June 10, 2019

Garin Schrieve
Washington State Department of Ecology
Southwest Regional Office
PO Box 47600
Olympia, Washington 98504

Via email: garin.schrieve@ecy.wa.gov

Regarding: Annual Monitoring Report
Ecology Facility Site ID #28, Cleanup Site ID #2272
Nippon Dynawave Packaging – former Weyerhaeuser Chlor-Alkali Plant Site
3535 Industrial Way
Longview, Washington
PBS Project 17814.000, Phase 0004

Dear Mr. Schrieve:

This letter report serves as the annual report for the Nippon Dynawave Packaging Company (NDP) former Weyerhaeuser Chlor-Alkali site (site) located at 3535 Industrial Way in Longview, Washington. The Compliance Monitoring Plan[1] specifies that an annual compliance monitoring report is to be prepared summarizing the results of groundwater monitoring, additional work, and notable changes to site conditions for the monitoring period. This report provides a summary of work completed at the site from April 1, 2018 to March 31, 2019.

SITE LOCATION

The Chlor-Alkali site is located within the Nippon Dynawave Packaging mill complex, which consists of the Kraft pulp and paper mill, as well as the liquid packaging paper and extruder operations. The Nippon Dynawave Packaging facility is surrounded by industrial facilities, including the North Pacific Paper Corporation (NORPAC) facility and Weyerhaeuser lumber mill to the east and the Weyerhaeuser truck shop to the west. A portion of the site is currently leased by Westlake Chemical (Westlake) from Nippon Dynawave Packaging. Westlake acquired this site as part of their 2016 acquisition of Axiall Corporation.

The entire facility is zoned as heavy industrial. Figure 1 shows the site location.

The Chlor-Alkali site comprises the area within the Agreed Order[2] and associated Restrictive Covenant related to historical mercury contamination. The area under the Restrictive Covenant includes the entire portion of the site leased to Westlake, a portion of the truck shop parcel owned by Weyerhaeuser, and portions of the Nippon Dynawave Packaging mill complex. The extent of the Restrictive Covenant and the properties within the area are shown in Figure 2.

[1] CH2M HILL. (September 2004). Chlor-Alkali Plant – Compliance Monitoring Plan. Prepared for Weyerhaeuser Company. Longview, Washington.
[2] Washington State Department of Ecology. (2004). Agreed Order No. DE 1037.

OPERATIONAL HISTORY

As a result of the historical operations prior to 1976 (production of chlorine and sodium hydroxide for use by the pulp and paper industry), mercury was released to the site from equipment and process leaks and spills. Historical operations and contaminant sources were removed when chlorine production in the No. 1 Cell Room ceased in 1975 (remediation of surface impoundments began in 1972). In 1976, the mercury cells in the No. 2 Cell Room were converted to diaphragm cells (a nonmercury-based process). Cell Room No. 1, where historical mercury processing occurred, was demolished in 1991 and Cell Room No. 2 continued to operate until 1999. Chlor-Alkali production ceased at the facility in March 1999.

In 1985, the Washington State Department of Ecology (Ecology) designated the Chlor-Alkali plant as a medium priority on the Washington hazardous waste site list (Cleanup Site #2272, Facility Site ID #28) due to mercury concentrations exceeding the Environmental Protection Agency (EPA) maximum contaminant level (MCL) in groundwater wells. Groundwater has been sampled at the site since 1991. Mercury present at the site is inorganic, has relatively low mobility, and is considered the only constituent of concern at the site.

In 2005, Ecology approved a long-term monitoring plan. After reviewing the 2010 Groundwater Monitoring Report, a revised monitoring schedule was proposed by Ecology in 2011. Under the revised schedule, one year of quarterly sampling was to be completed once every five years. The western monitoring wells (MW wells) would only be sampled once during the sample year. Groundwater sampling under this schedule was completed in 2014.

In December 2015, Ecology approved a revised long-term monitoring schedule and decommissioning of the western monitoring wells (MW-1 to MW-4). The revised long-term monitoring schedule consists of a single monitoring event to be conducted once every five years. The western monitoring wells (MW-1 to MW-4) were decommissioned in February 2016.

The current Compliance Monitoring Plan for the site specifies that an annual compliance monitoring report is to be prepared summarizing the results of groundwater monitoring, additional work, and notable changes to site conditions for the monitoring period.

SITE GEOLOGY AND HYDROGEOLOGY

Geology

The site is located on the floodplain of the Columbia River. Over the years, dredged sediment and gravel fill have been placed across portions of the site at a thickness of between 2 and 20 feet. Alluvium underlying the fill consists of silt, sandy silt, and silty sand. Fine-grained alluvial deposits predominate to a depth of approximately 200 feet, where the alluvium becomes generally a coarse-grained mixture of sand, gravel, and cobbles. Flows of the Columbia River Basalt Group underlie the alluvium.

The site is flat and overlies a remnant of Mt. Coffin, an isolated basalt erosional peak that was leveled and covered with a thin layer of fill before the plant was built. Basalt at the site is encountered at variable depths because of the buried remnant of Mt. Coffin, ranging from less than 5 feet at the Mt. Coffin remnant to greater than 300 feet elsewhere.

Hydrogeology

Groundwater occurring in alluvium is referred to as alluvial (or alluvial zone) groundwater, and groundwater occurring in basalt as basalt (or basalt zone) groundwater. These zones do not exist in a “layer cake” arrangement at the site. Instead, the buried but steep relief associated with the remnant of Mt. Coffin allows basalt groundwater

and alluvial groundwater to occur side-by-side in the southern portion of the site. Groundwater in both of these zones discharges to the Columbia River, which lies on the west boundary of the site and which controls the base level of the local and regional hydrologic systems.

Groundwater occurs in the upper part of the fill and alluvium deposits under unconfined conditions at depths of 8 to 15 feet below ground surface (bgs) in the west area and 2.5 to 4.5 feet bgs in the more easterly former No. 1 Cell Room area. Groundwater elevations in the upper finer-grained part of the alluvium, as determined by site monitoring wells, are controlled by seasonal variations in precipitation and, to a lesser extent, by fluctuations in the Columbia River stage. Figure 2 presents the location of existing monitoring wells at the site.

In general, groundwater elevations tend to be highest in spring and lowest in late summer or early fall. Based on the Remedial Investigation (RI) findings, the hydraulic gradient in the alluvium ranges from 0.04 to 0.008 feet per foot, the hydraulic conductivity is estimated at 28 feet per day, and the horizontal groundwater flow velocity ranges from 1 to 6 feet per day.

The direction of groundwater flow varies across the site but is generally toward the river, as is the stormwater flow direction. In the central and western portions of the site, groundwater generally flows to the west-southwest. In the eastern portion of the site, groundwater in the alluvium flows around the less permeable, buried remnant of Mt. Coffin, with south-southeasterly flow east of Mt. Coffin and west to southwesterly flow west of Mt. Coffin. The area where the elevation of basalt exceeds 10 feet (that is, basalt is present within 10 feet of the surface) exhibits a greater effect on shallow groundwater flow, as noted in the RI. Based on RI findings, the hydraulic gradient in the basalt zone is estimated at 0.03 feet/feet, the hydraulic conductivity is estimated at 6×10^3 feet/day, and the horizontal groundwater flow velocity is estimated at approximately 0.004 feet/day.

Below a depth of approximately 200 feet, groundwater occurs in a confined alluvial aquifer. The total thickness of this aquifer is poorly documented but is at least 130 feet thick.

NATURE AND EXTENT OF CONTAMINATION IN GROUNDWATER

The mercury released to the environment at the Chlor-Alkali plant was elemental and inorganic, with relatively low mobility. Elemental mercury is very dense and readily sinks under gravity through openings in media through which it travels (e.g., large pores, fractures, joints). Mercury stops moving when it encounters a pore or fracture too small for it to enter. The residual mercury will then slowly dissolve into groundwater or soil pore water. In the unsaturated zone, mercury also will enter the vapor phase. Because of its density, high surface tension, presence as a separate-phase liquid, and accumulation in basalt fractures, active mercury remediation at the site is inherently complex and difficult.

Use of mercury at the plant ceased in 1976, and all of the processes and equipment using mercury have been either converted to another type of process or removed. As a result, there are no remaining sources of mercury at the site other than the residual from the earlier releases.

The distribution of mercury in the two water-bearing zones (alluvial groundwater and basalt groundwater) is predominantly a result of the proximity of the zones to historical sources (particularly, the former No. 1 Cell Room and former surface impoundment area) and of groundwater flow. Site groundwater sampling results have shown that mercury concentrations are generally below detection limits in all areas of the site except at the former No. 1 Cell Room and former surface impoundment area. In these areas, 2019 groundwater sampling results indicate that

mercury concentration in alluvial and basalt groundwater range from below the detection limit of 0.2 microgram per liter (µg/L) to up to 130 µg/L.

Results from the RI include the following additional information:

- Mercury concentrations in groundwater are remaining steady or decreasing with time. The rate of decrease is slowest in the area of the former No. 1 Cell Room and the former surface impoundments. Except for in these areas, mercury concentrations are at or below the drinking water maximum contaminant level (MCL) of 2 µg/L for mercury.
- Potential explanations for the slow decrease in mercury concentrations in the area of the former No. 1 Cell Room include the following:
    - The amount of groundwater flux (and therefore the rate of flushing) is limited because the asphalt cap reduces rainfall infiltration, and the permeability of the basalt and alluvium fill above the basalt is very low.
    - It is possible that small amounts of elemental mercury may be present below the water table as isolated globules in basalt fractures. If present, these globules could serve as an ongoing source of dissolved mercury in basalt groundwater.
- Although transient fluctuations in mercury concentrations may occur as a result of unusually high groundwater levels and rainfall conditions, concentrations in groundwater are not expected to increase substantially over time. The original mercury sources were removed from the plant 35 years ago. Additional mercury sources were addressed in subsequent removal actions. Furthermore, results from soil and groundwater sampling suggest that leaching of mercury from soil to groundwater by infiltration and percolation of precipitation is not a major factor influencing mercury concentrations in groundwater.
- Mercury is not present in groundwater upgradient of the former No. 1 Cell Room and former surface impoundment area based on semiannual groundwater sampling data from monitoring wells CH-7 and CH-8 collected from 1998 to 2009.
- The basalt portion of the shallow aquifer contains higher mercury concentrations than the alluvial aquifer, but transmits less groundwater flow; therefore, mercury flux contributed by the basalt aquifer constitutes a relatively insignificant amount of mercury to the surrounding groundwater and Columbia River.

RECENT SITE ACTIVITIES

The following section summarizes recent site activities, including the current groundwater monitoring program and recent site redevelopment activities.

Groundwater Monitoring Program

The long-term monitoring program is intended to confirm the effectiveness of the cleanup action by monitoring to ensure that mercury concentrations in groundwater are either stable or decreasing. Groundwater monitoring consists of water level measurements, groundwater sample collection, and analysis for dissolved mercury and general groundwater parameters.

The 2019 groundwater monitoring event is the first monitoring event conducted under the revised schedule proposed by PBS in the 2015 Annual Monitoring Report.[3] Under the revised schedule, groundwater monitoring would be conducted in the first quarter of the year once every five years.

Based on their location, the wells in the monitoring network can be categorized into the following four groups:

- HLA shallow "A" wells: These wells are located in the area of the Former No. 1 Cell Room and are screened in alluvial fill material that overlies the basalt zone (Mt. Coffin remnant) in this area. This group includes HLA-1A and HLA-3A.
- HLA shallow "B" wells: These wells are located in the area of the Former No. 1 Cell Room and are screened within the basalt zone. Included in this group are HLA-1B, HLA-3B, HLA-6B, and HLA-7B.
- CH wells: These wells are screened within the alluvial aquifer and include wells CH-1 to CH-6. Two other wells in this group, CH-7 and CH-8, were background monitoring wells that were located upgradient of the site and were decommissioned in May 2011. Mercury was never detected above reporting limits in these two background wells.
- MW wells: The western monitoring wells (MW wells) were decommissioned in February 2016.

Figure 2 presents the locations of the current groundwater monitoring well network.

In March 2019, a work plan was submitted to Ecology detailing the proposed 2019 groundwater monitoring event and well redevelopment. On March 7, 8, and 11, 2019, well development and maintenance activities were conducted for the current groundwater monitoring well network. PBS was onsite to monitor air conditions for the presence of mercury throughout field activities. Well monuments were not replaced and soil waste was not generated. Development activities were completed to improve hydraulic connectivity with the surrounding aquifer.

Groundwater monitoring was conducted in the first quarter of 2019 from March 25 to 27. The sampling event was conducted in accordance with the *Field Sampling Plan for Long-Term Monitoring Program*.[4] Prior to collecting groundwater samples, groundwater elevations were measured at all monitoring wells. Historical groundwater elevation data for site monitoring wells are summarized in Table 2. The water levels measured in 2019 were consistent with historical water levels.

Groundwater samples were field filtered and submitted to Apex Laboratories for analysis of dissolved mercury by EPA Method 245.1. To assess the quality of the data, the laboratory reviewed holding times, control samples, blank contamination, laboratory duplicates, spike recovery, and field duplicates. This evaluation concluded that all results were acceptable for all quarters. The laboratory quality control (QC) report is provided in Attachment 1. The field duplicate results are provided in Table 3.

Specific Conductance Monitoring

Increases in specific conductance levels over historical values were identified at seven wells (HLA-1A, HLA-1B, HLA-3A, HLA-3B, HLA-6B, HLA-7B, and CH-6) between 2008 and 2010. The increase was attributed to resumption of salt storage and brine production at the facility following construction of the new membrane Chlor-Alkali plant.

[3] PBS Engineering and Environmental (April 29, 2015). 2015 Annual Monitoring Report.
[4] CH2M HILL (2004). *Field Sampling Plan for Long-Term Monitoring Program*. Attachment A of the *Compliance Monitoring Plan*. Prepared for Weyerhaeuser.

To address this issue, Equa-Chlor (now Westlake Chemical), relined their brine trench with heavy polyurethane in July 2008. In fall 2009, the salt pad storage area was lined with a 45-mil linear low-density polyethylene (LLDPE) liner, and a perimeter retaining wall was installed.

In 2019, specific conductance in the shallow "A" wells remained consistent with historical concentrations, pre-2008 levels. In HLA-3A, levels increased from those in 2014 but were still consistent with historical pre-2008 levels. Specific conductance in the shallow "B" wells remains elevated from pre-increase levels. In HLA-1B, levels dropped from those seen in 2014 but were still above pre-increase levels.

Levels in the CH wells did not experience the historical significant increase except for well CH-6; in 2019, this well had the highest specific conductance measured since 1999. Table 4 provides historical specific conductivity data dating back to 2005. Although not a significant increase, the specific conductance measured in CH-5R was the highest since monitoring began in 1991.

Mercury Results

Detections of dissolved mercury were similar to previous sampling events with the exception of CH-4. The 2019 mercury concentrations ranged from below detection limits (0.2 µg/L) to 130 µg/L in the HLA wells, and from below detection limits (0.2 µg/L) to 1.06 µg/L in the CH wells.

Recent and historical mercury concentrations dating back to 2005, which is when monitoring under the Cleanup Action Plan (CAP)[5] schedule began, are summarized in Table 5. Field parameters are summarized in Table 6. Time series graphs of mercury concentrations and groundwater levels are shown in Figures 4, 5, 6a, and 6b. Laboratory analytical results are provided in Attachment 1.

Statistical Analysis Summary

As per the *Compliance Monitoring Plan*, the Mann-Kendall test (or Kendall's test) was used to assist in identifying whether trends are present in mercury concentrations at each of the active monitoring wells. Kendall's test was not evaluated for monitoring well CH-6 as mercury has not been detected at this well during the past 12 monitoring events. The monitoring data were also compared with average, maximum, minimum, and 95th-percentile concentrations.

Table 7 summarizes the results of the Kendall's test and statistical evaluation. The Kendall's test indicated that concentrations appear to be decreasing at four wells (HLA-1A, HLA-1B, CH-2, and CH-3) and stable at seven wells (HLA-3A, HLA-3B, HLA-6B, HLA-7B, CH-1, CH-4, and CH-5R). The stable trend indicated at monitoring well CH-4 is driven by the measurement in March 2019 that is higher than recent historical levels at this well. The March 2019 measurement in CH-4 is within the range of values observed historically at this well.

Handling of Investigation-Derived Waste

Purged groundwater from the well maintenance and monitoring event was stored in 5-gallon plastic buckets that were transported to Sump D, an on-site, approved disposal area.

[5] CH2M HILL (2004). Cleanup Action Plan (CAP) for Chlor-Alkali Site.

Additional Work

Westlake Water Vault

In June 2018, Westlake began construction of a below-grade water collection sump to manage rinse water inside a warehouse building located in the northeast corner of the Westlake site. Since the work consisted of subsurface excavation and was not considered emergency repair or routine maintenance, PBS submitted notification to Ecology on June 14, 2018. Ecology gave approval to proceed on June 15, 2018.

PBS mobilized to the site on June 19, 2018. The sump excavation measured approximately 4 feet by 4 feet by 2.5 feet deep. PBS used a photoionization detector (PID) to screen soils for VOCs. PID readings ranged from 0.0 to 0.4 part per million (ppm). The contractor used a Jerome Mercury Vapor Analyzer to monitor worker breathing zones. The mercury analyzer did not detect mercury at any time during excavation activities. One three-point composite sample was collected from the materials excavated from the sump at depths of approximately 1 feet bgs, 2 feet bgs, and 2.5 feet bgs. Groundwater was not encountered.

The soil sample was submitted for initial analysis for total mercury. The soil sample was below the screening level of 4 milligrams per kilogram (mg/kg) and was not analyzed for leachable mercury by toxicity characteristic leaching procedure (TCLP). Based on soil sample results, it was determined that soil from the sump excavation could be disposed of as nonhazardous solid waste.

Westlake Re-Paving

In September 2018, PBS conducted soil characterization and air monitoring activities during re-paving efforts for approximately 800 square feet of pavement at the Chlor-Alkali Plant in Longview, Washington. The work was completed for paving activities that were conducted within the area managed under the Agreed Order.

While several low detections of mercury were measured with the mercury meter, field screening did not suggest the presence of significant amounts of mercury in the excavated material. Chemical analysis of the soil samples showed mercury at concentrations of 0.847 mg/kg and 0.160 mg/kg. The concentrations were significantly below the action level of 4 mg/kg triggering additional analysis of leachable mercury; therefore, no additional analysis was conducted, and the material was determined to be suitable for disposal as nonhazardous waste. Additionally, while several low detections of mercury were measured in air immediately adjacent to the surface soil, none of the detected concentrations exceeded action levels and none were measured in breathing space.

Westlake Sewer Replacement

In March 2019, PBS monitored mercury in air and soil, in addition to collecting soil samples during replacement of a short section of sewer. No significant levels of mercury were monitored in air or soil. One of the soil samples showed a mercury concentration of 12 mg/kg and was subsequently analyzed for TCLP mercury. The results of the TCLP analysis were non-detect.

NDP Effluent Line Repairs

In March 2019, NDP began site-preparation work to enable repair leaks from three effluent lines in the Agreed Order boundary. Site records indicated minimal potential for mercury contamination in these work areas, particularly under the B&E Sump discharge line, which was upland and upgradient of historic contamination sources. The effluent lines sit mostly above ground surface, but manual removal of soil to depths of 6”-18” was required in some areas to provide access to the effluent line leaks for repairs. PBS conducted mercury air monitoring during manual soil excavation under the Outfall 001 & 002 woodstave lines, with no mercury detected.

No other air, soil, or groundwater monitoring was conducted, given the minimal potential for mercury in the shallow soils and groundwater at these locations.

Impervious Conditions

Site activities associated with the re-paving project resulted in replacement of approximately 800 square feet of impervious surface. The project did not affect the total amount of impervious area at the site. The total impervious area remains unchanged (approximately 28.2 acres) from that reported last year. The extent of existing impermeable surfaces is shown in Figure 3.

CONCLUSIONS AND RECOMMENDATIONS

Recent groundwater monitoring indicates that the areas of the site where mercury concentrations were detected above the analytical detection limits continue to be in the vicinity of the significant historical sources. Based on the results of the Kendall trend test, mercury concentrations appear to be stable or decreasing for all monitoring wells. At this time, it is recommended that groundwater monitoring and analysis continue as outlined for the current monitoring program. The next groundwater monitoring event will be conducted in the first quarter of 2024.

Please feel free to contact me at 503.806.2253 or Lizbeth Saldivar at 503.935.5515 with any questions or comments.

Sincerely,

Digitally signed by Mark Leece
Date: 2019.06.11 10:57:19 -07'00'

Mark Leece, PE
Principal Engineer

Digitally signed by Lizbeth Saldivar
Date: 2019.06.10 14:05:30 -07'00'

Lizbeth Saldivar, EIT
Environmental Engineering Staff

cc: Greg Bean, Nippon Dynawave Packaging Co.
Brian Wood, Nippon Dynawave Packaging Co.
Mimi Falcon, Nippon Dynawave Packaging Co.
Carol Wiseman, Weyerhaeuser
Paul Gianotti, Weyerhaeuser
Anthony Rizzo, Weyerhaeuser
Jack Carter, Weyerhaeuser
Kim Wigfield, Ecology

Attachments: Figure 1. Vicinity Map
Figure 2. Groundwater Monitoring Well Locations
Figure 3. Extent of Impermeable Surface
Figure 4. Dissolved Mercury Concentrations and Groundwater Levels – Shallow Wells Overlying Basalt
Figure 5. Dissolved Mercury Concentrations and Groundwater Levels – Basalt Wells
Figure 6a. Dissolved Mercury Concentrations and Groundwater Levels – Alluvial Aquifer Wells (CH-1 to CH-3)
Figure 6b. Dissolved Mercury Concentrations and Groundwater Levels –

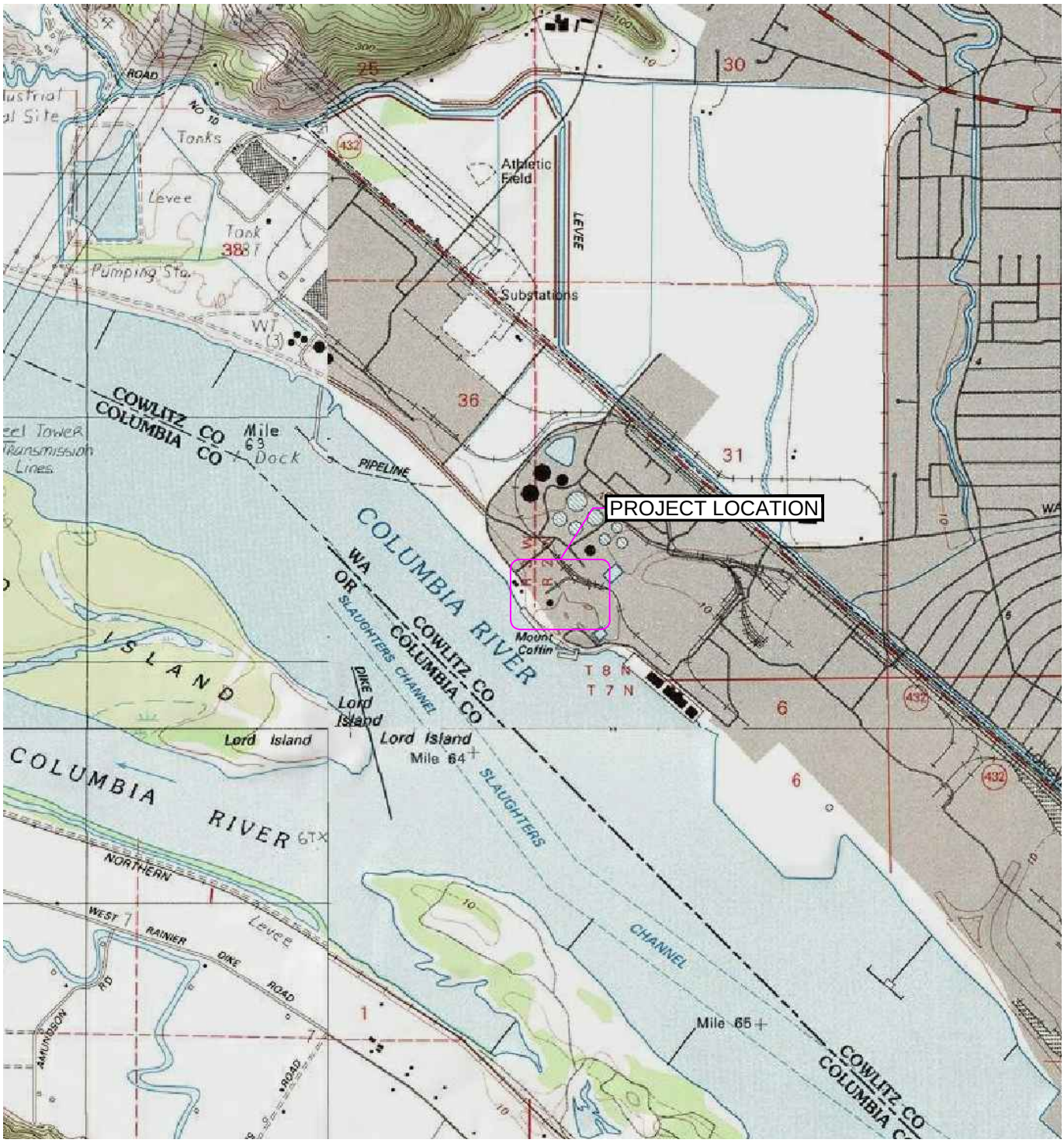
Alluvial Aquifer Wells (CH-4 to CH-6)

Table 1. Amount of Impervious Area within Restricted Covenant Area
Table 2. Historical Monitoring Well Groundwater Elevation Data
Table 3. Field Duplicate Results
Table 4. Historical Specific Conductance
Table 5. Historical Analytical Results
Table 6. First Quarter Field Parameters
Table 7. Statistics for Mercury in Groundwater

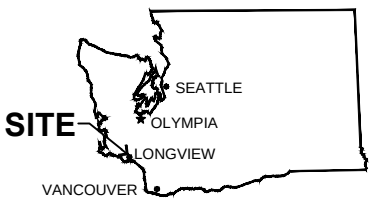
Attachment 1. Laboratory Analytical Report

LS:CS:ML:mo

Figures



SOURCE: USGS KELSO WA OR QUADRANGLE 1990.



WASHINGTON

SCALE: 1" = 2,000'

0' 1,000' 2,000' 4,000'

PREPARED FOR: NIPPON DYNAWAVE PACKAGING

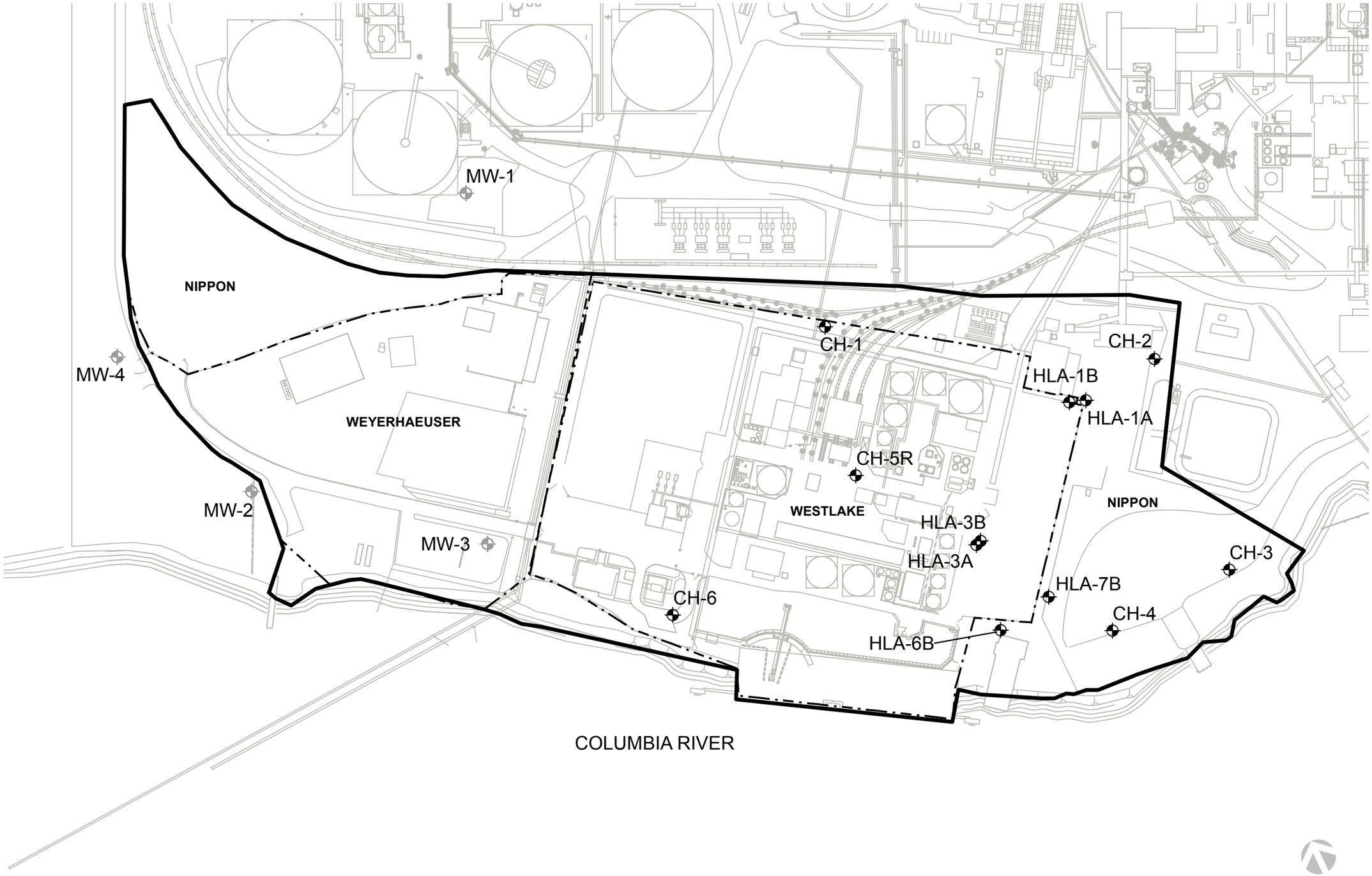
PBS

VICINITY MAP

3535 INDUSTRIAL WAY
LONGVIEW, WASHINGTON

MAY 2019
17759.000

FIGURE
1



LEGEND

- Extent of Restrictive Covenant
- Property Boundaries
- Monitoring Well
- Monitoring Wells Decommissioned in March 2016

1 inch = 200 feet

0 100 200 400'

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PBS Engineering and Environmental Inc.
4412 SW Corbett Avenue
Portland, OR 97239
503.248.1939
pbsusa.com

PBS

GROUNDWATER MONITORING WELL LOCATIONS
CHLOR-ALKALI PLANT
3535 INDUSTRIAL WAY, LONGVIEW, WASHINGTON

PROJECT
17759.000
DATE
MAY 2019
FIGURE
2

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EXTENT OF IMPERMEABLE SURFACES

CHLOR-ALKALI PLANT

3535 INDUSTRIAL WAY, LONGVIEW, WASHINGTON

FIGURE	DATE	PROJECT
3	MAY 2019	17759.000

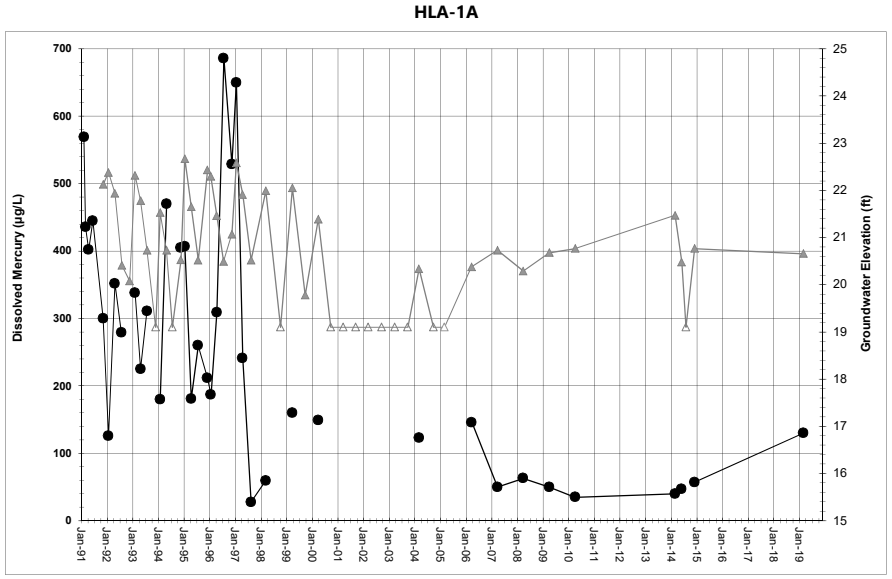
PBS Engineering and Environmental Inc.
4412 SW Corbett Avenue
Portland, OR 97239
503.248.1939

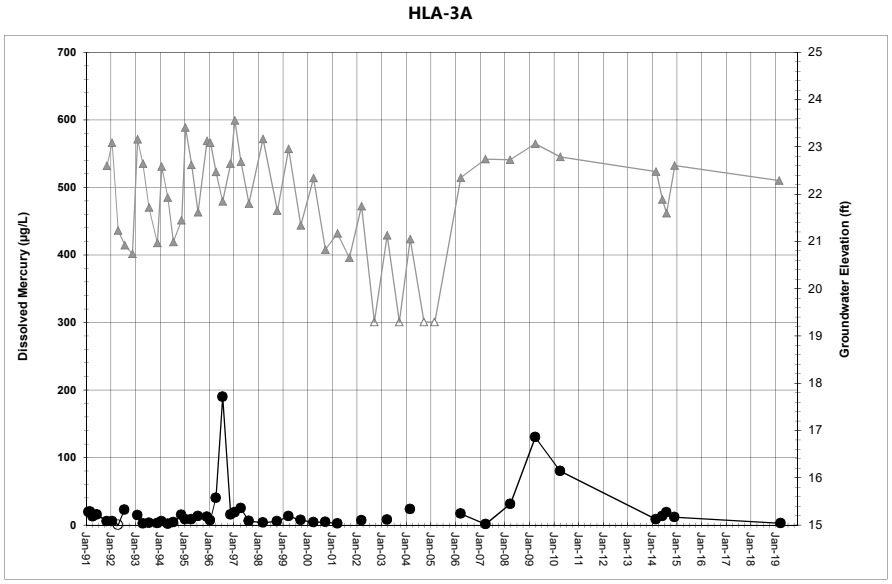
pbsusa.com

Figure 4: Dissolved Mercury Concentrations and Groundwater Levels - Shallow Wells Overlying Basalt

Nippon Chlor-Alkali Plant

Longview, Washington





Analytical Results

- Dissolved Mercury Concentration (µg/L)
- Not Detected, Value Shown at Reporting Limit

Groundwater Elevations

- Groundwater Elevation (feet)
- Well Was Dry; Value Shown is Elevation of Bottom of Well

Notes:

1. Break in line indicates no sample collected for lab analysis because the well was dry.

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May 2019

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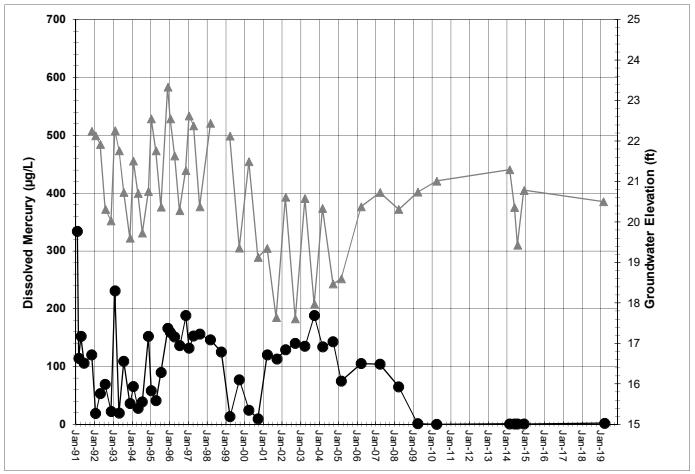
Figure 5: Dissolved Mercury Concentrations and Groundwater Levels - Basalt Wells

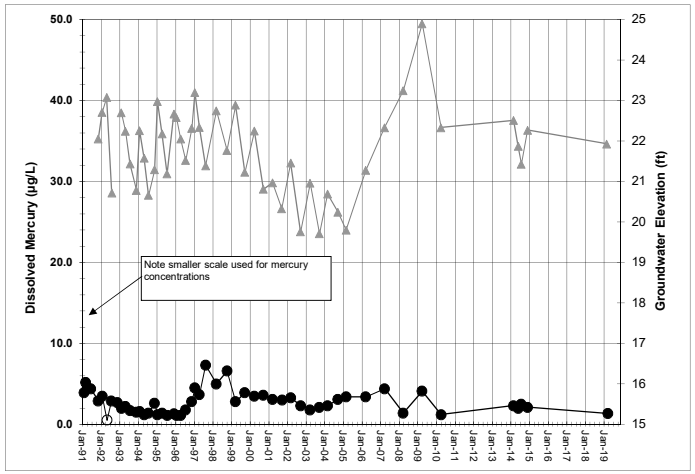
Nippon Chlor-Alkali Plant

Longview, Washington

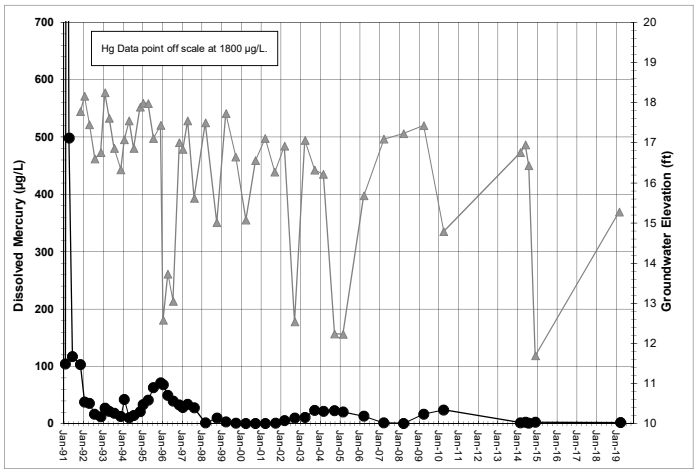
HLA-1B



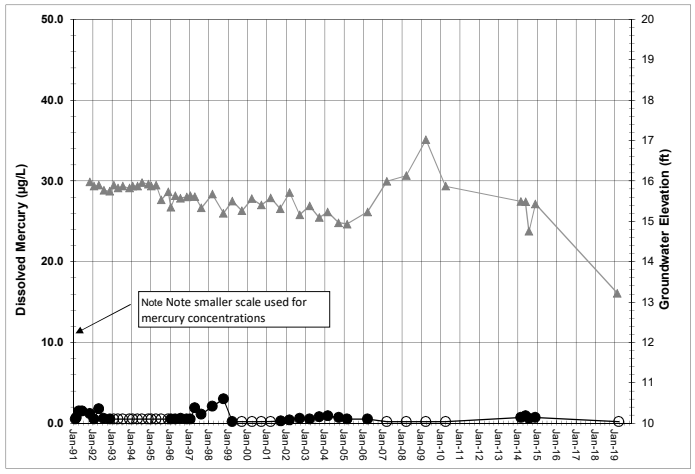
HLA-3B



HLA-7B



HLA-6B



Analytical Results

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Groundwater Elevations

- Groundwater Elevation (feet)
- Well Was Dry; Value Shown is Elevation of Bottom of Well

Notes:

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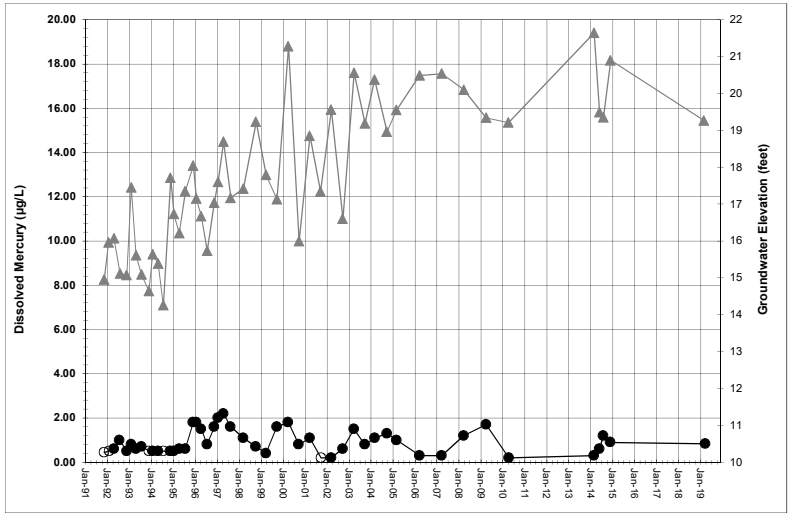
Figure 6a: Dissolved Mercury Concentrations and Groundwater Levels - Alluvial Aquifer Wells (CH-1 to CH-3)

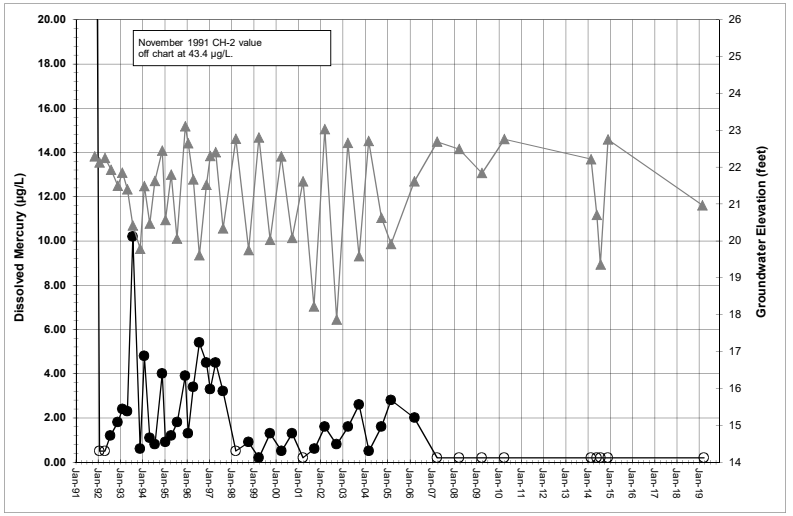
Nippon Chlor-Alkali Plant

Longview, Washington

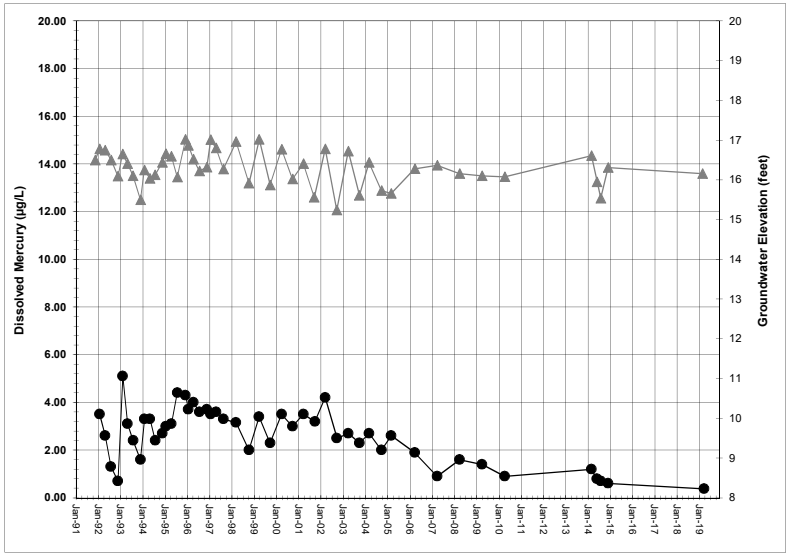
CH-1



CH-2



CH-3



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PBS

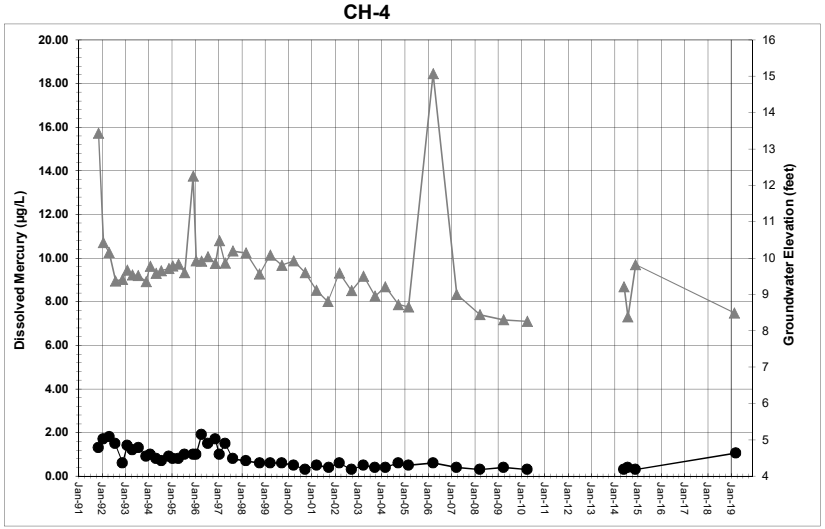
May 2019

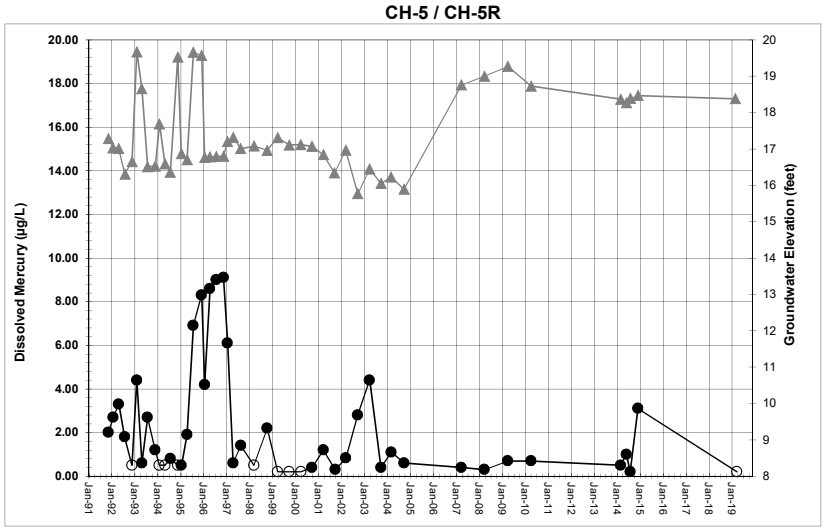
PBS Project 17814.000

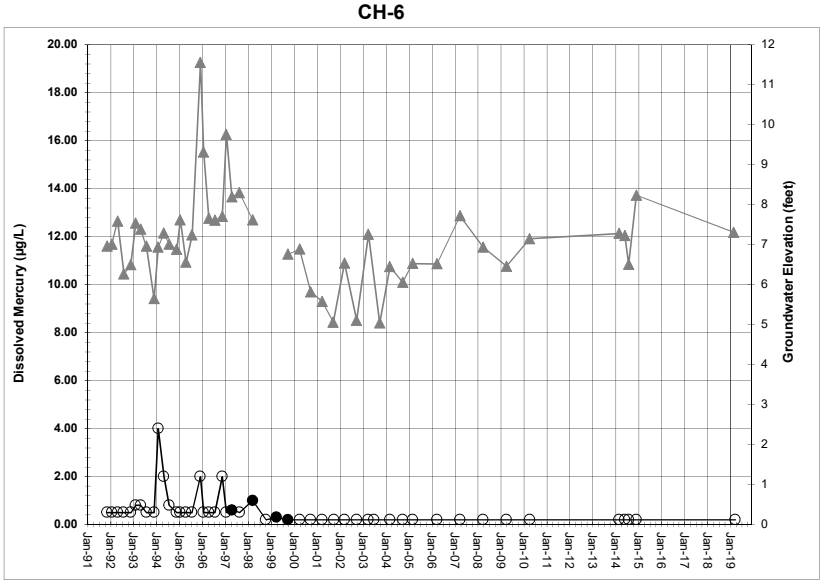
Figure 6b: Dissolved Mercury Concentrations and Groundwater Levels - Alluvial Aquifer Wells (CH-4 to CH-6)

Nippon Chlor-Alkali Plant

Longview, Washington







Analytical Results

- Dissolved Mercury Concentration (µg/L)
- Not Detected, Value Shown at Reporting Limit

Groundwater Elevations

- Groundwater Elevation (feet)
- Well Was Dry; Value Shown is Elevation of Bottom of Well

Notes:

1. Break in line indicates no sample collected for lab analysis because the well was dry.
2. CH-5 was decommissioned in January 2005.

PBS

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Tables

Table 1. Amount of Impervious Area Within Restrictive Covenant

Nippon Chlor-Alkali Plant
Longview, Washington

Year	Total Area (acres)	Pervious Area (acres)	Impervious Area (acres)
2004	38.5	14.68	23.84
2010	38.5	11.14	27.36
2014	38.5	10.3	28.2
2019	38.5	10.3	28.2

Table 2. Historical Monitoring Well Groundwater Elevation Data

Nippon Chlor-Alkali Plant
Longview, Washington

Well ID	MPE	Overall Well Depth (ft bMPE)	Bottom of Screen Elevation (ft)	Location	Date	Mar-2005	Mar-2006	Mar-2007	Mar-2008	Apr-2009	Apr-2010	Mar-2014	Jun-2014	Aug-2014	Dec-2014	Mar-2019
HLA-1A	27.63	7.9	19.1	Former No. 1 Cell Room Area	DTW	DRY	7.25	6.90	7.34	6.95	6.86	6.16	7.15	DRY	6.86	6.97
					ELEV	19.10	20.38	20.73	20.29	20.68	20.77	21.47	20.48	---	20.77	20.66
HLA-1B	27.03	34.3	-4.2		DTW	8.43	6.65	6.30	6.72	6.29	6.02	5.74	6.67	7.60	6.25	6.53
					ELEV	18.60	20.38	20.73	20.31	20.74	21.01	21.29	20.36	19.43	20.78	20.50
HLA-3A	26.54	6.3	19.3		DTW	DRY	4.19	3.80	3.81	3.47	3.75	4.06	4.65	4.94	3.93	4.25
					ELEV	19.30	22.35	22.74	22.73	23.07	22.79	22.48	21.89	21.60	22.61	22.29
HLA-3B[a]	27.88	29.3	-2.4		DTW	7.46	5.98	5.55	4.63	2.98	5.55	5.37	6.01	6.45	5.61	5.95
					ELEV	19.80	21.28	22.33	23.25	24.90	22.33	22.51	21.87	21.43	22.27	21.93
HLA-6B[a]	26.54	28.2	-1.1		DTW	12.39	12.09	10.55	10.41	9.52	10.67	11.05	11.06	11.79	11.11	13.32
					ELEV	14.93	15.23	15.99	16.13	17.02	15.87	15.49	15.48	14.75	15.43	13.22
HLA-7B	26.08	26.3	0.9		DTW	13.85	10.40	8.99	8.85	8.65	11.29	9.32	9.13	9.65	14.38	10.8
					ELEV	12.23	15.68	17.09	17.23	17.43	14.79	16.76	16.95	16.43	11.70	15.28
CH-1	25.29	19.0	8.3	Central Site	DTW	5.74	4.80	4.75	5.19	5.95	6.08	3.65	5.80	5.94	4.39	6.02
					ELEV	19.55	20.49	20.54	20.10	19.34	19.21	21.64	19.49	19.35	20.90	19.27
CH-2	25.42	16.6	8.8	Former Surface Impoundments Area	DTW	5.50	3.80	2.73	2.93	3.58	2.66	3.20	4.71	6.06	2.67	4.45
					ELEV	19.92	21.62	22.69	22.49	21.84	22.76	22.22	20.71	19.36	22.75	20.97
CH-3	25.07	17.5	8.3		DTW	9.41	8.79	8.70	8.91	8.97	8.99	8.46	9.12	9.53	8.76	8.91
					ELEV	15.66	16.28	16.37	16.16	16.10	16.08	16.61	15.95	15.54	16.31	16.16
CH-4	26.30	20.6	6.2		DTW	17.65	11.23	17.30	17.86	18.00	18.04	NM	17.09	17.92	16.48	17.81
					ELEV	8.65	15.07	9.00	8.44	8.30	8.26	NM	9.21	8.38	9.82	8.49
CH-5 / CH-5R[b]	25.64 / 27.41[b]	17.1	10.3	Central Site	DTW	NM	NM	8.65	8.41	8.14	8.68	9.04	9.14	9.02	8.94	9.03
					ELEV	NM	NM	18.76	19.00	19.27	18.73	18.37	18.27	18.39	18.47	18.38
CH-6	23.16	32.0	-6.3	Adjacent to River	DTW	16.63	16.64	15.44	16.22	16.70	16.01	15.88	15.93	16.65	14.92	15.85
					ELEV	6.53	6.52	7.72	6.94	6.46	7.15	7.28	7.23	6.51	8.24	7.31
MW-1[c]	24.06	21.7	4.9	Western Site Area	DTW	9.67	9.20	9.12	NM	10.43	9.83	9.40	NM	NM	NM	(c)
					ELEV	14.39	14.86	14.94	NM	13.63	14.23	14.66	NM	NM	NM	(c)
MW-2[c]	17.57	22.7	5.0		DTW	9.86	8.46	8.24	NM	9.38	8.98	7.84	NM	NM	NM	(c)
					ELEV	7.71	9.11	9.33	NM	8.19	8.59	9.73	NM	NM	NM	(c)
MW-3[c]	17.10	22.5	-3.9		DTW	9.22	8.43	7.77	NM	8.94	8.32	6.99	NM	NM	NM	(c)
					ELEV	7.88	8.67	9.33	NM	8.16	8.78	10.11	NM	NM	NM	(c)
MW-4[c]	26.38	27.1	1.8		DTW	14.37	14.02	13.96	14.37	14.20	14.11	14.11	NM	NM	NM	(c)
					ELEV	12.01	12.36	12.42	12.01	12.18	12.27	12.27	NM	NM	NM	(c)

Notes:

DRY = water level apparently below bottom elevation of well

DTW = Depth to groundwater (feet below MPE).

ELEV = Groundwater elevation (feet, NGVD 1929). Groundwater elevation = MPE - DTW.

MPE = Measuring Point Elevation (feet, 1929 NGVD), corresponding to top of PVC well casing.

NM = Not Measured

[a] Wells were modified and re-surveyed prior to the March 2007 monitoring event. Previous MPE were: HLA-3B = 27.76, HLA-6B = 27.32

[b] Well CH-5 was replaced by well CH-5R before the March 2007 sampling event. The MPE for CH-5 was 25.64.

[c] MW wells were decommissioned in Feb. 2016.

Table 3. Field Duplicate Results

Nippon Chlor-Alkali Plant
Longview, Washington

Monitoring Event	Sample	Parent Sample (µg/L)	Duplicate Sample (µg/L)	%RPD
Mar-14	032614-HLA-1B	0.8	0.8	0
Mar-14	032514-CH-5R	0.5	0.7	33*
Jun-14	061814-CH-3	0.8	0.5	46.2*
Aug-14	082714-CH-6	< 0.2	< 0.2	0
Dec-14	120914-CH-5R	3.1	3.3	6.3
Mar-19	032519-CH-4	1.06	0.878	18.6

*Given the very low concentration of dissolved mercury, even a relatively small difference between the sample and the duplicate can have a larger impact on the RPD. It is PBS' opinion that the RPD calculated from the duplicate sample is acceptable.

Table 4. Historical Specific Conductance

Nippon Chlor-Alkali Plant
Longview, Washington

Well ID	Mar-2005	Mar-2006	Mar-2007	Mar-2008	Apr-2009	Apr-2010	Mar-2014	Jun-2014	Aug-2014	Dec-2014	Mar-2019
	Specific Conductance (µS/cm)										
HLA-1A	DRY	650	573	690	801	1,040	346	557	NS	640	690
HLA-1B	2,126	2,003	1,756	1,900	8,020	69,000	17,310	21,590	19,940	17,340	5,010
HLA-3A	DRY	635	2,890	69,700	>99,900	67,000	2,004	3,830	3,627	2,880	10,790
HLA-3B	22,340	18,980	17,870	36,900	>99,900	230,000	71,780	105,800	98,010	102,600	83,900
HLA-6B	1,674	1,841	97,500	>99,900	>99,900	194,000	31,630	39,320	28,350	33,300	50,340
HLA-7B	1,655	1,617	5,750	13,900	60,200	125,000	31,740	16,030	24,320	29,820	21,190
CH-1	2,633	1,964	1,952	1,950	1,940	1,860	1,271	2,000	1,648	1,850	3,420
CH-2	137	141	130	140	219	219	115	114	182	139	120
CH-3	1,303	1,213	1,090	1,280	1,110	1,180	835	1,150	1,040	1,220	810
CH-4	2,766	1,772	2,105	1,520	1,900	1,500	(a)	1,640	1,942	1,950	3,160
CH-5R	(b)	(b)	2,336	3,150	3,620	3,140	2,208	3,560	1,299	2,470	5,820
CH-6	61,800	59,000	54,300	>99,900	>99,900	102,000	44,780	85,900	89,060	145,800	188,200
MW-1	509	NS	280	NS	461	NS	326	NS	NS	NS	(c)
MW-2	1,502	NS	1,395	NS	1,350	NS	899	NS	NS	NS	(c)
MW-3	8,140	NS	5,970	NS	8,580	NS	1,224	NS	NS	NS	(c)
MW-4	742	NS	454	NS	645	NS	478	NS	NS	NS	(c)

µS/cm = microSiemens per centimeter

NS = Not sampled per approved monitoring plan

(a) Well not sampled due to monument being filled with rain

(b) CH-5 decomissioned in Jan. 2005. Replacement installed in Aug. 2006

(c) MW wells were decommissioned in Feb. 2016.

DRY = Well had no recoverable water so no analysis was conducted

Table 5. Historical Analytical Results

Nippon Chlor-Alkali Plant
Longview, Washington

Well ID	Mar-2005	Mar-2006	Mar-2007	Mar-2008	Apr-2009	Apr-2010	Mar-2014	Jun-2014	Aug-2014	Dec-2014	Mar-2019
	Dissolved Mercury (µg/L)										
HLA-1A	DRY	146	50	63	50	35	40	47	DRY	57	130
HLA-1B	75	105	104	65	0.9	0.3	0.8	0.6	0.6	0.6	1.91
HLA-3A	DRY	17.1	1.5	31	130	80	8.4	13.4	19	11.6	2.99
HLA-3B	3.4	3.4	4.4	1.4	4.1	1.2	2.3	2	2.5	2.1	1.33
HLA-6B	0.5	0.5	<0.2	<0.2	<0.2	<0.2	0.7	0.9	0.6	0.7	<0.2
HLA-7B	20.3	13.2	1.5	0.7	16.8	24	1.8	2.5	0.8	2.5	2.11
CH-1	1.0	0.3	0.3	1.2	1.7	0.2	0.3	0.6	1.2	0.9	0.831
CH-2	2.8	2	<0.2	<0.2	<0.2	<0.2	<0.2	< 0.2	<0.2	<0.2	<0.2
CH-3	2.6	1.9	0.9	1.6	1.4	0.9	1.2	0.8	0.7	0.6	0.382
CH-4	0.5	0.6	0.4	0.3	0.4	0.3	(a)	0.3	0.4	0.3	1.06
CH-5R	(b)	(b)	0.4	0.3	0.7	0.7	0.5	1	<0.2	3.1	<0.2
CH-6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	< 0.2	<0.2	<0.2	<0.2
MW-1	<0.2	NS	<0.2	NS	<0.2	NS	<0.2	NS	NS	NS	(c)
MW-2	<0.2	NS	<0.2	NS	<0.2	NS	<0.2	NS	NS	NS	(c)
MW-3	<0.2	NS	<0.2	NS	<0.2	NS	<0.2	NS	NS	NS	(c)
MW-4	<0.2	NS	<0.2	NS	<0.2	NS	<0.2	NS	NS	NS	(c)

µg/L: micrograms per liter

DRY = Well had no recoverable water so no analysis was conducted

NS = Not Sampled per approved monitoring plan

(a) Well not sampled due to monument being filled with rain

(b) CH-5 decomissioned in Jan. 2005. Replacement installed in Aug. 2006

(c) MW wells were decommissioned in Feb. 2016.

Table 6. First Quarter Field Parameters

Nippon Chlor-Alkali Plant
Longview, Washington

Well ID	Sample Date	Field Parameters				
		Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH	ORP (mV)
HLA-1A	3/27/2019	12.3	690	7.26	7.85	68.8
HLA-1B	3/25/2019	15.5	5,010	0.15	9.04	67.6
HLA-3A	3/27/2019	10.4	10,790	2.05	8.00	175.1
HLA-3B	3/27/2019	14.9	83,900	5.41	7.49	141.5
HLA-6B	3/26/2019	15.3	50,340	0.7	7.57	128.8
HLA-7B	3/25/2019	15.0	21,190	6.01	7.99	113.5
CH-1	3/26/2019	14.5	3,420	0.86	9.62	-96.9
CH-2	3/26/2019	10.4	120	5.48	6.79	96.7
CH-3	3/25/2019	14.5	810	0.07	7.14	-136.3
CH-4	3/25/2019	15.0	3,160	0.09	6.92	-122.2
CH-5R	3/27/2019	20.8	5,820	0.15	6.81	-33.4
CH-6	3/26/2019	18.5	188,200	0.08	5.52	109.0

µS/cm: microsiemens per centimeter

mg/L: milligrams per liter

mV: millivolts

°C = degrees Celsius

Table 7. Statistics for Mercury in Groundwater (µg/L)

Nippon Chlor-Alkali Plant
Longview, Washington

Well ID	Number of Detections	Number of Samples	Frequency of Detection	Range of Non-Detect Concentrations[1]		Range of Detected Concentrations[1]		Mean[1]	Median[1]	95 UCL[1]	Kendall's Test for Most Recent 12 Events		
				Minimum	Maximum	Minimum	Maximum				Date Interval		Trend
HLA-1A	38	38	1.00			27.5	686	247.1	212	577.1	3/24/1999	3/27/2019	Decreasing
HLA-1B	53	53	1.00			0.3	334	93.4	105	188	9/24/2004	3/25/2019	Decreasing
HLA-3A	46	47	0.98	0.5	0.5	1.5	190	19.0	8.6	68.1	3/26/2003	3/27/2019	Stable
HLA-3B	52	53	0.98	0.5	0.5	1.1	7.3	2.8	2.6	5.1	9/23/2004	3/27/2019	Stable
HLA-6B	25	52	0.48	0.2	0.5	0.3	3	0.67	0.5	1.8	9/24/2004	3/26/2019	Stable
HLA-7B	53	53	1.00			0.5	1800	67.6	20.3	109.2	9/23/2004	3/25/2019	Stable
CH-1	39	49	0.80	0.2	0.5	0.2	2.2	0.9	0.8	1.8	9/24/2004	3/26/2019	Stable
CH-2	36	49	0.73	0.2	0.5	0.2	43.4	2.6	1.2	5.2	9/24/2004	3/26/2019	Decreasing
CH-3	48	48	1.00			0.38	5.1	2.6	2.7	4.3	9/23/2004	3/25/2019	Decreasing
CH-4	48	48	1.00			0.3	1.9	0.8	0.7	1.7	3/4/2004	3/25/2019	Stable
CH-5R	37	46	0.80	0.2	0.5	0.3	9.1	2.1	0.8	8.5	9/23/2003	3/27/2019	Stable
CH-6	4	49	0.08	0.2	4	0.3	1	0.5	0.5	2	9/24/2004	3/26/2019	N/A

Notes:

(1) Includes all detect and nondetect results at their reporting limit concentration.

NA indicates that the test was not applicable because mercury was not detected in these monitoring wells during the most recent 12 monitoring events.

Attachment 1

Laboratory Analytical Report

Apex Laboratories, LLC

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

Monday, May 20, 2019

Lizbeth Saldivar
PBS Engineering and Environmental
4412 SW Corbett Ave
Portland, OR 97239

RE: A9C1017 - Longview-Chloro Alkali - 17814.000

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A9C1017, which was received by the laboratory on 3/28/2019 at 11:46:00AM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: ldomenighini@apex-labs.com, or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of final reporting, unless prior arrangements have been made.

Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	2.4 degC

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.
All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.

Apex Laboratories

Lisa Domenighini, Client Services Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Apex Laboratories, LLC

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

PBS Engineering and Environmental	Project: **Longview-Chloro Alkali**	
4412 SW Corbett Ave	Project Number: **17814.000**	**Report ID:**
Portland, OR 97239	Project Manager: **Lizbeth Saldivar**	**A9C1017 - 05 20 19 0914**

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
032519-CH-4	A9C1017-01	Water	03/25/19 11:28	03/28/19 11:46
032519-CH-3	A9C1017-02	Water	03/25/19 12:58	03/28/19 11:46
032519-HLA-7B	A9C1017-03	Water	03/25/19 15:30	03/28/19 11:46
032519-HLA-1B	A9C1017-04	Water	03/25/19 17:25	03/28/19 11:46
032619-HLA-6B	A9C1017-05	Water	03/26/19 11:00	03/28/19 11:46
032619-CH-2	A9C1017-06	Water	03/26/19 12:10	03/28/19 11:46
032619-CH-1	A9C1017-07	Water	03/26/19 13:20	03/28/19 11:46
032619-CH-6	A9C1017-08	Water	03/26/19 15:05	03/28/19 11:46
032719-HLA-3A	A9C1017-09	Water	03/27/19 09:55	03/28/19 11:46
032719-HLA-3B	A9C1017-10	Water	03/27/19 13:10	03/28/19 11:46
032719-CH-5R	A9C1017-11	Water	03/27/19 15:20	03/28/19 11:46
032519-DUP	A9C1017-12	Water	03/25/19 12:00	03/28/19 11:46
032719-HLA-1A	A9C1017-13	Water	03/27/19 14:10	03/28/19 11:46

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

PBS Engineering and Environmental	Project:	**Longview-Chloro Alkali**	
4412 SW Corbett Ave	Project Number:	**17814.000**	**Report ID:**
Portland, OR 97239	Project Manager:	**Lizbeth Saldivar**	**A9C1017 - 05 20 19 0914**

ANALYTICAL CASE NARRATIVE

Work Order: A9C1017

Amended Report Revision 1:

Reporting the Method Reporting Limits (MRL)-

This report supersedes all previous reports.

The final report has been amended to report all data to the method reporting limits (MRLs).

Lisa Domenighini
Client Services Manager
5-20-19

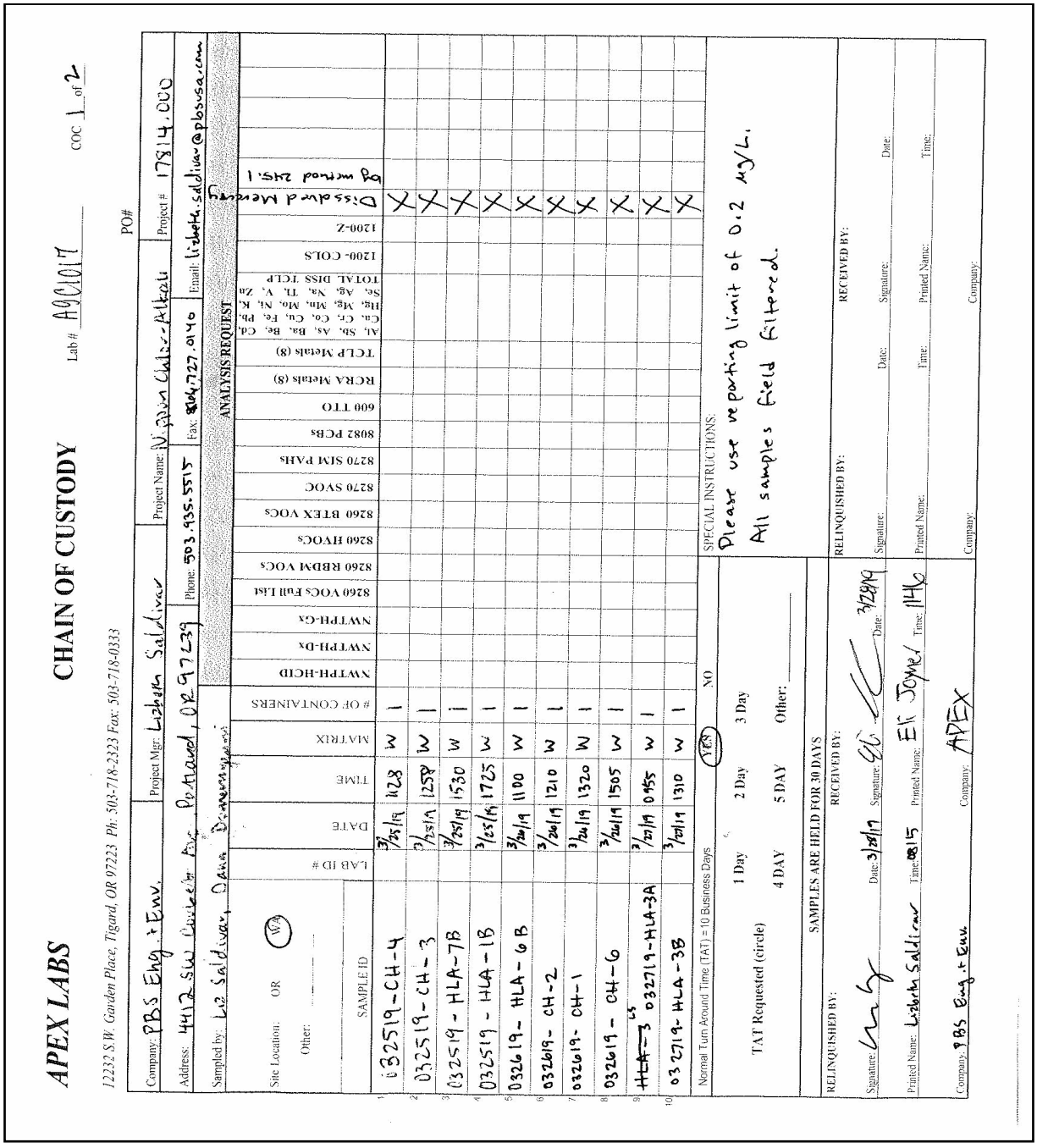
Subcontract

This report is not complete without the attached subcontract laboratory report for Mercuy by EPA 245.1 from Calscience/Eurofins.

Apex Laboratories, LLC

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

PBS Engineering and Environmental	Project: **Longview-Chloro Alkali**	
4412 SW Corbett Ave	Project Number: **17814.000**	**Report ID:**
Portland, OR 97239	Project Manager: **Lizbeth Saldivar**	**A9C1017 - 05 20 19 0914**



APEX LABS

CHAIN OF CUSTODY

Lab # A9C1017

COC 1 of 2

12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

PO#

Company: PBS Eng. + Env. | Project Mgr: Lizbeth Saldivar | Project Name: JV Longview Chloro-Alkali | Project #: 17814.000

Address: 4412 SW Corbett Ave, Portland, OR 97239 | Phone: 503.935.5515 | Fax: 503.727.0940 | Email: lizbeth.saldivar@pbsusa.com

Sampled by: Liz Saldivar, Dana Dennenmoser

Site Location: OR (WA) Other: ____

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 VOCs Full List	8260 RBDM VOCs	8260 HVOCs	8260 BTEX VOCs	8270 SVOC	8270 SIM PAHs	8082 PCBs	600 TTO	RCRA Metals (8)	TCLP Metals (8)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTAL DISS TCLP	1200- COLS	1200-Z	Dissolved Metals by method 245.1
032519-CH-4		3/25/19	1428	W	1																X
032519-CH-3		3/25/19	1259	W	1																X
032519-HLA-7B		3/25/19	1530	W	1																X
032519-HLA-1B		3/25/19	1735	W	1																X
032619-HLA-6B		3/26/19	1100	W	1																X
032619-CH-2		3/26/19	1210	W	1																X
032619-CH-1		3/26/19	1320	W	1																X
032619-CH-6		3/26/19	1505	W	1																X
HLA-3 032719-HLA-3A		3/27/19	0955	W	1																X
032719-HLA-3B		3/27/19	1310	W	1																X

Normal Turn Around Time (TAT) = 10 Business Days (YES) NO

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: ____

SPECIAL INSTRUCTIONS:
Please use reporting limit of 0.2 ug/L.
All samples field filtered.

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY: Signature: [signature] Date: 3/28/19 Printed Name: Lizbeth Saldivar Time: 0815 Company: PBS Eng. + Env.

RECEIVED BY: Signature: [signature] Date: 3/28/19 Printed Name: Eli Joyce Time: 1142 Company: APEX

RELINQUISHED BY: Signature: ____ Date: ____ Printed Name: ____ Time: ____ Company: ____

RECEIVED BY: Signature: ____ Date: ____ Printed Name: ____ Time: ____ Company: ____

Apex Laboratories

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

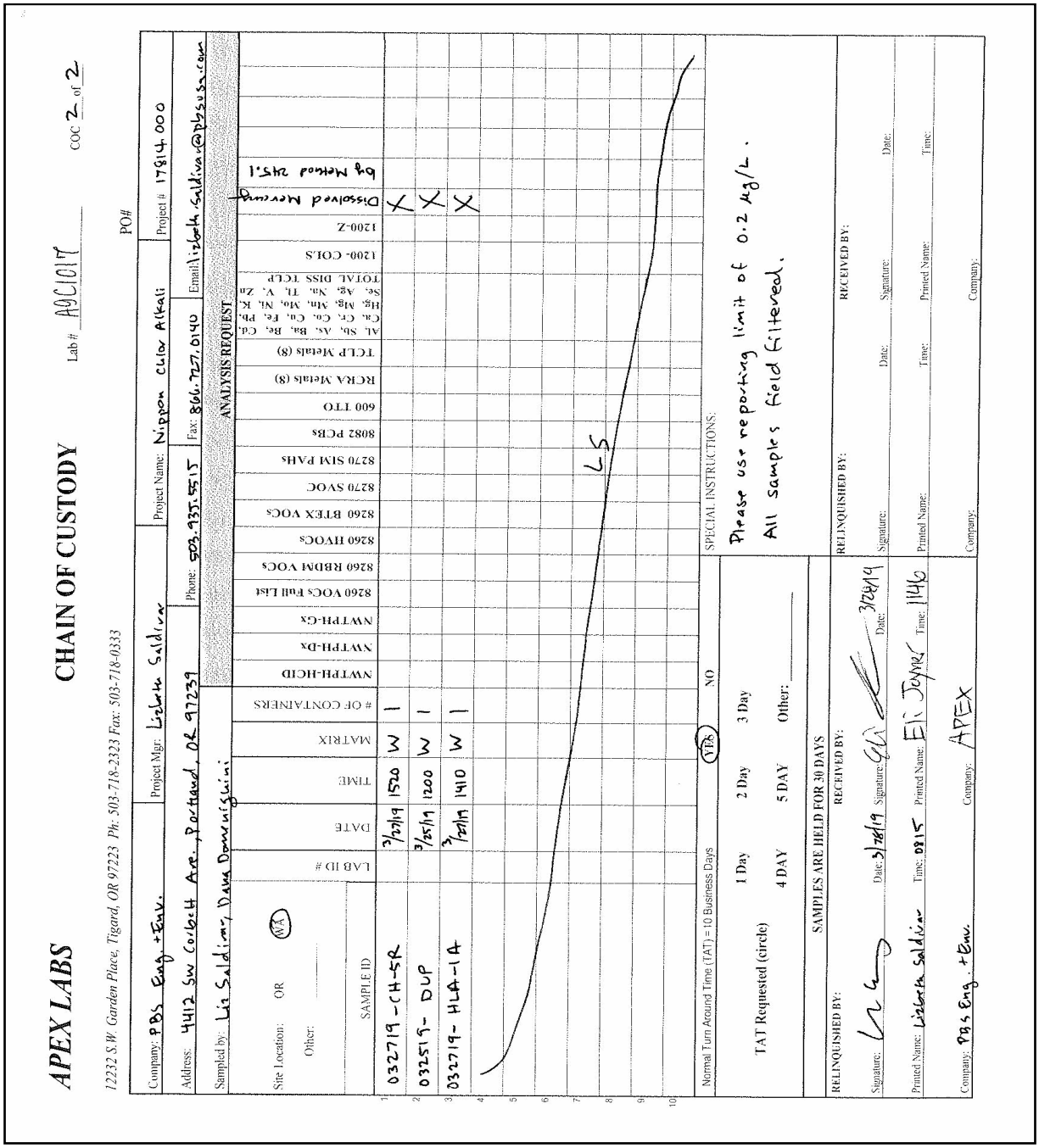
Lisa A Domenighini

Lisa Domenighini, Client Services Manager

Apex Laboratories, LLC

12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

PBS Engineering and Environmental	Project: **Longview-Chloro Alkali**	
4412 SW Corbett Ave	Project Number: **17814.000**	**Report ID:**
Portland, OR 97239	Project Manager: **Lizbeth Saldivar**	**A9C1017 - 05 20 19 0914**



APEX LABS

CHAIN OF CUSTODY

Lab # A9C1017

COC 2 of 2

PO#

12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Company: PBS Eng. + Env. | Project Mgr: Lizbeth Saldivar | Project Name: Nippon Chloro Alkali | Project # 17814.000

Address: 4412 SW Corbett Ave. Portland, OR 97239 | Phone: 503.935.5515 | Fax: 866.727.0140 | Email: lizbeth.saldivar@pbsusa.com

Sampled by: Liz Saldivar, Dana Domenighini

Site Location: OR WA

Other:

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 VOCs Full List	8260 RBDM VOCs	8260 HVOCs	8260 BTEX VOCs	8270 SVOC	8270 SIM PAHs	8082 PCBs	600 TTO	RCRA Metals (8)	TCLP Metals (8)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTAL DISS TCLP	1200-COLS	1200-Z	Dissolved Mercury by Method 245.1
1 032719-CH-SR		3/27/19	1520	W	1																	X
2 032519-DUP		3/25/19	1200	W	1																	X
3 032719-HLA-19		3/27/19	1410	W	1																	X
4																						
5																						
6																						
7																						
8																						
9																						
10																						

Normal Turn Around Time (TAT) = 10 Business Days (YES) NO

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY 5 DAY Other: _____

SPECIAL INSTRUCTIONS:

Please use reporting limit of 0.2 µg/L.

All samples field filtered.

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY:

Signature: [signature] Date: 3/28/19

Printed Name: Lizbeth Saldivar Time: 0915

Company: PBS Eng. + Env.

RECEIVED BY:

Signature: [signature] Date: 3/28/19

Printed Name: Eli Joyner Time: 1146

Company: APEX

RELINQUISHED BY:

Signature: Date:

Printed Name: Time:

Company:

RECEIVED BY:

Signature: Date:

Printed Name: Time:

Company:

Apex Laboratories

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Apex Laboratories, LLC
12232 S.W. Garden Place
Tigard, OR 97223
503-718-2323
EPA ID: OR01039

PBS Engineering and Environmental	Project: **Longview-Chloro Alkali**	
4412 SW Corbett Ave	Project Number: **17814.000**	**Report ID:**
Portland, OR 97239	Project Manager: **Lizbeth Saldivar**	**A9C1017 - 05 20 19 0914**

APEX LABS COOLER RECEIPT FORM

Client: PBS - PDX Element WO#: A9 C1017

Project/Project #: Nippon Chlor-Alkali 17814.000

Delivery Info:

Date/time received: 3/28/19 @ 1146 By: EJ

Delivered by: Apex X Client ___ ESS ___ FedEx ___ UPS ___ Swift ___ Senvoy ___ SDS ___ Other ___

Cooler Inspection Date/time inspected: 3/28/19 @ 1215 By: EJ

Chain of Custody included? Yes X No ___ Custody seals? Yes ___ No X

Signed/dated by client? Yes X No ___

Signed/dated by Apex? Yes X No ___

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	2.4						
Received on ice? (Y/N)	Y						
Temp. blanks? (Y/N)	Y						
Ice type: (Gel/Real/Other)	Real						
Condition:	Good						

Cooler out of temp? (Y/(N)) Possible reason why: ___

If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/(NA)

Out of temperature samples form initiated? Yes/No/(NA)

Samples Inspection: Date/time inspected: 3/28/19 @ 1643 By: [illegible]

All samples intact? Yes X No ___ Comments: ___

Bottle labels/COCs agree? Yes X No ___ Comments: ___

COC/container discrepancies form initiated? Yes ___ No ___ NA X

Containers/volumes received appropriate for analysis? Yes X No ___ Comments: ___

Do VOA vials have visible headspace? Yes ___ No ___ NA X

Comments ___

Water samples: pH checked: Yes X No ___ NA ___ pH appropriate? Yes X No ___ NA ___

Comments: ___

Additional information: ___

Labeled by: [illegible] Witness: DVL Cooler Inspected by: [illegible] See Project Contact Form: Y

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Lisa A Domenighini

Lisa Domenighini, Client Services Manager

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Supplemental Report 1

The original report has been revised/corrected.

WORK ORDER NUMBER: 19-04-0089

The difference is service

AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: APEX Laboratories, LLC

Client Project Name: A9C1017

Attention: Lisa Domenighini
12232 SW Garden Place
Portland, OR 97223-8246

Approved for release on 05/17/2019 by:
Lori Thompson
Project Manager

ResultLink

Email your PM

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Contents

Client Project Name: A9C1017
Work Order Number: 19-04-0089

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Work Order Narrative

Work Order: 19-04-0089 Page 1 of 1

Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 04/02/19. They were assigned to Work Order 19-04-0089.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

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Sample Summary

Client:	APEX Laboratories, LLC 12232 SW Garden Place Portland, OR 97223-8246	Work Order:	19-04-0089
		Project Name:	A9C1017
		PO Number:	
		Date/Time Received:	04/02/19 10:15
		Number of Containers:	13
Attn:	Lisa Domenighini		

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
032519-CH-4	19-04-0089-1	03/25/19 11:28	1	Aqueous
032519-CH-3	19-04-0089-2	03/25/19 12:58	1	Aqueous
032519-HLA-7B	19-04-0089-3	03/25/19 15:30	1	Aqueous
032519-HLA-1B	19-04-0089-4	03/25/19 17:25	1	Aqueous
032619-HLA-6B	19-04-0089-5	03/26/19 11:00	1	Aqueous
032619-CH-2	19-04-0089-6	03/26/19 12:10	1	Aqueous
032619-CH-1	19-04-0089-7	03/26/19 13:20	1	Aqueous
032619-CH-6	19-04-0089-8	03/26/19 15:05	1	Aqueous
032719-HLA-3A	19-04-0089-9	03/27/19 09:55	1	Aqueous
032719-HLA-3B	19-04-0089-10	03/27/19 13:10	1	Aqueous
032719-CH-5R	19-04-0089-11	03/27/19 15:20	1	Aqueous
032519-DUP	19-04-0089-12	03/25/19 12:00	1	Aqueous
032719-HLA-1A	19-04-0089-13	03/27/19 14:10	1	Aqueous

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Analytical Report

APEX Laboratories, LLC
12232 SW Garden Place
Portland, OR 97223-8246

Project: A9C1017

Date Received: 04/02/19
Work Order: 19-04-0089
Preparation: EPA 245.1 Filt.
Method: EPA 245.1
Units: mg/L

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032519-CH-4	**19-04-0089-1-A**	**03/25/19 11:28**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 11:58**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	0.00106	0.000200	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032519-CH-3	**19-04-0089-2-A**	**03/25/19 12:58**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:01**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	0.000382	0.000200	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032519-HLA-7B	**19-04-0089-3-A**	**03/25/19 15:30**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 11:51**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	0.00211	0.000200	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032519-HLA-1B	**19-04-0089-4-A**	**03/25/19 17:25**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:03**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	0.00191	0.000200	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032619-HLA-6B	**19-04-0089-5-A**	**03/26/19 11:00**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:05**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.000200	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032619-CH-2	**19-04-0089-6-A**	**03/26/19 12:10**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:07**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.000200	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032619-CH-1	**19-04-0089-7-A**	**03/26/19 13:20**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:10**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	0.000831	0.000200	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032619-CH-6	**19-04-0089-8-A**	**03/26/19 15:05**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:12**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.000200	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

APEX Laboratories, LLC
12232 SW Garden Place
Portland, OR 97223-8246

Project: A9C1017

Date Received: 04/02/19
Work Order: 19-04-0089
Preparation: EPA 245.1 Filt.
Method: EPA 245.1
Units: mg/L

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032719-HLA-3A	**19-04-0089-9-A**	**03/27/19 09:55**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:23**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	0.00299	0.000200	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032719-HLA-3B	**19-04-0089-10-A**	**03/27/19 13:10**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:30**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	0.00133	0.000200	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032719-CH-5R	**19-04-0089-11-A**	**03/27/19 15:20**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:33**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.000200	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032519-DUP	**19-04-0089-12-A**	**03/25/19 12:00**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:35**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	0.000878	0.000200	1.00	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
032719-HLA-1A	**19-04-0089-13-A**	**03/27/19 14:10**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:37**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	0.130	0.00200	10.0	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-04-008-8893**	**N/A**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/08/19 16:44**	**190408LA2F**

Parameter	Result	RL	DF	Qualifiers
Mercury	ND	0.000200	1.00	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Quality Control - Spike/Spike Duplicate

APEX Laboratories, LLC		Date Received:	04/02/19
12232 SW Garden Place		Work Order:	19-04-0089
Portland, OR 97223-8246		Preparation:	EPA 245.1 Filt.
		Method:	EPA 245.1
Project: A9C1017			Page 1 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
032519-HLA-7B	**Sample**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 11:51**	**190408SA2**
032519-HLA-7B	**Matrix Spike**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 11:54**	**190408SA2**
032519-HLA-7B	**Matrix Spike Duplicate**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 11:56**	**190408SA2**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	0.002109	0.01000	0.01406	120	0.01450	124	57-141	3	0-10	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

APEX Laboratories, LLC		Date Received:	04/02/19
12232 SW Garden Place		Work Order:	19-04-0089
Portland, OR 97223-8246		Preparation:	EPA 245.1 Filt.
		Method:	EPA 245.1
Project: A9C1017			Page 2 of 2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
032719-HLA-3A	**Sample**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:23**	**190408SA2A**
032719-HLA-3A	**Matrix Spike**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:26**	**190408SA2A**
032719-HLA-3A	**Matrix Spike Duplicate**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/09/19 12:28**	**190408SA2A**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Mercury	0.002994	0.01000	0.01421	112	0.01410	111	57-141	1	0-10	

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RPD: Relative Percent Difference. CL: Control Limits

eurofins | Calscience

Quality Control - LCS

APEX Laboratories, LLC		Date Received:	04/02/19
12232 SW Garden Place		Work Order:	19-04-0089
Portland, OR 97223-8246		Preparation:	EPA 245.1 Filt.
		Method:	EPA 245.1
Project: A9C1017			Page 1 of 1

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-04-008-8893	**LCS**	**Aqueous**	**Mercury 07**	**04/08/19**	**04/08/19 16:46**	**190408LA2F**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
Mercury	0.01000	0.009174	92	85-121	

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RPD: Relative Percent Difference. CL: Control Limits

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Sample Analysis Summary Report

Work Order: 19-04-0089 Page 1 of 1

Method	Extraction	Chemist ID	Instrument	Analytical Location
EPA 245.1	EPA 245.1 Filt.	868	Mercury 07	1

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Glossary of Terms and Qualifiers

Work Order: 19-04-0089 Page 1 of 1

Qualifiers	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

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WAD 3/29/19

SUBCONTRACT ORDER

Apex Laboratories

A9C1017

WAD 4/1/19

19-04-0089

SENDING LABORATORY:

Apex Laboratories
12232 S.W. Garden Place
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 718-0333
Project Manager: Lisa Domenighini

RECEIVING LABORATORY:

Eurofins_CalScience
7440 Lincoln Way
Garden Grove, CA 92841-1427
Phone :(714) 895-5494
Fax: (714) 894-7501

Sample Name: 032519-CH-4 (1) **Water** **Sampled: 03/25/19 11:28** (A9C1017-01)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/22/19 11:28	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Sample Name: 032519-CH-3 (2) **Water** **Sampled: 03/25/19 12:58** (A9C1017-02)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/22/19 12:58	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Sample Name: 032519-HLA-7B (3) **Water** **Sampled: 03/25/19 15:30** (A9C1017-03)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/22/19 15:30	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Sample Name: 032519-HLA-1B (4) **Water** **Sampled: 03/25/19 17:25** (A9C1017-04)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/22/19 17:25	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Standard TAT

Released By	Date	Received By	Date
[illegible]	4-1-19	Fed Ex (Shipper)	
Fed Ex (Shipper)		[illegible] EC	4/2/19 10:15
Released By	Date	Received By	Date

SUBCONTRACT ORDER

Apex Laboratories

A9C1017

0089

Sample Name: 032619-HLA-6B (5) **Water** **Sampled: 03/26/19 11:00** (A9C1017-05)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/23/19 11:00	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Sample Name: 032619-CH-2 (6) **Water** **Sampled: 03/26/19 12:10** (A9C1017-06)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/23/19 12:10	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Sample Name: 032619-CH-1 (7) **Water** **Sampled: 03/26/19 13:20** (A9C1017-07)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/23/19 13:20	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Sample Name: 032619-CH-6 (8) **Water** **Sampled: 03/26/19 15:05** (A9C1017-08)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/23/19 15:05	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Sample Name: 032719-HLA-3A (9) **Water** **Sampled: 03/27/19 09:55** (A9C1017-09)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/24/19 09:55	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Sample Name: 032719-HLA-3B (10) **Water** **Sampled: 03/27/19 13:10** (A9C1017-10)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/24/19 13:10	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Standard TAT

Released By: [signature] Date: 4-1-19 — Fed Ex (Shipper) — Received By: [signature] Date: 4/2/19 10:15

Released By: Fed Ex (Shipper) Date: — Received By: [signature] Date:

SUBCONTRACT ORDER

Apex Laboratories

A9C1017

0059

Sample Name: 032719-CH-5R (11) **Water** **Sampled: 03/27/19 15:20** (A9C1017-11)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/24/19 15:20	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Sample Name: 032519-DUP (12) **Water** **Sampled: 03/25/19 12:00** (A9C1017-12)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/22/19 12:00	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Sample Name: 032719-HLA-1A (13) **Water** **Sampled: 03/27/19 14:10** (A9C1017-13)

Analysis	Due	Expires	Comments
Hg (Mercury) - 245.1 - Dissolved (H2O) (SUB)	04/10/19 17:00	04/24/19 14:10	
Containers Supplied: (A)250 mL Poly (FF) - Nitric (HNO3)			

Standard TAT

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Released By — Date 4-1-19 — Fed Ex (Shipper) — Received By — Date

Fed Ex (Shipper) — Released By — Date — Received By EC — Date 4/2/19 10:15

0089

ORIGIN ID:BNOA (503) 718-2323
SAMPLE CONTROL
APEX LABS
12232 SW GARDEN PLACE

TIGARD, OR 97223
UNITED STATES US

SHIP DATE: 01APR19
ACTWGT: 30.00 LB
CAD: 4716258/INET4100

BILL SENDER

TO DANIELLE GONSMAN
CALSCIENCE
7440 LINCOLN WAY

GARDEN GROVE CA 92841
(714) 895-5494

INV:
PO:
REF:
DEPT:

565J1D7E5/23AD

FedEx Express

TUE - 02 APR 10:30A
PRIORITY OVERNIGHT

TRK# 0201 7748 5456 2726

WZ APVA

92841
CA-US SNA

FedEx Ship Manager - Print Your Label(s)

4/1/2019

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WORK ORDER NUMBER: 19-04-0089

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: Apex Labs

DATE: 04/02/2019

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: -0.2°C); Temperature (w/o CF): 2.9 °C (w/ CF): 2.7 °C; ☐ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____)

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

☐ Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: ☐ Air ☐ Filter Checked by: 836

CUSTODY SEAL:

Cooler ☐ Present and Intact ☐ Present but Not Intact ☑ Not Present ☐ N/A Checked by: 836

Sample(s) ☐ Present and Intact ☐ Present but Not Intact ☑ Not Present ☐ N/A Checked by: 1163

SAMPLE CONDITION:	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Sampling date ☐ Sampling time ☐ Matrix ☐ Number of containers			
☐ No analysis requested ☐ Not relinquished ☐ No relinquished date ☐ No relinquished time			
Sampler's name indicated on COC	☐	☐	☑
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and in good condition	☑	☐	☐
Proper containers for analyses requested	☑	☐	☐
Sufficient volume/mass for analyses requested	☑	☐	☐
Samples received within holding time	☑	☐	☐
Aqueous samples for certain analyses received within 15-minute holding time			
☐ pH ☐ Residual Chlorine ☐ Dissolved Sulfide ☐ Dissolved Oxygen	☐	☐	☑
Proper preservation chemical(s) noted on COC and/or sample container	☑	☐	☐
Unpreserved aqueous sample(s) received for certain analyses			
☐ Volatile Organics ☐ Total Metals ☐ Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	☑	☐	☐
Container(s) for certain analysis free of headspace	☐	☐	☑
☐ Volatile Organics ☐ Dissolved Gases (RSK-175) ☐ Dissolved Oxygen (SM 4500)			
☐ Carbon Dioxide (SM 4500) ☐ Ferrous Iron (SM 3500) ☐ Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE: (Trip Blank Lot Number: _____)

Aqueous: ☐ VOA ☐ VOA**h** ☐ VOA**na$_2$** ☐ 100PJ ☐ 100PJ**na$_2$** ☐ 125AGB ☐ 125AGB**h** ☐ 125AGB**p** ☐ 125PB ☐ 125PB**znna** (pH__9)

☐ 250AGB ☐ 250CGB ☐ 250CGB**s** (pH__2) ☐ 250PB ☑ 250PB**n** (pH<2) ☐ 500AGB ☐ 500AGJ ☐ 500AGJ**s** (pH__2) ☐ 500PB

☐ 1AGB ☐ 1AGB**na$_2$** ☐ 1AGB**s** (pH__2) ☐ 1AGB**s** (O&G) ☐ 1PB ☐ 1PB**na** (pH__12) ☐ _____ ☐ _____ ☐ _____

Solid: ☐ 4ozCGJ ☐ 8ozCGJ ☐ 16ozCGJ ☐ Sleeve (___) ☐ EnCores® (___) ☐ TerraCores® (___) ☐ _____ ☐ _____ ☐ _____

Air: ☐ Tedlar™ ☐ Canister ☐ Sorbent Tube ☐ PUF ☐ _____ **Other Matrix** (_____): ☐ _____ ☐ _____ ☐ _____

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO_3, **na** = NaOH, **na$_2$** = $Na_2S_2O_3$, **p** = H_3PO_4, Labeled/Checked by: 1163

s = H_2SO_4, **u** = ultra-pure, **x** = Na_2SO_3+$NaHSO_4.H_2O$, **znna** = Zn $(CH_3CO_2)_2$ + NaOH Reviewed by: 619

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