00	0.002	52
11-Feb-09	1240	7.3	22.0	657	2.08	322.9	0.18	–	1.90	–	–
12-Feb-09	1250	7.3	22.1	657	2.29	330.6	0.18	–	2.00	0.006	51
13-Feb-09	1040	7.3	21.5	656	2.37	345.1	0.18	–	2.00	–	–
16-Feb-09	1500	7.2	21.3	653	2.35	320.8	0.19	–	1.60	–	–
17-Feb-09	1225	7.3	21.6	655	2.11	343.0	0.19	–	1.70	0.007	49
18-Feb-09	1430	7.2	22.2	659	2.02	327.6	0.19	–	1.80	–	–
19-Feb-09	1340	7.2	22.4	660	2.30	312.9	0.18	–	1.70	0.010	51
20-Feb-09	1530	7.3	21.7	666	2.57	332.6	0.19	–	1.80	–	–
23-Feb-09	1235	7.2	22.3	666	2.24	340.9	0.20	–	2.00	–	–
24-Feb-09	1305	7.2	22.3	659	2.69	334.9	0.18	7	1.70	0.008	52
25-Feb-09	1350	7.2	22.2	659	3.43	356.7	0.18	–	1.80	–	–
27-Feb-09	1205	7.2	22.3	660	2.92	345.2	0.18	–	1.80	–	–

Note:
(a) The ion selective probe for perchlorate is calibrated to <0.1 mg/L. Readings below this value are estimates or "J" values.
(b) Samples shaded red are possible monitoring/equipment errors and are not included in calculations.
(c) A dash signifies parmeters that were not read.

Table A-4. OU-1 On Site Water Quality Log Sheet FBR Skid On-Line

Date	Time	PH	Temperature
d/m/y			°C
Avg.		6.7	23.1
Std.		0.1	0.4
Max.		6.9	24.5
Min.		6.5	22.1
4-Sep-08	1345	6.57	23.5
5-Sep-08	1350	6.5	23.2
8-Sep-08	1330	6.52	23.1
9-Sep-08	1300	6.59	23.1
10-Sep-08	1315	6.61	22.9
11-Sep-08	1335	6.57	23.0
12-Sep-08	1310	6.6	22.6
15-Sep-08	1115	6.45	23.2
16-Sep-08	1200	6.48	23.1
17-Sep-08	1240	6.53	23.1
18-Sep-08	1800	6.49	23.2
19-Sep-08	800	6.5	23.1
23-Sep-08	1315	6.45	23.3
24-Sep-08	1750	6.57	23.2
25-Sep-08	1330	6.58	23.4
26-Sep-08	1325	6.59	23.3
29-Sep-08	1000	6.48	23.1
30-Sep-08	1200	6.58	23.4
1-Oct-08	1415	6.56	23.4
2-Oct-08	1225	6.53	23.5
3-Oct-08	1215	6.52	23.3
6-Oct-08	1330	6.48	23.4
7-Oct-08	1330	6.59	23.7
8-Oct-08	1345	6.59	23.5
9-Oct-08	1400	6.6	23.5
10-Oct-08	1100	6.61	23.1
13-Oct-08	1400	6.63	23.1
14-Oct-08	1500	6.64	23.2
15-Oct-08	1330	6.65	23.4
16-Oct-08	1220	6.63	23.8
17-Oct-08	1400	6.63	23.7
20-Oct-08	1430	6.66	23.3
21-Oct-08	1200	6.65	23.5
22-Oct-08	1330	6.68	23.6

Date	Time	PH	Temperature
23-Oct-08	1205	6.7	23.4
24-Oct-08	1240	6.67	23.5
27-Oct-08	1330	6.69	23.6
28-Oct-08	1300	6.7	23.6
29-Oct-08	1445	6.69	23.8
30-Oct-08	430	6.7	23.1
31-Oct-08	1200	6.7	23.1
3-Nov-08	1410	6.71	22.8
4-Nov-08	1345	6.7	23.1
5-Nov-08	1330	6.7	23.2
6-Nov-08	1320	6.7	23.3
7-Nov-08	1300	6.69	23.4
10-Nov-08	1540	6.64	23.4
11-Nov-08	930	6.66	23.2
12-Nov-08	1400	6.61	23.8
13-Nov-08	1145	6.71	23.4
14-Nov-08	1445	6.69	23.4
17-Nov-08	1230	6.67	24.3
18-Nov-08	1145	6.65	24.5
19-Nov-08	1225	6.72	23.0
20-Nov-08	1000	6.72	23.0
21-Nov-08	1030	6.71	23.0
24-Nov-08	1110	6.73	22.8
25-Nov-08	1120	6.67	22.8
26-Nov-08	1200	6.71	22.7
1-Dec-08	1515	6.64	23.2
2-Dec-08	1600	6.7	22.9
3-Dec-08	1320	6.73	22.9
4-Dec-08	1310	6.74	23.0
5-Dec-08	1400	6.75	23.2
8-Dec-08	1310	6.74	22.7
9-Dec-08	1300	6.76	22.8
10-Dec-08	1320	6.72	22.9
11-Dec-08	1500	6.77	22.8
12-Dec-08	1330	6.75	22.6
15-Dec-08	1450	6.76	22.3
16-Dec-08	1535	6.79	22.4
17-Dec-08	1400	6.66	22.1
18-Dec-08	1700	6.74	22.5
19-Dec-08	1600	6.75	22.5
22-Dec-08	1220	6.73	22.4
23-Dec-08	1235	6.72	22.6
24-Dec-08	1000	6.71	22.5

Date	Time	PH	Temperature
29-Dec-08	1750	6.7	23.1
30-Dec-08	1335	6.71	23.1
31-Dec-08	1200	6.71	23.1
5-Jan-09	1620	6.57	22.7
6-Jan-09	1220	6.57	22.8
7-Jan-09	1215	6.60	23.0
8-Jan-09	1210	6.60	23.1
9-Jan-09	1235	6.67	23.1
12-Jan-09	1140	6.70	23.30
13-Jan-09	1000	6.70	23.10
14-Jan-09	845	6.71	22.70
15-Jan-09	1400	6.93	23.20
16-Jan-09	1430	6.84	23.20
19-Jan-09	1310	6.78	22.80
20-Jan-09	1040	6.68	23.20
21-Jan-09	1330	6.70	22.90
22-Jan-09	1035	6.70	22.70
23-Jan-09	1300	6.70	22.60
26-Jan-09	1510	6.70	22.90
27-Jan-09	1015	6.69	23.00
28-Jan-09	1130	6.68	22.30
29-Jan-09	1100	6.63	23.20
30-Jan-09	1050	6.59	23.20
2-Feb-09	1340	6.56	23.30
4-Feb-09	1100	6.55	22.90
5-Feb-09	1105	6.64	22.70
6-Feb-09	1300	6.71	22.60
9-Feb-09	1200	6.80	22.30
10-Feb-09	1430	6.72	22.80
11-Feb-09	1240	6.69	22.90
12-Feb-09	1250	6.68	22.90
13-Feb-09	1040	6.67	22.40
16-Feb-09	1500	6.68	22.20
17-Feb-09	1225	6.67	22.50
18-Feb-09	1430	6.69	22.90
19-Feb-09	1340	6.69	23.00
20-Feb-09	1530	6.69	22.70
23-Feb-09	1235	6.67	23.00
24-Feb-09	1305	6.67	23.10
25-Feb-09	1350	6.65	22.90
27-Feb-09	1205	6.57	22.90

Note:

(a) The ion selective probe for perchlorate is calibrated to <0.1 mg/L. Readings below this value are estimates or "J" values.

(b) Samples shaded red are possible monitoring/equipment errors and are not included in calculations.

(c) A dash signifies parmeters that were not read.

Table A-5. OU-1 On Site Water Quality Log Sheet FBR Effluent

Date	Time	PH	Temperature	Conductivity	DO	ORP	ClO4	Sulfide	Nitrate-N	Nitrite-N	Sulfate	Ammonia-N	PO_4	Filtered TOC
d/m/y			°C	µS/cm	mg/L	mV	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Avg.		7.2	22.6	657.3	0.0	-181.1	0.1	10.1	0.2	0.0	48.1	0.9	1.1	2.4
Std.		0.1	0.6	41.9	0.1	62.1	0.1	17.1	0.2	0.0	2.5	0.5	0.3	0.5
Max.		7.4	23.6	1016.0	0.4	-10.1	0.7	111.0	0.7	0.0	57.0	3.0	2.3	4.1
Min.		6.9	21.1	609.0	0.0	-335.9	0.1	0.0	0.0	0.0	42.0	0.0	0.2	1.6
4-Sep-08	1345	7.3	23.0	610	–	-276.5	0.16	111	0	0.000	45	0.80	1.11	2.20
5-Sep-08	1350	7.2	22.7	609	–	-241.3	0.16	–	–	–	–	–	–	–
8-Sep-08	1330	7.2	22.5	613	–	-278.0	0.14	–	–	–	–	–	–	–
9-Sep-08	1300	7.2	22.5	617	–	-231.7	0.07	3	0.5	0.003	50	0.80	0.97	2.50
10-Sep-08	1315	7.2	22.2	617	–	-238.0	0.07	–	–	–	–	–	–	–
11-Sep-08	1335	7.2	21.7	617	–	-213.6	0.07	14	0.3	0.003	48	0.70	0.96	2.30
12-Sep-08	1310	7.3	21.2	619	–	-10.1	0.07	–	–	–	–	–	–	–
15-Sep-08	1115	7.3	22.8	618	–	-25.2	0.07	–	–	–	–	–	–	–
16-Sep-08	1200	7.2	22.1	610	–	-250.0	0.07	8	0.3	0.004	49	0.00	0.16	2.70
17-Sep-08	1240	7.2	22.7	617	–	-223.8	0.07	–	–	–	–	–	–	–
18-Sep-08	1800	7.2	22.8	616	–	-280.6	0.07	12	0.4	0.005	49	0.80	0.97	2.60
19-Sep-08	800	7.2	22.6	615	–	-277.3	0.07	–	–	–	–	–	–	–
23-Sep-08	1315	7.2	22.7	641	–	-224.8	0.08	2	0.3	0.004	57	1.40	1.16	2.60
24-Sep-08	1750	7.2	23.2	637	–	-292.4	0.07	–	–	–	–	–	–	–
25-Sep-08	1330	7.2	23.3	639	–	-249.4	0.07	20	0	0.001	46	0.60	1.06	2.40
26-Sep-08	1325	7.2	23.3	645	–	-209.0	0.07	–	–	–	–	–	–	–
29-Sep-08	1000	7.2	23.4	639	–	-250.3	0.07	–	–	–	–	–	–	–
30-Sep-08	1200	7.2	23.6	640	–	-280.1	0.07	0.21	0.03	0.002	49	0.80	1.15	2.70
1-Oct-08	1415	7.2	23.5	641	–	-247.1	0.07	–	–	–	–	–	–	–
2-Oct-08	1225	7.1	23.2	638	0.43	-220.2	0.07	24	0	0.000	46	0.40	0.91	2.60
3-Oct-08	1215	7.1	22.8	645	–	-238.8	0.14	–	–	–	–	–	–	–
6-Oct-08	1330	7.2	23.2	649	0.17	-202.5	0.07	–	–	–	–	–	–	–
7-Oct-08	1330	7.2	23.5	656	0.07	-230.1	0.07	20	0	0.003	48	0.20	0.92	1.60
8-Oct-08	1345	7.2	23.6	656	0.00	-245.4	0.07	–	–	–	–	–	–	–
9-Oct-08	1400	7.2	23.3	653	0.00	-243.0	0.07	12	0.1	0.001	49	0.50	1.11	2.10
10-Oct-08	1100	7.2	22.7	652	0.13	-160.6	0.09	–	–	–	–	–	–	–
13-Oct-08	1400	7.2	22.8	652	–	-172.8	0.08	–	–	–	–	–	–	–
14-Oct-08	1500	7.1	23.0	655	–	-169.3	0.08	6	0.2	0.002	48	0.03	1.03	2.20
15-Oct-08	1330	7.2	23.4	656	–	-182.4	0.09	–	–	–	–	–	–	–
16-Oct-08	1220	7.2	23.6	655	–	-185.7	0.09	2	0.1	0.001	46	0.01	1.00	2.10

Date	Time	PH	Temperature	Conductivity	DO	ORP	ClO4	Sulfide	Nitrate-N	Nitrite-N	Sulfate	Ammonia-N	PO_4	Filtered TOC
17-Oct-08	1400	7.2	23.4	654	–	-199.2	0.08	–	–	–	–	–	–	–
20-Oct-08	1430	7.1	22.8	655	0.01	-241.0	0.08	–	–	–	–	–	–	–
21-Oct-08	1200	7.1	23.4	655	–	-252.3	0.15	7	0.2	0.003	44	0.60	1.06	1.80
22-Oct-08	1330	7.1	23.5	654	–	-217.4	0.09	–	–	–	–	–	–	–
23-Oct-08	1205	7.1	23.5	656	–	-205.3	0.09	17	0.1	0.002	49	0.80	1.04	2.00
24-Oct-08	1240	7.1	23.6	658	–	-200.1	0.09	–	–	–	–	–	–	–
27-Oct-08	1330	7.1	23.5	655	0.03	-167.8	0.09	–	–	–	–	–	–	–
28-Oct-08	1300	7.2	23.6	659	0.00	-175.8	0.09	7	0.2	0.002	49	0.40	0.91	1.90
29-Oct-08	1445	7.1	23.4	658	0.00	-177.8	0.09	–	–	–	–	–	–	–
30-Oct-08	1430	7.1	22.8	659	0.00	-181.0	0.09	6	0.2	0.003	49	0.60	0.98	
31-Oct-08	1200	7.1	22.9	658	0.00	-178.1	0.09	–	–	–	–	–	–	–
3-Nov-08	1410	7.1	22.3	658	0.00	-166.9	0.11	–	–	–	–	–	–	–
4-Nov-08	1345	7.1	22.5	656	0.00	-162.8	0.11	1	0	0.002	49	1.40	1.07	2.10
5-Nov-08	1330	7.1	22.6	655	0.00	-174.2	0.11	–	–	–	–	–	–	–
6-Nov-08	1320	7.1	22.9	656	0.00	-153.9	0.11	0	0	0.002	49	1.30	1.06	2.00
7-Nov-08	1300	7.1	22.9	655	0.00	-179.3	0.11	–	–	–	–	–	–	–
10-Nov-08	1540	7.1	22.7	663	0.00	-181.1	0.11	–	–	–	–	–	–	–
11-Nov-08	930	7.2	22.4	667	0.00	-180.9	0.10	11	0.1	0.002	47	3.00	2.32	2.40
12-Nov-08	1400	7.1	23.5	657	0.00	-182.3	0.10	–	–	–	–	–	–	–
13-Nov-08	1145	7.1	22.8	651	0.00	-218.5	0.09	16	0	0.002	47	1.10	1.29	2.00
14-Nov-08	1445	7.1	23.0	654	0.00	-257.8	0.09	–	–	–	–	–	–	–
17-Nov-08	1230	7.1	23.3	655	0.00	-234.2	0.11	–	–	–	–	–	1.15	–
18-Nov-08	1145	7.2	23.3	654	0.00	-214.1	0.07	13	0.3	0.001	51	0.80	1.11	2.80
19-Nov-08	1225	7.2	22.7	654	0.00	-180.6	0.07	–	0.6	–	–	–	0.94	–
20-Nov-08	1000	7.2	22.6	659	0.00	-169.2	0.07	4	0.2	0.005	53	0.70	0.97	–
21-Nov-08	1030	7.2	22.5	658	0.00	-155.3	0.07	–	–	–	–	–	–	–
24-Nov-08	1110	7.2	22.2	651	0.00	-114.1	0.06	–	0.2	–	–	–	–	–
25-Nov-08	1120	7.1	22.0	650	0.00	-181.8	0.06	5	0.7	0.003	45	0.60	1.02	
26-Nov-08	1200	7.1	21.9	651	0.00	-180.1	0.06	–	–	–	–	–	–	–
1-Dec-08	1515	7.08	22.8	643	0.00	-236.30	0.70	–	–	–	–	–	–	–
2-Dec-08	1600	7.13	22.0	648	0.00	-162.50	0.70	10	0.3	0.003	47	0.80	1.08	
3-Dec-08	1320	7.21	22.8	650	0.00	-169.60	0.70	–	–	–	–	–	–	–
4-Dec-08	1310	7.22	22.2	650	0.00	-166.50	0.60	10	0.4	0.002	48	1.20	1.12	
5-Dec-08	1400	7.18	22.6	650	0.00	-176.80	0.60	–	–	–	–	–	–	–
8-Dec-08	1310	7.15	21.9	650	0.00	-147.90	0.07	–	–	–	–	–	–	–
9-Dec-08	1300	7.20	22.1	648	0.00	-176.60	0.07	0	0.3	0.003	50	–	1.09	–
10-Dec-08	1320	7.21	22.6	649	0.00	-188.40	0.07	–	–	–	–	–	–	–
11-Dec-08	1500	7.23	22.3	652	0.00	-105.00	0.07	0	0.4	0.002	50	–	1.11	–
12-Dec-08	1330	7.21	21.9	651	0.00	-200.10	0.07	–	–	–	–	–	–	–

Date	Time	PH	Temperature	Conductivity	DO	ORP	ClO4	Sulfide	Nitrate-N	Nitrite-N	Sulfate	Ammonia-N	PO_4	Filtered TOC
15-Dec-08	1450	7.18	21.5	646	0.00	-187.70	0.07	–	–	–	–	–	–	–
16-Dec-08	1535	7.19	21.7	810	0.00	-153.60	0.07	13	0.4	0.003	50	–	1.14	–
17-Dec-08	1400	7.11	21.1	1016	0.00	-181.20	0.07	–	–	–	–	–	–	–
18-Dec-08	1700	7.17	22.2	668	0.00	-163.00	0.07	11	0.3	0.003	50	–	1.13	–
19-Dec-08	1600	7.19	21.8	703	0.00	-164.60	0.07	–	–	–	–	–	–	–
22-Dec-08	1220	7.20	21.4	649	0.00	-131.30	0.06	–	–	–	–	–	–	–
23-Dec-08	1235	7.23	21.8	651	0.00	-117.10	0.06	13	0.3	0.004	49	–	1.17	–
24-Dec-08	1000	7.22	21.7	650	0.00	-110.80	0.06	–	–	–	–	–	–	–
29-Dec-08	1750	7.18	22.1	657	0.00	-48.90	0.07	–	–	–	–	–	–	–
30-Dec-08	1335	7.19	22.9	654	0.00	-43.00	0.06	8	0.4	0.003	49	0.90	1.14	–
31-Dec-08	1200	7.18	22.8	652	0.00	-40.20	0.06	–	–	–	–	–	–	–
5-Jan-09	1620	7.14	22.0	656	0.00	-159.10	0.07	–	–	–	–	–	–	–
6-Jan-09	1220	7.16	22.3	655	0.00	-136.50	0.06	0	0.2	0.004	47	0.90	1.12	2.40
7-Jan-09	1215	7.16	22.3	656	0.00	-137.20	0.06	–	–	–	–	–	–	–
8-Jan-09	1210	7.16	22.4	657	0.00	-188.30	0.06	13	0.1	0.001	47	0.90	1.16	2.40
9-Jan-09	1235	7.13	22.7	657	0.00	-124.90	0.06	–	–	–	–	–	–	–
12-Jan-09	1140	7.17	22.7	659	0.00	-124.30	0.06	–	–	–	–	–	–	–
13-Jan-09	1000	7.17	22.3	658	0.00	-92.40	0.06	0	0.2	0.004	48	1.30	1.19	2.50
14-Jan-09	845	7.16	22.0	658	0.00	-107.90	0.06	–	–	–	–	–	–	–
15-Jan-09	1400	7.33	23.0	668	0.00	-152.00	0.07	0	0.2	0.002	42	1.20	1.78	2.00
16-Jan-09	1430	7.21	22.9	665	0.00	-144.00	0.07	–	–	–	–	–	–	–
19-Jan-09	1310	7.39	22.1	667	0.00	-192.80	0.06	–	–	–	–	–	–	
20-Jan-09	1040	7.15	23.0	660	0.00	-158.80	0.05	4	0.5	0.003	45	0.90	1.29	2.50
21-Jan-09	1330	7.17	22.7	660	0.00	-132.90	0.05	–	–	–	–	–	–	–
22-Jan-09	1035	7.14	22.1	657	0.00	-132.60	0.05	0	0.2	0.002	44	0.90	1.32	2.50
23-Jan-09	1300	7.15	22.0	658	0.00	-135.20	0.05	–	–	–	–	–	–	–
26-Jan-09	1510	7.06	22.3	650	0.00	-179.60	0.07	–	–	–	–	–	–	–
27-Jan-09	1015	7.10	22.5	650	0.00	-175.80	0.05	1	0.4	0.003	47	0.90	1.20	3.20
28-Jan-09	1130	7.14	21.9	812	0.00	-236.40	0.07	–	–	–	–	–	–	–
29-Jan-09	1100	6.93	22.9	651	0.00	-288.90	0.07	38	0.1	0.003	48	1.00	1.19	2.40
30-Jan-09	1050	7.04	22.8	654	0.00	-292.00	0.08	–	–	–	–	–	–	–
2-Feb-09	1340	7.11	23.0	667	0.00	-335.90	0.11	–	–	–	–	–	–	–
4-Feb-09	1100	7.18	22.6	659	0.00	-293.90	0.09	–	–	–	–	–	–	–
5-Feb-09	1105	7.20	22.0	667	0.00	-243.10	0.08	0	0.4	0.002	52	0.80	1.28	2.00
6-Feb-09	1300	7.19	22.0	666	0.00	-253.50	0.08	–	–	–	–	–	–	–

Date	Time	PH	Temperature	Conductivity	DO	ORP	ClO4	Sulfide	Nitrate-N	Nitrite-N	Sulfate	Ammonia-N	PO_4	Filtered TOC
9-Feb-09	1200	7.20	22.0	665	0.00	-124.80	0.08	–	–	–	–	–	–	–
10-Feb-09	1430	7.24	22.2	663	0.00	-133.60	0.08	11	0.0	0.003	45	1.00	1.26	4.10
11-Feb-09	1240	7.19	22.4	663	0.00	-166.90	0.07	–	–	–	–	–	–	–
12-Feb-09	1250	7.24	22.2	663	0.00	-64.10	0.06	0	0.0	0.001	48	1.00	1.28	2.00
13-Feb-09	1040	7.22	21.4	661	0.00	-25.40	0.06	–	–	–	–	–	–	–
16-Feb-09	1500	7.19	21.3	658	0.00	-126.10	0.07	–	–	–	–	–	–	–
17-Feb-09	1225	7.19	21.8	662	0.00	-231.40	0.07	0	0.4	0.002	48	0.80	1.17	2.30
18-Feb-09	1430	7.18	22.3	665	0.00	-145.60	0.07	–	–	–	–	–	–	–
19-Feb-09	1340	7.21	22.9	667	0.00	-88.90	0.06	3	0.3	0.003	49	1.30	1.29	2.40
20-Feb-09	1530	7.19	22.6	666	0.00	-209.30	0.06	–	–	–	–	–	–	–
23-Feb-09	1235	7.12	22.5	672	0.00	-110.20	0.06	–	–	–	–	–	–	–
24-Feb-09	1305	7.17	22.6	664	0.00	-122.30	0.06	9	0.5	0.002	47	1.20	1.24	3.40
25-Feb-09	1350	7.16	22.3	664	0.00	-116.80	0.06	–	–	–	–	–	–	–
27-Feb-09	1205	7.17	22.6	660	0.00	-183.20	0.06	–	–	–	–	–	–	–

Note:
(a) The ion selective probe for perchlorate is calibrated to <0.1 mg/L. Readings below this value are estimates or "J" values.
(b) Samples shaded red are possible monitoring/equipment errors and are not included in calculations.
(c) A dash signifies parmeters that were not read.
(d) UR = Under Range

Table A-6. OU-1 On Site Water Quality Log Sheet Combined Wellhead Effluent

Date	Time	PH	Temperature	Conductivity	DO	ORP	ClO4	Nitrate-N
d/m/y			°C	µS/cm	mg/L	mV	mg/L	mg/L
Avg.		7.2	22.5	660.2	1.6	398.7	0.2	0.3
Std.		0.1	0.7	58.6	1.3	259.2	1.1	0.3
Max.		7.5	24.4	1150.0	6.4	778.2	12.0	2.0
Min.		7.2	21.1	633.0	0.0	91.8	0.1	0.8
4-Sep-08	1345	7.3	23.4	648	–	560.6	0.15	–
5-Sep-08	1350	7.3	23.0	633	–	545.0	0.14	–
8-Sep-08	1330	7.3	22.9	636	–	465.6	0.12	–
9-Sep-08	1300	7.3	22.8	640	–	454.8	0.11	–
10-Sep-08	1315	7.4	22.5	648	–	775.1	12.00	–
11-Sep-08	1335	7.4	22.1	646	–	769.3	0.12	–
12-Sep-08	1310	7.5	21.2	649	–	768.1	0.12	–
15-Sep-08	1115	7.4	23.0	648	–	766.4	0.12	–
16-Sep-08	1200	7.5	22.6	646	–	754.7	0.12	–
17-Sep-08	1240	7.5	22.8	648	–	756.3	0.12	–
18-Sep-08	1800	7.5	22.8	649	–	771.7	0.12	–
19-Sep-08	800	7.4	22.6	650	–	770.4	0.12	–
23-Sep-08	1315	7.4	23.1	662	–	492.5	0.11	–
24-Sep-08	1750	7.5	23.3	666	–	530.6	0.10	–
25-Sep-08	1330	7.5	23.6	664	5.45	536.1	0.10	–
26-Sep-08	1325	7.4	23.4	672	5.48	593.0	0.10	–
29-Sep-08	1000	7.5	23.7	672	5.08	489.3	0.10	–
30-Sep-08	1200	7.5	23.7	669	5.11	491.2	0.11	–
1-Oct-08	1415	7.5	23.8	675	5.13	477.0	0.10	–
2-Oct-08	1225	7.4	23.4	668	6.18	565.5	0.10	–
3-Oct-08	1215	7.5	23.0	686	6.42	695.6	0.12	–
6-Oct-08	1330	7.5	23.5	691	5.01	755.3	0.15	–
7-Oct-08	1330	7.5	23.6	688	4.83	731.4	0.12	–
8-Oct-08	1345	7.5	23.7	704	3.48	764.2	0.14	–
9-Oct-08	1400	7.5	23.7	702	3.80	734.6	0.12	–
10-Oct-08	1100	7.4	23.2	692	2.90	751.8	0.11	–
13-Oct-08	1400	7.4	23.1	716	2.39	743.9	0.14	–
14-Oct-08	1500	7.4	23.3	702	2.87	743.8	0.09	–
15-Oct-08	1330	7.4	23.8	652	2.33	258.5	0.09	–
16-Oct-08	1220	7.4	24.0	651	2.56	251.6	0.09	0.9
17-Oct-08	1400	7.4	23.8	650	2.88	255.4	0.09	–
20-Oct-08	1430	7.3	23.3	651	2.12	245.8	0.90	–
21-Oct-08	1200	7.3	23.9	651	1.63	193.5	0.12	1.0
22-Oct-08	1330	7.3	24.0	652	1.69	195.2	0.10	–

Date	Time	PH	Temperature	Conductivity	DO	ORP	ClO4	Nitrate-N
23-Oct-08	1205	7.3	23.8	652	1.85	198.3	0.10	1.1
24-Oct-08	1240	7.3	23.9	652	1.88	199.1	0.10	–
27-Oct-08	1330	7.3	24.4	655	2.88	210.1	0.10	–
28-Oct-08	1300	7.4	23.9	654	2.07	239.6	0.10	1.1
29-Oct-08	1445	7.3	23.9	653	1.31	185.9	0.10	–
30-Oct-08	1430	7.3	23.1	654	1.67	235.5	0.10	1.0
31-Oct-08	1200	7.3	23.2	655	1.88	230.2	0.10	–
3-Nov-08	1410	7.3	22.6	653	1.70	209.8	0.12	–
4-Nov-08	1345	7.3	22.9	652	1.59	210.6	0.12	1.2
5-Nov-08	1330	7.3	23.0	651	1.63	211.2	0.12	–
6-Nov-08	1320	7.3	23.6	651	1.52	208.9	0.12	1.1
7-Nov-08	1300	7.3	23.6	652	1.55	210.1	0.12	–
10-Nov-08	1540	7.3	23.2	658	0.00	97.0	0.12	–
11-Nov-08	930	7.4	22.9	661	0.00	91.8	0.11	1.6
12-Nov-08	1400	7.4	23.0	660	0.00	96.3	0.11	–
13-Nov-08	1145	7.4	22.8	646	0.83	142.9	0.12	1.4
14-Nov-08	1445	7.4	22.9	648	1.12	144.6	0.11	–
17-Nov-08	1230	7.4	23.7	649	1.08	183.0	0.09	–
18-Nov-08	1145	7.4	24.0	650	1.27	201.6	0.08	1.2
19-Nov-08	1225	7.4	23.0	653	3.28	167.8	0.07	–
20-Nov-08	1000	7.3	23.4	655	2.46	233.1	0.07	0.8
21-Nov-08	1030	7.3	23.0	654	2.38	218.1	0.07	–
24-Nov-08	1110	7.3	22.6	648	1.89	238.6	0.06	–
25-Nov-08	1120	7.3	22.3	646	1.97	235.5	0.07	1.4
26-Nov-08	1200	7.3	22.1	647	1.99	240.1	0.07	–
1-Dec-08	1515	7.2	21.1	637	1.10	176.2	0.07	–
2-Dec-08	1600	7.3	22.3	642	1.29	219.5	0.07	1.2
3-Dec-08	1320	7.3	22.7	645	1.06	173.6	0.07	–
4-Dec-08	1310	7.3	22.6	644	0.86	137.4	0.07	1.3
5-Dec-08	1400	7.3	22.8	646	0.98	155.2	0.07	–
8-Dec-08	1310	7.3	22.2	645	1.32	191.6	0.07	–
9-Dec-08	1300	7.3	22.5	646	1.18	197.8	0.07	1.0
10-Dec-08	1320	7.3	22.6	648	1.22	199.1	0.07	–
11-Dec-08	1500	7.3	22.4	648	1.22	223.5	0.07	1.1
12-Dec-08	1330	7.3	22.1	646	1.11	146.3	0.07	–
15-Dec-08	1450	7.3	21.6	643	1.03	151.2	0.07	–
16-Dec-08	1535	7.3	21.7	963	0.67	175.3	0.07	1.3
17-Dec-08	1400	7.3	21.2	1150	0.98	174.1	0.07	–
18-Dec-08	1700	7.3	22.5	660	1.89	163.4	0.07	1.2
19-Dec-08	1600	7.3	22.1	673	1.91	226.4	0.07	–
22-Dec-08	1220	7.3	21.7	645	1.86	182.8	0.07	–
23-Dec-08	1235	7.3	22.1	646	1.57	201.7	0.07	1.2
24-Dec-08	1000	7.3	22.1	645	1.16	200.1	0.07	–

Date	Time	PH	Temperature	Conductivity	DO	ORP	ClO4	Nitrate-N
29-Dec-08	1750	7.3	22.5	652	1.33	222.4	0.08	–
30-Dec-08	1335	7.3	23.5	650	1.44	225.6	0.07	1.2
31-Dec-08	1200	7.3	23.4	652	1.46	220.0	0.07	–
5-Jan-09	1620	7.3	22.3	652	1.69	186.8	0.07	–
6-Jan-09	1220	7.3	22.8	651	1.93	230.2	0.07	1.4
7-Jan-09	1215	7.3	22.7	651	1.58	189.6	0.06	–
8-Jan-09	1210	7.3	22.6	652	1.24	191.7	0.06	1.6
9-Jan-09	1235	7.3	23.1	652	1.19	163.8	0.06	–
12-Jan-09	1140	7.3	22.9	653	1.24	160.2	0.07	–
13-Jan-09	1000	7.3	22.4	652	1.19	168.3	0.07	1.2
14-Jan-09	845	7.3	22.4	653	1.04	191.5	0.07	–
15-Jan-09	1400	7.4	23.2	662	0.66	170.8	0.08	1.5
16-Jan-09	1430	7.3	23.1	658	1.14	180.1	0.08	–
19-Jan-09	1310	7.4	22.3	661	0.51	225.2	0.08	–
20-Jan-09	1040	7.3	23.3	653	1.44	180.6	0.06	1.5
21-Jan-09	1330	7.3	23.0	653	1.12	166.8	0.06	–
22-Jan-09	1035	7.3	22.8	654	1.12	177.4	0.06	1.2
23-Jan-09	1300	7.3	22.9	655	1.18	179.1	0.06	–
26-Jan-09	1510	7.2	22.6	660	1.38	222.8	0.08	–
27-Jan-09	1015	7.3	22.8	669	1.43	764.5	0.08	1.4
28-Jan-09	1130	7.4	22.0	842	1.93	744.2	0.08	–
29-Jan-09	1100	7.3	23.2	670	1.60	744.1	0.08	1.7
30-Jan-09	1050	7.5	23.1	691	4.11	744.2	0.09	–
2-Feb-09	1340	7.2	23.4	693	0.00	481.3	0.09	–
4-Feb-09	1100	7.3	22.5	690	4.39	738.4	0.10	–
5-Feb-09	1105	7.3	22.3	715	0.54	745.1	0.10	2.0
6-Feb-09	1300	7.3	22.1	725	0.89	755.6	0.10	–
9-Feb-09	1200	7.4	22.4	715	1.25	710.2	0.13	–
10-Feb-09	1430	7.4	22.6	710	1.10	772.8	0.13	–
11-Feb-09	1240	7.4	22.7	722	1.10	777.6	0.11	–
12-Feb-09	1250	7.3	22.6	689	1.08	777.4	0.09	–
13-Feb-09	1040	7.3	21.6	686	1.11	778.2	0.09	–
16-Feb-09	1500	7.3	21.4	689	1.21	761.3	0.09	–
17-Feb-09	1225	7.3	22.0	688	1.08	762.0	0.09	–
18-Feb-09	1430	7.3	22.8	689	1.11	766.2	0.09	–
19-Feb-09	1340	7.3	23.0	689	0.97	767.3	0.09	–
20-Feb-09	1530	7.3	22.7	687	1.13	767.1	0.09	–
23-Feb-09	1235	7.3	22.8	703	1.32	768.6	0.10	–
24-Feb-09	1305	7.3	23.0	688	1.42	769.9	0.09	–
25-Feb-09	1350	7.3	22.9	697	2.10	751.1	0.09	–
27-Feb-09	1205	7.4	22.8	688	2.14	749.4	0.09	–

Note:

(a) The ion selective probe for perchlorate is calibrated to <0.1 mg/L. Readings below this value are estimates or "J" values.

(b) Samples shaded red are possible monitoring/equipment errors and are not included in calculations.

(c) A dash signifies parmeters that were not read.

Attachment B
Laboratory Analytical Results

Table B-6. Laboratory Analytical Data OU-1 Treatment System - September 2008

Sampling Date		9/4/2008							9/10/2008							9/15/2008							9/25/2008			
Sample Locations		EW-1	EW-2	EW-3	GACIN	GACMID	FBR Inlet	FBR Outlet	EW-1	EW-2	EW-3	GACIN	GACMID	FBR Inlet	FBR Outlet	EW-1	EW-2	EW-3	GACIN	GACMID	FBR Inlet	FBR Outlet	GACIN	GACMID	FBR Inlet	FBR Outlet
	Unit																									
Conductivity	µS/cm	620	600	620	–	–	630	620	620	600	620	–	–	620	620	630	610	640	–	–	630	630	620	–	620	620
Perchlorate	µg/L	<2.00	77	261	–	–	< 2.0	< 2.0	2	80	242	–	–	39	< 2.0	2	78	216	–	–	174	< 2.0	142	–	160	< 2.0
Nitrite	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nitrate	mg/L	–	–	–	–	–	1.4	<0.25	–	–	–	–	–	1.6	<0.25	–	–	–	–	–	1.5	<0.25	–	–	1.5	<.25
Sulfate	mg/L	–	–	–	–	–	52	53	–	–	–	–	–	52	51	–	–	–	–	–	47	48	–	–	–	–
Chloride	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	51	51
Sulfide	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TDS	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TSS	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Turbidity	NTU	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1,1-Dichloroethene	µg/L	–	–	–	<1.0	<1.0	<1.0	–	–	–	–	<1.0	<1.0	<1.0	–	–	–	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–
Chloroform	µg/L	–	–	–	12.0	9.3	<1.0	–	–	–	–	9.8	10.0	<1.0	–	–	–	–	9.4	11.0	<1.0	–	8.4	10.0	<1.0	–
Carbon Tetrachloride	µg/L	–	–	–	4.6	<1.0	<1.0	–	–	–	–	3.9	<1.0	<1.0	–	–	–	–	3.7	<1.0	<1.0	–	2.6	<1.0	<1.0	–
Trichloroethene	µg/L	–	–	–	<1.0	<1.0	<1.0	–	–	–	–	<1.0	<1.0	<1.0	–	–	–	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–
Bromodichloromethane	µg/L	–	–	–	9.5	<1.0	<1.0	–	–	–	–	7.7	1.4	<1.0	–	–	–	–	7.4	2.0	<1.0	–	6.5	<1.0	<1.0	–
Dibromochloromethane	µg/L	–	–	–	3.6	<1.0	<1.0	–	–	–	–	2.9	<1.0	<1.0	–	–	–	–	2.8	<1.0	<1.0	–	3.0	2.3	<1.0	–
Tetrachloroethene	µg/L	–	–	–	<1.0	<1.0	<1.0	–	–	–	–	<1.0	<1.0	<1.0	–	–	–	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–
Bromoform	µg/L	–	–	–	1.4	<1.0	<1.0	–	–	–	–	1.1	<1.0	<1.0	–	–	–	–	1.2	<1.0	<1.0	–	1.1	<1.0	<1.0	–
Total VOCs	µg/L	–	–	–	31.1	9.3	0.0	–	–	–	–	25.4	11.4	0.0	–	–	–	–	24.5	13.0	0.0	–	21.6	12.3	0.0	–
1,4-Dioxane	µg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table B-6. Laboratory Analytical Data OU-1 Treatment System - October 2008

Sampling Date		10/2/2008									10/8/2008				10/15/2008				10/23/2008				10/30/2008								
Sample Locations		EW-1	EW-2	EW-3	GACIN	GACMID	FBR Inlet	FBR Outlet	Trimite In	Trimite Out	GACIN	GACMID	FBR Inlet	FBR Outlet	GACIN	GACMID	FBR Inlet	FBR Outlet	GACIN	GACMID	FBR Inlet	FBR Outlet	EW-1	EW-2	EW-3	GACIN	GACMID	FBR Inlet	FBR Outlet	Trimite In	Trimite Out
	Unit																														
Conductivity	µS/cm	630	610	640	–	–	630	630	–	–	640	–	640	640	640	–	640	630	630	–	630	640	620	610	630	–	–	630	630	–	–
Perchlorate	µg/L	4	70	169	–	–	167	< 2.0	–	–	164	–	157	< 2.0	167	–	178	< 2.0	201	–	240	< 2.0	3	3	223	–	–	237	< 2.0	–	–
Nitrite	mg/L	<0.25	<0.25	<0.25	<0.25	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nitrate	mg/L	0.7	1.5	1.6	1.6	–	1.4	<0.25	–	–	–	–	1.5	<0.25	–	–	1.6	<0.25	–	–	1.6	<.25	0.9	0.8	1.6	–	–	1.6	<0.25	–	–
Sulfate	mg/L	51	48	52	51	–	51	53	–	–	–	–	53	51	–	–	54	51	–	–	–	–	49	49	45	–	–	50	50	–	–
Chloride	mg/L	72	64	74	71	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	53	52	59	57	61	–	–	–	–	–	–
Sulfide	mg/L	–	–	–	–	–	<0.10	0.35	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TDS	mg/L	–	–	–	360	–	–	–	370	390	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	360	–	–	–	–	–
TSS	mg/L	–	–	–	<2.5	–	–	–	12	5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	<2.5	–	–	–	3	<2.5
Turbidity	NTU	–	–	–	0.20	–	–	–	6.60	5.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	< .10	–	–	–	1.90	< .10
1,1-Dichloroethene	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–
Chloroform	µg/L	19.0	9.5	10.0	10.0	12.0	<1.0	<1.0	–	–	9.8	11.0	<1.0	–	9.6	12.0	1.1	–	10.0	12.0	2.4	–	13.0	11.0	10.0	10.0	12.0	3.4	<1.0	–	–
Carbon Tetrachloride	µg/L	<1.0	6.0	2.0	3.2	<1.0	<1.0	<1.0	–	–	1.5	<1.0	<1.0	–	1.4	<1.0	<1.0	–	1.6	<1.0	<1.0	–	<1.0	<1.0	1.9	1.9	<1.0	<1.0	<1.0	–	–
Trichloroethene	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–
Bromodichloromethane	µg/L	4.6	5.5	9.3	8.4	3.1	<1.0	<1.0	–	–	8.3	3.1	<1.0	–	7.7	3.6	<1.0	–	7.4	<1.0	<1.0	–	2.2	6.0	7.3	7.3	5.0	<1.0	<1.0	–	–
Dibromochloromethane	µg/L	1.1	<1.0	5.4	3.9	<1.0	<1.0	<1.0	–	–	5.7	<1.0	<1.0	–	5.4	<1.0	<1.0	–	5.0	4.5	<1.0	–	<1.0	<1.0	4.6	4.7	<1.0	<1.0	<1.0	–	–
Tetrachloroethene	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	1.1	<1.0	<1.0	–	<1.0	<1.0	1.3	1.3	<1.0	<1.0	<1.0	–	–
Bromoform	µg/L	<1.0	<1.0	1.8	1.3	<1.0	<1.0	<1.0	–	–	1.9	<1.0	<1.0	–	2.0	<1.0	<1.0	–	1.9	<1.0	<1.0	–	<1.0	<1.0	1.7	1.7	<1.0	<1.0	<1.0	–	–
Total VOCs	µg/L	24.7	21.0	28.5	26.8	15.1	0.0	0.0	–	–	27.2	14.1	0.0	–	26.1	15.6	1.1	–	27.0	16.5	2.4	–	15.2	17.0	26.8	26.9	17.0	3.4	0.0	–	–
1,4-Dioxane	µg/L	–	–	–	<3.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	< 3.0	–	–	< 3.0	–	–

Table B-6. Laboratory Analytical Data OU-1 Treatment System - November 2008

Sampling Date		11/6/2008				11/13/2008				11/20/2008				11/25/2008								
Sample Locations	Unit	GACIN	GACMID	FBR Inlet	FBR Outlet	GACIN	GACMID	FBR Inlet	FBR Outlet	GACIN	GACMID	FBR Inlet	FBR Outlet	EW 1	EW 2	EW 3	GACIN	GACMID	FBR Inlet	FBR Outlet	Trimite In	Trimite Out
Conductivity	µS/cm	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Perchlorate	µg/L	235	–	234	< 2.0	277	–	262	< 2.0	256	–	218	< 2.0	4	42	199	–	–	187	< 2.0	–	–
Nitrite	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	<0.25	<0.25	<0.25	–	–	–	–	–	–
Nitrate	mg/L	–	–	1.5	<0.25	–	–	1.5	<0.25	–	–	1.6	<0.25	0.9	1.2	1.7	–	–	1.5	<0.25	–	–
Sulfate	mg/L	–	–	48	48	–	–	52	50	–	–	50	50	48	46	50	–	–	49	49	–	–
Chloride	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	60	56	61	–	–	–	–	–	–
Sulfide	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TDS	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TSS	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	< 2.5	–	–	–	3	< 2.5
Turbidity	NTU	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	< .10	–	–	–	1.40	< .10
1,1-Dichloroethene	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–	–
Chloroform	µg/L	9.8	12.0	4.5	–	9.3	12.0	3.8	–	9.2	12.0	6.4	–	11.0	8.9	8.4	8.4	11.0	6.7	–	–	–
Carbon Tetrachloride	µg/L	2.2	<1.0	<1.0	–	2.6	<1.0	<1.0	–	2.4	<1.0	<1.0	–	<1.0	2.4	2.1	2.1	<1.0	<1.0	–	–	–
Trichloroethene	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–	–
Bromodichloromethane	µg/L	6.9	5.6	<1.0	–	6.3	5.8	<1.0	–	6.2	6.1	<1.0	–	1.6	4.7	5.8	5.4	6.4	<1.0	–	–	–
Dibromochloromethane	µg/L	4.3	<1.0	<1.0	–	3.8	<1.0	<1.0	–	3.5	<1.0	<1.0	–	<1.0	<1.0	3.3	2.3	<1.0	<1.0	–	–	–
Tetrachloroethene	µg/L	1.4	<1.0	<1.0	–	1.5	<1.0	<1.0	–	1.5	<1.0	<1.0	–	<1.0	<1.0	1.3	<1.0	<1.0	<1.0	–	–	–
Bromoform	µg/L	1.4	<1.0	<1.0	–	1.2	<1.0	<1.0	–	1.2	<1.0	<1.0	–	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	–	–	–
Total VOCs	µg/L	26.0	17.6	4.5	–	24.7	17.8	3.8	–	24.0	18.1	6.4	–	12.6	16.0	22.0	18.2	17.4	6.7	–	–	–
1,4-Dioxane	µg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	<3.0	–	–	<3.0	–	–

Table B-6. Laboratory Analytical Data OU-1 Treatment System - December 2008

Sampling Date		12/3/2009				12/9/2009				12/18/2009				12/22/2009				12/29/2009								
Sample Locations		GACIN	GACMID	FBR Inlet	FBR Outlet	GACIN	GACMID	FBR Inlet	FBR Outlet	GACIN	GACMID	FBR Inlet	FBR Outlet	GACIN	GACMID	FBR Inlet	FBR Outlet	EW-1	EW-2	EW-3	GACIN	GACMID	FBR Inlet	FBR Outlet	Trimite In	Trimite Out
	Unit																									
Conductivity	µS/cm	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Perchlorate	µg/L	140	–	179	< 2.0	140	–	156	< 2.0	114	–	135	< 2.0	112	–	120	< 2.0	8	74	129	–	–	114	< 2.0	–	–
Nitrite	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	< .25	< .25	< .25	–	–	–	–	–	–
Nitrate	mg/L	–	–	1.6	<0.25	–	–	1.6	<0.25	–	–	1.7	<0.25	–	–	1.8	<0.25	1.0	1.5	2.0	–	–	1.7	<0.25	–	–
Sulfate	mg/L	–	–	49	51	–	–	50	51	–	–	52	50	–	–	51	50	52	49	53	50.0	–	51	50	–	–
Chloride	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	74	67	76	72.0	–	–	–	–	–
Sulfide	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	< .10	< .10	–	–
TDS	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	370	–	–	–	380	380
TSS	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	< 2.5	–	–	–	3	< 2.5
Turbidity	NTU	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	< .10	–	–	–	0.64	< .10
1,1-Dichloroethene	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–
Chloroform	µg/L	7.1	11.0	8.4	–	6.6	9.8	8.5	–	5.5	8.1	8.7	–	5.4	7.7	8.2	–	6.9	7.3	4.0	5.0	6.9	6.7	<1.0	–	–
Carbon Tetrachloride	µg/L	2.2	1.2	<1.0	–	2.1	1.4	<1.0	–	2.0	1.5	<1.0	–	2.0	1.6	<1.0	–	<1.0	3.6	1.2	1.9	1.7	<1.0	<1.0	–	–
Trichloroethene	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–
Bromodichloromethane	µg/L	4.6	6.6	<1.0	–	4.1	6.1	1.2	–	3.4	5.2	1.6	–	3.2	4.9	1.5	–	<1.0	<1.0	2.6	2.9	<1.0	1.5	<1.0	–	–
Dibromochloromethane	µg/L	1.9	1.1	<1.0	–	1.6	1.1	<1.0	–	1.4	1.2	<1.0	–	1.3	1.2	<1.0	–	<1.0	<1.0	3.3	1.1	4.4	<1.0	<1.0	–	–
Tetrachloroethene	µg/L	1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	1.4	<1.0	1.3	<1.0	<1.0	–	–
Bromoform	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–
Total VOCs	µg/L	16.8	19.9	8.4	–	14.4	18.4	9.7	–	12.3	16.0	10.3	–	11.9	15.4	9.7	–	6.9	10.9	12.5	10.9	14.3	8.2	0.0	–	–
1,4-Dioxane	µg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	< 3.0	–	–	–	–	–

Table B-6. Laboratory Analytical Data OU-1 Treatment System - January 2009

Sampling Date		1/7/2009				1/14/2009				1/21/2009				1/28/2009								
Sample Locations	Unit	GACIN	GACMID	FBR Inlet	FBR Outlet	GACIN	GACMID	FBR Inlet	FBR Outlet	GACIN	GACMID	FBR Inlet	FBR Outlet	EW 1	EW 2	EW 3	GACIN	GACMID	FBR Inlet	FBR Outlet	Trimite In	Trimite Out
Conductivity	µS/cm	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Perchlorate	µg/L	126	–	121	< 2.0	132	–	110	< 2.0	129	–	< 2.0	< 2.0	5	50	125	–	–	18	< 2.0	–	–
Nitrite	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nitrate	mg/L	–	–	1.8	<0.25	–	–	1.6	<0.25	–	–	1.6	<.25	–	–	–	–	–	–	–	–	–
Sulfate	mg/L	–	–	51	51	–	–	48	48	–	–	49	48	–	–	–	–	–	–	–	–	–
Chloride	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Sulfide	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TDS	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TSS	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Turbidity	NTU	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1,1-Dichloroethene	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–	–
Chloroform	µg/L	4.9	6.9	8.6	–	5.2	7.1	8.6	–	4.9	9.1	<1.0	–	6.7	6.5	3.0	4.7	7.6	<1.0	–	–	–
Carbon Tetrachloride	µg/L	2.1	1.9	<1.0	–	2.3	2.1	<1.0	–	2.4	<1.0	<1.0	–	<1.0	3.6	1.4	1.8	<1.0	<1.0	–	–	–
Trichloroethene	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–	–
Bromodichloromethane	µg/L	2.7	4.2	2.0	–	3.1	4.6	2.5	–	2.9	<1.0	<1.0	–	<1.0	3.3	1.9	2.2	2.8	<1.0	–	–	–
Dibromochloromethane	µg/L	<1.0	1.1	<1.0	–	1.1	1.3	<1.0	–	<1.0	3.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–	–
Tetrachloroethene	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–	–
Bromoform	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–	–
Total VOCs	µg/L	9.7	14.1	10.6	–	11.7	15.1	11.1	–	10.2	12.1	0.0	–	6.7	13.4	6.3	8.7	10.4	0.0	–	–	–
1,4-Dioxane	µg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	< 3.0	–	–	< 3.0	–	–

Table B-6. Laboratory Analytical Data OU-1 Treatment System - February 2009

Sampling Date		2/4/2009				2/12/2009				2/19/2009				2/27/2009								
Sample Locations	Unit	GACIN	GACMID	FBR Inlet	FBR Outlet	GACIN	GACMID	FBR Inlet	FBR Outlet	GACIN	GACMID	FBR Inlet	FBR Outlet	EW 1	EW 2	EW 3	GACIN	GACMID	FBR Inlet	FBR Outlet	Trimite In	Trimite Out
Conductivity	µS/cm	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Perchlorate	µg/L	135	–	84	< 2.0	164	–	133	< 2.0	147	–	149	< 2.0	5	50	239	–	–	166	< 2.0	–	–
Nitrite	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	< .25	< .25	< .25	–	–	–	–	–	–
Nitrate	mg/L	–	–	1.8	<0.25	–	–	1.8	<0.25	–	–	1.7	<.25	0.9	1.2	2.1	–	–	1.6	<0.25	–	–
Sulfate	mg/L	–	–	64	65	–	–	49	48	–	–	47	45	41	40	41	–	–	43	42	–	–
Chloride	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	58	54	58	–	–	–	–	–	–
Sulfide	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TDS	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TSS	mg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8.0	–	–	–	3	< 2.5
Turbidity	NTU	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8.5	–	–	–	0.89	< .10
1,1-Dichloroethene	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–	–
Chloroform	µg/L	4.4	7.4	<1.0	–	4.4	7.0	<1.0	–	4.5	6.5	1.5	–	5.9	6.2	4.2	4.8	6.1	2.5	–	–	–
Carbon Tetrachloride	µg/L	2.4	<1.0	<1.0	–	2.8	<1.0	<1.0	–	2.7	<1.0	<1.0	–	<1.0	3.9	2.7	2.5	<1.0	<1.0	–	–	–
Trichloroethene	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	2.6	<1.0	–	–	–
Bromodichloromethane	µg/L	2.4	2.7	<1.0	–	2.5	2.9	<1.0	–	2.7	<1.0	<1.0	–	1.1	3.2	2.5	2.4	<1.0	<1.0	–	–	–
Dibromochloromethane	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	2.9	<1.0	–	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	–	–	–
Tetrachloroethene	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	–	–	–
Bromoform	µg/L	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	–	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	–	–	–
Total VOCs	µg/L	9.2	10.1	0.0	–	9.7	9.9	0.0	–	9.9	9.4	1.5	–	7.0	13.3	11.9	9.7	8.7	2.5	–	–	–
1,4-Dioxane	µg/L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	< 3.0	–	–	< 3.0	–	–

Table B-7. Summary of Laboratory Analytical for Metals

Sampling Date		10/2/2008		12/30/2008	
Sampling Location		GACIN	Trimite Outlet	GACIN	Trimite Outlet
Parameter	Unit				
Beryllium	mg/L	<0.0040	<0.0040	<0.0040	<0.0040
Magnesium	mg/L	20	20	22	20
Calcium	mg/L	71	70	69	65
Vanadium	mg/L	<0.003	0.0036	0.0060	0.035
Chromium	mg/L	0.009	<0.0050	<0.0050	<0.0050
Hexavalent Chromium	mg/L	<10	<10	<10	<10
Manganese	mg/L	<0.0050	<0.0050	<0.0050	<0.0050
Iron	mg/L	0.42	0.36	0.39	0.35
Cobalt	mg/L	<0.0050	<0.0050	<0.0050	<0.0050
Nickel	mg/L	<0.010	<0.010	<0.010	<0.010
Copper	mg/L	<0.010	<0.010	<0.010	<0.010
Zinc	mg/L	<0.10	<0.10	<0.10	<0.10
Arsenic	mg/L	<0.0050	<0.0050	<0.0050	<0.0050
Selenium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050
Strontium	mg/L	–	–	–	–
Molybdenum	mg/L	0.0067	0.0055	0.005	0.0064
Silver	mg/L	<0.0050	<0.0050	<0.0050	<0.0050
Cadmium	mg/L	<0.0050	<0.0050	<0.0050	<0.0050
Antimony	mg/L	<0.0050	<0.0050	<0.0050	<0.0050
Barium	mg/L	0.074	0.072	0.080	0.077
Mercury	mg/L	<0.0010	<0.0010	0.0014	<0.0010
Thallium	mg/L	<.0020	<0.0020	<.0020	<0.0020
Lead	mg/L	<0.0050	<0.0050	<0.0050	<0.0050