

Pilot Test Report
Former Clariant Corporation Facility
Kalama, WA

Facility No. 24634187
VCP Project No. SWO492

H&H Job No. CLR-045

October 28, 2011



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OUR CLIENTS DEMAND A SMARTER SOLUTION

Via USPS and E-mail

October 28, 2011

State of Washington - Dept of Ecology
Water Quality Program
PO Box 47600
Olympia, WA 98504

Attention: Mr. Gene Radcliff, L.G.

Re: Pilot Test Report
Former Clariant Corporation Facility
Kalama, WA
Facility No. 24634187
VCP Project No. SWO492
H&H Job No. CLR-045

Hart & Hickman, PC
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Dear Gene:

1.0 Introduction

On behalf of Clariant Corporation (Clariant), Hart & Hickman, PC (H&H) has prepared this Pilot Test Report for the proposed ground water remedial action at the former Clariant Corporation (Clariant) facility located at 404 Hendrickson Drive in Kalama, Washington. A site location map is provided as Figure 1. The facility is currently owned and operated by Chemtrade Logistics, Inc. The site is enrolled in Washington State Department of Ecology's (Ecology) Voluntary Cleanup Program (VCP), VCP number SWO492, facility number 24634187.

H&H submitted a Pilot Test Plan for the pilot testing activities to Ecology on September 9, 2011. The Pilot Test Plan included a summary of remedial action (RA) activities previously conducted at the site. These RA activities were conducted during August and September 2010 and included removal of soils impacted with cadmium and/or zinc above applicable cleanup levels (CULs), installation of 23 vertical injection wells and six horizontal injection wells, and injection of calcium polysulfide (CaSx) to address dissolved cadmium and/or zinc in ground water. CaSx is a lime-sulfur solution designed to be

used in various treatment systems as a metal precipitating agent and has been used for in-situ treatment of ground water impacted with metals. An RA Report documenting the RA activities was submitted to Ecology on January 19, 2011. The CaSx injection completed during the 2010 RA activities and the recently completed pilot test injection were conducted under an Underground Injection Control (UIC) conditional rule authorization that was issued by Ecology for the site on August 24, 2010.

Based upon a review of ground water monitoring data collected after completion of the 2010 RA activities, H&H proposed additional RA activities to further remediate dissolved phase ground water impacts and to remediate leachable zinc in soil below the depths of previous soil excavations. In the July 5, 2011 Post-Injection Monitoring Report & RAWP Addendum, H&H proposed a plan for additional RA at the site using CaSx injection and ground water re-circulation that included plans for pilot testing of the proposed remedial activities. Per Ecology's request, a Pilot Test Plan was prepared and submitted to provide additional details of the pilot testing activities. The Pilot Test Plan included a discussion of site background information (including a description of CULs and points of compliance for the site), site geology and hydrogeology, CaSx injection activities completed during the September 2010 RA activities, and a summary of post-injection ground water monitoring and data evaluation. Because this information was included in the Pilot Test Plan, it is not repeated in this report.

The following sections include a discussion of the methods, observations, and results of the recently completed pilot testing of CaSx injection and ground water re-circulation activities.

2.0 Pilot Test Activities

2.1 Summary of Rationale for Additional CaSx Injection

Based on a post-injection data evaluation, it is evident that leachable zinc in the soils located beneath the previous excavations should be addressed to prevent future dissolution of zinc from this soil during periods of high ground water elevation and also from infiltrating rainwater. Therefore, the RAWP

Addendum includes 1) installation of additional horizontal wells in the former settling basin #2 (FSB2) area at or a few feet above the approximate depth of the former excavations and injection of CaSx into the horizontal wells to fix the zinc in these soils, and 2) additional injection of CaSx using the existing injection well network to address dissolved zinc and cadmium impacts that persist in ground water.

As part of the RAWP Addendum, H&H also proposed that the method of CaSx injection be enhanced during the proposed additional injection by re-circulation of ground water and CaSx in the subsurface via concurrent injection and extraction. We believe that natural distribution and mixing of CaSx in the aquifer may have been inhibited by the temporal stagnant ground water flow conditions indicated by historical ground water elevation data collected at the site. The re-circulation will be performed in an effort to enhance subsurface distribution and mixing of the CaSx, and to pull the CaSx through targeted areas of the aquifer. In addition, the RAWP included possible in-line filtration of the re-circulated solution unit prior to injection into the subsurface to determine if insoluble zinc compounds precipitate out of solution during the above-ground mixing and if they can be efficiently removed prior to injection.

2.2 Pilot Test Well Installation

As part of the pilot test activities, one ground water extraction well (EW1) and three temporary observation wells (TW1, TW2, and TW3) were installed for use during the pilot testing. Well installation activities were conducted at the site between September 26, 2011 by Cascade Drilling of Clackamas, OR with oversight conducted by H&H. The ground water extraction well was installed using a hollow stem auger drill rig to 35 ft below ground surface (bgs) and was constructed with 25 ft of 8-inch diameter PVC well screen. A boring log for the extraction well is included as Appendix A.

Three one-inch diameter PVC temporary observations wells were installed to 35 ft bgs using direct push technology (DPT) drilling methods. Each temporary well included 20 ft of well screen. The

temporary observation wells were removed following completion of the pilot testing activities. The extraction and temporary observation well locations are shown in Figure 2.

2.3 Pre-Injection Ground Water Monitoring

Prior to injection of CaSx during the pilot test activities, the one-year post-injection ground water monitoring was conducted in accordance with the August 6, 2010 Remedial Action Work Plan (RAWP). Well construction details for permanent site monitor wells are summarized in Table 1 and well locations are shown in Figure 2.

2.3.1 Ground Water Elevations

As part of the ground water monitoring, water level gauging of all site monitor wells was conducted at the approximate time of low tide on September 23, 2011 and approximately 1 to 2 hours prior to high tide on September 28, 2011.

Inferred ground water elevation contour maps for each set of ground water elevation measurements collected during the monitoring event are included as Figures 3A and 3B. Ground water elevations during the September 2011 monitoring were significantly lower than during the previous three sampling events (conducted during December 2010 through June 2011) when ground water elevations were measured at historically high levels and when the elevation of the Columbia River adjacent to the site also reached historically high levels. The September 2011 elevations were similar to those considered to be “normal” at the site.

Consistent with previous sampling events, it is apparent that shallow ground water flow at the site is influenced by the tidal elevation variations of the Columbia River. In the eastern portion of the site, there is a relatively strong hydraulic gradient from east to west toward the river. In the western portion of the site, hydraulic communication between the river and shallow ground water results in a temporal

mound in the ground water table near the river that creates a weak hydraulic gradient from west to east in that area. The ground water mound near the river is temporal and its presence depends upon the timing and magnitude of the tides. The converging hydraulic gradients appear to cause ground water in the central portion of the site to be temporally stagnant.

Predicted and verified Columbia River elevation/tide data were obtained from the National Oceanic and Atmospheric Administration's (NOAA) NOS/CO-OPs Observational Data Interactive Navigation program (<http://tidesandcurrents.noaa.gov/gmap3>). Daily elevation data obtained from the NOAA website indicate that the elevation of the Columbia River fluctuated approximately 5 to 6 feet between low and high tides in the vicinity of the site at the time of the recent sampling. Columbia River elevation data are summarized along with the site ground water elevation data in Table 2.

2.3.2 Ground Water Sampling

In accordance with the RAWP, one-year post-injection sampling of permanent monitor wells PZ1, PZ3 through PZ6, PZ12, PZ13, AB1, AB2, and OW1 through OW3 was performed prior to beginning the pilot test injection activities. The samples collected from these wells were analyzed for dissolved cadmium, dissolved zinc, and total sulfides. In addition, prior to beginning the pilot test injection activities, ground water samples were collected from temporary pilot test observation wells TW1 through TW3 for analysis of dissolved zinc and total sulfides.

Ground water from each of the wells was purged and sampled using standard low-flow/low-stress techniques. Ground water parameters that included temperature, pH, conductivity, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity were measured during the low-flow purging. A summary of the ground water field parameter data collected during sampling of the permanent monitor wells is included in Table 3.

Results of analysis of the ground water samples indicated concentrations of dissolved zinc and cadmium in the southern portion of the site (to the west of the manufacturing plant) that were similar to pre-2010 injection levels. In the northern portion of the site, concentrations of dissolved zinc increased from those detected during recent sampling events in wells located along the western portion of the site (including PZ1, OW1 through OW3, and AB2). As mentioned in Section 1.0 (and summarized in greater detail in the RAWP Addendum and Pilot Test Plan), it is evident that soils located beneath the previous excavation areas contain a significant mass of leachable zinc and that this residual zinc contributed to increased concentrations of dissolved zinc detected in ground water in that area during the recent period of high ground water elevation. The recent increased zinc concentrations in wells in the western portion of the site are likely due to the transport of ground water from the previous excavation areas toward the western portion of the site when the Columbia River elevation decreased during July through September 2011.

Zinc was not detected in PZ13 during the recent monitoring event. This is the first time that dissolved zinc has not been detected in the well since it was installed. During the previous three sampling events conducted during December through June 2011, dissolved zinc was detected at concentrations ranging from 21,100 to 79,000 micrograms per liter ($\mu\text{g/l}$) in PZ13. Sulfides were also detected in PZ13 during the recent sampling. Based on these results, it appears that residual CaSx from the 2010 injection has been effective in immobilizing dissolved zinc in the area.

Dissolved zinc was detected in the PZ12 sample at a concentration of 88,100 $\mu\text{g/l}$ during the monitoring event. In pre-injection sampling of the pilot test temporary observation wells, dissolved zinc was detected in TW1 through TW3 at concentrations of 27,900 $\mu\text{g/l}$, 95,200 $\mu\text{g/l}$, and 183,000 $\mu\text{g/l}$, respectively. These results confirm that there is a relatively large mass of residual zinc in soil below the depth of the previous excavations in the area of these wells. Note that zinc carbonate sludge was observed in the vicinity of PZ12 and TW3 during the 2010 excavation.

The analytical results for dissolved cadmium and zinc concentrations in the ground water samples collected as part of the one-year post-injection sampling are summarized along with historical data in Table 4. In addition, sulfide analytical results are summarized in Table 3. Dissolved zinc concentrations and inferred isoconcentration contours for the permanent monitor well samples are shown in Figure 4. Analytical data reports are included in Appendix B.

2.4 Pilot Test Methods

Pilot testing of CaSx injection and ground water re-circulation was conducted on September 27 and 28, 2011. Equipment utilized for the testing included:

- A 6,500-gallon poly tank for receiving and temporary storage of CaSx
- A 20,000-gallon frac tank for above-ground mixing of CaSx and extracted ground water
- A bag/cartridge filter system for removal of solid sulfide compounds precipitated out of the CaSx and ground water mixture prior to injection into the subsurface
- A utility pump for 1) transport and injection of the CaSx and ground water mixture, and 2) for circulating CaSx and ground water within the frac tank to enhance uniform mixing
- A submersible pump for ground water extraction
- A generator for powering the pumps
- Hoses, piping, and fittings for fluid transport
- In-line flow meters capable of displaying total volume (in gallons) and flow rate (in gallons per minute – gpm) for measurement of extraction and injection volumes and flow rates
- Multiple hydrogen sulfide (HS) gas monitors to confirm that HS gas was not generated during the testing

Approximately 9,000 gallons of CaSx were delivered to the site by two 4,500-gallon tankers. The CaSx was transferred from each tanker directly into the poly tank. The CaSx solution consisted of approximately 28% calcium polysulfide by weight and 72% water by weight. Ambient air in the

vicinity of the tanks and pumps was monitored for HS gas for the duration of the pilot testing. HS was not detected in ambient air within or in the vicinity of the work area during the pilot testing activities.

The pilot testing was started on September 27, 2011. Initially, approximately 3,000 gallons of ground water were pumped from the newly-installed extraction well into the frac tank. Extraction flow rates ranged from approximately 45 to 60 gallons per minute (gpm). Then, approximately 1,000 gallons of CaSx was pumped into the frac tank and mixed with CaSx solution for a volumetric CaSx to ground water ratio of approximately 3:1. Injection personnel attempted to maintain this approximate mixture ratio throughout the pilot testing. After mixing the CaSx and ground water in the frac tank for approximately 30 minutes, the mixture was pumped out of the frac tank, through the filtration unit, and into previously installed vertical injection wells IW-7, IW-8, and IW-11 (Figure 2). Injection flow rates were regulated with in-line ball valves to approximately 40 to 50 gpm. Ground water was continuously pumped out of the extraction well during these processes. The CaSx and ground water injection and re-circulation was conducted in the manner described above over a two-day period and for approximately seven hours per day.

After beginning injection of the CaSx and ground water mixture, ground water quality parameters (including conductivity, DO, ORP, and pH) and ground water elevations were monitored in temporary observation wells TW1 through TW3, PZ12, OW-3, and the extraction well to assist in evaluating the effectiveness of the injection and re-circulation in distributing and mixing the CaSx solution throughout the targeted area of the aquifer. Based on the previous injection, an increase in pH and decrease in ORP are indicative of CaSx distribution.

The total volume of ground water extracted and re-circulated during the pilot testing was approximately 28,000 gallons. As noted previously, approximately 9,000 gallons of CaSx were also injected. Therefore, approximately 12,500 gallons of the CaSx and ground water mixture were injected into each injection well.

2.4 Pilot Test Results

Ground water elevation measurements taken during the testing indicated drawdown of approximately 1.5 ft in the extraction well, 1 ft in TW1 and TW2, and 0.5 ft in TW3 and PZ12. On the first day of testing, there was no indication of CaSx present in any of the observation wells and the ground quality parameters in those wells remained at approximate pre-injection levels. Extraction, injection, and re-circulation of ground water were stopped at the end of the first day.

The CaSx and ground water injection and re-circulation were continued on the second day as described in Section 2.3 (approximately 15 hours after the end of the first day of pilot testing was completed). During purging of TW3 at the start of the day, a bright yellow liquid with high pH and low ORP indicative of CaSx distribution was present in the well. A sample was collected from TW3 at that time for analysis of dissolved zinc and total sulfides. Results of the sampling indicated a dissolved zinc concentration of 735 $\mu\text{g/l}$ (reduced from the pre-injection level of 183,000 $\mu\text{g/l}$) and 153,000 $\mu\text{g/l}$ sulfides. No sulfides were detected in the TW3 sample collected prior to the injection activities. Analytical results for dissolved zinc and sulfides in samples collected as part of the pilot test are summarized in Table 5.

The injection and re-circulation activities continued without interruption throughout the second day, and monitoring of the observation wells in the area was conducted continuously. Evidence of CaSx distribution was not observed in any wells other than TW3 until approximately six hours after starting the second day of testing. At that time, evidence of CaSx distribution was observed in TW1. The evidence of CaSx distribution was observed immediately after beginning to purge the well; however, the well was not purged during the preceding three hours, so the exact length of time that evidence of CaSx distribution was present in the well is not know. A sample was collected from TW1 at the time that it was observed for analysis of dissolved zinc and total sulfides. Results of the sampling indicated a dissolved zinc concentration of 261 $\mu\text{g/l}$ (reduced from the pre-injection level of 27,900 $\mu\text{g/l}$) and

155,000 µg/l sulfides. No sulfides were detected in the TW1 sample collected prior to the injection activities.

Following the observation of CaSx distribution in TW1, OW3 was purged for approximately one hour (during which time there was no indication of CaSx distribution into the well). After approximately one hour, evidence of CaSx distribution was observed in OW3 when clear purge water was observed to change to a bright yellow liquid. A sample was collected from OW3 at that time for analysis of dissolved zinc and total sulfides. Results of the sampling indicated a dissolved zinc concentration of 79,900 µg/l (which is an increase from the pre-injection level of 41,600 µg/l) and 5,710,000 µg/l sulfides. No sulfides were detected in the OW3 sample collected prior to the injection activities. Based on these results, it appears that there was not sufficient time for the sulfides to react with the dissolved zinc in the ground water before the sample was collected. Note that the sulfide levels detected in the sample were significantly higher than in the TW1 and TW3 samples where there was a significant decrease in dissolved zinc concentrations from pre-injection levels.

There was no evidence of CaSx distribution in any of the other observation wells during the second day of pilot testing and there was no evidence of CaSx distribution in PZ1 or AB2, which are located along the western edge of the property between the injection area and the Columbia River. The CaSx and ground water injection and re-circulation activities were completed on September 28. At the beginning of the following day, evidence of CaSx distribution was observed in PZ12 during purging of the well. A sample was collected from the well at that time for analysis of dissolved and total zinc and total sulfides. Results of the sampling indicated a dissolved zinc concentration of 6,960 µg/l (reduced from the pre-injection level of 88,100 µg/l), a total zinc concentration of 68,000 µg/l, and 274,000 µg/l sulfides. A sulfide concentration of 3,550 µg/l was detected in the PZ12 sample collected prior to the pilot testing activities.

There was no evidence of CaSx distribution observed in TW2 or the extraction well during the pilot testing activities. A sample was collected from the extraction well effluent on the second day of pilot

testing and samples were collected from the extraction well and TW2 on the day after completion of the pilot testing. Dissolved zinc was detected at a concentration of 208,000 µg/l in the sample collected from TW2. Dissolved zinc was detected at a concentration of 147,000 µg/l in ground water collected from the line from the extraction well to the frac tank and 161,000 µg/l in a sample collected directly from the extraction well. The sample results did not indicate the presence of sulfides in either well. However, based on the length of time that it took for CaSx to move into the observation wells located closer to the injection wells, it is possible that CaSx has moved into these areas since completion of the pilot testing.

A sample of the CaSx and ground water mixture in the frac tank was collected during the second day of injection activities at approximately the same time as collection of the extraction well effluent ground water sample that contained a dissolved zinc concentration of 147,000 µg/l. Analytical results of the frac tank sample indicated a dissolved zinc concentration of 1,460 µg/l and 6,570,000 µg/l sulfides.

Note that in accordance with WAC 173-200-060, the applicable CUL for zinc in on-site ground water is the Maximum Contaminant Level (MCL) 5,000 µg/l. Because the site is located adjacent to the Columbia River, Ecology determined a CUL for zinc at the site's property boundary with the Columbia River as the calculated surface water standard of 74 µg/l for zinc (calculated based upon an average hardness of the Columbia River of 58 mg/l). Therefore, the current goal of RA at the site is to remediate ground water such that dissolved zinc is at or below 74 µg/L in POC wells AB1 and AB2.

During the pilot testing, the filter system removed a significant volume of sludge from the mixture of CaSx and ground water prior to injection. Approximately 30 to 40 lbs of green-black sludge were collected into 10- and 25-micron bag filters by the filtration system. Analytical results of two sludge samples collected from the filters indicated that the sludge contained total iron, manganese, and zinc concentrations at an average of 11,000 mg/kg, 3,750 mg/kg, and 57,500 mg/kg, respectively. The samples were approximately 24 percent solids (on average).

2.5 Injection and Re-circulation Process Limitations

The only limitation of the ground water injection and re-circulation process identified during the pilot testing was the maximum ground water pumping rate out of the extraction well that could be achieved with the equipment used during the testing. During ground water extraction, ground water drawdown in the extraction well was consistent and there was an approximately 8-ft vertical water column in the extraction well above the pump intake. As such, the extraction pumping rate appeared to be limited only by the pump and by pressure head losses in the lines from the extraction well to the frac tank. During the testing, line-loss was significant due to lay-flat hose that was used in the lines from the well to the frac tank. We believe that the extraction rates may be enhanced by 30 gpm or more by using rigid hose and adding an in-line pump to the above-ground portion of the hose that will effectively reduce the pressure head on the submersible pump.

3.0 Conclusions

Results of the pilot testing indicate that the CaSx and ground water injection and re-circulation processes effectively enhanced mixing and distribution of CaSx in the portion of the aquifer where the testing was conducted. By the end of the third day after the start of the pilot testing, there was evidence of lateral distribution of CaSx up to approximately 15 ft from the injection wells. This lateral distance of CaSx distribution is approximately two times greater than the distance that was observed during the approximately two-week injection conducted during 2010. Based on evidence that there was some CaSx distribution during periods of the pilot testing when no active injection or extraction was conducted, it is likely that additional lateral distribution of CaSx has occurred since completion of the test.

The enhanced CaSx distribution observed during the pilot testing is believed to be a combination of the hydraulic gradient created by injection and extraction that caused movement of ground water, effective

lowering of the injected solution's specific gravity (relative to that of the unmixed CaSx solution delivered to the site) so that it has a greater tendency to spread laterally than to sink, and the significant increase in the quantity of solution injected into each injection well (relative to the 2010 injection) which likely aided in dispersion of the solution.

In addition to the evidence of enhanced mixing and distribution of CaSx observed during the pilot testing, analytical data indicates that the above-ground mixing of ground water and CaSx was effective in significantly reducing dissolved zinc concentrations detected in the extracted ground water to concentrations less than the on-site ground water MCL for zinc. It is possible that this reduction might be even greater if the mixture's retention time is increased. Furthermore, solids (that included zinc compounds) precipitated out of solution during the mixing and were able to be removed from the solution by an in-line filtration system prior to injection of the solution.

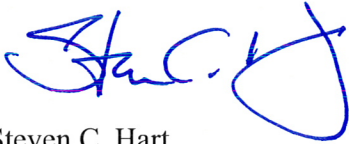
Based on the results of the pilot testing, we believe that the CaSx and ground water injection and re-circulation processes effectively enhanced the remedial approach for reducing concentrations of dissolved zinc in ground water at the site and that injection solution will be hydraulically maintained on-site during the treatment process. As such, we believe that the process should be applied during implementation of full-scale CaSx injection and re-circulation at the site per the RAWP Addendum. These activities will be conducted using the existing injection wells and the newly-installed extraction well at the site, six proposed horizontal wells, and six proposed extraction wells. The proposed well locations (which have been repositioned slightly following the pilot test and include one additional extraction well) are shown in Figure 6. With Ecology approval, we would like to conduct the full-scale CaSx injection and re-circulation at the site during December 2011.

Mr. Gene Radcliff
October 28, 2011
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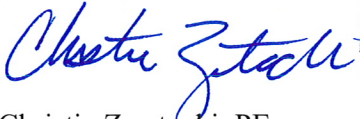
Should you have any questions or need any additional information, please feel free to contact us.

Sincerely,

Hart & Hickman, PC



Steven C. Hart
Principal



Christie Zawtocki, PE
Project Manager



cc: Ms. Mary Shaleen-Hansen (via USPS and e-mail)
Bill Grier (via e-mail)
Ron Walton (via e-mail)
Steve Klaeren (via e-mail)

Attachments

Tables

Table 1
Summary of Site Monitoring Well Construction Details
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Installation Date	Well Diameter (inches)	Total Depth (ft bgs)	Sceen Interval (ft bgs)	TOC Elevation (ft CRD)
PZ1	04/15/03	1	32	17-32	28.99
PZ2	04/15/03	1	32	17-32	30.16
PZ3	04/15/03	1	32	17-32	28.47
PZ4	04/15/03	1	32	17-32	26.78
PZ5	04/16/03	1	32	17-32	26.86
PZ6	04/16/03	1	32	17-32	27.58
PZ7	04/16/03	1	31	16-31	28.06
PZ8	04/16/03	1	31	15.5-30.5	28.17
PZ9	05/06/03	1	32	17-32	27.54
PZ10	07/26/05	0.75	32	17-32	26.94
PZ11	07/27/05	0.75	32	17-32	30.39
PZ12	07/27/05	0.75	32	17-32	30.53
PZ13	07/27/05	0.75	30	15-30	30.40
PZ14	02/06/07	0.75	32	17-32	29.09
PZ15	02/06/07	0.75	32	17-32	27.79
AB1	07/01/03	2	28	14.1-28.2	27.53
AB2	07/01/03	2	30	14.4-30.0	28.41
OW1	09/20/10	2	35	20-35	26.51
OW2	09/20/10	2	35	20-35	25.99
OW3	09/20/10	2	35	20-35	26.13

Notes:

ft bgs = feet below ground surface

ft CRD = elevation in ft relative to Columbia River Datum

TOC = Top of Casing

Survey of well elevations based on NAVD88 and adjusted to CRD by subtracting 3.8 ft

OW1 through OW3 TOC elevations have not been surveyed

Depth and screen interval of AB1 and AB2 account for 45° and 35° angles of installation relative to vertical, respectively.

Table 2
Summary of Ground Water Elevation Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Measured	TOC Elevation ¹ (ft CRD)	Depth to Water (ft below TOC)	Water Elevation ¹ (ft CRD)	Time Measured	High (CRD) ²		Low (CRD) ²	
						Time	Elevation (ft)	Time	Elevation (ft)
PZ1	04/17/03	28.99	22.29	6.70	4:05 p.m.	5:03 p.m.	8.83	12:48 p.m.	6.12
PZ1	05/06/03		24.16	4.83	4:48 p.m.	8:45 p.m.	6.71	3:27 p.m.	4.94
PZ1	05/21/03		23.61	5.38	11:00 a.m.	7:15 a.m.	6.86	4:30 p.m.	3.84
PZ1	07/07/03		25.92	3.07	10:31 a.m.	9:09 a.m.	4.34	4:54 p.m.	1.41
PZ1	08/13/03		24.53	4.46	10:05 a.m.	4:12 a.m.	7.10	1:09 p.m.	4.54
PZ1	01/28/04		22.67	6.32	8:56 a.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
PZ1	01/28/04		23.04	5.95	3:00 p.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
PZ1	04/28/04		25.45	3.54	11:58 a.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ1	04/28/04		26.58	2.41	8:22 p.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ1	04/29/04		25.56	3.43	12:14 p.m.	11:03 a.m.	4.71	6:39 a.m.	3.3
PZ1	07/29/04		26.15	2.84	11:40 a.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ1	07/29/04		25.66	3.33	3:01 p.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ1	10/27/04		25.27	3.72	12:35 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ1	10/27/04		23.84	5.15	4:36 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ1	01/27/05		24.61	4.38	12:19 p.m.	5:55 p.m.	--	12:40 p.m.	4.13
PZ1	05/03/05		24.41	4.58	3:09 p.m.	11:36 p.m.	5.86	8:00 p.m.	3.12
PZ1	07/25/05		25.90	3.09	6:12 p.m.	8:00 p.m.	6.26	2:54 p.m.	2.44
PZ1	07/26/05		25.07	3.92	7:31 a.m.	7:12 a.m.	5.92	--	--
PZ1	10/26/05		26.28	2.71	12:24 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ1	10/26/05		26.19	2.80	4:19 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ1	10/27/05		26.87	2.12	7:26 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ1	10/27/05		27.19	1.80	10:03 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ1	07/12/06		24.47	4.52	2:42 p.m.	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ1	02/07/07		25.16	3.83	1:47 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ1	02/04/10		23.65	5.34	8:29 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ1	09/01/10		26.84	2.15	09:54 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ1	11/02/10		25.50	3.49	11:19 a.m.	1:15 p.m.	4.42	8:42 a.m.	0.75
PZ1	12/20/10		22.68	6.31	11:13 a.m.	--	--	10:09 a.m.	4.25
PZ1	12/20/10		21.74	7.25	2:25 p.m.	2:27 p.m.	7.11	--	--
PZ1	03/21/11		21.64	7.35	3:52 p.m.	--	--	2:15 p.m.	4.77
PZ1	03/23/11		21.34	7.65	8:32 a.m.	7:18 a.m.	7.27	--	--
PZ1	06/21/11		18.43	10.56	3:17 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ1	06/22/11		18.49	10.50	8:20 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ1	09/23/11		26.97	2.02	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ1	09/28/11		25.31	3.68	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ2	04/17/03	30.16	23.49	6.67	4:08 p.m.	5:03 p.m.	8.83	12:48 p.m.	6.12
PZ2	05/06/03		25.42	4.74	4:50 p.m.	8:45 p.m.	6.71	3:27 p.m.	4.94
PZ2	05/21/03		24.81	5.35	11:04 a.m.	7:15 a.m.	6.86	4:30 p.m.	3.84
PZ2	07/07/03		27.12	3.04	10:33 a.m.	9:09 a.m.	4.34	4:54 p.m.	1.41
PZ2	08/13/03		25.80	4.36	10:43 a.m.	4:12 a.m.	7.10	1:09 p.m.	4.54
PZ2	01/28/04		23.79	6.37	8:59 a.m.	8:42 a.m.	8.10	4:54 p.m.	5.78

Table 2
Summary of Ground Water Elevation Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Measured	TOC Elevation ¹ (ft CRD)	Depth to Water (ft below TOC)	Water Elevation ¹ (ft CRD)	Time Measured	High (CRD) ²		Low (CRD) ²	
						Time	Elevation (ft)	Time	Elevation (ft)
PZ2	01/28/04		24.20	5.96	2:20 p.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
PZ2	04/28/04		26.64	3.52	11:54 a.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ2	04/28/04		27.81	2.35	8:19 p.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ2	04/29/04		26.72	3.44	12:18 p.m.	11:03 a.m.	4.71	6:39 a.m.	3.3
PZ2	07/29/04		27.37	2.79	11:38 a.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ2	07/29/04		26.88	3.28	2:58 p.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ2	10/27/04		26.52	3.64	12:40 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ2	10/27/04		24.91	5.25	4:38 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ2	01/27/05		25.85	4.31	12:23 p.m.	5:55 p.m.		12:40 p.m.	4.13
PZ2	05/03/05		25.53	4.63	2:30 p.m.	11:36 p.m.	5.86	8:00 p.m.	3.12
PZ2	07/25/05		27.08	3.08	6:16 p.m.	8:00 p.m.	6.26	2:54 p.m.	2.44
PZ2	07/26/05		26.25	3.91	7:30 a.m.	7:12 a.m.	5.92	6:26 p.m.	2.66
PZ2	10/26/05		27.48	2.68	12:23 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ2	10/26/05		27.36	2.80	4:45 p.m.	12:36 p.m.	4.58	6:26 p.m.	2.66
PZ2	10/27/05		28.07	2.09	7:23 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ2	10/27/05		28.42	1.74	10:01 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ2	07/12/06		25.68	4.48	2:34 p.m.	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ2	02/07/07		26.38	3.78	1:50 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ2	02/04/10		24.74	5.42	9:05 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ2	09/01/10		28.04	2.12	9:51 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ2	12/20/10		23.86	6.30	11:28 a.m.	--	--	10:09 a.m.	4.25
PZ2	12/20/10		22.80	7.36	2:34 p.m.	2:27 p.m.	7.11	--	--
PZ2	03/21/11		22.86	7.30	4:06 p.m.	--	--	2:15 p.m.	4.77
PZ2	03/23/11		22.44	7.72	8:41 a.m.	7:18 a.m.	7.27	--	--
PZ2	06/21/11		19.67	10.49	3:33 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ2	06/22/11		19.72	10.44	8:06 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ2	09/23/11		28.24	1.92	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ2	09/28/11		26.52	3.64	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ3	04/17/03	28.47	21.68	6.79	4:11 p.m.	5:03 p.m.	8.83	12:48 p.m.	6.12
PZ3	05/06/03		23.73	4.74	4:53 p.m.	8:45 p.m.	6.71	3:27 p.m.	4.94
PZ3	05/21/03		23.13	5.34	11:07 a.m.	7:15 a.m.	6.86	4:30 p.m.	3.84
PZ3	07/07/03		25.33	3.14	10:37 a.m.	9:09 a.m.	4.34	4:54 p.m.	1.41
PZ3	08/13/03		24.42	4.05	11:27 a.m.	4:12 a.m.	7.10	1:09 p.m.	4.54
PZ3	01/28/04		21.98	6.49	9:00 a.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
PZ3	01/28/04		22.26	6.21	1:05 p.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
PZ3	04/28/04		24.90	3.57	11:46 a.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ3	04/28/04		26.16	2.31	8:17 p.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ3	04/29/04		24.95	3.52	12:20 p.m.	11:03 a.m.	4.71	6:39 a.m.	3.3
PZ3	07/29/04		25.70	2.77	11:33 a.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ3	07/29/04		25.12	3.35	2:55 p.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ3	10/27/04		24.82	3.65	12:42 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66

Table 2
Summary of Ground Water Elevation Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Measured	TOC Elevation ¹ (ft CRD)	Depth to Water (ft below TOC)	Water Elevation ¹ (ft CRD)	Time Measured	High (CRD) ²		Low (CRD) ²	
						Time	Elevation (ft)	Time	Elevation (ft)
PZ3	10/27/04		23.09	5.38	4:40 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ3	01/27/05		24.20	4.27	12:26 p.m.	5:55 a.m.		12:40 p.m.	4.13
PZ3	05/03/05		23.76	4.71	1:10 p.m.	11:36 p.m.	5.86	8:00 p.m.	3.12
PZ3	07/25/05		25.34	3.13	6:19 p.m.	8:00 p.m.	6.26	2:54 p.m.	2.44
PZ3	07/26/05		24.50	3.97	7:23 a.m.	7:12 a.m.	5.92		
PZ3	10/26/05		25.75	2.72	12:11 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ3	10/26/05		25.64	2.83	4:44 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ3	10/27/05		26.42	2.05	7:21 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ3	10/27/05		26.74	1.73	10:00 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ3	07/12/06		24.04	4.43	2:40 p.m.	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ3	02/07/07		24.68	3.79	1:40 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ3	02/04/10		22.99	5.48	9:19 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ3	09/01/10		26.30	2.17	09:45 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ3	11/02/10		24.55	3.92	11:59 a.m.	1:15 p.m.	4.42	8:42 a.m.	0.75
PZ3	12/20/10		22.08	6.39	11:32 a.m.	--	--	10:09 a.m.	4.25
PZ3	12/20/10		20.96	7.51	2:38 p.m.	2:27 p.m.	7.11	--	--
PZ3	03/21/11		20.98	7.49	4:34 p.m.	--	--	2:15 p.m.	4.77
PZ3	03/23/11		20.70	7.77	9:07 a.m.	7:18 a.m.	7.27	--	--
PZ3	06/21/11		17.96	10.51	3:38 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ3	06/22/11		18.01	10.46	7:45 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ3	09/23/11		26.66	1.81	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ3	09/28/11		24.66	3.81	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ4	04/17/03	26.78	20.00	6.78	4:13 p.m.	5:03 p.m.	8.83	12:48 p.m.	6.12
PZ4	05/06/03		21.81	4.97	4:54 p.m.	8:45 p.m.	6.71	3:27 p.m.	4.94
PZ4	05/21/03		21.41	5.37	11:18 a.m.	7:15 a.m.	6.86	4:30 p.m.	3.84
PZ4	07/07/03		23.76	3.02	10:39 a.m.	9:09 a.m.	4.34	4:54 p.m.	1.41
PZ4	08/13/03		22.40	4.38	1:15 p.m.	4:12 a.m.	7.10	1:09 p.m.	4.54
PZ4	01/28/04		20.54	6.24	9:09 a.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
PZ4	04/28/04		23.28	3.50	12:30 p.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ4	04/28/04		24.22	2.56	8:13 p.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ4	04/29/04		23.40	3.38	12:28 p.m.	11:03 a.m.	4.71	6:39 a.m.	3.3
PZ4	07/29/04		23.72	3.06	11:48 p.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ4	10/27/04		22.92	3.86	12:43 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ4	01/27/05		21.79	4.99	4:51 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ4	01/27/05		22.32	4.46	12:34 p.m.	5:55 a.m.		12:40 p.m.	4.13
PZ4	05/03/05		22.60	4.18	11:15 a.m.	11:36 p.m.	5.86	8:00 p.m.	3.12
PZ4	07/25/05		23.59	3.19	6:27 p.m.	8:00 p.m.	6.26	2:54 p.m.	2.44
PZ4	07/26/05		23.01	3.77	7:17 a.m.	7:12 a.m.	5.92		
PZ4	10/26/05		24.15	2.63	12:37 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ4	10/26/05		23.96	2.82	4:42 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ4	10/27/05		24.51	2.27	7:21 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48

Table 2
Summary of Ground Water Elevation Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Measured	TOC Elevation ¹ (ft CRD)	Depth to Water (ft below TOC)	Water Elevation ¹ (ft CRD)	Time Measured	High (CRD) ²		Low (CRD) ²	
						Time	Elevation (ft)	Time	Elevation (ft)
PZ4	10/27/05		24.84	1.94	10:10 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ4	07/12/06		21.91	4.87	2:40 p.m.	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ4	02/07/07		22.78	4.00	1:32 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ4	02/04/10		NM	NM	NM	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ4	09/01/10		24.61	2.17	10:18 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ4	11/02/10		23.16	3.62	11:52 a.m.	13:15 p.m.	4.42	8:42 a.m.	0.75
PZ4	12/20/10		20.41	6.37	10:30 a.m.	--	--	10:09 a.m.	4.25
PZ4	12/20/10		19.60	7.18	2:44 p.m.	2:27 p.m.	7.11	--	--
PZ4	03/21/11		19.17	7.61	4:11 p.m.	--	--	2:15 p.m.	4.77
PZ4	03/23/11		19.14	7.64	9:12 a.m.	7:18 a.m.	7.27	--	--
PZ4	06/21/11		16.07	10.71	2:55 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ4	06/22/11		16.26	10.52	7:42 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ4	09/23/11		24.60	2.18	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ4	09/28/11		23.13	3.65	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ5	04/17/03	26.86	20.06	6.80	4:15 p.m.	5:03 p.m.	8.83	12:48 p.m.	6.12
PZ5	05/06/03		21.79	5.07	4:55 p.m.	8:45 p.m.	6.71	3:27 p.m.	4.94
PZ5	05/21/03		21.51	5.35	11:22 a.m.	7:15 a.m.	6.86	4:30 p.m.	3.84
PZ5	07/07/03		23.91	2.95	10:40 a.m.	9:09 a.m.	4.34	4:54 p.m.	1.41
PZ5	08/13/03		22.73	4.13	12:53 p.m.	4:12 a.m.	7.10	1:09 p.m.	4.54
PZ5	01/28/04		21.78	5.08	9:08 a.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
PZ5	04/28/04		23.41	3.45	12:34 p.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ5	04/29/04		23.57	3.29	12:27 p.m.	11:03 a.m.	4.71	6:39 a.m.	3.3
PZ5	07/29/04		23.61	3.25	11:47 a.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ5	10/27/04		22.89	3.97	12:44 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ5	10/27/04		22.07	4.79	4:50 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ5	01/27/05		22.30	4.56	12:32 p.m.	5:55 a.m.		12:40 p.m.	4.13
PZ5	05/03/05		22.75	4.11	10:25 a.m.	11:36 p.m.	5.86	8:00 p.m.	3.12
PZ5	10/26/05		24.35	2.51	12:40 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ5	10/26/05		24.06	2.80	4:40 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ5	10/27/05		24.36	2.50	7:17 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ5	10/27/05		24.77	2.09	10:12 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ5	07/12/06		21.91	4.95	2:40 p.m.	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ5	02/07/07		22.80	4.06	1:34 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ5	02/04/10		21.70	5.16	9:27 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ5	09/01/10		24.73	2.13	10:22 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ5	11/02/10		23.34	3.52	11:56 a.m.	1:15 p.m.	4.42	8:42 a.m.	0.75
PZ5	12/20/10		20.41	6.45	11:36 a.m.	--	--	10:09 a.m.	4.25
PZ5	12/20/10		19.83	7.03	2:42 p.m.	2:27 p.m.	7.11	--	--
PZ5	03/21/11		19.19	7.67	4:56 p.m.	--	--	2:15 p.m.	4.77
PZ5	03/23/11		19.30	7.56	9:17 a.m.	7:18 a.m.	7.27	--	--
PZ5	06/21/11		16.06	10.80	2:53 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39

Table 2
Summary of Ground Water Elevation Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Measured	TOC Elevation ¹ (ft CRD)	Depth to Water (ft below TOC)	Water Elevation ¹ (ft CRD)	Time Measured	High (CRD) ²		Low (CRD) ²	
						Time	Elevation (ft)	Time	Elevation (ft)
PZ5	06/22/11		16.29	10.57	7:39 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ5	09/23/11		24.47	2.39	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ5	09/28/11		23.22	3.64	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ6	04/17/03	27.58	20.76	6.82	4:18 p.m.	5:03 p.m.	8.83	12:48 p.m.	6.12
PZ6	05/06/03		22.47	5.11	4:58 p.m.	8:45 p.m.	6.71	3:27 p.m.	4.94
PZ6	05/21/03		22.25	5.33	11:13 a.m.	7:15 a.m.	6.86	4:30 p.m.	3.84
PZ6	07/07/03		24.64	2.94	10:42 a.m.	9:09 a.m.	4.34	4:54 p.m.	1.41
PZ6	08/13/03		23.93	3.65	4:08 p.m.	4:12 a.m.	7.10	1:09 p.m.	4.54
PZ6	01/28/04		21.55	6.03	9:11 a.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
PZ6	04/28/04		24.13	3.45	12:11 p.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ6	04/29/04		24.31	3.27	12:30 p.m.	11:03 a.m.	4.71	6:39 a.m.	3.3
PZ6	07/29/04		24.35	3.23	11:49 a.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ6	10/27/04		23.59	3.99	12:45 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ6	10/27/04		22.87	4.71	4:52 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ6	01/27/05		23.02	4.56	12:35 p.m.	5:55 a.m.	--	12:40 p.m.	4.13
PZ6	05/03/05		23.29	4.29	12:08 p.m.	11:36 p.m.	5.86	8:00 p.m.	3.12
PZ6	07/25/05		24.28	3.30	6:25 p.m.	8:00 p.m.	6.26	2:54 p.m.	2.44
PZ6	07/26/05		23.86	3.72	7:15 a.m.	7:12 a.m.	5.92	--	--
PZ6	10/26/05		25.11	2.47	12:36 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ6	10/26/05		24.82	2.76	4:55 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ6	10/27/05		25.12	2.46	7:37 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ6	10/27/05		25.42	2.16	10:14 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ6	07/12/06		22.54	5.04	2:30 p.m.	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ6	02/07/07		23.54	4.04	1:30 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ6	02/04/10		22.54	5.04	9:23 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ6	09/01/10		24.80	2.78	10:15 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ6	11/02/10		24.10	3.48	11:48 a.m.	1:15 p.m.	4.42	8:42 a.m.	0.75
PZ6	12/20/10		21.15	6.43	10:21 a.m.	--	--	10:09 a.m.	4.25
PZ6	12/20/10		20.65	6.93	2:52 p.m.	2:27 p.m.	7.11	--	--
PZ6	03/21/11		19.92	7.66	4:47 p.m.	--	--	2:15 p.m.	4.77
PZ6	03/23/11		20.16	7.42	8:50 a.m.	7:18 a.m.	7.27	--	--
PZ6	06/21/11		16.70	10.88	2:30 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ6	06/22/11		16.99	10.59	7:50 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ6	09/23/11		25.11	2.47	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ6	09/28/11		23.96	3.62	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ7	04/29/04	28.06	24.02	4.04	12:10 p.m.	11:03 a.m.	4.71	6:39 a.m.	3.3
PZ7	07/29/04		24.15	3.91	11:50 a.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ7	10/27/04		23.38	4.68	12:47 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ7	10/27/04		23.31	4.75	4:55 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ7	01/27/05		22.76	5.30	12:40 p.m.	5:55 a.m.	--	12:40 p.m.	4.13
PZ7	05/03/05		22.98	5.08	4:07 p.m.	11:36 p.m.	5.86	8:00 p.m.	3.12
PZ7	07/25/05		23.66	4.40	6:08 p.m.	8:00 p.m.	6.26	2:54 p.m.	2.44

Table 2
Summary of Ground Water Elevation Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Measured	TOC Elevation ¹ (ft CRD)	Depth to Water (ft below TOC)	Water Elevation ¹ (ft CRD)	Time Measured	High (CRD) ²		Low (CRD) ²	
						Time	Elevation (ft)	Time	Elevation (ft)
PZ7	07/26/05		23.72	4.34	7:13 a.m.	7:12 a.m.	5.92	--	--
PZ7	10/26/05		24.58	3.48	12:33 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ7	10/26/05		24.55	3.51	5:03 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ7	10/27/05		24.55	3.51	7:39 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ7	10/27/05		24.63	3.43	10:16 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ7	07/12/06		NM	NM	NM	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ7	02/07/07		NM	NM	NM	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ7	02/04/10		24.80	3.26	10:40 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ7	12/20/10		20.89	7.17	10:55 a.m.	--	--	10:09 a.m.	4.25
PZ7	12/20/10		20.84	7.22	3:03 p.m.	2:27 p.m.	7.11	--	--
PZ7	03/21/11		19.52	8.54	4:25 p.m.	--	--	2:15 p.m.	4.77
PZ7	03/23/11		19.17	8.89	9:00 a.m.	7:18 a.m.	7.27	--	--
PZ7	06/21/11		16.61	11.45	2:42 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ7	06/22/11		16.91	11.15	7:55 p.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ7	09/23/11		24.61	3.45	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ7	09/28/11		23.77	4.29	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ8	04/17/03	28.17	19.78	8.39	4:24 p.m.	5:03 p.m.	8.83	12:48 p.m.	6.12
PZ8	05/06/03		20.81	7.36	5:00 p.m.	8:45 p.m.	6.71	3:27 p.m.	4.94
PZ8	05/21/03		20.95	7.22	11:29 a.m.	7:15 a.m.	6.86	4:30 p.m.	3.84
PZ8	07/07/03		21.30	6.87	10:46 a.m.	9:09 a.m.	4.34	4:54 p.m.	1.41
PZ8	08/13/03		21.66	6.51	12:55 p.m.	4:12 a.m.	7.10	1:09 p.m.	4.54
PZ8	01/28/04		20.42	7.75	9:12 a.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
PZ8	04/28/04		21.13	7.04	12:20 p.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ8	04/29/04		21.05	7.12	12:11 p.m.	11:03 a.m.	4.71	6:39 a.m.	3.3
PZ8	07/29/04		21.53	6.64	11:52 a.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ8	10/27/04		21.11	7.06	12:48 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ8	10/27/04		21.14	7.03	4:54 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ8	01/27/05		20.94	7.23	12:37 p.m.	5:55 a.m.	--	12:40 p.m.	4.13
PZ8	05/03/05		20.93	7.24	4:01 p.m.	11:36 p.m.	5.86	8:00 p.m.	3.12
PZ8	07/25/05		21.35	6.82	6:06 p.m.	8:00 p.m.	6.26	2:54 p.m.	2.44
PZ8	07/26/05		21.33	6.84	7:10 a.m.	7:12 a.m.	5.92	--	--
PZ8	10/26/05		21.48	6.69	12:32 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ8	10/26/05		21.43	6.74	5:01 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ8	10/27/05		21.46	6.71	7:40 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ8	10/27/05		21.34	6.83	10:15 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ8	07/12/06		NM	NM	NM	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ8	02/07/07		21.23	6.94	1:28 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ8	02/04/10		21.02	7.15	9:35 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ8	09/01/10		21.54	6.63	10:10 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ8	12/20/10		20.39	7.78	11:05 a.m.	--	--	10:09 a.m.	4.25
PZ8	12/20/10		20.35	7.82	2:55 p.m.	2:27 p.m.	7.11	--	--
PZ8	03/21/11		19.35	8.82	4:15 p.m.	--	--	2:15 p.m.	4.77
PZ8	03/23/11		19.84	8.33	8:54 a.m.	7:18 a.m.	7.27	--	--

Table 2
Summary of Ground Water Elevation Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Measured	TOC Elevation ¹ (ft CRD)	Depth to Water (ft below TOC)	Water Elevation ¹ (ft CRD)	Time Measured	High (CRD) ²		Low (CRD) ²	
						Time	Elevation (ft)	Time	Elevation (ft)
PZ8	06/21/11		16.59	11.58	2:38 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ8	06/22/11		16.89	11.28	7:58 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ8	09/23/11		21.83	6.34	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ8	09/28/11		21.68	6.49	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ9	04/17/03	27.54	--	--	--	5:03 p.m.	8.83	12:48 p.m.	6.12
PZ9	05/06/03		22.73	4.81	4:56 p.m.	8:45 p.m.	6.71	3:27 p.m.	4.94
PZ9	05/21/03		22.12	5.42	11:25 a.m.	7:15 a.m.	6.86	4:30 p.m.	3.84
PZ9	07/07/03		24.33	3.21	10:48 a.m.	9:09 a.m.	4.34	4:54 p.m.	1.41
PZ9	08/13/03		23.52	4.02	12:35 p.m.	4:12 a.m.	7.10	1:09 p.m.	4.54
PZ9	01/28/04		21.01	6.53	9:05 a.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
PZ9	04/28/04		23.93	3.61	11:41 a.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ9	04/28/04		25.18	2.36	8:14 p.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
PZ9	04/29/04		23.97	3.57	12:25 p.m.	11:03 a.m.	4.71	6:39 a.m.	3.3
PZ9	07/29/04		24.72	2.82	11:30 a.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ9	07/29/04		24.14	3.40	2:52 p.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
PZ9	10/27/04		23.74	3.80	12:10 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ9	10/27/04		22.11	5.43	4:45 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
PZ9	01/27/05		23.20	4.34	12:30 p.m.	5:55 a.m.	--	12:40 p.m.	4.13
PZ9	05/03/05		23.56	3.98	9:15 a.m.	11:36 p.m.	5.86	8:00 p.m.	3.12
PZ9	07/25/05		24.31	3.23	6:23 p.m.	8:00 p.m.	6.26	2:54 p.m.	2.44
PZ9	07/26/05		23.54	4.00	7:21 a.m.	7:12 a.m.	5.92	6:26 p.m.	2.66
PZ9	10/26/05		24.78	2.76	12:09 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ9	10/26/05		24.60	2.94	12:48 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ9	10/26/05		24.56	2.98	3:48 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ9	10/26/05		24.64	2.90	4:40 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ9	10/27/05		25.40	2.14	7:15 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ9	10/27/05		25.54	2.00	7:51 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ9	10/27/05		25.65	1.89	8:26 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ9	10/27/05		25.76	1.78	9:00 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ9	10/27/05		25.79	1.75	9:30 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ9	10/27/05		25.79	1.75	9:45 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ9	10/27/05		25.77	1.77	10:00 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ9	10/27/05		25.68	1.86	10:20 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ9	07/12/06		22.97	4.57	2:18 p.m.	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ9	02/07/07		23.69	3.85	1:38 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ9	02/04/10		22.04	5.50	9:42 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ9	09/01/10		25.34	2.20	9:47 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ9	12/20/10		21.06	6.48	11:40 a.m.	--	--	10:09 a.m.	4.25
PZ9	12/20/10		19.97	7.57	2:40 p.m.	2:27 p.m.	7.11	--	--
PZ9	03/21/11		19.98	7.56	4:39 p.m.	--	--	2:15 p.m.	4.77
PZ9	03/23/11		19.73	7.81	9:23 a.m.	7:18 a.m.	7.27	--	--
PZ9	06/21/11		16.98	10.56	3:40 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ9	06/22/11		17.06	10.48	7:36 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36

Table 2
Summary of Ground Water Elevation Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Measured	TOC Elevation ¹ (ft CRD)	Depth to Water (ft below TOC)	Water Elevation ¹ (ft CRD)	Time Measured	High (CRD) ²		Low (CRD) ²	
						Time	Elevation (ft)	Time	Elevation (ft)
PZ9	09/23/11		25.67	1.87	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ9	09/28/11		23.68	3.86	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ10	07/26/05	26.94	22.85	4.09	2:30 p.m.	7:12 a.m.	5.92	--	--
PZ10	10/26/05		24.42	2.52	12:07 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ10	10/26/05		24.02	2.92	4:38 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ10	10/27/05		24.08	2.86	7:12 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ10	10/27/05		24.44	2.50	10:20 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ10	07/12/06		NM	NM	NM	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ10	02/07/07		NM	NM	NM	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ10	02/04/10		NM	NM	NM	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ10	09/01/10		24.62	2.32	10:05 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ10	12/20/10		20.26	6.68	11:51 p.m.	2:27 p.m.	7.11	10:09 a.m.	4.25
PZ10	12/20/10		19.73	7.21	3:10 p.m.	2:27 p.m.	7.11	10:09 a.m.	4.25
PZ10	03/21/11		19.02	7.92	4:57 p.m.	--	--	2:15 p.m.	4.77
PZ10	03/23/11		19.26	7.68	9:27 a.m.	7:18 a.m.	7.27	--	--
PZ10	06/21/11		15.79	11.15	3:04 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ10	06/22/11		16.06	10.88	7:33 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ10	09/23/11		24.00	2.94	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ10	09/28/11		23.08	3.86	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ11	07/27/05	30.39	27.03	3.36	3:40 p.m.	--	--	--	--
PZ11	10/26/05		27.96	2.43	12:30 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ11	10/26/05		27.67	2.72	4:53 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ11	10/27/05		28.09	2.30	7:33 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ11	10/27/05		28.46	1.93	10:09 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ11	07/12/06		25.66	4.73	3:00 p.m.	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ11	02/07/07		26.47	3.92	1:45 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ11	02/04/10		25.26	5.13	9:10 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ11	09/01/10		28.39	2.00	10:02 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ11	12/20/10		24.11	6.28	11:26 a.m.	--	--	10:09 a.m.	4.25
PZ11	12/20/10		23.50	6.89	2:31 p.m.	2:27 p.m.	7.11	--	--
PZ11	03/21/11		22.92	7.47	4:03 p.m.	--	--	2:15 p.m.	4.77
PZ11	03/23/11		22.98	7.41	8:38 a.m.	7:18 a.m.	7.27	--	--
PZ11	06/21/11		19.73	10.66	3:10 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ11	06/22/11		19.92	10.47	8:08 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ11	09/23/11		28.17	2.22	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ11	09/28/11		26.86	3.53	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ12	07/27/05	30.53	26.80	3.73	2:15 p.m.	--	--	--	--
PZ12	10/26/05		27.95	2.58	12:28 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ12	10/26/05		27.69	2.84	4:52 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ12	10/27/05		28.11	2.42	7:30 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ12	10/27/05		28.47	2.06	10:06 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ12	07/12/06		25.61	4.92	2:39 p.m.	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ12	02/07/07		NM	NM	NM	7:09 a.m.	6.42	3:03 p.m.	3.33

Table 2
Summary of Ground Water Elevation Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Measured	TOC Elevation ¹ (ft CRD)	Depth to Water (ft below TOC)	Water Elevation ¹ (ft CRD)	Time Measured	High (CRD) ²		Low (CRD) ²	
						Time	Elevation (ft)	Time	Elevation (ft)
PZ12	02/04/10		25.42	5.11	8:34 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ12	09/01/10		NM	NM	NM	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ12	11/02/10		27.18	3.35	11:37 a.m.	1:15 p.m.	4.42	8:42 a.m.	0.75
PZ12	12/20/10		24.25	6.28	11:20 a.m.	--	--	10:09 a.m.	4.25
PZ12	12/20/10		23.50	7.03	3:12 p.m.	2:27 p.m.	7.11	--	--
PZ12	03/21/11		23.06	7.47	3:33 p.m.	--	--	2:15 p.m.	4.77
PZ12	03/23/11		23.21	7.32	8:08 a.m.	7:18 a.m.	7.27	--	--
PZ12	06/21/11		19.91	10.62	3:12 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ12	06/22/11		20.11	10.42	8:11 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ12	09/23/11		28.27	2.26	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ12	09/28/11		NM	NM	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ13	07/27/05	30.40	26.50	3.90	9:43 p.m.				
PZ13	10/26/05		27.86	2.54	12:27 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ13	10/26/05		27.58	2.82	4:50 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
PZ13	10/27/05		27.63	2.77	7:29 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ13	10/27/05		28.10	2.30	10:05 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
PZ13	07/12/06		NM	NM	NM	6:28 p.m.	6.53	2:40 p.m.	4.00
PZ13	02/07/07		26.30	4.10	1:56 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ13	02/04/10		25.50	4.90	8:32 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ13	09/01/10		28.21	2.19	9:59 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ13	11/02/10		26.93	3.47	11:30 a.m.	1:15 p.m.	4.42	8:42 a.m.	0.75
PZ13	12/20/10		23.89	6.51	11:18 a.m.	--	--	10:09 a.m.	4.25
PZ13	12/20/10		23.56	6.84	2:22 p.m.	2:27 p.m.	7.11	--	--
PZ13	03/21/11		23.57	6.83	3:36 p.m.	--	--	2:15 p.m.	4.77
PZ13	03/23/11		23.11	7.29	8:05 a.m.	7:18 a.m.	7.27	--	--
PZ13	06/21/11		19.50	10.90	3:14 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ13	06/22/11		19.75	10.65	8:14 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ13	09/23/11		27.82	2.58	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ13	09/28/11		26.63	3.77	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ14	02/07/07	29.09	25.33	3.76	2:00 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ14	02/04/10		23.74	5.35	8:20 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ14	09/01/10		26.94	2.15	9:57 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ14	06/21/11		18.55	10.54	3:17 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ14	06/22/11		18.62	10.47	8:16 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ14	09/23/11		27.15	1.94	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ14	09/28/11		25.44	3.65	3:25 p.m.	5:30 p.m.	4.74	--	--
PZ15	02/07/07	27.79	23.91	3.88	1:24 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
PZ15	02/04/10		22.22	5.57	9:45 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
PZ15	09/01/10		25.58	2.21	9:50 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
PZ15	06/21/11		NM	NM	NM	8:48 a.m.	9.36	5:06 p.m.	8.39
PZ15	06/22/11		NM	NM	NM	9:48 a.m.	9.00	5:21 p.m.	8.36
PZ15	09/23/11		26.04	1.75	8:45 a.m.	--	--	9:16 a.m.	-0.85
PZ15	09/28/11		23.91	3.88	3:25 p.m.	5:30 p.m.	4.74	--	--

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Kalama, WA
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Well ID	Date Measured	TOC Elevation ¹ (ft CRD)	Depth to Water (ft below TOC)	Water Elevation ¹ (ft CRD)	Time Measured	High (CRD) ²		Low (CRD) ²	
						Time	Elevation (ft)	Time	Elevation (ft)
AB1 ³	07/07/03	27.53	33.70	3.70	10:35 a.m.	9:09 a.m.	4.34	4:54 p.m.	1.41
AB1 ³	08/13/03		31.43	5.31	11:25 a.m.	4:12 a.m.	7.10	1:09 p.m.	4.54
AB1 ³	01/28/04		29.49	6.68	9:03 a.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
AB1 ³	01/28/04		29.19	6.89	1:07 p.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
AB1 ³	04/28/04		--	--	--	9:39 a.m.	4.60	6:46 p.m.	2.19
AB1 ³	04/29/04		33.72	3.69	12:22 p.m.	11:03 a.m.	4.71	6:39 a.m.	3.3
AB1 ³	07/29/04		33.08	4.14	11:35 a.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
AB1 ³	07/29/04		33.65	3.74	2:56 p.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
AB1 ³	10/27/04		33.35	3.95	12:50 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
AB1 ³	10/27/04		30.11	6.24	4:42 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
AB1 ³	01/27/05		32.14	4.80	12:27 p.m.	5:55 a.m.		12:40 p.m.	4.13
AB1 ³	05/03/05		31.31	5.39	1:49 p.m.	11:36 p.m.	5.86	8:00 p.m.	3.12
AB1 ³	07/25/05		34.18	3.36	6:20 p.m.	8:00 p.m.	6.26	2:54 p.m.	2.44
AB1 ³	07/26/05		31.78	5.06	7:25 a.m.	7:12 a.m.	5.92		
AB1 ³	10/26/05		34.53	3.11	12:21 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
AB1 ³	10/26/05		33.60	3.77	4:56 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
AB1 ³	10/27/05		34.52	3.12	7:20 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
AB1 ³	07/12/06		31.14	4.39	2:40 p.m.	6:28 p.m.	6.53	2:40 p.m.	4.00
AB1 ³	02/07/07		32.54	4.52	1:41 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
AB1 ³	02/04/10		30.08	6.26	9:17 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
AB1 ³	09/01/10		34.71	2.99	10:27 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
AB1 ³	11/02/10		32.19	4.77	12:03 p.m.	13:15 p.m.	4.42	8:42 a.m.	0.75
AB1 ³	12/20/10		29.08	6.97	11:30 a.m.	--	--	10:09 a.m.	4.25
AB1 ³	12/20/10		28.32	7.50	2:36 p.m.	2:27 p.m.	7.11	--	--
AB1 ³	03/21/11		27.65	7.98	4:32 p.m.	--	--	2:15 p.m.	4.77
AB1 ³	03/23/11		27.07	8.39	8:30 a.m.	7:18 a.m.	7.27	--	--
AB1 ³	06/21/11		23.48	10.93	3:36 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
AB1 ³	06/22/11		23.49	10.92	7:46 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
AB1 ³	09/23/11		35.19	2.65	8:45 a.m.	--	--	9:16 a.m.	-0.85
AB1 ³	09/28/11		32.64	4.45	3:25 p.m.	5:30 p.m.	4.74	--	--
AB2 ³	07/07/03	28.41	30.07	3.78	10:30 a.m.	9:09 a.m.	4.34	4:54 p.m.	1.41
AB2 ³	08/13/03		29.94	3.88	4:10 p.m.	4:12 a.m.	7.10	1:09 p.m.	4.54
AB2 ³	01/28/04		26.12	7.01	8:47 a.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
AB2 ³	01/28/04		26.88	6.39	3:00 p.m.	8:42 a.m.	8.10	4:54 p.m.	5.78
AB2 ³	04/28/04		29.59	4.17	11:59 a.m.	9:39 a.m.	4.60	6:46 p.m.	2.19
AB2 ³	04/29/04		29.62	4.15	12:15 p.m.	11:03 a.m.	4.71	6:39 a.m.	3.3
AB2 ³	07/29/04		30.36	3.54	11:42 a.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
AB2 ³	07/29/04		29.75	4.04	3:03 p.m.	2:36 p.m.	5.15	10:27 a.m.	2.47
AB2 ³	10/27/04		29.48	4.26	12:37 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66

Table 2
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Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Measured	TOC Elevation ¹ (ft CRD)	Depth to Water (ft below TOC)	Water Elevation ¹ (ft CRD)	Time Measured	High (CRD) ²		Low (CRD) ²	
						Time	Elevation (ft)	Time	Elevation (ft)
AB2 ³	10/27/04		27.39	5.97	4:35 p.m.	3:15 p.m.	7.41	10:39 a.m.	3.66
AB2 ³	01/27/05		28.78	4.83	12:18 p.m.	5:55 a.m.	--	12:40 p.m.	4.13
AB2 ³	05/03/05		28.58	5.00	5:15 p.m.	11:36 p.m.	5.86	8:00 p.m.	3.12
AB2 ³	07/25/05		30.00	3.83	6:15 p.m.	8:00 p.m.	6.26	2:54 p.m.	2.44
AB2 ³	07/26/05		28.99	4.66	7:33 a.m.	7:12 a.m.	5.92	--	--
AB2 ³	10/26/05		30.35	3.55	12:26 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
AB2 ³	10/26/05		30.52	3.41	4:49 p.m.	11:42 a.m.	4.43	6:26 p.m.	2.66
AB2 ³	10/27/05		31.54	2.57	7:28 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
AB2 ³	10/27/05		31.78	2.38	10:04 a.m.	12:36 p.m.	4.58	7:24 a.m.	1.48
AB2 ³	07/12/06		28.36	4.36	2:40 p.m.	6:28 p.m.	6.53	2:40 p.m.	4.00
AB2 ³	02/07/07		29.40	4.33	1:54 p.m.	7:09 a.m.	6.42	3:03 p.m.	3.33
AB2 ³	02/04/10		27.23	6.10	8:27 a.m.	7:39 a.m.	5.47	2:45 p.m.	1.34
AB2 ³	09/01/10		31.21	2.84	10:30 a.m.	9:42 p.m.	2.62	5:33 a.m.	-0.93
AB2 ³	11/02/10		29.56	4.19	11:21 a.m.	13:15 p.m.	4.42	8:42 a.m.	0.75
AB2 ³	12/20/10		26.36	6.82	11:16 a.m.	--	--	10:09 a.m.	4.25
AB2 ³	12/20/10		24.97	7.95	2:26 p.m.	2:27 p.m.	7.11	--	--
AB2 ³	03/21/11		25.20	7.77	3:54 p.m.	--	--	2:15 p.m.	4.77
AB2 ³	03/23/11		24.63	8.23	8:30 a.m.	7:18 a.m.	7.27	--	--
AB2 ³	06/21/11		21.36	10.91	3:21 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
AB2 ³	06/22/11		21.35	10.92	8:19 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
AB2 ³	09/23/11		31.66	2.47	8:45 a.m.	--	--	9:16 a.m.	-0.85
AB2 ³	09/28/11		29.45	4.28	3:25 p.m.	5:30 p.m.	4.74	--	--
OW1	11/02/10	26.51	23.00	3.51	11:26 a.m.	13:15 p.m.	4.42	8:42 a.m.	0.75
OW1	12/20/10		20.22	6.29	11:10 a.m.	--	--	10:09 a.m.	4.25
OW1	12/20/10		19.38	7.13	2:20 p.m.	2:27 p.m.	7.11	--	--
OW1	03/21/11		19.15	7.36	3:40 p.m.	--	--	2:15 p.m.	4.77
OW1	03/23/11		18.97	7.54	8:20 a.m.	7:18 a.m.	7.27	--	--
OW1	06/21/11		15.93	10.58	3:26 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
OW1	06/22/11		16.05	10.46	8:21 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
OW1	09/23/11		24.43	2.08	8:45 a.m.	--	--	9:16 a.m.	-0.85
OW1	09/28/11		22.79	3.72	3:25 p.m.	5:30 p.m.	4.74	--	--
OW2	11/02/10	25.99	22.45	3.54	11:24 p.m.	13:15 p.m.	4.42	8:42 a.m.	0.75
OW2	12/20/10		19.71	6.28	11:08 a.m.	--	--	10:09 a.m.	4.25
OW2	12/20/10		18.56	7.43	3:14 p.m.	2:27 p.m.	7.11	--	--
OW2	03/21/11		18.64	7.35	3:58 p.m.	--	--	2:15 p.m.	4.77
OW2	03/23/11		18.37	7.62	8:27 a.m.	7:18 a.m.	7.27	--	--
OW2	06/21/11		15.48	10.51	3:24 a.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
OW2	06/22/11		15.51	10.48	8:23 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
OW2	09/23/11		23.99	2.00	8:45 a.m.	--	--	9:16 a.m.	-0.85

Table 2
Summary of Ground Water Elevation Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Measured	TOC Elevation ¹ (ft CRD)	Depth to Water (ft below TOC)	Water Elevation ¹ (ft CRD)	Time Measured	High (CRD) ²		Low (CRD) ²	
						Time	Elevation (ft)	Time	Elevation (ft)
OW2	09/28/11		22.85	3.14	3:25 p.m.	5:30 p.m.	4.74	--	--
OW3	11/02/10	26.13	22.62	3.51	11:28 a.m.	13:15 p.m.	4.42	8:42 a.m.	0.75
OW3	12/20/10		19.83	6.30	11:13 a.m.	--	--	10:09 a.m.	4.25
OW3	12/20/10		19.98	6.15	2:28 p.m.	2:27 p.m.	7.11	--	--
OW3	03/21/11		18.76	7.37	3:42 p.m.	--	--	2:15 p.m.	4.77
OW3	03/23/11		18.60	7.53	8:14 a.m.	7:18 a.m.	7.27	--	--
OW3	06/21/11		15.55	10.58	3:30 p.m.	8:48 a.m.	9.36	5:06 p.m.	8.39
OW3	06/22/11		15.65	10.48	8:24 a.m.	9:48 a.m.	9.00	5:21 p.m.	8.36
OW3	09/23/11		24.05	2.08	8:45 a.m.	--	--	9:16 a.m.	-0.85
OW3	09/28/11		22.52	3.61	3:25 p.m.	5:30 p.m.	4.74	--	--

Notes:

- 1) Survey based on NAVD88 and adjusted to CRD by subtracting 3.8 feet. Control point was taken from the I-5 intersection at the Todd Road overpass located at the northeast corner of the interchange.
- 2) Tidal data are from NOAA Co-ops web site <http://co-ops.nos.noaa.gov>. Verified times and high/low water level data from the Longview and St. Helens stations were used. Tides for Kalama were estimated by using the difference between the times and water level data at these two stations (assuming Kalama is located approximately at the midpoint). These elevations are based on MLLW.
- 3) Water elevations in the angle monitoring wells are approximated by the following calculations (where WL = depth to water):
 AB1 (27.53 - WL COS 45°)
 AB2 (28.41 - WL COS 35°)

2003 through February 2010 data was obtained from CDM reports or electronic files provided to H&H by Clariant.

ft TOC = feet below top of casing.

CRD = Columbia River Datum.

NM = not measured.

Table 3
Summary of Ground Water Field Parameters and Sulfide Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Sampled	Time Sampled	Temperature (°C)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)	Turbidity* (NTU)	Sulfides (mg/L)
PZ1	04/15/03	1255	14.6	155	5.23	6.27	64.0	70	--
PZ1	07/18/03	1430	15.2	--	--	6.84	--	Clear	--
PZ1	08/13/03	1035	15.9	600	--	7.79	--	4.3	--
PZ1	01/28/04	1530	13.5	190	--	6.49	--	5.4	--
PZ1	04/28/04	0942	13.3	192	--	6.37	--	1.13	--
PZ1	07/29/04	1532	18.0	202	--	6.20	--	5.4	--
PZ1	10/27/04	0915	11.5	189	--	5.44	--	0.36	--
PZ1	01/27/05	1015	12.9	198	4.05	6.38	-43.0	0	--
PZ1	05/03/05	1532	15.6	208	--	6.02	--	0.55	--
PZ1	07/26/05	0900	15.0	167	3.38	7.25	212.9	1.20	--
PZ1	10/26/05	1535	13.9	142	--	5.67	--	--	--
PZ1	07/12/06	1836	14.9	159	--	5.90	--	2.8	--
PZ1	02/04/10	1415	13.2	160	2.04	5.29	24.0	Clear	--
PZ1	09/02/10	1400	15.8	69	8.44	5.66	-63.5	3.17	<0.200
PZ1	11/02/10	1650	14.8	84	7.62	6.57	-27.8	4.12	<0.200
PZ1	12/20/10	1634	11.2	69	6.45	6.77	43.4	3.2	<0.200
PZ1	03/22/11	1030	12.4	121	6.29	6.52	-58.5	1.32	<0.200
PZ1	06/21/11	1140	15.4	124	4.77	6.51	5.7	1.97	<0.200
PZ1	09/22/11	1125	16.8	170	8.99	5.74	261	<1.0	<0.200
PZ3	04/15/03	1645	14.6	689	0.25	5.85	43.0	40	--
PZ3	05/06/03	1550	15.4	695	1.62	6.80	24.0	4	--
PZ3	05/21/03	1215	15.7	710	--	7.15	--	Clear	--
PZ3	07/18/03	1615	15.3	--	--	7.10	--	Clear	--
PZ3	08/13/03	1202	15.5	740	--	6.72	--	1.8	--
PZ3	01/28/04	1330	13.9	517	--	6.27	--	1.05	--
PZ3	04/28/04	1747	21.6	551	--	6.27	--	1.5	--
PZ3	07/29/04	1239	18.9	421	--	6.15	--	5.3	--
PZ3	10/27/04	1100	12.9	340	--	5.95	--	1.61	--
PZ3	01/27/05	1440	14.7	459	3.39	6.68	-48.0	0.60	--
PZ3	05/03/05	1335	16.0	436	--	6.10	--	0.70	--
PZ3	07/25/05	1256	17.7	306	2.15	6.19	80.0	3.97	--
PZ3	10/27/05	0915	12.8	257	--	5.64	--	--	--
PZ3	07/13/06	0718	14.2	471	--	5.84	--	2.0	--
PZ3	07/13/06	1600	14.7	198	--	6.35	--	0.30	--
PZ3	02/05/10	1120	14.0	603	1.55	6.02	23.0	Clear	--
PZ3	09/01/10	1436	14.0	311	3.54	6.11	66.6	3.38	<0.200
PZ3	11/03/10	1310	19.0	254	5.19	6.30	76.9	2.01	<0.200
PZ3	12/21/10	1445	12.5	200	2.79	6.69	-10.2	3.07	<0.200
PZ3	03/22/11	1620	12.6	342	2.64	5.96	-110.0	0.74	<0.200
PZ3	06/21/11	1625	18.6	341	1.16	6.20	4.4	1.09	<0.200
PZ3	09/22/11	945	17.3	404	7.46	5.86	231	<1.0	<0.200
PZ4	04/15/03	1845	14.2	1,050	4.49	5.35	91.0	67	--
PZ4	05/21/03	1246	14.8	380	--	7.16	--	Clear	--
PZ4	08/13/03	1346	15.9	510	--	6.62	--	5.2	--
PZ4	01/28/04	1110	14.1	767	--	5.53	--	0.17	--
PZ4	04/28/04	2122	14.0	811	--	5.76	--	4.97	--

Table 3
Summary of Ground Water Field Parameters and Sulfide Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Sampled	Time Sampled	Temperature (°C)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)	Turbidity* (NTU)	Sulfides (mg/L)
PZ4	07/29/04	1825	17.2	884	--	5.46	--	4.4	--
PZ4	10/27/04	1335	12.5	614	--	5.53	--	0.25	--
PZ4	01/27/05	1645	13.6	1,770	1.99	5.58	-49.0	0	--
PZ4	05/03/05	1152	14.6	957	--	5.58	--	0.87	--
PZ4	07/25/05	1530	15.2	454	0.86	5.82	236.3	2.84	--
PZ4	10/26/05	1310	13.3	692	--	5.35	--	--	--
PZ4	07/13/06	0746	14.0	465	--	5.73	--	3.1	--
PZ4	07/13/06	1640	16.5	405	--	6.18	--	8.4	--
PZ4	09/01/10	1244	13.7	636	2.91	5.50	84.8	3.72	<0.200
PZ4	11/03/10	1120	16.7	587	5.11	5.71	125.1	4.84	<0.200
PZ4	12/21/10	1515	11.8	275	2.36	6.34	-31.3	4.86	<0.200
PZ4	03/22/11	1445	12.7	668	5.72	5.94	-66.5	1.55	<0.200
PZ4	06/21/11	1515	16.96	888	6.15	5.65	35.9	2.27	<0.200
PZ4	09/22/11	1620	21.43	839	3.90	5.41	165.0	2.5	<0.200
PZ5	04/16/03	1115	13.6	530	4.78	5.86	100.0	57	--
PZ5	05/21/03	1320	14.2	170	--	7.10	--	Clear	--
PZ5	08/13/03	1729	15.9	860	--	6.69	--	9.7	--
PZ5	01/28/04	1150	13.6	210	--	6.19	--	1.6	--
PZ5	04/28/04	1958	14.2	293	--	6.03	--	1.51	--
PZ5	07/29/04	1902	16.6	479	--	5.92	--	2.6	--
PZ5	10/27/04	1415	12.4	1,300	--	5.32	--	0.64	--
PZ5	01/27/05	1605	13.3	460	3.8	6.34	-27.0	7.9	--
PZ5	05/03/05	1100	14.1	281	--	5.77	--	1.09	--
PZ5	07/25/05	1737	15.8	478	3.05	5.94	199.3	5.15	--
PZ5	10/26/05	1150	14.0	770	--	5.45	--	--	--
PZ5	07/13/06	0800	13.9	190	--	5.00	--	4.70	--
PZ5	07/13/06	1658	12.0	186	--	5.80	--	4.45	--
PZ5	02/05/10	1455	13.6	433	1.9	5.76	22.0	Clear	--
PZ5	09/01/10	1521	15.8	212	4.13	5.50	87.3	5.38	<0.200
PZ5	11/03/10	1035	14.2	142	5.43	6.20	79.0	1.94	<0.200
PZ5	12/21/10	1600	10.4	142	7.21	6.22	34.6	2.25	<0.200
PZ5	03/22/11	1520	12.0	425	6.81	6.28	-84.5	1.27	<0.200
PZ5	06/21/11	1555	15.3	2,178	4.22	5.43	65.4	1.01	<0.200
PZ5	09/22/11	1650	20.7	162	2.98	5.77	148	2.7	<0.200
PZ6	04/16/03	1310	13.8	345	7.07	4.74	162.0	17	--
PZ6	05/21/03	1415	14.4	250	--	6.85	--	Clear	--
PZ6	08/13/03	1642	16.1	880	--	6.76	--	6.9	--
PZ6	01/28/04	1020	12.1	447	--	5.96	--	0.07	--
PZ6	04/28/04	1412	19.1	293	--	5.90	--	23.9	--
PZ6	07/29/04	1738	18.2	725	--	5.80	--	6.3	--
PZ6	10/27/04	1500	12.2	747	--	5.63	--	0.42	--
PZ6	01/27/05	1730	13.0	991	3.72	5.59	12.0	3.2	--
PZ6	05/03/05	1233	14.9	1,370	--	5.28	--	0.90	--
PZ6	07/25/05	1549	16.0	1,275	4.85	4.48	290.3	0.87	--
PZ6	10/26/05	820	11.5	916	--	4.15	--	--	--
PZ6	07/13/06	0906	14.0	802	--	5.08	--	1.90	--

Table 3
Summary of Ground Water Field Parameters and Sulfide Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Sampled	Time Sampled	Temperature (°C)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)	Turbidity* (NTU)	Sulfides (mg/L)
PZ6	09/01/10	1133	12.9	728	7.60	5.68	117.6	4.36	<0.200
PZ6	11/03/10	1155	15.4	671	6.38	5.69	133.0	1.53	<0.200
PZ6	12/20/10	1715	11.8	217	6.80	6.32	55.6	3.33	<0.200
PZ6	03/22/11	1415	11.8	357	7.19	5.76	-39.7	1.99	<0.200
PZ6	06/21/11	1445	16.4	420	6.93	5.94	21.9	4.90	<0.200
PZ6	09/22/11	1555	19.7	220	3.93	5.73	135	<1.0	<0.200
PZ12	07/27/05	1452	17.6	198	2.54	9.65	15.2	3.75	--
PZ12	10/26/05	1430	13.7	164	--	5.66	--	--	--
PZ12	07/13/06	1802	14.7	193	--	5.45	--	3.09	--
PZ12	02/04/10	1230	13.2	290	2.86	5.71	25.0	Clear	--
PZ12	09/02/10	1124	12.3	185	1.54	5.61	-2.2	3.52	<0.200
PZ12	11/03/10	945	11.9	269	1.93	6.70	-65.9	3.60	<0.200
PZ12	12/21/10	1230	12.8	372	0.61	6.54	-32.8	1.83	<0.200
PZ12	03/22/11	945	12.1	641	0.22	6.03	-192.3	0.99	<0.200
PZ12	06/21/11	1405	16.2	531	2.43	5.46	-7.1	2.55	<0.200
PZ12	09/22/11	1520	19.7	1,000	2.22	4.02	182	2.1	3.55
PZ13	07/27/05	1032	15.9	168	1.52	8.61	-121.8	2.3	--
PZ13	09/02/10	1029	14.3	225	2.97	6.14	14.8	4.92	<0.200
PZ13	11/02/10	1420	16.1	1,941	0.14	9.80	-449.8	776	36
PZ13	12/21/10	1020	11.0	539	0.94	6.71	-101.4	444	<0.200
PZ13	03/22/11	900	10.5	349	4.48	6.61	-151.9	267	10.4
PZ13	06/21/11	1340	15.0	366	5.22	6.31	-59.5	21.9	1.22
PZ13	09/22/11	1430	20.8	651	3.85	6.59	-233	200.0	2.98
AB1	07/07/03	1531	17.3	397	--	6.73	--	9	--
AB1	07/18/03	1525	15.2	--	--	6.94	--	Clear	--
AB1	08/13/03	1218	15.8	720	--	6.80	--	1.1	--
AB1	01/28/04	1410	13.6	253	--	6.82	--	3.2	--
AB1	04/28/04	1843	19.0	373	--	7.04	--	24.8	--
AB1	07/29/04	1356	20.6	334	--	6.54	--	12	--
AB1	10/27/04	1210	14.7	195	--	6.25	--	1.03	--
AB1	01/27/05	1355	14.2	209	2.38	7.12	-58.0	2.6	--
AB1	05/03/05	1408	15.0	310	--	6.52	--	0.70	--
AB1	07/25/05	1425	15.4	226	3.46	6.65	189.2	10.2	--
AB1	10/27/05	1030	12.3	177	--	6.08	--	--	--
AB1	07/13/06	0730	13.7	255	--	6.08	--	0.9	--
AB1	07/13/06	1612	16.1	505	--	5.95	--	0.9	--
AB1	02/05/10	1045	12.7	391	1.65	6.29	31.0	Clear	--
AB1	09/01/10	1339	14.6	314	5.47	6.39	67.1	6.13	<0.200
AB1	11/03/10	1245	19.3	186	6.34	6.67	62.5	1.12	<0.200
AB1	12/21/10	1410	10.8	112	9.01	7.36	23.0	4.33	<0.200
AB1	03/22/11	1600	11.5	158	8.95	6.54	-49.7	0.45	<0.200
AB1	06/21/11	1640	16.2	212	8.63	7.17	-7.3	2.35	<0.200
AB1	09/22/11	1020	16.9	310	4.20	6.14	233.0	<1.0	<0.200
AB2	07/07/03	1247	15.8	174	--	6.29	--	2.7	--
AB2	07/18/03	1325	15.1	--	--	7.03	--	9	--
AB2	08/12/03	1700	14.7	710	--	7.11	--	5.7	--

Table 3
Summary of Ground Water Field Parameters and Sulfide Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Well ID	Date Sampled	Time Sampled	Temperature (°C)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)	Turbidity* (NTU)	Sulfides (mg/L)
AB2	01/28/04	1860	14.0	165	--	6.51	--	20	--
AB2	04/28/04	1030	16.6	192	--	6.67	--	219	--
AB2	07/29/04	1628	18.5	180	--	6.35	--	68	--
AB2	10/27/04	0955	12.0	162	--	5.61	--	9.12	--
AB2	01/27/05	1135	13.5	174	1.66	6.52	-68.0	37	--
AB2	05/03/05	1732	14.5	213	--	6.18	--	95	--
AB2	07/26/05	0811	14.5	140	1.89	7.14	190.1	1.15	--
AB2	01/26/05	1510	14.4	137	--	5.88	--	--	--
AB2	07/13/06	0702	14.0	190	--	5.63	--	0.30	--
AB2	07/13/06	1542	14.4	136	--	5.94	--	0.30	--
AB2	02/04/10	1330	13.1	135	6.62	5.34	28.0	Clear	--
AB2	09/02/10	1319	15.5	79	2.42	5.42	-15.4	5.37	<0.200
AB2	11/02/10	1545	16.5	111	4.18	6.99	-62.4	1.80	<0.200
AB2	12/20/10	1610	11.2	80	2.39	6.70	22.4	0.86	<0.200
AB2	03/22/11	1125	11.6	99	7.35	6.67	-65.5	0.49	<0.200
AB2	06/21/11	935	13.7	109	7.48	6.50	339.50	1.61	<0.200
AB2	09/22/11	1155	17.0	168	2.61	5.61	261	<1.0	<0.200
OW1	09/23/10	1000	12.7	162	10.6	6.47	-50.8	0.20	<0.200
OW1	11/02/10	1845	14.2	104	7.28	6.63	-19.4	3.89	<0.200
OW1	12/20/10	1545	11.2	91	6.02	6.84	38.9	1.13	<0.200
OW1	03/22/11	1340	12.7	192	6.4	6.62	-58.7	0.50	<0.200
OW1	06/21/11	1040	15.6	227	2.84	6.39	60.4	3.06	<0.200
OW1	09/22/11	1305	17.0	270	4.66	5.99	229	0.3	<0.200
OW2	09/23/10	0920	13.4	123	8.87	6.34	-43.0	1.55	<0.200
OW2	11/02/10	1645	15.3	99	7.91	6.73	-40.7	4.54	<0.200
OW2	12/20/10	1355	12.2	123	6.22	5.90	89.3	3.22	<0.200
OW2	03/22/11	1055	11.2	172	5.7	6.60	-67.8	0.59	<0.200
OW2	06/21/11	1015	14.3	224	3.58	6.25	170.5	4.61	<0.200
OW2	09/22/11	1235	17.5	256	4.65	5.81	256	<1.0	<0.200
OW3	09/23/10	0830	13.3	104	10.46	6.43	-49.7	0.21	<0.200
OW3	11/02/10	1845	13.9	104	5.85	6.46	-4.9	4.46	<0.200
OW3	12/21/10	1110	12.9	153	2.92	6.67	13.5	2.15	<0.200
OW3	03/22/11	1150	10.9	270	5.55	6.48	-73.5	0.62	<0.200
OW3	06/21/11	1120	15.3	186	4.41	6.45	13.4	3.29	<0.200
OW3	09/22/11	1330	17.0	355	5.60	5.82	242	0.3	<0.200

Notes:

Only data for wells used for injection performance monitoring are shown

* turbidity values were collected prior to field filtering

°C - degrees Celsius, µs/cm - microsiemens per centimeter, mg/L - milligrams per liter, mV - millivolts

ORP - oxidation reduction potential, NTU - Nephelometric turbidity units

sulfides analysis performed by laboratory using SM 4500-S-2 D

-- indicates parameter not measured/analyzed or was not available from previous report

Table 4
Summary of Ground Water Analytical Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Sample ID	Sample Date	Sample Time	Zinc		Cadmium	
			Total	Dissolved	Total	Dissolved
			µg/L			
PZ1	04/15/03	1255	--	2,100	--	<4.4
PZ1	07/18/03	1430	--	3,500	--	--
PZ1	08/13/03	1035	7,300	--	<4.4	--
PZ1	01/28/04	1530	10,000	--	--	--
PZ1	04/29/04	1214	--	13,000	--	--
PZ1	07/29/04	1532	--	16,000	--	--
PZ1	10/27/04	0915	--	13,000	--	--
PZ1	01/27/05	1015	--	16,100	--	--
PZ1	05/03/05	1532	--	16,800	--	--
PZ1	07/26/05	0900	--	20,500	--	<2.0
PZ1	10/26/05	1535	--	12,600	--	--
PZ1	07/12/06	1836	--	11,500	--	0.7
PZ1	02/04/10	1415	--	8,440	--	0.5
PZ1	09/02/10	1400	5,630	--	<1.0	--
PZ1	11/02/10	1650	--	7,290	--	<1.0
PZ1	12/20/10	1640	--	6,720	--	<1.0
PZ1	03/22/11	1030	--	12,300	--	<10.0
PZ1	06/21/11	1140	--	14,700	--	<10.0
PZ1	09/22/11	1125	--	17,800	--	<1.0
PZ3	04/15/03	1645	--	7,200	--	<4.4
PZ3	05/06/03	1550	--	11,000	--	<4.4
PZ3	05/21/03	1215	--	12,000	--	<4.0
PZ3	07/18/03	1615	--	12,000	--	--
PZ3	08/13/03	1202	7,400	--	<4.4	--
PZ3	01/28/04	1330	8,300	--	<4.4	--
PZ3	04/28/04	1747	--	11,000	--	<4.0
PZ3	07/29/04	1239	--	6,600	--	<4.0
PZ3	10/27/04	1100	--	4,300	--	<4.0
PZ3	01/27/05	1440	--	8,920	--	<2
PZ3	05/03/05	1335	--	7,160	--	<2
PZ3	07/25/05	1256	--	6,850	--	<2.0
PZ3	10/27/05	0915	--	4,140	--	<2.0
PZ3	07/13/06	0718	--	7,510	--	1.0
PZ3	07/13/06	1600	--	850	--	0.3
PZ3	02/05/10	1170	--	3,690	--	0.5
PZ3	09/01/10	1436	2,670	--	<1.0	--
PZ3	11/03/10	1310	--	1,940	--	<1.0
PZ3	12/21/10	1445	--	2,280	--	<1.0
PZ3	03/22/11	1620	--	4,370	--	<10.0
PZ3	09/22/11	1625	--	2,930	--	<10.0
PZ3	06/21/11	0945	--	4,420	--	<1.0

Table 4
Summary of Ground Water Analytical Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Sample ID	Sample Date	Sample Time	Zinc		Cadmium	
			Total	Dissolved	Total	Dissolved
			µg/L			
PZ4	04/15/03	1845	--	3,300	--	46
PZ4	05/21/03	1246	--	650	--	9.2
PZ4	08/13/03	1346	720	--	9.6	--
PZ4	01/28/04	1110	6,600	--	64	--
PZ4	04/28/04	2122	--	2,300	--	27
PZ4	07/29/04	1825	--	3,500	--	37
PZ4	10/27/04	1335	--	1,700	--	16
PZ4	01/27/05	1645	--	8,060	--	82
PZ4	05/03/05	1152	--	2,090	--	19
PZ4	07/25/05	1530	--	1,190	--	10
PZ4	10/26/05	1310	--	1,450	--	13
PZ4	07/13/06	0746 (HT)	--	620	--	7.7
PZ4	07/13/06	1640 (LT)	--	420	--	5.3
PZ4	09/01/10	1244	2,210	--	16.6	--
PZ4	11/03/10	1120	--	1,890	--	15.6
PZ4	12/21/10	1515	--	896	--	6.61
PZ4	03/22/11	1445	--	3,980	--	36.9
PZ4	06/21/11	1515	--	5,310	--	38.3
PZ4	09/22/11	1620	--	2,810	--	26.1
PZ5	04/16/03	1115	--	3,600	--	180
PZ5	05/21/03	1320	--	3,000	--	120
PZ5	08/13/03	1729	4,300	--	160	--
PZ5	01/28/04	1150	3,700	--	110	--
PZ5	04/28/04	1958	--	6,700	--	200
PZ5	07/29/04	1902	--	8,800	--	320
PZ5	10/27/04	1415	--	34,000	--	1,100
PZ5	01/27/05	1605	--	7,930	--	326
PZ5	05/03/05	1100	--	5,850	--	244
PZ5	07/25/05	1737	--	7,550	--	302
PZ5	10/26/05	1224	--	14,100	--	628
PZ5	07/13/06	0800 (HT)	--	3,390	--	152
PZ5	07/13/06	1658 (LT)	--	3,250	--	146
PZ5	02/05/10	1450	--	3,060	--	107
PZ5	09/01/10	1521	4,350	--	118	--
PZ5	11/03/10	1035	--	2,080	--	69.7
PZ5	12/21/10	1545	--	2,880	--	91.8
PZ5	03/22/11	1520	--	2,980	--	84.7
PZ5	06/21/11	1555	--	35,800	--	1,150
PZ5	09/22/11	1650	--	2,390	--	102

Table 4
Summary of Ground Water Analytical Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Sample ID	Sample Date	Sample Time	Zinc		Cadmium	
			Total	Dissolved	Total	Dissolved
			µg/L			
PZ6	04/16/03	1310	--	1,500	--	<4.4
PZ6	05/21/03	1415	--	1,400	--	<4.0
PZ6	08/13/03	1642	2,100	--	<4.4	--
PZ6	01/28/04	1020	2,600	--	--	--
PZ6	04/28/04	1412	--	1,400	--	--
PZ6	07/29/04	1738	--	4,600	--	--
PZ6	10/27/04	1500	--	2,600	--	--
PZ6	01/27/05	1730	--	5,370	--	--
PZ6	05/03/05	1233	--	12,500	--	--
PZ6	07/25/05	1549	--	26,200	--	6
PZ6	10/27/05	0721	--	16,800	--	6
PZ6	07/13/06	0906	3,800	--	1.7	--
PZ6	09/01/10	1133	1,310	--	<1.0	--
PZ6	11/03/10	1155	--	1,190	--	<1.0
PZ6	12/20/10	1715	--	553	--	<1.0
PZ6	03/22/11	1415	--	740	--	<10.0
PZ6	06/21/11	1550	--	1,660	--	<10.0
PZ6	09/22/11	1555	--	500	--	<1.0
PZ12	07/27/05	1452	--	57,300	--	<2.0
PZ12	10/26/05	1430	--	44,600	--	--
PZ12	07/12/06	1802	--	37,400	--	0.4
PZ12	02/04/10	1230	--	34,200	--	0.6
PZ12	09/02/10	1124	37,800	--	<1.0	--
PZ12	11/03/10	945	--	1,940	--	<1.0
PZ12	12/21/10	1230	--	87,100	--	<1.0
PZ12	03/22/11	945	--	112,000	--	<10.0
PZ12	06/21/11	1405	--	74,100	--	<10.0
PZ12	09/22/11	1520	--	88,100	--	<1.0
PZ13	07/27/05	1032	--	17,300	--	<2.0
PZ13	09/02/10	1029	18,400	--	<1.0	--
PZ13	11/02/10	1420	--	151	--	<1.0
PZ13	12/21/10	1020	--	79,000	--	<1.0
PZ13	03/22/11	900	--	68,200	--	<10.0
PZ13	06/21/11	1340	--	21,100	--	<10.0
PZ13	09/22/11	1430	--	<10.0	--	<1.0
AB1	07/07/03	1531	1,200	1,100	<4.4	<4.0
AB1	07/18/03	1525	--	610	--	--
AB1	08/13/03	1218	--	810	--	<4.0
AB1	01/28/04	1410	680	--	--	--
AB1	04/28/04	1843	--	1,200	--	--
AB1	07/29/04	1356	--	1,100	--	--
AB1	10/27/04	1210	--	660	--	--

Table 4
Summary of Ground Water Analytical Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Sample ID	Sample Date	Sample Time	Zinc		Cadmium	
			Total	Dissolved	Total	Dissolved
			µg/L			
AB1	01/27/05	1355	--	1,050	--	--
AB1	05/03/05	1408	--	1,330	--	--
AB1	07/25/05	1425	--	1,280	--	<2.0
AB1	10/27/05	1030	--	697	--	--
AB1	07/13/06	0730 (HT)	--	630	--	0.3
AB1	07/13/06	1612 (LT)	--	9,000	--	1.2
AB1	02/05/10	1045	--	980	--	0.3
AB1	09/01/10	1339	996	--	<1.0	--
AB1	11/03/10	1245	--	613	--	<1.0
AB1	12/21/10	1410	--	463	--	<1.0
AB1	03/22/11	1600	--	439	--	<10.0
AB1	06/21/11	1640	--	304	--	<10.0
AB1	09/22/11	1020	--	1,090	--	<1.0
AB2	07/07/03	1247	3,700	3,600	<4.0	<4.0
AB2	07/18/03	1325	--	3,200	--	--
AB2	08/12/03	1700	--	2,700	--	<4.0
AB2	01/28/04	1860	3,500	--	--	--
AB2	04/28/04	1030	--	1,200	--	--
AB2	07/29/04	1628	--	6,200	--	--
AB2	10/27/04	0955	--	4,800	--	--
AB2	01/27/05	1135	--	8,490	--	--
AB2	05/03/05	1732	--	10,600	--	--
AB2	07/26/05	0811	--	7,960	--	<2.0
AB2	10/26/05	1510	--	7,540	--	--
AB2	07/13/06	0702 (HT)	--	8,010	--	0.8
AB2	07/13/06	1542 (LT)	--	4,840	--	0.5
AB2	02/04/10	1330	--	5,840	--	0.4
AB2	09/02/10	1319	9,290	--	<1.0	--
AB2	11/02/10	1545	--	7,310	--	<1.0
AB2	12/20/10	1610	--	6,310	--	<1.0
AB2	03/22/11	1125	--	5,630	--	<10.0
AB2	06/21/11	935	--	4,210	--	<10.0
AB2	09/22/11	1155	--	14,300	--	<1.0
OW1	09/23/10	1000	--	15,200	--	<1.0
OW1	11/02/10	1845	--	14,800	--	<1.0
OW1	12/20/10	1545	--	14,600	--	<1.0
OW1	03/22/10	1340	--	12,500	--	<10.0
OW1	06/21/11	1040	--	21,100	--	<10.0
OW1	09/22/11	1305	--	28,600	--	1.18

Table 4
Summary of Ground Water Analytical Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Sample ID	Sample Date	Sample Time	Zinc		Cadmium	
			Total	Dissolved	Total	Dissolved
			µg/L			
OW2	09/23/10	0920	--	11,700	--	<1.0
OW2	11/02/10	1645	--	9,790	--	<1.0
OW2	12/20/10	1355	--	7,750	--	<1.0
OW2	03/22/11	1055	--	19,900	--	<10.0
OW2	06/21/11	1015	--	28,600	--	<10.0
OW2	09/22/11	1235	--	31,100	--	1.62
OW3	09/23/10	0830	--	13,200	--	<1.0
OW3	11/02/10	1845	--	16,700	--	<1.0
OW3	12/21/10	1110	--	22,400	--	<1.0
OW3	03/22/11	1150	--	35,100	--	<10.0
OW3	06/21/11	1120	--	22,400	--	<10.0
OW3	09/22/11	1330	--	41,600	--	1.72

Notes:

Samples analyzed by EPA Method 6010B for total concentrations and by EPA Method 200 or 6010B for dissolved concentrations

Only data for wells used for injection performance monitoring are shown

µg/L = micrograms per liter

-- indicates not analyzed

HT - sample collected at high tide, LT - sample collected at low tide

Table 5
Summary of Pilot Test Zinc and Sulfide Data
Former Clariant Facility
Kalama, WA
H&H Project No. CLR-045

Sample ID	Dissolved Zinc (by EPA 6010B)		Total Sulfides (by Std Method 4500-S-2)	
	Pre-Pilot Test	Post-Pilot Test	Pre-Injection	Post-Injection
	µg/l		mg/l	
PZ12	88,100	6,960	<0.2	274
OW3	41,600	79,900	<0.2	5,710
TW1	27,900	261	<0.2	155
TW2	95,200	208,000	<0.2	<0.2
TW3	183,000	735	<0.2	153
Extraction Well (EW1)	147,000*	160,000	<0.2	<0.2
Frac Tank Water	147,000**	1,460**	<0.2	6,570**

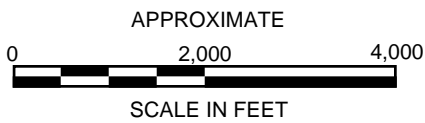
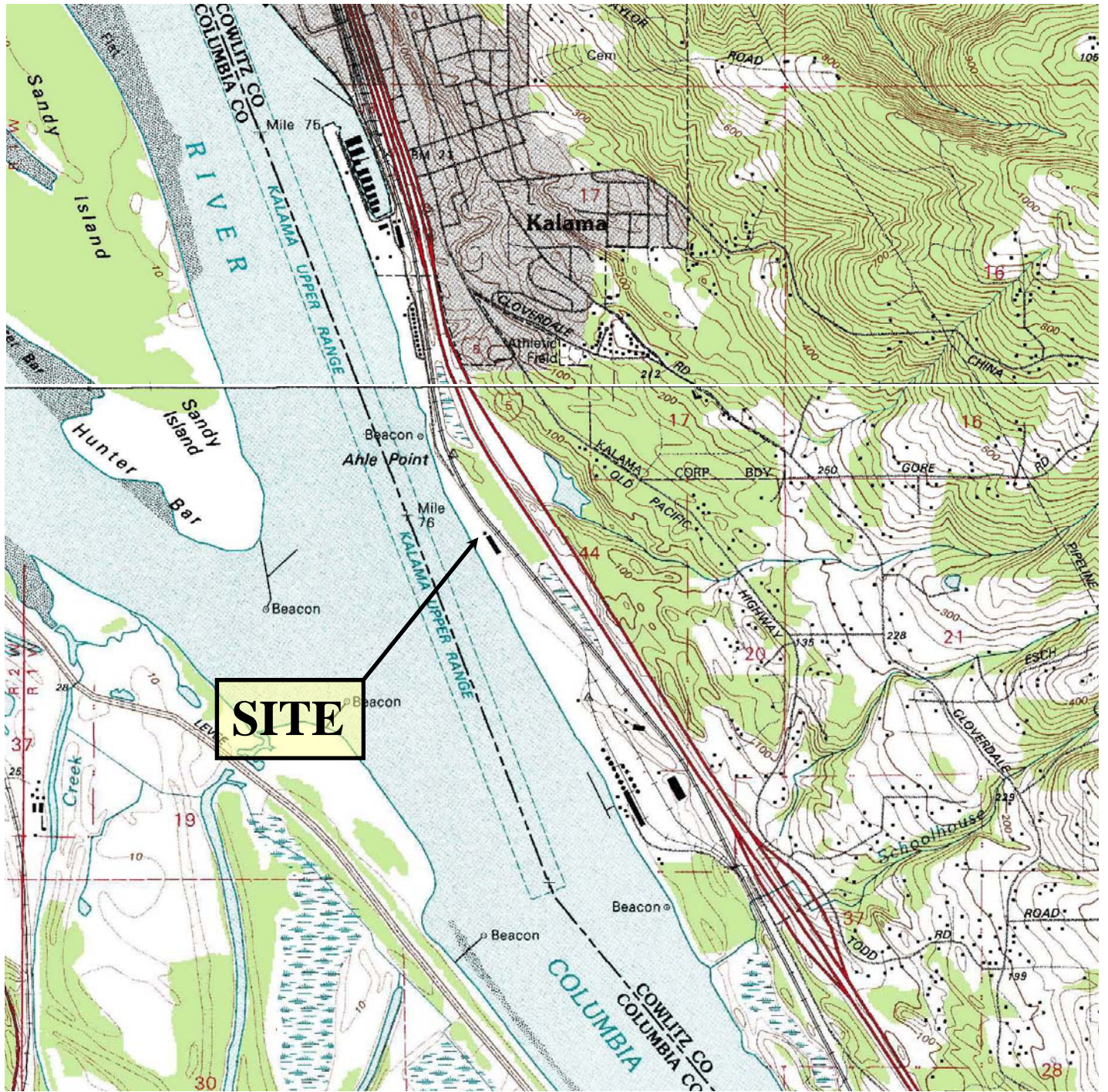
Notes:

µg/l = micrograms per liter; mg/l = milligrams per liter


* data for the sample collected from extraction well ground water being pumped into frac tank during the pilot test

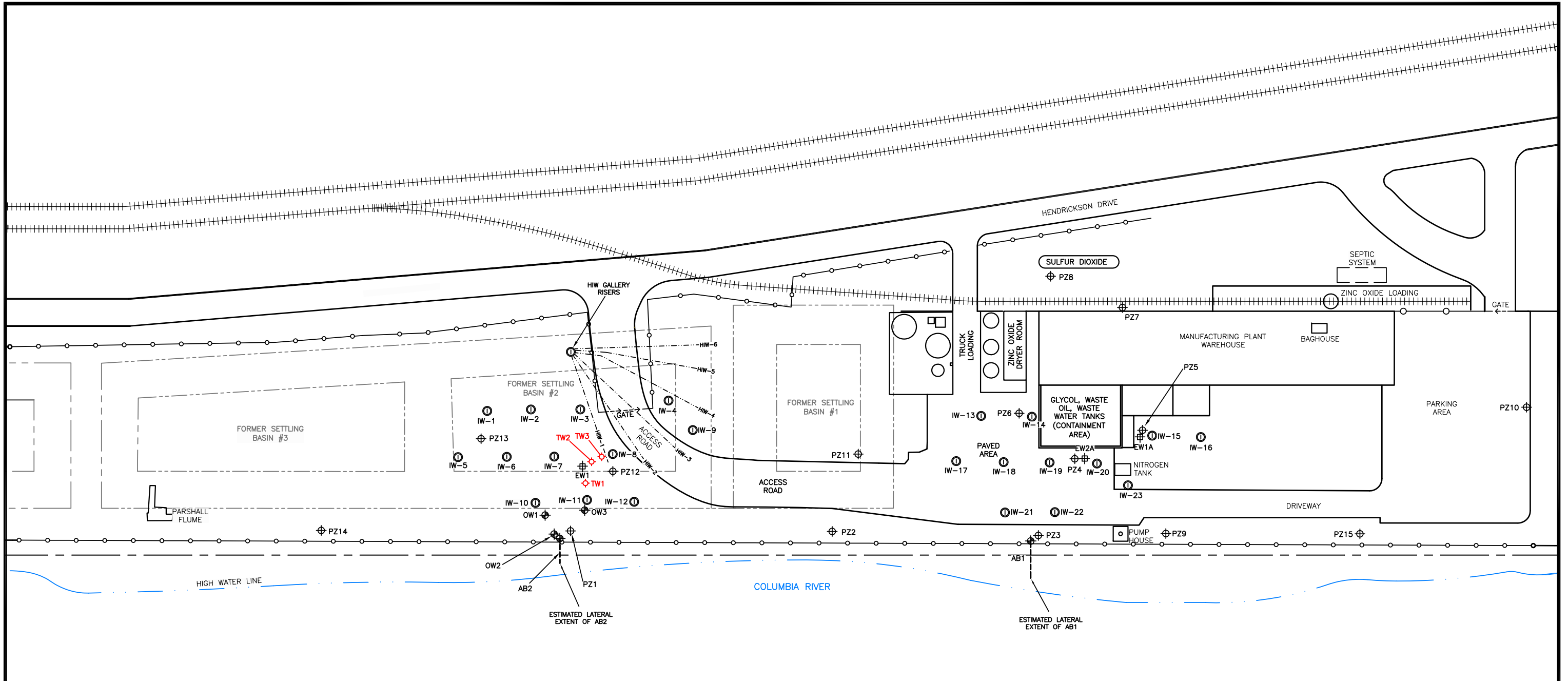
** Pre-Pilot Test Frac Tank Water data is for the sample collected from extraction well ground water being pumped into the frac tank during the pilot test and the Post-Pilot Test Frac Tank Water data is for a sample collected from the frac tank after the ground water mixed with CaSx for approximately 30 minutes.

Figures

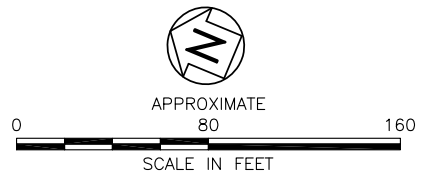


U.S.G.S. QUADRANGLE MAP
DEER ISLAND & KALAMA, WA 7.5 MIN.
TOPOGRAPHIC QUADRANGLES
 QUADRANGLE
 7.5 MINUTE SERIES (TOPOGRAPHIC)

TITLE	SITE LOCATION MAP	
PROJECT	CLARIANT CORPORATION KALAMA, WASHINGTON	
 2923 South Tryon Street-Suite 100 Charlotte, North Carolina 28203 A PROFESSIONAL CORPORATION 704-586-0007 (p) 704-586-0373 (f)		
DATE:	07-19-10	REVISION NO: 0
JOB NO:	CLR-045	FIGURE NO: 1




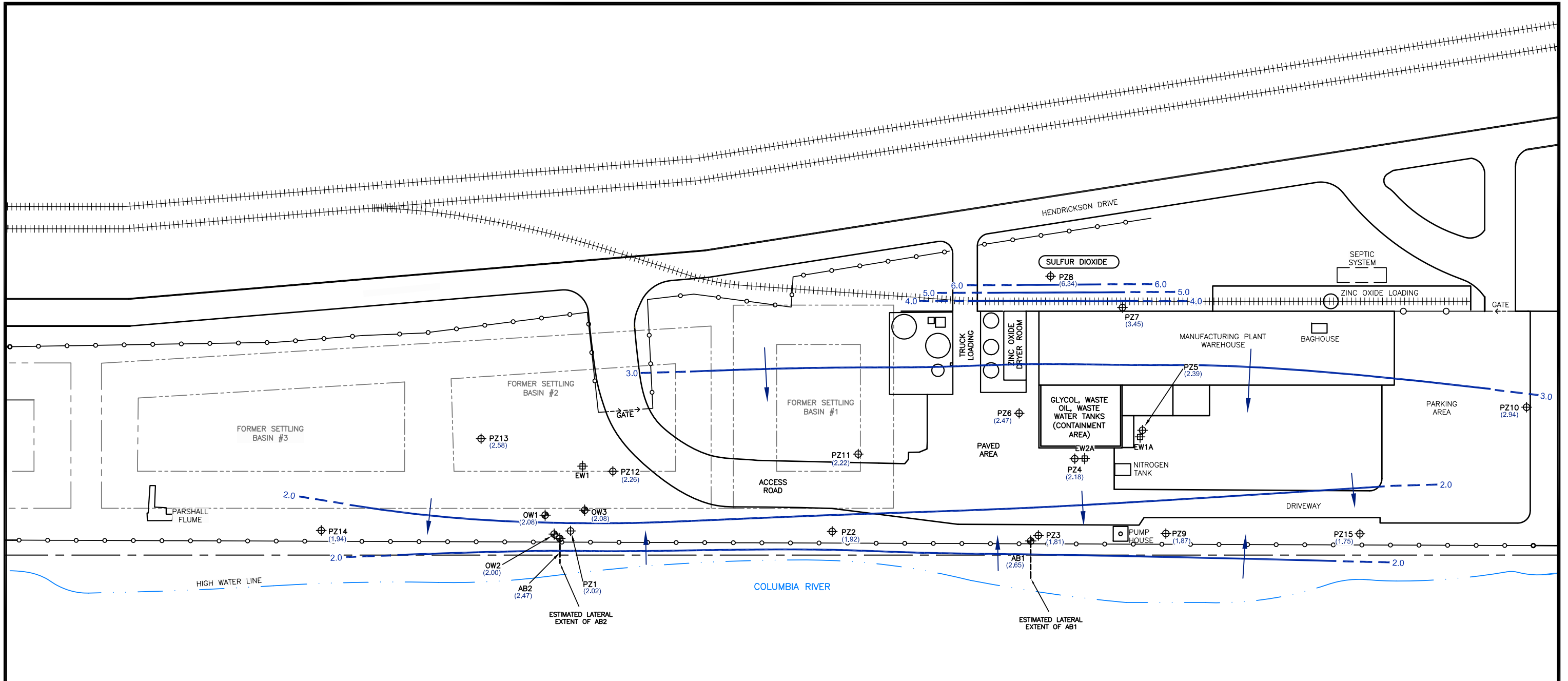
- LEGEND:**
- — — — — PROPERTY LINE
 - FENCE LINE
 - ||||| RAILROAD TRACK
 - — — — — EAST EDGE OF COLUMBIA RIVER
 - — — — — EXTENT OF FORMER SETTLING BASIN
 - - - - - SUBSURFACE EXTENT OF HORIZONTAL INJECTION WELL
 - ⊕ MONITORING/OBSERVATION WELL
 - ⊕ PIEZOMETER
 - ⊙ INJECTION WELL
 - ⊕ EXTRACTION WELL
 - ⊕ TEMPORARY OBSERVATION WELL



NOTES

- MAP BASED ON CDM SITE PLAN PROVIDED TO HART & HICKMAN BY CLARIANT CORPORATION.
- THE BOTTOM OF ANGLE WELLS AB1 AND AB2 ARE LOCATED APPROXIMATELY 30 AND 20 FEET (RESPECTIVELY) SOUTHWEST OF THE WELL LOCATION DEPICTED ON THE MAP. THE DASHED LINES EXTENDING TOWARD THE COLUMBIA RIVER FROM THOSE WELLS INDICATES THE ESTIMATED LATERAL EXTENT OF EACH WELL IN THAT DIRECTION.
- TEMPORARY OBSERVATION WELLS TW1 THROUGH TW3 WERE REMOVED FOLLOWING COMPLETION OF PILOT TESTING ACTIVITIES ON SEPTEMBER 29, 2011.

TITLE		SITE MAP	
PROJECT		CLARIANT - KALAMA SITE 404 HENDRICKSON DRIVE KALAMA, WASHINGTON	
		 2923 South Tryon Street-Suite 100 Charlotte, North Carolina 28203 704-586-0007(p) 704-586-0373(f) License # C-1269	
DATE: 11/04/10	REVISION NO. 0		
JOB NO. CLR-045	FIGURE NO. 2		




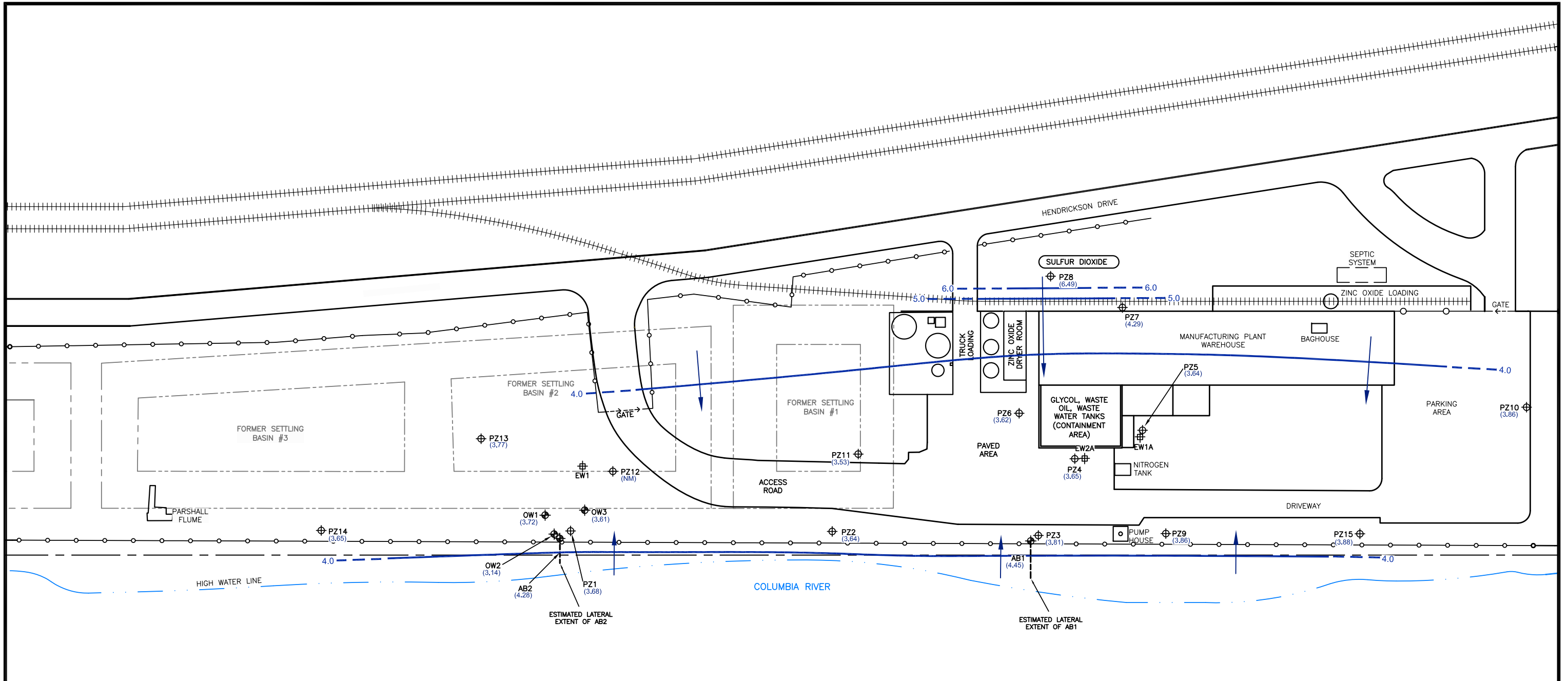
- LEGEND:**
- — — — — PROPERTY LINE
 - FENCE LINE
 - ||||| RAILROAD TRACK
 - — — — — EAST EDGE OF COLUMBIA RIVER
 - · · · · · EXTENT OF FORMER SETTLING BASIN
 - ⊕ MONITORING/OBSERVATION WELL
 - ⊕ PIEZOMETER
 - (2.02) GROUND WATER ELEVATION (FT CRD)
 - 4.0 — — — — — GROUND WATER ELEVATION CONTOUR IN FT CRD (DASHING INDICATES EXTRAPOLATED CONTOUR)
 - INFERRED GROUND WATER FLOW DIRECTION



NOTES

- GROUND WATER ELEVATION MEASUREMENTS WERE TAKEN AT APPROXIMATE TIME OF PREDICTED LOW DAILY TIDAL ELEVATION OF COLUMBIA RIVER.
- THE BOTTOM OF ANGLE WELLS AB1 AND AB2 ARE LOCATED APPROXIMATELY 30 AND 20 FEET (RESPECTIVELY) SOUTHWEST OF THE WELL LOCATION DEPICTED ON THE MAP. THE DASHED LINES EXTENDING TOWARD THE COLUMBIA RIVER FROM THOSE WELLS INDICATES THE ESTIMATED LATERAL EXTENT OF EACH WELL IN THAT DIRECTION.

TITLE GROUND WATER ELEVATION CONTOUR MAP (LOW TIDE) SEPTEMBER 23, 2011	
PROJECT CLARIANT - KALAMA SITE 404 HENDRICKSON DRIVE KALAMA, WASHINGTON	
 2923 South Tryon Street-Suite 100 Charlotte, North Carolina 28203 704-586-0007(p) 704-586-0373(f) License # C-1269	
DATE: 10/19/11	REVISION NO. 0
JOB NO. CLR-045	FIGURE NO. 3A




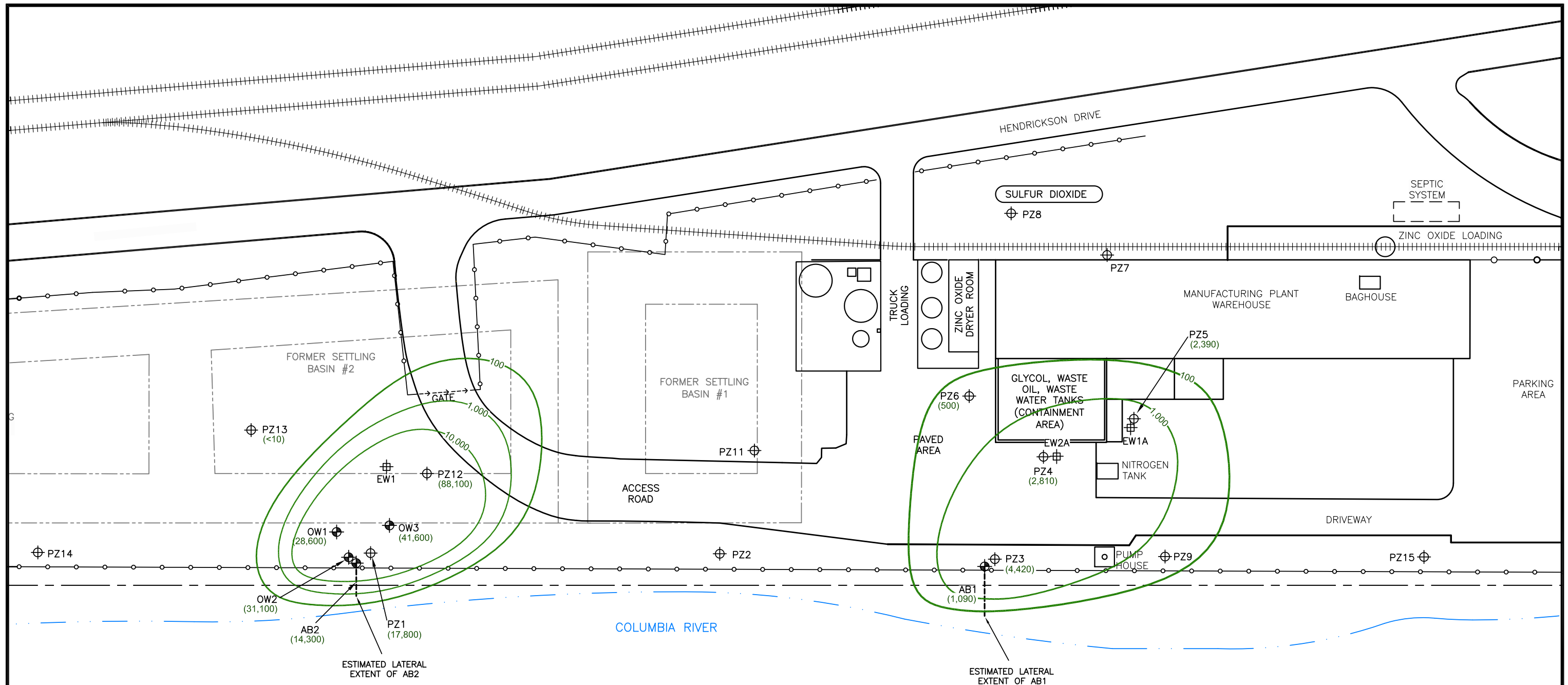
- LEGEND:**
- — — — — PROPERTY LINE
 - FENCE LINE
 - ||||| RAILROAD TRACK
 - — — — — EAST EDGE OF COLUMBIA RIVER
 - - - - - EXTENT OF FORMER SETTLING BASIN
 - ⊕ MONITORING/OBSERVATION WELL
 - ⊕ PIEZOMETER
 - (3.68) GROUND WATER ELEVATION (FT CRD)
 - 4.0 - - - - - GROUND WATER ELEVATION CONTOUR IN FT CRD (DASHING INDICATES EXTRAPOLATED CONTOUR)
 - INFERRED GROUND WATER FLOW DIRECTION



NOTES

- GROUND WATER ELEVATION MEASUREMENTS WERE TAKEN AT APPROXIMATE TIME OF PREDICTED HIGH DAILY TIDAL ELEVATION OF COLUMBIA RIVER.
- THE BOTTOM OF ANGLE WELLS AB1 AND AB2 ARE LOCATED APPROXIMATELY 30 AND 20 FEET (RESPECTIVELY) SOUTHWEST OF THE WELL LOCATION DEPICTED ON THE MAP. THE DASHED LINES EXTENDING TOWARD THE COLUMBIA RIVER FROM THOSE WELLS INDICATES THE ESTIMATED LATERAL EXTENT OF EACH WELL IN THAT DIRECTION.


TITLE GROUND WATER ELEVATION CONTOUR MAP (HIGH TIDE) SEPTEMBER 28, 2011	
PROJECT CLARIANT - KALAMA SITE 404 HENDRICKSON DRIVE KALAMA, WASHINGTON	
 2923 South Tryon Street-Suite 100 Charlotte, North Carolina 28203 704-586-0007(p) 704-586-0373(f) License # C-1269	
DATE: 10/19/11	REVISION NO. 0
JOB NO. CLR-045	FIGURE NO. 3B

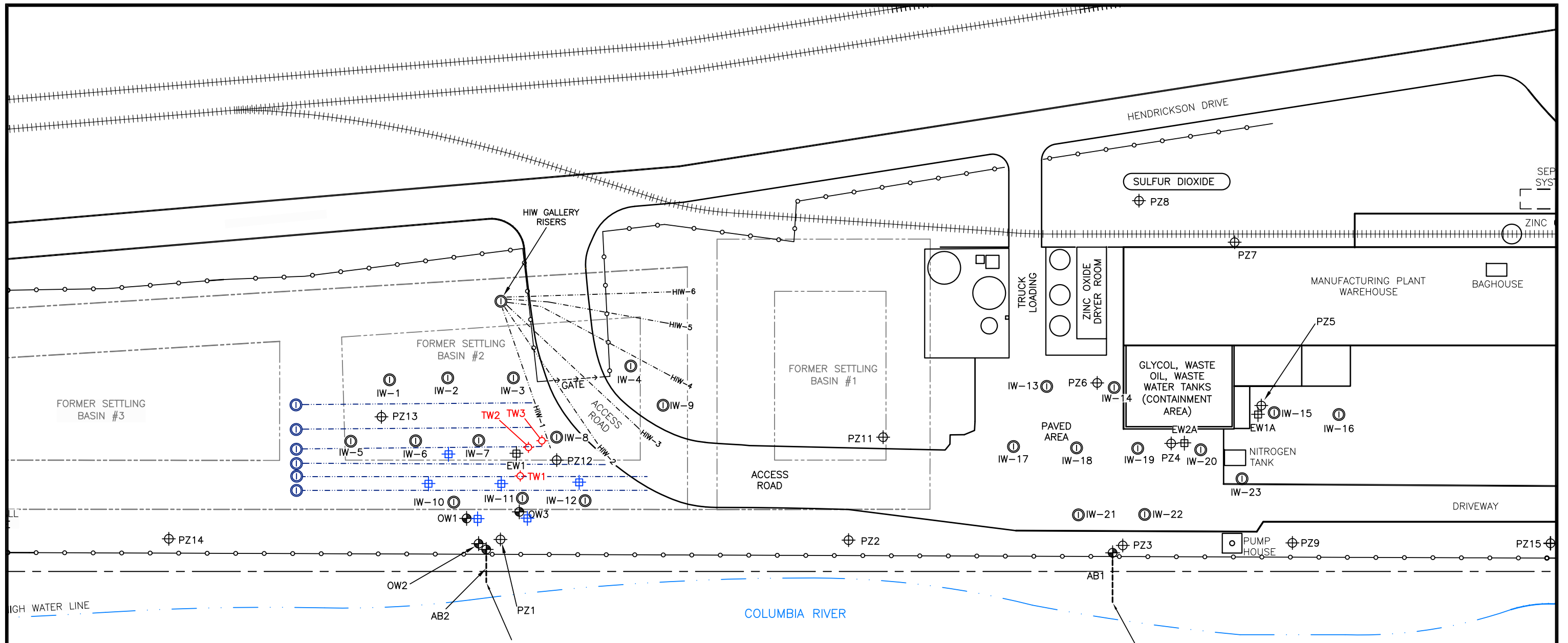


- LEGEND:**
- — — — — PROPERTY LINE
 - ○ — ○ — FENCE LINE
 - ||||| RAILROAD TRACK
 - · · · — EAST EDGE OF COLUMBIA RIVER
 - - - - - EXTENT OF FORMER SETTLING BASIN
 - ⊕ MONITORING/OBSERVATION WELL
 - ⊕ PIEZOMETER
 - ⊕ INJECTION WELL
 - (17,800) SEPTEMBER 22, 2011 ZINC CONCENTRATION (µg/L)
 - 1,000 — ZINC ISOCONCENTRATION CONTOUR IN µg/L

NOTES

- HISTORICAL GROUND WATER SAMPLE DATA USED TO AID IN CONTOURING.
- THE BOTTOM OF ANGLE WELLS AB1 AND AB2 ARE LOCATED APPROXIMATELY 30 AND 20 FEET (RESPECTIVELY) SOUTHWEST OF THE WELL LOCATION DEPICTED ON THE MAP. THE DASHED LINES EXTENDING TOWARD THE COLUMBIA RIVER FROM THOSE WELLS INDICATES THE ESTIMATED LATERAL EXTENT OF EACH WELL IN THAT DIRECTION. THE ESTIMATED LOCATION OF THE BOTTOM OF EACH SCREEN WAS USED IN CONTOURING.

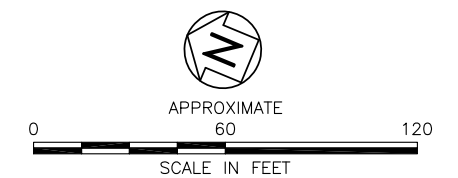
TITLE	SEPTEMBER 22, 2011 ZINC ISOCONCENTRATION MAP	
PROJECT	CLARIANT - KALAMA SITE 404 HENDRICKSON DRIVE KALAMA, WASHINGTON	
 2923 South Tryon Street-Suite 100 Charlotte, North Carolina 28203 704-586-0007(p) 704-586-0373(f) License # C-1269		
DATE: 10/17/11	REVISION NO. 0	
JOB NO. CLR-045	FIGURE NO. 4	



LEGEND:

- — — — — PROPERTY LINE
- ○ — — — — FENCE LINE
- ||||| RAILROAD TRACK
- — — — — EAST EDGE OF COLUMBIA RIVER
- - - - - EXTENT OF FORMER SETTLING BASIN
- - - - - SUBSURFACE EXTENT OF EXISTING HORIZONTAL INJECTION WELL
- ⊕ MONITORING/OBSERVATION WELL
- ⊕ PIEZOMETER
- ⊙ INJECTION WELL
- ⊕ EXTRACTION WELL
- ⊕ PROPOSED EXTRACTION WELL LOCATION
- ⊕ PILOT TEST TEMPORARY OBSERVATION WELL
- ⊙ PROPOSED HORIZONTAL INJECTION WELLHEAD LOCATION
- - - - - SUBSURFACE EXTENT OF PROPOSED HORIZONTAL INJECTION WELL

NOTE
 TEMPORARY OBSERVATION WELLS TW1 THROUGH TW3
 WERE REMOVED FOLLOWING COMPLETION OF PILOT
 TESTING ACTIVITIES ON SEPTEMBER 29, 2011.



TITLE	
PROPOSED WELL LOCATIONS MAP	
PROJECT	
CLARIANT - KALAMA SITE 404 HENDRICKSON DRIVE KALAMA, WASHINGTON	
2923 South Tryon Street-Suite 100 Charlotte, North Carolina 28203 704-586-0007 (p) 704-586-0373 (f) License # C-1269	
DATE: 10/19/11	REVISION NO. 1
JOB NO. CLR-045	FIGURE NO. 5

Appendix A
Extraction Well Boring Log



BORING NUMBER EW-1

2923 South Tryon Street-Suite 100
 Charlotte, North Carolina 28203
 704-586-0007(p) 704-586-0373(f)

3334 Hillsborough Street
 Raleigh, North Carolina 27607
 919-847-4241(p) 919-847-4261(f)

PROJECT: Clariant - Kalama RA
JOB NUMBER: CLR-045
LOCATION: Kalama, Washington

DEPTH (ft)	RECOVERY (%)	SAMPLE TYPE NUMBER	OVA (ppm)		LITHOLOGY	MATERIAL DESCRIPTION	BORING DIAGRAM	DEPTH (ft)
			BKG.	SAMP.				
0						Gray/brown, loose, slightly moist, fine to medium SAND (2010 excavation backfill material)		0
5								5
10								10
15						Gray/black/brown, slightly moist, fine to coarse SAND		15
20								20
25						Gray/black/brown, very moist to wet, fine to coarse SAND		25
30								30
35						Bottom of borehole at 35.0 feet.		35

BORING LOG - HART HICKMAN.GDT - 10/19/11 10:25 - S:\AAA-MASTER GINT PROJECTS\CLR-045.GPJ

DRILLING CONTRACTOR: Cascade Drilling
DRILL RIG/ METHOD: CME-75 / Hollow Stem Auger
SAMPLING METHOD: Drill Cuttings
LOGGED BY: BSD
DRAWN BY:

BORING STARTED: 9/26/11
BORING COMPLETED: 9/26/11
TOTAL DEPTH: 35 ft.
TOP OF CASING ELEV:
DEPTH TO WATER:

Remarks:

Appendix B
Laboratory Analytical Reports

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Portland
9405 SW Nimbus Ave.
Beaverton, OR 97008
Tel: (503) 906-9200

TestAmerica Job ID: PUI0798

Client Project/Site: CLR-045
Client Project Description: Clariant - Kalama
Revision: 1

For:

Hart & Hickman
2923 S. Tryon St, Ste. 100
Charlotte, NC 28203

Attn: Scott Drury



Authorized for release by:
10/19/2011 02:56:48 PM

Darrell Auvil
Project Manager
darrell.auvil@testamericainc.com

LINKS

Review your project
results through
TotalAccess

Have a Question?



Visit us at:
www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.



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Client Sample Results	6
QC Sample Results	18
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Chain of Custody	22

Sample Summary

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
PUI0798-01	PZ1	Water	09/22/11 11:25	09/22/11 17:45
PUI0798-02	PZ3	Water	09/22/11 09:45	09/22/11 17:45
PUI0798-03	PZ4	Water	09/22/11 16:20	09/22/11 17:45
PUI0798-04	PZ5	Water	09/22/11 16:50	09/22/11 17:45
PUI0798-05	PZ6	Water	09/22/11 15:55	09/22/11 17:45
PUI0798-06	PZ12	Water	09/22/11 15:20	09/22/11 17:45
PUI0798-07	PZ13	Water	09/22/11 14:30	09/22/11 17:45
PUI0798-08	OW-1	Water	09/22/11 13:05	09/22/11 17:45
PUI0798-09	OW-2	Water	09/22/11 12:35	09/22/11 17:45
PUI0798-10	OW-3	Water	09/22/11 13:30	09/22/11 17:45
PUI0798-11	AB1	Water	09/22/11 10:20	09/22/11 17:45
PUI0798-12	AB2	Water	09/22/11 11:55	09/22/11 17:45

Case Narrative

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Job ID: PUI0798

Laboratory: TestAmerica Portland

Narrative

Amended report to reflect small change in sample identification to samples #8, #9 and #10.

1

2

3

4

5

6

7

8

9

Definitions/Glossary

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Qualifiers

Metals

Qualifier	Qualifier Description
MHA	Due to high levels of analyte in the sample, the MS/MSD calculation does not provide useful spike recovery information. See Blank Spike (LCS).

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Client Sample ID: PZ1

Lab Sample ID: PUI0798-01

Date Collected: 09/22/11 11:25

Matrix: Water

Date Received: 09/22/11 17:45

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100		mg/l		09/26/11 14:12	09/28/11 00:32	1.00
Zinc	17.8		1.00		mg/l		09/26/11 14:12	09/28/11 01:47	100

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		09/26/11 13:09	09/26/11 14:53	1.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Client Sample ID: PZ3

Lab Sample ID: PUI0798-02

Date Collected: 09/22/11 09:45

Matrix: Water

Date Received: 09/22/11 17:45

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100		mg/l		09/26/11 14:12	09/28/11 00:36	1.00
Zinc	4.42		0.100		mg/l		09/26/11 14:12	09/28/11 01:51	10.0

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		09/26/11 13:09	09/26/11 14:53	1.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Client Sample ID: PZ4

Lab Sample ID: PUI0798-03

Date Collected: 09/22/11 16:20

Matrix: Water

Date Received: 09/22/11 17:45

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0261		0.00100		mg/l		09/26/11 14:12	09/28/11 00:40	1.00
Zinc	2.81		0.100		mg/l		09/26/11 14:12	09/28/11 01:55	10.0

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		09/26/11 13:09	09/26/11 14:53	1.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Client Sample ID: PZ5

Lab Sample ID: PUI0798-04

Date Collected: 09/22/11 16:50

Matrix: Water

Date Received: 09/22/11 17:45

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.102		0.00100		mg/l		09/26/11 14:12	09/28/11 00:48	1.00
Zinc	2.39		0.100		mg/l		09/26/11 14:12	09/28/11 02:04	10.0

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		09/26/11 13:09	09/26/11 14:53	1.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Client Sample ID: PZ6

Lab Sample ID: PUI0798-05

Date Collected: 09/22/11 15:55

Matrix: Water

Date Received: 09/22/11 17:45

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100		mg/l		09/26/11 14:12	09/28/11 00:52	1.00
Zinc	0.500		0.0100		mg/l		09/26/11 14:12	09/28/11 02:08	1.00

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		09/26/11 13:09	09/26/11 14:53	1.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Client Sample ID: PZ12

Lab Sample ID: PUI0798-06

Date Collected: 09/22/11 15:20

Matrix: Water

Date Received: 09/22/11 17:45

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100		mg/l		09/26/11 14:12	09/28/11 00:56	1.00
Zinc	88.1		10.0		mg/l		09/26/11 14:12	09/28/11 02:12	1000

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	3.55		0.400		mg/l		09/26/11 13:09	09/26/11 14:53	1.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Client Sample ID: PZ13

Lab Sample ID: PUI0798-07

Date Collected: 09/22/11 14:30

Matrix: Water

Date Received: 09/22/11 17:45

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100		mg/l		09/26/11 14:12	09/28/11 01:00	1.00
Zinc	ND		0.0100		mg/l		09/26/11 14:12	09/28/11 02:16	1.00

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	2.98		0.400		mg/l		09/26/11 13:09	09/26/11 14:53	1.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Client Sample ID: OW-1

Lab Sample ID: PUI0798-08

Date Collected: 09/22/11 13:05

Matrix: Water

Date Received: 09/22/11 17:45

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00118		0.00100		mg/l		09/26/11 14:12	09/28/11 01:22	1.00
Zinc	28.6		1.00		mg/l		09/26/11 14:12	09/28/11 02:29	100

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		09/26/11 13:09	09/26/11 14:53	1.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Client Sample ID: OW-2

Lab Sample ID: PUI0798-09

Date Collected: 09/22/11 12:35

Matrix: Water

Date Received: 09/22/11 17:45

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00162		0.00100		mg/l		09/26/11 14:12	09/28/11 01:26	1.00
Zinc	31.1		1.00		mg/l		09/26/11 14:12	09/28/11 02:33	100

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		09/26/11 13:09	09/26/11 14:53	1.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Client Sample ID: OW-3

Lab Sample ID: PUI0798-10

Date Collected: 09/22/11 13:30

Matrix: Water

Date Received: 09/22/11 17:45

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.00172		0.00100		mg/l		09/26/11 14:12	09/28/11 01:30	1.00
Zinc	41.6		1.00		mg/l		09/26/11 14:12	09/28/11 02:37	100

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		09/26/11 13:09	09/26/11 14:53	1.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Client Sample ID: AB1

Lab Sample ID: PUI0798-11

Date Collected: 09/22/11 10:20

Matrix: Water

Date Received: 09/22/11 17:45

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100		mg/l		09/26/11 14:12	09/28/11 01:34	1.00
Zinc	1.09		0.100		mg/l		09/26/11 14:12	09/28/11 02:41	10.0

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		09/26/11 13:09	09/26/11 14:53	1.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Client Sample ID: AB2

Lab Sample ID: PUI0798-12

Date Collected: 09/22/11 11:55

Matrix: Water

Date Received: 09/22/11 17:45

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100		mg/l		09/26/11 15:53	09/28/11 03:02	1.00
Zinc	14.3		0.500		mg/l		09/26/11 15:53	09/29/11 23:43	50.0

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		09/26/11 13:09	09/26/11 14:53	1.00



QC Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods

Lab Sample ID: 11I0759-BLK1
Matrix: Water
Analysis Batch: 11I0759

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 11I0759_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100		mg/l		09/26/11 14:12	09/27/11 23:33	1.00
Zinc	ND		0.0100		mg/l		09/26/11 14:12	09/27/11 23:33	1.00

Lab Sample ID: 11I0759-BS1
Matrix: Water
Analysis Batch: 11I0759

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 11I0759_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Cadmium	0.100	0.0963		mg/l		96.3	85 - 115
Zinc	0.100	0.104		mg/l		104	85 - 115

Lab Sample ID: 11I0759-MS1
Matrix: Water
Analysis Batch: 11I0759

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 11I0759_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Cadmium	ND		0.100	0.0973		mg/l		97.3	70 - 130
Zinc	ND		0.100	0.109		mg/l		109	70 - 130

Lab Sample ID: 11I0759-MS2
Matrix: Water
Analysis Batch: 11I0759

Client Sample ID: PZ4
Prep Type: Dissolved
Prep Batch: 11I0759_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Cadmium	0.0261		0.100	0.129		mg/l		103	70 - 130

Lab Sample ID: 11I0759-MS2
Matrix: Water
Analysis Batch: 11I0759

Client Sample ID: PZ4
Prep Type: Dissolved
Prep Batch: 11I0759_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Zinc	2.81		0.100	2.80	MHA	mg/l		-10.0	70 - 130

Lab Sample ID: 11I0759-DUP1
Matrix: Water
Analysis Batch: 11I0759

Client Sample ID: Duplicate
Prep Type: Dissolved
Prep Batch: 11I0759_P

Analyte	Sample Result	Sample Qualifier	Duplicate Result	Duplicate Qualifier	Unit	D	RPD	RPD Limit
Cadmium	ND		ND		mg/l			20
Zinc	0.00632		0.00633		mg/l		0.158	20

Lab Sample ID: 11I0767-BLK1
Matrix: Water
Analysis Batch: 11I0767

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 11I0767_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.00100		mg/l		09/26/11 15:53	09/28/11 02:54	1.00
Zinc	ND		0.0100		mg/l		09/26/11 15:53	09/28/11 02:54	1.00

QC Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Method: EPA 200.8 - Dissolved Metals per EPA 200 Series Methods (Continued)

Lab Sample ID: 11I0767-BS1
Matrix: Water
Analysis Batch: 11I0767

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 11I0767_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec.	
							Limits	
Cadmium	0.100	0.0933		mg/l		93.3	85 - 115	
Zinc	0.100	0.100		mg/l		100	85 - 115	

Lab Sample ID: 11I0767-MS1
Matrix: Water
Analysis Batch: 11I0767

Client Sample ID: Matrix Spike
Prep Type: Dissolved
Prep Batch: 11I0767_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec.	
									Limits	
Cadmium	0.00235		0.100	0.0968		mg/l		94.4	70 - 130	
Zinc	0.00689		0.100	0.108		mg/l		101	70 - 130	

Lab Sample ID: 11I0767-DUP1
Matrix: Water
Analysis Batch: 11I0767

Client Sample ID: AB2
Prep Type: Dissolved
Prep Batch: 11I0767_P

Analyte	Sample Result	Sample Qualifier	Duplicate Result	Duplicate Qualifier	Unit	D	RPD	RPD	
								Limit	
Cadmium	ND		0.000930		mg/l		10.2	20	

Lab Sample ID: 11I0767-DUP1
Matrix: Water
Analysis Batch: 11I0767

Client Sample ID: AB2
Prep Type: Dissolved
Prep Batch: 11I0767_P

Analyte	Sample Result	Sample Qualifier	Duplicate Result	Duplicate Qualifier	Unit	D	RPD	RPD	
								Limit	
Zinc	14.3		14.8		mg/l		3.88	20	

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Lab Sample ID: 11I0756-BLK1
Matrix: Water
Analysis Batch: 11I0756

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 11I0756_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac

Lab Sample ID: 11I0756-BS1
Matrix: Water
Analysis Batch: 11I0756

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 11I0756_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec.	
							Limits	
Sulfide	1.00	0.898		mg/l		89.8	75 - 125	

Lab Sample ID: 11I0756-MS1
Matrix: Water
Analysis Batch: 11I0756

Client Sample ID: PZ1
Prep Type: Total
Prep Batch: 11I0756_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec.	
									Limits	
Sulfide	ND		1.00	0.875		mg/l		87.5	75 - 125	

QC Sample Results

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods (Continued)

Lab Sample ID: 11I0756-DUP1
Matrix: Water
Analysis Batch: 11I0756

Client Sample ID: PZ1
Prep Type: Total
Prep Batch: 11I0756_P

Analyte	Sample Result	Sample Qualifier	Duplicate Result	Duplicate Qualifier	Unit	D	RPD	RPD Limit
Sulfide	ND		ND		mg/l			20



Certification Summary

Client: Hart & Hickman
Project/Site: CLR-045

TestAmerica Job ID: PUI0798

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Portland	Alaska	Alaska UST	10	UST-012
TestAmerica Portland	Alaska	State Program	10	OR00040
TestAmerica Portland	California	State Program	9	2597
TestAmerica Portland	Oregon	NELAC	10	OR100021
TestAmerica Portland	USDA	USDA		P330-11-00092
TestAmerica Portland	Washington	State Program	10	C586

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.



Portland Sample Control Checklist

Work Order #: PU10789 Date/Time Received: 9/22/11 @ 1750
 Client Name: HART & HICKMAN
 Project Name: CLARIANT KALAMA
 Time Zone: EDT/EST CDT/CST MDT/MST PDT/PST AK HI OTHER

Unpacking Checks:

Cooler (s): _____
 Temperature (s): 2.5 _____
 Digi #1 Digi #2 IR Gun Plastic Glass
 Raytek Plastic Glass

Temperature out of Range:

Not enough or No Ice
 Ice Melted
 W/in 4 Hrs of collection
 Ice Not Needed
 Other: _____

Ice used: (circle one) GEL LOOSE BLUE NONE OTHER: _____ Initials: PSS

N/A Yes No

- 1. If ESI client, were temp blanks received? If no, document on NOD.
- 2. Cooler Seals intact? (N/A if hand delivered) if no and ESI client, document on NOD.
- 3. Chain of Custody present? If no, document on NOD. Along with "received by" & "relinquished by" signatures with date & time?
- 4. Bottles received intact? If no, document on NOD.
- 5. Sample is not multiphasic? If no, document on NOD.
- 6. Sampler name/signature documented on COC?
- 7. Proper Container and preservatives used? If no, document on NOD.
- 8. pH for HN03/ESI samples checked and meet requirements? If no, document on NOD.
- 9. Cyanide samples checked for sulfides and meet requirements? If no, notify PM.
- 10. HF Dilution required?
- 11. Sufficient volume provided for all analysis and requested MS/MSD? If no, document on NOD and consult PM before proceeding.
- 12. Did chain of custody agree with samples received? If no, document on NOD.
- 13. Were VOA samples received without headspace?
- 14. Did samples require preservation with sodium thiosulfate?
- 15. If yes to #14, was the residual chlorine test negative? If no, document on NOD.
- 16. Are dissolved/field filtered metals bottles sediment-free? If no, document on NOD.
- 17. Are analyses with short holding times received in hold?
- 18. Were special log- in instructions read and followed?

No indication bottles are field-filtered.

Checklist Reviewed: _____ Log-in initials: PSS Labeler initials: PSS

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Portland
9405 SW Nimbus Ave.
Beaverton, OR 97008
Tel: (503) 906-9200

TestAmerica Job ID: PUI1028

Client Project/Site: CLR.045
Client Project Description: Clariant - Kalama
Revision: 1

For:

Hart & Hickman
2923 S. Tryon St, Ste. 100
Charlotte, NC 28203

Attn: Scott Drury



Authorized for release by:
10/20/2011 11:09:13 AM

Darrell Auvil
Project Manager
darrell.auvil@testamericainc.com

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Sample Summary

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
PUI1028-01	TW1	Water	09/27/11 09:30	09/29/11 16:00
PUI1028-02	TW2	Water	09/27/11 10:15	09/29/11 16:00
PUI1028-03	TW3	Water	09/27/11 10:30	09/29/11 16:00
PUI1028-04	Filter Solids-1	Other dry	09/28/11 10:00	09/29/11 16:00
PUI1028-05	EW-1	Water	09/28/11 08:45	09/29/11 16:00
PUI1028-06	TW3	Water	09/28/11 08:25	09/29/11 16:00
PUI1028-07	Frac Tank	Water	09/28/11 09:40	09/29/11 16:00
PUI1028-08	TW1	Water	09/28/11 14:40	09/29/11 16:00
PUI1028-09	OW-3	Water	09/28/11 16:05	09/29/11 16:00
PUI1028-10	PZ12	Water	09/29/11 08:45	09/29/11 16:00
PUI1028-11	Filter Solids-2	Other dry	09/29/11 13:50	09/29/11 16:00
PUI1028-12	TW2	Water	09/29/11 13:45	09/29/11 16:00
PUI1028-13	EW-1	Water	09/29/11 14:00	09/29/11 16:00



Case Narrative

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Job ID: PUI1028

Laboratory: TestAmerica Portland

Narrative

Amended report to reflect small change in sample identification to samples #9 and #10.

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Definitions/Glossary

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Qualifiers

Metals

Qualifier	Qualifier Description
B4	Target analyte detected in blank at/above method acceptance criteria.
MHA	Due to high levels of analyte in the sample, the MS/MSD calculation does not provide useful spike recovery information. See Blank Spike (LCS).
B1	Analyte was detected in the associated method blank. Analyte concentration in the sample is greater than 10x the concentration found in the method blank.

Wet Chem

Qualifier	Qualifier Description
M8	The MS and/or MSD were below the acceptance limits. See Blank Spike (LCS).

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Client Sample ID: TW1

Date Collected: 09/27/11 09:30
Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-01

Matrix: Water

Method: EPA 6010B - Dissolved Metals per EPA 6000/7000 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	27.9		0.200		mg/l		10/05/11 10:46	10/06/11 00:05	10.0

Method: NCA SOP - Lab Filtration

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lab Filtration	ND		1.00		N/A		10/03/11 07:59	10/03/11 08:50	1.00

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		10/03/11 10:28	10/03/11 12:30	1.00

Client Sample ID: TW2

Date Collected: 09/27/11 10:15
Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-02

Matrix: Water

Method: EPA 6010B - Dissolved Metals per EPA 6000/7000 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	95.2		0.400		mg/l		10/05/11 10:46	10/06/11 00:22	20.0

Method: NCA SOP - Lab Filtration

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lab Filtration	ND		1.00		N/A		10/03/11 07:59	10/03/11 08:50	1.00

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		10/03/11 10:28	10/03/11 12:30	1.00

Client Sample ID: TW3

Date Collected: 09/27/11 10:30
Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-03

Matrix: Water

Method: EPA 6010B - Dissolved Metals per EPA 6000/7000 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	183		1.00		mg/l		10/05/11 10:46	10/06/11 00:35	50.0

Method: NCA SOP - Lab Filtration

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lab Filtration	ND		1.00		N/A		10/03/11 07:59	10/03/11 08:50	1.00

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		10/03/11 10:28	10/03/11 12:30	1.00

Client Sample ID: Filter Solids-1

Date Collected: 09/28/11 10:00
Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-04

Matrix: Other dry
Percent Solids: 17.6

Method: EPA 6010B - Total Metals per EPA 6000/7000 Series Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	14600	B1	568		mg/kg dry	☼	10/04/11 10:09	10/04/11 23:26	5.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Client Sample ID: Filter Solids-1

Date Collected: 09/28/11 10:00

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-04

Matrix: Other dry

Percent Solids: 17.6

Method: EPA 6010B - Total Metals per EPA 6000/7000 Series Methods (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	4580		142		mg/kg dry	✱	10/04/11 10:09	10/04/11 23:26	5.00
Zinc	58200		2840		mg/kg dry	✱	10/04/11 10:09	10/05/11 02:39	50.0

Method: ASTM D2216-80 - Percent Dry Weight (Solids) per ASTM D2216-80

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
% Solids	17.6		0.0100		% by Weight		10/04/11 14:10	10/05/11 07:50	1.00

Client Sample ID: EW-1

Date Collected: 09/28/11 08:45

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-05

Matrix: Water

Method: EPA 6010B - Dissolved Metals per EPA 6000/7000 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	147		1.00		mg/l		10/05/11 10:46	10/06/11 00:41	50.0

Method: NCA SOP - Lab Filtration

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lab Filtration	ND		1.00		N/A		10/03/11 07:59	10/03/11 08:50	1.00

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		10/03/11 10:28	10/03/11 12:30	1.00

Client Sample ID: TW3

Date Collected: 09/28/11 08:25

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-06

Matrix: Water

Method: EPA 6010B - Dissolved Metals per EPA 6000/7000 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	0.735		0.0200		mg/l		10/05/11 10:46	10/06/11 00:59	1.00

Method: NCA SOP - Lab Filtration

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lab Filtration	ND		1.00		N/A		10/03/11 07:59	10/03/11 08:50	1.00

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	153		20.0		mg/l		10/03/11 10:28	10/03/11 12:30	100

Client Sample ID: Frac Tank

Date Collected: 09/28/11 09:40

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-07

Matrix: Water

Method: EPA 6010B - Dissolved Metals per EPA 6000/7000 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	1.46		1.00		mg/l		10/05/11 10:46	10/06/11 01:06	10.0

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Client Sample ID: Frac Tank

Date Collected: 09/28/11 09:40

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-07

Matrix: Water

Method: NCA SOP - Lab Filtration

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lab Filtration	ND		1.00		N/A		10/03/11 07:59	10/03/11 08:50	1.00

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	6570		2000		mg/l		10/03/11 10:28	10/03/11 12:30	10000

Client Sample ID: TW1

Date Collected: 09/28/11 14:40

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-08

Matrix: Water

Method: EPA 6010B - Dissolved Metals per EPA 6000/7000 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	0.261		0.0200		mg/l		10/05/11 10:46	10/06/11 01:12	1.00

Method: NCA SOP - Lab Filtration

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lab Filtration	ND		1.00		N/A		10/03/11 07:59	10/03/11 08:50	1.00

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	155		20.0		mg/l		10/03/11 10:28	10/03/11 12:30	100

Client Sample ID: OW-3

Date Collected: 09/28/11 16:05

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-09

Matrix: Water

Method: EPA 6010B - Dissolved Metals per EPA 6000/7000 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	79.9		1.00		mg/l		10/05/11 10:46	10/06/11 01:18	10.0

Method: NCA SOP - Lab Filtration

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lab Filtration	ND		1.00		N/A		10/03/11 07:59	10/03/11 08:50	1.00

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	5710		2000		mg/l		10/03/11 10:28	10/03/11 12:30	10000

Client Sample ID: PZ12

Date Collected: 09/29/11 08:45

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-10

Matrix: Water

Method: EPA 200.7 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	6.96		0.200		mg/l		10/05/11 10:46	10/06/11 01:24	10.0

Method: EPA 6010B - Total Metals per EPA 6000/7000 Series Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	68.0		0.400		mg/l		10/06/11 10:06	10/07/11 10:45	20.0

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Client Sample ID: PZ12

Date Collected: 09/29/11 08:45

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-10

Matrix: Water

Method: NCA SOP - Lab Filtration

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lab Filtration	ND		1.00		N/A		10/03/11 07:59	10/03/11 08:50	1.00

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	274		200		mg/l		10/03/11 10:28	10/03/11 12:30	1000

Client Sample ID: Filter Solids-2

Date Collected: 09/29/11 13:50

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-11

Matrix: Other dry
Percent Solids: 29.3

Method: EPA 6010B - Total Metals per EPA 6000/7000 Series Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	7630	B1	341		mg/kg dry	☼	10/04/11 10:09	10/04/11 23:32	5.00
Manganese	2890		85.3		mg/kg dry	☼	10/04/11 10:09	10/04/11 23:32	5.00
Zinc	56600		1710		mg/kg dry	☼	10/04/11 10:09	10/05/11 02:46	50.0

Method: ASTM D2216-80 - Percent Dry Weight (Solids) per ASTM D2216-80

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
% Solids	29.3		0.0100		% by Weight		10/04/11 14:10	10/05/11 07:50	1.00

Client Sample ID: TW2

Date Collected: 09/29/11 13:45

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-12

Matrix: Water

Method: EPA 200.7 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	208		1.00		mg/l		10/05/11 10:46	10/06/11 01:30	50.0

Method: NCA SOP - Lab Filtration

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lab Filtration	ND		1.00		N/A		10/03/11 07:59	10/03/11 08:50	1.00

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		10/03/11 10:28	10/03/11 12:30	1.00

Client Sample ID: EW-1

Date Collected: 09/29/11 14:00

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-13

Matrix: Water

Method: EPA 200.7 - Dissolved Metals per EPA 200 Series Methods - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	161		1.00		mg/l		10/05/11 10:46	10/06/11 01:37	50.0

Method: NCA SOP - Lab Filtration

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lab Filtration	ND		1.00		N/A		10/03/11 07:59	10/03/11 08:50	1.00

Client Sample Results

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Client Sample ID: EW-1

Date Collected: 09/29/11 14:00

Date Received: 09/29/11 16:00

Lab Sample ID: PUI1028-13

Matrix: Water

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		10/03/11 10:28	10/03/11 12:30	1.00

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

QC Sample Results

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Method: EPA 200.7 - Dissolved Metals per EPA 200 Series Methods

Lab Sample ID: 11J0121-BLK1
Matrix: Water
Analysis Batch: 11J0121

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 11J0121_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.0200		mg/l		10/05/11 10:46	10/05/11 23:53	1.00

Lab Sample ID: 11J0121-BS1
Matrix: Water
Analysis Batch: 11J0121

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 11J0121_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Zinc	1.00	0.976		mg/l		97.6	85 - 115

Lab Sample ID: 11J0121-MS1
Matrix: Water
Analysis Batch: 11J0121

Client Sample ID: TW2
Prep Type: Dissolved
Prep Batch: 11J0121_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Zinc	95.2		1.00	93.6	MHA	mg/l		-160	75 - 125

Lab Sample ID: 11J0121-MS2
Matrix: Water
Analysis Batch: 11J0121

Client Sample ID: EW-1
Prep Type: Dissolved
Prep Batch: 11J0121_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Zinc	161		1.00	160	MHA	mg/l		-29.2	75 - 125

Lab Sample ID: 11J0121-DUP1
Matrix: Water
Analysis Batch: 11J0121

Client Sample ID: TW1
Prep Type: Dissolved
Prep Batch: 11J0121_P

Analyte	Sample Result	Sample Qualifier	Duplicate Result	Duplicate Qualifier	Unit	D	RPD	RPD Limit
Zinc	27.9		27.8		mg/l		0.174	20

Method: EPA 6010B - Dissolved Metals per EPA 6000/7000 Series Methods

Lab Sample ID: 11J0121-BLK1
Matrix: Water
Analysis Batch: 11J0121

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 11J0121_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		0.0200		mg/l		10/05/11 10:46	10/05/11 23:53	1.00

Lab Sample ID: 11J0121-BS1
Matrix: Water
Analysis Batch: 11J0121

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 11J0121_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Zinc	1.00	0.976		mg/l		97.6	85 - 115

QC Sample Results

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Method: EPA 6010B - Dissolved Metals per EPA 6000/7000 Series Methods (Continued)

Lab Sample ID: 11J0121-MS1
Matrix: Water
Analysis Batch: 11J0121

Client Sample ID: TW2
Prep Type: Dissolved
Prep Batch: 11J0121_P

Analyte	Sample	Sample	Spike	Matrix Spike	Matrix Spike	Unit	D	% Rec	% Rec.	
	Result	Qualifier	Added	Result	Qualifier				Limits	Limits
Zinc	95.2		1.00	93.6	MHA	mg/l		-160	75 - 125	

Lab Sample ID: 11J0121-MS2
Matrix: Water
Analysis Batch: 11J0121

Client Sample ID: EW-1
Prep Type: Dissolved
Prep Batch: 11J0121_P

Analyte	Sample	Sample	Spike	Matrix Spike	Matrix Spike	Unit	D	% Rec	% Rec.	
	Result	Qualifier	Added	Result	Qualifier				Limits	Limits
Zinc	161		1.00	160	MHA	mg/l		-29.2	75 - 125	

Lab Sample ID: 11J0121-DUP1
Matrix: Water
Analysis Batch: 11J0121

Client Sample ID: TW1
Prep Type: Dissolved
Prep Batch: 11J0121_P

Analyte	Sample	Sample	Duplicate		Unit	D	RPD	Limit
	Result	Qualifier	Result	Qualifier				
Zinc	27.9		27.8		mg/l		0.174	20

Method: EPA 6010B - Total Metals per EPA 6000/7000 Series Methods

Lab Sample ID: 11J0070-BLK1
Matrix: Soil
Analysis Batch: 11J0070

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 11J0070_P

Analyte	Blank	Blank	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Iron	ND	B4	19.2		mg/kg wet		10/04/11 10:09	10/04/11 23:06	1.00
Manganese	ND		4.81		mg/kg wet		10/04/11 10:09	10/04/11 23:06	1.00
Zinc	ND		9.62		mg/kg wet		10/04/11 10:09	10/04/11 23:06	1.00

Lab Sample ID: 11J0070-BS1
Matrix: Soil
Analysis Batch: 11J0070

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 11J0070_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec.	
							Limits	Limits
Iron	243	266		mg/kg wet		110	80 - 120	
Manganese	243	263		mg/kg wet		108	80 - 120	
Zinc	48.5	51.6		mg/kg wet		106	80 - 120	

Lab Sample ID: 11J0070-MS1
Matrix: Soil
Analysis Batch: 11J0070

Client Sample ID: Matrix Spike
Prep Type: Total
Prep Batch: 11J0070_P

Analyte	Sample	Sample	Spike	Matrix Spike	Matrix Spike	Unit	D	% Rec	% Rec.	
	Result	Qualifier	Added	Result	Qualifier				Limits	Limits
Iron	29500		319	30300	MHA	mg/kg dry	☼	248	75 - 125	
Manganese	1240		319	1640		mg/kg dry	☼	123	75 - 125	
Zinc	85.7		63.8	161		mg/kg dry	☼	118	75 - 125	

Lab Sample ID: 11J0070-MSD1
Matrix: Soil
Analysis Batch: 11J0070

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total
Prep Batch: 11J0070_P

Analyte	Sample	Sample	Spike	Matrix Spike Dup	Matrix Spike Dup	Unit	D	% Rec	% Rec.		RPD
	Result	Qualifier	Added	Result	Qualifier				Limits	Limits	
Iron	29500		322	28600	MHA	mg/kg dry	☼	-279	75 - 125	5.74	40

QC Sample Results

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Method: EPA 6010B - Total Metals per EPA 6000/7000 Series Methods (Continued)

Lab Sample ID: 11J0070-MSD1
Matrix: Soil
Analysis Batch: 11J0070

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total
Prep Batch: 11J0070_P

Analyte	Sample	Sample	Spike	Matrix Spike Dup	Matrix Spike Dup	Unit	D	% Rec	% Rec.	Limits	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier							
Manganese	1240		322	1370	MHA	mg/kg dry	✖	37.6	75 - 125	18.1	40	
Zinc	85.7		64.4	154		mg/kg dry	✖	106	75 - 125	4.58	40	

Lab Sample ID: 11J0165-BLK1
Matrix: Water
Analysis Batch: 11J0165

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 11J0165_P

Analyte	Blank	Blank	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Zinc	ND		0.0200		mg/l		10/06/11 10:06	10/06/11 17:33	1.00

Lab Sample ID: 11J0165-BS1
Matrix: Water
Analysis Batch: 11J0165

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 11J0165_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec.	Limits

Lab Sample ID: 11J0165-MS1
Matrix: Water
Analysis Batch: 11J0165

Client Sample ID: Matrix Spike
Prep Type: Total
Prep Batch: 11J0165_P

Analyte	Sample	Sample	Spike	Matrix Spike	Matrix Spike	Unit	D	% Rec	% Rec.	Limits
	Result	Qualifier	Added	Result	Qualifier					
Zinc	ND		1.00	1.06		mg/l		106	75 - 125	

Lab Sample ID: 11J0165-MS2
Matrix: Water
Analysis Batch: 11J0165

Client Sample ID: Matrix Spike
Prep Type: Total
Prep Batch: 11J0165_P

Analyte	Sample	Sample	Spike	Matrix Spike	Matrix Spike	Unit	D	% Rec	% Rec.	Limits
	Result	Qualifier	Added	Result	Qualifier					
Zinc	ND		1.00	1.09		mg/l		109	75 - 125	

Lab Sample ID: 11J0165-DUP1
Matrix: Water
Analysis Batch: 11J0165

Client Sample ID: Duplicate
Prep Type: Total
Prep Batch: 11J0165_P

Analyte	Sample	Sample	Duplicate Result	Duplicate Qualifier	Unit	D	RPD	Limit
	Result	Qualifier						
Zinc	0.0332		0.0322		mg/l		3.07	20

Method: NCA SOP - Lab Filtration

Lab Sample ID: 11J0004-BLK1
Matrix: Water
Analysis Batch: 11J0004

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 11J0004_P

Analyte	Blank	Blank	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Lab Filtration	ND		1.00		N/A		10/03/11 07:59	10/03/11 08:50	1.00

QC Sample Results

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Method: ASTM D2216-80 - Percent Dry Weight (Solids) per ASTM D2216-80

Lab Sample ID: 11J0064-DUP1
Matrix: Soil
Analysis Batch: 11J0064

Client Sample ID: Duplicate
Prep Type: Total
Prep Batch: 11J0064_P

Analyte	Sample Result	Sample Qualifier	Duplicate Result	Duplicate Qualifier	Unit	D	RPD	Limit
% Solids	72.4		72.5		% by Weight		0.173	20

Lab Sample ID: 11J0064-DUP2
Matrix: Soil
Analysis Batch: 11J0064

Client Sample ID: Duplicate
Prep Type: Total
Prep Batch: 11J0064_P

Analyte	Sample Result	Sample Qualifier	Duplicate Result	Duplicate Qualifier	Unit	D	RPD	Limit
% Solids	79.1		78.7		% by Weight		0.539	20

Method: SM 4500-S-2 D - Conventional Chemistry Parameters per Standard Methods

Lab Sample ID: 11J0025-BLK1
Matrix: Water
Analysis Batch: 11J0025

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 11J0025_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		0.200		mg/l		10/03/11 10:28	10/03/11 12:30	1.00

Lab Sample ID: 11J0025-BS1
Matrix: Water
Analysis Batch: 11J0025

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 11J0025_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec Limits
Sulfide	1.00	0.833		mg/l		83.3	75 - 125

Lab Sample ID: 11J0025-MS1
Matrix: Water
Analysis Batch: 11J0025

Client Sample ID: Matrix Spike
Prep Type: Total
Prep Batch: 11J0025_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec Limits
Sulfide	ND		1.00	0.733	M8	mg/l		73.3	75 - 125

Lab Sample ID: 11J0025-DUP1
Matrix: Water
Analysis Batch: 11J0025

Client Sample ID: Duplicate
Prep Type: Total
Prep Batch: 11J0025_P

Analyte	Sample Result	Sample Qualifier	Duplicate Result	Duplicate Qualifier	Unit	D	RPD	Limit
Sulfide	ND		ND		mg/l			20

Certification Summary

Client: Hart & Hickman
Project/Site: CLR.045

TestAmerica Job ID: PUI1028

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Portland	Alaska	Alaska UST	10	UST-012
TestAmerica Portland	Alaska	State Program	10	OR00040
TestAmerica Portland	California	State Program	9	2597
TestAmerica Portland	Oregon	NELAC	10	OR100021
TestAmerica Portland	USDA	USDA		P330-11-00092
TestAmerica Portland	Washington	State Program	10	C586

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

11720 North Creek Pkwy N Suite 400, Bothell, WA 98011-8244
 11922 E. First Ave, Spokane, WA 99206-5302
 9405 SW Nimbus Ave, Beaverton, OR 97008-7145
 2000 W International Airport Rd Ste A10, Anchorage, AK 99502-1119

425-420-9200 FAX 420-9210
 509-924-9200 FAX 924-9290
 503-906-9200 FAX 906-9210
 907-563-9200 FAX 563-9210

CHAIN OF CUSTODY REPORT

Work Order #: **PUI1028**

CLIENT: **Harv Howard (HrH)**
 REPORT TO: **Scott Denny** *sdenny@kathichem.com*
 ADDRESS: **2923 S. Raymond St. STE 100**
CLACKWAH, WA 98003
 PHONE: **2045800003** FAX:
 PROJECT NAME: **Cenimar Kalama**
 PROJECT NUMBER: **CLK-045** (JPL)
 SAMPLED BY: **(BSB) Scott Denny / John Lopez**

INVOICE TO: **HrH**
Arms Cyntrian Wells
 P.O. NUMBER:
 PRESERVATIVE
 REQUESTED ANALYSES

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	None	Moist No	Disso	Zn Co	Total Zn	Co	Zn, Mn, Sulfide	Co	Total Zn
1 TW1	092711 / 0930	X	X	X	X	X	X	X	X	X
2 TW2	092711 / 1015	X	X	X	X	X	X	X	X	X
3 TW3	092711 / 1030	X	X	X	X	X	X	X	X	X
4 FILTER Solids 01	092811 / 1000	X	X	X	X	X	X	X	X	X
5 EW-1	092911 / 0845	X	X	X	X	X	X	X	X	X
6 TW3	092911 / 0825	X	X	X	X	X	X	X	X	X
7 FRAC Tank	092811 / 0940	X	X	X	X	X	X	X	X	X
8 TW1	092811 / 1440	X	X	X	X	X	X	X	X	X
9 OW-1	092811 / 1605	X	X	X	X	X	X	X	X	X
10 P212	092911 / 0845	X	X	X	X	X	X	X	X	X

RELEASED BY: **Scott Denny** FIRM: **Harv** DATE: **092911** TIME: **1600**
 PRINT NAME: **Scott Denny** RECEIVED BY: **KAREN WILSON** FIRM: **TPP** DATE: **9-29-11** TIME: **1600**
 RELEASED BY: **Scott Denny** FIRM: **Harv** DATE: **092911** TIME: **1600**
 PRINT NAME: **Scott Denny** RECEIVED BY: **KAREN WILSON** FIRM: **TPP** DATE: **9-29-11** TIME: **1600**

ADDITIONAL REMARKS: **SAMPLES NOT FIELD FILTERED**
RUN PER F-2 DISSOLVED + TOTAL Zn IF POSSIBLE
 TEMPERATURE: **21.0** PAGE: **1** OF **2**
 TAL-1000(0408)



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Portland Sample Control Checklist

Work Order #: PVI 1028 Date/Time Received: 9/29/11 1200

Client Name: H+H

Project Name: Clariant Kalama

Time Zone:
 EDT/EST CDT/CST MDT/MST PDT/PST AK HI OTHER

Unpacking Checks:

Cooler (s): 2 _____
 Temperature (s): 2 _____
 Digi #1 Digi #2 IR Gun (Plastic Glass)
 Raytek (Plastic Glass)

Temperature out of Range:

Not enough or No Ice
 Ice Melted
 W/in 4 Hrs of collection
 Ice Not Needed
 Other: _____

Ice used: (circle one) GEL (LOOSE) BLUE NONE OTHER: _____ Initials: AM

- | N/A | Yes | No | |
|-------------------------------------|--------------------------|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1. If ESI client, were temp blanks received? If no, document on NOD. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2. Cooler Seals intact? (N/A if hand delivered) if no and ESI client, document on NOD. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3. Chain of Custody present? If no, document on NOD. Along with "received by" & "relinquished by" signatures with date & time? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4. Bottles received intact? If no, document on NOD. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5. Sample is not multiphasic? If no, document on NOD. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6. Sampler name/signature documented on COC? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7. Proper Container and preservatives used? If no, document on NOD. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 8. pH for HN03/ESI samples checked and meet requirements? If no, document on NOD. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 9. Cyanide samples checked for sulfides and meet requirements? If no, notify PM. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 10. HF Dilution required? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 11. Sufficient volume provided for all analysis and requested MS/MSD? If no, document on NOD and consult PM before proceeding. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 12. Did chain of custody agree with samples received? If no, document on NOD. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 13. Were VOA samples received without headspace? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 14. Did samples require preservation with sodium thiosulfate? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 15. If yes to #14, was the residual chlorine test negative? If no, document on NOD. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 16. Are dissolved/field filtered metals bottles sediment-free? If no, document on NOD. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 17. Are analyses with short holding times received in hold? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 18. Were special log- in instructions read and followed? |

Checklist Reviewed: _____ Log-in initials: PS Labeler initials: PS

Sample
TW-2
9/29/11 0945
not on COC.
Metals bottles
lab preserved
9/29/11
1800
PS PS