

June 20, 2019

Mr. Zach Richardson, PE
City of Edmonds Public Works Department
121 Fifth Avenue North
Edmonds, WA 98020

**RE: WATER QUALITY SAMPLING RESULTS IN SUPPORT OF THE WILLOW CREEK
DAYLIGHTING/EDMONDS MARSH RESTORATION**

Dear Mr. Richardson:

This letter report is for the Willow Creek Daylighting / Edmonds Marsh Restoration Project, water quality and sediment quality sampling efforts. The City of Edmonds (City) is currently conducting studies and developing plans to daylight Willow Creek from Edmonds Marsh through Marina Beach Park as part of the Edmonds Creek restoration project (Project). The water quality and sediment sampling performed and described below is funded in part by the Salmon Recovery Funding Board, Grant 14-1299. Shannon & Wilson was contracted by the City in December 2016 to collect water and sediment quality samples for the Project in a manner consistent with the requirements of the National Pollutant Discharge Elimination System Phase II stormwater discharge monitoring guidelines. This letter provides the findings of the four water quality sampling events and one sediment quality sampling event from December 2016 through September 2017.

OVERVIEW

The City is currently operating under a Washington Department of Ecology (WDOE) Phase II Municipal Stormwater Discharge Permit. The City is executing a series of programs to improve stormwater quality in its drainage basins. Within the Phase II Municipal Stormwater Permit, there are a range of requirements for stormwater monitoring, with implementation of monitoring programs designated as the responsibility of the City (permittee). To date, an integrated stormwater and sediment quality sampling program has not been fully developed for the Willow Creek, Shellabarger Creek, Marina Beach Park and Edmonds Marsh drainage basin.

The Edmonds Marsh drainage basin is 833 acres with a variety of contributing land uses including Single Family residential, Multi Family, Commercial, Waterfront, and other Open Space zoning designations. Willow Creek (393 acres) and Shellabarger Creek (378 acres) drainage basins are primary freshwater hydrologic sources (streams) to the Edmonds

Marsh. Another 62 acres of drainage basin flow to the marsh through Harbor Square, Point Edmonds, the BNSF Railway, State Route- (SR-) 104 and the SR-104 Washington State Department of Transportation (WSDOT) manhole overflows.

Stormwater pollutants that may enter upstream from the marsh are likely the typical ones found in urban and roadway runoff and residential development (e.g., petroleum products, heavy metals, bacteria and fecal coliform, nutrients, waste, and suspended sediments). Pollutants that may enter the marsh from adjacent BNSF Railway and Unocal property petroleum operations are similar, but more likely petroleum-based products.

Water quality standards are mandated by Section 404 and 401 of the federal Clean Water Act. In Washington, the WDOE is responsible for establishing water quality criteria under the Clean Water Act for toxic pollutants to protect aquatic life and beneficial use by people. These criteria, which are not to be exceeded in waters of the state, are developed based on criteria recommended by the U.S. Environmental Protection Agency (EPA), and provided in Chapter 173-201A of the Washington Administrative Code. Table 1 summarizes the WDOE fresh and saline water quality criteria for protection of aquatic life in fresh water for the water quality constituents outlined by WDOE water quality sampling guidance, and in our scope of services. Where standards for fresh water varied based on type of salmon use, the criterion uses the “core summer salmonid habitat”¹ value.

In addition to mandating water quality standards, the Clean Water Act requires that states restore their waters to be “fishable and swimmable.” Under Section 303(d) of the Clean Water Act, states are required to submit lists of impaired waters to the EPA and establish Total Maximum Daily Loads (TMDL) for these waters. Willow Creek and Shellabarger Creek are not identified by WDOE TMDL as impaired waters. This may only indicate a lack of data, not confirmation that water quality standards are met. The marine waters at Marina Beach Park are listed as impaired based on past exceedances of the bacteria criterion, specifically for fecal coliform. Shoreline areas adjacent to the Marina Beach Park are listed as TMDL 303d Category 5 waters that require water quality improvement for bacteria (fecal coliform).

¹ WDOE’s Water Quality Atlas identifies the category of aquatic life use as “Core summer salmonid habitat” for Willow and Shellabarger Creeks.

<https://fortress.wa.gov/ecy/waterqualityatlas/map.aspx?CustomMap=y&RT=0&Layers=23,29&Filters=n,n,n,n>

METHODS

Shannon & Wilson performed water and sediment quality sampling along Willow Creek, Shellabarger Creek, Edmonds Marsh, and the Marina Beach Park shoreline at seven water quality sampling stations (Figure 1). We followed the Quality Assurance Project Plans outlined in the WDOE, 2012 Status and Trends Stormwater Monitoring and Assessment Strategy for Small Streams.

Water quality samples were collected four times with one fall sediment sampling event during 2017.

Quarterly water quality sampling, field measurements and laboratory analysis for the following water quality parameters includes:

- Temperature
- Dissolved Oxygen (DO)
- pH
- Turbidity
- Conductivity
- Total Suspended Solids
- Total Phosphorus
- Total Persulphate Nitrogen
- Chloride
- Hardness
- Metals (Priority Pollutant Metals)
- Fecal Coliform

Sediment sampling occurred in June 2017. Field measurement and laboratory analysis for the following sediment quality parameter includes:

- Volatile Organic Compounds (VOCs)
- Semi-Volatile Organic Compounds (SVOCs)
- Butyl Tins
- Polychlorinated Biphenyls
- Petroleum Diesel/Gas Motor Oil Organics
- Chlorinated Pesticides
- Metals (Priority Pollutant Metals)
- Ammonia/Nitrate/Nitrites/Sulfides

Collected water and sediment samples were placed in a cooler on ice for delivery following chain-of-custody procedures to Fremont Analytical for water quality laboratory analysis, and Analytical Resources Incorporated for sediment quality laboratory analysis. Each sample was analyzed for the suite of parameters listed above. Sample chain of custody and laboratory methods used is provided in Appendix B.

Shannon & Wilson did not sample or test for total petroleum hydrocarbons (TPHs) or polyaromatic hydrocarbons (PAHs) as part of the water quality sampling effort, because

there are not water quality standards for fishable and swimmable criteria for these contaminants. We recommend future sediment quality sampling efforts include additional water quality testing for TPHs and PAHs, similar to the sediment quality testing performed in this study.

To further characterize water quality, Shannon & Wilson collected macroinvertebrate and periphyton samples were collected in early October 2017. Macroinvertebrate and periphyton samples were collected following the procedure outlined in the WDOE's *Ambient Biological Monitoring in Rivers and Streams: Benthic Macroinvertebrates and Periphyton* (WDOE, 2010²). Preserved macroinvertebrate and periphyton specimens were sent out for analysis to Rhithron Laboratories following chain-of-custody procedures outlined in Appendix C. We note that during our macroinvertebrate sampling efforts, we encountered Unocal cleanup activities in the daylight channel (Appendix A). A sheen was encountered in the Willow Creek downstream from cleanup operations and an extra water quality sample collected.

For macroinvertebrate analysis, Rhithron Laboratories implemented standard protocols for each sample to achieve the necessary subsample of 500 organisms. Once collected, each individual specimen was identified to target taxonomic levels for the Puget Sound benthic index of biological integrity (B-IBI) by a certified taxonomist.

Samples of periphyton were preserved, thoroughly mixed, and split into two aliquots to allow for analysis of diatoms and soft-bodied algae (Bollman, 2018³). Slides were prepared using diatom subsamples (two replicates per sample) following methods outlined by the Academy of Natural Sciences (2002⁴). One replicate from each sample was analyzed by etching transect lines on the coverslip and then identifying 600 valves along the line (Bollman, 2018). Soft-Bodied algae were homogenized and a small sub-sample was identified to genus (Bollman, 2018) All samples were analyzed for New Zealand mud snails (Bollman, 2018).

² Ambient Biological Monitoring in Rivers and Streams: Benthic Macroinvertebrates and Periphyton

³ Bollman, W., 2018, Analysis of biological samples: Technical summary of methods and quality assurance procedures, Prepared for Shannon & Wilson, Inc., Rhithron Associates Inc. Missoula, Montana, February.

⁴ ANSP. 2002. Protocols for the analysis of algal samples collected as part of the U.S. Geological Survey National Water-Quality Assessment Program. The Academy of Natural Sciences Patrick Center for Environmental Research: Report No. 02-06. May 2002.

RESULTS

The results of water and sediment chemistry analyses are contained in Tables 1 and 2, with chain-of-custody and laboratory reports in Appendix B. The table also includes the corresponding fresh water and saline water, State of Washington water and sediment quality standards for protection of aquatic life.

Laboratory testing shows three of the measured or tested parameters exceed the water quality standards:

- DO measured low at freshwater sampling site WC-03 (near the Harbor Square stormwater outfall) in December 2016; this value (3.49 milligrams per liter).
- pH measured slightly below standard at two sites (WC-03 and WC-02) in December 2016 and March 2017, respectively. pH measured high for all sites, except WC-06 in the fall, September 2017 sampling event.
- Fecal coliform sampling had varying exceedances occur at each of the water quality sampling monitoring locations.

Laboratory testing shows measured or tested parameters exceeding the sediment quality standards for the following:

- VOC, Carbon Disulfide at WC-01, WC-02, WC-03, WC-04, WC-06, WC-06, and WC-07. Carbon disulfide is used in solvents for phosphorus, sulfur, selenium, bromine, iodine, fats, resins, rubber, and asphalt, and in making products such as Rayon. Carbon disulfide can occur naturally in small amounts in marshes.
- SVOC, significant exceedances occurred at the WC-03 monitoring station downstream from the stormwater outfall at the Port of Edmonds, Harbor Square south parking area. There were numerous analytes with exceedances (Table 2). Other SVOC exceedances occurred to a lesser degree with few analytes and lower levels contamination at WC-04, WC-05, and WC-06.
- Diesel- and Gas-Range Organics exceedances occurred at the WC-03 monitoring station.
- Heavy metal nickel exceedances occurred at WC-03, WC-04, WC-05, and WC-06.
- Wet chemistry sulfide exceedances occurred at WC-03.

Additional sampling was performed to collect macroinvertebrate and periphyton samples; laboratory results are summarized in Tables 3 through 5 and in Appendix C. The additional water quality sampling performed on September 20, 2017, at WC-02 for additional diesel and heavy oils, downstream from the Unocal cleanup site activities, did not result in water quality detection.

FINDINGS

The findings for water and sediment quality sampling and testing include a number of key observations. The data show acceptable water quality conditions throughout the marsh for all parameters with the exceptions discussed below.

Fecal coliform bacteria levels exceeded water quality criteria at multiple stations during multiple sampling event, and exceeded the water quality criteria for all monitoring locations in September 2017. The September event indicates some sort of increase in fecal coliform sources in late summer and early fall periods; this may be natural in origin, or human sources, which needs additional data to evaluate the likely sources. In each of the four sampling events, there was at least one station with fecal coliform bacteria concentrations more than double the criteria, and every station in the marsh exceeded the criteria at least two out of the four sampling events. In three of the four sampling events, the highest fecal coliform concentration was at a station (WC-02) in the Willow Creek channel near the existing pipe draining the marsh. We note that this is also the location of the WSDOT SR-104 stormwater pipe manhole and overflow area, and the primary inflow area from the Puget Sound when the tidegates are lashed open. The initial sampling results indicate that WC-02 has persistent fecal coliform exceedances, with more variability in exceedances and levels of fecal coliform at other monitoring locations. Without further data collection and fecal coliform source typing, it is not feasible to draw conclusions regarding initial water quality monitoring results.

Second, pH was measured above the threshold of 8.5 for 8 of the 28 samples, with 6 of the exceedances occurring in September 2017. The increase in pH could be a sampling error from the equipment as all measured high during a single period. We recommend additional sampling be performed to determine if there are elevated pH levels during late summer periods, and what the source may be.

Periodic measurements of DO and lead were out of range and appear to be localized anomalies requiring no specific action. WC-03 at times has stagnate water conditions in the marsh and if ponded for extended periods of time could result in low DO. Regrading the stormwater outfall and tidal channel to increase drainage might improve the DO conditions.

A single measurement of lead exceeding the state water quality standards occurred at WC-05 in December 2016 and did not appear to be a recurring problem. Copper exceedances occurred at WC-01, WC-02 and WC-03 in September 2017. If these copper (and other heavy metals occur) sources could include the adjacent railroad right of way, Harbor Square, the Unocal Site, Point Edmund stormwater outfall and the WSDOT manhole overflow system.

The sediment monitoring results are an issue that needs further attention. We recommend the City notify the WDOE that contaminated sediments were found at the WC-03 outfall. It is our understanding that the City will coordinate with WDOE and provide the data and information in this report to assess next steps.

Using the Puget Sound B-IBI, the seven samples received a rating of either poor or very poor indicating impaired water quality (Table 3). The distinction between sites rated as very poor and poor is unclear. The percentages of tolerant (species found in the least disturbed habitats) to super tolerant taxa (species found as disturbance increases) are shown in Table 4. Six of the stations had less than 10 percent tolerant taxa and five stations had over 10 percent super tolerant taxa. These results indicate that water quality at all the samples sites are negatively affected by water quality pollutant inputs and human disturbance. As water quality improves, through stream and marsh restoration and stormwater best management practices, the numbers of tolerant taxa should move increase towards 10 percent and the number of super tolerant taxa should decrease to below 10 percent.

Currently, there is no biotic index for periphyton in Washington State. Individual metrics, like those found in Table 4, are used to by WDOE for the purpose of tracking baseline and water quality improvements and analysis. Additional metrics and taxa listings can be found in Appendix C of this letter report.

All samples tested negative for New Zealand Mudsnaills.

RECOMMENDATIONS

We recommend a Microbial Source Tracking (MST) sampling event to attempt to identify the fecal coliform sources (i.e., human sewage, wildlife mammals, birds, fish, or domestic pets).

We recommend developing a sampling plan with multiple samples collected in a grid around the WC-03 Harbor Square outfall area of contamination. The results of the additional sediment sampling will inform the WC-03 sediment remediation plan.

We recommend the City contact WDOE regarding the sediment cleanup requirements. This will provide the City with information regarding their legal obligations, and methods and monitoring requirements for the contaminated sediment removal.

We also recommend the City continue tracking the WDOE's Administration of Grants and Loans (EAGL) system for which a City of Edmonds Marsh grant was applied for by the City

in the spring of 2018. The City would need to perform the cleanup at their own cost, to be reimbursed by the State under the EAGL program.

We recommend the City compile, review, and integrate other water and sediment quality sampling data collected by the Edmonds Stream Team in 2016 to build a larger dataset and baseline as part of the Edmonds Marsh restoration project.

Finally, we recommend development of a long-term water and sediment quality monitoring plan that identifies the water quality analytes of interest, sampling dates and locations, frequency of sampling, testing, and reporting, with budgets to sample for a ten-year period. The ten-year period would be coincident with the Edmonds Marsh restoration project to establish baseline water and sediment quality conditions prior to construction of the project and monitor improvements with the implementation of the project. Going forward, the monitoring data and documentation will provide important information for demonstrating water and sediment quality improvements in the Edmonds Marsh, Willow Creek, and Shellabarger Creek systems. Monitoring is an important part of the habitat restoration project design and future adaptations.

CLOSURE

The findings and conclusions documented in this letter report have been prepared for specific application to this project and have been developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area, and in accordance with the terms and conditions set forth in our agreement. The conclusions presented in this letter report are professional opinions based on interpretation of information currently available to us, and are made within the operational scope, budget, and schedule constraints of this project. No warranty, express or implied, is made.

Shannon & Wilson, Inc. has prepared the enclosed "Important Information About Your Geotechnical/Environmental Report" to assist you and others in understanding the use and limitations of our reports.

If you have any questions, please contact me at (206) 695-6885.

Sincerely,

SHANNON & WILSON



David R. Cline, PE, CFM
Vice President

DRC:SWG/ajs

Enc: Table 1 – Water Quality Analytical Results
Table 2 – Sediment Quality Analytical Results
Table 3 – Summary of Macroinvertebrate Scores and Ratings
Table 4 – Summary of Macroinvertebrate Sampling Taxa Richness and Tolerance
Table 5 – Summary of Periphyton Metrics
Figure 1 – Existing Conditions and Sampling Locations
Appendix A – Site Photographs
Appendix B – Water and Sediment Quality Laboratory Testing Reports and Chains of Custody
Appendix C – Macroinvertebrate Testing Methods and Quality Assurance Procedures
Appendix D – Important Information About Your Geotechnical/Environmental Report

TABLE 1A
WATER QUALITY ANALYTICAL RESULTS

Analyte/Parameter	Test Method	WA State Water Quality Standards ¹		Sample ID (December 2016)							Sample ID (March 2017)						
		Fresh Water	Saline Water	WC-01	WC-02	WC-03	WC-04	WC-05	WC-06	WC-07	WC-01	WC-02	WC-03	WC-04	WC-05	WC-06	WC-07
Field Instrument Testing																	
Temperature (°C)	YSI Multiparameter Meter	17.5 ²	16	4.2	5.0	6.9	8.1	7.1	7.7	8.7	8.6	9.2	8.6	10.0	9.8	10.2	10.5
Dissolved Oxygen (milligrams/liter)	YSI Multiparameter Meter	9.5 ⁵	7.0 ⁴	8.09	12.05	3.49	11.78	18.36	13.29	14.70	12.14	10.8	12.63	9.83	10.35	10.16	10.75
Specific Conductivity (millisiemens/cm)	YSI Multiparameter Meter	-	-	47.03	0.67	0.25	0.28	0.01	0.24	0.28	41.46	21.43	0.12	0.21	0.18	0.18	0.21
Total Dissolved Solids (grams/liter)	YSI Multiparameter Meter	-	-	30.59	0.44	0.16	0.18	0.01	0.16	0.18	26.94	13.29	0.08	0.13	0.12	0.12	0.14
Salinity (parts per thousand) ³	YSI Multiparameter Meter	<0.5	>0.5	30.35	0.33	0.12	0.13	-	-	0.13	26.36	12.36	0.06	0.10	0.09	0.09	0.11
pH	YSI Multiparameter Meter	6.5 to 8.5 ⁶	7.0 to 8.5 ⁷	7.23	6.78	6.34	6.71	6.80	7.65	7.30	7.40	6.87	7.00	7.25	7.27	7.15	7.13
Oxidation-Reduction Potential (ORP mV)	YSI Multiparameter Meter	-	-	399.4	304.5	215.7	226.7	200.9	180.2	216.4	230.8	191.4	93.1	115.1	109.2	120.3	131.4
Lab Testing																	
Fecal Coliform (CFU/100ml)	Fecal Coliform by SM 9222D	50 ⁸	14 ⁹	8	6	110	424	88	41	224	2	101	6	95	36	32	62
Chloride (milligrams/liter)	EPA Method 300.0	230/860	-	24,300	100	31.7	8.52	10.9	9.93	8.18	16,900	7,320	7.48	5.39	7.48	7.55	5.47
Total Hardness (as CaCO3) (milligrams/liter)	EPA Method 200.8/SM 2340B	-	-	4,840	121	48.8	109	94.8	103	114	5,060	2,320	20.9	91.0	83.5	92.2	91.4
Total Mercury	EPA Method 245.1	0.012/2.1	0.025/1.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Antimony	EPA Method 200.8	-	-	0.265	ND	0.246	0.226	ND	0.231	ND	ND	ND	0.341	ND	ND	0.202	ND
Total Arsenic	EPA Method 200.8	190/360	36/69	1.12	1.81	ND	2.21	1.98	ND	2.15	3.36	2.18	ND	2.12	1.66	2.52	2.82
Total Beryllium	EPA Method 200.8	-	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Cadmium	EPA Method 200.8	0.65/3.1	9.3/42.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Chromium	EPA Method 200.8	10/15	50/1,100	0.938	1.65	1.22	1.52	2.68	1.39	1.20	1.84	0.943	2.06	1.65	2.08	2.67	1.47
Total Copper	EPA Method 200.8	9.9/15	3.1/4.8	2.46	1.57	2.87	3.30	5.08	1.64	1.42	2.94	1.90	2.60	2.44	2.81	2.09	1.92
Total Lead	EPA Method 200.8	2.1/54	8.1/210	ND	0.513	0.927	0.746	2.24	ND	ND	0.598	0.57	0.751	0.617	ND	ND	ND
Total Nickel	EPA Method 200.8	130/1200	8.2/74	1.56	1.64	1.94	1.49	3.20	1.64	1.20	1.69	1.10	1.33	1.38	2.41	1.50	1.55
Total Selenium	EPA Method 200.8	5/20	71/290	6.51	ND	ND	ND	ND	ND	ND	6.87	3.03	ND	ND	ND	ND	ND
Total Silver	EPA Method 200.8	2.6	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Thallium	EPA Method 200.8	-	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Zinc	EPA Method 200.8	90/99	81/90	33.8	12.9	26.7	27.8	42.9	14.9	12.8	12.7	6.53	15.3	13.5	6.44	8.18	8.04
Total Phosphorus (milligrams/liter)	EPA Method 365.3	4 or less	-	ND	ND	0.230	ND	0.827	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Suspended Solids (milligrams/liter)	SM 2540D	-	-	ND	5.00	11.0	6.00	581	ND	ND	14.0	5.00	7.00	ND	9.00	5.00	ND

Notes:

All units are micrograms per liter (µg/L) unless otherwise noted.

Bold text indicates a water quality exceedance

-- Not available

ND = Non-Detect

 = Saline sample compared to saline water standards

 = Sample varies with tide and stream flow. Compared to saline water standards.

 = Freshwater sample compared to freshwater standards

 = Water quality parameter outside of acceptable condition

¹ Surface water criteria sourced from the Washington Administrative Code, Table 240 of WAC 173-201A-240 and <http://www.ecy.wa.gov/programs/wq/swqs/criteria.html>. If applicable, criteria presented as chronic/acute (10/100) concentration.

² Temperature criteria based on "Core summer salmonid habitat" category of aquatic life use: <http://www.ecy.wa.gov/programs/wq/swqs/AquaticLifeTempSupp.html#beneuse>

³ 0.5 ppt is the threshold used by Washington Department of Ecology in determining whether a wetland is estuarine. Needs to be measured near the bottom during periods of annual low flow.

⁴ Per Ecology's Water Quality Atlas, the marine water has "Extraordinary" aquatic life use. http://www.ecy.wa.gov/programs/wq/swqs/criteria-marine/wac173201a_210-do.html

⁵ Dissolved oxygen criteria based on "Core summer salmonid habitat" category of aquatic life use: http://www.ecy.wa.gov/programs/wq/swqs/criteria-freshwater/wac173201a_200-do.html

⁶ Human-caused variation within the above range of less than 0.2 units is allowed. http://www.ecy.wa.gov/programs/wq/swqs/criteria-freshwater/wac173201a_200-ph.html

⁷ Human-caused variation within the above range of less than 0.2 units is allowed. http://www.ecy.wa.gov/programs/wq/swqs/criteria-marine/wac173201a_210-ph.html

⁸ Fecal coliform standard based on "Extraordinary Primary Contact Recreation" category, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 100 colonies/100 mL.

http://www.ecy.wa.gov/programs/wq/swqs/criteria-freshwater/wac173201a_200-bacteria.html

⁹ Fecal coliform standard based on "Primary Contact Recreation" category, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies /100 mL.

http://www.ecy.wa.gov/programs/wq/swqs/criteria-marine/wac173201a_210-bacteria.html

TABLE 1B
WATER QULAITY ANALYTICAL RESULTS

Analyte/Parameter	Test Method	WA State Water Quality Standards ¹		Sample ID (June 2017)							Sample ID (September 2017)						
		Fresh Water	Saline Water	WC-01	WC-02	WC-03	WC-04	WC-05	WC-06	WC-07	WC-01	WC-02	WC-03	WC-04	WC-05	WC-06	WC-07
Field Instrument Testing																	
Temperature (°C)	YSI Multiparameter Meter	17.5 ²	16	13.3	14.8	17.7	14.5	13.6	13.3	15.0	14.4	15.2	15.5	13.8	12.1	12	13.9
Dissolved Oxygen (milligrams/liter)	YSI Multiparameter Meter	9.5 ⁵	7.0 ⁴	6.89	8.67	2.4	6.32	8.42	10.37	8.39	6.01	4.93	2.52	6.01	7.1	6.21	4.21
Specific Conductivity (millisiemens/cm)	YSI Multiparameter Meter	-	-	43.5	30.48	0.252	0.274	0.242	0.242	0.278	44.63	10.500	0.057	0.275	0.238	0.237	0.264
Total Dissolved Solids (grams/liter)	YSI Multiparameter Meter	-	-	28.27	19.71	0.1638	0.1207	0.1573	0.1573	0.1807	29.00	6.644	0.0370	0.1787	0.1547	0.1546	0.1716
Salinity (parts per thousand) ³	YSI Multiparameter Meter	<0.5	>0.5	28.02	18.89	0.120	0.130	0.12	0.12	0.13	28.85	5.99	0.03	0.13	0.11	0.11	0.13
pH	YSI Multiparameter Meter	6.5 to 8.5 ⁶	7.0 to 8.5 ⁷	7.35	7.82	6.96	7.35	7.71	7.73	8.23	9.25	8.8	9.26	9.22	8.79	8.14	8.50
Oxidation-Reduction Potential (ORP mV)	YSI Multiparameter Meter	-	-	303.1	300	264.3	260	255.5	256.2	246.7	420.9	437.7	467.6	440.5	563.1	711.4	763.6
Lab Testing																	
Fecal Coliform (CFU/100ml)	Fecal Coliform by SM 9222D	50 ⁸	14 ⁹	13	392	32	61	37	39	42	24	1170	68	392	164	256	352
Chloride (milligrams/liter)	EPA Method 300.0	230/860	-	14,600	9670	18.6	5.8	7.76	7.88	6.16	16,400	3,190	4.58	6.29	7.53	7.66	6.00
Total Hardness (as CaCO3) (milligrams/liter)	EPA Method 200.8/SM 2340B	-	-	3,800	3420	73.3	121	90.2	95.5	109	6,090	1,110	16.3	124.0	101	105	121
Total Mercury	EPA Method 245.1	0.012/2.1	0.025/1.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Antimony	EPA Method 200.8	-	-	ND	ND	1.3	ND	ND	ND	ND	ND	ND	3.04	ND	ND	ND	ND
Total Arsenic	EPA Method 200.8	190/360	36/69	2.53	2.09	1.42	3.42	1.72	1.89	2.95	2.32	ND	1.38	3.25	2.16	1.76	3.44
Total Beryllium	EPA Method 200.8	-	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Cadmium	EPA Method 200.8	0.65/3.1	9.3/42.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Chromium	EPA Method 200.8	10/15	50/1,100	2.25	1.21	1.00	1.81	1.29	1.91	1.20	5.3	2.79	1.96	3.45	1.45	1.33	2.62
Total Copper	EPA Method 200.8	9.9/15	3.1/4.8	2.49	2.32	6.30	3.87	1.41	0.774	2.58	4.89	4.80	10.90	2.86	1.87	2.07	2.53
Total Lead	EPA Method 200.8	2.1/54	8.1/210	ND	ND	ND	0.683	ND	ND	ND	1.5	1.29	1.97	0.792	1.24	1.38	1.15
Total Nickel	EPA Method 200.8	130/1200	8.2/74	2.91	1.26	2.21	1.35	1.19	0.983	1.27	3.08	1.81	2.43	1.68	1.65	1.47	1.7
Total Selenium	EPA Method 200.8	5/20	71/290	ND	ND	ND	ND	ND	ND	ND	18.1	12.8	ND	ND	ND	ND	ND
Total Silver	EPA Method 200.8	2.6	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Thallium	EPA Method 200.8	-	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Zinc	EPA Method 200.8	90/99	81/90	17.0	17.3	29.0	26.9	8.35	5.32	3.27	62	54.6	83.7	41.1	40.9	41.9	45.4
Total Phosphorus (milligrams/liter)	EPA Method 365.3	4 or less	-	ND	ND	0.392	0.252	0.285	0.219	0.246	ND	ND	ND	ND	ND	ND	ND
Total Suspended Solids (milligrams/liter)	SM 2540D	-	-	ND	5.00	ND	ND	13.0	ND	8.00	76.0	ND	7.00	7.00	8.00	6.00	5.00
Leachate Level				100			20										20

Notes:

All units are micrograms per liter (µg/L) unless otherwise noted.

Bold text indicates a water quality exceedance

-- Not available

ND = Non-Detect



= Saline sample compared to saline water standards

= Sample varies with tide and stream flow. Compared to saline water standards.

= Freshwater sample compared to freshwater standards

= Water quality parameter outside of acceptable condition

¹ Surface water criteria sourced from the Washington Administrative Code, Table 240 of WAC 173-201A-240 and <http://www.ecy.wa.gov/programs/wq/swqs/criteria.html>. If applicable, criteria presented as chonic/acute (10/100) concentration.

² Temperature criteria based on "Core summer salmonid habitat" category of aquatic life use: <http://www.ecy.wa.gov/programs/wq/swqs/AquaticLifeTempSupp.html#beneuse>

³ 0.5 ppt is the threshold used by Washington Department of Ecology in determining whether a wetland is estuarine. Needs to be measured near the bottom during periods of annual low flow.

⁴ Per Ecology's Water Quality Atlas, the marine water has "Extraordinary" aquatic life use. http://www.ecy.wa.gov/programs/wq/swqs/criteria-marine/wac173201a_210-do.html

⁵ Dissolved oxygen criteria based on "Core summer salmonid habitat" category of aquatic life use: http://www.ecy.wa.gov/programs/wq/swqs/criteria-freshwater/wac173201a_200-do.html

⁶ Human-caused variation within the above range of less than 0.2 units is allowed. http://www.ecy.wa.gov/programs/wq/swqs/criteria-freshwater/wac173201a_200-ph.html

⁷ Human-caused variation within the above range of less than 0.2 units is allowed. http://www.ecy.wa.gov/programs/wq/swqs/criteria-marine/wac173201a_210-ph.html

⁸ Fecal coliform standard based on "Extraordinary Primary Contact Recreation" category, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 100 colonies/100 mL.
http://www.ecy.wa.gov/programs/wq/swqs/criteria-freshwater/wac173201a_200-bacteria.html

⁹ Fecal coliform standard based on "Primary Contact Recreation" category, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies /100 mL.
http://www.ecy.wa.gov/programs/wq/swqs/criteria-marine/wac173201a_210-bacteria.html

TABLE 2
SEDIMENT QUALITY ANALYTICAL RESULTS

Analyte/Parameter	Test Method	Units	EPA Region II Freshwater Sediment *	SMS Freshwater Sediment		SMS Marine Sediment		Marine Sediment AETS		Sample ID (June 2017)														Trip Blank	
				SCO	CSL	SCO	CSL	SCO	CSL	WC-01	WC-02	WC-03 (2-FT)	WC-03 (2-FT) RE1	WC-03 (DEEP)	WC-03 (DEEP) RE1	WC-04 (2- FT)	WC-04 (DEEP)	WC-05 (2 FT)	WC-05 (DEEP)	WC-06	WC-07				
Volatile Organic Compounds (VOC)																									
Chloromethane	EPA 8260C	ug/kg	0.851							ND	8.67	ND	--	ND	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	EPA 8260C	ug/kg								16.8	36.2	ND	--	148	--	20.6	21.5	108	120 M	106	118	ND	ND	ND	ND
Methylene Chloride	EPA 8260C	ug/kg								3.94	1.78 J,B	12.7 B	--	4.41 J,B	--	5.19	4.73 B	4.82 B	3.58	4.52	4.85	ND	ND	ND	ND
Carbon Disulfide	EPA 8260C	ug/kg								6.28	3.93	22.8	--	13.0	--	4.54	5.41	5.91	4.29	4.21	4.54	ND	ND	ND	ND
2-Butanone	EPA 8260C	ug/kg								ND	2.66 J,B	21.0 J	--	18.0	--	1.88 J	2.01 J	5.11	4.41	4.91 J	4.74 J	ND	ND	ND	ND
Toluene	EPA 8260C	ug/kg	1100						0.34 J	0.28 J,B	2.22 J	--	1.59 J,B	--	0.86 J	0.88 J	20.0	13.4	0.98 J	0.88 J	ND	ND	ND	ND	
2-Hexanone	EPA 8260C	ug/kg								ND	ND	ND	--	ND	--	ND	ND	7.19	ND	ND	ND	ND	ND	ND	
Ethylbenzene	EPA 8260C	ug/kg								ND	ND	ND	--	ND	--	ND	ND	ND	0.27 J	ND	ND	ND	ND	ND	ND
m,p-Xylene	EPA 8260C	ug/kg								ND	ND	ND	--	1.97 J	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	EPA 8260C	ug/kg								ND	ND	ND	--	0.84 J	--	ND	ND	0.32 J	ND	ND	ND	ND	ND	ND	ND
Xylenes, total	EPA 8260C	ug/kg	25.2						ND	ND	ND	--	2.82 J	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,2,4-Trimethylbenzene	EPA 8260C	ug/kg				0.81	1.8	31	51	ND	ND	ND	--	ND	--	ND	ND	0.45 J	ND	ND	ND	ND	ND	ND	
4-Isopropyl Toluene	EPA 8260C	ug/kg								ND	ND	ND	--	ND	--	ND	ND	11.6	4.94	1.96	ND	ND	ND	0.46	
Semi-VOC																									
Phenol	EPA 8270D	ug/kg	599	120	210	420	1200	420	1200	ND	10.9 J	ND	ND	26.7	ND	ND	9.1 J	ND	ND	8.4 J	ND	ND	ND	--	
1,4-Dichlorobenzene	EPA 8270D	ug/kg				3.1	9			ND	ND	ND	ND	8.2 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	
4-Methylphenol	EPA 8270D	ug/kg		260	2000	670	670	670	670	ND	ND	68.4 D	ND	31.0	ND	ND	ND	14.3 J	ND	ND	ND	ND	ND	--	
Naphthalene	EPA 8270D	ug/kg	176			99	170	2100	2100	ND	ND	111	143 J,D	196	188 D	ND	ND	ND	ND	ND	ND	ND	ND	--	
Benzoic acid	EPA 8270D	ug/kg		2900	3800	650	650	650	650	ND	ND	496 J,D	ND	331	401 D	ND	ND	ND	ND	ND	ND	ND	ND	--	
2-Methylnaphthalene	EPA 8270D	ug/kg		20.2		38	64	670	670	ND	ND	50.2 J,D	ND	ND	31.4 J,D	ND	ND	ND	ND	ND	ND	ND	ND	--	
Acenaphthylene	EPA 8270D	ug/kg	5.9			66	66	1300	1300	ND	ND	107 D	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	
Dimethylphthalate	EPA 8270D	ug/kg				53	53	71	160	ND	ND	56.7 J,D	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	
Acenaphthene	EPA 8270D	ug/kg		6.7		16	57	500	500	ND	ND	2,570 D	2,370 D	1,580	1,550 D	7.7 J	ND	11.2 J	ND	11.0 J	ND	ND	ND	--	
Dibenzofuran	EPA 8270D	ug/kg	200	680		15	58	540	540	ND	ND	415 D	424 D	225	ND	5.9 J	ND	7.9 J	ND	8.3 J	ND	ND	--		
Fluorene	EPA 8270D	ug/kg		423		23	79	540	540	ND	ND	2,210 D	1,920 D	1,080	1,020 D	9.0 J	ND	19.6	ND	15.4 J	ND	ND	--		
Phenanthrene	EPA 8270D	ug/kg		204		100	480	1500	1500	ND	10.6 J	7,460 D,E	6,850 D	1,340	1,290 D	111	78	345	12.4 J	325	38.0	ND	ND	--	
Anthracene	EPA 8270D	ug/kg	57.2			220	1200	960	960	ND	ND	1,180 D	1,150 D	334	319 D	8.5 J	16.3 J	63.1	ND	43.3	ND	ND	--		
Carbazole	EPA 8270D	ug/kg				-	-	-	-	ND	ND	995 D	938 D	155	184 D	11.4 J	11.5 J	81.3	ND	52.7	ND	ND	--		
Di-n-Butylphthalate	EPA 8270D	ug/kg		380	1000	220	1700	1400	1400	ND	ND	703 D	691 D	35.4	48 D	ND	ND	ND	ND	ND	ND	ND	ND	--	
Fluoranthene	EPA 8270D	ug/kg	423			160	1200	1700	2500	5.5 J	20.2	19,700 D,E	19,300 D	3,150 E	3,340 D	146	144	695	27.7	578	62.7	ND	ND	--	
Pyrene	EPA 8270D	ug/kg		195		100	1400	2600	3300	ND	20.3	14,300 D,E	13,900 D	2,310 E	2,360 D	116	124	528	24.5	446	49.6	ND	ND	--	
Butylbenzylphthalate	EPA 8270D	ug/kg		10900		4.9	64	63	900	ND	ND	ND	ND	ND	39.4 J,D	ND	ND	ND	ND	ND	ND	ND	ND	--	
Benzo(a)anthracene	EPA 8270D	ug/kg	108			110	270	1300	1600	ND	6.5 J	6,320 D,E	6,040 D	950	953 D	33.8	55.8	276	11.1 J	199	22.5	ND	ND	--	
Chrysene	EPA 8270D	ug/kg		166		110	460	1400	2800	ND	12.3 J	13,200 D,E	11,500 D	1,880	1,850 D	67.9	87.2	321	18.9 J	278	38.9	ND	ND	--	
bis(2-Ethylhexyl)phthalate	EPA 8270D	ug/kg			500	22000	47	78	1300	1900	ND	412	7,080 D,E	7,050 D	2,950 E	2,830 D	64.7	636	ND	32.5 J	66.5	42.6 J	ND	ND	--
Di-n-Octylphthalate	EPA 8270D	ug/kg	240	39	1100	58	4500	6200	6200	ND	ND	512 D	785 D	122	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	
Benzo(a)fluoranthene, Total	EPA 8270D	ug/kg				230	450	3200	3600	ND	23.3 J	21,500 D,E	21,100 D	2,900	2,890 D	109	126	500	29.6 J	441	65.4	ND	ND	--	
Benzo(a)pyrene	EPA 8270D	ug/kg		150		99	210	1600	1600	ND	8.8 J	8,740 D,E	8,620 D	1,140	1,120 D	49	61.8	245	12.0 J	209	29.1	ND	ND	--	
Indeno(1,2,3-cd)pyrene	EPA 8270D	ug/kg	17			34	88	600	690	ND	10.3 J	5,940 D,E	7,310 D	787	1,000 D	35.4	45.3	162	8.1 J	144	19.2 J	ND	ND	--	
Dibenzo(a,h)anthracene	EPA 8270D	ug/kg		33		12	33	230	230	ND	ND	2,500 D	2,600 D	335	409 D	ND	19.8	53.1	ND	51.6	9.7 J	ND	ND	--	
Benzo(g,h,i)perylene	EPA 8270D	ug/kg		170		31	78	670	720	ND	12.8 J	6,120 D,E	8,260 D	797	1,130 D	40.6	50.9	178	14.1 J	164	24.7	ND	ND	--	
1-Methylnaphthalene	EPA 8270D	ug/kg	176			-	-	-	-	ND	ND	185 D	207 J,D	120	131 D	ND	ND	ND	ND	ND	ND	ND	ND	--	
Naphthalene	EPA 8270D-SIM	ug/kg				99	170	2100	2100	ND	5.73	87.7 D	91.5 J,D	143	151 D	ND	ND	ND	ND	ND	ND	ND	ND	--	
2-Methylnaphthalene	EPA 8270D-SIM	ug/kg		20.2		38	64	670	670	ND	3.9 J	44.8 D	74.1 J,D	29	32.1 D	ND	ND	ND	ND	ND	ND	ND	ND	--	
1-Methylnaphthalene	EPA 8270D-SIM	ug/kg	5.9			-	-	-	-	ND	ND	178 D	195 D	104	102 D	ND	ND	ND	ND	ND	ND	ND	ND	--	
Acenaphthylene	EPA 8270D-SIM	ug/kg				66	66	1300	1300	ND	ND	49.2 D	78.7 J,D	17.5	21.6 J,D	ND	ND	ND	ND	ND	ND	ND	ND	--	
Acenaphthene	EPA 8270D-SIM	ug/kg		6.7		16	57	500	500	ND	ND	1,480 D,E	1,910 D	759 E	969 D	ND	ND	ND	ND	2.73 J	ND	ND	ND	--	
Dibenzofuran	EPA 8270D-SIM	ug/kg	200	680		15	58	540	540	ND	ND	321 D	381 D	164	187 D	ND	ND	ND	ND	2.67 J	ND	ND	ND	--	
Fluorene	EPA 8270D-SIM	ug/kg		423		23	79	540	540	ND	ND	1,250 D	1,560 D	551 E	676 D	ND	3.27 J	ND	ND	4.11 J	ND	ND	ND	--	
Phenanthrene	EPA 8270D-SIM	ug/kg		204		100	480	1500	1500	ND	9.18	3,180 D,E	4,410 D	692 E	859 D	10.1	30.4	9.88	13.4	73.6	10.8	ND	ND	--	
Anthracene	EPA 8270D-SIM	ug/kg	423			220	1200	960	960	ND	ND	769 D	868 D	204	232 D	ND	6.98	ND	ND	11.1	ND	ND	ND	--	
Fluoranthene	EPA 8270D-SIM	ug/kg				160	1200	1700	2500	ND	13.8	7,340 D,E	12,000 D	1,490 E	2,120 D	24.2	81.0	19.4	29.9	180	24.1	ND	ND	--	
Pyrene	EPA 8270D-SIM	ug/kg		195		100	1400	2600	3300	ND	12.5	4,780 D,E	8,830 D	179	1,470 D	19.8	64.2	15.5	26.0	143	20.6	ND	ND	--	
Benzo(a)anthracene	EPA 8270D-SIM	ug/kg	108			110	270	1300	1600	ND	4.37 J	3,080 D,E	4,230 D	558 E	653 D	7.63	31.7	6.89	11.8	70.3	9.93	ND	ND	--	
Chrysene	EPA 8270D-SIM	ug/kg		166		110	460	1400	2800	ND	6.45	4,770 D,E	6,990 D	848 E	1,030 D	11.1	39.3	9.57	14.0	86.0	14.6	ND	ND	--	
Benzo(b)fluoranthene	EPA 8270D-SIM	ug/kg				-	-																		

TABLE 3
SUMMARY OF MACROINVERTEBRATE SCORES AND RATINGS

Station ID	Station Name	B-IBI Score	B-IBI Rating
WC-01	Puget Sound	18	Poor ¹
WC-02	Lower Willow Creek	14	Very Poor ²
WC-03	Willow Creek Marsh	12	Very Poor ²
WC-04	Willow Creek Marsh	16	Very Poor ²
WC-05	Willow Creek Marsh	18	Poor ¹
WC-06	Upper Willow Creek	18	Poor ¹
WC-07	Upper Shellebarger Creek	14	Very Poor ²

Notes:

¹ Poor: scores 18-26; “Overall taxa diversity depressed; proportion of predators greatly reduced as is long-lived taxa richness; few stoneflies or intolerant taxa present; dominance by three most abundant taxa often very high” (Karr et al., 1986)

² Very Poor: scores 10-16 “Overall taxa diversity very low and dominated by a few highly tolerant taxa; mayfly, stonefly, caddis fly, clinger, long-lived, and intolerant taxa largely absent; relative abundance of predators very low” (Karr et al., 1986)

TABLE 4
SUMMARY OF MACROINVERTEBRATE SAMPLING
TAXA RICHNESS AND TOLERANCE

Station ID	Taxa Richness	Intolerant ¹ %	Super Tolerant ² %
WC-01	20.0	0.0	5.8
WC-02	8.0	0.0	85.4
WC-03	12.0	0.0	70.6
WC-04	2.0	0.0	50.0
WC-05	8.0	3.2	61.3
WC-06	20.0	12.8	13.9
WC-07	15.0	7.5	4.0

Notes:

¹ Intolerant- Species identified as intolerant are the most sensitive taxa; they represent approximately 5-10% of the taxa present in the region. These animals are the first to disappear as human disturbance increases (Karr et al., 1986).

² Supertolerant- as disturbance increases, they represent an increasingly large percentage of the assemblage. Invertebrates designated as tolerant represent the 5-10% most tolerant taxa in a region (Karr et al., 1986).

TABLE 5
SUMMARY OF PERIPHYTON METRICS

Station ID	Sum ¹	Taxon	Shannon H (log2)	Pollution Index	Siltation Taxa %	Dominant Sp. %	Disturbance Taxa %	Rhopalodiales %	Motility Taxa %
WC-01	600	25	3.47	2.11	46.67	20.67	0.00	0.00	32.50
WC-02	600	19	2.29	1.96	90.00	55.00	0.00	0.00	72.67
WC-03	314	46	4.51	2.53	34.39	16.88	6.69	0.32	39.17
WC-04	600	49	3.68	2.55	20.50	34.00	9.17	0.17	51.83
WC-05	600	49	3.45	2.55	11.33	37.17	5.83	0.50	19.83
WC-06	600	36	2.81	2.70	11.00	52.50	5.67	0.00	13.83
WC-07	600	16	1.00	2.88	1.50	84.17	0.33	0.00	3.33

Notes:

¹ Sum -Total sample count.

Appendix A

Site Photographs



Sample location WC-01. Photo taken April 13, 2012.



Sample location WC-02. Photo taken December 21, 2016.



Sample location WC-02. Photo taken September 20, 2017.



Sample location WC-02. Photo taken September 20, 2017.



Sample location WC-03. Photo taken
December 21, 2016.



Sample location WC-04. Photo taken
December 21, 2016.



Sample location WC-05. Photo taken
December 21, 2016.



Sample location WC-06. Photo taken
December 21, 2016.



Sample location WC-06. Photo taken September 20, 2017.



Sample location WC-07. Photo taken December 21, 2016.

Appendix B

Water and Sediment Quality Laboratory Testing Reports and Chains of Custody



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Shannon & Wilson

Dave Cline
400 N. 34th Street, Suite 100
Seattle, WA 98103

RE: Willow Creek
Work Order Number: 1612224

December 29, 2016

Attention Dave Cline:

Fremont Analytical, Inc. received 7 sample(s) on 12/21/2016 for the analyses presented in the following report.

Fecal Coliform by SM 9222D
Ion Chromatography by EPA Method 300.0
Mercury by EPA Method 245.1
Total Metals by EPA Method 200.8
Total Hardness by EPA Method 200.8/SM 2340B
Total Phosphorous by EPA Method 365.3
Total Suspended Solids (TSS) by SM 2540D

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Mike Ridgeway
Laboratory Director

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

CLIENT: Shannon & Wilson
Project: Willow Creek
Work Order: 1612224

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1612224-001	WC-01-DEC16	12/21/2016 9:32 AM	12/21/2016 1:53 PM
1612224-002	WC-02-DEC16	12/21/2016 10:08 AM	12/21/2016 1:53 PM
1612224-003	WC-03-DEC16	12/21/2016 10:50 AM	12/21/2016 1:53 PM
1612224-004	WC-04-DEC16	12/21/2016 11:32 AM	12/21/2016 1:53 PM
1612224-005	WC-05-DEC16	12/21/2016 11:50 AM	12/21/2016 1:53 PM
1612224-006	WC-06-DEC16	12/21/2016 12:20 PM	12/21/2016 1:53 PM
1612224-007	WC-07-DEC16	12/21/2016 12:41 PM	12/21/2016 1:53 PM

CLIENT: Shannon & Wilson**Project:** Willow Creek

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

1612224-001E

TEST_SUB has been Sub Contracted.

1612224-002E

TEST_SUB has been Sub Contracted.

1612224-003E

TEST_SUB has been Sub Contracted.

1612224-004E

TEST_SUB has been Sub Contracted.

1612224-005E

TEST_SUB has been Sub Contracted.

1612224-006E

TEST_SUB has been Sub Contracted.

1612224-007E

TEST_SUB has been Sub Contracted.

1612224-001E

TEST_SUB has been Sub Contracted.

1612224-002E

TEST_SUB has been Sub Contracted.

1612224-003E

TEST_SUB has been Sub Contracted.

1612224-004E

TEST_SUB has been Sub Contracted.

1612224-005E

TEST_SUB has been Sub Contracted.

1612224-006E

TEST_SUB has been Sub Contracted.

1612224-007E

TEST_SUB has been Sub Contracted.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Analytical Report

Work Order: 1612224

Date Reported: 12/29/2016

Client: Shannon & Wilson

Collection Date: 12/21/2016 9:32:00 AM

Project: Willow Creek

Lab ID: 1612224-001

Matrix: Groundwater

Client Sample ID: WC-01-DEC16

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R33595	Analyst: MW	
Coliform, Fecal	8.00	1.00		CFU/100ml	1	12/21/2016 2:30:56 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R33562	Analyst: KT	
Chloride	24,300	500	D	mg/L	5000	12/22/2016 2:20:00 PM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 15768	Analyst: WF	
Mercury	ND	0.100		µg/L	1	12/27/2016 3:33:25 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 15759	Analyst: TN	
Total Hardness (as CaCO ₃)	4,840	4.00	D	mg/L CaCO ₃	5	12/23/2016 2:12:09 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 15759	Analyst: TN	
Antimony	0.265	1.00	JD	µg/L	5	12/28/2016 12:14:13 PM
Arsenic	1.12	5.00	JD	µg/L	5	12/28/2016 12:14:13 PM
Beryllium	ND	1.00	D	µg/L	5	12/28/2016 12:14:13 PM
Cadmium	ND	1.00	D	µg/L	5	12/28/2016 12:14:13 PM
Chromium	0.938	2.50	JD	µg/L	5	12/28/2016 12:14:13 PM
Copper	2.46	2.50	JD	µg/L	5	12/28/2016 12:14:13 PM
Lead	ND	2.50	D	µg/L	5	12/28/2016 12:14:13 PM
Nickel	1.56	2.50	JD	µg/L	5	12/28/2016 12:14:13 PM
Selenium	6.51	5.00	D	µg/L	5	12/28/2016 12:14:13 PM
Silver	ND	1.00	D	µg/L	5	12/28/2016 12:14:13 PM
Thallium	ND	1.00	D	µg/L	5	12/28/2016 12:14:13 PM
Zinc	33.8	7.50	D	µg/L	5	12/28/2016 12:14:13 PM
NOTES:						
Diluted due to matrix.						
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 15788	Analyst: KT	
Phosphorus, Total (As P)	ND	0.200		mg/L	1	12/28/2016 2:03:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R33542	Analyst: KT	
Total Suspended Solids	ND	5.00		mg/L	1	12/22/2016 12:22:00 PM



Analytical Report

Work Order: 1612224

Date Reported: 12/29/2016

Client: Shannon & Wilson

Collection Date: 12/21/2016 10:08:00 AM

Project: Willow Creek

Lab ID: 1612224-002

Matrix: Groundwater

Client Sample ID: WC-02-DEC16

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R33595	Analyst: MW	
Coliform, Fecal	6.00	1.00		CFU/100ml	1	12/21/2016 2:30:56 PM
NOTES: Confluent growth observed.						
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R33562	Analyst: KT	
Chloride	100	1.00	D	mg/L	10	12/22/2016 11:50:00 AM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 15768	Analyst: WF	
Mercury	ND	0.100		µg/L	1	12/27/2016 3:35:06 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 15759	Analyst: TN	
Total Hardness (as CaCO ₃)	121	4.00	D	mg/L CaCO ₃	5	12/23/2016 2:15:44 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 15759	Analyst: TN	
Antimony	ND	0.200		µg/L	1	12/28/2016 12:17:49 PM
Arsenic	1.81	1.00		µg/L	1	12/28/2016 12:17:49 PM
Beryllium	ND	0.200		µg/L	1	12/28/2016 12:17:49 PM
Cadmium	ND	0.200		µg/L	1	12/28/2016 12:17:49 PM
Chromium	1.65	0.500		µg/L	1	12/28/2016 12:17:49 PM
Copper	1.57	0.500		µg/L	1	12/28/2016 12:17:49 PM
Lead	0.513	0.500		µg/L	1	12/28/2016 12:17:49 PM
Nickel	1.64	0.500		µg/L	1	12/28/2016 12:17:49 PM
Selenium	ND	1.00		µg/L	1	12/28/2016 12:17:49 PM
Silver	ND	0.200		µg/L	1	12/28/2016 12:17:49 PM
Thallium	ND	0.200		µg/L	1	12/28/2016 12:17:49 PM
Zinc	12.9	1.50		µg/L	1	12/28/2016 12:17:49 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 15788	Analyst: KT	
Phosphorus, Total (As P)	ND	0.200		mg/L	1	12/28/2016 2:11:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R33542	Analyst: KT	
Total Suspended Solids	5.00	5.00		mg/L	1	12/22/2016 12:24:00 PM



Analytical Report

Work Order: 1612224

Date Reported: 12/29/2016

Client: Shannon & Wilson

Collection Date: 12/21/2016 10:50:00 AM

Project: Willow Creek

Lab ID: 1612224-003

Matrix: Groundwater

Client Sample ID: WC-03-DEC16

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R33595		Analyst: MW
Coliform, Fecal	110	1.00		CFU/100ml	1	12/21/2016 2:30:56 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R33562		Analyst: KT
Chloride	31.7	0.500	D	mg/L	5	12/22/2016 1:14:00 PM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 15768		Analyst: WF
Mercury	ND	0.100		µg/L	1	12/27/2016 3:36:47 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 15759		Analyst: TN
Total Hardness (as CaCO ₃)	48.8	4.00	D	mg/L CaCO ₃	5	12/23/2016 2:19:20 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 15759		Analyst: TN
Antimony	0.246	0.200		µg/L	1	12/28/2016 12:21:25 PM
Arsenic	ND	1.00		µg/L	1	12/28/2016 12:21:25 PM
Beryllium	ND	0.200		µg/L	1	12/28/2016 12:21:25 PM
Cadmium	ND	0.200		µg/L	1	12/28/2016 12:21:25 PM
Chromium	1.22	0.500		µg/L	1	12/28/2016 12:21:25 PM
Copper	2.87	0.500		µg/L	1	12/28/2016 12:21:25 PM
Lead	0.927	0.500		µg/L	1	12/28/2016 12:21:25 PM
Nickel	1.94	0.500		µg/L	1	12/28/2016 12:21:25 PM
Selenium	ND	1.00		µg/L	1	12/28/2016 12:21:25 PM
Silver	ND	0.200		µg/L	1	12/28/2016 12:21:25 PM
Thallium	ND	0.200		µg/L	1	12/28/2016 12:21:25 PM
Zinc	26.7	1.50		µg/L	1	12/28/2016 12:21:25 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 15788		Analyst: KT
Phosphorus, Total (As P)	0.230	0.200		mg/L	1	12/28/2016 2:14:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R33542		Analyst: KT
Total Suspended Solids	11.0	5.00		mg/L	1	12/22/2016 12:26:00 PM



Analytical Report

Work Order: 1612224

Date Reported: 12/29/2016

Client: Shannon & Wilson

Collection Date: 12/21/2016 11:32:00 AM

Project: Willow Creek

Lab ID: 1612224-004

Matrix: Groundwater

Client Sample ID: WC-04-DEC16

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R33595		Analyst: MW
Coliform, Fecal	424	1.00		CFU/100ml	1	12/21/2016 2:30:56 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R33562		Analyst: KT
Chloride	8.52	0.100		mg/L	1	12/22/2016 12:12:00 PM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 15768		Analyst: WF
Mercury	ND	0.100		µg/L	1	12/27/2016 3:41:53 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 15759		Analyst: TN
Total Hardness (as CaCO ₃)	109	4.00	D	mg/L CaCO ₃	5	12/23/2016 2:22:56 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 15759		Analyst: TN
Antimony	0.226	0.200		µg/L	1	12/28/2016 12:25:01 PM
Arsenic	2.21	1.00		µg/L	1	12/28/2016 12:25:01 PM
Beryllium	ND	0.200		µg/L	1	12/28/2016 12:25:01 PM
Cadmium	ND	0.200		µg/L	1	12/28/2016 12:25:01 PM
Chromium	1.52	0.500		µg/L	1	12/28/2016 12:25:01 PM
Copper	3.30	0.500		µg/L	1	12/28/2016 12:25:01 PM
Lead	0.746	0.500		µg/L	1	12/28/2016 12:25:01 PM
Nickel	1.49	0.500		µg/L	1	12/28/2016 12:25:01 PM
Selenium	ND	1.00		µg/L	1	12/28/2016 12:25:01 PM
Silver	ND	0.200		µg/L	1	12/28/2016 12:25:01 PM
Thallium	ND	0.200		µg/L	1	12/28/2016 12:25:01 PM
Zinc	27.8	1.50		µg/L	1	12/28/2016 12:25:01 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 15788		Analyst: KT
Phosphorus, Total (As P)	ND	0.200		mg/L	1	12/28/2016 2:17:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R33542		Analyst: KT
Total Suspended Solids	6.00	5.00		mg/L	1	12/22/2016 12:28:00 PM



Analytical Report

Work Order: 1612224

Date Reported: 12/29/2016

Client: Shannon & Wilson

Collection Date: 12/21/2016 11:50:00 AM

Project: Willow Creek

Lab ID: 1612224-005

Matrix: Groundwater

Client Sample ID: WC-05-DEC16

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R33595		Analyst: MW
Coliform, Fecal	88.0	1.00		CFU/100ml	1	12/21/2016 2:30:56 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R33562		Analyst: KT
Chloride	10.9	0.200	D	mg/L	2	12/22/2016 12:23:00 PM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 15768		Analyst: WF
Mercury	ND	0.100		µg/L	1	12/27/2016 3:43:36 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 15759		Analyst: TN
Total Hardness (as CaCO ₃)	94.8	4.00	D	mg/L CaCO ₃	5	12/23/2016 2:26:32 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 15759		Analyst: TN
Antimony	ND	0.200		µg/L	1	12/28/2016 12:28:37 PM
Arsenic	1.98	1.00		µg/L	1	12/28/2016 12:28:37 PM
Beryllium	ND	0.200		µg/L	1	12/28/2016 12:28:37 PM
Cadmium	ND	0.200		µg/L	1	12/28/2016 12:28:37 PM
Chromium	2.68	0.500		µg/L	1	12/28/2016 12:28:37 PM
Copper	5.08	0.500		µg/L	1	12/28/2016 12:28:37 PM
Lead	2.24	0.500		µg/L	1	12/28/2016 12:28:37 PM
Nickel	3.20	0.500		µg/L	1	12/28/2016 12:28:37 PM
Selenium	ND	1.00		µg/L	1	12/28/2016 12:28:37 PM
Silver	ND	0.200		µg/L	1	12/28/2016 12:28:37 PM
Thallium	ND	0.200		µg/L	1	12/28/2016 12:28:37 PM
Zinc	42.9	1.50		µg/L	1	12/28/2016 12:28:37 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 15788		Analyst: KT
Phosphorus, Total (As P)	0.827	0.200		mg/L	1	12/28/2016 2:19:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R33542		Analyst: KT
Total Suspended Solids	581	5.00		mg/L	1	12/22/2016 12:30:00 PM



Analytical Report

Work Order: 1612224

Date Reported: 12/29/2016

Client: Shannon & Wilson

Collection Date: 12/21/2016 12:20:00 PM

Project: Willow Creek

Lab ID: 1612224-006

Matrix: Groundwater

Client Sample ID: WC-06-DEC16

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R33595		Analyst: MW
Coliform, Fecal	41.0	1.00		CFU/100ml	1	12/21/2016 2:30:56 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R33562		Analyst: KT
Chloride	9.93	0.100		mg/L	1	12/22/2016 12:34:00 PM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 15768		Analyst: WF
Mercury	ND	0.100		µg/L	1	12/27/2016 3:45:18 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 15759		Analyst: TN
Total Hardness (as CaCO ₃)	103	4.00	D	mg/L CaCO ₃	5	12/23/2016 2:30:08 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 15759		Analyst: TN
Antimony	0.231	0.200		µg/L	1	12/28/2016 12:32:12 PM
Arsenic	ND	1.00		µg/L	1	12/28/2016 12:32:12 PM
Beryllium	ND	0.200		µg/L	1	12/28/2016 12:32:12 PM
Cadmium	ND	0.200		µg/L	1	12/28/2016 12:32:12 PM
Chromium	1.39	0.500		µg/L	1	12/28/2016 12:32:12 PM
Copper	1.64	0.500		µg/L	1	12/28/2016 12:32:12 PM
Lead	ND	0.500		µg/L	1	12/28/2016 12:32:12 PM
Nickel	1.64	0.500		µg/L	1	12/28/2016 12:32:12 PM
Selenium	ND	1.00		µg/L	1	12/28/2016 12:32:12 PM
Silver	ND	0.200		µg/L	1	12/28/2016 12:32:12 PM
Thallium	ND	1.00	D	µg/L	5	12/23/2016 2:30:08 PM
Zinc	14.9	1.50		µg/L	1	12/28/2016 12:32:12 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 15788		Analyst: KT
Phosphorus, Total (As P)	ND	0.200		mg/L	1	12/28/2016 2:22:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R33542		Analyst: KT
Total Suspended Solids	ND	5.00		mg/L	1	12/22/2016 12:32:00 PM



Analytical Report

Work Order: 1612224

Date Reported: 12/29/2016

Client: Shannon & Wilson

Collection Date: 12/21/2016 12:41:00 PM

Project: Willow Creek

Lab ID: 1612224-007

Matrix: Groundwater

Client Sample ID: WC-07-DEC16

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R33595		Analyst: MW
Coliform, Fecal	224	1.00		CFU/100ml	1	12/21/2016 2:30:56 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R33562		Analyst: KT
Chloride	8.18	0.100		mg/L	1	12/22/2016 12:45:00 PM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 15768		Analyst: WF
Mercury	ND	0.100		µg/L	1	12/27/2016 3:47:01 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 15759		Analyst: TN
Total Hardness (as CaCO ₃)	114	4.00	D	mg/L CaCO ₃	5	12/23/2016 2:33:43 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 15759		Analyst: TN
Antimony	ND	0.200		µg/L	1	12/28/2016 12:35:48 PM
Arsenic	2.15	1.00		µg/L	1	12/28/2016 12:35:48 PM
Beryllium	ND	0.200		µg/L	1	12/28/2016 12:35:48 PM
Cadmium	ND	0.200		µg/L	1	12/28/2016 12:35:48 PM
Chromium	1.20	0.500		µg/L	1	12/28/2016 12:35:48 PM
Copper	1.42	0.500		µg/L	1	12/28/2016 12:35:48 PM
Lead	ND	0.500		µg/L	1	12/28/2016 12:35:48 PM
Nickel	1.20	0.500		µg/L	1	12/28/2016 12:35:48 PM
Selenium	ND	1.00		µg/L	1	12/28/2016 12:35:48 PM
Silver	ND	0.200		µg/L	1	12/28/2016 12:35:48 PM
Thallium	ND	0.200		µg/L	1	12/28/2016 12:35:48 PM
Zinc	12.8	1.50		µg/L	1	12/28/2016 12:35:48 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 15788		Analyst: KT
Phosphorus, Total (As P)	ND	0.200		mg/L	1	12/28/2016 2:29:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R33542		Analyst: KT
Total Suspended Solids	ND	5.00		mg/L	1	12/22/2016 12:34:00 PM



Work Order: 1612224
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Fecal Coliform by SM 9222D

Sample ID	MB-R33595	SampType:	MBLK	Units:	CFU/100ml	Prep Date:	12/21/2016	RunNo:	33595		
Client ID:	MBLKW	Batch ID:	R33595			Analysis Date:	12/21/2016	SeqNo:	637403		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Coliform, Fecal	ND	1.00									



Date: 12/29/2016

Work Order: 1612224
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Total Hardness by EPA Method 200.8/SM 2340B

Sample ID	MB-15759	SampType:	MBLK			Units:	mg/L			Prep Date:	12/23/2016			RunNo:	33572			
Client ID:	MBLKW	Batch ID:	15759			Analysis Date:						12/23/2016			SeqNo:	637065		
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual					

Calcium	ND	0.100									
Magnesium	ND	0.100									

Sample ID	LCS-15759	SampType: LCS			Units: mg/L		Prep Date: 12/23/2016			RunNo: 33572		
Client ID:	LCSW	Batch ID: 15759			Analysis Date: 12/23/2016					SeqNo: 637066		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Calcium	1.05	0.100	1.000	0	105	50	150				
Magnesium	0.899	0.100	1.000	0	89.9	50	150				

Sample ID	1612240-001ADUP	SampType:	DUP	Units:	mg/L CaCO3	Prep Date:	12/23/2016	RunNo:	33572		
Client ID:	BATCH	Batch ID:	15759	Analysis Date:				12/23/2016	SeqNo:	637070	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Hardness (as CaCO3)	68.0	0.800						67.65	0.559	20	

Sample ID	1612240-001AMS	SampType:	MS	Units:	mg/L	Prep Date:	12/23/2016	RunNo:	33572		
Client ID:	BATCH	Batch ID:	15759	Analysis Date:				12/23/2016	SeqNo:	637071	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Calcium	24.3	0.100	5.000	19.52	95.8	50	150				
Magnesium	8.90	0.100	5.000	4.590	86.2	50	150				

Sample ID	1612240-001AMSD	SampType: MSD			Units: mg/L		Prep Date: 12/23/2016			RunNo: 33572		
Client ID:	BATCH	Batch ID: 15759			Analysis Date: 12/23/2016					SeqNo: 637072		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Calcium	21.7	0.100	5.000	19.52	44.0	50	150	24.31	11.3	20	S
Magnesium	8.25	0.100	5.000	4.590	73.1	50	150	8.900	7.62	20	



Work Order: 1612224
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Total Hardness by EPA Method 200.8/SM 2340B

Sample ID	1612240-001AMSD	SampType:	MSD	Units:	mg/L	Prep Date:	12/23/2016	RunNo:	33572		
Client ID:	BATCH	Batch ID:	15759			Analysis Date:	12/23/2016	SeqNo:	637072		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed and recovered within range.



Date: 12/29/2016

Work Order: 1612224
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Ion Chromatography by EPA Method 300.0

Sample ID	MB-R33562	SampType:	MBLK			Units:	mg/L			Prep Date:	12/22/2016		RunNo:	33562	
Client ID:	MBLKW	Batch ID:	R33562							Analysis Date:	12/22/2016		SeqNo:	636778	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual		

Chloride	ND	0.100										

Sample ID	LCS-R33562	SampType: LCS			Units: mg/L	Prep Date: 12/22/2016			RunNo: 33562			
Client ID:	LCSW	Batch ID: R33562			Analysis Date: 12/22/2016			SeqNo: 636779				
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	2.86	0.100	3.000	0	95.4	90	110					

Sample ID	1612224-005CDUP	SampType:	DUP	Units:	mg/L	Prep Date:	12/22/2016	RunNo:	33562			
Client ID:	WC-05-DEC16	Batch ID:	R33562			Analysis Date:	12/22/2016	SeqNo:	636787			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	11.0	0.200							10.89	1.25	20	D

Sample ID	1612224-005CMS	SampType:	MS	Units:	mg/L	Prep Date:	12/22/2016	RunNo:	33562			
Client ID:	WC-05-DEC16	Batch ID:	R33562			Analysis Date:	12/22/2016	SeqNo:	636788			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	15.0	0.200	6.000	10.89	68.8	80	120					DS

NOTES:

S - Spike recovery indicates a possible matrix effect. The method is in control as indicated by the Laboratory Control Sample (LCS).

Sample ID	1612224-005CMSD	SampType:	MSD	Units:	mg/L	Prep Date:	12/22/2016	RunNo:	33562			
Client ID:	WC-05-DEC16	Batch ID:	R33562			Analysis Date:	12/22/2016	SeqNo:	636789			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	15.0	0.200	6.000	10.89	68.0	80	120	15.02	0.311	20	DS

NOTES:

S - Spike recovery indicates a possible matrix effect. The method is in control as indicated by the Laboratory Control Sample (LCS).

Work Order: 1612224
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Total Phosphorous by EPA Method 365.3

Sample ID	MB-15788	SampType:	MBLK			Units:	mg/L			Prep Date:	12/28/2016			RunNo:	33607		
Client ID:	MBLKW	Batch ID:	15788			Analysis Date:					12/28/2016			SeqNo:	637744		
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual					

Phosphorus, Total (As P) ND 0.200

Sample ID	LCS-15788	SampType: LCS			Units: mg/L		Prep Date: 12/28/2016			RunNo: 33607		
Client ID:	LCSW	Batch ID: 15788			Analysis Date: 12/28/2016			SeqNo: 637745				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Phosphorus, Total (As P) 2.13 0.200 2.000 0 107 65 135

Sample ID	1612224-001BDUP	SampType:	DUP	Units:	mg/L	Prep Date:	12/28/2016	RunNo:	33607		
Client ID:	WC-01-DEC16	Batch ID:	15788	Analysis Date:				12/28/2016	SeqNo:	637747	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P) ND 0.200 0 30

Sample ID	1612224-001BMS	SampType:	MS	Units:	mg/L	Prep Date:	12/28/2016	RunNo:	33607		
Client ID:	WC-01-DEC16	Batch ID:	15788	Analysis Date:				12/28/2016	SeqNo:	637748	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P) 2.07 0.200 2.000 0.05180 101 65 135

Sample ID	1612224-001BMSD	SampType:	MSD	Units:	mg/L	Prep Date:	12/28/2016	RunNo:	33607		
Client ID:	WC-01-DEC16	Batch ID:	15788	Analysis Date:				12/28/2016	SeqNo:	637749	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P) 2.10 0.200 2.000 0.05180 102 65 135 2.067 1.47 30



Date: 12/29/2016

Work Order: 1612224
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Suspended Solids (TSS) by SM 2540D

Sample ID	MB-R33542	SampType:	MBLK			Units:	mg/L			Prep Date:	12/22/2016		RunNo:	33542	
Client ID:	MBLKW	Batch ID:	R33542							Analysis Date:	12/22/2016		SeqNo:	636390	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual			

Total Suspended Solids ND 5.00

Sample ID	LCS-R33542	SampType: LCS			Units: mg/L		Prep Date: 12/22/2016			RunNo: 33542		
Client ID:	LCSW	Batch ID: R33542			Analysis Date: 12/22/2016					SeqNo: 636391		
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Suspended Solids 268 10.0 300.0 0 89.3 65 135

Sample ID	1612215-001ADUP	SampType:	DUP	Units:	mg/L	Prep Date:	12/22/2016	RunNo:	33542			
Client ID:	BATCH	Batch ID:	R33542			Analysis Date:	12/22/2016	SeqNo:	636393			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Suspended Solids ND 5.00 0 30

Sample ID	1612226-001BDUP	SampType:	DUP	Units:	mg/L	Prep Date:	12/22/2016	RunNo:	33542		
Client ID:	BATCH	Batch ID:	R33542			Analysis Date:	12/22/2016	SeqNo:	636409		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Suspended Solids ND 5.00 0 30



Date: 12/29/2016

Work Order: 1612224
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	MB-15759	SampType:	MBLK		Units:	µg/L		Prep Date:	12/23/2016		RunNo:	33571	
Client ID:	MBLKW	Batch ID:	15759					Analysis Date:	12/23/2016		SeqNo:	637020	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual
Antimony		ND	0.200										
Arsenic		ND	1.00										
Beryllium		ND	0.200										
Cadmium		ND	0.200										
Chromium		ND	0.500										
Copper		ND	0.500										
Lead		ND	0.500										
Nickel		ND	0.500										
Selenium		ND	1.00										
Silver		ND	0.200										
Thallium		ND	0.200										
Zinc		ND	1.50										

Sample ID	LCS-15759	SampType:	LCS	Units:	µg/L	Prep Date:	12/23/2016	RunNo:	33571		
Client ID:	LCSW	Batch ID:	15759			Analysis Date:	12/23/2016	SeqNo:	637021		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	4.98	0.200	5.000	0	99.5	85	115				
Arsenic	102	1.00	100.0	0	102	85	115				
Beryllium	5.12	0.200	5.000	0	102	85	115				
Cadmium	4.81	0.200	5.000	0	96.3	85	115				
Chromium	108	0.500	100.0	0	108	85	115				
Copper	105	0.500	100.0	0	105	85	115				
Lead	52.6	0.500	50.00	0	105	85	115				
Nickel	106	0.500	100.0	0	106	85	115				
Selenium	9.77	1.00	10.00	0	97.7	85	115				
Silver	5.26	0.200	5.000	0	105	85	115				
Thallium	2.71	0.200	2.500	0	108	85	115				
Zinc	101	1.50	100.0	0	101	85	115				



Date: 12/29/2016

Work Order: 1612224
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Total Metals by EPA Method 200.8

Sample ID	1612240-001ADUP	SampType:	DUP	Units:	µg/L	Prep Date:	12/23/2016	RunNo:	33571		
Client ID:	BATCH	Batch ID:	15759			Analysis Date:	12/23/2016	SeqNo:	637025		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.200						0.2035	19.4	30	
Arsenic	ND	1.00						0		30	
Beryllium	ND	0.200						0		30	
Cadmium	ND	0.200						0		30	
Chromium	0.831	0.500						0.4915	51.3	30	
Copper	283	0.500						285.6	0.768	30	
Lead	30.8	0.500						30.42	1.23	30	
Nickel	16.5	0.500						15.78	4.31	30	
Selenium	1.05	1.00						0.3835	92.7	30	
Silver	ND	0.200						0		30	
Thallium	ND	0.200						0		30	
Zinc	305	1.50						301.8	0.932	30	

Sample ID	1612240-001AMS	SampType: MS		Units: µg/L		Prep Date: 12/23/2016			RunNo: 33571		
Client ID:	BATCH	Batch ID: 15759					Analysis Date: 12/23/2016			SeqNo: 637026	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	25.5	0.200	25.00	0.2035	101	70	130				
Arsenic	510	1.00	500.0	0	102	70	130				
Beryllium	26.6	0.200	25.00	0.005000	106	70	130				
Cadmium	25.4	0.200	25.00	0.1025	101	70	130				
Chromium	549	0.500	500.0	0.4915	110	70	130				
Copper	814	0.500	500.0	285.6	106	70	130				
Lead	280	0.500	250.0	30.42	99.7	70	130				
Nickel	567	0.500	500.0	15.78	110	70	130				
Selenium	49.7	1.00	50.00	0.3835	98.6	70	130				
Silver	19.8	0.200	25.00	0	79.2	70	130				
Thallium	12.7	0.200	12.50	0.005500	102	70	130				
Zinc	832	1.50	500.0	301.8	106	70	130				

Work Order: 1612224
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Total Metals by EPA Method 200.8

Sample ID	1612240-001AMSD	SampType:	MSD	Units:	µg/L	Prep Date:	12/23/2016	RunNo:	33571		
Client ID:	BATCH	Batch ID:	15759			Analysis Date:	12/23/2016	SeqNo:	637027		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	25.4	0.200	25.00	0.2035	101	70	130	25.49	0.202	30	
Arsenic	512	1.00	500.0	0	102	70	130	509.6	0.531	30	
Beryllium	23.9	0.200	25.00	0.005000	95.5	70	130	26.56	10.6	30	
Cadmium	26.7	0.200	25.00	0.1025	106	70	130	25.36	5.06	30	
Chromium	555	0.500	500.0	0.4915	111	70	130	548.5	1.11	30	
Copper	813	0.500	500.0	285.6	105	70	130	813.9	0.109	30	
Lead	279	0.500	250.0	30.42	99.3	70	130	279.6	0.355	30	
Nickel	554	0.500	500.0	15.78	108	70	130	566.5	2.21	30	
Selenium	48.3	1.00	50.00	0.3835	95.9	70	130	49.69	2.77	30	
Silver	20.5	0.200	25.00	0	82.1	70	130	19.80	3.63	30	
Thallium	12.8	0.200	12.50	0.005500	102	70	130	12.72	0.717	30	
Zinc	835	1.50	500.0	301.8	107	70	130	832.4	0.332	30	



Date: 12/29/2016

Work Order: 1612224
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Mercury by EPA Method 245.1

Sample ID	MB-15768	SampType:	MBLK			Units:	µg/L			Prep Date:	12/27/2016		RunNo:	33581	
Client ID:	MBLKW	Batch ID:	15768							Analysis Date:	12/27/2016		SeqNo:	637511	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual			

Mercury	ND	0.100										

Sample ID	LCS-15768	SampType:	LCS	Units:	µg/L	Prep Date:	12/27/2016	RunNo:	33581		
Client ID:	LCSW	Batch ID:	15768			Analysis Date:	12/27/2016	SeqNo:	637512		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	2.46	0.100	2.500	0	98.4	85	115					

Sample ID	1612213-001DDUP	SampType:	DUP	Units:	µg/L	Prep Date:	12/27/2016	RunNo:	33581		
Client ID:	BATCH	Batch ID:	15768			Analysis Date:	12/27/2016	SeqNo:	637514		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	ND	0.100							0		20	

Sample ID	1612213-001DMS	SampType:	MS	Units:	µg/L	Prep Date:	12/27/2016	RunNo:	33581			
Client ID:	BATCH	Batch ID:	15768			Analysis Date:	12/27/2016	SeqNo:	637515			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	2.42	0.100	2.500	0	96.8	80	120					

Sample ID	1612213-001DMSD	SampType:	MSD	Units:	µg/L	Prep Date:	12/27/2016	RunNo:	33581			
Client ID:	BATCH	Batch ID:	15768			Analysis Date:	12/27/2016	SeqNo:	637516			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	2.30	0.100	2.500	0	92.0	80	120	2.420	5.08	20		

Client Name: **SW**
 Logged by: **Erica Silva**

Work Order Number: **1612224**
 Date Received: **12/21/2016 1:53:00 PM**

Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
 2. How was the sample delivered? Client

Log In

3. Coolers are present? Yes ☒ No ☐ NA ☐
 4. Shipping container/cooler in good condition? Yes ☒ No ☐
 5. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes ☐ No ☐ Not Required ☒
 6. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
 7. Were all items received at a temperature of >0°C to 10.0°C* Yes ☒ No ☐ NA ☐
 8. Sample(s) in proper container(s)? Yes ☒ No ☐
 9. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
 10. Are samples properly preserved? Yes ☒ No ☐
 11. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
 12. Is there headspace in the VOA vials? Yes ☐ No ☐ NA ☒
 13. Did all samples containers arrive in good condition(unbroken)? Yes ☒ No ☐
 14. Does paperwork match bottle labels? Yes ☒ No ☐
 15. Are matrices correctly identified on Chain of Custody? Yes ☐ No ☒
 16. Is it clear what analyses were requested? Yes ☒ No ☐
 17. Were all holding times able to be met? Yes ☒ No ☐

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes ☒ No ☐ NA ☐

Person Notified: Dave Cline, Scott Gaulke Date 12/21/2016
 By Whom: Erica Silva Via: ☒ eMail ☒ Phone ☐ Fax ☐ In Person
 Regarding: Condensing of each sample to one line, Matrix, Total Persulfate Nitrogen subcontracting
 Client Instructions: Confirmed as 7 samples, Groundwater, proceed with subcontracting to lab performing S

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler 1	1.8
Cooler 2	2.1
Sample 1	2.0
Sample 2	0.4

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



Fremont

Chain of Custody Record

3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Date: 12/21/16

Laboratory Project No (Internal):

Page: 1 of 3

Client:

Simmons & Wilson

Project Name:

Address:

400 N. 34th ST Suite 100

Location:

City, State, Zip

Seattle WA 98103 Tel: 206 615 6700

Collected by:

Edmonds W
Chas Heland

Reports To (PM): Dave Currie

Fax:

Email: DRC@SHAWAC.COM

Project No: 21-12588-032

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)	VOC (EPA 8260)	GX/BTEX by EPA 8021b	BTEX by 8260	Gasoline Range Organics	Hydrocarbon Identification (HID)	Diesel/Heavy Oil Range Organics	SEMI VOL (EPA 8270)	PAH (EPA 8270 - SIM)	PCBs (EPA 8082)	CI Pesticides (EPA 8091)	CI Herbicides (EPA 8151A)	Metals* (6020 / 200.8)	Total (T) / Dissolved (D)	Anions (IC)*	FECAL	TSS COLIFORM	HARDNESS	TOTAL PHOSPHORUS	TOTAL PERCHLORATE NITROGEN	Comments/Depth

1 WC-01-DEC16-FC 12/1/16 09:32 GW

2 WC-01-DEC16-FC 12/1/16 09:32 GW

3 WC-01-DEC16-FC 12/1/16 09:32 GW

4 WC-01-DEC16-FC 12/1/16 09:32 GW

5 WC-02-DEC16-FC 12/1/16 09:32 GW

6 WC-02-DEC16-FC 12/1/16 09:32 GW

7 WC-02-DEC16-FC 12/1/16 09:32 GW

8 WC-02-DEC16-FC 12/1/16 09:32 GW

9 WC-02-DEC16-FC 12/1/16 09:32 GW

10 WC-03-DEC16-FC 12/1/16 09:32 GW

11 WC-03-DEC16-FC 12/1/16 09:32 GW

12 WC-03-DEC16-FC 12/1/16 09:32 GW

13 WC-03-DEC16-FC 12/1/16 09:32 GW

14 WC-03-DEC16-FC 12/1/16 09:32 GW

15 WC-03-DEC16-FC 12/1/16 09:32 GW

16 WC-03-DEC16-FC 12/1/16 09:32 GW

Sample Disposal:

Nitrate

Nitrite

Chloride

Sulfate

Bromide

O-Phosphate

Fluoride

Nitrate+Nitrite

Special Remarks:

Relinquished

Date/Time

Received

Date/Time

Relinquished

Date/Time

Received

Date/Time

Relinquished

Date/Time

Received

Date/Time

TAT -> Next Day 2 Day 3 Day STD



Fremont

Chain of Custody Record

3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Date: 12/31/16

Laboratory Project No (Internal):

Page: 2 of 3

Client: SHARON WILSON

Project Name:

Address: 400 N 34th ST

Location:

City, State, Zip: SEATTLE, WA 98103

Collected by:

Reports To (PM): DAVE ELME

Fax:

Email: DRE@SHARONWILSON.COM

Project No: 21-1-12588-032

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)	VOC (EPA 8260)	GX/BTEX by EPA 8021b	BTEX by 8260	Gasoline Range Organics	Hydrocarbon Identification (HCD)	Semi Vol (EPA 8270)	PAH (EPA 8270 - SIM)	PCBs (EPA 8082)	Cl Pesticides (EPA 8081)	Herbicides (EPA 8151A)	Metals* (6020 / 200.8)	Total (T) Dissolved (D)	Anions (IC)**	FECAL COLIFORM	TSS	HARDNESS	TOTAL PHOSPHORUS	TOTAL PERCHLORATE NITRATE	Comments/Depth

1 WC-03-DEC16-H-M 12/31/16 10:50

2 WC-03-DEC16-SS-PN-CL 11:32

3 WC-04-DEC16-FC 11:32

4 WC-04-DEC16-PHO

5 WC-04-DEC16-H-M

6 WC-04-DEC16-SS-PN-CL

7 WC-05-DEC16-FC

8 WC-05-DEC16-PHO

9 WC-05-DEC16-H-M

10 WC-05-DEC16-SS-PN-CL

Metals Analysis (Circle): MTCA-5 RCRA-8 (Priority Pollutants) TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab (A fee may be assessed if samples are retained after 30 days.)

Relinquished Date/Time 12/31/16 13:51

Relinquished Date/Time 12/31/16 13:51

Received Date/Time 12/24/16 13:53

Received Date/Time 12/24/16 13:53

TAT -> Next Day 2 Day 3 Day STD

Special Remarks:

www.fremontanalytical.com



Fremont

Chain of Custody Record and Laboratory Services Agreement

3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Client: Simmons & Wilson
Address: 400 N 34th Street Ste 100
City, State, Zip: Seattle WA 98103
Telephone: 206 695 6706 Fax: _____

Project Name: Wilson Center
Project No: 21-1-12588-032
Location: Edmonds, WA
Report To (PM): Dave Clive
PM Email: ORC@Simmons.com

Date: 12/21/16

Laboratory Project No (Internal): _____
Page: 3 of: 3

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/BTEX	BTEX	Gasoline Range Organics (GX)	Hydrocarbon Identification (GX)	Diesel/Heavy Oil Range Organics (GX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM / 625)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)	Anions (IC)**	EDB (8011)	FECAL	TSS	HARNESS	TOTAL PHOSPHORUS	PERCHLORATE	NITROGEN	Comments

1	WC-06-DECEMBER-FC	12/21/16	12:20	GW																			
2	WC-06-DECEMBER-FC																						
3	WC-06-DECEMBER-H-M																						
4	WC-06-DECEMBER-H-M																						
5	WC-07-DECEMBER-FC																						
6	WC-07-DECEMBER-FC																						
7	WC-07-DECEMBER-H-M																						
8	WC-07-DECEMBER-H-M																						
9																							
10																							

**Metals Analysis (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Ti U V Zn

**Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate-Nitrite Turn-around times for samples received after 4:00pm will begin on the following business day.

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished: _____ Date/Time: 12/21/16 13:51 Received: Prinabelly Date/Time: 12/21/16 13:55
X _____ Date/Time: _____ Received: _____ Date/Time: _____



3600 Fremont Ave. N.
Seattle, WA 98103
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Shannon & Wilson

Dave Cline
400 N. 34th Street, Suite 100
Seattle, WA 98103

RE: Willow Creek
Work Order Number: 1703343

April 06, 2017

Attention Dave Cline:

Fremont Analytical, Inc. received 7 sample(s) on 3/30/2017 for the analyses presented in the following report.

Fecal Coliform by SM 9222D
Ion Chromatography by EPA Method 300.0
Mercury by EPA Method 245.1
Total Metals by EPA Method 200.8
Total Hardness by EPA Method 200.8/SM 2340B
Total Phosphorous by EPA Method 365.3
Total Suspended Solids (TSS) by SM 2540D

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Mike Ridgeway
Laboratory Director

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

CLIENT: Shannon & Wilson
Project: Willow Creek
Work Order: 1703343

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1703343-001	WC-01-MAR17	03/30/2017 10:30 AM	03/30/2017 2:22 PM
1703343-002	WC-02-MAR17	03/30/2017 11:00 AM	03/30/2017 2:22 PM
1703343-003	WC-03-MAR17	03/30/2017 11:30 AM	03/30/2017 2:22 PM
1703343-004	WC-04-MAR17	03/30/2017 12:00 PM	03/30/2017 2:22 PM
1703343-005	WC-05-MAR17	03/30/2017 12:20 PM	03/30/2017 2:22 PM
1703343-006	WC-06-MAR17	03/30/2017 12:40 PM	03/30/2017 2:22 PM
1703343-007	WC-07-MAR17	03/30/2017 1:00 PM	03/30/2017 2:22 PM

CLIENT: Shannon & Wilson**Project:** Willow Creek

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

1703343-001E

TEST_SUB has been Sub Contracted.

1703343-002E

TEST_SUB has been Sub Contracted.

1703343-003E

TEST_SUB has been Sub Contracted.

1703343-004E

TEST_SUB has been Sub Contracted.

1703343-005E

TEST_SUB has been Sub Contracted.

1703343-006E

TEST_SUB has been Sub Contracted.

1703343-007E

TEST_SUB has been Sub Contracted.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Analytical Report

Work Order: 1703343
Date Reported: 4/6/2017

Client: Shannon & Wilson

Collection Date: 3/30/2017 10:30:00 AM

Project: Willow Creek

Lab ID: 1703343-001

Matrix: Groundwater

Client Sample ID: WC-01-MAR17

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Fecal Coliform by SM 9222D

Batch ID: R35261 Analyst: MW

Coliform, Fecal	2.00	1.00		CFU/100ml	1	3/30/2017 3:26:59 PM

Ion Chromatography by EPA Method 300.0

Batch ID: R35279 Analyst: KT

Chloride	16,900	1,000	D	mg/L	10000	3/31/2017 1:11:00 PM

Mercury by EPA Method 245.1

Batch ID: 16716 Analyst: WF

Mercury	ND	0.100		µg/L	1	4/6/2017 2:53:55 PM

Total Hardness by EPA Method 200.8/SM 2340B

Batch ID: 16702 Analyst: TN

Total Hardness (as CaCO ₃)	5,060	4.00	D	mg/L CaCO ₃	5	4/5/2017 3:04:55 PM

Total Metals by EPA Method 200.8

Batch ID: 16702 Analyst: TN

Antimony	ND	1.00	D	µg/L	5	4/5/2017 3:04:55 PM
Arsenic	3.36	5.00	JD	µg/L	5	4/5/2017 3:04:55 PM
Beryllium	ND	1.00	D	µg/L	5	4/5/2017 3:04:55 PM
Cadmium	ND	1.00	D	µg/L	5	4/5/2017 3:04:55 PM
Chromium	1.84	2.50	JD	µg/L	5	4/5/2017 3:04:55 PM
Copper	2.94	2.50	D	µg/L	5	4/5/2017 3:04:55 PM
Lead	0.598	2.50	JD	µg/L	5	4/5/2017 3:04:55 PM
Nickel	1.69	2.50	JD	µg/L	5	4/5/2017 3:04:55 PM
Selenium	6.87	5.00	D	µg/L	5	4/5/2017 3:04:55 PM
Silver	ND	1.00	D	µg/L	5	4/5/2017 3:04:55 PM
Thallium	ND	1.00	D	µg/L	5	4/5/2017 3:04:55 PM
Zinc	12.7	7.50	D	µg/L	5	4/5/2017 3:04:55 PM

NOTES:

Diluted due to matrix.

Total Phosphorous by EPA Method 365.3

Batch ID: 16713 Analyst: KT

Phosphorus, Total (As P)	ND	0.200		mg/L	1	4/6/2017 12:59:00 PM

Total Suspended Solids (TSS) by SM 2540D

Batch ID: R35290 Analyst: KT

Total Suspended Solids	14.0	5.00		mg/L	1	4/3/2017 12:04:00 PM



Analytical Report

Work Order: 1703343
Date Reported: 4/6/2017

Client: Shannon & Wilson

Collection Date: 3/30/2017 11:00:00 AM

Project: Willow Creek

Lab ID: 1703343-002

Matrix: Groundwater

Client Sample ID: WC-02-MAR17

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Fecal Coliform by SM 9222D

Batch ID: R35261 Analyst: MW

Coliform, Fecal	101	1.00		CFU/100ml	1	3/30/2017 3:26:59 PM

Ion Chromatography by EPA Method 300.0

Batch ID: R35279 Analyst: KT

Chloride	7,320	500	D	mg/L	5000	3/31/2017 1:20:00 PM

Mercury by EPA Method 245.1

Batch ID: 16716 Analyst: WF

Mercury	ND	0.100		µg/L	1	4/6/2017 2:55:38 PM

Total Hardness by EPA Method 200.8/SM 2340B

Batch ID: 16702 Analyst: TN

Total Hardness (as CaCO ₃)	2,320	4.00	D	mg/L CaCO ₃	5	4/5/2017 3:33:06 PM

Total Metals by EPA Method 200.8

Batch ID: 16702 Analyst: TN

Antimony	ND	1.00	D	µg/L	5	4/5/2017 3:33:06 PM
Arsenic	2.18	5.00	JD	µg/L	5	4/5/2017 3:33:06 PM
Beryllium	ND	1.00	D	µg/L	5	4/5/2017 3:33:06 PM
Cadmium	ND	1.00	D	µg/L	5	4/5/2017 3:33:06 PM
Chromium	0.943	2.50	JD	µg/L	5	4/5/2017 3:33:06 PM
Copper	1.90	2.50	JD	µg/L	5	4/5/2017 3:33:06 PM
Lead	0.570	2.50	JD	µg/L	5	4/5/2017 3:33:06 PM
Nickel	1.10	2.50	JD	µg/L	5	4/5/2017 3:33:06 PM
Selenium	3.03	5.00	JD	µg/L	5	4/5/2017 3:33:06 PM
Silver	ND	1.00	D	µg/L	5	4/5/2017 3:33:06 PM
Thallium	ND	1.00	D	µg/L	5	4/5/2017 3:33:06 PM
Zinc	6.53	7.50	JD	µg/L	5	4/5/2017 3:33:06 PM

NOTES:

Diluted due to matrix.

Total Phosphorous by EPA Method 365.3

Batch ID: 16713 Analyst: KT

Phosphorus, Total (As P)	ND	0.200		mg/L	1	4/6/2017 1:07:00 PM

Total Suspended Solids (TSS) by SM 2540D

Batch ID: R35290 Analyst: KT

Total Suspended Solids	5.00	5.00		mg/L	1	4/3/2017 12:08:00 PM



Analytical Report

Work Order: 1703343
Date Reported: 4/6/2017

Client: Shannon & Wilson

Collection Date: 3/30/2017 11:30:00 AM

Project: Willow Creek

Lab ID: 1703343-003

Matrix: Groundwater

Client Sample ID: WC-03-MAR17

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R35261	Analyst: MW	
Coliform, Fecal	6.00	1.00		CFU/100ml	1	3/30/2017 3:26:59 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R35279	Analyst: KT	
Chloride	7.48	0.200	D	mg/L	2	3/31/2017 12:56:00 PM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 16716	Analyst: WF	
Mercury	ND	0.100		µg/L	1	4/6/2017 2:57:21 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 16702	Analyst: TN	
Total Hardness (as CaCO ₃)	20.9	0.800		mg/L CaCO ₃	1	4/5/2017 3:12:58 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 16702	Analyst: TN	
Antimony	0.341	0.200		µg/L	1	4/5/2017 3:12:58 PM
Arsenic	ND	1.00		µg/L	1	4/5/2017 3:12:58 PM
Beryllium	ND	0.200		µg/L	1	4/5/2017 3:12:58 PM
Cadmium	ND	0.200		µg/L	1	4/5/2017 3:12:58 PM
Chromium	2.06	0.500		µg/L	1	4/5/2017 3:12:58 PM
Copper	2.60	0.500		µg/L	1	4/5/2017 3:12:58 PM
Lead	0.751	0.500		µg/L	1	4/5/2017 3:12:58 PM
Nickel	1.33	0.500		µg/L	1	4/5/2017 3:12:58 PM
Selenium	ND	1.00		µg/L	1	4/5/2017 3:12:58 PM
Silver	ND	0.200		µg/L	1	4/5/2017 3:12:58 PM
Thallium	ND	0.200		µg/L	1	4/5/2017 3:12:58 PM
Zinc	15.3	1.50		µg/L	1	4/5/2017 3:12:58 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 16713	Analyst: KT	
Phosphorus, Total (As P)	ND	0.200		mg/L	1	4/6/2017 1:10:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R35290	Analyst: KT	
Total Suspended Solids	7.00	5.00		mg/L	1	4/3/2017 12:10:00 PM



Analytical Report

Work Order: 1703343
Date Reported: 4/6/2017

Client: Shannon & Wilson

Collection Date: 3/30/2017 12:00:00 PM

Project: Willow Creek

Lab ID: 1703343-004

Matrix: Groundwater

Client Sample ID: WC-04-MAR17

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R35261	Analyst: MW	
Coliform, Fecal	95.0	1.00		CFU/100ml	1	3/30/2017 3:26:59 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R35279	Analyst: KT	
Chloride	5.39	0.100		mg/L	1	3/31/2017 11:05:00 AM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 16716	Analyst: WF	
Mercury	ND	0.100		µg/L	1	4/6/2017 2:59:04 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 16702	Analyst: TN	
Total Hardness (as CaCO ₃)	91.0	0.800		mg/L CaCO ₃	1	4/5/2017 3:16:59 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 16702	Analyst: TN	
Antimony	ND	0.200		µg/L	1	4/5/2017 3:16:59 PM
Arsenic	2.12	1.00		µg/L	1	4/5/2017 3:16:59 PM
Beryllium	ND	0.200		µg/L	1	4/5/2017 3:16:59 PM
Cadmium	ND	0.200		µg/L	1	4/5/2017 3:16:59 PM
Chromium	1.65	0.500		µg/L	1	4/5/2017 3:16:59 PM
Copper	2.44	0.500		µg/L	1	4/5/2017 3:16:59 PM
Lead	0.617	0.500		µg/L	1	4/5/2017 3:16:59 PM
Nickel	1.38	0.500		µg/L	1	4/5/2017 3:16:59 PM
Selenium	ND	1.00		µg/L	1	4/5/2017 3:16:59 PM
Silver	ND	0.200		µg/L	1	4/5/2017 3:16:59 PM
Thallium	ND	0.200		µg/L	1	4/5/2017 3:16:59 PM
Zinc	13.5	1.50		µg/L	1	4/5/2017 3:16:59 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 16713	Analyst: KT	
Phosphorus, Total (As P)	ND	0.200		mg/L	1	4/6/2017 1:13:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R35290	Analyst: KT	
Total Suspended Solids	ND	5.00		mg/L	1	4/3/2017 12:12:00 PM



Analytical Report

Work Order: 1703343
Date Reported: 4/6/2017

Client: Shannon & Wilson

Collection Date: 3/30/2017 12:20:00 PM

Project: Willow Creek

Lab ID: 1703343-005

Matrix: Groundwater

Client Sample ID: WC-05-MAR17

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R35261	Analyst: MW	
Coliform, Fecal	36.0	1.00		CFU/100ml	1	3/30/2017 3:26:59 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R35279	Analyst: KT	
Chloride	7.48	0.200	D	mg/L	2	3/31/2017 12:08:00 PM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 16716	Analyst: WF	
Mercury	ND	0.100		µg/L	1	4/6/2017 3:00:44 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 16702	Analyst: TN	
Total Hardness (as CaCO ₃)	83.5	0.800		mg/L CaCO ₃	1	4/5/2017 3:21:01 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 16702	Analyst: TN	
Antimony	ND	0.200		µg/L	1	4/5/2017 3:21:01 PM
Arsenic	1.66	1.00		µg/L	1	4/5/2017 3:21:01 PM
Beryllium	ND	0.200		µg/L	1	4/5/2017 3:21:01 PM
Cadmium	ND	0.200		µg/L	1	4/5/2017 3:21:01 PM
Chromium	2.08	0.500		µg/L	1	4/5/2017 3:21:01 PM
Copper	2.81	0.500		µg/L	1	4/5/2017 3:21:01 PM
Lead	ND	0.500		µg/L	1	4/5/2017 3:21:01 PM
Nickel	2.41	0.500		µg/L	1	4/5/2017 3:21:01 PM
Selenium	ND	1.00		µg/L	1	4/5/2017 3:21:01 PM
Silver	ND	0.200		µg/L	1	4/5/2017 3:21:01 PM
Thallium	ND	0.200		µg/L	1	4/5/2017 3:21:01 PM
Zinc	6.44	1.50		µg/L	1	4/5/2017 3:21:01 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 16713	Analyst: KT	
Phosphorus, Total (As P)	ND	0.200		mg/L	1	4/6/2017 1:15:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R35290	Analyst: KT	
Total Suspended Solids	9.00	5.00		mg/L	1	4/3/2017 12:14:00 PM



Analytical Report

Work Order: 1703343
Date Reported: 4/6/2017

Client: Shannon & Wilson

Collection Date: 3/30/2017 12:40:00 PM

Project: Willow Creek

Lab ID: 1703343-006

Matrix: Groundwater

Client Sample ID: WC-06-MAR17

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R35261	Analyst: MW	
Coliform, Fecal	32.0	1.00		CFU/100ml	1	3/30/2017 3:26:59 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R35279	Analyst: KT	
Chloride	7.55	0.200	D	mg/L	2	3/31/2017 12:18:00 PM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 16716	Analyst: WF	
Mercury	ND	0.100		µg/L	1	4/6/2017 3:02:25 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 16702	Analyst: TN	
Total Hardness (as CaCO ₃)	92.2	0.800		mg/L CaCO ₃	1	4/5/2017 3:25:02 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 16702	Analyst: TN	
Antimony	0.202	0.200		µg/L	1	4/5/2017 3:25:02 PM
Arsenic	2.52	1.00		µg/L	1	4/5/2017 3:25:02 PM
Beryllium	ND	0.200		µg/L	1	4/5/2017 3:25:02 PM
Cadmium	ND	0.200		µg/L	1	4/5/2017 3:25:02 PM
Chromium	2.67	0.500		µg/L	1	4/5/2017 3:25:02 PM
Copper	2.09	0.500		µg/L	1	4/5/2017 3:25:02 PM
Lead	ND	0.500		µg/L	1	4/5/2017 3:25:02 PM
Nickel	1.50	0.500		µg/L	1	4/5/2017 3:25:02 PM
Selenium	ND	1.00		µg/L	1	4/5/2017 3:25:02 PM
Silver	ND	0.200		µg/L	1	4/5/2017 3:25:02 PM
Thallium	ND	0.200		µg/L	1	4/5/2017 3:25:02 PM
Zinc	8.18	1.50		µg/L	1	4/5/2017 3:25:02 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 16713	Analyst: KT	
Phosphorus, Total (As P)	ND	0.200		mg/L	1	4/6/2017 1:23:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R35290	Analyst: KT	
Total Suspended Solids	5.00	5.00		mg/L	1	4/3/2017 12:16:00 PM



Analytical Report

Work Order: 1703343
Date Reported: 4/6/2017

Client: Shannon & Wilson

Collection Date: 3/30/2017 1:00:00 PM

Project: Willow Creek

Lab ID: 1703343-007

Matrix: Groundwater

Client Sample ID: WC-07-MAR17

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R35261	Analyst: MW	
Coliform, Fecal	62.0	1.00		CFU/100ml	1	3/30/2017 3:26:59 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R35279	Analyst: KT	
Chloride	5.47	0.100		mg/L	1	3/31/2017 11:34:00 AM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 16716	Analyst: WF	
Mercury	ND	0.100		µg/L	1	4/6/2017 3:04:07 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 16702	Analyst: TN	
Total Hardness (as CaCO ₃)	91.4	0.800		mg/L CaCO ₃	1	4/5/2017 3:29:03 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 16702	Analyst: TN	
Antimony	ND	0.200		µg/L	1	4/5/2017 3:29:03 PM
Arsenic	2.82	1.00		µg/L	1	4/5/2017 3:29:03 PM
Beryllium	ND	0.200		µg/L	1	4/5/2017 3:29:03 PM
Cadmium	ND	0.200		µg/L	1	4/5/2017 3:29:03 PM
Chromium	1.47	0.500		µg/L	1	4/5/2017 3:29:03 PM
Copper	1.92	0.500		µg/L	1	4/5/2017 3:29:03 PM
Lead	ND	0.500		µg/L	1	4/5/2017 3:29:03 PM
Nickel	1.55	0.500		µg/L	1	4/5/2017 3:29:03 PM
Selenium	ND	1.00		µg/L	1	4/5/2017 3:29:03 PM
Silver	ND	0.200		µg/L	1	4/5/2017 3:29:03 PM
Thallium	ND	0.200		µg/L	1	4/5/2017 3:29:03 PM
Zinc	8.04	1.50		µg/L	1	4/5/2017 3:29:03 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 16713	Analyst: KT	
Phosphorus, Total (As P)	ND	0.200		mg/L	1	4/6/2017 1:25:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R35290	Analyst: KT	
Total Suspended Solids	ND	5.00		mg/L	1	4/3/2017 12:18:00 PM



Work Order: 1703343
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Fecal Coliform by SM 9222D

Sample ID	MB-R35261			SampType:	MBLK			Units:	CFU/100ml			Prep Date:	3/30/2017			RunNo:	35261		
Client ID:	MBLKW			Batch ID:	R35261						Analysis Date:	3/30/2017			SeqNo:	674631			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual							
Coliform, Fecal		ND	1.00																



Date: 4/6/2017

Work Order: 1703343
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Total Hardness by EPA Method 200.8/SM 2340B

Sample ID	MB-16702	SampType:	MBLK	Units:	mg/L	Prep Date:	4/5/2017	RunNo:	35364		
Client ID:	MBLKW	Batch ID:	16702			Analysis Date:	4/5/2017	SeqNo:	677121		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Calcium	ND	0.100									
Magnesium	ND	0.100									

Sample ID	LCS-16702	SampType: LCS			Units: mg/L		Prep Date: 4/5/2017			RunNo: 35364		
Client ID:	LCSW	Batch ID: 16702			Analysis Date: 4/5/2017					SeqNo: 677122		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Calcium	1.11	0.100	1.000	0	111	50	150				
Magnesium	1.01	0.100	1.000	0	101	50	150				

Sample ID	1703353-001ADUP	SampType:	DUP	Units:	mg/L CaCO3	Prep Date:	4/5/2017	RunNo:	35364		
Client ID:	BATCH	Batch ID:	16702			Analysis Date:	4/5/2017	SeqNo:	677124		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Hardness (as CaCO3)	105	0.800						104.7	0.216	20	

Sample ID	1703353-001AMS	SampType: MS			Units: mg/L		Prep Date: 4/5/2017			RunNo: 35364		
Client ID:	BATCH	Batch ID: 16702			Analysis Date: 4/5/2017					SeqNo: 677125		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Calcium	33.4	0.100	5.000	27.33	121	50	150				
Magnesium	13.5	0.100	5.000	8.862	93.7	50	150				

Sample ID	1703353-001AMSD	SampType: MSD			Units: mg/L		Prep Date: 4/5/2017			RunNo: 35364		
Client ID:	BATCH	Batch ID: 16702			Analysis Date: 4/5/2017				SeqNo: 677126			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Calcium	32.9	0.100	5.000	27.33	111	50	150	33.36	1.44	20	
Magnesium	14.0	0.100	5.000	8.862	102	50	150	13.55	3.13	20	



Work Order: 1703343
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Total Hardness by EPA Method 200.8/SM 2340B

Sample ID	1703353-001AMSD		SampType:	MSD		Units:	mg/L		Prep Date:	4/5/2017		RunNo:	35364	
Client ID:	BATCH		Batch ID:	16702					Analysis Date:	4/5/2017		SeqNo:	677126	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual		



Date: 4/6/2017

Work Order: 1703343
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID	MB-R35279	SampType:	MBLK			Units:	mg/L			Prep Date:	3/31/2017			RunNo:	35279		
Client ID:	MBLKW	Batch ID:	R35279						Analysis Date:	3/31/2017			SeqNo:	675065			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual				

Chloride	ND	0.100										

Sample ID	LCS-R35279	SampType: LCS			Units: mg/L		Prep Date: 3/31/2017			RunNo: 35279		
Client ID:	LCSW	Batch ID: R35279			Analysis Date: 3/31/2017			SeqNo: 675066				
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	2.93	0.100	3.000	0	97.7	90	110					

Sample ID	1703343-007CDUP	SampType:	DUP	Units:	mg/L	Prep Date:	3/31/2017	RunNo:	35279			
Client ID:	WC-07-MAR17	Batch ID:	R35279			Analysis Date:	3/31/2017	SeqNo:	675080			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	5.48	0.100							5.472	0.223	20	

Sample ID	1703343-007CMS	SampType:	MS	Units:	mg/L	Prep Date:	3/31/2017	RunNo:	35279			
Client ID:	WC-07-MAR17	Batch ID:	R35279			Analysis Date:	3/31/2017	SeqNo:	675081			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	8.58	0.100	3.000	5.472	104	80	120					E

NOTES:

E - Estimated value. The amount exceeds the linear working range of the instrument.

Sample ID	1703343-007CMSD			SampType:	MSD		Units:	mg/L		Prep Date:	3/31/2017		RunNo:	35279	
Client ID:	WC-07-MAR17			Batch ID:	R35279					Analysis Date:	3/31/2017		SeqNo:	675082	
Analyte				Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual

Chloride	8.57	0.100	3.000	5.472	103	80	120	8.585	0.125	20	E	

NOTES:

E - Estimated value. The amount exceeds the linear working range of the instrument.

Work Order: 1703343
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Total Phosphorous by EPA Method 365.3

Sample ID	MB-16713	SampType: MBLK		Units: mg/L		Prep Date: 4/6/2017			RunNo: 35396			
Client ID:	MBLKW	Batch ID: 16713					Analysis Date: 4/6/2017			SeqNo: 677574		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Phosphorus, Total (As P)	ND	0.200									

Sample ID	LCS-16713	SampType: LCS			Units: mg/L		Prep Date: 4/6/2017			RunNo: 35396		
Client ID:	LCSW	Batch ID: 16713			Analysis Date: 4/6/2017			SeqNo: 677575				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Phosphorus, Total (As P)	2.17	0.200	2.000	0	109	65	135				

Sample ID	1703343-001BDUP	SampType:	DUP	Units:	mg/L	Prep Date:	4/6/2017	RunNo:	35396		
Client ID:	WC-01-MAR17	Batch ID:	16713			Analysis Date:	4/6/2017	SeqNo:	677577		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P)	ND	0.200						0		30	

Sample ID	1703343-001BMS	SampType:	MS	Units:	mg/L	Prep Date:	4/6/2017	RunNo:	35396		
Client ID:	WC-01-MAR17	Batch ID:	16713			Analysis Date:	4/6/2017	SeqNo:	677578		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P)	2.13	0.200	2.000	0.08480	102	65	135				

Sample ID	1703343-001BMSD	SampType:	MSD	Units:	mg/L	Prep Date:	4/6/2017	RunNo:	35396		
Client ID:	WC-01-MAR17	Batch ID:	16713			Analysis Date:	4/6/2017	SeqNo:	677579		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P)	2.14	0.200	2.000	0.08480	103	65	135	2.127	0.843	30	



Date: 4/6/2017

Work Order: 1703343
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Suspended Solids (TSS) by SM 2540D

Sample ID	MB-R35290	SampType:	MBLK			Units:	mg/L			Prep Date:	4/3/2017		RunNo:	35290	
Client ID:	MBLKW	Batch ID:	R35290						Analysis Date:	4/3/2017			SeqNo:	675247	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual		

Total Suspended Solids ND 5.00

Sample ID	LCS-R35290	SampType:	LCS	Units:	mg/L	Prep Date:	4/3/2017	RunNo:	35290		
Client ID:	LCSW	Batch ID:	R35290			Analysis Date:	4/3/2017	SeqNo:	675248		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Suspended Solids 270 10.0 300.0 0 90.0 65 135

Sample ID	1703343-001CDUP	SampType:	DUP	Units:	mg/L	Prep Date:	4/3/2017	RunNo:	35290			
Client ID:	WC-01-MAR17	Batch ID:	R35290			Analysis Date:	4/3/2017	SeqNo:	675250			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Suspended Solids 15.0 5.00 14.00 6.90 30

Sample ID	1703364-001CDUP	SampType:	DUP	Units:	mg/L	Prep Date:	4/3/2017	RunNo:	35290			
Client ID:	BATCH	Batch ID:	R35290			Analysis Date:	4/3/2017	SeqNo:	675262			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Suspended Solids 92.0 5.00 92.00 0 30



Date: 4/6/2017

Work Order: 1703343
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	MB-16702	SampType:	MBLK		Units:	µg/L		Prep Date:	4/5/2017		RunNo:	35363	
Client ID:	MBLKW	Batch ID:	16702					Analysis Date:	4/5/2017		SeqNo:	677073	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual
Antimony		ND	0.200										
Arsenic		ND	1.00										
Beryllium		ND	0.200										
Cadmium		ND	0.200										
Chromium		ND	0.500										
Copper		ND	0.500										
Lead		ND	0.500										
Nickel		ND	0.500										
Selenium		ND	1.00										
Silver		ND	0.200										
Thallium		ND	0.200										
Zinc		ND	1.50										

Sample ID	LCS-16702	SampType:	LCS	Units:	µg/L	Prep Date:	4/5/2017	RunNo:	35363		
Client ID:	LCSW	Batch ID:	16702			Analysis Date:	4/5/2017	SeqNo:	677074		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	4.71	0.200	5.000	0	94.2	85	115				
Arsenic	97.7	1.00	100.0	0	97.7	85	115				
Beryllium	4.92	0.200	5.000	0	98.3	85	115				
Cadmium	4.70	0.200	5.000	0	94.0	85	115				
Chromium	95.3	0.500	100.0	0	95.3	85	115				
Copper	97.1	0.500	100.0	0	97.1	85	115				
Lead	47.7	0.500	50.00	0	95.4	85	115				
Nickel	97.3	0.500	100.0	0	97.3	85	115				
Selenium	9.83	1.00	10.00	0	98.3	85	115				
Silver	4.63	0.200	5.000	0	92.7	85	115				
Thallium	2.45	0.200	2.500	0	97.8	85	115				
Zinc	100	1.50	100.0	0	100	85	115				



Date: 4/6/2017

Work Order: 1703343
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	1703353-001ADUP	SampType:	DUP	Units:	µg/L	Prep Date:	4/5/2017	RunNo:	35363		
Client ID:	BATCH	Batch ID:	16702			Analysis Date:	4/5/2017	SeqNo:	677076		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	1.24	0.200						1.462	16.3	30	R
Arsenic	1.70	1.00						1.782	4.86	30	
Beryllium	ND	0.200						0		30	
Cadmium	ND	0.200						0		30	
Chromium	2.23	0.500						1.602	32.6	30	
Copper	2.36	0.500						2.546	7.73	30	
Lead	ND	0.500						0.5985	61.2	30	
Nickel	1.65	0.500						1.959	17.0	30	
Selenium	ND	1.00						0		30	
Silver	ND	0.200						0		30	
Thallium	ND	0.200						0		30	
Zinc	12.9	1.50						13.63	5.88	30	

NOTES:

R - High RPD observed. The method is in control as indicated by the LCS.

Sample ID	1703353-001AMS	SampType: MS			Units: µg/L	Prep Date: 4/5/2017			RunNo: 35363		
Client ID:	BATCH	Batch ID: 16702			Analysis Date: 4/5/2017			SeqNo: 677077			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	26.3	0.200	25.00	1.462	99.2	70	130				
Arsenic	508	1.00	500.0	1.782	101	70	130				
Beryllium	24.1	0.200	25.00	0	96.6	70	130				
Cadmium	23.5	0.200	25.00	0.08750	93.7	70	130				
Chromium	504	0.500	500.0	1.602	100	70	130				
Copper	501	0.500	500.0	2.546	99.7	70	130				
Lead	241	0.500	250.0	0.5985	96.3	70	130				
Nickel	516	0.500	500.0	1.959	103	70	130				
Selenium	52.4	1.00	50.00	0.2040	104	70	130				
Silver	15.1	0.200	25.00	0	60.5	70	130				S
Thallium	12.5	0.200	12.50	0	100	70	130				
Zinc	526	1.50	500.0	13.63	102	70	130				



Date: 4/6/2017

Work Order: 1703343
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	1703353-001AMS	SampType:	MS	Units:	µg/L	Prep Date:	4/5/2017	RunNo:	35363		
Client ID:	BATCH	Batch ID:	16702			Analysis Date:	4/5/2017	SeqNo:	677077		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.

Sample ID	1703353-001AMSD	SampType: MSD			Units: µg/L	Prep Date: 4/5/2017			RunNo: 35363		
Client ID:	BATCH	Batch ID: 16702			Analysis Date: 4/5/2017			SeqNo: 677078			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	26.1	0.200	25.00	1.462	98.6	70	130	26.26	0.611	30	S
Arsenic	513	1.00	500.0	1.782	102	70	130	508.4	0.820	30	
Beryllium	24.0	0.200	25.00	0	96.0	70	130	24.14	0.600	30	
Cadmium	23.5	0.200	25.00	0.08750	93.5	70	130	23.50	0.115	30	
Chromium	503	0.500	500.0	1.602	100	70	130	503.7	0.0868	30	
Copper	503	0.500	500.0	2.546	100	70	130	501.2	0.411	30	
Lead	238	0.500	250.0	0.5985	94.9	70	130	241.4	1.49	30	
Nickel	502	0.500	500.0	1.959	100	70	130	515.6	2.65	30	
Selenium	49.5	1.00	50.00	0.2040	98.6	70	130	52.38	5.68	30	
Silver	14.9	0.200	25.00	0	59.5	70	130	15.12	1.68	30	
Thallium	12.1	0.200	12.50	0	97.1	70	130	12.51	3.04	30	
Zinc	515	1.50	500.0	13.63	100	70	130	525.8	2.06	30	

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.



Date: 4/6/2017

Work Order: 1703343
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Mercury by EPA Method 245.1

Sample ID	MB-16716	SampType:	MBLK			Units:	µg/L			Prep Date:	4/6/2017			RunNo:	35392		
Client ID:	MBLKW	Batch ID:	16716							Analysis Date:	4/6/2017			SeqNo:	677710		
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual				

Mercury	ND	0.100										

Sample ID	LCS-16716	SampType:	LCS	Units:	µg/L	Prep Date:	4/6/2017	RunNo:	35392		
Client ID:	LCSW	Batch ID:	16716			Analysis Date:	4/6/2017	SeqNo:	677712		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	2.67	0.100	2.500	0	107	85	115					

Sample ID	1703336-002ADUP	SampType:	DUP	Units:	µg/L	Prep Date:	4/6/2017	RunNo:	35392			
Client ID:	BATCH	Batch ID:	16716			Analysis Date:	4/6/2017	SeqNo:	677714			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	ND	0.100							0		20	

Sample ID	1703336-002AMS	SampType:	MS	Units:	µg/L	Prep Date:	4/6/2017	RunNo:	35392			
Client ID:	BATCH	Batch ID:	16716			Analysis Date:	4/6/2017	SeqNo:	677715			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	2.49	0.100	2.500	0.03200	98.3	80	120					

Sample ID	1703336-002AMSD	SampType:	MSD	Units:	µg/L	Prep Date:	4/6/2017	RunNo:	35392			
Client ID:	BATCH	Batch ID:	16716			Analysis Date:	4/6/2017	SeqNo:	677716			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	2.47	0.100	2.500	0.03200	97.5	80	120	2.490	0.806	20		

Client Name: **SW**

Work Order Number: **1703343**

Logged by: **Clare Griggs**

Date Received: **3/30/2017 2:22:00 PM**

Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
2. How was the sample delivered? Client

Log In

3. Coolers are present? Yes ☒ No ☐ NA ☐
4. Shipping container/cooler in good condition? Yes ☒ No ☐
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes ☐ No ☐ Not Required ☒
6. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
7. Were all items received at a temperature of $>0^{\circ}\text{C}$ to 10.0°C^* Yes ☒ No ☐ NA ☐
8. Sample(s) in proper container(s)? Yes ☒ No ☐
9. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
10. Are samples properly preserved? Yes ☒ No ☐
11. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
12. Is there headspace in the VOA vials? Yes ☐ No ☐ NA ☒
13. Did all samples containers arrive in good condition(unbroken)? Yes ☒ No ☐
14. Does paperwork match bottle labels? Yes ☒ No ☐
15. Are matrices correctly identified on Chain of Custody? Yes ☐ No ☒
16. Is it clear what analyses were requested? Yes ☒ No ☐
17. Were all holding times able to be met? Yes ☒ No ☐

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified: Date

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

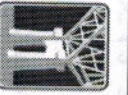
Client Instructions:

19. Additional remarks:

Item Information

Item #	Temp $^{\circ}\text{C}$
Cooler	1.2
Sample	1.2
Temp Blank	1.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



Fremont

Analytical

3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record & Laboratory Services Agreement

Date: 3/30/17 Page: 1707749 of: 23

Project Name: Wilson Creek

Project No: 21-1-12588-032

Collected by: Chris Herndon

Location: Edmonds, WA

Report To (PM): DAVE CUNE

PM Email: DAC@STANWIL.COM

Laboratory Project No (Internal): 1707749
Special Remarks:

Sample Disposal: ☐ Return to client ☐ Disposal by lab (after 30 days)

Client: Shannon Wilson
Address: 1100 N 34th St #100
City, State, Zip: Seattle, WA 98103
Telephone: 206 695 6706

Fax:

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)	VOCs (EPA 8260 / 624)	GX/BTEX	BTEX	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCD)	Diesel/Heavy Oil Range Organics (DHO)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)	Anions (IC)**	EDB (8011)	FECAL COLIFORM	TSS	HARDNESS	TOTAL PHOSPHORUS	TOTAL PERSULFATE	NITROGEN

Comments

1	WC-01-MAR17	3/30/17	10:30																			
2	WC-02-MAR17	3/30/17	11:00																			
3	WC-03-MAR17	3/30/17	11:30																			
4	WC-04-MAR17	3/30/17	12:00																			
5	WC-05-MAR17	3/30/17	12:20																			
6	WC-06-MAR17	3/30/17	12:40																			
7	WC-07-MAR17	3/30/17	13:00																			
8																						
9																						
10																						

*Matrix: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

**Metals (Circle): MTCA-5 RCRA-8 TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Ti U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide Iodide O-Phosphate Fluoride Nitrate+Nitrite

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above and that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished: [Signature] Date/Time: 3/30/17 14:22 Received: [Signature] Date/Time: 3/30/17 1422

Relinquished: [Signature] Date/Time: 3/30/17 14:22 Received: [Signature] Date/Time: 3/30/17 1422

Relinquished: [Signature] Date/Time: 3/30/17 14:22 Received: [Signature] Date/Time: 3/30/17 1422

Turn-around Time:

☒ Standard

☐ 3 Day

☐ 2 Day

☐ Next Day

Same Day (specify)



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Shannon & Wilson

Dave Cline
400 N. 34th Street, Suite 100
Seattle, WA 98103

RE: Willow Creek

Work Order Number: 1706323

July 14, 2017

Attention Dave Cline:

Fremont Analytical, Inc. received 7 sample(s) on 6/27/2017 for the analyses presented in the following report.

Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.
Fecal Coliform by SM 9222D
Herbicides by EPA Method 8151A
Ion Chromatography by EPA Method 300.0
Mercury by EPA Method 245.1
Organochlorine Pesticides by EPA Method 8081
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)
Total Metals by EPA Method 200.8
Total Hardness by EPA Method 200.8/SM 2340B
Total Phosphorous by EPA Method 365.3
Total Suspended Solids (TSS) by SM 2540D

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

Mike Ridgeway
Laboratory Director

CLIENT: Shannon & Wilson
Project: Willow Creek
Work Order: 1706323

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1706323-001	WC-1	06/27/2017 8:30 AM	06/27/2017 2:19 PM
1706323-002	WC -2	06/27/2017 10:26 AM	06/27/2017 2:19 PM
1706323-003	WC -3	06/27/2017 9:30 AM	06/27/2017 2:19 PM
1706323-004	WC -4	06/27/2017 9:45 AM	06/27/2017 2:19 PM
1706323-005	WC -5	06/27/2017 12:25 PM	06/27/2017 2:19 PM
1706323-006	WC -6	06/27/2017 11:43 AM	06/27/2017 2:19 PM
1706323-007	WC -7	06/27/2017 1:05 PM	06/27/2017 2:19 PM

CLIENT: Shannon & Wilson
Project: Willow Creek

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 8:30:00 AM

Project: Willow Creek

Lab ID: 1706323-001

Matrix: Water

Client Sample ID: WC-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Fecal Coliform by SM 9222D

Batch ID: R37096 Analyst: MW

Coliform, Fecal	13.0	1.00		CFU/100ml	1	6/27/2017 3:00:05 PM

Organochlorine Pesticides by EPA Method 8081

Batch ID: 17482 Analyst: SG

Toxaphene	ND	0.995		µg/L	1	7/6/2017 7:07:34 PM
alpha-BHC	ND	0.0995		µg/L	1	7/6/2017 7:07:34 PM
beta-BHC	ND	0.0995		µg/L	1	7/6/2017 7:07:34 PM
Gamma BHC (Lindane)	ND	0.0995		µg/L	1	7/6/2017 7:07:34 PM
delta-BHC	ND	0.0995		µg/L	1	7/6/2017 7:07:34 PM
Heptachlor	ND	0.0995		µg/L	1	7/6/2017 7:07:34 PM
Aldrin	ND	0.0995		µg/L	1	7/6/2017 7:07:34 PM
Heptachlor epoxide	ND	0.0995		µg/L	1	7/6/2017 7:07:34 PM
gamma-Chlordane	ND	0.0995		µg/L	1	7/6/2017 7:07:34 PM
Endosulfan I	ND	0.0995		µg/L	1	7/6/2017 7:07:34 PM
alpha-Chlordane	ND	0.0995		µg/L	1	7/6/2017 7:07:34 PM
Dieldrin	ND	0.0995		µg/L	1	7/6/2017 7:07:34 PM
4,4'-DDE	ND	0.149		µg/L	1	7/6/2017 7:07:34 PM
Endrin	ND	0.149		µg/L	1	7/6/2017 7:07:34 PM
Endosulfan II	ND	0.149		µg/L	1	7/6/2017 7:07:34 PM
4,4'-DDD	ND	0.149		µg/L	1	7/6/2017 7:07:34 PM
Endrin aldehyde	ND	0.149		µg/L	1	7/6/2017 7:07:34 PM
Endosulfan sulfate	ND	0.149		µg/L	1	7/6/2017 7:07:34 PM
4,4'-DDT	ND	0.149		µg/L	1	7/6/2017 7:07:34 PM
Endrin ketone	ND	0.149		µg/L	1	7/6/2017 7:07:34 PM
Methoxychlor	ND	0.497		µg/L	1	7/6/2017 7:07:34 PM
Surr: Decachlorobiphenyl	109	31 - 151		%Rec	1	7/6/2017 7:07:34 PM
Surr: Tetrachloro-m-xylene	92.9	31.4 - 125		%Rec	1	7/6/2017 7:07:34 PM

Herbicides by EPA Method 8151A

Batch ID: 17481 Analyst: BT

Dicamba	ND	4.47		µg/L	1	6/30/2017 3:46:47 AM
2,4-D	ND	1.99		µg/L	1	6/30/2017 3:46:47 AM
2,4-DP	ND	0.994		µg/L	1	6/30/2017 3:46:47 AM
2,4,5-TP (Silvex)	ND	0.596		µg/L	1	6/30/2017 3:46:47 AM
2,4,5-T	ND	0.994		µg/L	1	6/30/2017 3:46:47 AM
Dinoseb	ND	3.73		µg/L	1	6/30/2017 3:46:47 AM
Dalapon	ND	3.98		µg/L	1	6/30/2017 3:46:47 AM
2,4-DB	ND	2.98		µg/L	1	6/30/2017 3:46:47 AM
MCPP	ND	9.94		µg/L	1	6/30/2017 3:46:47 AM

Original



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 8:30:00 AM

Project: Willow Creek

Lab ID: 1706323-001

Matrix: Water

Client Sample ID: WC-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Herbicides by EPA Method 8151A

Batch ID: 17481

Analyst: BT

MCPA	ND	9.94		µg/L	1	6/30/2017 3:46:47 AM
Picloram	ND	0.497		µg/L	1	6/30/2017 3:46:47 AM
Bentazon	ND	2.68		µg/L	1	6/30/2017 3:46:47 AM
Chloramben	ND	1.19		µg/L	1	6/30/2017 3:46:47 AM
Acifluorfen	ND	4.22		µg/L	1	6/30/2017 3:46:47 AM
3,5-Dichlorobenzoic acid	ND	4.97		µg/L	1	6/30/2017 3:46:47 AM
4-Nitrophenol	ND	0.746		µg/L	1	6/30/2017 3:46:47 AM
Dacthal (DCPA)	ND	0.845		µg/L	1	6/30/2017 3:46:47 AM
Surr: 2,4-Dichlorophenylacetic acid	99.0	34.8 - 149		%Rec	1	6/30/2017 3:46:47 AM

Ion Chromatography by EPA Method 300.0

Batch ID: R37195

Analyst: KT

Chloride	14,600	1,000	D	mg/L	10000	7/3/2017 8:50:00 PM

Mercury by EPA Method 245.1

Batch ID: 17507

Analyst: WF

Mercury	ND	0.100		µg/L	1	6/30/2017 5:09:35 PM

Total Hardness by EPA Method 200.8/SM 2340B

Batch ID: 17496

Analyst: TN

Total Hardness (as CaCO ₃)	3,800	8.00	D	mg/L CaCO ₃	10	6/29/2017 12:16:18 PM

Total Metals by EPA Method 200.8

Batch ID: 17496

Analyst: TN

Antimony	ND	2.00	D	µg/L	10	6/29/2017 12:16:18 PM
Arsenic	2.53	10.0	JD	µg/L	10	6/29/2017 12:16:18 PM
Beryllium	ND	2.00	D	µg/L	10	6/29/2017 12:16:18 PM
Cadmium	ND	2.00	D	µg/L	10	6/29/2017 12:16:18 PM
Chromium	2.25	5.00	JD	µg/L	10	6/29/2017 12:16:18 PM
Copper	2.49	5.00	JD	µg/L	10	6/29/2017 12:16:18 PM
Lead	ND	5.00	D	µg/L	10	6/29/2017 12:16:18 PM
Nickel	2.91	5.00	JD	µg/L	10	6/29/2017 12:16:18 PM
Selenium	ND	10.0	D	µg/L	10	6/29/2017 12:16:18 PM
Silver	ND	2.00	D	µg/L	10	6/29/2017 12:16:18 PM
Thallium	ND	2.00	D	µg/L	10	6/29/2017 12:16:18 PM
Zinc	17.0	15.0	D	µg/L	10	6/29/2017 12:16:18 PM

NOTES:

Diluted due to matrix.



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 8:30:00 AM

Project: Willow Creek

Lab ID: 1706323-001

Matrix: Water

Client Sample ID: WC-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Total Phosphorous by EPA Method 365.3

Batch ID: 17515 Analyst: KT

Phosphorus, Total (As P)	ND	0.200		mg/L	1	6/30/2017 11:59:00 AM

Total Suspended Solids (TSS) by SM 2540D

Batch ID: R37141 Analyst: KT

Total Suspended Solids	ND	5.00		mg/L	1	6/30/2017 2:10:00 PM



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 10:26:00 AM

Project: Willow Creek

Lab ID: 1706323-002

Matrix: Water

Client Sample ID: WC -2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Fecal Coliform by SM 922D

Batch ID: R37096 Analyst: MW

Coliform, Fecal	392	1.00		CFU/100ml	1	6/27/2017 3:00:05 PM

Organochlorine Pesticides by EPA Method 8081

Batch ID: 17482 Analyst: SG

Toxaphene	ND	0.999		µg/L	1	7/6/2017 7:27:32 PM
alpha-BHC	ND	0.0999		µg/L	1	7/6/2017 7:27:32 PM
beta-BHC	ND	0.0999		µg/L	1	7/6/2017 7:27:32 PM
Gamma BHC (Lindane)	ND	0.0999		µg/L	1	7/6/2017 7:27:32 PM
delta-BHC	ND	0.0999		µg/L	1	7/6/2017 7:27:32 PM
Heptachlor	ND	0.0999		µg/L	1	7/6/2017 7:27:32 PM
Aldrin	ND	0.0999		µg/L	1	7/6/2017 7:27:32 PM
Heptachlor epoxide	ND	0.0999		µg/L	1	7/6/2017 7:27:32 PM
gamma-Chlordane	ND	0.0999		µg/L	1	7/6/2017 7:27:32 PM
Endosulfan I	ND	0.0999		µg/L	1	7/6/2017 7:27:32 PM
alpha-Chlordane	ND	0.0999		µg/L	1	7/6/2017 7:27:32 PM
Dieldrin	ND	0.0999		µg/L	1	7/6/2017 7:27:32 PM
4,4'-DDE	ND	0.150		µg/L	1	7/6/2017 7:27:32 PM
Endrin	ND	0.150		µg/L	1	7/6/2017 7:27:32 PM
Endosulfan II	ND	0.150		µg/L	1	7/6/2017 7:27:32 PM
4,4'-DDD	ND	0.150		µg/L	1	7/6/2017 7:27:32 PM
Endrin aldehyde	ND	0.150		µg/L	1	7/6/2017 7:27:32 PM
Endosulfan sulfate	ND	0.150		µg/L	1	7/6/2017 7:27:32 PM
4,4'-DDT	ND	0.150		µg/L	1	7/6/2017 7:27:32 PM
Endrin ketone	ND	0.150		µg/L	1	7/6/2017 7:27:32 PM
Methoxychlor	ND	0.499		µg/L	1	7/6/2017 7:27:32 PM
Surr: Decachlorobiphenyl	101	31 - 151		%Rec	1	7/6/2017 7:27:32 PM
Surr: Tetrachloro-m-xylene	86.5	31.4 - 125		%Rec	1	7/6/2017 7:27:32 PM

Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.

Batch ID: 17504 Analyst: SB

Diesel (Fuel Oil)	ND	49.9		µg/L	1	6/30/2017 5:24:29 PM
Heavy Oil	ND	99.7		µg/L	1	6/30/2017 5:24:29 PM
Surr: 2-Fluorobiphenyl	84.3	50 - 150		%Rec	1	6/30/2017 5:24:29 PM
Surr: o-Terphenyl	76.6	50 - 150		%Rec	1	6/30/2017 5:24:29 PM

Herbicides by EPA Method 8151A

Batch ID: 17481 Analyst: BT

Dicamba	ND	4.50		µg/L	1	6/30/2017 4:27:17 AM
2,4-D	ND	2.00		µg/L	1	6/30/2017 4:27:17 AM

Original



Analytical Report

Work Order: 1706323

Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 10:26:00 AM

Project: Willow Creek

Lab ID: 1706323-002

Matrix: Water

Client Sample ID: WC -2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Herbicides by EPA Method 8151A

Batch ID: 17481

Analyst: BT

2,4-DP	ND	1.00		µg/L	1	6/30/2017 4:27:17 AM
2,4,5-TP (Silvex)	ND	0.600		µg/L	1	6/30/2017 4:27:17 AM
2,4,5-T	ND	1.00		µg/L	1	6/30/2017 4:27:17 AM
Dinoseb	ND	3.75		µg/L	1	6/30/2017 4:27:17 AM
Dalapon	ND	4.00		µg/L	1	6/30/2017 4:27:17 AM
2,4-DB	ND	3.00		µg/L	1	6/30/2017 4:27:17 AM
MCPP	ND	10.0		µg/L	1	6/30/2017 4:27:17 AM
MCPA	ND	10.0		µg/L	1	6/30/2017 4:27:17 AM
Picloram	ND	0.500		µg/L	1	6/30/2017 4:27:17 AM
Bentazon	ND	2.70		µg/L	1	6/30/2017 4:27:17 AM
Chloramben	ND	1.20		µg/L	1	6/30/2017 4:27:17 AM
Acifluorfen	ND	4.25		µg/L	1	6/30/2017 4:27:17 AM
3,5-Dichlorobenzoic acid	ND	5.00		µg/L	1	6/30/2017 4:27:17 AM
4-Nitrophenol	ND	0.750		µg/L	1	6/30/2017 4:27:17 AM
Dacthal (DCPA)	ND	0.850		µg/L	1	6/30/2017 4:27:17 AM
Surr: 2,4-Dichlorophenylacetic acid	69.2	34.8 - 149		%Rec	1	6/30/2017 4:27:17 AM

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Batch ID: 17474

Analyst: BT

Naphthalene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
2-Methylnaphthalene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
1-Methylnaphthalene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Acenaphthylene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Acenaphthene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Fluorene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Phenanthrene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Anthracene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Fluoranthene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Pyrene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Benz(a)anthracene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Chrysene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Benzo(b)fluoranthene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Benzo(k)fluoranthene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Benzo(a)pyrene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Indeno(1,2,3-cd)pyrene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Dibenz(a,h)anthracene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Benzo(g,h,i)perylene	ND	0.0995		µg/L	1	6/30/2017 4:01:11 PM
Surr: 2-Fluorobiphenyl	112	31.2 - 159		%Rec	1	6/30/2017 4:01:11 PM
Surr: Terphenyl-d14	90.5	21.9 - 122		%Rec	1	6/30/2017 4:01:11 PM

Original



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 10:26:00 AM

Project: Willow Creek

Lab ID: 1706323-002

Matrix: Water

Client Sample ID: WC -2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Ion Chromatography by EPA Method 300.0

Batch ID: R37195 Analyst: KT

Chloride	9,670	1,000	D	mg/L	10000	7/3/2017 9:11:00 PM

Mercury by EPA Method 245.1

Batch ID: 17507 Analyst: WF

Mercury	ND	0.100		µg/L	1	6/30/2017 5:16:25 PM

Total Hardness by EPA Method 200.8/SM 2340B

Batch ID: 17480 Analyst: TN

Total Hardness (as CaCO ₃)	3,420	8.00	D	mg/L CaCO ₃	10	6/28/2017 3:42:47 PM

NOTES:

I - Indicates an analyte with an internal standard that does not meet established acceptance criteria.

Diluted due to matrix.

Total Metals by EPA Method 200.8

Batch ID: 17480 Analyst: TN

Antimony	ND	2.00	D	µg/L	10	6/28/2017 3:42:47 PM
Arsenic	2.09	10.0	JD	µg/L	10	6/28/2017 3:42:47 PM
Beryllium	ND	2.00	D	µg/L	10	6/28/2017 3:42:47 PM
Cadmium	ND	2.00	D	µg/L	10	6/28/2017 3:42:47 PM
Chromium	1.21	5.00	JD	µg/L	10	6/28/2017 3:42:47 PM
Copper	2.32	5.00	JD	µg/L	10	6/28/2017 3:42:47 PM
Lead	ND	5.00	D	µg/L	10	6/28/2017 3:42:47 PM
Nickel	1.26	5.00	JD	µg/L	10	6/28/2017 3:42:47 PM
Selenium	ND	10.0	D	µg/L	10	6/28/2017 3:42:47 PM
Silver	ND	2.00	D	µg/L	10	6/28/2017 3:42:47 PM
Thallium	ND	0.200		µg/L	1	6/28/2017 2:37:17 PM
Zinc	17.3	15.0	D	µg/L	10	6/28/2017 3:42:47 PM

NOTES:

I - Indicates an analyte with an internal standard that does not meet established acceptance criteria.

Diluted due to matrix.

Total Phosphorous by EPA Method 365.3

Batch ID: 17515 Analyst: KT

Phosphorus, Total (As P)	ND	0.200		mg/L	1	6/30/2017 12:07:00 PM

Total Suspended Solids (TSS) by SM 2540D

Batch ID: R37141 Analyst: KT

Total Suspended Solids	5.00	5.00		mg/L	1	6/30/2017 2:12:00 PM



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 9:30:00 AM

Project: Willow Creek

Lab ID: 1706323-003

Matrix: Water

Client Sample ID: WC -3

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Fecal Coliform by SM 9222D

Batch ID: R37096 Analyst: MW

Coliform, Fecal	32.0	1.00		CFU/100ml	1	6/27/2017 3:00:05 PM

Organochlorine Pesticides by EPA Method 8081

Batch ID: 17482 Analyst: SG

Toxaphene	ND	1.00		µg/L	1	7/6/2017 7:37:35 PM
alpha-BHC	ND	0.100		µg/L	1	7/6/2017 7:37:35 PM
beta-BHC	ND	0.100		µg/L	1	7/6/2017 7:37:35 PM
Gamma BHC (Lindane)	ND	0.100		µg/L	1	7/6/2017 7:37:35 PM
delta-BHC	ND	0.100		µg/L	1	7/6/2017 7:37:35 PM
Heptachlor	ND	0.100		µg/L	1	7/6/2017 7:37:35 PM
Aldrin	ND	0.100		µg/L	1	7/6/2017 7:37:35 PM
Heptachlor epoxide	ND	0.100		µg/L	1	7/6/2017 7:37:35 PM
gamma-Chlordane	ND	0.100		µg/L	1	7/6/2017 7:37:35 PM
Endosulfan I	ND	0.100		µg/L	1	7/6/2017 7:37:35 PM
alpha-Chlordane	ND	0.100		µg/L	1	7/6/2017 7:37:35 PM
Dieldrin	ND	0.100		µg/L	1	7/6/2017 7:37:35 PM
4,4'-DDE	ND	0.151		µg/L	1	7/6/2017 7:37:35 PM
Endrin	ND	0.151		µg/L	1	7/6/2017 7:37:35 PM
Endosulfan II	ND	0.151		µg/L	1	7/6/2017 7:37:35 PM
4,4'-DDD	ND	0.151		µg/L	1	7/6/2017 7:37:35 PM
Endrin aldehyde	ND	0.151		µg/L	1	7/6/2017 7:37:35 PM
Endosulfan sulfate	ND	0.151		µg/L	1	7/6/2017 7:37:35 PM
4,4'-DDT	ND	0.151		µg/L	1	7/6/2017 7:37:35 PM
Endrin ketone	ND	0.151		µg/L	1	7/6/2017 7:37:35 PM
Methoxychlor	ND	0.502		µg/L	1	7/6/2017 7:37:35 PM
Surr: Decachlorobiphenyl	65.2	31 - 151		%Rec	1	7/6/2017 7:37:35 PM
Surr: Tetrachloro-m-xylene	83.2	31.4 - 125		%Rec	1	7/6/2017 7:37:35 PM

Herbicides by EPA Method 8151A

Batch ID: 17481 Analyst: BT

Dicamba	ND	4.51		µg/L	1	6/30/2017 12:06:31 PM
2,4-D	ND	2.01		µg/L	1	6/30/2017 12:06:31 PM
2,4-DP	ND	1.00		µg/L	1	6/30/2017 12:06:31 PM
2,4,5-TP (Silvex)	ND	0.602		µg/L	1	6/30/2017 12:06:31 PM
2,4,5-T	ND	1.00		µg/L	1	6/30/2017 12:06:31 PM
Dinoseb	ND	3.76		µg/L	1	6/30/2017 12:06:31 PM
Dalapon	ND	4.01		µg/L	1	6/30/2017 12:06:31 PM
2,4-DB	ND	3.01		µg/L	1	6/30/2017 12:06:31 PM
MCPP	ND	10.0		µg/L	1	6/30/2017 12:06:31 PM

Original



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 9:30:00 AM

Project: Willow Creek

Lab ID: 1706323-003

Matrix: Water

Client Sample ID: WC -3

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Herbicides by EPA Method 8151A</u>				Batch ID: 17481		Analyst: BT
MCPA	ND	10.0		µg/L	1	6/30/2017 12:06:31 PM
Picloram	ND	0.501		µg/L	1	6/30/2017 12:06:31 PM
Bentazon	ND	2.71		µg/L	1	6/30/2017 12:06:31 PM
Chloramben	ND	1.20		µg/L	1	6/30/2017 12:06:31 PM
Acifluorfen	ND	4.26		µg/L	1	6/30/2017 12:06:31 PM
3,5-Dichlorobenzoic acid	ND	5.01		µg/L	1	6/30/2017 12:06:31 PM
4-Nitrophenol	ND	0.752		µg/L	1	6/30/2017 12:06:31 PM
Dacthal (DCPA)	ND	0.852		µg/L	1	6/30/2017 12:06:31 PM
Surr: 2,4-Dichlorophenylacetic acid	65.3	34.8 - 149		%Rec	1	6/30/2017 12:06:31 PM
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: R37195		Analyst: KT
Chloride	18.6	1.00	D	mg/L	10	7/3/2017 4:37:00 PM
<u>Mercury by EPA Method 245.1</u>				Batch ID: 17507		Analyst: WF
Mercury	ND	0.100		µg/L	1	6/30/2017 5:18:06 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>				Batch ID: 17480		Analyst: TN
Total Hardness (as CaCO ₃)	73.3	0.800		mg/L CaCO ₃	1	6/28/2017 2:41:19 PM
<u>Total Metals by EPA Method 200.8</u>				Batch ID: 17480		Analyst: TN
Antimony	1.30	0.200		µg/L	1	6/28/2017 2:41:19 PM
Arsenic	1.42	1.00		µg/L	1	6/28/2017 2:41:19 PM
Beryllium	ND	0.200		µg/L	1	6/28/2017 2:41:19 PM
Cadmium	ND	0.200		µg/L	1	6/28/2017 2:41:19 PM
Chromium	1.00	0.500		µg/L	1	6/28/2017 2:41:19 PM
Copper	6.30	0.500		µg/L	1	6/28/2017 2:41:19 PM
Lead	ND	0.500		µg/L	1	6/28/2017 2:41:19 PM
Nickel	2.21	0.500		µg/L	1	6/28/2017 2:41:19 PM
Selenium	ND	1.00		µg/L	1	6/28/2017 2:41:19 PM
Silver	ND	0.200		µg/L	1	6/28/2017 2:41:19 PM
Thallium	ND	0.200		µg/L	1	6/28/2017 2:41:19 PM
Zinc	29.0	1.50		µg/L	1	6/28/2017 2:41:19 PM



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 9:30:00 AM

Project: Willow Creek

Lab ID: 1706323-003

Matrix: Water

Client Sample ID: WC -3

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Total Phosphorous by EPA Method 365.3

Batch ID: 17515 Analyst: KT

Phosphorus, Total (As P)	0.392	0.200		mg/L	1	6/30/2017 12:10:00 PM

Total Suspended Solids (TSS) by SM 2540D

Batch ID: R37141 Analyst: KT

Total Suspended Solids	ND	5.00		mg/L	1	6/30/2017 2:14:00 PM



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 9:45:00 AM

Project: Willow Creek

Lab ID: 1706323-004

Matrix: Water

Client Sample ID: WC -4

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Fecal Coliform by SM 9222D

Batch ID: R37096 Analyst: MW

Coliform, Fecal	61.0	1.00		CFU/100ml	1	6/27/2017 3:00:05 PM

Organochlorine Pesticides by EPA Method 8081

Batch ID: 17482 Analyst: SG

Toxaphene	ND	1.00		µg/L	1	7/6/2017 7:47:34 PM
alpha-BHC	ND	0.100		µg/L	1	7/6/2017 7:47:34 PM
beta-BHC	ND	0.100		µg/L	1	7/6/2017 7:47:34 PM
Gamma BHC (Lindane)	ND	0.100		µg/L	1	7/6/2017 7:47:34 PM
delta-BHC	ND	0.100		µg/L	1	7/6/2017 7:47:34 PM
Heptachlor	ND	0.100		µg/L	1	7/6/2017 7:47:34 PM
Aldrin	ND	0.100		µg/L	1	7/6/2017 7:47:34 PM
Heptachlor epoxide	ND	0.100		µg/L	1	7/6/2017 7:47:34 PM
gamma-Chlordane	ND	0.100		µg/L	1	7/6/2017 7:47:34 PM
Endosulfan I	ND	0.100		µg/L	1	7/6/2017 7:47:34 PM
alpha-Chlordane	ND	0.100		µg/L	1	7/6/2017 7:47:34 PM
Dieldrin	ND	0.100		µg/L	1	7/6/2017 7:47:34 PM
4,4'-DDE	ND	0.151		µg/L	1	7/6/2017 7:47:34 PM
Endrin	ND	0.151		µg/L	1	7/6/2017 7:47:34 PM
Endosulfan II	ND	0.151		µg/L	1	7/6/2017 7:47:34 PM
4,4'-DDD	ND	0.151		µg/L	1	7/6/2017 7:47:34 PM
Endrin aldehyde	ND	0.151		µg/L	1	7/6/2017 7:47:34 PM
Endosulfan sulfate	ND	0.151		µg/L	1	7/6/2017 7:47:34 PM
4,4'-DDT	ND	0.151		µg/L	1	7/6/2017 7:47:34 PM
Endrin ketone	ND	0.151		µg/L	1	7/6/2017 7:47:34 PM
Methoxychlor	ND	0.502		µg/L	1	7/6/2017 7:47:34 PM
Surr: Decachlorobiphenyl	85.6	31 - 151		%Rec	1	7/6/2017 7:47:34 PM
Surr: Tetrachloro-m-xylene	88.0	31.4 - 125		%Rec	1	7/6/2017 7:47:34 PM

Herbicides by EPA Method 8151A

Batch ID: 17481 Analyst: BT

Dicamba	ND	4.47		µg/L	1	7/3/2017 11:16:00 PM
2,4-D	ND	1.99		µg/L	1	7/3/2017 11:16:00 PM
2,4-DP	ND	0.994		µg/L	1	7/3/2017 11:16:00 PM
2,4,5-TP (Silvex)	ND	0.597		µg/L	1	7/3/2017 11:16:00 PM
2,4,5-T	ND	0.994		µg/L	1	7/3/2017 11:16:00 PM
Dinoseb	ND	3.73		µg/L	1	7/3/2017 11:16:00 PM
Dalapon	ND	3.98		µg/L	1	7/3/2017 11:16:00 PM
2,4-DB	ND	2.98		µg/L	1	7/3/2017 11:16:00 PM
MCPP	ND	9.94		µg/L	1	7/3/2017 11:16:00 PM

Original



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 9:45:00 AM

Project: Willow Creek

Lab ID: 1706323-004

Matrix: Water

Client Sample ID: WC -4

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Herbicides by EPA Method 8151A

Batch ID: 17481

Analyst: BT

MCPA	ND	9.94		µg/L	1	7/3/2017 11:16:00 PM
Picloram	ND	0.497		µg/L	1	7/3/2017 11:16:00 PM
Bentazon	ND	2.68		µg/L	1	7/3/2017 11:16:00 PM
Chloramben	ND	1.19		µg/L	1	7/3/2017 11:16:00 PM
Acifluorfen	ND	4.23		µg/L	1	7/3/2017 11:16:00 PM
3,5-Dichlorobenzoic acid	ND	4.97		µg/L	1	7/3/2017 11:16:00 PM
4-Nitrophenol	ND	0.746		µg/L	1	7/3/2017 11:16:00 PM
Dacthal (DCPA)	ND	0.845		µg/L	1	7/3/2017 11:16:00 PM
Surr: 2,4-Dichlorophenylacetic acid	72.7	34.8 - 149		%Rec	1	7/3/2017 11:16:00 PM

Ion Chromatography by EPA Method 300.0

Batch ID: R37204

Analyst: KT

Chloride	5.80	0.500	D	mg/L	5	7/5/2017 9:15:00 AM

Mercury by EPA Method 245.1

Batch ID: 17507

Analyst: WF

Mercury	ND	0.100		µg/L	1	6/30/2017 5:19:47 PM

Total Hardness by EPA Method 200.8/SM 2340B

Batch ID: 17480

Analyst: TN

Total Hardness (as CaCO ₃)	121	0.800		mg/L CaCO ₃	1	6/28/2017 2:53:28 PM

Total Metals by EPA Method 200.8

Batch ID: 17480

Analyst: TN

Antimony	ND	0.200		µg/L	1	6/28/2017 2:53:28 PM
Arsenic	3.42	1.00		µg/L	1	6/28/2017 2:53:28 PM
Beryllium	ND	0.200		µg/L	1	6/28/2017 2:53:28 PM
Cadmium	ND	0.200		µg/L	1	6/28/2017 2:53:28 PM
Chromium	1.81	0.500		µg/L	1	6/28/2017 2:53:28 PM
Copper	3.87	0.500		µg/L	1	6/28/2017 2:53:28 PM
Lead	0.683	0.500		µg/L	1	6/28/2017 2:53:28 PM
Nickel	1.35	0.500		µg/L	1	6/28/2017 2:53:28 PM
Selenium	ND	1.00		µg/L	1	6/28/2017 2:53:28 PM
Silver	ND	0.200		µg/L	1	6/28/2017 2:53:28 PM
Thallium	ND	0.200		µg/L	1	6/28/2017 2:53:28 PM
Zinc	26.9	1.50		µg/L	1	6/28/2017 2:53:28 PM



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 9:45:00 AM

Project: Willow Creek

Lab ID: 1706323-004

Matrix: Water

Client Sample ID: WC -4

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Total Phosphorous by EPA Method 365.3

Batch ID: 17515 Analyst: KT

Phosphorus, Total (As P)	0.252	0.200		mg/L	1	6/30/2017 12:13:00 PM

Total Suspended Solids (TSS) by SM 2540D

Batch ID: R37141 Analyst: KT

Total Suspended Solids	ND	5.00		mg/L	1	6/30/2017 2:16:00 PM



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 12:25:00 PM

Project: Willow Creek

Lab ID: 1706323-005

Matrix: Water

Client Sample ID: WC -5

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Fecal Coliform by SM 9222D

Batch ID: R37096 Analyst: MW

Coliform, Fecal	37.0	1.00		CFU/100ml	1	6/27/2017 3:00:05 PM

Organochlorine Pesticides by EPA Method 8081

Batch ID: 17482 Analyst: SG

Toxaphene	ND	0.996		µg/L	1	7/6/2017 7:57:35 PM
alpha-BHC	ND	0.0996		µg/L	1	7/6/2017 7:57:35 PM
beta-BHC	ND	0.0996		µg/L	1	7/6/2017 7:57:35 PM
Gamma BHC (Lindane)	ND	0.0996		µg/L	1	7/6/2017 7:57:35 PM
delta-BHC	ND	0.0996		µg/L	1	7/6/2017 7:57:35 PM
Heptachlor	ND	0.0996		µg/L	1	7/6/2017 7:57:35 PM
Aldrin	ND	0.0996		µg/L	1	7/6/2017 7:57:35 PM
Heptachlor epoxide	ND	0.0996		µg/L	1	7/6/2017 7:57:35 PM
gamma-Chlordane	ND	0.0996		µg/L	1	7/6/2017 7:57:35 PM
Endosulfan I	ND	0.0996		µg/L	1	7/6/2017 7:57:35 PM
alpha-Chlordane	ND	0.0996		µg/L	1	7/6/2017 7:57:35 PM
Dieldrin	ND	0.0996		µg/L	1	7/6/2017 7:57:35 PM
4,4'-DDE	ND	0.149		µg/L	1	7/6/2017 7:57:35 PM
Endrin	ND	0.149		µg/L	1	7/6/2017 7:57:35 PM
Endosulfan II	ND	0.149		µg/L	1	7/6/2017 7:57:35 PM
4,4'-DDD	ND	0.149		µg/L	1	7/6/2017 7:57:35 PM
Endrin aldehyde	ND	0.149		µg/L	1	7/6/2017 7:57:35 PM
Endosulfan sulfate	ND	0.149		µg/L	1	7/6/2017 7:57:35 PM
4,4'-DDT	ND	0.149		µg/L	1	7/6/2017 7:57:35 PM
Endrin ketone	ND	0.149		µg/L	1	7/6/2017 7:57:35 PM
Methoxychlor	ND	0.498		µg/L	1	7/6/2017 7:57:35 PM
Surr: Decachlorobiphenyl	88.7	31 - 151		%Rec	1	7/6/2017 7:57:35 PM
Surr: Tetrachloro-m-xylene	83.4	31.4 - 125		%Rec	1	7/6/2017 7:57:35 PM

Herbicides by EPA Method 8151A

Batch ID: 17481 Analyst: BT

Dicamba	ND	4.50		µg/L	1	7/3/2017 11:37:00 PM
2,4-D	ND	2.00		µg/L	1	7/3/2017 11:37:00 PM
2,4-DP	ND	1.00		µg/L	1	7/3/2017 11:37:00 PM
2,4,5-TP (Silvex)	ND	0.600		µg/L	1	7/3/2017 11:37:00 PM
2,4,5-T	ND	1.00		µg/L	1	7/3/2017 11:37:00 PM
Dinoseb	ND	3.75		µg/L	1	7/3/2017 11:37:00 PM
Dalapon	ND	4.00		µg/L	1	7/3/2017 11:37:00 PM
2,4-DB	ND	3.00		µg/L	1	7/3/2017 11:37:00 PM
MCP	ND	10.0		µg/L	1	7/3/2017 11:37:00 PM

Original



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 12:25:00 PM

Project: Willow Creek

Lab ID: 1706323-005

Matrix: Water

Client Sample ID: WC -5

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Herbicides by EPA Method 8151A

Batch ID: 17481

Analyst: BT

MCPA	ND	10.0		µg/L	1	7/3/2017 11:37:00 PM
Picloram	ND	0.500		µg/L	1	7/3/2017 11:37:00 PM
Bentazon	ND	2.70		µg/L	1	7/3/2017 11:37:00 PM
Chloramben	ND	1.20		µg/L	1	7/3/2017 11:37:00 PM
Acifluorfen	ND	4.25		µg/L	1	7/3/2017 11:37:00 PM
3,5-Dichlorobenzoic acid	ND	5.00		µg/L	1	7/3/2017 11:37:00 PM
4-Nitrophenol	ND	0.750		µg/L	1	7/3/2017 11:37:00 PM
Dacthal (DCPA)	ND	0.850		µg/L	1	7/3/2017 11:37:00 PM
Surr: 2,4-Dichlorophenylacetic acid	90.2	34.8 - 149		%Rec	1	7/3/2017 11:37:00 PM

Ion Chromatography by EPA Method 300.0

Batch ID: R37204

Analyst: KT

Chloride	7.76	0.500	D	mg/L	5	7/5/2017 10:40:00 AM

Mercury by EPA Method 245.1

Batch ID: 17507

Analyst: WF

Mercury	ND	0.100		µg/L	1	6/30/2017 5:21:28 PM

Total Hardness by EPA Method 200.8/SM 2340B

Batch ID: 17480

Analyst: TN

Total Hardness (as CaCO ₃)	90.2	0.800		mg/L CaCO ₃	1	6/28/2017 2:57:29 PM

Total Metals by EPA Method 200.8

Batch ID: 17480

Analyst: TN

Antimony	ND	0.200		µg/L	1	6/28/2017 2:57:29 PM
Arsenic	1.72	1.00		µg/L	1	6/28/2017 2:57:29 PM
Beryllium	ND	0.200		µg/L	1	6/28/2017 2:57:29 PM
Cadmium	ND	0.200		µg/L	1	6/28/2017 2:57:29 PM
Chromium	1.29	0.500		µg/L	1	6/28/2017 2:57:29 PM
Copper	1.41	0.500		µg/L	1	6/28/2017 2:57:29 PM
Lead	ND	0.500		µg/L	1	6/28/2017 2:57:29 PM
Nickel	1.19	0.500		µg/L	1	6/28/2017 2:57:29 PM
Selenium	ND	1.00		µg/L	1	6/28/2017 2:57:29 PM
Silver	ND	0.200		µg/L	1	6/28/2017 2:57:29 PM
Thallium	ND	0.200		µg/L	1	6/28/2017 2:57:29 PM
Zinc	8.35	1.50		µg/L	1	6/28/2017 2:57:29 PM



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 12:25:00 PM

Project: Willow Creek

Lab ID: 1706323-005

Matrix: Water

Client Sample ID: WC -5

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Total Phosphorous by EPA Method 365.3

Batch ID: 17515 Analyst: KT

Phosphorus, Total (As P)	0.285	0.200		mg/L	1	6/30/2017 12:15:00 PM

Total Suspended Solids (TSS) by SM 2540D

Batch ID: R37141 Analyst: KT

Total Suspended Solids	13.0	5.00		mg/L	1	6/30/2017 2:18:00 PM



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 11:43:00 AM

Project: Willow Creek

Lab ID: 1706323-006

Matrix: Water

Client Sample ID: WC -6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Fecal Coliform by SM 9222D

Batch ID: R37096 Analyst: MW

Coliform, Fecal	39.0	1.00		CFU/100ml	1	6/27/2017 3:00:05 PM

Organochlorine Pesticides by EPA Method 8081

Batch ID: 17482 Analyst: SG

Toxaphene	ND	0.997		µg/L	1	7/6/2017 8:07:32 PM
alpha-BHC	ND	0.0997		µg/L	1	7/6/2017 8:07:32 PM
beta-BHC	ND	0.0997		µg/L	1	7/6/2017 8:07:32 PM
Gamma BHC (Lindane)	ND	0.0997		µg/L	1	7/6/2017 8:07:32 PM
delta-BHC	ND	0.0997		µg/L	1	7/6/2017 8:07:32 PM
Heptachlor	ND	0.0997		µg/L	1	7/6/2017 8:07:32 PM
Aldrin	ND	0.0997		µg/L	1	7/6/2017 8:07:32 PM
Heptachlor epoxide	ND	0.0997		µg/L	1	7/6/2017 8:07:32 PM
gamma-Chlordane	ND	0.0997		µg/L	1	7/6/2017 8:07:32 PM
Endosulfan I	ND	0.0997		µg/L	1	7/6/2017 8:07:32 PM
alpha-Chlordane	ND	0.0997		µg/L	1	7/6/2017 8:07:32 PM
Dieldrin	ND	0.0997		µg/L	1	7/6/2017 8:07:32 PM
4,4'-DDE	ND	0.150		µg/L	1	7/6/2017 8:07:32 PM
Endrin	ND	0.150		µg/L	1	7/6/2017 8:07:32 PM
Endosulfan II	ND	0.150		µg/L	1	7/6/2017 8:07:32 PM
4,4'-DDD	ND	0.150		µg/L	1	7/6/2017 8:07:32 PM
Endrin aldehyde	ND	0.150		µg/L	1	7/6/2017 8:07:32 PM
Endosulfan sulfate	ND	0.150		µg/L	1	7/6/2017 8:07:32 PM
4,4'-DDT	ND	0.150		µg/L	1	7/6/2017 8:07:32 PM
Endrin ketone	ND	0.150		µg/L	1	7/6/2017 8:07:32 PM
Methoxychlor	ND	0.499		µg/L	1	7/6/2017 8:07:32 PM
Surr: Decachlorobiphenyl	82.7	31 - 151		%Rec	1	7/6/2017 8:07:32 PM
Surr: Tetrachloro-m-xylene	76.9	31.4 - 125		%Rec	1	7/6/2017 8:07:32 PM

Herbicides by EPA Method 8151A

Batch ID: 17481 Analyst: BT

Dicamba	ND	4.47		µg/L	1	7/3/2017 11:57:00 PM
2,4-D	ND	1.99		µg/L	1	7/3/2017 11:57:00 PM
2,4-DP	ND	0.993		µg/L	1	7/3/2017 11:57:00 PM
2,4,5-TP (Silvex)	ND	0.596		µg/L	1	7/3/2017 11:57:00 PM
2,4,5-T	ND	0.993		µg/L	1	7/3/2017 11:57:00 PM
Dinoseb	ND	3.72		µg/L	1	7/3/2017 11:57:00 PM
Dalapon	ND	3.97		µg/L	1	7/3/2017 11:57:00 PM
2,4-DB	ND	2.98		µg/L	1	7/3/2017 11:57:00 PM
MCPP	ND	9.93		µg/L	1	7/3/2017 11:57:00 PM

Original



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 11:43:00 AM

Project: Willow Creek

Lab ID: 1706323-006

Matrix: Water

Client Sample ID: WC -6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Herbicides by EPA Method 8151A

Batch ID: 17481

Analyst: BT

MCPA	ND	9.93		µg/L	1	7/3/2017 11:57:00 PM
Picloram	ND	0.496		µg/L	1	7/3/2017 11:57:00 PM
Bentazon	ND	2.68		µg/L	1	7/3/2017 11:57:00 PM
Chloramben	ND	1.19		µg/L	1	7/3/2017 11:57:00 PM
Acifluorfen	ND	4.22		µg/L	1	7/3/2017 11:57:00 PM
3,5-Dichlorobenzoic acid	ND	4.96		µg/L	1	7/3/2017 11:57:00 PM
4-Nitrophenol	ND	0.745		µg/L	1	7/3/2017 11:57:00 PM
Dacthal (DCPA)	ND	0.844		µg/L	1	7/3/2017 11:57:00 PM
Surr: 2,4-Dichlorophenylacetic acid	59.1	34.8 - 149		%Rec	1	7/3/2017 11:57:00 PM

Ion Chromatography by EPA Method 300.0

Batch ID: R37204

Analyst: KT

Chloride	7.88	0.500	D	mg/L	5	7/5/2017 11:01:00 AM

Mercury by EPA Method 245.1

Batch ID: 17507

Analyst: WF

Mercury	ND	0.100		µg/L	1	6/30/2017 5:26:35 PM

Total Hardness by EPA Method 200.8/SM 2340B

Batch ID: 17480

Analyst: TN

Total Hardness (as CaCO ₃)	95.5	0.800		mg/L CaCO ₃	1	6/28/2017 3:01:30 PM

Total Metals by EPA Method 200.8

Batch ID: 17480

Analyst: TN

Antimony	ND	0.200		µg/L	1	6/28/2017 3:01:30 PM
Arsenic	1.89	1.00		µg/L	1	6/28/2017 3:01:30 PM
Beryllium	ND	0.200		µg/L	1	6/28/2017 3:01:30 PM
Cadmium	ND	0.200		µg/L	1	6/28/2017 3:01:30 PM
Chromium	1.91	0.500		µg/L	1	6/28/2017 3:01:30 PM
Copper	0.774	0.500		µg/L	1	6/28/2017 3:01:30 PM
Lead	ND	0.500		µg/L	1	6/28/2017 3:01:30 PM
Nickel	0.983	0.500		µg/L	1	6/28/2017 3:01:30 PM
Selenium	ND	1.00		µg/L	1	6/28/2017 3:01:30 PM
Silver	ND	0.200		µg/L	1	6/28/2017 3:01:30 PM
Thallium	ND	0.200		µg/L	1	6/28/2017 3:01:30 PM
Zinc	5.32	1.50		µg/L	1	6/28/2017 3:01:30 PM



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 11:43:00 AM

Project: Willow Creek

Lab ID: 1706323-006

Matrix: Water

Client Sample ID: WC -6

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Total Phosphorous by EPA Method 365.3

Batch ID: 17515 Analyst: KT

Phosphorus, Total (As P)	0.219	0.200		mg/L	1	6/30/2017 12:18:00 PM

Total Suspended Solids (TSS) by SM 2540D

Batch ID: R37141 Analyst: KT

Total Suspended Solids	ND	5.00		mg/L	1	6/30/2017 2:20:00 PM



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 1:05:00 PM

Project: Willow Creek

Lab ID: 1706323-007

Matrix: Water

Client Sample ID: WC -7

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Fecal Coliform by SM 9222D

Batch ID: R37096 Analyst: MW

Coliform, Fecal	42.0	1.00		CFU/100ml	1	6/27/2017 3:00:05 PM

Organochlorine Pesticides by EPA Method 8081

Batch ID: 17482 Analyst: SG

Toxaphene	ND	0.994		µg/L	1	7/6/2017 8:17:32 PM
alpha-BHC	ND	0.0994		µg/L	1	7/6/2017 8:17:32 PM
beta-BHC	ND	0.0994		µg/L	1	7/6/2017 8:17:32 PM
Gamma BHC (Lindane)	ND	0.0994		µg/L	1	7/6/2017 8:17:32 PM
delta-BHC	ND	0.0994		µg/L	1	7/6/2017 8:17:32 PM
Heptachlor	ND	0.0994		µg/L	1	7/6/2017 8:17:32 PM
Aldrin	ND	0.0994		µg/L	1	7/6/2017 8:17:32 PM
Heptachlor epoxide	ND	0.0994		µg/L	1	7/6/2017 8:17:32 PM
gamma-Chlordane	ND	0.0994		µg/L	1	7/6/2017 8:17:32 PM
Endosulfan I	ND	0.0994		µg/L	1	7/6/2017 8:17:32 PM
alpha-Chlordane	ND	0.0994		µg/L	1	7/6/2017 8:17:32 PM
Dieldrin	ND	0.0994		µg/L	1	7/6/2017 8:17:32 PM
4,4'-DDE	ND	0.149		µg/L	1	7/6/2017 8:17:32 PM
Endrin	ND	0.149		µg/L	1	7/6/2017 8:17:32 PM
Endosulfan II	ND	0.149		µg/L	1	7/6/2017 8:17:32 PM
4,4'-DDD	ND	0.149		µg/L	1	7/6/2017 8:17:32 PM
Endrin aldehyde	ND	0.149		µg/L	1	7/6/2017 8:17:32 PM
Endosulfan sulfate	ND	0.149		µg/L	1	7/6/2017 8:17:32 PM
4,4'-DDT	ND	0.149		µg/L	1	7/6/2017 8:17:32 PM
Endrin ketone	ND	0.149		µg/L	1	7/6/2017 8:17:32 PM
Methoxychlor	ND	0.497		µg/L	1	7/6/2017 8:17:32 PM
Surr: Decachlorobiphenyl	81.6	31 - 151		%Rec	1	7/6/2017 8:17:32 PM
Surr: Tetrachloro-m-xylene	75.4	31.4 - 125		%Rec	1	7/6/2017 8:17:32 PM

Herbicides by EPA Method 8151A

Batch ID: 17481 Analyst: BT

Dicamba	ND	4.51		µg/L	1	7/4/2017 12:18:00 AM
2,4-D	ND	2.00		µg/L	1	7/4/2017 12:18:00 AM
2,4-DP	ND	1.00		µg/L	1	7/4/2017 12:18:00 AM
2,4,5-TP (Silvex)	ND	0.601		µg/L	1	7/4/2017 12:18:00 AM
2,4,5-T	ND	1.00		µg/L	1	7/4/2017 12:18:00 AM
Dinoseb	ND	3.76		µg/L	1	7/4/2017 12:18:00 AM
Dalapon	ND	4.01		µg/L	1	7/4/2017 12:18:00 AM
2,4-DB	ND	3.01		µg/L	1	7/4/2017 12:18:00 AM
MCPP	ND	10.0		µg/L	1	7/4/2017 12:18:00 AM

Original



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 1:05:00 PM

Project: Willow Creek

Lab ID: 1706323-007

Matrix: Water

Client Sample ID: WC -7

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Herbicides by EPA Method 8151A

Batch ID: 17481

Analyst: BT

MCPA	ND	10.0		µg/L	1	7/4/2017 12:18:00 AM
Picloram	ND	0.501		µg/L	1	7/4/2017 12:18:00 AM
Bentazon	ND	2.70		µg/L	1	7/4/2017 12:18:00 AM
Chloramben	ND	1.20		µg/L	1	7/4/2017 12:18:00 AM
Acifluorfen	ND	4.26		µg/L	1	7/4/2017 12:18:00 AM
3,5-Dichlorobenzoic acid	ND	5.01		µg/L	1	7/4/2017 12:18:00 AM
4-Nitrophenol	ND	0.751		µg/L	1	7/4/2017 12:18:00 AM
Dacthal (DCPA)	ND	0.852		µg/L	1	7/4/2017 12:18:00 AM
Surr: 2,4-Dichlorophenylacetic acid	71.3	34.8 - 149		%Rec	1	7/4/2017 12:18:00 AM

Ion Chromatography by EPA Method 300.0

Batch ID: R37204

Analyst: KT

Chloride	6.16	0.500	D	mg/L	5	7/5/2017 11:22:00 AM

Mercury by EPA Method 245.1

Batch ID: 17507

Analyst: WF

Mercury	ND	0.100		µg/L	1	6/30/2017 5:28:17 PM

Total Hardness by EPA Method 200.8/SM 2340B

Batch ID: 17480

Analyst: TN

Total Hardness (as CaCO ₃)	109	0.800		mg/L CaCO ₃	1	6/28/2017 3:05:31 PM

Total Metals by EPA Method 200.8

Batch ID: 17480

Analyst: TN

Antimony	ND	0.200		µg/L	1	6/28/2017 3:05:31 PM
Arsenic	2.95	1.00		µg/L	1	6/28/2017 3:05:31 PM
Beryllium	ND	0.200		µg/L	1	6/28/2017 3:05:31 PM
Cadmium	ND	0.200		µg/L	1	6/28/2017 3:05:31 PM
Chromium	1.20	0.500		µg/L	1	6/28/2017 3:05:31 PM
Copper	2.58	0.500		µg/L	1	6/28/2017 3:05:31 PM
Lead	ND	0.500		µg/L	1	6/28/2017 3:05:31 PM
Nickel	1.27	0.500		µg/L	1	6/28/2017 3:05:31 PM
Selenium	ND	1.00		µg/L	1	6/28/2017 3:05:31 PM
Silver	ND	0.200		µg/L	1	6/28/2017 3:05:31 PM
Thallium	ND	0.200		µg/L	1	6/28/2017 3:05:31 PM
Zinc	3.27	1.50		µg/L	1	6/28/2017 3:05:31 PM



Analytical Report

Work Order: 1706323
Date Reported: 7/14/2017

Client: Shannon & Wilson

Collection Date: 6/27/2017 1:05:00 PM

Project: Willow Creek

Lab ID: 1706323-007

Matrix: Water

Client Sample ID: WC -7

Analyses	Result	RL	Qual	Units	DF	Date Analyzed

Total Phosphorous by EPA Method 365.3

Batch ID: 17515 Analyst: KT

Phosphorus, Total (As P)	0.246	0.200		mg/L	1	6/30/2017 12:26:00 PM

Total Suspended Solids (TSS) by SM 2540D

Batch ID: R37141 Analyst: KT

Total Suspended Solids	8.00	5.00		mg/L	1	6/30/2017 2:22:00 PM



Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Fecal Coliform by SM 9222D

Sample ID	MB-R37096			SampType:	MBLK		Units:	CFU/100ml		Prep Date:	6/27/2017		RunNo:	37096	
Client ID:	MBLKW			Batch ID:	R37096					Analysis Date:	6/27/2017		SeqNo:	712866	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual			
Coliform, Fecal		ND	1.00												



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Hardness by EPA Method 200.8/SM 2340B

Sample ID	MB-17480	SampType:	MBLK			Units:	mg/L			Prep Date:	6/28/2017		RunNo:	37082	
Client ID:	MBLKW	Batch ID:	17480						Analysis Date:	6/28/2017			SeqNo:	712472	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual		

Calcium	ND	0.100
Magnesium	ND	0.100

Sample ID	LCS-17480	SampType:	LCS	Units:	mg/L	Prep Date:	6/28/2017	RunNo:	37082		
Client ID:	LCSW	Batch ID:	17480			Analysis Date:	6/28/2017	SeqNo:	712473		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Calcium	1.04	0.100	1.000	0	104	50	150
Magnesium	0.978	0.100	1.000	0	97.8	50	150

Sample ID	1706273-002ADUP	SampType:	DUP	Units:	mg/L CaCO3	Prep Date:	6/28/2017	RunNo:	37082			
Client ID:	BATCH	Batch ID:	17480			Analysis Date:	6/28/2017	SeqNo:	712477			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Hardness (as CaCO3)	29.4	0.800					32.31	9.30	20

Sample ID	1706273-002AMS	SampType:	MS	Units:	mg/L	Prep Date:	6/28/2017	RunNo:	37082			
Client ID:	BATCH	Batch ID:	17480			Analysis Date:	6/28/2017	SeqNo:	712478			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Calcium	17.1	0.100	5.000	12.06	101	50	150
Magnesium	5.33	0.100	5.000	0.5312	96.0	50	150

Sample ID	1706273-002AMSD	SampType:	MSD	Units:	mg/L	Prep Date:	6/28/2017	RunNo:	37082			
Client ID:	BATCH	Batch ID:	17480			Analysis Date:	6/28/2017	SeqNo:	712479			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Calcium	16.0	0.100	5.000	12.06	78.5	50	150	17.12	6.83	20
Magnesium	5.05	0.100	5.000	0.5312	90.4	50	150	5.331	5.41	20



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Hardness by EPA Method 200.8/SM 2340B

Sample ID	1706273-002AMSD	SampType:	MSD	Units:	mg/L	Prep Date:	6/28/2017	RunNo:	37082
Client ID:	BATCH	Batch ID:	17480	Analysis Date:	6/28/2017	SeqNo:	712479		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD RPDLimit Qual

Sample ID	MB-17496	SampType:	MBLK	Units:	mg/L	Prep Date:	6/29/2017	RunNo:	37109
Client ID:	MBLKW	Batch ID:	17496	Analysis Date:	6/29/2017	SeqNo:	713035		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD RPDLimit Qual
Calcium	ND	0.100							
Magnesium	ND	0.100							

Sample ID	LCS-17496	SampType:	LCS	Units:	mg/L	Prep Date:	6/29/2017	RunNo:	37109
Client ID:	LCSW	Batch ID:	17496	Analysis Date:	6/29/2017	SeqNo:	713038		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD RPDLimit Qual
Calcium	1.22	0.100	1.000	0	122	50	150		
Magnesium	1.12	0.100	1.000	0	112	50	150		

Sample ID	1706341-001ADUP	SampType:	DUP	Units:	mg/L CaCO3	Prep Date:	6/29/2017	RunNo:	37109
Client ID:	BATCH	Batch ID:	17496	Analysis Date:	6/29/2017	SeqNo:	713040		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD RPDLimit Qual
Total Hardness (as CaCO3)	318	0.800						290.4	9.21 20

Sample ID	1706341-001AMS	SampType:	MS	Units:	mg/L	Prep Date:	6/29/2017	RunNo:	37109
Client ID:	BATCH	Batch ID:	17496	Analysis Date:	6/29/2017	SeqNo:	713041		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD RPDLimit Qual
Calcium	61.1	0.100	5.000	52.51	172	50	150		S
Magnesium	47.3	0.100	5.000	38.68	172	50	150		S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed and recovered within range.



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Hardness by EPA Method 200.8/SM 2340B

Sample ID	1706341-001AMSD	SampType: MSD	Units: mg/L			Prep Date: 6/29/2017			RunNo: 37109		
Client ID:	BATCH	Batch ID:	17496				Analysis Date: 6/29/2017			SeqNo: 713042	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Calcium	59.3	0.100	5.000	52.51	136	50	150	61.12	2.99	20	
Magnesium	45.4	0.100	5.000	38.68	134	50	150	47.28	4.09	20	



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID	MB-R37195	SampType:	MBLK			Units:	mg/L			Prep Date:	7/3/2017			RunNo:	37195		
Client ID:	MBLKW	Batch ID:	R37195							Analysis Date:	7/3/2017			SeqNo:	714705		
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual				

Chloride	ND	0.100									

Sample ID	LCS-R37195		SampType: LCS		Units: mg/L		Prep Date: 7/3/2017		RunNo: 37195		
Client ID:	LCSW		Batch ID: R37195		Analysis Date: 7/3/2017				SeqNo: 714715		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	0.685	0.100	0.7500	0	91.3	90	110				

Sample ID	1706323-004BDUP	SampType:	DUP	Units:	mg/L	Prep Date:	7/3/2017	RunNo:	37195		
Client ID:	WC -4	Batch ID:	R37195			Analysis Date:	7/3/2017	SeqNo:	714718		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	6.31	0.200						6.342	0.474	20	DE

Sample ID	1706323-004BMS	SampType:	MS	Units:	mg/L	Prep Date:	7/3/2017	RunNo:	37195		
Client ID:	WC -4	Batch ID:	R37195			Analysis Date:	7/3/2017	SeqNo:	714719		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	7.83	0.200	1.500	6.342	99.1	80	120				DE

Sample ID	1706323-004BMSD	SampType:	MSD	Units:	mg/L	Prep Date:	7/3/2017	RunNo:	37195		
Client ID:	WC -4	Batch ID:	R37195			Analysis Date:	7/3/2017	SeqNo:	714720		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	7.81	0.200	1.500	6.342	97.7	80	120	7.828	0.256	20	DE



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID	MB-R37204	SampType:	MBLK	Units:	mg/L	Prep Date:	7/5/2017	RunNo:	37204		
Client ID:	MBLKW	Batch ID:	R37204			Analysis Date:	7/5/2017	SeqNo:	714856		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	ND	0.100									

Sample ID	LCS-R37204	SampType:	LCS	Units:	mg/L	Prep Date:	7/5/2017	RunNo:	37204		
Client ID:	LCSW	Batch ID:	R37204			Analysis Date:	7/5/2017	SeqNo:	714857		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	0.763	0.100	0.7500	0	102	90	110				

Sample ID	1706323-004BDUP	SampType:	DUP	Units:	mg/L	Prep Date:	7/5/2017	RunNo:	37204		
Client ID:	WC -4	Batch ID:	R37204			Analysis Date:	7/5/2017	SeqNo:	714859		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	5.75	0.500						5.805	0.952	20	D

Sample ID	1706323-004BMS	SampType:	MS	Units:	mg/L	Prep Date:	7/5/2017	RunNo:	37204		
Client ID:	WC -4	Batch ID:	R37204			Analysis Date:	7/5/2017	SeqNo:	714860		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	9.84	0.500	3.750	5.805	107	80	120				D

Sample ID	1706323-004BMSD	SampType:	MSD	Units:	mg/L	Prep Date:	7/5/2017	RunNo:	37204		
Client ID:	WC -4	Batch ID:	R37204			Analysis Date:	7/5/2017	SeqNo:	714847		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	9.78	0.500	3.750	5.805	106	80	120	9.835	0.612	20	D



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Phosphorous by EPA Method 365.3

Sample ID	MB-17515	SampType:	MBLK			Units:	mg/L			Prep Date:	6/30/2017			RunNo:	37161		
Client ID:	MBLKW	Batch ID:	17515							Analysis Date:	6/30/2017			SeqNo:	714065		
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual				

Phosphorus, Total (As P) ND 0.200

Sample ID	LCS-17515	SampType:	LCS	Units:	mg/L	Prep Date:	6/30/2017	RunNo:	37161		
Client ID:	LCSW	Batch ID:	17515			Analysis Date:	6/30/2017	SeqNo:	714066		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P) 2.40 0.200 2.000 0 120 65 135

Sample ID	1706323-001CDUP	SampType:	DUP	Units:	mg/L	Prep Date:	6/30/2017	RunNo:	37161			
Client ID:	WC-1	Batch ID:	17515			Analysis Date:	6/30/2017	SeqNo:	714068			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P) 0.282 0.200 0.05180 138 30 R

NOTES:

R - High RPD observed. The method is in control as indicated by the LCS.

Sample ID	1706323-001CMS	SampType:	MS	Units:	mg/L	Prep Date:	6/30/2017	RunNo:	37161			
Client ID:	WC-1	Batch ID:	17515			Analysis Date:	6/30/2017	SeqNo:	714069			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P) 2.41 0.200 2.000 0.05180 118 65 135

Sample ID	1706323-001CMSD	SampType:	MSD	Units:	mg/L	Prep Date:	6/30/2017	RunNo:	37161			
Client ID:	WC-1	Batch ID:	17515			Analysis Date:	6/30/2017	SeqNo:	714070			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P) 2.39 0.200 2.000 0.05180 117 65 135 2.405 0.475 30



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Suspended Solids (TSS) by SM 2540D

Sample ID MB-R37141	SampType: MBLK	Units: mg/L		Prep Date: 6/30/2017	RunNo: 37141
Client ID: MBLKW	Batch ID: R37141	Analysis Date: 6/30/2017		SeqNo: 713640	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual

Total Suspended Solids ND 5.00

Sample ID LCS-R37141	SampType: LCS	Units: mg/L		Prep Date: 6/30/2017	RunNo: 37141
Client ID: LCSW	Batch ID: R37141	Analysis Date: 6/30/2017		SeqNo: 713641	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual

Total Suspended Solids 252 10.0 300.0 0 84.0 65 135

Sample ID 1706311-001ADUP	SampType: DUP	Units: mg/L		Prep Date: 6/30/2017	RunNo: 37141
Client ID: BATCH	Batch ID: R37141	Analysis Date: 6/30/2017		SeqNo: 713643	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual

Total Suspended Solids ND 5.00 0 30

Sample ID 1706369-002ADUP	SampType: DUP	Units: mg/L		Prep Date: 6/30/2017	RunNo: 37141
Client ID: BATCH	Batch ID: R37141	Analysis Date: 6/30/2017		SeqNo: 713661	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual

Total Suspended Solids ND 5.00 0 30



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	MB-17480	SampType:	MBLK		Units:	µg/L		Prep Date:	6/28/2017		RunNo:	37081	
Client ID:	MBLKW	Batch ID:	17480					Analysis Date:	6/28/2017		SeqNo:	712409	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual		
Antimony	ND	0.200											
Arsenic	ND	1.00											
Beryllium	ND	0.200											
Cadmium	ND	0.200											
Chromium	ND	0.500											
Copper	ND	0.500											
Lead	ND	0.500											
Nickel	ND	0.500											
Selenium	ND	1.00											
Silver	ND	0.200											
Thallium	ND	0.200											
Zinc	ND	1.50											

Sample ID	LCS-17480	SampType:	LCS	Units:	µg/L	Prep Date:	6/28/2017	RunNo:	37081		
Client ID:	LCSW	Batch ID:	17480			Analysis Date:	6/28/2017	SeqNo:	712410		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	4.95	0.200	5.000	0	99.0	85	115				
Arsenic	111	1.00	100.0	0	111	85	115				
Beryllium	5.20	0.200	5.000	0	104	85	115				
Cadmium	5.23	0.200	5.000	0	105	85	115				
Chromium	112	0.500	100.0	0	112	85	115				
Copper	107	0.500	100.0	0	107	85	115				
Lead	49.6	0.500	50.00	0	99.2	85	115				
Nickel	107	0.500	100.0	0	107	85	115				
Selenium	10.6	1.00	10.00	0	106	85	115				
Silver	5.43	0.200	5.000	0	109	85	115				
Thallium	2.46	0.200	2.500	0	98.5	85	115				
Zinc	106	1.50	100.0	0	106	85	115				



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	1706273-002ADUP	SampType:	DUP	Units:	µg/L	Prep Date:	6/28/2017	RunNo:	37081		
Client ID:	BATCH	Batch ID:	17480			Analysis Date:	6/28/2017	SeqNo:	712414		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.200						0.2260	157	30	
Arsenic	ND	1.00						0		30	
Beryllium	ND	0.200						0		30	
Cadmium	ND	0.200						0		30	
Chromium	0.766	0.500						0.3765	68.1	30	
Copper	3.49	0.500						3.416	2.14	30	
Lead	ND	0.500						0		30	
Nickel	ND	0.500						0.5260	52.6	30	
Selenium	ND	1.00						0		30	
Silver	ND	0.200						0		30	
Thallium	ND	0.200						0		30	
Zinc	14.4	1.50						13.38	7.53	30	

Sample ID	1706273-002AMS	SampType:	MS	Units:	µg/L	Prep Date:	6/28/2017	RunNo:	37081		
Client ID:	BATCH	Batch ID:	17480			Analysis Date:	6/28/2017	SeqNo:	712415		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	25.9	0.200	25.00	0.2260	103	70	130				
Arsenic	537	1.00	500.0	0.4655	107	70	130				
Beryllium	25.1	0.200	25.00	0	100	70	130				
Cadmium	26.9	0.200	25.00	0.01050	108	70	130				
Chromium	523	0.500	500.0	0.3765	104	70	130				
Copper	512	0.500	500.0	3.416	102	70	130				
Lead	233	0.500	250.0	0	93.3	70	130				
Nickel	490	0.500	500.0	0.5260	97.9	70	130				
Selenium	57.0	1.00	50.00	0	114	70	130				
Silver	19.2	0.200	25.00	0	76.8	70	130				
Thallium	11.7	0.200	12.50	0	93.2	70	130				
Zinc	518	1.50	500.0	13.38	101	70	130				



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	1706273-002AMSD		SampType: MSD		Units: µg/L		Prep Date: 6/28/2017			RunNo: 37081		
Client ID:	BATCH		Batch ID: 17480					Analysis Date: 6/28/2017			SeqNo: 712416	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Antimony	26.0	0.200	25.00	0.2260	103	70	130	25.94	0.179	30		
Arsenic	528	1.00	500.0	0.4655	105	70	130	536.6	1.62	30		
Beryllium	24.4	0.200	25.00	0	97.7	70	130	25.10	2.72	30		
Cadmium	26.3	0.200	25.00	0.01050	105	70	130	26.94	2.58	30		
Chromium	521	0.500	500.0	0.3765	104	70	130	522.6	0.332	30		
Copper	523	0.500	500.0	3.416	104	70	130	511.6	2.26	30		
Lead	234	0.500	250.0	0	93.7	70	130	233.2	0.450	30		
Nickel	488	0.500	500.0	0.5260	97.5	70	130	489.8	0.317	30		
Selenium	54.8	1.00	50.00	0	110	70	130	57.01	3.93	30		
Silver	19.2	0.200	25.00	0	76.8	70	130	19.19	0.0156	30		
Thallium	11.8	0.200	12.50	0	94.2	70	130	11.66	0.982	30		
Zinc	505	1.50	500.0	13.38	98.2	70	130	517.9	2.61	30		

Sample ID	MB-17496	SampType:	MBLK			Units:	µg/L			Prep Date:	6/29/2017			RunNo:	37108		
Client ID:	MBLKW	Batch ID:	17496						Analysis Date:	6/29/2017			SeqNo:	713008			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual				
Antimony		ND	0.200														
Arsenic		ND	0.500														
Beryllium		ND	0.200														
Cadmium		ND	0.200														
Chromium		ND	0.500														
Copper		ND	0.500														
Lead		ND	0.500														
Nickel		ND	0.500														
Selenium		ND	1.00														
Silver		ND	0.200														
Thallium		ND	0.200														
Zinc		ND	1.50														



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	LCS-17496	SampType:	LCS	Units:	µg/L	Prep Date:	6/29/2017	RunNo:	37108		
Client ID:	LCSW	Batch ID:	17496			Analysis Date:	6/29/2017	SeqNo:	713011		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	4.88	0.200	5.000	0	97.6	85	115				
Arsenic	102	0.500	100.0	0	102	85	115				
Beryllium	5.57	0.200	5.000	0	111	85	115				
Cadmium	5.22	0.200	5.000	0	104	85	115				
Chromium	102	0.500	100.0	0	102	85	115				
Copper	104	0.500	100.0	0	104	85	115				
Lead	48.6	0.500	50.00	0	97.1	85	115				
Nickel	102	0.500	100.0	0	102	85	115				
Selenium	10.2	1.00	10.00	0	102	85	115				
Silver	5.14	0.200	5.000	0	103	85	115				
Thallium	2.55	0.200	2.500	0	102	85	115				
Zinc	103	1.50	100.0	0	103	85	115				

Sample ID	1706341-001ADUP	SampType:	DUP	Units:	µg/L	Prep Date:	6/29/2017	RunNo:	37108		
Client ID:	BATCH	Batch ID:	17496			Analysis Date:	6/29/2017	SeqNo:	713013		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.200						0.2865	87.2	30	R
Arsenic	1.54	0.500						1.270	19.1	30	
Beryllium	ND	0.200						0		30	
Cadmium	0.793	0.200						0.7225	9.30	30	
Chromium	1.86	0.500						1.688	9.56	30	
Copper	3.38	0.500						4.719	32.9	30	
Lead	0.643	0.500						0.4265	40.5	30	
Nickel	3.72	0.500						3.422	8.37	30	
Selenium	1.08	1.00						1.602	39.1	30	
Silver	ND	0.200						0		30	
Thallium	ND	0.200						0		30	
Zinc	4.29	1.50						3.684	15.2	30	



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	1706341-001ADUP	SampType:	DUP	Units:	µg/L	Prep Date:	6/29/2017	RunNo:	37108		
Client ID:	BATCH	Batch ID:	17496			Analysis Date:	6/29/2017	SeqNo:	713013		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

NOTES:

R - High RPD observed. The method is in control as indicated by the LCS.

Sample ID	1706341-001AMS	SampType: MS			Units: µg/L	Prep Date: 6/29/2017			RunNo: 37108		
Client ID:	BATCH	Batch ID: 17496			Analysis Date: 6/29/2017			SeqNo: 713014			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	26.0	0.200	25.00	0.2865	103	70	130				
Arsenic	539	0.500	500.0	1.270	108	70	130				
Beryllium	26.8	0.200	25.00	0.01200	107	70	130				
Cadmium	27.4	0.200	25.00	0.7225	107	70	130				
Chromium	529	0.500	500.0	1.688	105	70	130				
Copper	505	0.500	500.0	4.719	100	70	130				
Lead	242	0.500	250.0	0.4265	96.5	70	130				
Nickel	523	0.500	500.0	3.422	104	70	130				
Selenium	52.6	1.00	50.00	1.602	102	70	130				
Silver	18.8	0.200	25.00	0	75.1	70	130				
Thallium	12.3	0.200	12.50	0	98.7	70	130				
Zinc	517	1.50	500.0	3.684	103	70	130				

Sample ID	1706341-001AMSD	SampType: MSD			Units: µg/L	Prep Date: 6/29/2017			RunNo: 37108		
Client ID:	BATCH	Batch ID: 17496			Analysis Date: 6/29/2017			SeqNo: 713015			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	25.2	0.200	25.00	0.2865	99.8	70	130	25.96	2.88	30	
Arsenic	507	0.500	500.0	1.270	101	70	130	539.5	6.25	30	
Beryllium	26.6	0.200	25.00	0.01200	106	70	130	26.79	0.774	30	
Cadmium	28.1	0.200	25.00	0.7225	110	70	130	27.44	2.39	30	
Chromium	510	0.500	500.0	1.688	102	70	130	528.6	3.66	30	
Copper	475	0.500	500.0	4.719	94.1	70	130	505.4	6.17	30	
Lead	239	0.500	250.0	0.4265	95.6	70	130	241.7	0.923	30	



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	1706341-001AMSD	SampType: MSD	Units: µg/L			Prep Date: 6/29/2017			RunNo: 37108		
Client ID:	BATCH	Batch ID: 17496				Analysis Date: 6/29/2017			SeqNo: 713015		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nickel	493	0.500	500.0	3.422	97.9	70	130	523.2	5.92	30	
Selenium	50.7	1.00	50.00	1.602	98.1	70	130	52.62	3.79	30	
Silver	18.6	0.200	25.00	0	74.5	70	130	18.78	0.791	30	
Thallium	12.3	0.200	12.50	0	98.7	70	130	12.33	0.0648	30	
Zinc	494	1.50	500.0	3.684	98.1	70	130	516.8	4.49	30	

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Mercury by EPA Method 245.1

Sample ID	MB-17507	SampType:	MBLK	Units:	µg/L	Prep Date:	6/30/2017	RunNo:	37131		
Client ID:	MBLKW	Batch ID:	17507			Analysis Date:	6/30/2017	SeqNo:	714227		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.100

Sample ID	LCS-17507	SampType:	LCS	Units:	µg/L	Prep Date:	6/30/2017	RunNo:	37131		
Client ID:	LCSW	Batch ID:	17507			Analysis Date:	6/30/2017	SeqNo:	714228		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 2.49 0.100 2.500 0 99.6 85 115

Sample ID	1706323-001ADUP	SampType:	DUP	Units:	µg/L	Prep Date:	6/30/2017	RunNo:	37131		
Client ID:	WC-1	Batch ID:	17507			Analysis Date:	6/30/2017	SeqNo:	714230		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury ND 0.100 0 20

Sample ID	1706323-001AMS	SampType:	MS	Units:	µg/L	Prep Date:	6/30/2017	RunNo:	37131		
Client ID:	WC-1	Batch ID:	17507			Analysis Date:	6/30/2017	SeqNo:	714231		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 2.50 0.100 2.500 0.05200 97.9 70 130

Sample ID	1706323-001AMSD	SampType:	MSD	Units:	µg/L	Prep Date:	6/30/2017	RunNo:	37131		
Client ID:	WC-1	Batch ID:	17507			Analysis Date:	6/30/2017	SeqNo:	714232		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury 2.42 0.100 2.500 0.05200 94.7 70 130 2.500 3.25 20

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.

Sample ID	MB-17504	SampType:	MBLK			Units:	µg/L			Prep Date:	6/29/2017		RunNo:	37153	
Client ID:	MBLKW	Batch ID:	17504							Analysis Date:	6/30/2017		SeqNo:	713945	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual		

Diesel (Fuel Oil)	ND	50.3									
Heavy Oil	ND	101									
Surr: 2-Fluorobiphenyl	76.0		80.40		94.5	50	150				
Surr: o-Terphenyl	80.6		80.40		100	50	150				

Sample ID	LCS-17504	SampType:	LCS	Units:	µg/L	Prep Date:	6/29/2017	RunNo:	37153		
Client ID:	LCSW	Batch ID:	17504			Analysis Date:	6/30/2017	SeqNo:	713943		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Diesel (Fuel Oil)	712	49.7	994.5	0	71.6	65	135				
Surr: 2-Fluorobiphenyl	71.3		79.56		89.6	50	150				
Surr: o-Terphenyl	72.6		79.56		91.3	50	150				

Sample ID	LCSD-17504	SampType:	LCSD	Units:	µg/L	Prep Date:	6/29/2017	RunNo:	37153		
Client ID:	LCSW02	Batch ID:	17504			Analysis Date:	6/30/2017	SeqNo:	713944		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Diesel (Fuel Oil)	808	49.8	995.3	0	81.2	65	135	712.4	12.6	30	
Surr: 2-Fluorobiphenyl	77.7		79.62		97.6	50	150		0		
Surr: o-Terphenyl	85.3		79.62		107	50	150		0		



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Herbicides by EPA Method 8151A

Sample ID	CCV-17481	SampType: CCV			Units: µg/L	Prep Date: 6/30/2017			RunNo: 37156		
Client ID:	CCV	Batch ID: 17481				Analysis Date: 6/30/2017			SeqNo: 714035		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Dalapon	211	4.00	200.0	0	105	80	120				
Surr: 2,4-Dichlorophenylacetic acid	211		200.0		105	50	135				

Sample ID	MB-17481	SampType:	MBLK	Units:	µg/L	Prep Date:	6/28/2017	RunNo:	37156		
Client ID:	MBLKW	Batch ID:	17481			Analysis Date:	6/30/2017	SeqNo:	714036		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Dicamba	ND	4.49									
2,4-D	ND	2.00									
2,4-DP	ND	0.999									
2,4,5-TP (Silvex)	ND	0.599									
2,4,5-T	ND	0.999									
Dinoseb	ND	3.74									
Dalapon	ND	3.99									
2,4-DB	ND	3.00									
MCPP	ND	9.99									
MCPA	ND	9.99									
Picloram	ND	0.499									
Bentazon	ND	2.70									
Chloramben	ND	1.20									
Acifluorfen	ND	4.24									
3,5-Dichlorobenzoic acid	ND	4.99									
4-Nitrophenol	ND	0.749									
Dacthal (DCPA)	ND	0.849									
Surr: 2,4-Dichlorophenylacetic acid	23.3		19.97		117	34.8	149				

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Herbicides by EPA Method 8151A

Sample ID	LCS-17481	SampType:	LCS	Units:	µg/L	Prep Date:	6/28/2017	RunNo:	37156		
Client ID:	LCSW	Batch ID:	17481			Analysis Date:	6/30/2017	SeqNo:	714037		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	4.37	4.50	4.004	0	109	29.9	130				
2,4-D	4.56	2.00	4.004	0	114	26.1	136				
2,4-DP	4.46	1.00	4.004	0	111	10	137				
2,4,5-TP (Silvex)	4.72	0.601	4.004	0	118	26.5	146				
2,4,5-T	4.61	1.00	4.004	0	115	26.4	142				
Dinoseb	3.90	3.75	4.004	0	97.3	10	130				
Dalapon	ND	4.00	20.02	0	0	19	159				S
2,4-DB	4.63	3.00	4.004	0	116	26.8	157				
MCP	22.7	10.0	20.02	0	113	27.4	147				
MCPA	24.7	10.0	20.02	0	123	24.7	153				
Picloram	3.36	0.501	4.004	0	83.9	10	159				
Bentazon	4.05	2.70	4.004	0	101	38.4	132				
Chloramben	2.69	1.20	4.004	0	67.2	5	131				
Acifluorfen	3.99	4.25	4.004	0	99.7	10	136				
3,5-Dichlorobenzoic acid	4.31	5.01	4.004	0	108	10	116				
4-Nitrophenol	1.65	0.751	4.004	0	41.1	5	122				
Dacthal (DCPA)	2.08	0.851	4.004	0	51.8	10	161				
Surr: 2,4-Dichlorophenylacetic acid	21.4		20.02		107	34.8	149				

NOTES:

S - Outlying spike recovery observed for Dalapon. A duplicate analysis was performed with similar results. Please refer to CCV-17481

Sample ID	LCS-17481	SampType:	LCS	Units:	µg/L	Prep Date:	6/28/2017	RunNo:	37156		
Client ID:	LCSW02	Batch ID:	17481			Analysis Date:	6/30/2017	SeqNo:	714038		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	3.97	4.50	4.002	0	99.2	29.9	130	0		30	
2,4-D	4.97	2.00	4.002	0	124	26.1	136	4.560	8.68	30	
2,4-DP	4.02	1.00	4.002	0	100	10	137	4.457	10.3	30	
2,4,5-TP (Silvex)	4.32	0.600	4.002	0	108	26.5	146	4.719	8.84	30	
2,4,5-T	4.21	1.00	4.002	0	105	26.4	142	4.611	9.07	30	
Dinoseb	3.62	3.75	4.002	0	90.4	10	130	3.897	7.41	30	



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Herbicides by EPA Method 8151A

Sample ID	LCSD-17481	SampType:	LCSD	Units:	µg/L	Prep Date:	6/28/2017	RunNo:	37156		
Client ID:	LCSW02	Batch ID:	17481			Analysis Date:	6/30/2017	SeqNo:	714038		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dalapon	ND	4.00	20.01	0	0	19	159	0		30	S
2,4-DB	4.41	3.00	4.002	0	110	26.8	157	4.631	4.88	30	
MCP	21.6	10.0	20.01	0	108	27.4	147	22.70	5.11	30	
MCPA	24.1	10.0	20.01	0	121	24.7	153	24.72	2.44	30	
Picloram	3.15	0.500	4.002	0	78.8	10	159	3.358	6.33	30	
Bentazon	3.80	2.70	4.002	0	94.9	38.4	132	4.048	6.35	30	
Chloramben	2.64	1.20	4.002	0	66.1	5	131	2.689	1.73	30	
Acifluorfen	3.76	4.25	4.002	0	94.0	10	136	0		30	
3,5-Dichlorobenzoic acid	3.92	5.00	4.002	0	97.9	10	116	0		30	
4-Nitrophenol	1.92	0.750	4.002	0	48.0	5	122	1.646	15.4	30	
Dacthal (DCPA)	1.70	0.850	4.002	0	42.5	10	161	2.075	19.8	30	
Surr: 2,4-Dichlorophenylacetic acid	19.6		20.01		98.0	34.8	149		0		

NOTES:

S - Outlying spike recovery observed for Dalapon. A duplicate analysis was performed with similar results. Please refer to CCV-17481

Sample ID	1706323-001HDUP	SampType:	DUP	Units:	µg/L	Prep Date:	6/28/2017	RunNo:	37156		
Client ID:	WC-1	Batch ID:	17481			Analysis Date:	6/30/2017	SeqNo:	714044		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dicamba	ND	4.51						0		50	
2,4-D	ND	2.00						0		50	
2,4-DP	ND	1.00						0		50	
2,4,5-TP (Silvex)	ND	0.601						0		50	
2,4,5-T	ND	1.00						0		50	
Dinoseb	ND	3.76						0		50	
Dalapon	ND	4.01						0		50	
2,4-DB	ND	3.01						0		50	
MCP	ND	10.0						0		50	
MCPA	ND	10.0						0		50	
Picloram	ND	0.501						0		50	
Bentazon	ND	2.71						0		50	

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Herbicides by EPA Method 8151A

Sample ID	1706323-001HDUP	SampType:	DUP	Units:	µg/L	Prep Date:	6/28/2017	RunNo:	37156		
Client ID:	WC-1	Batch ID:	17481			Analysis Date:	6/30/2017	SeqNo:	714044		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloramben	ND	1.20						0		50	
Acifluorfen	ND	4.26						0		50	
3,5-Dichlorobenzoic acid	ND	5.01						0		50	
4-Nitrophenol	ND	0.752						0		50	
Dacthal (DCPA)	ND	0.852						0		50	
Surr: 2,4-Dichlorophenylacetic acid	14.0		20.04		70.0	34.8	149		0		

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID	MB-17474	SampType:	MBLK		Units:	µg/L			Prep Date:	6/27/2017		RunNo:	37175	
Client ID:	MBLKW	Batch ID:	17474						Analysis Date:	6/30/2017		SeqNo:	714396	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual	
Naphthalene		ND	0.0996											
2-Methylnaphthalene		ND	0.0996											
1-Methylnaphthalene		ND	0.0996											
Acenaphthylene		ND	0.0996											
Acenaphthene		ND	0.0996											
Fluorene		ND	0.0996											
Phenanthrene		ND	0.0996											
Anthracene		ND	0.0996											
Fluoranthene		ND	0.0996											
Pyrene		ND	0.0996											
Benz(a)anthracene		ND	0.0996											
Chrysene		ND	0.0996											
Benzo(b)fluoranthene		ND	0.0996											
Benzo(k)fluoranthene		ND	0.0996											
Benzo(a)pyrene		ND	0.0996											
Indeno(1,2,3-cd)pyrene		ND	0.0996											
Dibenz(a,h)anthracene		ND	0.0996											
Benzo(g,h,i)perylene		ND	0.0996											
Surr: 2-Fluorobiphenyl		2.17		1.992		109	31.2	159						
Surr: Terphenyl-d14		2.54		1.992		127	21.9	122					S	

NOTES:

S - Outlying surrogate recovery(ies) observed (high bias). Sample is non-detect; no further action required.

Sample ID	LCS-17474	SampType:	LCS	Units:	µg/L	Prep Date:	6/27/2017	RunNo:	37175		
Client ID:	LCSW	Batch ID:	17474			Analysis Date:	6/30/2017	SeqNo:	714397		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	2.47	0.0998	3.991	0	62.0	30.4	113				
2-Methylnaphthalene	2.49	0.0998	3.991	0	62.4	33.2	126				
1-Methylnaphthalene	3.02	0.0998	3.991	0	75.6	30.2	119				
Acenaphthylene	3.27	0.0998	3.991	0	82.0	34	133				

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID	LCS-17474	SampType:	LCS	Units:	µg/L	Prep Date:	6/27/2017	RunNo:	37175		
Client ID:	LCSW	Batch ID:	17474			Analysis Date:	6/30/2017	SeqNo:	714397		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Acenaphthene	2.65	0.0998	3.991	0	66.5	31.8	127				
Fluorene	2.66	0.0998	3.991	0	66.6	27.7	138				
Phenanthrene	2.54	0.0998	3.991	0	63.7	26.3	139				
Anthracene	2.88	0.0998	3.991	0	72.1	27	125				
Fluoranthene	2.93	0.0998	3.991	0	73.4	23.5	142				
Pyrene	2.97	0.0998	3.991	0	74.5	25.1	136				
Benz(a)anthracene	2.33	0.0998	3.991	0	58.3	42.8	125				
Chrysene	2.31	0.0998	3.991	0	57.8	32.3	120				
Benzo(b)fluoranthene	1.73	0.0998	3.991	0	43.3	25.9	132				
Benzo(k)fluoranthene	2.28	0.0998	3.991	0	57.2	25.1	118				
Benzo(a)pyrene	1.82	0.0998	3.991	0	45.5	18.7	120				
Indeno(1,2,3-cd)pyrene	1.63	0.0998	3.991	0	40.9	21.3	131				
Dibenz(a,h)anthracene	1.55	0.0998	3.991	0	38.9	21.3	137				
Benzo(g,h,i)perylene	1.52	0.0998	3.991	0	38.0	21.2	127				
Surr: 2-Fluorobiphenyl	1.80		1.995		90.4	31.2	159				
Surr: Terphenyl-d14	1.51		1.995		75.5	21.9	122				

Sample ID	LCSD-17474	SampType:	LCSD	Units:	µg/L	Prep Date:	6/27/2017	RunNo:	37175		
Client ID:	LCSW02	Batch ID:	17474			Analysis Date:	6/30/2017	SeqNo:	714398		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	2.65	0.0996	3.985	0	66.5	30.4	113	2.474	6.85	30	
2-Methylnaphthalene	2.68	0.0996	3.985	0	67.4	33.2	126	2.490	7.54	30	
1-Methylnaphthalene	3.23	0.0996	3.985	0	81.0	30.2	119	3.017	6.75	30	
Acenaphthylene	3.57	0.0996	3.985	0	89.5	34	133	3.271	8.62	30	
Acenaphthene	2.90	0.0996	3.985	0	72.8	31.8	127	2.653	8.95	30	
Fluorene	2.98	0.0996	3.985	0	74.8	27.7	138	2.659	11.4	30	
Phenanthrene	2.89	0.0996	3.985	0	72.6	26.3	139	2.544	12.8	30	
Anthracene	3.28	0.0996	3.985	0	82.3	27	125	2.878	13.1	30	
Fluoranthene	3.40	0.0996	3.985	0	85.4	23.5	142	2.927	15.1	30	

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID	LCSD-17474		SampType: LCSD		Units: µg/L		Prep Date: 6/27/2017			RunNo: 37175		
Client ID:	LCSW02		Batch ID: 17474					Analysis Date: 6/30/2017			SeqNo: 714398	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Pyrene	3.41	0.0996	3.985	0	85.5	25.1	136	2.975	13.6	30		
Benz(a)anthracene	2.77	0.0996	3.985	0	69.5	42.8	125	2.327	17.3	30		
Chrysene	2.84	0.0996	3.985	0	71.3	32.3	120	2.308	20.7	30		
Benzo(b)fluoranthene	2.36	0.0996	3.985	0	59.3	25.9	132	1.729	31.0	30	R	
Benzo(k)fluoranthene	2.89	0.0996	3.985	0	72.5	25.1	118	2.284	23.3	30		
Benzo(a)pyrene	2.41	0.0996	3.985	0	60.5	18.7	120	1.817	28.1	30		
Indeno(1,2,3-cd)pyrene	2.26	0.0996	3.985	0	56.6	21.3	131	1.631	32.2	30	R	
Dibenz(a,h)anthracene	2.16	0.0996	3.985	0	54.2	21.3	137	1.551	32.9	30	R	
Benzo(g,h,i)perylene	2.04	0.0996	3.985	0	51.1	21.2	127	1.515	29.3	30		
Surr: 2-Fluorobiphenyl	2.02		1.993		101	31.2	159		0	0		
Surr: Terphenyl-d14	2.02		1.993		101	21.9	122		0	0		

NOTES:

R - High RPD observed, spike recoveries are within range.

Sample ID	1706318-001CDUP	SampType:	DUP	Units:	µg/L	Prep Date:	6/27/2017	RunNo:	37175		
Client ID:	BATCH	Batch ID:	17474			Analysis Date:	6/30/2017	SeqNo:	714400		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	0.0993						0		30	
2-Methylnaphthalene	ND	0.0993						0		30	
1-Methylnaphthalene	ND	0.0993						0		30	
Acenaphthylene	ND	0.0993						0		30	
Acenaphthene	ND	0.0993						0		30	
Fluorene	ND	0.0993						0		30	
Phenanthrene	ND	0.0993						0		30	
Anthracene	ND	0.0993						0		30	
Fluoranthene	ND	0.0993						0		30	
Pyrene	ND	0.0993						0		30	
Benz(a)anthracene	ND	0.0993						0		30	
Chrysene	ND	0.0993						0		30	
Benzo(b)fluoranthene	ND	0.0993						0		30	

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID	1706318-001CDUP	SampType:	DUP	Units:	µg/L	Prep Date:	6/27/2017	RunNo:	37175		
Client ID:	BATCH	Batch ID:	17474			Analysis Date:	6/30/2017	SeqNo:	714400		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo(k)fluoranthene	ND	0.0993						0		30	
Benzo(a)pyrene	ND	0.0993						0		30	
Indeno(1,2,3-cd)pyrene	ND	0.0993						0		30	
Dibenz(a,h)anthracene	ND	0.0993						0		30	
Benzo(g,h,i)perylene	ND	0.0993						0		30	
Surr: 2-Fluorobiphenyl	1.97		1.986		98.9	31.2	159		0		
Surr: Terphenyl-d14	1.75		1.986		88.1	21.9	122		0		



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Organochlorine Pesticides by EPA Method 8081

Sample ID	TOX CCV-E-17482	SampType:	CCV	Units:	µg/L	Prep Date:	7/6/2017	RunNo:	37211		
Client ID:	CCV	Batch ID:	17482			Analysis Date:	7/6/2017	SeqNo:	715949		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Toxaphene	1,130	1.00	1,000	0	113	80	120				
Surr: Decachlorobiphenyl	244		200.0		122	64.3	142				
Surr: Tetrachloro-m-xylene	214		200.0		107	39.7	136				

Sample ID	MB-17482	SampType:	MBLK			Units:	µg/L			Prep Date:	6/28/2017		RunNo:	37211	
Client ID:	MBLKW	Batch ID:	17482							Analysis Date:	7/6/2017		SeqNo:	715950	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual		

Toxaphene	ND	1.00									
alpha-BHC	ND	0.100									
beta-BHC	ND	0.100									
Gamma BHC (Lindane)	ND	0.100									
delta-BHC	ND	0.100									
Heptachlor	ND	0.100									
Aldrin	ND	0.100									
Heptachlor epoxide	ND	0.100									
gamma-Chlordane	ND	0.100									
Endosulfan I	ND	0.100									
alpha-Chlordane	ND	0.100									
Dieldrin	ND	0.100									
4,4'-DDE	ND	0.150									
Endrin	ND	0.150									
Endosulfan II	ND	0.150									
4,4'-DDD	ND	0.150									
Endrin aldehyde	ND	0.150									
Endosulfan sulfate	ND	0.150									
4,4'-DDT	ND	0.150									
Endrin ketone	ND	0.150									
Methoxychlor	ND	0.500									
Surr: Decachlorobiphenyl	0.346		0.3999		86.6	31	151				



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Organochlorine Pesticides by EPA Method 8081

Sample ID	MB-17482	SampType: MBLK			Units: µg/L		Prep Date: 6/28/2017			RunNo: 37211		
Client ID:	MBLKW	Batch ID: 17482			Analysis Date: 7/6/2017					SeqNo: 715950		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Surr: Tetrachloro-m-xylene 0.213 0.3999 53.2 31.4 125

Sample ID	LCS-17482	SampType: LCS			Units: µg/L		Prep Date: 6/28/2017			RunNo: 37211		
Client ID:	LCSW	Batch ID: 17482			Analysis Date: 7/6/2017					SeqNo: 715951		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

alpha-BHC	0.943	0.100	1.002	0	94.1	28.4	125				
beta-BHC	0.998	0.100	1.002	0	99.5	40.2	142				
Gamma BHC (Lindane)	0.960	0.100	1.002	0	95.8	38.1	152				
delta-BHC	1.02	0.100	1.002	0	102	37.6	151				
Heptachlor	0.905	0.100	1.002	0	90.3	32.7	136				
Aldrin	0.941	0.100	1.002	0	93.9	34.4	124				
Heptachlor epoxide	1.04	0.100	1.002	0	104	33.5	140				
gamma-Chlordane	1.06	0.100	1.002	0	106	38	129				
Endosulfan I	1.05	0.100	1.002	0	105	16.3	133				
alpha-Chlordane	1.06	0.100	1.002	0	106	22.1	136				
Dieldrin	1.06	0.100	1.002	0	106	35.8	144				
4,4'-DDE	1.09	0.150	1.002	0	109	14.3	137				
Endrin	1.10	0.150	1.002	0	110	25.7	156				
Endosulfan II	1.14	0.150	1.002	0	114	40	138				
4,4'-DDD	1.13	0.150	1.002	0	113	28.3	141				
Endrin aldehyde	1.08	0.150	1.002	0	108	35.5	145				
Endosulfan sulfate	1.14	0.150	1.002	0	114	45.1	148				
4,4'-DDT	1.17	0.150	1.002	0	116	21.5	150				
Endrin ketone	1.14	0.150	1.002	0	114	42.2	150				
Methoxychlor	1.18	0.501	1.002	0	118	26.6	174				
Surr: Decachlorobiphenyl	0.503		0.4009		125	31	151				
Surr: Tetrachloro-m-xylene	0.332		0.4009		82.9	31.4	125				



Date: 7/14/2017

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Organochlorine Pesticides by EPA Method 8081

Sample ID	LCSD-17482	SampType: LCSD	Units: µg/L			Prep Date: 6/28/2017			RunNo: 37211		
Client ID:	LCSW02	Batch ID:	17482		Analysis Date: 7/6/2017				SeqNo: 715952		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
alpha-BHC	0.904	0.0995	0.9948	0	90.9	28.4	125	0.9429	4.16	30	
beta-BHC	0.972	0.0995	0.9948	0	97.7	40.2	142	0.9975	2.58	30	
Gamma BHC (Lindane)	0.928	0.0995	0.9948	0	93.3	38.1	152	0.9597	3.31	30	
delta-BHC	1.01	0.0995	0.9948	0	102	37.6	151	1.022	0.802	30	
Heptachlor	0.900	0.0995	0.9948	0	90.4	32.7	136	0.9045	0.533	30	
Aldrin	0.928	0.0995	0.9948	0	93.3	34.4	124	0.9411	1.36	30	
Heptachlor epoxide	1.04	0.0995	0.9948	0	105	33.5	140	1.040	0.308	30	
gamma-Chlordane	1.06	0.0995	0.9948	0	107	38	129	1.059	0.162	30	
Endosulfan I	1.07	0.0995	0.9948	0	107	16.3	133	1.053	1.39	30	
alpha-Chlordane	1.08	0.0995	0.9948	0	108	22.1	136	1.064	1.38	30	
Dieldrin	1.09	0.0995	0.9948	0	110	35.8	144	1.063	2.88	30	
4,4'-DDE	1.13	0.149	0.9948	0	114	14.3	137	1.091	3.89	30	
Endrin	1.15	0.149	0.9948	0	116	25.7	156	1.103	4.31	30	
Endosulfan II	1.17	0.149	0.9948	0	118	40	138	1.142	2.63	30	
4,4'-DDD	1.15	0.149	0.9948	0	116	28.3	141	1.129	1.95	30	
Endrin aldehyde	1.12	0.149	0.9948	0	112	35.5	145	1.082	3.32	30	
Endosulfan sulfate	1.19	0.149	0.9948	0	119	45.1	148	1.138	4.05	30	
4,4'-DDT	1.16	0.149	0.9948	0	116	21.5	150	1.168	0.922	30	
Endrin ketone	1.17	0.149	0.9948	0	118	42.2	150	1.145	2.45	30	
Methoxychlor	1.21	0.497	0.9948	0	121	26.6	174	1.184	1.80	30	
Surr: Decachlorobiphenyl	0.410		0.3979		103	31	151		0		
Surr: Tetrachloro-m-xylene	0.291		0.3979		73.3	31.4	125		0		

Sample ID	1706323-001IDUP	SampType:	DUP	Units:	µg/L	Prep Date:	6/28/2017	RunNo:	37211		
Client ID:	WC-1	Batch ID:	17482			Analysis Date:	7/6/2017	SeqNo:	715954		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Toxaphene	ND	0.993						0		30	
alpha-BHC	ND	0.0993						0		30	
beta-BHC	ND	0.0993						0		30	

Work Order: 1706323
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Organochlorine Pesticides by EPA Method 8081

Sample ID	1706323-001IDUP	SampType:	DUP	Units:	µg/L	Prep Date:	6/28/2017	RunNo:	37211		
Client ID:	WC-1	Batch ID:	17482			Analysis Date:	7/6/2017	SeqNo:	715954		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Gamma BHC (Lindane)	ND	0.0993						0		30	
delta-BHC	ND	0.0993						0		30	
Heptachlor	ND	0.0993						0		30	
Aldrin	ND	0.0993						0		30	
Heptachlor epoxide	ND	0.0993						0		30	
gamma-Chlordane	ND	0.0993						0		30	
Endosulfan I	ND	0.0993						0		30	
alpha-Chlordane	ND	0.0993						0		30	
Dieldrin	ND	0.0993						0		30	
4,4´-DDE	ND	0.149						0		30	
Endrin	ND	0.149						0		30	
Endosulfan II	ND	0.149						0		30	
4,4´-DDD	ND	0.149						0		30	
Endrin aldehyde	ND	0.149						0		30	
Endosulfan sulfate	ND	0.149						0		30	
4,4´-DDT	ND	0.149						0		30	
Endrin ketone	ND	0.149						0		30	
Methoxychlor	ND	0.497						0		30	
Surr: Decachlorobiphenyl	0.442		0.3974		111	31	151		0		
Surr: Tetrachloro-m-xylene	0.375		0.3974		94.5	31.4	125		0		

Client Name: **SW**
 Logged by: **Erica Silva**

Work Order Number: **1706323**
 Date Received: **6/27/2017 2:19:00 PM**

Chain of Custody

1. Is Chain of Custody complete? Yes ☐ No ☒ Not Present ☐
 2. How was the sample delivered? Client

Log In

3. Coolers are present? Yes ☒ No ☐ NA ☐
 4. Shipping container/cooler in good condition? Yes ☒ No ☐
 5. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes ☐ No ☐ Not Required ☒
 6. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
 7. Were all items received at a temperature of >0°C to 10.0°C * Yes ☒ No ☐ NA ☐
 8. Sample(s) in proper container(s)? Yes ☒ No ☐
 9. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
 10. Are samples properly preserved? Yes ☒ No ☐
 11. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
 12. Is there headspace in the VOA vials? Yes ☐ No ☐ NA ☒
 13. Did all samples containers arrive in good condition(unbroken)? Yes ☒ No ☐
 14. Does paperwork match bottle labels? Yes ☒ No ☐
 15. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
 16. Is it clear what analyses were requested? Yes ☒ No ☐
 17. Were all holding times able to be met? Yes ☒ No ☐

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes ☒ No ☐ NA ☐

Person Notified: Chris Helland Date 6/27/2017
 By Whom: Erica Silva Via: ☒ eMail ☒ Phone ☐ Fax ☐ In Person
 Regarding: Volume received for analyses not appearing on the COC
 Client Instructions: Add Chlorophyll-A, OC. Herbicides, OC. Pesticides

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler 1	0.8
Cooler 2	1.2
Cooler 3	2.2
Cooler 4	1.0
Sample 1	0.5

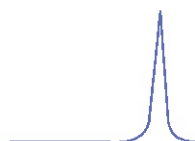
* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Client Name: **SW**Work Order Number: **1706323**Logged by: **Erica Silva**Date Received: **6/27/2017 2:19:00 PM**

Item #	Temp °C
Sample 2	1.6
Sample 3	2.5
Sample 4	0.8
Temp Blank 1	0.7
Temp Blank 2	0.8
Temp Blank 3	1.2
Temp Blank 4	0.8

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

June 2017 Chlorophyll-a Sample Results																	
Sample ID	Client Sample ID	Date Collected	750	664	665	750	664b-750b	665a-750a	DF	Volume of solvent (acetone) (L)	Total sample Volume (L)	Length of cuvette (cm)	mg/L of Chl-a in cuvette [C _a]	mg/L of Pheophyton in Cuvette P _e	Chl-a mg/L Total Sample	Pheo mg/L Total Sample	Notes
1706323-001G	WC-1	6/27/2017	0.001	0.071	0.056	0.002	0.070	0.054	1.000	0.010	1.076	1.000	0.43	0.73	0.40	0.67	
1706323-001G	WC-1	6/27/2017	0.002	0.074	0.053	0.002	0.072	0.051	1.000	0.010	1.076	1.000	0.56	0.95	0.52	0.89	Lab duplicate
1706323-002G	WC-2	6/27/2017	0.002	0.048	0.033	0.003	0.046	0.030	1.000	0.010	1.090	1.000	0.43	0.73	0.39	0.67	
1706323-003G	WC-3	6/27/2017	0.001	0.014	0.011	0.003	0.013	0.008	1.000	0.010	1.078	1.000	0.13	0.23	0.12	0.21	clogged filter used two filters to filter the entire 1.078 liters
1706323-004G	WC-4	6/27/2017	0.000	0.005	0.004	0.000	0.005	0.004	1.000	0.010	1.080	1.000	0.03	0.05	0.02	0.04	
1706323-005G	WC-5	6/27/2017	0.003	0.018	0.014	0.004	0.015	0.010	1.000	0.010	1.026	1.000	0.13	0.23	0.13	0.22	
1706323-006G	WC-6	6/27/2017	0.002	0.010	0.008	0.002	0.008	0.006	1.000	0.010	1.044	1.000	0.05	0.09	0.05	0.09	
1706323-007G	WC-7	6/27/2017	0.001	0.007	0.005	0.002	0.006	0.003	1.000	0.010	1.070	1.000	0.08	0.14	0.07	0.13	
BLANK	BLANK	BLANK	0.000	0.000	0.001	0.001	0.000	0.000	1.000	0.010	1.000	1.000	0	0	0	0	



Certificate of Analysis

Fremont Analytical
3600 Fremont Ave N
Seattle, WA 98103

Date Received: 6/29/2017

Date Reported: 7/14/2017

Project: TPN

Sample No.	Sampled	Sample ID	Result	Units	Method	Date Tested	Initials
Total Persulfate Nitrogen							
169527-01	6/27/2017	WC-1	0.16	mg/L	SM4500 N C	7/11/2017	EC
169527-02	6/27/2017	WC-2	0.40	mg/L	SM4500 N C	7/11/2017	EC
169527-03	6/27/2017	WC-3	3.36	mg/L	SM4500 N C	7/11/2017	EC
169527-04	6/27/2017	WC-4	1.59	mg/L	SM4500 N C	7/11/2017	EC
169527-05	6/27/2017	WC-5	1.76	mg/L	SM4500 N C	7/11/2017	EC
169527-06	6/27/2017	WC-6	1.72	mg/L	SM4500 N C	7/11/2017	EC
169527-07	6/27/2017	WC-7	1.65	mg/L	SM4500 N C	7/11/2017	EC

Approved For Release

Nancy Parrott, Laboratory Supervisor



SPECTRA Laboratories - Kitsap

...Where experience matters

26276 Twelve Trees Lane, Suite C • Poulsbo, WA 98370 • (360) 779-5141 • Fax (360) 779-5150 • www.spectra-lab.com

July 14, 2017

Fremont Analytical, Inc.
3600 Fremont Ave N
Seattle, WA 98103

Project: TPN
Sample Date: 6/27/17 0830

Lab Work Order #: 169527
Sample Received: 6/29/17 1005

Quality Control Report

Digest Blank

Test Parameter	Blank ID	Result mg/L	Date Analyzed	Method
Total Persulfate Nitrogen	MB071117-01	<0.01	7/11/17	SM 4500-N C

Laboratory Check Standard

Test Parameter	QC Sample ID	True Value mg/L	Result mg/L	% Recovery	Date Analyzed	Method
Total Persulfate Nitrogen	P232-505	19.0	17.9	94.1	7/11/17	SM 4500-N C

Approved for Release,

Nancy Parrott
Laboratory Supervisor

WDOE Accreditation #C594

This report is issued solely for the person or company to whom it is addressed. This laboratory accepts responsibility only for the due performance of analysis according to industry accepted practice. Spectra Laboratories-Kitsap LLC or its employees are not responsible for consequential damages in any kind or in any amount.



CHAIN OF CUSTODY RECORD

Omega C/CID 379

PAGE: 1 OF: 1

ADDRESS

Fremont Analytical, Inc.
3600 Fremont Ave. N.
Seattle, WA 98103
TEL: 206-352-3790
FAX: 206-352-7178
Website: www.fremontanalytical.com

SUB CONTRACTOR: SPECTRA-K

COMPANY:

Spectra Laboratories - Kitsap

ADDRESS:

26276 Twelve Trees Ln, Ste. C

CITY, STATE, ZIP:

Poulsbo, WA 98370

PHONE:

FAX:

EMAIL:

ACCOUNT #:

SPECIAL INSTRUCTIONS / COMMENTS:

Please email results to Mike Ridgeway at mridgeway@fremontanalytical.com and Chelsea Ward at cward@fremontanalytical.com.

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS, Method Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1706323-001E TEST_SUB	WC-1	250 HDPE NON	Water	6/27/2017 8:30:00 AM	1	Total Persulfate Nitrogen by SM 4500-N C-97, 169527-01
2	1706323-002E TEST_SUB	WC-2	250 HDPE NON	Water	6/27/2017 10:26:00 AM	1	169527-02
3	1706323-003E TEST_SUB	WC-3	250 HDPE NON	Water	6/27/2017 9:30:00 AM	1	169527-03
4	1706323-004E TEST_SUB	WC-4	250 HDPE NON	Water	6/27/2017 9:45:00 AM	1	169527-04
5	1706323-005E TEST_SUB	WC-5	250 HDPE NON	Water	6/27/2017 12:25:00 PM	1	169527-05
6	1706323-006E TEST_SUB	WC-6	250 HDPE NON	Water	6/27/2017 11:43:00 AM	1	169527-06
7	1706323-007E TEST_SUB	WC-7	250 HDPE NON	Water	6/27/2017 1:05:00 PM	1	169527-07

Relinquished By:

Date: 6/28/17

Time: 1615

Received By:

Mike Bauer

Date: 6/29/17

Time: 1005

REPORT TRANSMITTAL DESIRED:

☐ HARDCOPY (extra cost)☐ FAX☒ EMAIL☐ ONLINE

Relinquished By:

Date:

Time:

Received By:

Date:

Time:

TAT:

Standard ☒

RUSH

Next BD ☐2nd BD ☐3rd BD ☐

FOR LAB USE ONLY

Temp of samples

4.8 °C

Attempt to Cool?

Comments:

Note: RUSH requests will incur surcharges!



3600 Fremont Ave N,
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record & Laboratory Services Agreement

Laboratory Project No (Internal): **1706323**

Special Remarks:

Client: Shannon & Wilson

Address: 400 N 34th St #100

City, State, Zip: Seattle, WA

Telephone: 206-695-6706

Fax:

Date: 6/27/17 Page: 1 of 1

Project Name: Willow Creek

Project No: 21-1-12588-031

Collected by: BON, SCC, CMH

Location: Edmonds, WA

Report To (PM): DRC

PM Email: DRC@shawni.com

Sample Disposal: ☐ Return to client ☐ Disposal by lab (after 30 days)

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)	Chlorophyll-A	Chlorophyll-b	Hydrocarbons	Gasoline Range Organics (GX)	Hydrocarbon Identification (HID)	Diesel/Heavy Oil Range Organics (DX)	SVOCS (EPA 8270 / 625)	PCBs (EPA 8270 - SIM)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)	Anions (IC)**	EDB (8011)	Free Chlorine	TSS	HARDNESS	TOTAL PHOSPHORUS	PERCHLORATE	NITROGEN

1	WC-1	6/27/17	8:30	W	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X
2	WC-2		10:26		X	X	X	X		X											
3	WC-3		9:30		X	X	X	X													
4	WC-4		9:45		X	X	X	X													
5	WC-5		12:25		X	X	X	X													
6	WC-6		11:43		X	X	X	X													
7	WC-7		11:05 pm		X	X	X	X													
8																					
9																					
10																					

per C. Holland 6/27/17

Seen

Diurnal Extirpation

Beak

Matrix: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water
Metals (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL Individual Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sn Ti Tl U V Zn
Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide Iodide O-Phosphate Fluoride Nitrate-Nitrite
I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above and that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished	Date/Time	Received	Date/Time
<i>[Signature]</i>	6/27/17 14:19	<i>[Signature]</i>	6/27/2017 14:19
Reinforced	Date/Time	Received	Date/Time
<i>[Signature]</i>		<i>[Signature]</i>	



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
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info@fremontanalytical.com

Shannon & Wilson

Chris Helland
400 N. 34th Street, Suite 100
Seattle, WA 98103

RE: Willow Creek
Work Order Number: 1709235

October 05, 2017

Attention Chris Helland:

Fremont Analytical, Inc. received 9 sample(s) on 9/20/2017 for the analyses presented in the following report.

Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.
Fecal Coliform by SM 9222D
Ion Chromatography by EPA Method 300.0
Mercury by EPA Method 245.1
Total Metals by EPA Method 200.8
Total Hardness by EPA Method 200.8/SM 2340B
Total Phosphorous by EPA Method 365.3
Total Suspended Solids (TSS) by SM 2540D

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Mike Ridgeway
Laboratory Director

DoD/ELAP Certification #L17-135, ISO/IEC 17025:2005
ORELAP Certification: WA 100009-007 (NELAP Recognized)

CLIENT: Shannon & Wilson
Project: Willow Creek
Work Order: 1709235

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1709235-001	WC-01	09/20/2017 12:10 PM	09/20/2017 3:04 PM
1709235-002	WC -02	09/20/2017 1:29 PM	09/20/2017 3:04 PM
1709235-003	WC -03	09/20/2017 10:45 AM	09/20/2017 3:04 PM
1709235-004	WC -04	09/20/2017 11:15 AM	09/20/2017 3:04 PM
1709235-005	WC -05	09/20/2017 10:10 AM	09/20/2017 3:04 PM
1709235-006	WC -06	09/20/2017 9:30 AM	09/20/2017 3:04 PM
1709235-007	WC -07	09/20/2017 8:30 AM	09/20/2017 3:04 PM
1709235-008	WC-06	09/20/2017 11:45 AM	09/20/2017 3:04 PM
1709235-009	WC-07	09/20/2017 11:30 AM	09/20/2017 3:04 PM

CLIENT: Shannon & Wilson**Project:** Willow Creek

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

1709235-001E

TEST_SUB has been Sub Contracted.

1709235-002E

TEST_SUB has been Sub Contracted.

1709235-003E

TEST_SUB has been Sub Contracted.

1709235-004E

TEST_SUB has been Sub Contracted.

1709235-005E

TEST_SUB has been Sub Contracted.

1709235-006E

TEST_SUB has been Sub Contracted.

1709235-007E

TEST_SUB has been Sub Contracted.

Qualifiers:

- * - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate



Analytical Report

Work Order: 1709235

Date Reported: 10/5/2017

Client: Shannon & Wilson

Collection Date: 9/20/2017 12:10:00 PM

Project: Willow Creek

Lab ID: 1709235-001

Matrix: Stormwater

Client Sample ID: WC-01

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R38801	Analyst: MW	
Coliform, Fecal	24.0	1.00		CFU/100ml	1	9/20/2017 4:00:32 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R38867	Analyst: KT	
Chloride	16,400	1,000	D	mg/L	10000	9/27/2017 10:50:00 AM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 18285	Analyst: WF	
Mercury	ND	0.100		µg/L	1	9/22/2017 2:51:04 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 18279	Analyst: TN	
Total Hardness (as CaCO ₃)	6,090	8.00	D	mg/L CaCO ₃	10	9/22/2017 1:18:22 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 18279	Analyst: TN	
Antimony	ND	2.00	D	µg/L	10	9/22/2017 1:18:22 PM
Arsenic	2.32	10.0	JD	µg/L	10	9/22/2017 1:18:22 PM
Beryllium	ND	2.00	D	µg/L	10	9/22/2017 1:18:22 PM
Cadmium	ND	2.00	D	µg/L	10	9/22/2017 1:18:22 PM
Chromium	5.30	5.00	D	µg/L	10	9/22/2017 1:18:22 PM
Copper	4.89	5.00	JD	µg/L	10	9/22/2017 1:18:22 PM
Lead	1.50	5.00	JD	µg/L	10	9/22/2017 1:18:22 PM
Nickel	3.08	5.00	JD	µg/L	10	9/22/2017 1:18:22 PM
Selenium	18.1	10.0	D	µg/L	10	9/22/2017 1:18:22 PM
Silver	ND	2.00	D	µg/L	10	9/22/2017 1:18:22 PM
Thallium	ND	2.00	D	µg/L	10	9/22/2017 1:18:22 PM
Zinc	62.0	15.0	D	µg/L	10	9/22/2017 1:18:22 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 18305	Analyst: KT	
Phosphorus, Total (As P)	ND	0.200		mg/L	1	9/26/2017 12:39:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R38755	Analyst: KT	
Total Suspended Solids	76.0	5.00		mg/L	1	9/22/2017 10:26:00 AM



Analytical Report

Work Order: 1709235

Date Reported: 10/5/2017

Client: Shannon & Wilson

Collection Date: 9/20/2017 1:29:00 PM

Project: Willow Creek

Lab ID: 1709235-002

Matrix: Stormwater

Client Sample ID: WC -02

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R38801	Analyst: MW	
Coliform, Fecal	1,170	1.00		CFU/100ml	1	9/20/2017 4:00:32 PM
<u>Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.</u>						
				Batch ID: 18268	Analyst: SB	
Diesel (Fuel Oil)	ND	49.8		µg/L	1	9/22/2017 2:07:45 PM
Heavy Oil	ND	99.6		µg/L	1	9/22/2017 2:07:45 PM
Surr: 2-Fluorobiphenyl	87.2	50 - 150		%Rec	1	9/22/2017 2:07:45 PM
Surr: o-Terphenyl	81.7	50 - 150		%Rec	1	9/22/2017 2:07:45 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R38867	Analyst: KT	
Chloride	3,190	200	D	mg/L	2000	9/27/2017 11:11:00 AM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 18285	Analyst: WF	
Mercury	ND	0.100		µg/L	1	9/22/2017 2:52:47 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 18279	Analyst: TN	
Total Hardness (as CaCO ₃)	1,110	8.00	D	mg/L CaCO ₃	10	9/22/2017 1:22:23 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 18279	Analyst: TN	
Antimony	ND	2.00	D	µg/L	10	9/22/2017 1:22:23 PM
Arsenic	ND	10.0	D	µg/L	10	9/22/2017 1:22:23 PM
Beryllium	ND	2.00	D	µg/L	10	9/22/2017 1:22:23 PM
Cadmium	ND	2.00	D	µg/L	10	9/22/2017 1:22:23 PM
Chromium	2.79	5.00	JD	µg/L	10	9/22/2017 1:22:23 PM
Copper	4.80	5.00	JD	µg/L	10	9/22/2017 1:22:23 PM
Lead	1.29	5.00	JD	µg/L	10	9/22/2017 1:22:23 PM
Nickel	1.81	5.00	JD	µg/L	10	9/22/2017 1:22:23 PM
Selenium	12.8	10.0	D	µg/L	10	9/22/2017 1:22:23 PM
Silver	ND	2.00	D	µg/L	10	9/22/2017 1:22:23 PM
Thallium	ND	2.00	D	µg/L	10	9/22/2017 1:22:23 PM
Zinc	54.6	15.0	D	µg/L	10	9/22/2017 1:22:23 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 18305	Analyst: KT	
Phosphorus, Total (As P)	ND	0.200		mg/L	1	9/26/2017 12:41:00 PM

Original



Analytical Report

Work Order: 1709235
Date Reported: 10/5/2017

Client: Shannon & Wilson

Collection Date: 9/20/2017 1:29:00 PM

Project: Willow Creek

Lab ID: 1709235-002

Matrix: Stormwater

Client Sample ID: WC -02

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed

Total Suspended Solids (TSS) by SM 2540D

Batch ID: R38755 Analyst: KT

Total Suspended Solids	ND	5.00		mg/L	1	9/22/2017 10:28:00 AM



Analytical Report

Work Order: 1709235

Date Reported: 10/5/2017

Client: Shannon & Wilson

Collection Date: 9/20/2017 10:45:00 AM

Project: Willow Creek

Lab ID: 1709235-003

Matrix: Stormwater

Client Sample ID: WC -03

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R38801	Analyst: MW	
Coliform, Fecal	68.0	1.00		CFU/100ml	1	9/20/2017 4:00:32 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R38867	Analyst: KT	
Chloride	4.58	0.200	D	mg/L	2	9/27/2017 9:07:00 AM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 18285	Analyst: WF	
Mercury	ND	0.100		µg/L	1	9/22/2017 2:54:30 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 18279	Analyst: TN	
Total Hardness (as CaCO ₃)	16.3	0.800		mg/L CaCO ₃	1	9/22/2017 1:26:24 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 18279	Analyst: TN	
Antimony	3.04	0.200		µg/L	1	9/22/2017 1:26:24 PM
Arsenic	1.38	1.00		µg/L	1	9/22/2017 1:26:24 PM
Beryllium	ND	0.200		µg/L	1	9/22/2017 1:26:24 PM
Cadmium	ND	0.200		µg/L	1	9/22/2017 1:26:24 PM
Chromium	1.96	0.500		µg/L	1	9/22/2017 1:26:24 PM
Copper	10.9	0.500		µg/L	1	9/22/2017 1:26:24 PM
Lead	1.97	0.500		µg/L	1	9/22/2017 1:26:24 PM
Nickel	2.43	0.500		µg/L	1	9/22/2017 1:26:24 PM
Selenium	ND	1.00		µg/L	1	9/22/2017 1:26:24 PM
Silver	ND	0.200		µg/L	1	9/22/2017 1:26:24 PM
Thallium	ND	0.200		µg/L	1	9/22/2017 1:26:24 PM
Zinc	83.7	1.50		µg/L	1	9/22/2017 1:26:24 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 18305	Analyst: KT	
Phosphorus, Total (As P)	ND	0.200		mg/L	1	9/26/2017 12:49:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R38755	Analyst: KT	
Total Suspended Solids	7.00	5.00		mg/L	1	9/22/2017 10:30:00 AM



Analytical Report

Work Order: 1709235

Date Reported: 10/5/2017

Client: Shannon & Wilson

Collection Date: 9/20/2017 11:15:00 AM

Project: Willow Creek

Lab ID: 1709235-004

Matrix: Stormwater

Client Sample ID: WC -04

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R38801	Analyst: MW	
Coliform, Fecal	392	1.00		CFU/100ml	1	9/20/2017 4:00:32 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R38867	Analyst: KT	
Chloride	6.29	0.400	D	mg/L	4	9/27/2017 12:13:00 PM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 18285	Analyst: WF	
Mercury	ND	0.100		µg/L	1	9/22/2017 2:56:11 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 18279	Analyst: TN	
Total Hardness (as CaCO ₃)	124	0.800		mg/L CaCO ₃	1	9/22/2017 1:30:26 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 18279	Analyst: TN	
Antimony	ND	0.200		µg/L	1	9/22/2017 1:30:26 PM
Arsenic	3.25	1.00		µg/L	1	9/22/2017 1:30:26 PM
Beryllium	ND	0.200		µg/L	1	9/22/2017 1:30:26 PM
Cadmium	ND	0.200		µg/L	1	9/22/2017 1:30:26 PM
Chromium	3.45	0.500		µg/L	1	9/22/2017 1:30:26 PM
Copper	2.86	0.500		µg/L	1	9/22/2017 1:30:26 PM
Lead	0.792	0.500		µg/L	1	9/22/2017 1:30:26 PM
Nickel	1.68	0.500		µg/L	1	9/22/2017 1:30:26 PM
Selenium	ND	1.00		µg/L	1	9/22/2017 1:30:26 PM
Silver	ND	0.200		µg/L	1	9/22/2017 1:30:26 PM
Thallium	ND	0.200		µg/L	1	9/22/2017 1:30:26 PM
Zinc	41.1	1.50		µg/L	1	9/22/2017 1:30:26 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 18305	Analyst: KT	
Phosphorus, Total (As P)	ND	0.200		mg/L	1	9/26/2017 12:51:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R38755	Analyst: KT	
Total Suspended Solids	7.00	5.00		mg/L	1	9/22/2017 10:32:00 AM



Analytical Report

Work Order: 1709235

Date Reported: 10/5/2017

Client: Shannon & Wilson

Collection Date: 9/20/2017 10:10:00 AM

Project: Willow Creek

Lab ID: 1709235-005

Matrix: Stormwater

Client Sample ID: WC -05

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<u>Fecal Coliform by SM 9222D</u>						
				Batch ID: R38801	Analyst: MW	
Coliform, Fecal	164	1.00		CFU/100ml	1	9/20/2017 4:00:32 PM
<u>Ion Chromatography by EPA Method 300.0</u>						
				Batch ID: R38867	Analyst: KT	
Chloride	7.53	0.400	D	mg/L	4	9/27/2017 12:33:00 PM
<u>Mercury by EPA Method 245.1</u>						
				Batch ID: 18285	Analyst: WF	
Mercury	ND	0.100		µg/L	1	9/22/2017 2:57:52 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>						
				Batch ID: 18279	Analyst: TN	
Total Hardness (as CaCO ₃)	101	0.800		mg/L CaCO ₃	1	9/22/2017 1:34:27 PM
<u>Total Metals by EPA Method 200.8</u>						
				Batch ID: 18279	Analyst: TN	
Antimony	ND	0.200		µg/L	1	9/22/2017 1:34:27 PM
Arsenic	2.16	1.00		µg/L	1	9/22/2017 1:34:27 PM
Beryllium	ND	0.200		µg/L	1	9/22/2017 1:34:27 PM
Cadmium	ND	0.200		µg/L	1	9/22/2017 1:34:27 PM
Chromium	1.45	0.500		µg/L	1	9/22/2017 1:34:27 PM
Copper	1.87	0.500		µg/L	1	9/22/2017 1:34:27 PM
Lead	1.24	0.500		µg/L	1	9/22/2017 1:34:27 PM
Nickel	1.65	0.500		µg/L	1	9/22/2017 1:34:27 PM
Selenium	ND	1.00		µg/L	1	9/22/2017 1:34:27 PM
Silver	ND	0.200		µg/L	1	9/22/2017 1:34:27 PM
Thallium	ND	0.200		µg/L	1	9/22/2017 1:34:27 PM
Zinc	40.9	1.50		µg/L	1	9/22/2017 1:34:27 PM
<u>Total Phosphorous by EPA Method 365.3</u>						
				Batch ID: 18305	Analyst: KT	
Phosphorus, Total (As P)	ND	0.200		mg/L	1	9/26/2017 1:18:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>						
				Batch ID: R38755	Analyst: KT	
Total Suspended Solids	8.00	5.00		mg/L	1	9/22/2017 10:34:00 AM



Analytical Report

Work Order: 1709235

Date Reported: 10/5/2017

Client: Shannon & Wilson

Collection Date: 9/20/2017 9:30:00 AM

Project: Willow Creek

Lab ID: 1709235-006

Matrix: Stormwater

Client Sample ID: WC -06

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: R38867		Analyst: KT
Chloride	7.66	0.400	D	mg/L	4	9/27/2017 10:09:00 AM
<u>Mercury by EPA Method 245.1</u>				Batch ID: 18285		Analyst: WF
Mercury	ND	0.100		µg/L	1	9/22/2017 2:59:33 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>				Batch ID: 18279		Analyst: TN
Total Hardness (as CaCO ₃)	105	0.800		mg/L CaCO ₃	1	9/22/2017 1:38:28 PM
<u>Total Metals by EPA Method 200.8</u>				Batch ID: 18279		Analyst: TN
Antimony	ND	0.200		µg/L	1	9/22/2017 1:38:28 PM
Arsenic	1.76	1.00		µg/L	1	9/22/2017 1:38:28 PM
Beryllium	ND	0.200		µg/L	1	9/22/2017 1:38:28 PM
Cadmium	ND	0.200		µg/L	1	9/22/2017 1:38:28 PM
Chromium	1.33	0.500		µg/L	1	9/22/2017 1:38:28 PM
Copper	2.07	0.500		µg/L	1	9/22/2017 1:38:28 PM
Lead	1.38	0.500		µg/L	1	9/22/2017 1:38:28 PM
Nickel	1.47	0.500		µg/L	1	9/22/2017 1:38:28 PM
Selenium	ND	1.00		µg/L	1	9/22/2017 1:38:28 PM
Silver	ND	0.200		µg/L	1	9/22/2017 1:38:28 PM
Thallium	ND	0.200		µg/L	1	9/22/2017 1:38:28 PM
Zinc	41.9	1.50		µg/L	1	9/22/2017 1:38:28 PM
<u>Total Phosphorous by EPA Method 365.3</u>				Batch ID: 18305		Analyst: KT
Phosphorus, Total (As P)	ND	0.200		mg/L	1	9/26/2017 1:20:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>				Batch ID: R38755		Analyst: KT
Total Suspended Solids	6.00	5.00		mg/L	1	9/22/2017 10:36:00 AM



Analytical Report

Work Order: 1709235

Date Reported: 10/5/2017

Client: Shannon & Wilson

Collection Date: 9/20/2017 8:30:00 AM

Project: Willow Creek

Lab ID: 1709235-007

Matrix: Stormwater

Client Sample ID: WC -07

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
<u>Ion Chromatography by EPA Method 300.0</u>				Batch ID: R38867		Analyst: KT
Chloride	6.00	0.400	D	mg/L	4	9/27/2017 10:30:00 AM
<u>Mercury by EPA Method 245.1</u>				Batch ID: 18285		Analyst: WF
Mercury	ND	0.100		µg/L	1	9/22/2017 3:01:21 PM
<u>Total Hardness by EPA Method 200.8/SM 2340B</u>				Batch ID: 18279		Analyst: TN
Total Hardness (as CaCO ₃)	121	0.800		mg/L CaCO ₃	1	9/22/2017 1:42:29 PM
<u>Total Metals by EPA Method 200.8</u>				Batch ID: 18279		Analyst: TN
Antimony	ND	0.200		µg/L	1	9/22/2017 1:42:29 PM
Arsenic	3.44	1.00		µg/L	1	9/22/2017 1:42:29 PM
Beryllium	ND	0.200		µg/L	1	9/22/2017 1:42:29 PM
Cadmium	ND	0.200		µg/L	1	9/22/2017 1:42:29 PM
Chromium	2.62	0.500		µg/L	1	9/22/2017 1:42:29 PM
Copper	2.53	0.500		µg/L	1	9/22/2017 1:42:29 PM
Lead	1.15	0.500		µg/L	1	9/22/2017 1:42:29 PM
Nickel	1.70	0.500		µg/L	1	9/22/2017 1:42:29 PM
Selenium	ND	1.00		µg/L	1	9/22/2017 1:42:29 PM
Silver	ND	0.200		µg/L	1	9/22/2017 1:42:29 PM
Thallium	ND	0.200		µg/L	1	9/22/2017 1:42:29 PM
Zinc	45.4	1.50		µg/L	1	9/22/2017 1:42:29 PM
<u>Total Phosphorous by EPA Method 365.3</u>				Batch ID: 18305		Analyst: KT
Phosphorus, Total (As P)	ND	0.200		mg/L	1	9/26/2017 1:22:00 PM
<u>Total Suspended Solids (TSS) by SM 2540D</u>				Batch ID: R38755		Analyst: KT
Total Suspended Solids	5.00	5.00		mg/L	1	9/22/2017 10:38:00 AM



Analytical Report

Work Order: 1709235
Date Reported: 10/5/2017

Client: Shannon & Wilson

Collection Date: 9/20/2017 11:45:00 AM

Project: Willow Creek

Lab ID: 1709235-008

Matrix: Stormwater

Client Sample ID: WC-06

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed

Fecal Coliform by SM 9222D

Batch ID: R38801 Analyst: MW

Coliform, Fecal	256	1.00		CFU/100ml	1	9/20/2017 4:00:32 PM



Analytical Report

Work Order: 1709235
Date Reported: 10/5/2017

Client: Shannon & Wilson

Collection Date: 9/20/2017 11:30:00 AM

Project: Willow Creek

Lab ID: 1709235-009

Matrix: Stormwater

Client Sample ID: WC-07

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed

Fecal Coliform by SM 9222D

Batch ID: R38801 Analyst: MW

Coliform, Fecal	352	1.00		CFU/100ml	1	9/20/2017 4:00:32 PM



SPECTRA Laboratories - Kitsap

...Where experience matters

26276 Twelve Trees Lane, Suite C • Poulsbo, WA 98370 • (360) 779-5141 • Fax (360) 779-5150 • www.spectra-lab.com

Certificate of Analysis

Fremont Analytical
3600 Fremont Ave N
Seattle, WA 98103

Date Received: 9/22/2017

Date Reported: 10/5/2017

Project: TPN

Sample No.	Sampled	Sample ID	Result	Units	Method	Date Tested	Initials
Total Persulfate Nitrogen							
171942-01	09/20/2017 0:00	WC-1	0.32	mg/L	SM4500 N C	10/4/2017	EC
171942-02	09/20/2017 0:00	WC-2	1.05	mg/L	SM4500 N C	10/4/2017	EC
171942-03	09/20/2017 0:00	WC-3	0.72	mg/L	SM4500 N C	10/4/2017	EC
171942-04	09/20/2017 0:00	WC-4	1.42	mg/L	SM4500 N C	10/4/2017	EC
171942-05	09/20/2017 0:00	WC-5	1.60	mg/L	SM4500 N C	10/4/2017	EC
171942-06	09/20/2017 0:00	WC-6	1.56	mg/L	SM4500 N C	10/4/2017	EC
171942-07	09/20/2017 0:00	WC-7	1.50	mg/L	SM4500 N C	10/4/2017	EC

Approved For Release

Nancy Parrott
Nancy Parrott, Laboratory Supervisor



SPECTRA Laboratories - Kitsap

...Where experience matters

26276 Twelve Trees Lane, Suite C • Poulsbo, WA 98370 • (360) 779-5141 • Fax (360) 779-5150 • www.spectra-lab.com

October 5, 2017

Fremont Analytical, Inc.
3600 Fremont Ave N
Seattle, WA 98103

Project: TPN
Sample Date: 9/20/17 0830

Lab Work Order #: 171942
Sample Received: 9/22/17 1005

Quality Control Report

Digest Blank

Test Parameter	Blank ID	Result mg/L	Date Analyzed	Method
Total Persulfate Nitrogen	MB100417-02	<0.01	10/4/17	SM 4500-N C

Laboratory Check Standard

Test Parameter	QC Sample ID	True Value mg/L	Result mg/L	% Recovery	Date Analyzed	Method
Total Persulfate Nitrogen	P255-505	14.2	13.0	91.7	10/4/17	SM 4500-N C

Approved for Release,

Nancy Parrott

Nancy Parrott
Laboratory Supervisor

WDOE Accreditation #C594

This report is issued solely for the person or company to whom it is addressed. This laboratory accepts responsibility only for the due performance of analysis according to industry accepted practice. Spectra Laboratories-Kitsap LLC or its employees are not responsible for consequential damages in any kind or in any amount.



CHAIN OF CUSTODY RECORD

ADDRESS
Fremont Analytical, Inc.
3600 Fremont Ave. N.
Seattle, WA 98103
TEL: 206-352-3790
FAX: 206-352-178
Website: www.fremontanalytical.com

Omega CODID 416 PAGE 1 OF 1

SUB CONTRACTOR: SPECTRA-K		COMPANY: Spectra Laboratories - Kitsap		SPECIAL INSTRUCTIONS / COMMENTS:			
ADDRESS: 26276 Twelve Trees Ln, Ste. C		Standard TAT. Please email results to Mike Ridgeway at mridgeway@fremontanalytical.com and Chelsea Ward at cward@fremontanalytical.com.					
CITY, STATE, ZIP: Poulsbo, WA 98370							
PHONE: FAX: EMAIL:							
ACCOUNT #:							
ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1709235-001E	WC-1	250 HDPE NON	Water	9/20/2017 12:10:00 PM	1	Total Persulfate Nitrogen by SM 4500-N C-97
2	1709235-002E	WC-2	250 HDPE NON	Water	9/20/2017 1:29:00 PM	1	Total Persulfate Nitrogen by SM 4500-N C-97
3	1709235-003E	WC-3	250 HDPE NON	Water	9/20/2017 10:45:00 AM	1	Total Persulfate Nitrogen by SM 4500-N C-97
4	1709235-004E	WC-4	250 HDPE NON	Water	9/20/2017 11:15:00 AM	1	Total Persulfate Nitrogen by SM 4500-N C-97
5	1709235-005E	WC-5	250 HDPE NON	Water	9/20/2017 10:10:00 AM	1	Total Persulfate Nitrogen by SM 4500-N C-97
6	1709235-006E	WC-6	250 HDPE NON	Water	9/20/2017 9:30:00 AM	1	Total Persulfate Nitrogen by SM 4500-N C-97
7	1709235-007E	WC-7	250 HDPE NON	Water	9/20/2017 8:30:00 AM	1	Total Persulfate Nitrogen by SM 4500-N C-97

Relinquished By: [Signature]	Date: 9/20/17	Received By: [Signature]	Date: 9/20/17	Time: 12:39	Time: 12:05	
Relinquished By: [Signature]	Date: 9/20/17	Received By: [Signature]	Date: 9/20/17	Time: 12:39	Time: 12:05	
Relinquished By: [Signature]	Date: 9/20/17	Received By: [Signature]	Date: 9/20/17	Time: 12:39	Time: 12:05	
TAT: Standard		RUSH		Next BD	2nd BD	3rd BD
Note: RUSH requests will incur surcharges!						

REPORT TRANSMITTAL DESIRED:
☐ HARD COPY (extra cost) ☐ FAX ☐ EMAIL ☐ ONLINE

Temp of samples: 40.4 °C Attempt to Cool? ☐

Comments:



Date: 10/5/2017

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Fecal Coliform by SM 9222D

Sample ID	MB-R38801	SampType:	MBLK	Units:	CFU/100ml	Prep Date:	9/20/2017	RunNo:	38801		
Client ID:	MBLKW	Batch ID:	R38801			Analysis Date:	9/20/2017	SeqNo:	745651		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Coliform, Fecal	ND	1.00									



Date: 10/5/2017

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Hardness by EPA Method 200.8/SM 2340B

Sample ID	MB-18279	SampType:	MBLK			Units:	mg/L			Prep Date:	9/22/2017			RunNo:	38782		
Client ID:	MBLKW	Batch ID:	18279							Analysis Date:	9/22/2017			SeqNo:	745291		
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual				

Calcium	ND	0.100
Magnesium	ND	0.100

Sample ID	LCS-18279	SampType:	LCS	Units:	mg/L	Prep Date:	9/22/2017	RunNo:	38782		
Client ID:	LCSW	Batch ID:	18279			Analysis Date:	9/22/2017	SeqNo:	745292		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Calcium	1.09	0.100	1.000	0	109	50	150
Magnesium	1.01	0.100	1.000	0	101	50	150

Sample ID	1709231-001ADUP	SampType:	DUP	Units:	mg/L CaCO3	Prep Date:	9/22/2017	RunNo:	38782		
Client ID:	BATCH	Batch ID:	18279			Analysis Date:	9/22/2017	SeqNo:	745294		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Hardness (as CaCO3)	12.8	0.800						12.84	0.350	20

Sample ID	1709231-001AMS	SampType:	MS	Units:	mg/L	Prep Date:	9/22/2017	RunNo:	38782		
Client ID:	BATCH	Batch ID:	18279			Analysis Date:	9/22/2017	SeqNo:	745295		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Calcium	9.41	0.100	5.000	4.279	103	50	150
Magnesium	5.41	0.100	5.000	0.5243	97.7	50	150

Sample ID	1709231-001AMSD	SampType:	MSD	Units:	mg/L	Prep Date:	9/22/2017	RunNo:	38782		
Client ID:	BATCH	Batch ID:	18279			Analysis Date:	9/22/2017	SeqNo:	745296		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Calcium	9.93	0.100	5.000	4.279	113	50	150	9.412	5.35	20
Magnesium	5.37	0.100	5.000	0.5243	97.0	50	150	5.409	0.630	20

Original



Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Total Hardness by EPA Method 200.8/SM 2340B

Sample ID	1709231-001AMSD	SampType:	MSD	Units:	mg/L	Prep Date:	9/22/2017	RunNo:	38782		
Client ID:	BATCH	Batch ID:	18279			Analysis Date:	9/22/2017	SeqNo:	745296		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID	MB-R38867	SampType: MBLK			Units: mg/L		Prep Date: 9/27/2017			RunNo: 38867		
Client ID:	MBLKW	Batch ID: R38867			Analysis Date: 9/27/2017					SeqNo: 747295		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Chloride	ND	0.100									

Sample ID	LCS-R38867	SampType: LCS			Units: mg/L		Prep Date: 9/27/2017			RunNo: 38867		
Client ID:	LCSW	Batch ID: R38867			Analysis Date: 9/27/2017			SeqNo: 747296				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Chloride	0.701	0.100	0.7500	0	93.5	90	110				

Sample ID	1709235-007BDUP	SampType:	DUP	Units:	mg/L	Prep Date:	9/27/2017	RunNo:	38867		
Client ID:	WC -07	Batch ID:	R38867			Analysis Date:	9/27/2017	SeqNo:	747289		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	6.14	0.400						6.000	2.24	20	D

Sample ID	1709235-007BMS			SampType:	MS		Units:	mg/L		Prep Date:	9/27/2017		RunNo:	38867	
Client ID:	WC -07			Batch ID:	R38867					Analysis Date:	9/27/2017		SeqNo:	747290	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual			

Chloride	9.79	0.400	3.000	6.000	126	80	120				DS

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed and recovered within range.

Sample ID	1709235-007BMSD	SampType:	MSD	Units:	mg/L	Prep Date:	9/27/2017	RunNo:	38867		
Client ID:	WC -07	Batch ID:	R38867	Analysis Date:	9/27/2017	SeqNo:	747291				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Chloride	9.17	0.400	3.000	6.000	106	80	120	9.788	6.54	20	D



Date: 10/5/2017

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Ion Chromatography by EPA Method 300.0

Sample ID	1709302-002BDUP			SampType:	DUP		Units:	mg/L		Prep Date:	9/27/2017		RunNo:	38867	
Client ID:	BATCH			Batch ID:	R38867					Analysis Date:	9/27/2017		SeqNo:	747708	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual		
Chloride		4.11	0.100						4.106		0	20	E		

Sample ID	1709302-002BMS			SampType:	MS		Units:	mg/L		Prep Date:	9/27/2017		RunNo:	38867	
Client ID:	BATCH			Batch ID:	R38867					Analysis Date:	9/27/2017		SeqNo:	747709	
Analyte		Result	RL	SPK value	SPK Ref Val		%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit		Qual
Chloride		4.91	0.100	0.7500	4.106		107	80	120						E



Date: 10/5/2017

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Phosphorous by EPA Method 365.3

Sample ID	MB-18305	SampType:	MBLK			Units:	mg/L			Prep Date:	9/25/2017			RunNo:	38839		
Client ID:	MBLKW	Batch ID:	18305							Analysis Date:	9/26/2017			SeqNo:	746652		
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual					

Phosphorus, Total (As P) ND 0.200

Sample ID	LCS-18305	SampType:	LCS	Units:	mg/L	Prep Date:	9/25/2017	RunNo:	38839			
Client ID:	LCSW	Batch ID:	18305			Analysis Date:	9/26/2017	SeqNo:	746653			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P) 2.24 0.200 2.000 0 112 65 135

Sample ID	1709202-001DDUP	SampType:	DUP	Units:	mg/L	Prep Date:	9/25/2017	RunNo:	38839			
Client ID:	BATCH	Batch ID:	18305			Analysis Date:	9/26/2017	SeqNo:	746657			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P) 0.210 0.200 0.1368 42.4 30

Sample ID	1709202-001DMS	SampType:	MS	Units:	mg/L	Prep Date:	9/25/2017	RunNo:	38839			
Client ID:	BATCH	Batch ID:	18305			Analysis Date:	9/26/2017	SeqNo:	746658			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P) 1.76 0.200 2.000 0.1368 81.4 65 135

Sample ID	1709202-001DMSD	SampType:	MSD	Units:	mg/L	Prep Date:	9/25/2017	RunNo:	38839			
Client ID:	BATCH	Batch ID:	18305			Analysis Date:	9/26/2017	SeqNo:	746659			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Phosphorus, Total (As P) 2.36 0.200 2.000 0.1368 111 65 135 1.765 28.9 30



Date: 10/5/2017

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Phosphorous by EPA Method 365.3

Sample ID	1709235-007CDUP	SampType:	DUP	Units:	mg/L	Prep Date:	9/25/2017	RunNo:	38839		
Client ID:	WC -07	Batch ID:	18305			Analysis Date:	9/26/2017	SeqNo:	746670		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phosphorus, Total (As P)	ND	0.200						0		30	

Sample ID	1709235-007CMS	SampType:	MS	Units:	mg/L	Prep Date:	9/25/2017	RunNo:	38839		
Client ID:	WC -07	Batch ID:	18305			Analysis Date:	9/26/2017	SeqNo:	746671		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Phosphorus, Total (As P)	2.27	0.200	2.000	0.1452	106	65	135				



Date: 10/5/2017

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Suspended Solids (TSS) by SM 2540D

Sample ID	MB-R38755	SampType:	MBLK			Units:	mg/L			Prep Date:	9/22/2017		RunNo:	38755	
Client ID:	MBLKW	Batch ID:	R38755						Analysis Date:	9/22/2017			SeqNo:	744801	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual		

Total Suspended Solids ND 5.00

Sample ID	LCS-R38755	SampType:	LCS	Units:	mg/L	Prep Date:	9/22/2017	RunNo:	38755			
Client ID:	LCSW	Batch ID:	R38755			Analysis Date:	9/22/2017	SeqNo:	744802			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Suspended Solids 350 10.0 300.0 0 117 65 135

Sample ID	1709209-001ADUP	SampType:	DUP	Units:	mg/L	Prep Date:	9/22/2017	RunNo:	38755			
Client ID:	BATCH	Batch ID:	R38755			Analysis Date:	9/22/2017	SeqNo:	744804			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Suspended Solids 31.0 5.00 25.00 21.4 30

Sample ID	1709248-002FDUP	SampType:	DUP	Units:	mg/L	Prep Date:	9/22/2017	RunNo:	38755			
Client ID:	BATCH	Batch ID:	R38755			Analysis Date:	9/22/2017	SeqNo:	744824			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Total Suspended Solids ND 5.00 0 30



Date: 10/5/2017

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	MB-18279	SampType:	MBLK		Units:	µg/L		Prep Date:	9/22/2017		RunNo:	38781	
Client ID:	MBLKW	Batch ID:	18279					Analysis Date:	9/22/2017		SeqNo:	745251	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val		%RPD	RPDLimit	Qual
Antimony		ND	0.200										
Arsenic		ND	1.00										
Beryllium		ND	0.200										
Cadmium		ND	0.200										
Chromium		ND	0.500										
Copper		ND	0.500										
Lead		ND	0.500										
Nickel		ND	0.500										
Selenium		ND	1.00										
Silver		ND	0.200										
Thallium		ND	0.200										
Zinc		ND	1.50										

Sample ID	LCS-18279	SampType:	LCS	Units:	µg/L	Prep Date:	9/22/2017	RunNo:	38781		
Client ID:	LCSW	Batch ID:	18279			Analysis Date:	9/22/2017	SeqNo:	745252		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	5.34	0.200	5.000	0	107	85	115				
Arsenic	102	1.00	100.0	0	102	85	115				
Beryllium	5.49	0.200	5.000	0	110	85	115				
Cadmium	5.11	0.200	5.000	0	102	85	115				
Chromium	101	0.500	100.0	0	101	85	115				
Copper	99.4	0.500	100.0	0	99.4	85	115				
Lead	57.6	0.500	50.00	0	115	85	115				
Nickel	97.5	0.500	100.0	0	97.5	85	115				
Selenium	10.3	1.00	10.00	0	103	85	115				
Silver	4.72	0.200	5.000	0	94.4	85	115				
Thallium	2.80	0.200	2.500	0	112	85	115				
Zinc	97.0	1.50	100.0	0	97.0	85	115				



Date: 10/5/2017

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	1709231-001ADUP		SampType: DUP		Units: µg/L		Prep Date: 9/22/2017			RunNo: 38781		
Client ID:	BATCH		Batch ID: 18279					Analysis Date: 9/22/2017			SeqNo: 745254	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Antimony	1.15	0.200						1.340	15.6	30	R	
Arsenic	11.4	1.00						11.61	1.71	30		
Beryllium	0.766	0.200						0.8420	9.45	30		
Cadmium	ND	0.200						0		30		
Chromium	3.44	0.500						1.955	55.1	30		
Copper	10.3	0.500						10.12	1.96	30		
Lead	2.03	0.500						2.107	3.62	30		
Nickel	2.17	0.500						2.136	1.79	30		
Selenium	ND	1.00						0		30		
Silver	ND	0.200						0		30		
Thallium	ND	0.200						0		30		
Zinc	22.6	1.50						21.65	4.17	30		

NOTES:

R - High RPD observed. The method is in control as indicated by the LCS.

Sample ID	1709231-001AMS		SampType: MS		Units: µg/L		Prep Date: 9/22/2017		RunNo: 38781			
Client ID:	BATCH		Batch ID: 18279				Analysis Date: 9/22/2017		SeqNo: 745255			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Antimony	27.4	0.200	25.00	1.340	104	70	130					
Arsenic	527	1.00	500.0	11.61	103	70	130					
Beryllium	26.3	0.200	25.00	0.8420	102	70	130					
Cadmium	26.3	0.200	25.00	0.1785	104	70	130					
Chromium	505	0.500	500.0	1.955	101	70	130					
Copper	493	0.500	500.0	10.12	96.5	70	130					
Lead	270	0.500	250.0	2.107	107	70	130					
Nickel	491	0.500	500.0	2.136	97.7	70	130					
Selenium	52.9	1.00	50.00	0.8965	104	70	130					
Silver	16.2	0.200	25.00	0	64.9	70	130				S	
Thallium	13.2	0.200	12.50	0.06400	105	70	130					
Zinc	547	1.50	500.0	21.65	105	70	130					



Date: 10/5/2017

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID	1709231-001AMS	SampType:	MS	Units:	µg/L	Prep Date:	9/22/2017	RunNo:	38781		
Client ID:	BATCH	Batch ID:	18279			Analysis Date:	9/22/2017	SeqNo:	745255		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.

Sample ID	1709231-001AMSD	SampType: MSD			Units: µg/L	Prep Date: 9/22/2017			RunNo: 38781		
Client ID:	BATCH	Batch ID: 18279			Analysis Date: 9/22/2017			SeqNo: 745256			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	27.4	0.200	25.00	1.340	104	70	130	27.37	0.188	30	S
Arsenic	539	1.00	500.0	11.61	106	70	130	526.8	2.35	30	
Beryllium	27.6	0.200	25.00	0.8420	107	70	130	26.26	4.84	30	
Cadmium	25.9	0.200	25.00	0.1785	103	70	130	26.28	1.52	30	
Chromium	518	0.500	500.0	1.955	103	70	130	504.7	2.67	30	
Copper	504	0.500	500.0	10.12	98.7	70	130	492.5	2.24	30	
Lead	272	0.500	250.0	2.107	108	70	130	270.2	0.768	30	
Nickel	505	0.500	500.0	2.136	100	70	130	490.6	2.80	30	
Selenium	52.4	1.00	50.00	0.8965	103	70	130	52.88	0.984	30	
Silver	17.2	0.200	25.00	0	68.8	70	130	16.22	5.85	30	
Thallium	13.2	0.200	12.50	0.06400	105	70	130	13.20	0.121	30	
Zinc	541	1.50	500.0	21.65	104	70	130	547.4	1.13	30	

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.



Date: 10/5/2017

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Mercury by EPA Method 245.1

Sample ID	MB-18285	SampType:	MBLK	Units:	µg/L	Prep Date:	9/22/2017	RunNo:	38792			
Client ID:	MBLKW	Batch ID:	18285			Analysis Date:	9/22/2017	SeqNo:	745487			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	ND	0.100										

Sample ID	LCS-18285	SampType:	LCS	Units:	µg/L	Prep Date:	9/22/2017	RunNo:	38792		
Client ID:	LCSW	Batch ID:	18285			Analysis Date:	9/22/2017	SeqNo:	745488		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	2.46	0.100	2.500	0	98.4	85	115					

Sample ID	1709183-001ADUP	SampType:	DUP	Units:	µg/L	Prep Date:	9/22/2017	RunNo:	38792			
Client ID:	BATCH	Batch ID:	18285			Analysis Date:	9/22/2017	SeqNo:	745490			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	ND	0.100							0		20	

Sample ID	1709183-001AMS	SampType:	MS	Units:	µg/L	Prep Date:	9/22/2017	RunNo:	38792			
Client ID:	BATCH	Batch ID:	18285			Analysis Date:	9/22/2017	SeqNo:	745491			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	2.68	0.100	2.500	0	107	70	130					

Sample ID	1709183-001AMSD	SampType:	MSD	Units:	µg/L	Prep Date:	9/22/2017	RunNo:	38792			
Client ID:	BATCH	Batch ID:	18285			Analysis Date:	9/22/2017	SeqNo:	745492			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury	2.46	0.100	2.500	0	98.4	70	130	2.680	8.56	20		



Date: 10/5/2017

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Mercury by EPA Method 245.1

Sample ID	MB-18263FB	SampType:	MBLK	Units:	µg/L	Prep Date:	9/22/2017	RunNo:	38792			
Client ID:	MBLKW	Batch ID:	18285			Analysis Date:	9/22/2017	SeqNo:	745496			
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Mercury		ND	0.100									

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT

Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.

Sample ID	MB-18268	SampType:	MBLK			Units:	µg/L			Prep Date:	9/21/2017			RunNo:	38780		
Client ID:	MBLKW	Batch ID:	18268			Analysis Date:					9/22/2017			SeqNo:	745198		
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual					

Diesel (Fuel Oil)	ND	49.6									
Heavy Oil	ND	99.3									
Surr: 2-Fluorobiphenyl	65.8		79.43		82.8	50	150				
Surr: o-Terphenyl	72.5		79.43		91.2	50	150				

Sample ID	LCS-18268	SampType:	LCS	Units:	µg/L	Prep Date:	9/21/2017	RunNo:	38780		
Client ID:	LCSW	Batch ID:	18268	Analysis Date:				9/22/2017	SeqNo:	745199	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Diesel (Fuel Oil)	727	50.0	999.2	0	72.7	65	135				
Surr: 2-Fluorobiphenyl	71.8		79.93		89.9	50	150				
Surr: o-Terphenyl	70.7		79.93		88.5	50	150				

Sample ID	1709235-002FDUP	SampType:	DUP	Units:	µg/L	Prep Date:	9/21/2017	RunNo:	38780		
Client ID:	WC -02	Batch ID:	18268			Analysis Date:	9/22/2017	SeqNo:	745668		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Diesel (Fuel Oil)	ND	49.9						0		30	
Heavy Oil	ND	99.8						0		30	
Surr: 2-Fluorobiphenyl	70.5		79.84		88.3	50	150		0		
Surr: o-Terphenyl	65.2		79.84		81.6	50	150		0		

Sample ID	1709235-002FMS	SampType:	MS	Units:	µg/L	Prep Date:	9/21/2017	RunNo:	38780		
Client ID:	WC -02	Batch ID:	18268			Analysis Date:	9/22/2017	SeqNo:	745671		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Diesel (Fuel Oil)	468	50.1	1,001	0	46.7	65	135				S
Surr: 2-Fluorobiphenyl	72.1		80.12		90.0	50	150				
Surr: o-Terphenyl	46.2		80.12		57.7	50	150				



Date: 10/5/2017

Work Order: 1709235
CLIENT: Shannon & Wilson
Project: Willow Creek

QC SUMMARY REPORT
Diesel and Heavy Oil by NWTPH-Dx/Dx Ext.

Sample ID	1709235-002FMS	SampType:	MS	Units:	µg/L	Prep Date:	9/21/2017	RunNo:	38780		
Client ID:	WC -02	Batch ID:	18268			Analysis Date:	9/22/2017	SeqNo:	745671		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.

Sample ID	1709235-002FMSD	SampType:	MSD	Units:	µg/L	Prep Date:	9/21/2017	RunNo:	38780		
Client ID:	WC -02	Batch ID:	18268			Analysis Date:	9/22/2017	SeqNo:	745672		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diesel (Fuel Oil)	485	49.7	994.2	0	48.8	65	135	467.8	3.68	30	S
Surr: 2-Fluorobiphenyl	65.7		79.54		82.6	50	150		0		
Surr: o-Terphenyl	42.6		79.54		53.6	50	150		0		

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.

Client Name: **SW**
 Logged by: **Clare Griggs**

Work Order Number: **1709235**
 Date Received: **9/20/2017 3:04:00 PM**

Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
 2. How was the sample delivered? Client

Log In

3. Coolers are present? Yes ☒ No ☐ NA ☐
 4. Shipping container/cooler in good condition? Yes ☒ No ☐
 5. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes ☐ No ☐ Not Required ☒
 6. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
 7. Were all items received at a temperature of >0°C to 10.0°C* Yes ☐ No ☒ NA ☐
Please refer to item information.
 8. Sample(s) in proper container(s)? Yes ☒ No ☐
 9. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
 10. Are samples properly preserved? Yes ☒ No ☐
 11. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
 12. Is there headspace in the VOA vials? Yes ☐ No ☒ NA ☐
 13. Did all samples containers arrive in good condition(unbroken)? Yes ☒ No ☐
 14. Does paperwork match bottle labels? Yes ☒ No ☐
 15. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
 16. Is it clear what analyses were requested? Yes ☒ No ☐
 17. Were all holding times able to be met? Yes ☒ No ☐

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes ☒ No ☐ NA ☐

Person Notified: Chris Helland Date 9/20/2017
 By Whom: Clare Griggs Via: ☒ eMail ☐ Phone ☐ Fax ☐ In Person
 Regarding: Fecal Coliforms samples for WC-06 & WC-07
 Client Instructions: Sampled at different times than their corresponding samples.

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	1.1
Sample	13.6
Temp Blank	9.6

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



Fremont

Analytical

Chain of Custody Record and Laboratory Services Agreement

3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Client: SHAWON J WILSON
Address: 400 N. 34th ST. #100
City, State, Zip: SEATTLE, WA 98103
Telephone: 206-695-6706 Fax: _____

Project Name: WILSON CREBT
Project No: 21-1-12588
Location: EDMONDS, WA
Report To (PM): CHRIS HELLAND
PM Email: cmh@stamwil.com

Collected by: CMH

Date: 9/20

Laboratory Project No (Internal): 1709035

Page: _____ of: _____

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GV/STEX	BTEX	Gasoline Range Organics (GX)	Hydrocarbon Identification (GX)	Diesel/Heavy Oil Range Organics (DX)	SVOCS (EPA 8270 / 625)	PAHs (EPA 8270 - SIM / 625)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)	Anions (IC)**	EDB (8011)	FECL	TOTAL COLIFORM	HARDNESS	TSS	TOTAL PER SULPHATE	NITROGEN	Oil / Diesel	Comments
1 WC-01	9/20/17	13:10	SW																					
2 WC-02	9/20/17	13:29	SW																					
3 WC-03	9/20/17	10:45	SW																					
4 WC-04	9/20/17	11:15	SW																					
5 WC-05	9/20/17	10:10	SW																					
6 WC-06	9/20/17	9:30	SW																					
7 WC-07	9/20/17	8:30	SW																					
8																								
9																								
10																								

Relinquished: _____ Date/Time: 9/20/17 15:04 Received: CMH Date/Time: 9/20/17 15:04

Relinquished: _____ Date/Time: _____ Received: _____ Date/Time: _____

TAT → SameDay^ NextDay^ 2 Day 3 Day STD^

Please coordinate with the lab in advance

Appendix C

Macroinvertebrate Testing Methods and Quality Assurance Procedures



Analytical Resources, Incorporated
Analytical Chemists and Consultants

28 July 2017

Christopher Helland
Shannon & Wilson, Inc
400 N 34th St., Suite 100
Seattle, WA 98103-8636

RE: Willow Creek Daylight

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)
17F0434

Associated SDG ID(s)
N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

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.



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Cooler Receipt Form

ARI Client: Shannon + Wilson

COC No(s): _____ NA

Assigned ARI Job No: 17F0434

Project Name: _____

Delivered by: Fed-Ex UPS Courier Hand Delivered Other

Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES NO

Were custody papers included with the cooler? YES NO

Were custody papers properly filled out (ink, signed, etc.) YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time: 6:05

#1 #2 #3 #4
2.6 2.4 5.5 5.1

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D005206

Cooler Accepted by: B.H. Date: 6/28/17 Time: 6:05

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? _____

YES NO

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? _____ NA YES NO

Were all bottles sealed in individual plastic bags? _____ YES NO

Did all bottles arrive in good condition (unbroken)? _____ YES NO

Were all bottle labels complete and legible? _____ YES NO

Did the number of containers listed on COC match with the number of containers received? _____ YES NO

Did all bottle labels and tags agree with custody papers? _____ YES NO

Were all bottles used correct for the requested analyses? _____ YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... NA YES NO

Were all VOC vials free of air bubbles? NA YES NO

Was sufficient amount of sample sent in each bottle? YES NO

Date VOC Trip Blank was made at ARI: _____ NA

Was Sample Split by ARI: NA YES Date/Time: _____ Equipment: _____ Split by: _____

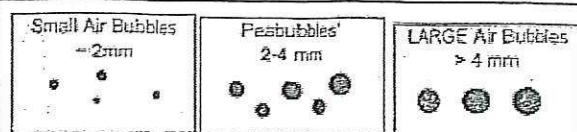
Samples Logged by: [Signature] Date: 06/28/17 Time: 0930

**** Notify Project Manager of discrepancies or concerns ****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____



Small → "sm" (< 2 mm)

Peabubbles → "pb" (2 to < 4 mm)

Large → "lg" (4 to < 6 mm)

Headspace → "hs" (> 6 mm)

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Willow Creek Daylight (17F0434)
Project #: 17T001-050
Client : Analytical Resources, Inc.
Source: Multiple
MTC Sample#: Multiple

Date Received: June 30, 2017
Sampled By: Others
Date Reported: July 27, 2017
Tested By: B. Goble, K. DeChurch

CASE NARRATIVE

1. Ten samples were submitted for grain size analysis according to Puget Sound Estuary Protocol (PSEP) methodology.
2. These samples were run in a single batch and one sample from this job was chosen for triplicate analysis. The triplicate data is reported on the QA summary.
3. Six samples did not contain the required amount of fines (5-25grams) for the pipette portion of the analysis. The samples could not be resplit and stay within the capacity of the balance. The samples have been qualified on the QA Summary.
4. The data is provided in summary tables and plots.
5. There were no other noted anomalies in this project.

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by: _____

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Willow Creek Daylight (17F0434)

Project #: 17T001-050

Date Received: June 30, 2017

Date Tested: July 25, 2017

Client: Analytical Resources, Inc.

Sampled by: Others

Tested by: B. Goble, K. DeChurch

Apparent Grain Size Distribution Summary

Percent Finer Than Indicated Size

Sample No.	Gravel			Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt			Clay		
Phi Size	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Sieve Size (microns)	3/8"	#4 (4750)	#10 (2000)	#18 (1000)	#35 (500)	#60 (250)	#120 (125)	#230 (63)	31.0	15.6	7.8	3.9	2.0	1.0
WC-4-2ft	100.0	99.0	94.5	84.7	50.4	7.6	1.5	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	100.0	98.4	93.9	84.6	50.4	7.4	1.2	0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
	100.0	99.5	94.8	85.1	51.2	7.8	1.4	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WC-1	100.0	71.7	55.7	39.9	11.5	1.9	0.9	0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
WC-2	100.0	94.8	90.5	85.8	74.9	47.8	21.7	8.8	5.4	3.3	2.2	1.7	1.4	1.2
WC-3-2ft	100.0	99.6	91.3	86.0	74.0	54.8	47.0	43.1	32.3	21.6	14.5	10.3	7.6	5.2
WC-3-Deep	100.0	98.0	92.2	86.4	75.1	55.3	44.8	39.3	30.3	21.2	14.3	10.1	7.1	4.5
WC-4-Deep	100.0	98.6	91.4	81.2	53.8	12.6	2.6	1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3
WC-5-2ft	100.0	99.9	98.1	90.4	67.2	19.3	4.2	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WC-5-Deep	100.0	86.4	63.5	53.4	38.8	17.1	7.5	4.4	2.9	1.8	1.1	0.6	0.3	0.2
WC-6	100.0	52.3	41.4	36.3	30.9	17.5	6.0	1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
WC-7	100.0	64.2	51.4	43.1	27.6	8.8	2.9	1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by: _____

B. Goble

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Materials Testing & Consulting, Inc.

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Project: Willow Creek Daylight (17F0434)

Project #: 17T001-050

Date Received: June 30, 2017

Date Tested: July 25, 2017

Client: Analytical Resources, Inc.

Sampled by: Others

Tested by: B. Goble, K. DeChurch

Apparent Grain Size Distribution Summary

Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay			Total Fines
Phi Size	< -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	> 10	> 4
Sieve Size (microns)	> #10 (2000)	10-18 (2000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0	<230 (<62)
WC-4-2ft	5.5	9.8	34.2	42.8	6.2	0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
WC-1	6.1	9.2	34.3	43.0	6.1	0.4	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	0.8
WC-2	5.2	9.7	33.9	43.4	6.3	0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
WC-3-2ft	44.3	15.7	28.4	9.6	1.0	0.0	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	0.9
WC-3-Deep	9.5	4.8	10.9	27.1	26.1	12.9	3.4	2.2	1.1	0.5	0.3	0.1	1.2	8.8
WC-4-Deep	8.7	5.3	12.0	19.2	7.9	3.8	10.8	10.7	7.1	4.2	2.7	2.4	5.2	43.1
WC-5-2ft	7.8	5.8	11.4	19.8	10.5	5.5	8.9	9.2	6.9	4.2	3.0	2.6	4.5	39.3
WC-5-Deep	8.6	10.2	27.4	41.2	10.0	1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	1.3
WC-6	1.9	7.7	23.2	47.9	15.1	2.2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0
WC-7	36.5	10.2	14.6	21.7	9.5	3.2	1.5	1.1	0.6	0.5	0.3	0.1	0.2	4.4
	58.6	5.0	5.4	13.4	11.5	4.6	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	1.4
	48.6	8.4	15.5	18.8	5.9	1.0	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	1.8

Reviewed by: _____

B. Goble

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Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Willow Creek Daylight (17F0434)

Project #: 17T001-050

Date Received: June 30, 2017

Date Tested: July 25, 2017

Client: Analytical Resources, Inc.

Sampled by: Others

Tested by: B. Goble, K. DeChurch

Relative Standard Deviation, By Phi Size

Sample ID	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
WC-4-2ft	100.0	99.0	94.5	84.7	50.4	7.6	1.5	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	100.0	98.4	93.9	84.6	50.4	7.4	1.2	0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
	100.0	99.5	94.8	85.1	51.2	7.8	1.4	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
AVE	100.0	98.9	94.4	84.8	50.7	7.6	1.4	0.9	NA	NA	NA	NA	NA	NA
STDEV	0.0	0.5	0.4	0.2	0.4	0.2	0.1	0.1	NA	NA	NA	NA	NA	NA
%RSD	0.0	0.5	0.4	0.2	0.7	2.3	6.9	7.0	NA	NA	NA	NA	NA	NA

The Triplicate Applies To The Following Samples

Client ID	Date Sampled	Date Extracted	Date Complete	QA Ratio (95-105)	Data Qualifiers	Pipette Portion (5.0-25.0g)
WC-4-2ft	6/22/2017	7/11/2017	7/15/2017	100.3	SS	1.2
	6/22/2017	7/11/2017	7/15/2017	100.2	SS	1.0
	6/22/2017	7/11/2017	7/15/2017	100.4	SS	1.2
WC-1	6/28/2017	7/11/2017	7/15/2017	100.6	SS	1.1
WC-2	6/28/2017	7/11/2017	7/15/2017	99.7		5.4
WC-3-2ft	6/28/2017	7/11/2017	7/15/2017	101.2		10.0
WC-3-Deep	6/28/2017	7/11/2017	7/15/2017	102.7		6.6
WC-4-Deep	6/28/2017	7/11/2017	7/15/2017	100.1	SS	1.4
WC-5-2ft	6/28/2017	7/11/2017	7/15/2017	101.0	SS	2.2
WC-5-Deep	6/28/2017	7/11/2017	7/15/2017	99.9		5.4
WC-6	6/28/2017	7/11/2017	7/15/2017	99.2	SS	1.8
WC-7	6/28/2017	7/11/2017	7/15/2017	100.8	SS	2.5

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Reviewed by:

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Project: Willow Creek Daylight (17F0434)
Project #: 17T001-050
Client : Analytical Resources, Inc.
Source: Multiple
MTC Sample#: Multiple

Date Received: June 30, 2017
Sampled By: Others
Date Tested: July 27, 2017
Tested By: B. Goble, K. DeChurch

Data Qualifiers

PSEP Grain Size Analysis

SM - The sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations.

SS - The sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis.

W - The weight of the sample in some pipette aliquots was below the level required for accurate weighing.

F - The samples were frozen prior to particle size determination.

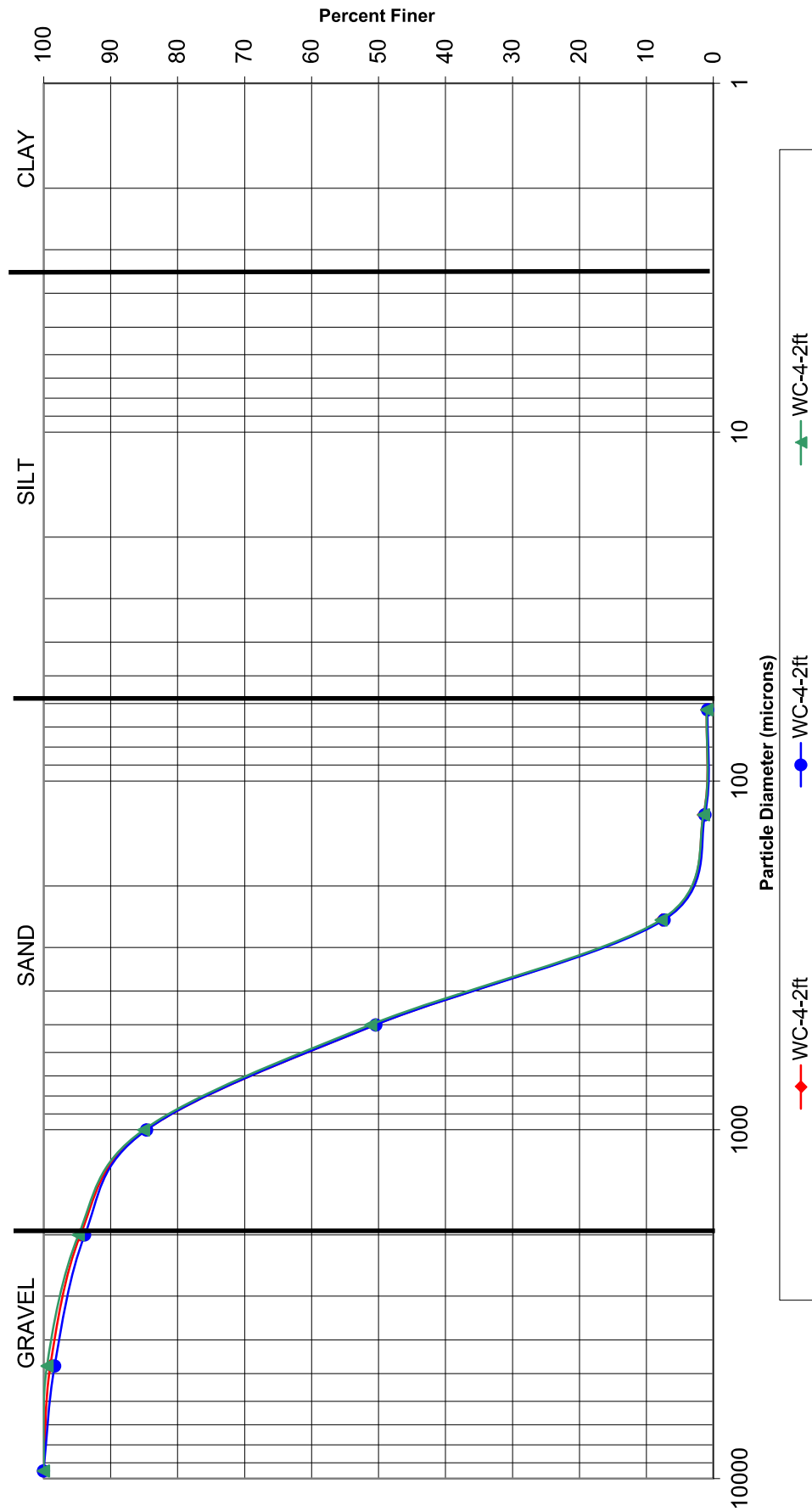
LV - Due to low sample volume provided, the samples could not be rerun to meet QA requirements.

Reviewed by: _____



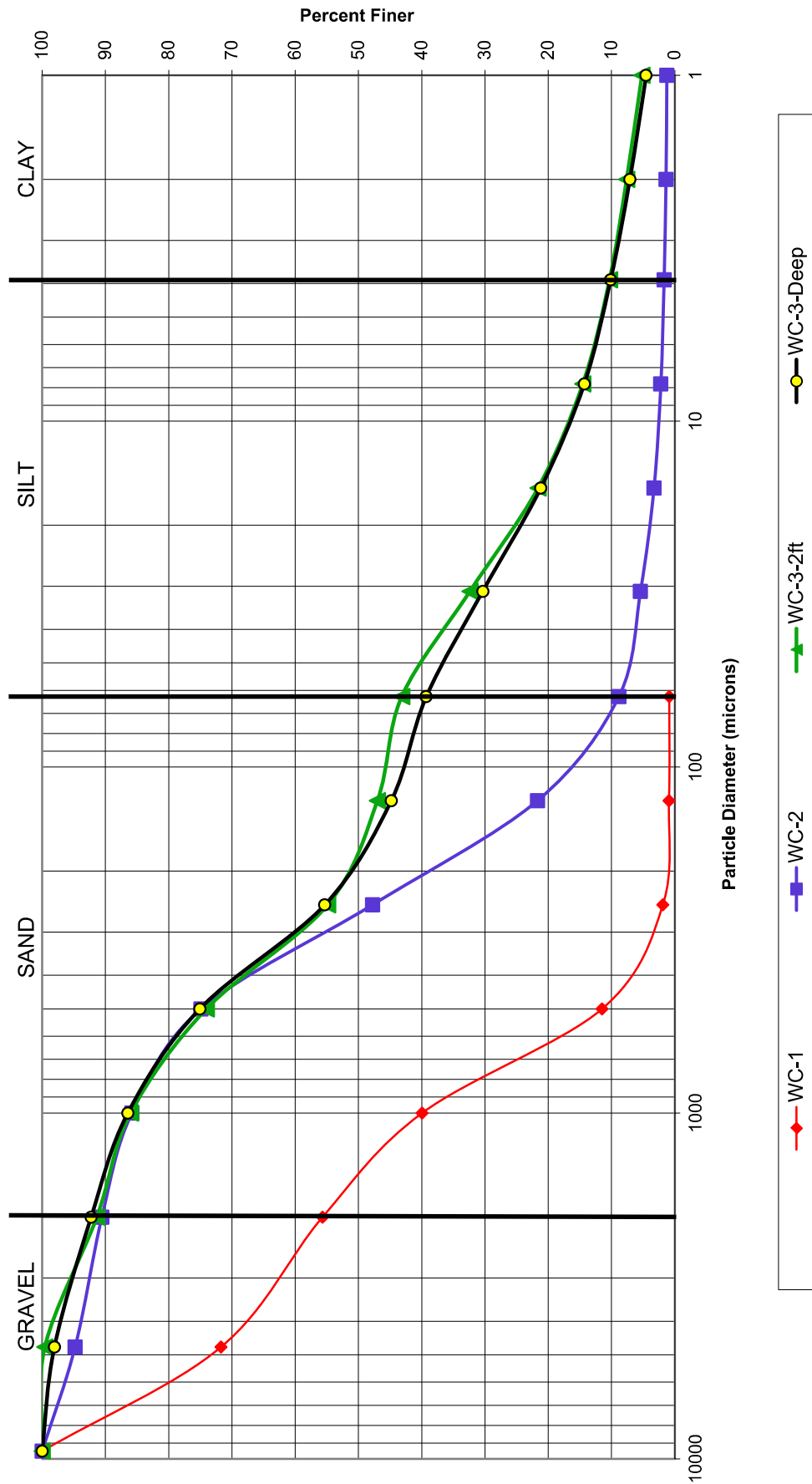
PSEP Grain Size Distribution

Triplicate Sample Plot



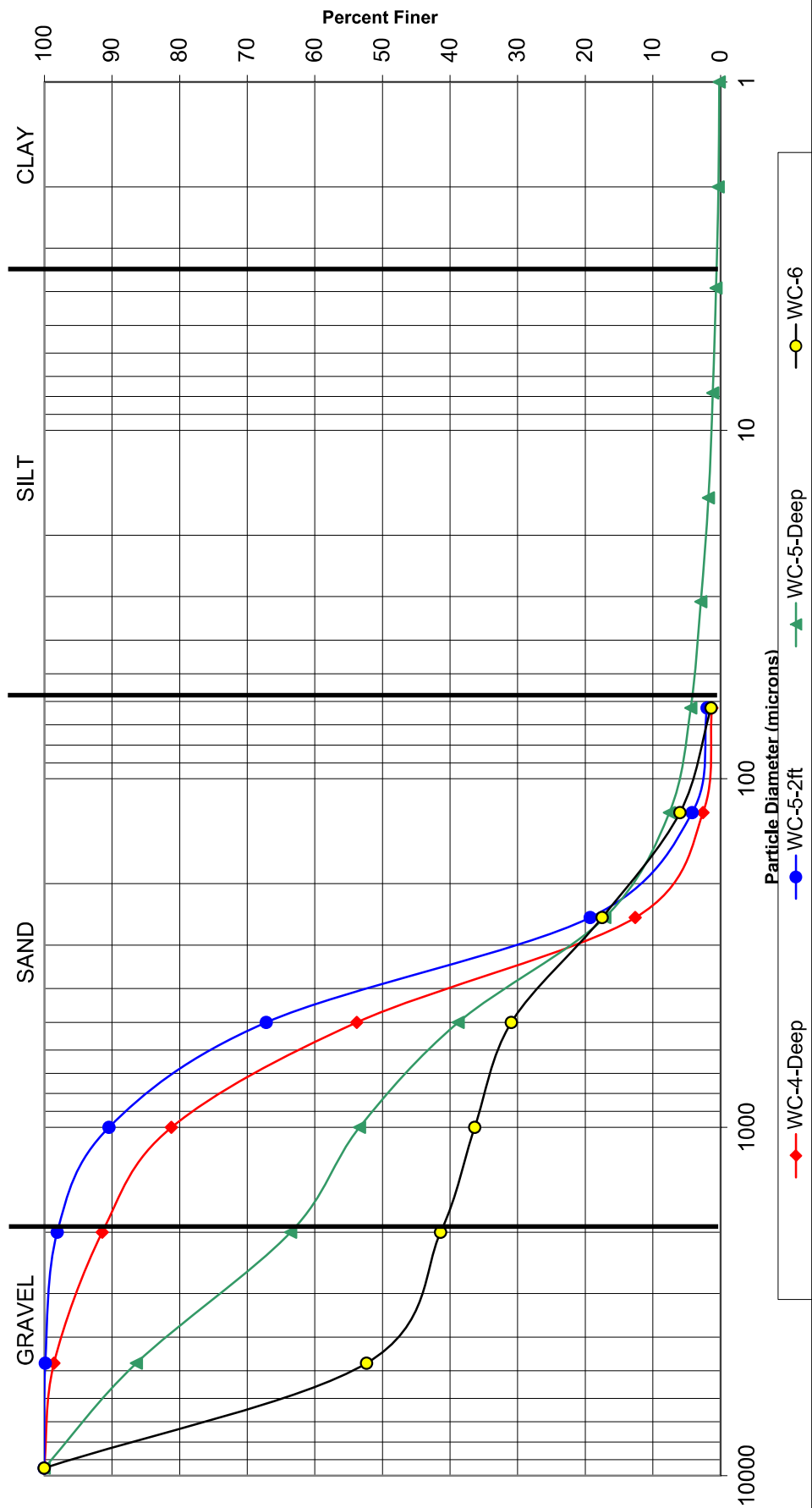


PSEP Grain Size Distribution



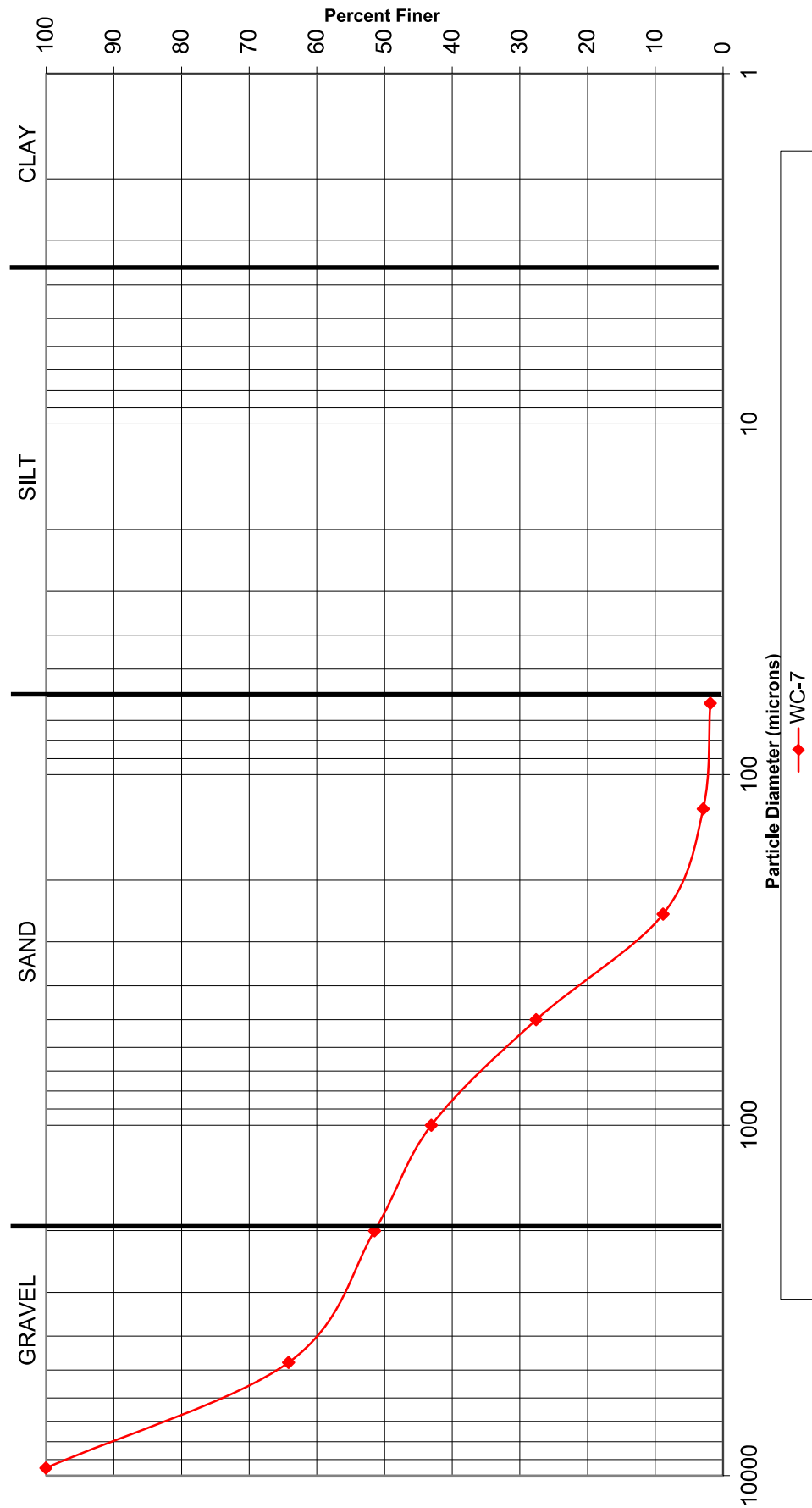


PSEP Grain Size Distribution





PSEP Grain Size Distribution



PSEP GRAIN SIZE ANALYSIS

Project: Willow Creek Daylight
 Project #: 17T001-050
 Source: WC-4-2ft
 Lab #: T17-1154-1
 Description: BROWN SAND

Client: Analytical Resources
 Sampled by: OTHERS
 Date Sampled: 6-27-17
 Date Setup: 7-19-17
 Equipment Used: TCA-002

SOLIDS CONTENT

Moisture Content	Initials:
Tare #	101
Tare Weight	1.4414
Wet Weight+Tare	86.5804
Dry Weight+Tare	68.493600

Test Sample	Initials:
Tare #	101
Tare Weight	50.2143
Wet Weight+Tare	201.8606
Dry Weight+Tare	168.3438

Calgon Batch #:

7/24/2017

PIPETTE ANALYSIS

Temp: 22

Initials: _____

TIME	Tare #	Tare Wt	Dry Wt+Tare
10:21:00	1154-1	1.4439	1.4691
10:21:20			

SIEVE ANALYSIS

Sieve Date: 7-20-17

Sieve Set #: TSA 101

Initials: ND

Sieve Size	Weight Retained
Tare	50.2174
#4	51.4226
#10	56.7579
#18	68.4939
#35	109.2791
#60	1860.2951
#120	167.6753
#230	168.2424
PAN	0.1766

SALT CORRECTION

1.2 g

Date: _____

Initials: _____

Tare Weight	
Dry Weight+Tare	

Triplicate Batch # _____

★ Sample consumed 7-19-17

PSEP GRAIN SIZE ANALYSIS

Project: Willow Creek Daylight
 Project #: 17T001-050
 Source: WC-4-2ft
 Lab #: T17-1154-2
 Description: _____

Client: Analytical Resources
 Sampled by: OTHERS
 Date Sampled: 6-27-17
 Date Setup: 7-19-17
 Equipment Used: TCA-002

SOLIDS CONTENT

Moisture Content	Initials:
Tare #	125
Tare Weight	1.4396
Wet Weight+Tare	69.6034
Dry Weight+Tare	54.7813

Test Sample	Initials:
Tare #	125
Tare Weight	50.7312
Wet Weight+Tare	200.8829
Dry Weight+Tare	167.3635

Calgon Batch #: _____

7/24/2017

Temp:22

TIME

PIPETTE ANALYSIS

Initials: _____

TIME	Tare #	Tare Wt	Dry Wt+Tare
10:24:00			
10:24:20	1154-2	1.4446	1.4688

SIEVE ANALYSIS

Sieve Date: 7-20-17
 Sieve Set #: TSA 102

Initials: SD

Sieve Size	Weight Retained
Tare	50.733622
#4	52.69399
#10	57.9456
#18	68.7810
#35	109.0269
#60	159.5941
#120	166.7684
#230	167.2488
PAN	0.1160

SALT CORRECTION

Date: _____ Initials: _____

Tare Weight	
Dry Weight+Tare	

Triplicate Batch # _____

*Sample consumed 7-19-17

PSEP GRAIN SIZE ANALYSIS

Project: W. flow Creek Daylight
 Project #: 17T001-050
 Source: WC-4-2 f1
 Lab #: T17-1154-3
 Description: _____

Client: Analytical Resources
 Sampled by: OTITERS
 Date Sampled: 6-27-17
 Date Setup: 7-19-17
 Equipment Used: TCA-002

SOLIDS CONTENT

Moisture Content	Initials:
Tare #	133
Tare Weight	1.43517g
Wet Weight+Tare	64.4174
Dry Weight+Tare	50.8291

Test Sample	Initials:
Tare #	133
Tare Weight	49.76767g
Wet Weight+Tare	201.6402
Dry Weight+Tare	167.7739

Calgon Batch #: _____

7/24/2017

PIPETTE ANALYSIS

Temp: 22

TIME

Initials: _____

TIME	Tare #	Tare Wt	Dry Wt+Tare
10:27:00			
10:27:20	1154-3	1.4443	1.4691

SIEVE ANALYSIS

Sieve Date: 7-20-17
 Sieve Set #: ISA 101
 Initials: BD

Sieve Size	Weight Retained
Tare	49.7685
#4	50.3623
#10	55.9653
#18	67.5360
#35	107.9157
#60	159.6043
#120	167.1469
#230	167.7076
PAN	0.1529

SALT CORRECTION

Date: _____ Initials: _____

Tare Weight	
Dry Weight+Tare	

Triplicate Batch # _____

*Sample consumed 7-19-17

PSEP GRAIN SIZE ANALYSIS

Project: Willow Creek Daylight

Client: Analytical Resources

Project #: 17T001-050

Sampled by: OTHERS

Source: WC-1

Date Sampled: 6-27-17

Lab #: TT7-1150

Date Setup: 7-19-17

Description: Gray sand w/ gravel & shell fragments
SOLIDS CONTENT

Equipment Used: TCA-002

SIEVE ANALYSIS

Sieve Date: 7-20-17

Sieve Set #: TSA102

Initials: ND

Sieve Size	Weight Retained
Tare	50.6297
#4	88.6453
#10	110.2031
#18	131.3464
#35	169.5674
#60	182.5112
#120	183.8132
#230	183.8467
PAN	0.0386

SALT CORRECTION

1.1g

Date: _____ Initials: _____

Tare Weight	
Dry Weight+Tare	

Triplicate Batch # _____

Moisture Content	Initials: <u>W</u>
Tare #	168
Tare Weight	1.4516
Wet Weight+Tare	109.6644
Dry Weight+Tare	95.9980

Test Sample	Initials: <u>W</u>
Tare #	168 <u>20</u>
Tare Weight	50.6205
Wet Weight+Tare	204.4116
Dry Weight+Tare	183.8866

Calgon Batch #:

7/24/2017

PIPETTE ANALYSIS

Temp: 22

TIME

Initials: _____

TIME	Tare #	Tare Wt	Dry Wt+Tare
10:30:00			
10:30:20	1150 1	1.4401	1.4584

PSEP GRAIN SIZE ANALYSIS

Project: Willow Creek Daylight
 Project #: 17T001-050
 Source: WC-2
 Lab #: T17-1151
 Description: Brown silty sand w/organic debris & gravel
SOLIDS CONTENT

Client: Analytical Resources
 Sampled by: 6-27-17 OTHERS
 Date Sampled: 6-27-17
 Date Setup: 7-19-17
 Equipment Used: TCA-002

SIEVE ANALYSIS

Sieve Date: 7-20-17
 Sieve Set #: BSA101

Initials: JD

Sieve Size	Weight Retained
Tare	49.3085
#4	52.5116
#10	55.0962
#18	58.0042
#35	64.6953
#60	81.2871
#120	97.2467
#230	105.1257
PAN	0.7292

SALT CORRECTION

Date: _____ Initials: _____

Tare Weight	
Dry Weight+Tare	

Triplicate Batch # _____

Moisture Content	Initials: <u>VS</u>
Tare #	174
Tare Weight	1.4259
Wet Weight+Tare	68.6625
Dry Weight+Tare	46.9429

Test Sample	Initials: <u>V</u>
Tare #	174
Tare Weight	49.2929
Wet Weight+Tare	139.7074
Dry Weight+Tare	105.71505 ^{JD}

Calgon Batch #: _____

7/24/2017

PIPETTE ANALYSIS

Temp: 22

Initials: _____

TIME

TIME	Tare #	Tare Wt	Dry Wt+Tare
10:09:00			
10:09:20	1151	1.44395	1.5606
10:10:49	1151	1.4388	1.5132
10:16:15	1151	1.4393	1.21893
10:37:59	1151	1.4405	1.4774
12:05:00	1151	1.44397	1.4648
15:43:00	1151	1.4445	1.4713
9:17:00	1151	1.4527	1.4779

750
703

PSEP GRAIN SIZE ANALYSIS

Project: Willow Creek Daylight
 Project #: 17T001-050
 Source: WC-3-2ft
 Lab #: T17-1152
 Description: BROWN CLAY & ORGANIC DEBRIS
SOLIDS CONTENT

Moisture Content	Initials: <u>h</u>
Tare #	<u>192</u>
Tare Weight	<u>1.4362</u>
Wet Weight+Tare	<u>56.2452</u>
Dry Weight+Tare	<u>27.9222</u>

Test Sample	Initials: <u>h</u>
Tare #	<u>192</u>
Tare Weight	<u>50.2317</u>
Wet Weight+Tare	<u>98.3558</u>
Dry Weight+Tare	<u>63.7999</u>

Calgon Batch #:

7/24/2017

Temp: 22

TIME

PIPETTE ANALYSIS

Initials: _____

TIME	Tare #	Tare Wt	Dry Wt+Tare
10:12:00			
10:12:20	<u>1152</u>	<u>1.4530</u>	<u>1.6582</u>
10:13:49	<u>1152</u>	<u>1.4410</u>	<u>1.5997</u>
10:19:15	<u>1152</u>	<u>1.4470</u>	<u>1.5559</u>
10:40:59	<u>1152</u>	<u>1.4320</u>	<u>1.5088</u>
12:08:00	<u>1152</u>	<u>1.4440</u>	<u>1.5014</u>
15:46:00	<u>1152</u>	<u>1.4601</u>	<u>1.5060</u>
9:20:00	<u>1152</u>	<u>1.4533</u>	<u>1.4872</u>

*1.4466

Client: Analytical Resources

Sampled by: OTTERS

Date Sampled: 6-27-17

Date Setup: 7-19-17

Equipment Used: TCA-002

SIEVE ANALYSIS

Sieve Date: 7-20-17

Sieve Set #: TSA102

Initials: BD

Sieve Size	Weight Retained
Tare	<u>50.2417</u>
#4	<u>50.3427</u>
#10	<u>52.2365</u>
#18	<u>53.4964</u>
#35	<u>56.2836</u>
#60	<u>60.7423</u>
#120	<u>62.5739</u>
#230	<u>63.4681</u>
PAN	<u>0.4191</u>

SALT CORRECTION

Date: _____

Initials: _____

Tare Weight	
Dry Weight+Tare	

Triplicate Batch # _____

PSEP GRAIN SIZE ANALYSIS

Project: Willow Creek Daylight Client: Analytical Resources
 Project #: 17T001-050 Sampled by: OTHERS
 Source: WC-3-Deep Date Sampled: 6-27-17
 Lab #: TH1153 Date Setup: 7-19-17
 Description: BROWN CLAY & organic debris Equipment Used: TCA-002

SOLIDS CONTENT

Moisture Content	Initials:
Tare #	196
Tare Weight	1.4356
Wet Weight+Tare	59.6771
Dry Weight+Tare	27.8167 25

Test Sample	Initials:
Tare #	196
Tare Weight	51.3129
Wet Weight+Tare	90.0101
Dry Weight+Tare	61.7199

Calgon Batch #:

7/24/2017

Temp:22

TIME

PIPETTE ANALYSIS

Initials: _____

TIME	Tare #	Tare Wt	Dry Wt+Tare
10:15:00	1153		
10:15:20	1	1.4510	1.5848
10:16:49	1153	1.4456	1.5553
10:22:15	1153	1.4492	1.5288
10:43:59	1153	1.4538	1.5108
12:11:00	1153	1.4295	1.4728
15:49:00	1153	1.4586	1.4919
9:23:00	1153	1.4417	1.4666

SIEVE ANALYSIS

Sieve Date: 7-20-17

Sieve Set #: TSA101

Initials: MD

Sieve Size	Weight Retained
Tare	51.3265
#4	51.6561
#10	52.6350
#18	53.6159
#35	55.5312
#60	58.8641
#120	60.6388
#230	61.5693
PAN	0.2411

SALT CORRECTION

Date: _____

Initials: _____

Tare Weight	
Dry Weight+Tare	

Triplicate Batch # _____

PSEP GRAIN SIZE ANALYSIS

Project: Willow Creek Daylight
 Project #: 17T001-050
 Source: WC-4-Deep
 Lab #: T17-1155
 Description: Brown sand

Client: Analytical Resources
 Sampled by: OTITERS
 Date Sampled: 6-27-17
 Date Setup: 7-19-17
 Equipment Used: TC-1002

SOLIDS CONTENT

Moisture Content	Initials: <u>W</u>
Tare #	<u>199</u>
Tare Weight	<u>1.43287</u> @
Wet Weight+Tare	<u>77.5913</u>
Dry Weight+Tare	<u>60.7311</u>

Test Sample	Initials: <u>W</u>
Tare #	<u>199</u>
Tare Weight	<u>49.9963</u>
Wet Weight+Tare	<u>201.5026</u>
Dry Weight+Tare	<u>166.9259</u>

Calgon Batch #:

7/24/2017

PIPETTE ANALYSIS

Temp: 22

TIME

Initials: _____

TIME	Tare #	Tare Wt	Dry Wt+Tare
10:33:00			
10:33:20	<u>1155</u> <u>1</u>	<u>1.4399</u>	<u>1.4768</u>

SIEVE ANALYSIS

Sieve Date: 7-20-17
 Sieve Set #: TSA 102

Initials: W

Sieve Size	Weight Retained
Tare	<u>50.0347</u>
#4	<u>51.7295</u>
#10	<u>60.1530</u>
#18	<u>72.2292</u>
#35	<u>104.5603</u>
#60	<u>153.1710</u>
#120	<u>164.9715</u>
#230	<u>166.5235</u>
PAN	<u>0.3363</u>

SALT CORRECTION

1.4g

Date: _____ Initials: _____

Tare Weight	
Dry Weight+Tare	

Triplicate Batch # _____

PSEP GRAIN SIZE ANALYSIS

Project: Willow Creek Daylight
 Project #: 17T001-050
 Source: WC - 5-2ft
 Lab #: TA-1156
 Description: Brown sand

Client: Analytical Resources
 Sampled by: OTHERS
 Date Sampled: 6-27-17
 Date Setup: 7-19-17
 Equipment Used: TCA-002

SOLIDS CONTENT

Moisture Content	Initials:
Tare #	206
Tare Weight	1.4286
Wet Weight+Tare	69.5473
Dry Weight+Tare	51.7963

Test Sample	Initials:
Tare #	206
Tare Weight	49.7401
Wet Weight+Tare	203.6575
Dry Weight+Tare	161.6243

Calgon Batch #:

7/24/2017

Temp:22

TIME

PIPETTE ANALYSIS

Initials: _____

TIME	Tare #	Tare Wt	Dry Wt+Tare
10:36:00			
10:36:20	1156 1	1.4412	1.4743

SIEVE ANALYSIS

Sieve Date: 7-20-17

Sieve Set #: TSA 101

Initials: TSN

Sieve Size	Weight Retained
Tare	49.7422
#4	49.90230 ³⁶
#10	51.9203
#18	60.6367
#35	87.0920
#60	141.6227
#120	158.7836
#230	161.3266
PAN	0.3266

SALT CORRECTION

2.208

Date: _____ Initials: _____

Tare Weight	
Dry Weight+Tare	

Triplicate Batch # _____

PSEP GRAIN SIZE ANALYSIS

Project: Willow Creek Daylight
 Project #: 17T001-050
 Source: WC-5-Deep
 Lab #: T17-1157
 Description: Brown sand & gravel w/ silt

Client: Analytical Resources
 Sampled by: OTHERS
 Date Sampled: 6-27-17
 Date Setup: 7-19-17
 Equipment Used: TCA-002

SOLIDS CONTENT

Moisture Content	Initials: <u>ly</u>
Tare #	<u>211</u>
Tare Weight	<u>1.4452</u>
Wet Weight+Tare	<u>79.0581</u>
Dry Weight+Tare	<u>63.6856</u>

Test Sample	Initials: <u>ly</u>
Tare #	<u>211</u>
Tare Weight	<u>49.1876</u>
Wet Weight+Tare	<u>205.0523</u>
Dry Weight+Tare	<u>169.9451</u>

Calgon Batch #:

7/24/2017

PIPETTE ANALYSIS

Temp: 22

TIME

Initials: _____

TIME	Tare #	Tare Wt	Dry Wt+Tare
10:18:00			
10:18:20	<u>1157</u>	<u>1.4340</u>	<u>1.55860</u>
10:19:49	<u>1157</u>	<u>1.4467</u>	<u>1.5293</u>
10:25:15	<u>1157</u>	<u>1.4411</u>	<u>1.4952</u>
10:46:59	<u>1157</u>	<u>1.4416</u>	<u>1.4797</u>
12:14:00	<u>1157</u>	<u>1.4367</u>	<u>1.4626</u>
15:52:00	<u>1157</u>	<u>1.4394</u>	<u>1.4571</u>
9:26:00	<u>1157</u>	<u>1.4426</u>	<u>1.4568</u>

SIEVE ANALYSIS

Sieve Date: 7-20-17
 Sieve Set #: BSA102

Initials: ly

Sieve Size	Weight Retained
Tare	<u>49.2175</u>
#4	<u>66.2275</u>
#10	<u>94.7589</u>
#18	<u>107.4637</u>
#35	<u>125.7085</u>
#60	<u>152.8088</u>
#120	<u>164.7213</u>
#230	<u>168.6767</u>
PAN	<u>1.2530</u>

SALT CORRECTION

Date: _____ Initials: _____

Tare Weight	
Dry Weight+Tare	

Triplicate Batch # _____

PSEP GRAIN SIZE ANALYSIS

Project: Willow Creek Daylight
 Project #: 17T001-050
 Source: WC-6
 Lab #: T17-1158
 Description: Brown sand & gravel

Client: Analytical Resources
 Sampled by: OTHERS
 Date Sampled: 6-27-17
 Date Setup: 7-19-17
 Equipment Used: TCA-002

SOLIDS CONTENT

Moisture Content	Initials:
Tare #	213
Tare Weight	1.4268
Wet Weight+Tare	133.2669
Dry Weight+Tare	112.8708

Test Sample	Initials:
Tare #	213
Tare Weight	50.4344
Wet Weight+Tare	203.4101
Dry Weight+Tare	178.9049

Calgon Batch #:

7/24/2017

PIPETTE ANALYSIS

Temp: 22

TIME

Initials: _____

	Tare #	Tare Wt	Dry Wt+Tare
10:39:00			
10:39:20	1158	1.4451	1.5113

SIEVE ANALYSIS

Sieve Date: 7-20-17

Sieve Set #: BSA 101

Initials: BD

Sieve Size	Weight Retained
Tare	50.4378
#4	112.0669
#10	126.2304
#18	132.7505
#35	139.7763
#60	157.18456
#120	172.0206
#230	177.9792
PAN	1.0307

SALT CORRECTION

Date: _____ Initials: _____

Tare Weight	
Dry Weight+Tare	

Triplicate Batch # _____

PSEP GRAIN SIZE ANALYSIS

Project: Willow Creek Daylight
 Project #: 17T001-050
 Source: WC-7
 Lab #: T17-1159
 Description: Brown sand & gravel w/ some silt

Client: Analytical Resources
 Sampled by: OTHERS
 Date Sampled: 6-27-17
 Date Setup: 7-19-17
 Equipment Used: TCA-002

SOLIDS CONTENT

Moisture Content	Initials: <u>W</u>
Tare #	<u>214</u>
Tare Weight	<u>1.4251</u>
Wet Weight+Tare	<u>89.7010</u>
Dry Weight+Tare	<u>78.03872</u> ⁷⁰

Test Sample	Initials: <u>W</u>
Tare #	<u>214</u>
Tare Weight	<u>50.1683</u>
Wet Weight+Tare	<u>205.5415</u>
Dry Weight+Tare	<u>183.1061</u>

Calgon Batch #:

7/24/2017

PIPETTE ANALYSIS

Temp: 22

TIME

Initials: _____

TIME	Tare #	Tare Wt	Dry Wt+Tare
10:42:00			
10:42:20	<u>1159-1</u>	<u>1.4526</u>	<u>1.4897</u>

SIEVE ANALYSIS

Sieve Date: 7-20-17
 Sieve Set #: TSA 102

Initials: W

Sieve Size	Weight Retained
Tare	<u>50.1781</u>
#4	<u>98.50847</u> ⁷⁰
#10	<u>115.6489</u>
#18	<u>126.9462</u>
#35	<u>147.8449</u>
#60	<u>173.1309</u>
#120	<u>181.1352</u>
#230	<u>182.5432</u>
PAN	<u>0.4059</u>

SALT CORRECTION

Date: _____ Initials: _____

Tare Weight	
Dry Weight+Tare	

Triplicate Batch # _____

Calgon Batch #343

	TARE WT(g)	TARE + DRY CALGON(g)	CALGON(g)	
1	1.5237	2.0272	0.5035	1
2	1.5162	2.0215	0.5053	2
3	1.5201	2.02437 [Ⓢ]	0.5036	3
4	1.5225	2.0258	0.5033	4
5	1.5099	2.0161	0.5062	5

Average = 0.50438



SUBCONTRACT ORDER
To: Materials Testing & Consulting, Inc. (Tukwila)
ARI Work Order: 17F0434

MTC PROJECT # 17T001-050

SENDING LABORATORY:

Analytical Resources, Inc.
4611 S. 134th Place, Suite 100
Tukwila, WA 98168
Phone: (206) 695-6200
Fax: (206) 695-6201
Project Manager: Amanda Volgardsen
E-Mail: av@arilabs.com

RECEIVING LABORATORY:

Materials Testing & Consulting, Inc. (Tukwila)
4611 S 134th Place, Ste 200
Tukwila, WA 98296
Phone :-
Fax: -

Analysis	Due	Expires	Sub Laboratory ID	Comments
Sample ID: 17F0434-01				
Sampled: 06/27/17 08:30 Matrix: Solid			T17-1150	
Grainsize PSEP (Subc)	07/13/17	12/27/17 01:18		
Containers Supplied:				
17F0434-01 H Glass WM, Clear, 16 oz				
Sample ID: 17F0434-02				
Sampled: 06/27/17 10:25 Matrix: Solid			T17-1151	
Grainsize PSEP (Subc)	07/13/17	12/27/17 03:13		
Containers Supplied:				
17F0434-02 H Glass WM, Clear, 16 oz				
Sample ID: 17F0434-03				
Sampled: 06/27/17 14:00 Matrix: Solid			T17-1152	
Grainsize PSEP (Subc)	07/13/17	12/27/17 06:48		
Containers Supplied:				
17F0434-03 H Glass WM, Clear, 16 oz				
Sample ID: 17F0434-04				
Sampled: 06/27/17 14:30 Matrix: Solid			T17-1153	
Grainsize PSEP (Subc)	07/13/17	12/27/17 07:18		
Containers Supplied:				
17F0434-04 H Glass WM, Clear, 16 oz				
Sample ID: 17F0434-05				
Sampled: 06/27/17 15:30 Matrix: Solid			T17-1154	
Grainsize PSEP (Subc)	07/13/17	12/27/17 08:18		
Containers Supplied:				
17F0434-05 H Glass WM, Clear, 16 oz				

Full Package Data/ET

Full Package
Raw Data/EPD

Released By Deuk Date 6/30/2017 Received By [Signature] Date 6-30-17 7.3°C

Released By _____ Date _____ Received By _____ Date _____



SUBCONTRACT ORDER
To: Materials Testing & Consulting, Inc. (Tukwila)
ARI Work Order: 17F0434

MTC PROJECT # 17T001-050

Analysis	Due	Expires	Sub Laboratory ID	Comments
Sample ID: 17F0434-06 Sampled: 06/27/17 16:00 Matrix: Solid			T17-1155	
Grainsize PSEP (Subc)	07/13/17	12/27/17 08:48		
Containers Supplied:				
17F0434-06 H Glass WM, Clear, 16 oz				
Sample ID: 17F0434-07 Sampled: 06/27/17 17:30 Matrix: Solid			T17-1156	
Grainsize PSEP (Subc)	07/13/17	12/27/17 10:18		
Containers Supplied:				
17F0434-07 H Glass WM, Clear, 16 oz				
Sample ID: 17F0434-08 Sampled: 06/27/17 18:00 Matrix: Solid			T17-1157	
Grainsize PSEP (Subc)	07/13/17	12/27/17 10:48		
Containers Supplied:				
17F0434-08 H Glass WM, Clear, 16 oz				
Sample ID: 17F0434-09 Sampled: 06/27/17 11:45 Matrix: Solid			T17-1158	
Grainsize PSEP (Subc)	07/13/17	12/27/17 04:33		
Containers Supplied:				
17F0434-09 H Glass WM, Clear, 16 oz				
Sample ID: 17F0434-10 Sampled: 06/27/17 13:05 Matrix: Solid			T17-1159	
Grainsize PSEP (Subc)	07/13/17	12/27/17 05:53		
Containers Supplied:				
17F0434-10 H Glass WM, Clear, 16 oz				

Released By Paul Mink Date 6/30/2017 Received By _____ Date _____

Released By _____ Date _____ Received By _____ Date _____



Sample ID Cross Reference Report

Client: Shannon & Wilson, Inc

Work Order: 17F0434

Project: Willow Creek Daylight

Project Number: Willow Creek Daylight

<u>LabNumber</u>	<u>SampleName</u>		<u>ClientMatrix</u>	<u>Sampled</u>	<u>SampleReceived</u>
17F0434-01	WC - 1	T17-1150	Sediment	27-Jun-2017 08:30	28-Jun-2017 06:05
17F0434-02	WC - 2	T17-1151	Sediment	27-Jun-2017 10:25	28-Jun-2017 06:05
17F0434-03	WC - 3 - 2 ft	T17-1152	Sediment	27-Jun-2017 14:00	28-Jun-2017 06:05
17F0434-04	WC - 3 - Deep	T17-1153	Sediment	27-Jun-2017 14:30	28-Jun-2017 06:05
17F0434-05	WC - 4 - 2 ft	T17-1154	Sediment	27-Jun-2017 15:30	28-Jun-2017 06:05
17F0434-06	WC - 4 - Deep	T17-1155	Sediment	27-Jun-2017 16:00	28-Jun-2017 06:05
17F0434-07	WC - 5 - 2 ft	T17-1156	Sediment	27-Jun-2017 17:30	28-Jun-2017 06:05
17F0434-08	WC - 5 - Deep	T17-1157	Sediment	27-Jun-2017 18:00	28-Jun-2017 06:05
17F0434-09	WC - 6	T17-1158	Sediment	27-Jun-2017 11:45	28-Jun-2017 06:05
17F0434-10	WC - 7	T17-1159	Sediment	27-Jun-2017 13:05	28-Jun-2017 06:05
~~17F0434-11~~	Trip Blank		Water	27-Jun-2017 08:30	28-Jun-2017 06:05



Shannon & Wilson, Inc
400 N 34th St., Suite 100
Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WC - 1	17F0434-01	Solid	27-Jun-2017 08:30	28-Jun-2017 06:05
WC - 2	17F0434-02	Solid	27-Jun-2017 10:25	28-Jun-2017 06:05
WC - 3 - 2 ft	17F0434-03	Solid	27-Jun-2017 14:00	28-Jun-2017 06:05
WC - 3 - Deep	17F0434-04	Solid	27-Jun-2017 14:30	28-Jun-2017 06:05
WC - 4 - 2 ft	17F0434-05	Solid	27-Jun-2017 15:30	28-Jun-2017 06:05
WC - 4 - Deep	17F0434-06	Solid	27-Jun-2017 16:00	28-Jun-2017 06:05
WC - 5 - 2 ft	17F0434-07	Solid	27-Jun-2017 17:30	28-Jun-2017 06:05
WC - 5 - Deep	17F0434-08	Solid	27-Jun-2017 18:00	28-Jun-2017 06:05
WC - 6	17F0434-09	Solid	27-Jun-2017 11:45	28-Jun-2017 06:05
WC - 7	17F0434-10	Solid	27-Jun-2017 13:05	28-Jun-2017 06:05
Trip Blank	17F0434-11	Water	27-Jun-2017 08:30	28-Jun-2017 06:05



Shannon & Wilson, Inc
400 N 34th St., Suite 100
Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Case Narrative

Sample receipt

Samples as listed on the preceding page were received June 28, 2017 under ARI workorder 17F0434. For details regarding sample receipt, please refer to the Cooler Receipt Form. The grainsize analysis was subcontracted to MTC Labs.

Volatiles - EPA Method SW8260C

The trip blank has 4-Isopropyl Toluene contamination. During the time of analysis there was a 4-Isopropyl Toluene contamination detected in the lab, and has been addressed. All other analytes are non-detect. No corrective action was taken.

The samples were run within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The initial calibration verification (ICV) for NT3 on 6/28/17 is outside of control limits low for all LCS/LCSD "Q" flagged analytes. The ICV for NT5 on 7/6/17 is outside of control limits low for all LCS/LCSD "Q" flagged analytes with the exception of Chloroethane and Trichlorofluoromethane, which are outside of control limits high. The ICV for NT5 on 7/7/17 is outside of control limits high for all LCS/LCSD "Q" flagged analytes with the exception of Chloromethane, Bromomethane and Iodomethane which are outside of control limits low. Associated samples that contain these analytes have been flagged with a "Q" qualifier. No further corrective action was taken.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

Method blank BFF0797 has Naphthalene and 1,2,3-Trichlorobenzene detected below the reporting limits. These analytes have been flagged with a "J" qualifier on the method blank. Method blank BFG0079 has Methylene Chloride detected above the reporting limit. Associated detected results have been flagged with an "B" qualifier. Method blank BFG0079 also has various analytes detected below the reporting limits, these analytes have been flagged with "J" qualifiers on the method blank. Method blank BFG0114 has various analytes detected below the reporting limits. These analytes have been flagged with "J" qualifiers on the method blank. No further corrective actions were taken.

The LCS for BFG0079 has high percent recoveries for Chloroethane and Trichlorofluoromethane. The BFG0079 LCS has low percent recoveries for 1,1,2-Trichloro-1,2,2-Trifluoroethane, 1,1-Dichloroethane, Carbon Disulfide and 1,1-Dichloropropene. The BFG0079 LCSD has high RPD for Chloroethane, Trichlorofluoromethane, 1,1,2-Trichloro-1,2,2-Trifluoroethane, 1,1-Dichloroethane, Iodomethane, Carbon Disulfide and 1,1,1-Trichloroethane. The BFG0114 LCS has low percent recoveries for Bromomethane and Iodomethane. The BFG0114 LCS has high percent recoveries for 1,1,1-Trichloroethane and Carbon Tetrachloride. The BFG0114 LCSD has low percent recoveries for Bromomethane and Iodomethane. The BFG0114 LCSD has a high RPD for Carbon Tetrachloride. All other LCS/LCSD percent recoveries and RPD were within control limits. No corrective action was taken.

Gasoline by NWTPH-q (GC/MS)



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The samples were run within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

There were no target compounds detected in the method blank.

The LCS/LCSD percent recoveries and RPD were within control limits.

Semivolatiles - EPA Method SW8270D

The samples were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

There were no target compounds detected in the method blank.

The BFF0828 LCS has a low percent recovery for 4-Chloroaniline. All other LCS percent recoveries were within control limits. No corrective action was taken.

Polynuclear Aromatic Hydrocarbons (PAH) - EPA Method SW8270D-SIM

The samples were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

There were no target compounds detected in the method blank.

The LCS percent recoveries were within control limits.

Butyl Tin(s) - EPA Method SW8270D-SIM

The samples were extracted and analyzed within the recommended holding times.



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Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

There were no target compounds detected in the method blank.

The LCS percent recoveries were within control limits.

Diesel/Heavy Oil Range Organics - WA-Ecology Method NW-TPHDx

The samples were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The surrogate percent recoveries were within control limits.

Method blank BFF0822 has Motor Oil Range Organics (C24-C38) detected above the reporting limit. Associated detected results have been flagged with an "B" qualifier. No further corrective action was taken.

The LCS percent recoveries were within control limits.

Pesticides - EPA Method SW8081A

The samples were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

Both columns of surrogate Decachlorobiphenyl were not reported for samples WC-3-2ft and WC-3-Dup due to chromatographic interference. The surrogate has been flagged with an "NRS" on the samples. No further corrective action was taken.

There were no target compounds detected in the method blank.

The LCS percent recoveries were within control limits.

PCB Aroclors - EPA Method SW8082A

The samples were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.



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Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

There were no target compounds detected in the method blank.

The LCS percent recoveries were within control limits.

Total Metals - EPA Method 6010C

The samples were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Method blank BFF0836 has Chromium detected below the reporting limit. The Chromium has been flagged with a "J" qualifier on the method blank. No further corrective action was taken.

The LCS percent recoveries were within control limits.

A matrix spike and duplicate were prepared in conjunction with sample WC-1. The matrix spike has a low spike recovery for Antimony. All other matrix spike percent recoveries and duplicate RPD were within QC limits. No corrective action was taken.

Total Hg - EPA Method 7471B

The samples were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

There were no target compounds detected in the method blank.

The LCS percent recoveries were within control limits.

A matrix spike and duplicate were prepared in conjunction with sample WC-1. The matrix spike percent recovery and duplicate RPD were within QC limits.

NO₂+NO₃ and Ammonia - Method SM4500

The samples were prepared and analyzed within the recommended holding times.

There were no target compounds detected in the method blank.

The LCS percent recoveries were within control limits.

A matrix spike and duplicate were prepared in conjunction with sample WC-1. The matrix spike percent recoveries and



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duplicate RPD were within QC limits.

Sulfide - Method SM4500

The samples were prepared and analyzed within the recommended holding times.

There were no target compounds detected in the method blank.

The LCS percent recoveries were within control limits.

A matrix spike and duplicate were prepared in conjunction with sample WC-1. The matrix spike percent recovery and duplicate RPD were within QC limits.

Total Organic Carbon - Plumb Method

The samples were prepared and analyzed within the recommended holding times.

There were no target compounds detected in the method blank.

The LCS percent recoveries were within control limits.

The SRM percent recovery was within control limits.

A matrix spike and duplicate were prepared in conjunction with sample WC-1. The matrix spike has a low percent recovery. The duplicate RPD was within QC limits.

Total Phosphorus - Method SM4500

The samples were prepared and analyzed within the recommended holding times.

There were no target compounds detected in the method blank.

The LCS percent recoveries were within control limits.

A matrix spike and duplicate were prepared in conjunction with sample WC-1. The matrix spike has a natural concentration of phosphorus that is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible. The total phosphorus has been flagged with an "HC" qualifier on the matrix spike. The duplicate has a high RPD. No further corrective action was taken.



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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 1
17F0434-01 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 08:30

Instrument: NT5

Analyzed: 07-Jul-2017 13:30

Sample Preparation: Preparation Method: EPA 5035 (Sodium Bisulfate)
Preparation Batch: BFG0114 Sample Size: 5.45 g (wet) Dry Weight: 4.81 g
Prepared: 07-Jul-2017 Final Volume: 5 mL % Solids: 88.32

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.27	1.04	ND	ug/kg	U
Vinyl Chloride	75-01-4	1	0.24	1.04	ND	ug/kg	U
Bromomethane	74-83-9	1	0.19	1.04	ND	ug/kg	U
Chloroethane	75-00-3	1	0.48	1.04	ND	ug/kg	U
Trichlorofluoromethane	75-69-4	1	0.28	1.04	ND	ug/kg	U
Acrolein	107-02-8	1	3.96	5.19	ND	ug/kg	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.30	2.08	ND	ug/kg	U
Acetone	67-64-1	1	0.50	5.19	16.8	ug/kg	
1,1-Dichloroethene	75-35-4	1	0.35	1.04	ND	ug/kg	U
Bromoethane	74-96-4	1	0.46	2.08	ND	ug/kg	U
Iodomethane	74-88-4	1	0.22	1.04	ND	ug/kg	U
Methylene Chloride	75-09-2	1	0.66	2.08	3.94	ug/kg	
Acrylonitrile	107-13-1	1	1.07	5.19	ND	ug/kg	U
Carbon Disulfide	75-15-0	1	0.58	1.04	6.28	ug/kg	
trans-1,2-Dichloroethene	156-60-5	1	0.28	1.04	ND	ug/kg	U
Vinyl Acetate	108-05-4	1	0.40	5.19	ND	ug/kg	U
1,1-Dichloroethane	75-34-3	1	0.21	1.04	ND	ug/kg	U
2-Butanone	78-93-3	1	0.53	5.19	ND	ug/kg	U
2,2-Dichloropropane	594-20-7	1	0.30	1.04	ND	ug/kg	U
cis-1,2-Dichloroethene	156-59-2	1	0.25	1.04	ND	ug/kg	U
Chloroform	67-66-3	1	0.24	1.04	ND	ug/kg	U
Bromochloromethane	74-97-5	1	0.34	1.04	ND	ug/kg	U
1,1,1-Trichloroethane	71-55-6	1	0.23	1.04	ND	ug/kg	U
1,1-Dichloropropene	563-58-6	1	0.32	1.04	ND	ug/kg	U
Carbon tetrachloride	56-23-5	1	0.22	1.04	ND	ug/kg	U
1,2-Dichloroethane	107-06-2	1	0.20	1.04	ND	ug/kg	U
Benzene	71-43-2	1	0.31	1.04	ND	ug/kg	U
Trichloroethene	79-01-6	1	0.22	1.04	ND	ug/kg	U
1,2-Dichloropropane	78-87-5	1	0.17	1.04	ND	ug/kg	U
Bromodichloromethane	75-27-4	1	0.26	1.04	ND	ug/kg	U
Dibromomethane	74-95-3	1	0.15	1.04	ND	ug/kg	U
2-Chloroethyl vinyl ether	110-75-8	1	0.29	5.19	ND	ug/kg	U
4-Methyl-2-Pentanone	108-10-1	1	0.44	5.19	ND	ug/kg	U
cis-1,3-Dichloropropene	10061-01-5	1	0.23	1.04	ND	ug/kg	U
Toluene	108-88-3	1	0.16	1.04	0.34	ug/kg	J
trans-1,3-Dichloropropene	10061-02-6	1	0.22	1.04	ND	ug/kg	U



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Reported:
28-Jul-2017 15:26

WC - 1
17F0434-01 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 08:30

Instrument: NT5

Analyzed: 07-Jul-2017 13:30

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	0.46	5.19	ND	ug/kg	U
1,1,2-Trichloroethane	79-00-5	1	0.30	1.04	ND	ug/kg	U
1,3-Dichloropropane	142-28-9	1	0.22	1.04	ND	ug/kg	U
Tetrachloroethene	127-18-4	1	0.27	1.04	ND	ug/kg	U
Dibromochloromethane	124-48-1	1	0.28	1.04	ND	ug/kg	U
1,2-Dibromoethane	106-93-4	1	0.18	1.04	ND	ug/kg	U
Chlorobenzene	108-90-7	1	0.23	1.04	ND	ug/kg	U
Ethylbenzene	100-41-4	1	0.21	1.04	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.24	1.04	ND	ug/kg	U
m,p-Xylene	179601-23-1	1	0.41	1.04	ND	ug/kg	U
o-Xylene	95-47-6	1	0.23	1.04	ND	ug/kg	U
Xylenes, total	1330-20-7	1	0.64	2.08	ND	ug/kg	U
Styrene	100-42-5	1	0.14	1.04	ND	ug/kg	U
Bromoform	75-25-2	1	0.31	1.04	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	79-34-5	1	0.26	1.04	ND	ug/kg	U
1,2,3-Trichloropropane	96-18-4	1	0.54	2.08	ND	ug/kg	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	0.45	5.19	ND	ug/kg	U
n-Propylbenzene	103-65-1	1	0.28	1.04	ND	ug/kg	U
Bromobenzene	108-86-1	1	0.16	1.04	ND	ug/kg	U
Isopropyl Benzene	98-82-8	1	0.24	1.04	ND	ug/kg	U
2-Chlorotoluene	95-49-8	1	0.31	1.04	ND	ug/kg	U
4-Chlorotoluene	106-43-4	1	0.29	1.04	ND	ug/kg	U
t-Butylbenzene	98-06-6	1	0.32	1.04	ND	ug/kg	U
1,3,5-Trimethylbenzene	108-67-8	1	0.26	1.04	ND	ug/kg	U
1,2,4-Trimethylbenzene	95-63-6	1	0.24	1.04	ND	ug/kg	U
s-Butylbenzene	135-98-8	1	0.25	1.04	ND	ug/kg	U
4-Isopropyl Toluene	99-87-6	1	0.25	1.04	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	0.24	1.04	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	0.24	1.04	ND	ug/kg	U
n-Butylbenzene	104-51-8	1	0.27	1.04	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	0.30	1.04	ND	ug/kg	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.61	5.19	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	0.34	5.19	ND	ug/kg	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.43	5.19	ND	ug/kg	U
Naphthalene	91-20-3	1	0.45	5.19	ND	ug/kg	U
1,2,3-Trichlorobenzene	87-61-6	1	0.32	5.19	ND	ug/kg	U
Dichlorodifluoromethane	75-71-8	1	0.22	1.04	ND	ug/kg	U
Methyl tert-butyl Ether	1634-04-4	1	0.24	1.04	ND	ug/kg	U
2-Pentanone	107-87-9	1	5.19	5.19	ND	ug/kg	U



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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 1
17F0434-01 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 08:30

Instrument: NT5

Analyzed: 07-Jul-2017 13:30

Analyte	CAS Number	Recovery Limits	Recovery	Units	Notes
Surrogate: 1,2-Dichloroethane-d4		80-149 %	110	%	
Surrogate: Toluene-d8		77-120 %	101	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	97.8	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	102	%	



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WC - 1
17F0434-01 (Solid)

Volatile Organic Compounds

Method: NWTPHg
Instrument: NT3

Sampled: 06/27/2017 08:30

Analyzed: 28-Jun-2017 17:57

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFF0798 Sample Size: 5.635 g (wet) Dry Weight: 4.98 g
Prepared: 28-Jun-2017 Final Volume: 5 mL % Solids: 88.32

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	5680	ND	ug/kg	U
Surrogate: Toluene-d8			80-120 %	98.9	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	91.6	%	



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WC - 1
17F0434-01 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 08:30

Instrument: NT10

Analyzed: 11-Jul-2017 12:59

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0828 Sample Size: 12.27 g (wet) Dry Weight: 10.84 g
Prepared: 29-Jun-2017 Final Volume: 1 mL % Solids: 88.32

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Phenol	108-95-2	1	7.6	18.5	ND	ug/kg	U
bis(2-chloroethyl) ether	111-44-4	1	6.3	18.5	ND	ug/kg	U
2-Chlorophenol	95-57-8	1	6.0	18.5	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	4.7	18.5	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	4.1	18.5	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	4.3	18.5	ND	ug/kg	U
Benzyl Alcohol	100-51-6	1	13.7	18.5	ND	ug/kg	U
2,2'-Oxybis(1-chloropropane)	108-60-1	1	5.2	18.5	ND	ug/kg	U
2-Methylphenol	95-48-7	1	7.2	18.5	ND	ug/kg	U
Hexachloroethane	67-72-1	1	5.2	18.5	ND	ug/kg	U
N-Nitroso-di-n-Propylamine	621-64-7	1	10.0	18.5	ND	ug/kg	U
4-Methylphenol	106-44-5	1	13.6	18.5	ND	ug/kg	U
Nitrobenzene	98-95-3	1	7.3	18.5	ND	ug/kg	U
Isophorone	78-59-1	1	7.2	18.5	ND	ug/kg	U
2-Nitrophenol	88-75-5	1	6.4	18.5	ND	ug/kg	U
2,4-Dimethylphenol	105-67-9	1	24.7	92.3	ND	ug/kg	U
Bis(2-Chloroethoxy)methane	111-91-1	1	5.9	18.5	ND	ug/kg	U
2,4-Dichlorophenol	120-83-2	1	29.5	92.3	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	5.5	18.5	ND	ug/kg	U
Naphthalene	91-20-3	1	4.8	18.5	ND	ug/kg	U
Benzoic acid	65-85-0	1	54.5	185	ND	ug/kg	U
4-Chloroaniline	106-47-8	1	31.1	92.3	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	4.6	18.5	ND	ug/kg	U
4-Chloro-3-Methylphenol	59-50-7	1	26.7	92.3	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	5.2	18.5	ND	ug/kg	U
Hexachlorocyclopentadiene	77-47-4	1	38.1	92.3	ND	ug/kg	U
2,4,6-Trichlorophenol	88-06-2	1	23.4	92.3	ND	ug/kg	U
2-Chloronaphthalene	91-58-7	1	4.1	18.5	ND	ug/kg	U
2-Nitroaniline	88-74-4	1	27.9	92.3	ND	ug/kg	U
Acenaphthylene	208-96-8	1	4.4	18.5	ND	ug/kg	U
Dimethylphthalate	131-11-3	1	5.9	18.5	ND	ug/kg	U
2,6-Dinitrotoluene	606-20-2	1	24.6	92.3	ND	ug/kg	U
Acenaphthene	83-32-9	1	4.7	18.5	ND	ug/kg	U
3-Nitroaniline	99-09-2	1	34.8	92.3	ND	ug/kg	U
2,4-Dinitrophenol	51-28-5	1	38.1	185	ND	ug/kg	U
Dibenzofuran	132-64-9	1	4.3	18.5	ND	ug/kg	U



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WC - 1
17F0434-01 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 08:30

Instrument: NT10

Analyzed: 11-Jul-2017 12:59

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
4-Nitrophenol	100-02-7	1	41.0	92.3	ND	ug/kg	U
2,4-Dinitrotoluene	121-14-2	1	21.1	92.3	ND	ug/kg	U
Fluorene	86-73-7	1	4.6	18.5	ND	ug/kg	U
4-Chlorophenylphenyl ether	7005-72-3	1	6.4	18.5	ND	ug/kg	U
Diethyl phthalate	84-66-2	1	16.3	18.5	ND	ug/kg	U
4-Nitroaniline	100-01-6	1	32.2	92.3	ND	ug/kg	U
4,6-Dinitro-2-methylphenol	534-52-1	1	46.6	185	ND	ug/kg	U
N-Nitrosodiphenylamine	86-30-6	1	8.8	18.5	ND	ug/kg	U
4-Bromophenyl phenyl ether	101-55-3	1	5.6	18.5	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	4.4	18.5	ND	ug/kg	U
Pentachlorophenol	87-86-5	1	28.9	92.3	ND	ug/kg	U
Phenanthrene	85-01-8	1	4.3	18.5	ND	ug/kg	U
Anthracene	120-12-7	1	5.5	18.5	ND	ug/kg	U
Carbazole	86-74-8	1	6.8	18.5	ND	ug/kg	U
Di-n-Butylphthalate	84-74-2	1	4.9	18.5	ND	ug/kg	U
Fluoranthene	206-44-0	1	4.2	18.5	5.5	ug/kg	J
Pyrene	129-00-0	1	5.1	18.5	ND	ug/kg	U
Butylbenzylphthalate	85-68-7	1	7.4	18.5	ND	ug/kg	U
Benzo(a)anthracene	56-55-3	1	4.8	18.5	ND	ug/kg	U
3,3'-Dichlorobenzidine	91-94-1	1	28.8	92.3	ND	ug/kg	U
Chrysene	218-01-9	1	4.8	18.5	ND	ug/kg	U
bis(2-Ethylhexyl)phthalate	117-81-7	1	26.6	46.1	ND	ug/kg	U
Di-n-Octylphthalate	117-84-0	1	8.0	18.5	ND	ug/kg	U
Benzo(a)fluoranthene, Total		1	9.4	36.9	ND	ug/kg	U
Benzo(a)pyrene	50-32-8	1	6.0	18.5	ND	ug/kg	U
Indeno(1,2,3-cd)pyrene	193-39-5	1	5.5	18.5	ND	ug/kg	U
Dibenzo(a,h)anthracene	53-70-3	1	5.7	18.5	ND	ug/kg	U
Benzo(g,h,i)perylene	191-24-2	1	5.4	18.5	ND	ug/kg	U
1-Methylnaphthalene	90-12-0	1	5.5	18.5	ND	ug/kg	U
Surrogate: 2-Fluorophenol				27-120 %	64.1	%	
Surrogate: Phenol-d5				29-120 %	66.3	%	
Surrogate: 2-Chlorophenol-d4				31-120 %	78.7	%	
Surrogate: 1,2-Dichlorobenzene-d4				32-120 %	82.4	%	
Surrogate: Nitrobenzene-d5				30-120 %	82.2	%	
Surrogate: 2-Fluorobiphenyl				35-120 %	84.1	%	
Surrogate: 2,4,6-Tribromophenol				24-134 %	72.0	%	
Surrogate: p-Terphenyl-d14				37-120 %	103	%	



Shannon & Wilson, Inc
400 N 34th St., Suite 100
Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 1
17F0434-01 (Solid)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM

Sampled: 06/27/2017 08:30

Instrument: NT8

Analyzed: 11-Jul-2017 12:00

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0829 Prepared: 30-Jun-2017	Sample Size: 12.27 g (wet) Final Volume: 0.5 mL	Dry Weight: 10.84 g % Solids: 88.32
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0051 Cleaned: 11-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0050 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Naphthalene	91-20-3	1	1.18	4.61	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	1.02	4.61	ND	ug/kg	U
1-Methylnaphthalene	90-12-0	1	0.37	4.61	ND	ug/kg	U
Acenaphthylene	208-96-8	1	1.00	4.61	ND	ug/kg	U
Acenaphthene	83-32-9	1	0.53	4.61	ND	ug/kg	U
Dibenzofuran	132-64-9	1	1.27	4.61	ND	ug/kg	U
Fluorene	86-73-7	1	0.58	4.61	ND	ug/kg	U
Phenanthrene	85-01-8	1	0.66	4.61	ND	ug/kg	U
Anthracene	120-12-7	1	0.80	4.61	ND	ug/kg	U
Fluoranthene	206-44-0	1	0.43	4.61	ND	ug/kg	U
Pyrene	129-00-0	1	0.58	4.61	ND	ug/kg	U
Benzo(a)anthracene	56-55-3	1	0.76	4.61	ND	ug/kg	U
Chrysene	218-01-9	1	0.97	4.61	ND	ug/kg	U
Benzo(b)fluoranthene	205-99-2	1	1.27	4.61	ND	ug/kg	U
Benzo(k)fluoranthene	207-08-9	1	0.70	4.61	ND	ug/kg	U
Benzo(j)fluoranthene	205-82-3	1	0.63	4.61	ND	ug/kg	U
Benzofluoranthenes, Total		1	2.78	9.23	ND	ug/kg	U
Benzo(a)pyrene	50-32-8	1	0.57	4.61	ND	ug/kg	U
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.97	4.61	ND	ug/kg	U
Dibenzo(a,h)anthracene	53-70-3	1	0.82	4.61	ND	ug/kg	U
Benzo(g,h,i)perylene	191-24-2	1	0.98	4.61	ND	ug/kg	U
Surrogate: 2-Methylnaphthalene-d10				32-120 %	54.1	%	
Surrogate: Dibenzo[a,h]anthracene-d14				21-133 %	78.9	%	
Surrogate: Fluoranthene-d10				36-134 %	71.1	%	



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Reported:
28-Jul-2017 15:26

WC - 1
17F0434-01 (Solid)

Butyl Tins

Method: EPA 8270D-SIM

Sampled: 06/27/2017 08:30

Instrument: NT12

Analyzed: 08-Jul-2017 08:24

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0827 Prepared: 30-Jun-2017	Sample Size: 6.07 g (wet) Final Volume: 0.5 mL	Dry Weight: 5.36 g % Solids: 88.32
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0024 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.420	3.60	ND	ug/kg	U
Dibutyltin Ion	14488-53-0	1	1.61	5.39	ND	ug/kg	U
Butyltin Ion	78763-54-9	1	1.76	3.81	ND	ug/kg	U
Tetrabutyltin	1461-25-2	1	4.66	4.66	ND	ug/kg	U
Surrogate: Triphenyltin					30-160 %	60.4 %	
Surrogate: Tripropyltin					30-160 %	53.5 %	



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Reported:
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WC - 1
17F0434-01 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 06/27/2017 08:30

Instrument: FID4

Analyzed: 11-Jul-2017 14:17

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0822 Sample Size: 10.13 g (wet) Dry Weight: 8.95 g
Prepared: 30-Jun-2017 Final Volume: 1 mL % Solids: 88.32

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	5.59	6.26	mg/kg	
Motor Oil Range Organics (C24-C38)		1	11.2	18.1	mg/kg	B
Surrogate: o-Terphenyl			50-150 %	86.4	%	



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Reported:
28-Jul-2017 15:26

WC - 1
17F0434-01 (Solid)

Chlorinated Pesticides

Method: EPA 8081B
Instrument: ECD6

Sampled: 06/27/2017 08:30

Analyzed: 11-Jul-2017 16:22

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0825 Prepared: 29-Jun-2017	Sample Size: 14.35 g (wet) Final Volume: 2.5 mL	Dry Weight: 12.67 g % Solids: 88.32
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0049 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0048 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0047 Cleaned: 07-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	1	0.08	0.49	ND	ug/kg	U
beta-BHC	319-85-7	1	0.09	0.49	ND	ug/kg	U
gamma-BHC (Lindane)	58-89-9	1	0.07	0.49	ND	ug/kg	U
delta-BHC	319-86-8	1	0.06	0.49	ND	ug/kg	U
Heptachlor	76-44-8	1	0.05	0.49	ND	ug/kg	U
Aldrin	309-00-2	1	0.36	0.49	ND	ug/kg	U
Heptachlor Epoxide	1024-57-3	1	0.17	0.49	ND	ug/kg	U
trans-Chlordane (beta-Chlordane)	5103-74-2	1	0.32	0.49	ND	ug/kg	U
cis-Chlordane (alpha-chlordane)	5103-71-9	1	0.11	0.49	ND	ug/kg	U
Endosulfan I	959-98-8	1	0.07	0.49	ND	ug/kg	U
4,4'-DDE	72-55-9	1	0.13	0.99	ND	ug/kg	U
Dieldrin	60-57-1	1	0.11	0.99	ND	ug/kg	U
Endrin	72-20-8	1	0.14	0.99	ND	ug/kg	U
Endosulfan II	33213-65-9	1	0.31	0.99	ND	ug/kg	U
4,4'-DDD	72-54-8	1	0.32	0.99	ND	ug/kg	U
Endrin Aldehyde	7421-93-4	1	0.38	0.99	ND	ug/kg	U
4,4'-DDT	50-29-3	1	0.32	0.99	ND	ug/kg	U
Endosulfan Sulfate	1031-07-8	1	0.12	0.99	ND	ug/kg	U
Endrin Ketone	53494-70-5	1	0.28	0.99	ND	ug/kg	U
Methoxychlor	72-43-5	1	0.29	4.93	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	0.34	0.49	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	0.14	0.49	ND	ug/kg	U
2,4'-DDE	3424-82-6	1	0.25	0.99	ND	ug/kg	U
2,4'-DDD	53-19-0	1	0.19	0.99	ND	ug/kg	U
2,4'-DDT	789-02-6	1	0.18	0.99	ND	ug/kg	U
Oxychlordane	27304-13-8	1	0.13	0.99	ND	ug/kg	U
cis-Nonachlor	5103-73-1	1	0.21	0.99	ND	ug/kg	U



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Reported:
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WC - 1
17F0434-01 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 08:30

Instrument: ECD6

Analyzed: 11-Jul-2017 16:22

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
trans-Nonachlor	39765-80-5	1	0.22	0.99	ND	ug/kg	U
Mirex	2385-85-5	1	0.64	0.99	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				30-160 %	83.3	%	
Surrogate: Decachlorobiphenyl [2C]				30-160 %	83.7	%	
Surrogate: Tetrachlorometaxylene				30-160 %	64.9	%	
Surrogate: Tetrachlorometaxylene [2C]				30-160 %	64.8	%	



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Reported:
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WC - 1
17F0434-01 (Solid)

Aroclor PCB

Method: EPA 8082A

Sampled: 06/27/2017 08:30

Instrument: ECD7

Analyzed: 07-Jul-2017 17:21

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0826 Prepared: 05-Jul-2017	Sample Size: 6.03 g (wet) Final Volume: 5 mL	Dry Weight: 5.33 g % Solids: 88.32
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0027 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid Cleanup Batch: CFG0025 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0026 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aroclor 1016	12674-11-2	1	7.5	18.8	ND	ug/kg	U
Aroclor 1221	11104-28-2	1	7.5	18.8	ND	ug/kg	U
Aroclor 1232	11141-16-5	1	7.5	18.8	ND	ug/kg	U
Aroclor 1242	53469-21-9	1	7.5	18.8	ND	ug/kg	U
Aroclor 1248	12672-29-6	1	7.5	18.8	ND	ug/kg	U
Aroclor 1254	11097-69-1	1	7.5	18.8	ND	ug/kg	U
Aroclor 1260	11096-82-5	1	8.7	18.8	ND	ug/kg	U
Aroclor 1262	37324-23-5	1	8.7	18.8	ND	ug/kg	U
Aroclor 1268	11100-14-4	1	8.7	18.8	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				40-133 %	87.7	%	
Surrogate: Tetrachlorometaxylene				53-120 %	77.4	%	
Surrogate: Decachlorobiphenyl [2C]				40-133 %	85.9	%	
Surrogate: Tetrachlorometaxylene [2C]				53-120 %	75.8	%	



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Reported:
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WC - 1
17F0434-01 (Solid)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 06/27/2017 08:30

Instrument: ICP2

Analyzed: 06-Jul-2017 21:47

Sample Preparation:

Preparation Method: SWC EPA 3050B

Preparation Batch: BFF0836

Prepared: 30-Jun-2017

Sample Size: 1.052 g (wet)

Final Volume: 50 mL

Dry Weight: 0.88 g

% Solids: 83.62

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Antimony	7440-36-0	2	0.257	5.68	1.07	mg/kg	J
Arsenic	7440-38-2	2	0.319	5.68	4.57	mg/kg	J
Beryllium	7440-41-7	2	0.0066	0.114	0.120	mg/kg	
Cadmium	7440-43-9	2	0.0141	0.227	0.158	mg/kg	J
Chromium	7440-47-3	2	0.0535	0.568	15.5	mg/kg	
Copper	7440-50-8	2	0.0280	0.227	10.7	mg/kg	
Lead	7439-92-1	2	0.148	2.27	3.79	mg/kg	
Nickel	7440-02-0	2	0.226	1.14	17.9	mg/kg	
Selenium	7782-49-2	2	0.928	5.68	ND	mg/kg	U
Silver	7440-22-4	2	0.0499	0.341	ND	mg/kg	U
Thallium	7440-28-0	2	0.518	5.68	ND	mg/kg	U
Zinc	7440-66-6	2	0.181	1.14	30.1	mg/kg	



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Reported:
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WC - 1
17F0434-01 (Solid)

Metals and Metallic Compounds

Method: EPA 7471B

Sampled: 06/27/2017 08:30

Instrument: CETAC

Analyzed: 30-Jun-2017 14:08

Sample Preparation:

Preparation Method: SMM EPA 7471B

Preparation Batch: BFF0838

Prepared: 30-Jun-2017

Sample Size: 0.229 g (wet)

Final Volume: 50 mL

Dry Weight: 0.19 g

% Solids: 83.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Mercury	7439-97-6	1	0.02611	ND	mg/kg	U



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Reported:
28-Jul-2017 15:26

WC - 1
17F0434-01 (Solid)

Wet Chemistry

Method: PSEP 1986

Sampled: 06/27/2017 08:30

Instrument: N/A

Analyzed: 29-Jun-2017 11:44

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFF0832

Prepared: 29-Jun-2017

Sample Size: 5 g (wet)

Final Volume: 5 g

Dry Weight: 4.18 g

% Solids: 83.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids, Sulfide		1	0.040	87.7	%	



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Reported:
28-Jul-2017 15:26

WC - 1
17F0434-01 (Solid)

Wet Chemistry

Method: SM 2540 G-97

Sampled: 06/27/2017 08:30

Instrument: N/A

Analyzed: 05-Jul-2017 11:59

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.84 g

% Solids: 83.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	83.62	%	



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Reported:
28-Jul-2017 15:26

WC - 1
17F0434-01 (Solid)

Wet Chemistry

Method: SM 4500-NH3 H-97

Sampled: 06/27/2017 08:30

Instrument: LACHAT2

Analyzed: 01-Jul-2017 13:28

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.65 g (wet)

Final Volume: 40 mL

Dry Weight: 3.89 g

% Solids: 83.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.41	ND	mg/kg NH3-N	U



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Reported:
28-Jul-2017 15:26

WC - 1
17F0434-01 (Solid)

Wet Chemistry

Method: SM 4500-NO₃⁻ I-00

Sampled: 06/27/2017 08:30

Instrument: LACHAT2

Analyzed: 01-Jul-2017 17:04

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.65 g (wet)

Final Volume: 40 mL

Dry Weight: 3.89 g

% Solids: 83.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.10	0.19	mg-N/kg	



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Reported:
28-Jul-2017 15:26

WC - 1
17F0434-01 (Solid)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 06/27/2017 08:30

Instrument: UV1800-2

Analyzed: 14-Jul-2017 14:53

Sample Preparation:

Preparation Method: SM 4500-P B-4 Strong Acid

Preparation Batch: BFG0152

Prepared: 13-Jul-2017

Sample Size: 0.3212 g (wet)

Final Volume: 50 mL

Dry Weight: 0.27 g

% Solids: 83.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	20	29.8	465	mg-P/kg	D



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Reported:
28-Jul-2017 15:26

WC - 1
17F0434-01 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00

Sampled: 06/27/2017 08:30

Instrument: UV1800-2

Analyzed: 30-Jun-2017 11:25

Sample Preparation:

Preparation Method: PSEP 1986

Preparation Batch: BFF0843

Prepared: 29-Jun-2017

Sample Size: 5.166 g (wet)

Final Volume: 100 mL

Dry Weight: 4.53 g

% Solids: 87.70

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	1.10	ND	mg/kg	U



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Reported:
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WC - 1
17F0434-01RE1 (Solid)

Wet Chemistry

Method: Plumb 1981, Combustion IR

Sampled: 06/27/2017 08:30

Instrument: APOLLO1

Analyzed: 17-Jul-2017 11:43

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.84 g

% Solids: 83.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.04	%	



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Reported:
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WC - 2
17F0434-02 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 10:25

Instrument: NT5

Analyzed: 06-Jul-2017 18:22

Sample Preparation: Preparation Method: EPA 5035 (Sodium Bisulfate)
Preparation Batch: BFG0079 Sample Size: 6.33 g (wet) Dry Weight: 4.80 g
Prepared: 06-Jul-2017 Final Volume: 5 mL % Solids: 75.83

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.27	1.04	8.67	ug/kg	
Vinyl Chloride	75-01-4	1	0.24	1.04	ND	ug/kg	U
Bromomethane	74-83-9	1	0.19	1.04	ND	ug/kg	U
Chloroethane	75-00-3	1	0.48	1.04	ND	ug/kg	U
Trichlorofluoromethane	75-69-4	1	0.28	1.04	ND	ug/kg	U
Acrolein	107-02-8	1	3.97	5.21	ND	ug/kg	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.30	2.08	ND	ug/kg	U
Acetone	67-64-1	1	0.50	5.21	36.2	ug/kg	
1,1-Dichloroethene	75-35-4	1	0.35	1.04	ND	ug/kg	U
Bromoethane	74-96-4	1	0.46	2.08	ND	ug/kg	U
Iodomethane	74-88-4	1	0.22	1.04	ND	ug/kg	U
Methylene Chloride	75-09-2	1	0.66	2.08	1.78	ug/kg	J, B
Acrylonitrile	107-13-1	1	1.07	5.21	ND	ug/kg	U
Carbon Disulfide	75-15-0	1	0.58	1.04	3.93	ug/kg	
trans-1,2-Dichloroethene	156-60-5	1	0.28	1.04	ND	ug/kg	U
Vinyl Acetate	108-05-4	1	0.40	5.21	ND	ug/kg	U
1,1-Dichloroethane	75-34-3	1	0.21	1.04	ND	ug/kg	U
2-Butanone	78-93-3	1	0.53	5.21	2.66	ug/kg	J
2,2-Dichloropropane	594-20-7	1	0.30	1.04	ND	ug/kg	U
cis-1,2-Dichloroethene	156-59-2	1	0.25	1.04	ND	ug/kg	U
Chloroform	67-66-3	1	0.24	1.04	ND	ug/kg	U
Bromochloromethane	74-97-5	1	0.34	1.04	ND	ug/kg	U
1,1,1-Trichloroethane	71-55-6	1	0.24	1.04	ND	ug/kg	U
1,1-Dichloropropene	563-58-6	1	0.32	1.04	ND	ug/kg	U
Carbon tetrachloride	56-23-5	1	0.22	1.04	ND	ug/kg	U
1,2-Dichloroethane	107-06-2	1	0.20	1.04	ND	ug/kg	U
Benzene	71-43-2	1	0.31	1.04	ND	ug/kg	U
Trichloroethene	79-01-6	1	0.22	1.04	ND	ug/kg	U
1,2-Dichloropropane	78-87-5	1	0.17	1.04	ND	ug/kg	U
Bromodichloromethane	75-27-4	1	0.26	1.04	ND	ug/kg	U
Dibromomethane	74-95-3	1	0.15	1.04	ND	ug/kg	U
2-Chloroethyl vinyl ether	110-75-8	1	0.29	5.21	ND	ug/kg	U
4-Methyl-2-Pentanone	108-10-1	1	0.44	5.21	ND	ug/kg	U
cis-1,3-Dichloropropene	10061-01-5	1	0.24	1.04	ND	ug/kg	U
Toluene	108-88-3	1	0.16	1.04	0.28	ug/kg	J
trans-1,3-Dichloropropene	10061-02-6	1	0.22	1.04	ND	ug/kg	U



Shannon & Wilson, Inc
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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 2
17F0434-02 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 10:25

Instrument: NT5

Analyzed: 06-Jul-2017 18:22

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	0.46	5.21	ND	ug/kg	U
1,1,2-Trichloroethane	79-00-5	1	0.30	1.04	ND	ug/kg	U
1,3-Dichloropropane	142-28-9	1	0.22	1.04	ND	ug/kg	U
Tetrachloroethene	127-18-4	1	0.27	1.04	ND	ug/kg	U
Dibromochloromethane	124-48-1	1	0.28	1.04	ND	ug/kg	U
1,2-Dibromoethane	106-93-4	1	0.18	1.04	ND	ug/kg	U
Chlorobenzene	108-90-7	1	0.23	1.04	ND	ug/kg	U
Ethylbenzene	100-41-4	1	0.21	1.04	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.24	1.04	ND	ug/kg	U
m,p-Xylene	179601-23-1	1	0.41	1.04	ND	ug/kg	U
o-Xylene	95-47-6	1	0.23	1.04	ND	ug/kg	U
Xylenes, total	1330-20-7	1	0.64	2.08	ND	ug/kg	U
Styrene	100-42-5	1	0.14	1.04	ND	ug/kg	U
Bromoform	75-25-2	1	0.31	1.04	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	79-34-5	1	0.26	1.04	ND	ug/kg	U
1,2,3-Trichloropropane	96-18-4	1	0.54	2.08	ND	ug/kg	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	0.46	5.21	ND	ug/kg	U
n-Propylbenzene	103-65-1	1	0.28	1.04	ND	ug/kg	U
Bromobenzene	108-86-1	1	0.16	1.04	ND	ug/kg	U
Isopropyl Benzene	98-82-8	1	0.24	1.04	ND	ug/kg	U
2-Chlorotoluene	95-49-8	1	0.31	1.04	ND	ug/kg	U
4-Chlorotoluene	106-43-4	1	0.29	1.04	ND	ug/kg	U
t-Butylbenzene	98-06-6	1	0.32	1.04	ND	ug/kg	U
1,3,5-Trimethylbenzene	108-67-8	1	0.26	1.04	ND	ug/kg	U
1,2,4-Trimethylbenzene	95-63-6	1	0.24	1.04	ND	ug/kg	U
s-Butylbenzene	135-98-8	1	0.25	1.04	ND	ug/kg	U
4-Isopropyl Toluene	99-87-6	1	0.25	1.04	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	0.24	1.04	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	0.24	1.04	ND	ug/kg	U
n-Butylbenzene	104-51-8	1	0.27	1.04	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	0.31	1.04	ND	ug/kg	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.61	5.21	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	0.35	5.21	ND	ug/kg	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.43	5.21	ND	ug/kg	U
Naphthalene	91-20-3	1	0.45	5.21	ND	ug/kg	U
1,2,3-Trichlorobenzene	87-61-6	1	0.32	5.21	ND	ug/kg	U
Dichlorodifluoromethane	75-71-8	1	0.22	1.04	ND	ug/kg	U
Methyl tert-butyl Ether	1634-04-4	1	0.24	1.04	ND	ug/kg	U
2-Pentanone	107-87-9	1	5.21	5.21	ND	ug/kg	U



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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 2
17F0434-02 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 10:25

Instrument: NT5

Analyzed: 06-Jul-2017 18:22

Analyte	CAS Number	Recovery Limits	Recovery	Units	Notes
Surrogate: 1,2-Dichloroethane-d4		80-149 %	117	%	
Surrogate: Toluene-d8		77-120 %	99.5	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	97.5	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	103	%	



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Reported:
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WC - 2
17F0434-02 (Solid)

Volatile Organic Compounds

Method: NWTPHg
Instrument: NT3

Sampled: 06/27/2017 10:25

Analyzed: 28-Jun-2017 18:23

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFF0798 Sample Size: 7.014 g (wet) Dry Weight: 5.32 g
Prepared: 28-Jun-2017 Final Volume: 5 mL % Solids: 75.83

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	6290	ND	ug/kg	U
Surrogate: Toluene-d8			80-120 %	98.7	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	95.2	%	



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Reported:
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WC - 2
17F0434-02 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 10:25

Instrument: NT10

Analyzed: 11-Jul-2017 13:36

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0828 Sample Size: 13.34 g (wet) Dry Weight: 10.12 g
Prepared: 29-Jun-2017 Final Volume: 1 mL % Solids: 75.83

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Phenol	108-95-2	1	8.1	19.8	10.9	ug/kg	J
bis(2-chloroethyl) ether	111-44-4	1	6.7	19.8	ND	ug/kg	U
2-Chlorophenol	95-57-8	1	6.4	19.8	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	5.0	19.8	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	4.3	19.8	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	4.6	19.8	ND	ug/kg	U
Benzyl Alcohol	100-51-6	1	14.7	19.8	ND	ug/kg	U
2,2'-Oxybis(1-chloropropane)	108-60-1	1	5.6	19.8	ND	ug/kg	U
2-Methylphenol	95-48-7	1	7.8	19.8	ND	ug/kg	U
Hexachloroethane	67-72-1	1	5.6	19.8	ND	ug/kg	U
N-Nitroso-di-n-Propylamine	621-64-7	1	10.7	19.8	ND	ug/kg	U
4-Methylphenol	106-44-5	1	14.5	19.8	ND	ug/kg	U
Nitrobenzene	98-95-3	1	7.9	19.8	ND	ug/kg	U
Isophorone	78-59-1	1	7.7	19.8	ND	ug/kg	U
2-Nitrophenol	88-75-5	1	6.8	19.8	ND	ug/kg	U
2,4-Dimethylphenol	105-67-9	1	26.5	98.9	ND	ug/kg	U
Bis(2-Chloroethoxy)methane	111-91-1	1	6.3	19.8	ND	ug/kg	U
2,4-Dichlorophenol	120-83-2	1	31.6	98.9	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	5.9	19.8	ND	ug/kg	U
Naphthalene	91-20-3	1	5.2	19.8	ND	ug/kg	U
Benzoic acid	65-85-0	1	58.4	198	ND	ug/kg	U
4-Chloroaniline	106-47-8	1	33.3	98.9	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	5.0	19.8	ND	ug/kg	U
4-Chloro-3-Methylphenol	59-50-7	1	28.6	98.9	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	5.6	19.8	ND	ug/kg	U
Hexachlorocyclopentadiene	77-47-4	1	40.8	98.9	ND	ug/kg	U
2,4,6-Trichlorophenol	88-06-2	1	25.1	98.9	ND	ug/kg	U
2,4,5-Trichlorophenol	95-95-4	1	26.6	98.9	ND	ug/kg	U
2-Chloronaphthalene	91-58-7	1	4.4	19.8	ND	ug/kg	U
2-Nitroaniline	88-74-4	1	29.9	98.9	ND	ug/kg	U
Acenaphthylene	208-96-8	1	4.7	19.8	ND	ug/kg	U
Dimethylphthalate	131-11-3	1	6.4	19.8	ND	ug/kg	U
2,6-Dinitrotoluene	606-20-2	1	26.4	98.9	ND	ug/kg	U
Acenaphthene	83-32-9	1	5.1	19.8	ND	ug/kg	U
3-Nitroaniline	99-09-2	1	37.3	98.9	ND	ug/kg	U
2,4-Dinitrophenol	51-28-5	1	40.8	198	ND	ug/kg	U



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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 2
17F0434-02 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 10:25

Instrument: NT10

Analyzed: 11-Jul-2017 13:36

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dibenzofuran	132-64-9	1	4.6	19.8	ND	ug/kg	U
4-Nitrophenol	100-02-7	1	43.9	98.9	ND	ug/kg	U
2,4-Dinitrotoluene	121-14-2	1	22.6	98.9	ND	ug/kg	U
Fluorene	86-73-7	1	4.9	19.8	ND	ug/kg	U
4-Chlorophenylphenyl ether	7005-72-3	1	6.9	19.8	ND	ug/kg	U
Diethyl phthalate	84-66-2	1	17.5	19.8	ND	ug/kg	U
4-Nitroaniline	100-01-6	1	34.5	98.9	ND	ug/kg	U
4,6-Dinitro-2-methylphenol	534-52-1	1	49.9	198	ND	ug/kg	U
N-Nitrosodiphenylamine	86-30-6	1	9.5	19.8	ND	ug/kg	U
4-Bromophenyl phenyl ether	101-55-3	1	6.0	19.8	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	4.7	19.8	ND	ug/kg	U
Pentachlorophenol	87-86-5	1	30.9	98.9	ND	ug/kg	U
Phenanthrene	85-01-8	1	4.6	19.8	10.6	ug/kg	J
Anthracene	120-12-7	1	5.9	19.8	ND	ug/kg	U
Carbazole	86-74-8	1	7.3	19.8	ND	ug/kg	U
Di-n-Butylphthalate	84-74-2	1	5.2	19.8	ND	ug/kg	U
Fluoranthene	206-44-0	1	4.5	19.8	20.2	ug/kg	
Pyrene	129-00-0	1	5.5	19.8	20.3	ug/kg	
Butylbenzylphthalate	85-68-7	1	8.0	19.8	ND	ug/kg	U
Benzo(a)anthracene	56-55-3	1	5.1	19.8	6.5	ug/kg	J
3,3'-Dichlorobenzidine	91-94-1	1	30.8	98.9	ND	ug/kg	U
Chrysene	218-01-9	1	5.2	19.8	12.3	ug/kg	J
bis(2-Ethylhexyl)phthalate	117-81-7	1	28.5	49.4	412	ug/kg	
Di-n-Octylphthalate	117-84-0	1	8.6	19.8	ND	ug/kg	U
Benzo(a)fluoranthene, Total		1	10.1	39.5	23.3	ug/kg	J
Benzo(a)pyrene	50-32-8	1	6.4	19.8	8.8	ug/kg	J
Indeno(1,2,3-cd)pyrene	193-39-5	1	5.9	19.8	10.3	ug/kg	J
Dibenzo(a,h)anthracene	53-70-3	1	6.1	19.8	ND	ug/kg	U
Benzo(g,h,i)perylene	191-24-2	1	5.8	19.8	12.8	ug/kg	J
1-Methylnaphthalene	90-12-0	1	5.9	19.8	ND	ug/kg	U
Surrogate: 2-Fluorophenol				27-120 %	63.0	%	
Surrogate: Phenol-d5				29-120 %	65.2	%	
Surrogate: 2-Chlorophenol-d4				31-120 %	77.6	%	
Surrogate: 1,2-Dichlorobenzene-d4				32-120 %	75.5	%	
Surrogate: Nitrobenzene-d5				30-120 %	69.8	%	
Surrogate: 2-Fluorobiphenyl				35-120 %	88.2	%	
Surrogate: 2,4,6-Tribromophenol				24-134 %	111	%	
Surrogate: p-Terphenyl-d14				37-120 %	89.9	%	



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Reported:
28-Jul-2017 15:26

WC - 2
17F0434-02 (Solid)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM

Sampled: 06/27/2017 10:25

Instrument: NT8

Analyzed: 11-Jul-2017 12:26

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0829 Prepared: 30-Jun-2017	Sample Size: 13.39 g (wet) Final Volume: 0.5 mL	Dry Weight: 10.15 g % Solids: 75.83
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0051 Cleaned: 11-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0050 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Naphthalene	91-20-3	1	1.26	4.92	5.73	ug/kg	
2-Methylnaphthalene	91-57-6	1	1.09	4.92	3.90	ug/kg	J
1-Methylnaphthalene	90-12-0	1	0.39	4.92	ND	ug/kg	U
Acenaphthylene	208-96-8	1	1.07	4.92	ND	ug/kg	U
Acenaphthene	83-32-9	1	0.56	4.92	ND	ug/kg	U
Dibenzofuran	132-64-9	1	1.36	4.92	ND	ug/kg	U
Fluorene	86-73-7	1	0.62	4.92	ND	ug/kg	U
Phenanthrene	85-01-8	1	0.71	4.92	9.18	ug/kg	
Anthracene	120-12-7	1	0.86	4.92	ND	ug/kg	U
Fluoranthene	206-44-0	1	0.46	4.92	13.8	ug/kg	
Pyrene	129-00-0	1	0.62	4.92	12.5	ug/kg	
Benzo(a)anthracene	56-55-3	1	0.81	4.92	4.37	ug/kg	J
Chrysene	218-01-9	1	1.04	4.92	6.45	ug/kg	
Benzo(b)fluoranthene	205-99-2	1	1.35	4.92	6.41	ug/kg	
Benzo(k)fluoranthene	207-08-9	1	0.75	4.92	3.44	ug/kg	J
Benzo(j)fluoranthene	205-82-3	1	0.67	4.92	3.20	ug/kg	J
Benzofluoranthenes, Total		1	2.96	9.85	13.5	ug/kg	
Benzo(a)pyrene	50-32-8	1	0.60	4.92	5.29	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	1.03	4.92	4.70	ug/kg	J
Dibenzo(a,h)anthracene	53-70-3	1	0.88	4.92	ND	ug/kg	U
Benzo(g,h,i)perylene	191-24-2	1	1.05	4.92	6.90	ug/kg	
Surrogate: 2-Methylnaphthalene-d10				32-120 %	40.0	%	
Surrogate: Dibenzo[a,h]anthracene-d14				21-133 %	60.5	%	
Surrogate: Fluoranthene-d10				36-134 %	54.6	%	



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Reported:
28-Jul-2017 15:26

WC - 2
17F0434-02 (Solid)

Butyl Tins

Method: EPA 8270D-SIM

Sampled: 06/27/2017 10:25

Instrument: NT12

Analyzed: 08-Jul-2017 08:36

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0827 Prepared: 30-Jun-2017	Sample Size: 7.09 g (wet) Final Volume: 0.5 mL	Dry Weight: 5.38 g % Solids: 75.83
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0024 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.418	3.59	ND	ug/kg	U
Dibutyltin Ion	14488-53-0	1	1.61	5.38	ND	ug/kg	U
Butyltin Ion	78763-54-9	1	1.76	3.79	ND	ug/kg	U
Tetrabutyltin	1461-25-2	1	4.65	4.65	ND	ug/kg	U
Surrogate: Triphenyltin					30-160 %	56.8 %	
Surrogate: Tripropyltin					30-160 %	55.7 %	



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Reported:
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WC - 2
17F0434-02 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 06/27/2017 10:25

Instrument: FID4

Analyzed: 11-Jul-2017 14:38

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0822 Sample Size: 10.06 g (wet) Dry Weight: 7.63 g
Prepared: 30-Jun-2017 Final Volume: 1 mL % Solids: 75.83

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.55	30.8	mg/kg	
Motor Oil Range Organics (C24-C38)		1	13.1	107	mg/kg	B
Surrogate: o-Terphenyl			50-150 %	95.2	%	



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Reported:
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WC - 2
17F0434-02 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 10:25

Instrument: ECD6

Analyzed: 11-Jul-2017 16:40

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0825 Prepared: 29-Jun-2017	Sample Size: 17.36 g (wet) Final Volume: 2.5 mL	Dry Weight: 13.16 g % Solids: 75.83
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0049 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0048 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0047 Cleaned: 07-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	1	0.08	0.47	ND	ug/kg	U
beta-BHC	319-85-7	1	0.09	0.47	ND	ug/kg	U
gamma-BHC (Lindane)	58-89-9	1	0.06	0.47	ND	ug/kg	U
delta-BHC	319-86-8	1	0.06	0.47	ND	ug/kg	U
Heptachlor	76-44-8	1	0.04	0.47	ND	ug/kg	U
Aldrin	309-00-2	1	0.35	0.47	ND	ug/kg	U
Heptachlor Epoxide	1024-57-3	1	0.16	0.47	ND	ug/kg	U
trans-Chlordane (beta-Chlordane)	5103-74-2	1	0.31	0.47	ND	ug/kg	U
cis-Chlordane (alpha-chlordane)	5103-71-9	1	0.11	0.47	ND	ug/kg	U
Endosulfan I	959-98-8	1	0.07	0.47	ND	ug/kg	U
4,4'-DDE	72-55-9	1	0.13	0.95	ND	ug/kg	U
Dieldrin	60-57-1	1	0.11	0.95	ND	ug/kg	U
Endrin	72-20-8	1	0.13	0.95	ND	ug/kg	U
Endosulfan II	33213-65-9	1	0.30	0.95	ND	ug/kg	U
4,4'-DDD	72-54-8	1	0.30	0.95	ND	ug/kg	U
Endrin Aldehyde	7421-93-4	1	0.37	0.95	ND	ug/kg	U
4,4'-DDT	50-29-3	1	0.31	0.95	ND	ug/kg	U
Endosulfan Sulfate	1031-07-8	1	0.12	0.95	ND	ug/kg	U
Endrin Ketone	53494-70-5	1	0.27	0.95	ND	ug/kg	U
Methoxychlor	72-43-5	1	0.28	4.75	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	0.32	0.47	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	0.14	0.47	ND	ug/kg	U
2,4'-DDE	3424-82-6	1	0.24	0.95	ND	ug/kg	U
2,4'-DDD	53-19-0	1	0.19	0.95	ND	ug/kg	U
2,4'-DDT	789-02-6	1	0.18	0.95	ND	ug/kg	U
Oxychlordane	27304-13-8	1	0.12	0.95	ND	ug/kg	U
cis-Nonachlor	5103-73-1	1	0.20	0.95	ND	ug/kg	U



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 2
17F0434-02 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 10:25

Instrument: ECD6

Analyzed: 11-Jul-2017 16:40

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
trans-Nonachlor	39765-80-5	1	0.22	0.95	ND	ug/kg	U
Mirex	2385-85-5	1	0.61	0.95	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				30-160 %	133	%	
Surrogate: Decachlorobiphenyl [2C]				30-160 %	92.9	%	
Surrogate: Tetrachlorometaxylene				30-160 %	99.6	%	
Surrogate: Tetrachlorometaxylene [2C]				30-160 %	73.1	%	



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Reported:
28-Jul-2017 15:26

WC - 2
17F0434-02 (Solid)

Aroclor PCB

Method: EPA 8082A

Sampled: 06/27/2017 10:25

Instrument: ECD7

Analyzed: 07-Jul-2017 17:43

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0826 Prepared: 05-Jul-2017	Sample Size: 7.23 g (wet) Final Volume: 5 mL	Dry Weight: 5.48 g % Solids: 75.83
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0027 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid Cleanup Batch: CFG0025 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0026 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aroclor 1016	12674-11-2	1	7.3	18.2	ND	ug/kg	U
Aroclor 1221	11104-28-2	1	7.3	18.2	ND	ug/kg	U
Aroclor 1232	11141-16-5	1	7.3	18.2	ND	ug/kg	U
Aroclor 1242	53469-21-9	1	7.3	18.2	ND	ug/kg	U
Aroclor 1248	12672-29-6	1	7.3	18.2	ND	ug/kg	U
Aroclor 1254	11097-69-1	1	7.3	18.2	ND	ug/kg	U
Aroclor 1260	11096-82-5	1	8.5	18.2	ND	ug/kg	U
Aroclor 1262	37324-23-5	1	8.5	18.2	ND	ug/kg	U
Aroclor 1268	11100-14-4	1	8.5	18.2	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				40-133 %	87.4	%	
Surrogate: Tetrachlorometaxylene				53-120 %	74.7	%	
Surrogate: Decachlorobiphenyl [2C]				40-133 %	81.5	%	
Surrogate: Tetrachlorometaxylene [2C]				53-120 %	65.4	%	



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Reported:
28-Jul-2017 15:26

WC - 2
17F0434-02 (Solid)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 06/27/2017 10:25

Instrument: ICP2

Analyzed: 07-Jul-2017 18:02

Sample Preparation: Preparation Method: SWC EPA 3050B
Preparation Batch: BFF0836 Sample Size: 1.01 g (wet) Dry Weight: 0.72 g
Prepared: 30-Jun-2017 Final Volume: 50 mL % Solids: 70.86

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Antimony	7440-36-0	2	0.316	6.99	0.815	mg/kg	J
Arsenic	7440-38-2	2	0.391	6.99	0.924	mg/kg	J
Beryllium	7440-41-7	2	0.0081	0.140	0.123	mg/kg	J
Cadmium	7440-43-9	2	0.0173	0.279	0.288	mg/kg	
Chromium	7440-47-3	2	0.0658	0.699	48.1	mg/kg	
Copper	7440-50-8	2	0.0345	0.279	12.2	mg/kg	
Lead	7439-92-1	2	0.182	2.79	4.88	mg/kg	
Nickel	7440-02-0	2	0.277	1.40	48.4	mg/kg	
Selenium	7782-49-2	2	1.14	6.99	ND	mg/kg	U
Silver	7440-22-4	2	0.0613	0.419	ND	mg/kg	U
Thallium	7440-28-0	2	0.637	6.99	ND	mg/kg	U
Zinc	7440-66-6	2	0.223	1.40	44.6	mg/kg	



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Reported:
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WC - 2
17F0434-02 (Solid)

Metals and Metallic Compounds

Method: EPA 7471B

Sampled: 06/27/2017 10:25

Instrument: CETAC

Analyzed: 30-Jun-2017 14:13

Sample Preparation:

Preparation Method: SMM EPA 7471B

Preparation Batch: BFF0838

Prepared: 30-Jun-2017

Sample Size: 0.236 g (wet)

Final Volume: 50 mL

Dry Weight: 0.17 g

% Solids: 70.86

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Mercury	7439-97-6	1	0.02990	ND	mg/kg	U



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Reported:
28-Jul-2017 15:26

WC - 2
17F0434-02 (Solid)

Wet Chemistry

Method: Plumb 1981, Combustion IR

Sampled: 06/27/2017 10:25

Instrument: APOLLO1

Analyzed: 17-Jul-2017 12:48

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.71 g

% Solids: 70.86

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.59	%	



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Reported:
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WC - 2
17F0434-02 (Solid)

Wet Chemistry

Method: PSEP 1986

Sampled: 06/27/2017 10:25

Instrument: N/A

Analyzed: 29-Jun-2017 11:44

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFF0832

Prepared: 29-Jun-2017

Sample Size: 5 g (wet)

Final Volume: 5 g

Dry Weight: 3.54 g

% Solids: 70.86

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids, Sulfide		1	0.040	69.0	%	



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Reported:
28-Jul-2017 15:26

WC - 2
17F0434-02 (Solid)

Wet Chemistry

Method: SM 2540 G-97

Sampled: 06/27/2017 10:25

Instrument: N/A

Analyzed: 05-Jul-2017 11:59

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.71 g

% Solids: 70.86

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	70.86	%	



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Reported:
28-Jul-2017 15:26

WC - 2
17F0434-02 (Solid)

Wet Chemistry

Method: SM 4500-NH3 H-97

Sampled: 06/27/2017 10:25

Instrument: LACHAT2

Analyzed: 01-Jul-2017 13:53

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.26 g (wet)

Final Volume: 40 mL

Dry Weight: 3.02 g

% Solids: 70.86

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.53	3.27	mg/kg NH3-N	



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Reported:
28-Jul-2017 15:26

WC - 2
17F0434-02 (Solid)

Wet Chemistry

Method: SM 4500-NO₃⁻ I-00

Sampled: 06/27/2017 10:25

Instrument: LACHAT2

Analyzed: 01-Jul-2017 17:08

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.26 g (wet)

Final Volume: 40 mL

Dry Weight: 3.02 g

% Solids: 70.86

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.13	ND	mg-N/kg	U



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Reported:
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WC - 2
17F0434-02 (Solid)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 06/27/2017 10:25

Instrument: UV1800-2

Analyzed: 14-Jul-2017 15:15

Sample Preparation:

Preparation Method: SM 4500-P B-4 Strong Acid

Preparation Batch: BFG0152

Prepared: 13-Jul-2017

Sample Size: 0.3385 g (wet)

Final Volume: 50 mL

Dry Weight: 0.24 g

% Solids: 70.86

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	20	33.3	413	mg-P/kg	D



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Reported:
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WC - 2
17F0434-02 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00

Sampled: 06/27/2017 10:25

Instrument: UV1800-2

Analyzed: 30-Jun-2017 11:27

Sample Preparation:

Preparation Method: PSEP 1986

Preparation Batch: BFF0843

Prepared: 29-Jun-2017

Sample Size: 5.082 g (wet)

Final Volume: 100 mL

Dry Weight: 3.51 g

% Solids: 69.00

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	5	7.13	135	mg/kg	D



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Reported:
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WC - 3 - 2 ft
17F0434-03 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 14:00

Instrument: NT5

Analyzed: 06-Jul-2017 18:45

Sample Preparation: Preparation Method: EPA 5035 (Sodium Bisulfate)
Preparation Batch: BFG0079 Sample Size: 4.38 g (wet) Dry Weight: 1.14 g
Prepared: 06-Jul-2017 Final Volume: 5 mL % Solids: 26.07

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	1.15	4.38	ND	ug/kg	U
Vinyl Chloride	75-01-4	1	1.03	4.38	ND	ug/kg	U
Bromomethane	74-83-9	1	0.82	4.38	ND	ug/kg	U
Chloroethane	75-00-3	1	2.02	4.38	ND	ug/kg	U
Trichlorofluoromethane	75-69-4	1	1.16	4.38	ND	ug/kg	U
Acrolein	107-02-8	1	16.7	21.9	ND	ug/kg	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	1.26	8.76	ND	ug/kg	U
Acetone	67-64-1	1	2.11	21.9	ND	ug/kg	U
1,1-Dichloroethene	75-35-4	1	1.47	4.38	ND	ug/kg	U
Bromoethane	74-96-4	1	1.93	8.76	ND	ug/kg	U
Iodomethane	74-88-4	1	0.94	4.38	ND	ug/kg	U
Methylene Chloride	75-09-2	1	2.78	8.76	12.7	ug/kg	B
Acrylonitrile	107-13-1	1	4.51	21.9	ND	ug/kg	U
Carbon Disulfide	75-15-0	1	2.45	4.38	22.8	ug/kg	
trans-1,2-Dichloroethene	156-60-5	1	1.16	4.38	ND	ug/kg	U
Vinyl Acetate	108-05-4	1	1.67	21.9	ND	ug/kg	U
1,1-Dichloroethane	75-34-3	1	0.89	4.38	ND	ug/kg	U
2-Butanone	78-93-3	1	2.25	21.9	21.0	ug/kg	J
2,2-Dichloropropane	594-20-7	1	1.28	4.38	ND	ug/kg	U
cis-1,2-Dichloroethene	156-59-2	1	1.05	4.38	ND	ug/kg	U
Chloroform	67-66-3	1	1.02	4.38	ND	ug/kg	U
Bromochloromethane	74-97-5	1	1.41	4.38	ND	ug/kg	U
1,1,1-Trichloroethane	71-55-6	1	0.99	4.38	ND	ug/kg	U
1,1-Dichloropropene	563-58-6	1	1.37	4.38	ND	ug/kg	U
Carbon tetrachloride	56-23-5	1	0.93	4.38	ND	ug/kg	U
1,2-Dichloroethane	107-06-2	1	0.84	4.38	ND	ug/kg	U
Benzene	71-43-2	1	1.30	4.38	ND	ug/kg	U
Trichloroethene	79-01-6	1	0.93	4.38	ND	ug/kg	U
1,2-Dichloropropane	78-87-5	1	0.71	4.38	ND	ug/kg	U
Bromodichloromethane	75-27-4	1	1.11	4.38	ND	ug/kg	U
Dibromomethane	74-95-3	1	0.64	4.38	ND	ug/kg	U
2-Chloroethyl vinyl ether	110-75-8	1	1.21	21.9	ND	ug/kg	U
4-Methyl-2-Pentanone	108-10-1	1	1.84	21.9	ND	ug/kg	U
cis-1,3-Dichloropropene	10061-01-5	1	0.99	4.38	ND	ug/kg	U
Toluene	108-88-3	1	0.66	4.38	2.22	ug/kg	J
trans-1,3-Dichloropropene	10061-02-6	1	0.95	4.38	ND	ug/kg	U



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Reported:
28-Jul-2017 15:26

WC - 3 - 2 ft
17F0434-03 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 14:00

Instrument: NT5

Analyzed: 06-Jul-2017 18:45

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	1.92	21.9	ND	ug/kg	U
1,1,2-Trichloroethane	79-00-5	1	1.25	4.38	ND	ug/kg	U
1,3-Dichloropropane	142-28-9	1	0.92	4.38	ND	ug/kg	U
Tetrachloroethene	127-18-4	1	1.13	4.38	ND	ug/kg	U
Dibromochloromethane	124-48-1	1	1.16	4.38	ND	ug/kg	U
1,2-Dibromoethane	106-93-4	1	0.77	4.38	ND	ug/kg	U
Chlorobenzene	108-90-7	1	0.96	4.38	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	630-20-6	1	1.02	4.38	ND	ug/kg	U
m,p-Xylene	179601-23-1	1	1.72	4.38	ND	ug/kg	U
o-Xylene	95-47-6	1	0.98	4.38	ND	ug/kg	U
Xylenes, total	1330-20-7	1	2.70	8.76	ND	ug/kg	U
Styrene	100-42-5	1	0.60	4.38	ND	ug/kg	U
Bromoform	75-25-2	1	1.30	4.38	ND	ug/kg	U
1,1,2,2-Tetrachloroethane	79-34-5	1	1.11	4.38	ND	ug/kg	U
1,2,3-Trichloropropane	96-18-4	1	2.26	8.76	ND	ug/kg	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	1.91	21.9	ND	ug/kg	U
n-Propylbenzene	103-65-1	1	1.19	4.38	ND	ug/kg	U
Bromobenzene	108-86-1	1	0.67	4.38	ND	ug/kg	U
Isopropyl Benzene	98-82-8	1	1.02	4.38	ND	ug/kg	U
2-Chlorotoluene	95-49-8	1	1.31	4.38	ND	ug/kg	U
4-Chlorotoluene	106-43-4	1	1.21	4.38	ND	ug/kg	U
t-Butylbenzene	98-06-6	1	1.34	4.38	ND	ug/kg	U
1,3,5-Trimethylbenzene	108-67-8	1	1.11	4.38	ND	ug/kg	U
1,2,4-Trimethylbenzene	95-63-6	1	1.01	4.38	ND	ug/kg	U
s-Butylbenzene	135-98-8	1	1.05	4.38	ND	ug/kg	U
4-Isopropyl Toluene	99-87-6	1	1.03	4.38	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	0.99	4.38	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	1.02	4.38	ND	ug/kg	U
n-Butylbenzene	104-51-8	1	1.15	4.38	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	1.28	4.38	ND	ug/kg	U
1,2-Dibromo-3-chloropropane	96-12-8	1	2.57	21.9	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	1.45	21.9	ND	ug/kg	U
Hexachloro-1,3-Butadiene	87-68-3	1	1.80	21.9	ND	ug/kg	U
Naphthalene	91-20-3	1	1.88	21.9	ND	ug/kg	U
1,2,3-Trichlorobenzene	87-61-6	1	1.34	21.9	ND	ug/kg	U
Dichlorodifluoromethane	75-71-8	1	0.91	4.38	ND	ug/kg	U
Methyl tert-butyl Ether	1634-04-4	1	1.01	4.38	ND	ug/kg	U
2-Pentanone	107-87-9	1	21.9	21.9	ND	ug/kg	U

Surrogate: 1,2-Dichloroethane-d4

80-149 %

111 %



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Reported:
28-Jul-2017 15:26

WC - 3 - 2 ft
17F0434-03 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 14:00

Instrument: NT5

Analyzed: 06-Jul-2017 18:45

Analyte	CAS Number	Recovery Limits	Recovery	Units	Notes
Surrogate: Toluene-d8		77-120 %	100	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	94.3	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	101	%	



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WC - 3 - 2 ft
17F0434-03 (Solid)

Volatile Organic Compounds

Method: NWTPHg
Instrument: NT3

Sampled: 06/27/2017 14:00

Analyzed: 28-Jun-2017 18:49

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFF0798 Sample Size: 3.621 g (wet) Dry Weight: 0.94 g
Prepared: 28-Jun-2017 Final Volume: 5 mL % Solids: 26.07

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	40700	ND	ug/kg	U
Surrogate: Toluene-d8			80-120 %	97.6	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	88.7	%	



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Reported:
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WC - 3 - 2 ft
17F0434-03 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 14:00

Instrument: NT10

Analyzed: 11-Jul-2017 14:12

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0828 Sample Size: 39.19 g (wet) Dry Weight: 10.22 g
Prepared: 29-Jun-2017 Final Volume: 1 mL % Solids: 26.07

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Phenol	108-95-2	3	24.2	58.7	ND	ug/kg	U
bis(2-chloroethyl) ether	111-44-4	3	19.9	58.7	ND	ug/kg	U
2-Chlorophenol	95-57-8	3	19.0	58.7	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	3	14.9	58.7	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	3	12.9	58.7	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	3	13.7	58.7	ND	ug/kg	U
Benzyl Alcohol	100-51-6	3	43.8	58.7	ND	ug/kg	U
2,2'-Oxybis(1-chloropropane)	108-60-1	3	16.6	58.7	ND	ug/kg	U
2-Methylphenol	95-48-7	3	23.0	58.7	ND	ug/kg	U
Hexachloroethane	67-72-1	3	16.6	58.7	ND	ug/kg	U
N-Nitroso-di-n-Propylamine	621-64-7	3	31.7	58.7	ND	ug/kg	U
4-Methylphenol	106-44-5	3	43.2	58.7	68.4	ug/kg	D
Nitrobenzene	98-95-3	3	23.3	58.7	ND	ug/kg	U
Isophorone	78-59-1	3	22.8	58.7	ND	ug/kg	U
2-Nitrophenol	88-75-5	3	20.3	58.7	ND	ug/kg	U
2,4-Dimethylphenol	105-67-9	3	78.7	294	ND	ug/kg	U
Bis(2-Chloroethoxy)methane	111-91-1	3	18.6	58.7	ND	ug/kg	U
2,4-Dichlorophenol	120-83-2	3	94.0	294	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	3	17.5	58.7	ND	ug/kg	U
Naphthalene	91-20-3	3	15.4	58.7	111	ug/kg	D
Benzoic acid	65-85-0	3	174	587	496	ug/kg	J, D
4-Chloroaniline	106-47-8	3	99.0	294	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	3	14.7	58.7	ND	ug/kg	U
4-Chloro-3-Methylphenol	59-50-7	3	84.9	294	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	3	16.6	58.7	50.2	ug/kg	J, D
Hexachlorocyclopentadiene	77-47-4	3	121	294	ND	ug/kg	U
2,4,6-Trichlorophenol	88-06-2	3	74.6	294	ND	ug/kg	U
2,4,5-Trichlorophenol	95-95-4	3	79.0	294	ND	ug/kg	U
2-Chloronaphthalene	91-58-7	3	13.0	58.7	ND	ug/kg	U
2-Nitroaniline	88-74-4	3	88.7	294	ND	ug/kg	U
Acenaphthylene	208-96-8	3	14.0	58.7	107	ug/kg	D
Dimethylphthalate	131-11-3	3	18.9	58.7	56.7	ug/kg	J, D
2,6-Dinitrotoluene	606-20-2	3	78.4	294	ND	ug/kg	U
Acenaphthene	83-32-9	3	15.1	58.7	2570	ug/kg	D
3-Nitroaniline	99-09-2	3	111	294	ND	ug/kg	U
2,4-Dinitrophenol	51-28-5	3	121	587	ND	ug/kg	U



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 3 - 2 ft
17F0434-03 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 14:00

Instrument: NT10

Analyzed: 11-Jul-2017 14:12

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dibenzofuran	132-64-9	3	13.5	58.7	415	ug/kg	D
4-Nitrophenol	100-02-7	3	130	294	ND	ug/kg	U
2,4-Dinitrotoluene	121-14-2	3	67.2	294	ND	ug/kg	U
Fluorene	86-73-7	3	14.5	58.7	2210	ug/kg	D
4-Chlorophenylphenyl ether	7005-72-3	3	20.4	58.7	ND	ug/kg	U
Diethyl phthalate	84-66-2	3	52.0	58.7	ND	ug/kg	U
4-Nitroaniline	100-01-6	3	102	294	ND	ug/kg	U
4,6-Dinitro-2-methylphenol	534-52-1	3	148	587	ND	ug/kg	U
N-Nitrosodiphenylamine	86-30-6	3	28.1	58.7	ND	ug/kg	U
4-Bromophenyl phenyl ether	101-55-3	3	17.8	58.7	ND	ug/kg	U
Hexachlorobenzene	118-74-1	3	13.9	58.7	ND	ug/kg	U
Pentachlorophenol	87-86-5	3	91.9	294	ND	ug/kg	U
Phenanthrene	85-01-8	3	13.8	58.7	7460	ug/kg	D, E
Anthracene	120-12-7	3	17.4	58.7	1180	ug/kg	D
Carbazole	86-74-8	3	21.6	58.7	995	ug/kg	D
Di-n-Butylphthalate	84-74-2	3	15.6	58.7	703	ug/kg	D
Fluoranthene	206-44-0	3	13.3	58.7	19700	ug/kg	D, E
Pyrene	129-00-0	3	16.3	58.7	14300	ug/kg	D, E
Butylbenzylphthalate	85-68-7	3	23.6	58.7	ND	ug/kg	U
Benzo(a)anthracene	56-55-3	3	15.2	58.7	6320	ug/kg	D, E
3,3'-Dichlorobenzidine	91-94-1	3	91.6	294	ND	ug/kg	U
Chrysene	218-01-9	3	15.3	58.7	13200	ug/kg	D, E
bis(2-Ethylhexyl)phthalate	117-81-7	3	84.6	147	7080	ug/kg	D, E
Di-n-Octylphthalate	117-84-0	3	25.6	58.7	512	ug/kg	D
Benzo(a)fluoranthene, Total		3	30.0	117	21500	ug/kg	D, E
Benzo(a)pyrene	50-32-8	3	19.0	58.7	8740	ug/kg	D, E
Indeno(1,2,3-cd)pyrene	193-39-5	3	17.6	58.7	5940	ug/kg	D, E
Dibenzo(a,h)anthracene	53-70-3	3	18.1	58.7	2500	ug/kg	D
Benzo(g,h,i)perylene	191-24-2	3	17.1	58.7	6120	ug/kg	D, E
1-Methylnaphthalene	90-12-0	3	17.5	58.7	185	ug/kg	D
Surrogate: 2-Fluorophenol				27-120 %	64.9	%	
Surrogate: Phenol-d5				29-120 %	70.7	%	
Surrogate: 2-Chlorophenol-d4				31-120 %	79.8	%	
Surrogate: 1,2-Dichlorobenzene-d4				32-120 %	67.6	%	
Surrogate: Nitrobenzene-d5				30-120 %	75.7	%	
Surrogate: 2-Fluorobiphenyl				35-120 %	86.9	%	
Surrogate: 2,4,6-Tribromophenol				24-134 %	95.7	%	
Surrogate: p-Terphenyl-d14				37-120 %	92.9	%	



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Reported:
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WC - 3 - 2 ft
17F0434-03 (Solid)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM

Sampled: 06/27/2017 14:00

Instrument: NT8

Analyzed: 11-Jul-2017 12:52

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0829 Prepared: 30-Jun-2017	Sample Size: 39.08 g (wet) Final Volume: 0.5 mL	Dry Weight: 10.19 g % Solids: 26.07
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0051 Cleaned: 11-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0050 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Naphthalene	91-20-3	3	3.75	14.7	87.7	ug/kg	D
2-Methylnaphthalene	91-57-6	3	3.25	14.7	44.8	ug/kg	D
1-Methylnaphthalene	90-12-0	3	1.18	14.7	178	ug/kg	D
Acenaphthylene	208-96-8	3	3.19	14.7	49.2	ug/kg	D
Acenaphthene	83-32-9	3	1.68	14.7	1480	ug/kg	D, E
Dibenzofuran	132-64-9	3	4.06	14.7	321	ug/kg	D
Fluorene	86-73-7	3	1.86	14.7	1250	ug/kg	D
Phenanthrene	85-01-8	3	2.11	14.7	3180	ug/kg	D, E
Anthracene	120-12-7	3	2.56	14.7	769	ug/kg	D
Fluoranthene	206-44-0	3	1.38	14.7	7340	ug/kg	D, E
Pyrene	129-00-0	3	1.84	14.7	4780	ug/kg	D, E
Benzo(a)anthracene	56-55-3	3	2.43	14.7	3080	ug/kg	D, E
Chrysene	218-01-9	3	3.10	14.7	4770	ug/kg	D, E
Benzo(b)fluoranthene	205-99-2	3	4.04	14.7	5750	ug/kg	D, E
Benzo(k)fluoranthene	207-08-9	3	2.24	14.7	2040	ug/kg	D, E
Benzo(j)fluoranthene	205-82-3	3	2.00	14.7	2320	ug/kg	D, E
Benzofluoranthenes, Total		3	8.86	29.4	9640	ug/kg	D, E
Benzo(a)pyrene	50-32-8	3	1.81	14.7	3960	ug/kg	D, E
Indeno(1,2,3-cd)pyrene	193-39-5	3	3.09	14.7	3600	ug/kg	D, E
Dibenzo(a,h)anthracene	53-70-3	3	2.62	14.7	997	ug/kg	D
Benzo(g,h,i)perylene	191-24-2	3	3.14	14.7	3920	ug/kg	D, E
Surrogate: 2-Methylnaphthalene-d10				32-120 %	61.3	%	
Surrogate: Dibenzo[a,h]anthracene-d14				21-133 %	165	%	*
Surrogate: Fluoranthene-d10				36-134 %	71.6	%	



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WC - 3 - 2 ft
17F0434-03 (Solid)

Butyl Tins

Method: EPA 8270D-SIM

Sampled: 06/27/2017 14:00

Instrument: NT12

Analyzed: 08-Jul-2017 08:56

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		
	Preparation Batch: BFF0827	Sample Size: 19.33 g (wet)	Dry Weight: 5.04 g
	Prepared: 30-Jun-2017	Final Volume: 0.5 mL	% Solids: 26.07
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CFG0024	Initial Volume: 0.5 mL	
	Cleaned: 07-Jul-2017	Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.446	3.83	142	ug/kg	
Dibutyltin Ion	14488-53-0	1	1.72	5.73	39.7	ug/kg	
Butyltin Ion	78763-54-9	1	1.88	4.05	12.3	ug/kg	
Tetrabutyltin	1461-25-2	1	4.96	4.96	ND	ug/kg	U
Surrogate: Triphenyltin				30-160 %	41.6	%	
Surrogate: Tripropyltin				30-160 %	41.7	%	



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WC - 3 - 2 ft
17F0434-03 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 06/27/2017 14:00

Instrument: FID4

Analyzed: 11-Jul-2017 14:59

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0822 Sample Size: 10.17 g (wet) Dry Weight: 2.65 g
Prepared: 30-Jun-2017 Final Volume: 1 mL % Solids: 26.07

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	18.9	1590	mg/kg	E
Motor Oil Range Organics (C24-C38)		1	37.7	4220	mg/kg	B, E
Surrogate: o-Terphenyl			50-150 %	90.1	%	



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Reported:
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WC - 3 - 2 ft
17F0434-03 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 14:00

Instrument: ECD6

Analyzed: 11-Jul-2017 16:58

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0825 Prepared: 29-Jun-2017	Sample Size: 48.03 g (wet) Final Volume: 2.5 mL	Dry Weight: 12.52 g % Solids: 26.07
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0049 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0048 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0047 Cleaned: 07-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	5	0.42	2.50	ND	ug/kg	U
beta-BHC	319-85-7	5	0.46	2.50	ND	ug/kg	U
gamma-BHC (Lindane)	58-89-9	5	0.34	2.50	ND	ug/kg	U
delta-BHC	319-86-8	5	0.33	2.50	ND	ug/kg	U
Heptachlor	76-44-8	5	0.23	2.50	ND	ug/kg	U
Aldrin	309-00-2	5	1.84	2.50	ND	ug/kg	U
Heptachlor Epoxide	1024-57-3	5	0.85	2.50	ND	ug/kg	U
trans-Chlordane (beta-Chlordane)	5103-74-2	5	1.63	2.50	ND	ug/kg	U
cis-Chlordane (alpha-chlordane)	5103-71-9	5	15.0	15.0	ND	ug/kg	Y1, U
Endosulfan I	959-98-8	5	25.0	25.0	ND	ug/kg	Y1, U
4,4'-DDE	72-55-9	5	0.67	4.99	ND	ug/kg	U
Dieldrin	60-57-1	5	0.57	4.99	ND	ug/kg	U
Endrin	72-20-8	5	0.71	4.99	ND	ug/kg	U
Endosulfan II	33213-65-9	5	1.56	4.99	ND	ug/kg	U
4,4'-DDD	72-54-8	5	1.60	4.99	ND	ug/kg	U
Endrin Aldehyde	7421-93-4	5	1.95	4.99	ND	ug/kg	U
4,4'-DDT	50-29-3	5	1.62	4.99	ND	ug/kg	U
Endosulfan Sulfate	1031-07-8	5	0.61	4.99	ND	ug/kg	U
Endrin Ketone	53494-70-5	5	1.41	4.99	ND	ug/kg	U
Methoxychlor	72-43-5	5	1.49	25.0	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	5	1.71	2.50	ND	ug/kg	U
Hexachlorobenzene	118-74-1	5	0.72	2.50	ND	ug/kg	U
2,4'-DDE	3424-82-6	5	1.24	4.99	ND	ug/kg	U
2,4'-DDD	53-19-0	5	0.97	4.99	ND	ug/kg	U
2,4'-DDT	789-02-6	5	0.93	4.99	ND	ug/kg	U
Oxychlordane	27304-13-8	5	0.64	4.99	ND	ug/kg	U
cis-Nonachlor	5103-73-1	5	1.05	4.99	ND	ug/kg	U



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WC - 3 - 2 ft
17F0434-03 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 14:00

Instrument: ECD6

Analyzed: 11-Jul-2017 16:58

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
trans-Nonachlor	39765-80-5	5	1.14	4.99	ND	ug/kg	U
Mirex	2385-85-5	5	3.21	4.99	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				30-160 %		NRS	NRS
Surrogate: Decachlorobiphenyl [2C]				30-160 %		NRS	NRS
Surrogate: Tetrachlorometaxylene				30-160 %	127	%	
Surrogate: Tetrachlorometaxylene [2C]				30-160 %	92.0	%	



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WC - 3 - 2 ft
17F0434-03 (Solid)

Aroclor PCB

Method: EPA 8082A

Sampled: 06/27/2017 14:00

Instrument: ECD7

Analyzed: 07-Jul-2017 18:05

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0826 Prepared: 05-Jul-2017	Sample Size: 19.36 g (wet) Final Volume: 5 mL	Dry Weight: 5.05 g % Solids: 26.07
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0027 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid Cleanup Batch: CFG0025 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0026 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aroclor 1016	12674-11-2	1	7.9	19.8	ND	ug/kg	U
Aroclor 1221	11104-28-2	1	7.9	19.8	ND	ug/kg	U
Aroclor 1232	11141-16-5	1	7.9	19.8	ND	ug/kg	U
Aroclor 1242	53469-21-9	1	7.9	19.8	ND	ug/kg	U
Aroclor 1248	12672-29-6	1	7.9	19.8	ND	ug/kg	U
Aroclor 1254	11097-69-1	1	7.9	19.8	ND	ug/kg	U
Aroclor 1260	11096-82-5	1	9.2	19.8	30.5	ug/kg	P1
Aroclor 1262	37324-23-5	1	9.2	19.8	ND	ug/kg	U
Aroclor 1268	11100-14-4	1	9.2	19.8	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				40-133 %	80.4	%	
Surrogate: Tetrachlorometaxylene				53-120 %	64.7	%	
Surrogate: Decachlorobiphenyl [2C]				40-133 %	73.6	%	
Surrogate: Tetrachlorometaxylene [2C]				53-120 %	66.7	%	



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WC - 3 - 2 ft
17F0434-03 (Solid)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 06/27/2017 14:00

Instrument: ICP2

Analyzed: 07-Jul-2017 18:06

Sample Preparation:

Preparation Method: SWC EPA 3050B

Preparation Batch: BFF0836

Prepared: 30-Jun-2017

Sample Size: 1.077 g (wet)

Final Volume: 50 mL

Dry Weight: 0.54 g

% Solids: 50.58

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Antimony	7440-36-0	2	0.415	9.18	1.86	mg/kg	J
Arsenic	7440-38-2	2	0.514	9.18	2.13	mg/kg	J
Beryllium	7440-41-7	2	0.0106	0.184	0.238	mg/kg	
Cadmium	7440-43-9	2	0.0227	0.367	1.05	mg/kg	
Chromium	7440-47-3	2	0.0864	0.918	71.1	mg/kg	
Copper	7440-50-8	2	0.0453	0.367	31.8	mg/kg	
Lead	7439-92-1	2	0.239	3.67	7.94	mg/kg	
Nickel	7440-02-0	2	0.365	1.84	52.7	mg/kg	
Selenium	7782-49-2	2	1.50	9.18	ND	mg/kg	U
Silver	7440-22-4	2	0.0805	0.551	ND	mg/kg	U
Thallium	7440-28-0	2	0.837	9.18	ND	mg/kg	U
Zinc	7440-66-6	2	0.293	1.84	77.8	mg/kg	



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WC - 3 - 2 ft
17F0434-03 (Solid)

Metals and Metallic Compounds

Method: EPA 7471B

Sampled: 06/27/2017 14:00

Instrument: CETAC

Analyzed: 30-Jun-2017 14:15

Sample Preparation:

Preparation Method: SMM EPA 7471B

Preparation Batch: BFF0838

Prepared: 30-Jun-2017

Sample Size: 0.287 g (wet)

Final Volume: 50 mL

Dry Weight: 0.15 g

% Solids: 50.58

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Mercury	7439-97-6	1	0.03445	0.03789	mg/kg	



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Reported:
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WC - 3 - 2 ft
17F0434-03 (Solid)

Wet Chemistry

Method: PSEP 1986

Sampled: 06/27/2017 14:00

Instrument: N/A

Analyzed: 29-Jun-2017 11:44

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFF0832

Prepared: 29-Jun-2017

Sample Size: 5 g (wet)

Final Volume: 5 g

Dry Weight: 2.53 g

% Solids: 50.58

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids, Sulfide		1	0.040	52.4	%	



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Reported:
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WC - 3 - 2 ft
17F0434-03 (Solid)

Wet Chemistry

Method: SM 2540 G-97

Sampled: 06/27/2017 14:00

Instrument: N/A

Analyzed: 05-Jul-2017 11:59

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.51 g

% Solids: 50.58

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	50.58	%	



Shannon & Wilson, Inc
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Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 3 - 2 ft
17F0434-03 (Solid)

Wet Chemistry

Method: SM 4500-NO₃⁻ I-00

Sampled: 06/27/2017 14:00

Instrument: LACHAT2

Analyzed: 01-Jul-2017 17:10

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.35 g (wet)

Final Volume: 40 mL

Dry Weight: 2.20 g

% Solids: 50.58

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.18	ND	mg-N/kg	U



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Reported:
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WC - 3 - 2 ft
17F0434-03 (Solid)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 06/27/2017 14:00

Instrument: UV1800-2

Analyzed: 14-Jul-2017 15:15

Sample Preparation:

Preparation Method: SM 4500-P B-4 Strong Acid

Preparation Batch: BFG0152

Prepared: 13-Jul-2017

Sample Size: 0.3183 g (wet)

Final Volume: 50 mL

Dry Weight: 0.16 g

% Solids: 50.58

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	20	49.7	1120	mg-P/kg	D



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Reported:
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WC - 3 - 2 ft
17F0434-03RE1 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 14:00

Instrument: NT10

Analyzed: 13-Jul-2017 15:43

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0828 Sample Size: 39.19 g (wet) Dry Weight: 10.22 g
Prepared: 29-Jun-2017 Final Volume: 1 mL % Solids: 26.07

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Phenol	108-95-2	15	121	294	ND	ug/kg	U
bis(2-chloroethyl) ether	111-44-4	15	99.5	294	ND	ug/kg	U
2-Chlorophenol	95-57-8	15	95.0	294	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	15	74.4	294	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	15	64.5	294	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	15	68.4	294	ND	ug/kg	U
Benzyl Alcohol	100-51-6	15	219	294	ND	ug/kg	U
2,2'-Oxybis(1-chloropropane)	108-60-1	15	83.2	294	ND	ug/kg	U
2-Methylphenol	95-48-7	15	115	294	ND	ug/kg	U
Hexachloroethane	67-72-1	15	83.0	294	ND	ug/kg	U
N-Nitroso-di-n-Propylamine	621-64-7	15	159	294	ND	ug/kg	U
4-Methylphenol	106-44-5	15	216	294	ND	ug/kg	U
Nitrobenzene	98-95-3	15	117	294	ND	ug/kg	U
Isophorone	78-59-1	15	114	294	ND	ug/kg	U
2-Nitrophenol	88-75-5	15	102	294	ND	ug/kg	U
2,4-Dimethylphenol	105-67-9	15	393	1470	ND	ug/kg	U
Bis(2-Chloroethoxy)methane	111-91-1	15	93.1	294	ND	ug/kg	U
2,4-Dichlorophenol	120-83-2	15	470	1470	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	15	87.5	294	ND	ug/kg	U
Naphthalene	91-20-3	15	77.1	294	143	ug/kg	J, D
Benzoic acid	65-85-0	15	868	2940	ND	ug/kg	U
4-Chloroaniline	106-47-8	15	495	1470	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	15	73.6	294	ND	ug/kg	U
4-Chloro-3-Methylphenol	59-50-7	15	424	1470	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	15	83.2	294	ND	ug/kg	U
Hexachlorocyclopentadiene	77-47-4	15	606	1470	ND	ug/kg	U
2,4,6-Trichlorophenol	88-06-2	15	373	1470	ND	ug/kg	U
2,4,5-Trichlorophenol	95-95-4	15	395	1470	ND	ug/kg	U
2-Chloronaphthalene	91-58-7	15	65.2	294	ND	ug/kg	U
2-Nitroaniline	88-74-4	15	443	1470	ND	ug/kg	U
Acenaphthylene	208-96-8	15	70.0	294	ND	ug/kg	U
Dimethylphthalate	131-11-3	15	94.5	294	ND	ug/kg	U
2,6-Dinitrotoluene	606-20-2	15	392	1470	ND	ug/kg	U
Acenaphthene	83-32-9	15	75.3	294	2370	ug/kg	D
3-Nitroaniline	99-09-2	15	553	1470	ND	ug/kg	U
2,4-Dinitrophenol	51-28-5	15	606	2940	ND	ug/kg	U



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Reported:
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WC - 3 - 2 ft
17F0434-03RE1 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 14:00

Instrument: NT10

Analyzed: 13-Jul-2017 15:43

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dibenzofuran	132-64-9	15	67.7	294	424	ug/kg	D
4-Nitrophenol	100-02-7	15	652	1470	ND	ug/kg	U
2,4-Dinitrotoluene	121-14-2	15	336	1470	ND	ug/kg	U
Fluorene	86-73-7	15	72.7	294	1920	ug/kg	D
4-Chlorophenylphenyl ether	7005-72-3	15	102	294	ND	ug/kg	U
Diethyl phthalate	84-66-2	15	260	294	ND	ug/kg	U
4-Nitroaniline	100-01-6	15	512	1470	ND	ug/kg	U
4,6-Dinitro-2-methylphenol	534-52-1	15	741	2940	ND	ug/kg	U
N-Nitrosodiphenylamine	86-30-6	15	141	294	ND	ug/kg	U
4-Bromophenyl phenyl ether	101-55-3	15	89.1	294	ND	ug/kg	U
Hexachlorobenzene	118-74-1	15	69.6	294	ND	ug/kg	U
Pentachlorophenol	87-86-5	15	460	1470	ND	ug/kg	U
Phenanthrene	85-01-8	15	68.9	294	6850	ug/kg	D
Anthracene	120-12-7	15	87.1	294	1150	ug/kg	D
Carbazole	86-74-8	15	108	294	938	ug/kg	D
Di-n-Butylphthalate	84-74-2	15	78.0	294	691	ug/kg	D
Fluoranthene	206-44-0	15	66.4	294	19300	ug/kg	D
Pyrene	129-00-0	15	81.5	294	13900	ug/kg	D
Butylbenzylphthalate	85-68-7	15	118	294	ND	ug/kg	U
Benzo(a)anthracene	56-55-3	15	76.1	294	6040	ug/kg	D
3,3'-Dichlorobenzidine	91-94-1	15	458	1470	ND	ug/kg	U
Chrysene	218-01-9	15	76.6	294	11500	ug/kg	D
bis(2-Ethylhexyl)phthalate	117-81-7	15	423	734	7050	ug/kg	D
Di-n-Octylphthalate	117-84-0	15	128	294	785	ug/kg	D
Benzo(a)fluoranthene, Total		15	150	587	21100	ug/kg	D
Benzo(a)pyrene	50-32-8	15	95.1	294	8620	ug/kg	D
Indeno(1,2,3-cd)pyrene	193-39-5	15	87.9	294	7310	ug/kg	D
Dibenzo(a,h)anthracene	53-70-3	15	90.4	294	2600	ug/kg	D
Benzo(g,h,i)perylene	191-24-2	15	85.4	294	8260	ug/kg	D
1-Methylnaphthalene	90-12-0	15	87.4	294	207	ug/kg	J, D
Surrogate: 2-Fluorophenol				27-120 %	59.0	%	
Surrogate: Phenol-d5				29-120 %	73.9	%	
Surrogate: 2-Chlorophenol-d4				31-120 %	81.9	%	
Surrogate: 1,2-Dichlorobenzene-d4				32-120 %	74.7	%	
Surrogate: Nitrobenzene-d5				30-120 %	75.0	%	
Surrogate: 2-Fluorobiphenyl				35-120 %	81.0	%	
Surrogate: 2,4,6-Tribromophenol				24-134 %	85.2	%	
Surrogate: p-Terphenyl-d14				37-120 %	98.4	%	



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Reported:
28-Jul-2017 15:26

WC - 3 - 2 ft
17F0434-03RE1 (Solid)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM

Sampled: 06/27/2017 14:00

Instrument: NT8

Analyzed: 11-Jul-2017 16:24

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0829 Prepared: 30-Jun-2017	Sample Size: 39.08 g (wet) Final Volume: 0.5 mL	Dry Weight: 10.19 g % Solids: 26.07
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0051 Cleaned: 11-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	Added 7/11/2017 by JZ
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0050 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	Added 7/11/2017 by JZ

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Naphthalene	91-20-3	30	37.5	147	91.5	ug/kg	J, D
2-Methylnaphthalene	91-57-6	30	32.5	147	74.1	ug/kg	J, D
1-Methylnaphthalene	90-12-0	30	11.8	147	195	ug/kg	D
Acenaphthylene	208-96-8	30	31.9	147	78.7	ug/kg	J, D
Acenaphthene	83-32-9	30	16.8	147	1910	ug/kg	D
Dibenzofuran	132-64-9	30	40.6	147	381	ug/kg	D
Fluorene	86-73-7	30	18.6	147	1560	ug/kg	D
Phenanthrene	85-01-8	30	21.1	147	4410	ug/kg	D
Anthracene	120-12-7	30	25.6	147	868	ug/kg	D
Fluoranthene	206-44-0	30	13.8	147	12000	ug/kg	D
Pyrene	129-00-0	30	18.4	147	8830	ug/kg	D
Benzo(a)anthracene	56-55-3	30	24.3	147	4230	ug/kg	D
Chrysene	218-01-9	30	31.0	147	6990	ug/kg	D
Benzo(b)fluoranthene	205-99-2	30	40.4	147	6850	ug/kg	D
Benzo(k)fluoranthene	207-08-9	30	22.4	147	3330	ug/kg	D
Benzo(j)fluoranthene	205-82-3	30	20.0	147	3080	ug/kg	D
Benzofluoranthenes, Total		30	88.6	294	13000	ug/kg	D
Benzo(a)pyrene	50-32-8	30	18.1	147	5320	ug/kg	D
Indeno(1,2,3-cd)pyrene	193-39-5	30	30.9	147	4520	ug/kg	D
Dibenzo(a,h)anthracene	53-70-3	30	26.2	147	1220	ug/kg	D
Benzo(g,h,i)perylene	191-24-2	30	31.4	147	5150	ug/kg	D
Surrogate: 2-Methylnaphthalene-d10				32-120 %	65.3	%	
Surrogate: Dibenzo[a,h]anthracene-d14				21-133 %	95.2	%	
Surrogate: Fluoranthene-d10				36-134 %	67.7	%	



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Reported:
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WC - 3 - 2 ft
17F0434-03RE1 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 06/27/2017 14:00

Instrument: FID4

Analyzed: 11-Jul-2017 19:35

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0822 Sample Size: 10.17 g (wet) Dry Weight: 2.65 g
Prepared: 30-Jun-2017 Final Volume: 1 mL % Solids: 26.07

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		10	189	1420	mg/kg	D
Motor Oil Range Organics (C24-C38)		10	377	4670	mg/kg	D, B
Surrogate: o-Terphenyl			50-150 %	90.7	%	



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Reported:
28-Jul-2017 15:26

WC - 3 - 2 ft
17F0434-03RE1 (Solid)

Wet Chemistry

Method: Plumb 1981, Combustion IR

Sampled: 06/27/2017 14:00

Instrument: APOLLO1

Analyzed: 17-Jul-2017 13:08

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.51 g

% Solids: 50.58

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	2.72	%	



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WC - 3 - 2 ft
17F0434-03RE1 (Solid)

Wet Chemistry

Method: SM 4500-NH3 H-97

Sampled: 06/27/2017 14:00

Instrument: LACHAT2

Analyzed: 01-Jul-2017 13:54

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.35 g (wet)

Final Volume: 40 mL

Dry Weight: 2.20 g

% Solids: 50.58

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	5	3.64	36.8	mg/kg NH3-N	D



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Reported:
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WC - 3 - 2 ft
17F0434-03RE2 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00

Sampled: 06/27/2017 14:00

Instrument: UV1800-2

Analyzed: 30-Jun-2017 12:44

Sample Preparation:

Preparation Method: PSEP 1986

Preparation Batch: BFF0843

Prepared: 29-Jun-2017

Sample Size: 5.499 g (wet)

Final Volume: 100 mL

Dry Weight: 2.88 g

% Solids: 52.40

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	20	34.7	596	mg/kg	D



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Reported:
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WC - 3 - Deep
17F0434-04 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 14:30

Instrument: NT5

Analyzed: 06-Jul-2017 19:08

Sample Preparation: Preparation Method: EPA 5035 (Sodium Bisulfate)
Preparation Batch: BFG0079 Sample Size: 5.02 g (wet) Dry Weight: 2.02 g
Prepared: 06-Jul-2017 Final Volume: 5 mL % Solids: 40.18

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.65	2.48	ND	ug/kg	U
Vinyl Chloride	75-01-4	1	0.58	2.48	ND	ug/kg	U
Bromomethane	74-83-9	1	0.46	2.48	ND	ug/kg	U
Chloroethane	75-00-3	1	1.15	2.48	ND	ug/kg	U
Trichlorofluoromethane	75-69-4	1	0.66	2.48	ND	ug/kg	U
Acrolein	107-02-8	1	9.44	12.4	ND	ug/kg	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.71	4.96	ND	ug/kg	U
Acetone	67-64-1	1	1.19	12.4	148	ug/kg	
1,1-Dichloroethene	75-35-4	1	0.83	2.48	ND	ug/kg	U
Bromoethane	74-96-4	1	1.09	4.96	ND	ug/kg	U
Iodomethane	74-88-4	1	0.53	2.48	ND	ug/kg	U
Methylene Chloride	75-09-2	1	1.57	4.96	4.41	ug/kg	J, B
Acrylonitrile	107-13-1	1	2.55	12.4	ND	ug/kg	U
Carbon Disulfide	75-15-0	1	1.39	2.48	13.0	ug/kg	
trans-1,2-Dichloroethene	156-60-5	1	0.66	2.48	ND	ug/kg	U
Vinyl Acetate	108-05-4	1	0.94	12.4	ND	ug/kg	U
1,1-Dichloroethane	75-34-3	1	0.50	2.48	ND	ug/kg	U
2-Butanone	78-93-3	1	1.27	12.4	18.0	ug/kg	
2,2-Dichloropropane	594-20-7	1	0.72	2.48	ND	ug/kg	U
cis-1,2-Dichloroethene	156-59-2	1	0.59	2.48	ND	ug/kg	U
Chloroform	67-66-3	1	0.58	2.48	ND	ug/kg	U
Bromochloromethane	74-97-5	1	0.80	2.48	ND	ug/kg	U
1,1,1-Trichloroethane	71-55-6	1	0.56	2.48	ND	ug/kg	U
1,1-Dichloropropene	563-58-6	1	0.77	2.48	ND	ug/kg	U
Carbon tetrachloride	56-23-5	1	0.53	2.48	ND	ug/kg	U
1,2-Dichloroethane	107-06-2	1	0.47	2.48	ND	ug/kg	U
Benzene	71-43-2	1	0.73	2.48	ND	ug/kg	U
Trichloroethene	79-01-6	1	0.53	2.48	ND	ug/kg	U
1,2-Dichloropropane	78-87-5	1	0.40	2.48	ND	ug/kg	U
Bromodichloromethane	75-27-4	1	0.63	2.48	ND	ug/kg	U
Dibromomethane	74-95-3	1	0.36	2.48	ND	ug/kg	U
2-Chloroethyl vinyl ether	110-75-8	1	0.68	12.4	ND	ug/kg	U
4-Methyl-2-Pentanone	108-10-1	1	1.04	12.4	ND	ug/kg	U
cis-1,3-Dichloropropene	10061-01-5	1	0.56	2.48	ND	ug/kg	U
Toluene	108-88-3	1	0.37	2.48	1.59	ug/kg	J
trans-1,3-Dichloropropene	10061-02-6	1	0.54	2.48	ND	ug/kg	U



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Reported:
28-Jul-2017 15:26

WC - 3 - Deep
17F0434-04 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 14:30

Instrument: NT5

Analyzed: 06-Jul-2017 19:08

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	1.09	12.4	ND	ug/kg	U
1,1,2-Trichloroethane	79-00-5	1	0.71	2.48	ND	ug/kg	U
1,3-Dichloropropane	142-28-9	1	0.52	2.48	ND	ug/kg	U
Tetrachloroethene	127-18-4	1	0.64	2.48	ND	ug/kg	U
Dibromochloromethane	124-48-1	1	0.66	2.48	ND	ug/kg	U
1,2-Dibromoethane	106-93-4	1	0.44	2.48	ND	ug/kg	U
Chlorobenzene	108-90-7	1	0.54	2.48	ND	ug/kg	U
Ethylbenzene	100-41-4	1	0.50	2.48	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.58	2.48	ND	ug/kg	U
m,p-Xylene	179601-23-1	1	0.97	2.48	1.97	ug/kg	J
o-Xylene	95-47-6	1	0.56	2.48	0.84	ug/kg	J
Xylenes, total	1330-20-7	1	1.53	4.96	2.82	ug/kg	J
Styrene	100-42-5	1	0.34	2.48	ND	ug/kg	U
Bromoform	75-25-2	1	0.74	2.48	ND	ug/kg	U
1,1,2,2-Tetrachloroethane	79-34-5	1	0.63	2.48	ND	ug/kg	U
1,2,3-Trichloropropane	96-18-4	1	1.28	4.96	ND	ug/kg	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	1.08	12.4	ND	ug/kg	U
n-Propylbenzene	103-65-1	1	0.67	2.48	ND	ug/kg	U
Bromobenzene	108-86-1	1	0.38	2.48	ND	ug/kg	U
Isopropyl Benzene	98-82-8	1	0.58	2.48	ND	ug/kg	U
2-Chlorotoluene	95-49-8	1	0.74	2.48	ND	ug/kg	U
4-Chlorotoluene	106-43-4	1	0.69	2.48	ND	ug/kg	U
t-Butylbenzene	98-06-6	1	0.76	2.48	ND	ug/kg	U
1,3,5-Trimethylbenzene	108-67-8	1	0.63	2.48	ND	ug/kg	U
1,2,4-Trimethylbenzene	95-63-6	1	0.57	2.48	ND	ug/kg	U
s-Butylbenzene	135-98-8	1	0.59	2.48	ND	ug/kg	U
4-Isopropyl Toluene	99-87-6	1	0.59	2.48	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	0.56	2.48	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	0.58	2.48	ND	ug/kg	U
n-Butylbenzene	104-51-8	1	0.65	2.48	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	0.73	2.48	ND	ug/kg	U
1,2-Dibromo-3-chloropropane	96-12-8	1	1.45	12.4	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	0.82	12.4	ND	ug/kg	U
Hexachloro-1,3-Butadiene	87-68-3	1	1.02	12.4	ND	ug/kg	U
Naphthalene	91-20-3	1	1.06	12.4	ND	ug/kg	U
1,2,3-Trichlorobenzene	87-61-6	1	0.76	12.4	ND	ug/kg	U
Dichlorodifluoromethane	75-71-8	1	0.51	2.48	ND	ug/kg	U
Methyl tert-butyl Ether	1634-04-4	1	0.57	2.48	ND	ug/kg	U
2-Pentanone	107-87-9	1	12.4	12.4	ND	ug/kg	U



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Project: Willow Creek Daylight
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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 3 - Deep
17F0434-04 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 14:30

Instrument: NT5

Analyzed: 06-Jul-2017 19:08

Analyte	CAS Number	Recovery Limits	Recovery	Units	Notes
Surrogate: 1,2-Dichloroethane-d4		80-149 %	107	%	
Surrogate: Toluene-d8		77-120 %	99.5	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	93.2	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	99.3	%	



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Reported:
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WC - 3 - Deep
17F0434-04 (Solid)

Volatile Organic Compounds

Method: NWTPHg

Sampled: 06/27/2017 14:30

Instrument: NT3

Analyzed: 28-Jun-2017 19:15

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFF0798 Sample Size: 6.189 g (wet) Dry Weight: 2.49 g
Prepared: 28-Jun-2017 Final Volume: 5 mL % Solids: 40.18

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	17500	ND	ug/kg	U
Surrogate: Toluene-d8			80-120 %	95.7	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	94.1	%	



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WC - 3 - Deep
17F0434-04 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 14:30

Instrument: NT10

Analyzed: 11-Jul-2017 14:49

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0828 Sample Size: 25.26 g (wet) Dry Weight: 10.15 g
Prepared: 29-Jun-2017 Final Volume: 1 mL % Solids: 40.18

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Phenol	108-95-2	1	8.1	19.7	26.7	ug/kg	
bis(2-chloroethyl) ether	111-44-4	1	6.7	19.7	ND	ug/kg	U
2-Chlorophenol	95-57-8	1	6.4	19.7	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	5.0	19.7	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	4.3	19.7	8.2	ug/kg	J
1,2-Dichlorobenzene	95-50-1	1	4.6	19.7	ND	ug/kg	U
Benzyl Alcohol	100-51-6	1	14.7	19.7	ND	ug/kg	U
2,2'-Oxybis(1-chloropropane)	108-60-1	1	5.6	19.7	ND	ug/kg	U
2-Methylphenol	95-48-7	1	7.7	19.7	ND	ug/kg	U
Hexachloroethane	67-72-1	1	5.6	19.7	ND	ug/kg	U
N-Nitroso-di-n-Propylamine	621-64-7	1	10.6	19.7	ND	ug/kg	U
4-Methylphenol	106-44-5	1	14.5	19.7	31.0	ug/kg	
Nitrobenzene	98-95-3	1	7.8	19.7	ND	ug/kg	U
Isophorone	78-59-1	1	7.6	19.7	ND	ug/kg	U
2-Nitrophenol	88-75-5	1	6.8	19.7	ND	ug/kg	U
2,4-Dimethylphenol	105-67-9	1	26.4	98.5	ND	ug/kg	U
Bis(2-Chloroethoxy)methane	111-91-1	1	6.2	19.7	ND	ug/kg	U
2,4-Dichlorophenol	120-83-2	1	31.5	98.5	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	5.9	19.7	ND	ug/kg	U
Naphthalene	91-20-3	1	5.2	19.7	196	ug/kg	
Benzoic acid	65-85-0	1	58.2	197	331	ug/kg	
4-Chloroaniline	106-47-8	1	33.2	98.5	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	4.9	19.7	ND	ug/kg	U
4-Chloro-3-Methylphenol	59-50-7	1	28.5	98.5	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	5.6	19.7	ND	ug/kg	U
Hexachlorocyclopentadiene	77-47-4	1	40.7	98.5	ND	ug/kg	U
2,4,6-Trichlorophenol	88-06-2	1	25.0	98.5	ND	ug/kg	U
2,4,5-Trichlorophenol	95-95-4	1	26.5	98.5	ND	ug/kg	U
2-Chloronaphthalene	91-58-7	1	4.4	19.7	ND	ug/kg	U
2-Nitroaniline	88-74-4	1	29.8	98.5	ND	ug/kg	U
Acenaphthylene	208-96-8	1	4.7	19.7	ND	ug/kg	U
Dimethylphthalate	131-11-3	1	6.3	19.7	ND	ug/kg	U
2,6-Dinitrotoluene	606-20-2	1	26.3	98.5	ND	ug/kg	U
Acenaphthene	83-32-9	1	5.1	19.7	1580	ug/kg	
3-Nitroaniline	99-09-2	1	37.1	98.5	ND	ug/kg	U
2,4-Dinitrophenol	51-28-5	1	40.7	197	ND	ug/kg	U



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Reported:
28-Jul-2017 15:26

WC - 3 - Deep
17F0434-04 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 14:30

Instrument: NT10

Analyzed: 11-Jul-2017 14:49

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dibenzofuran	132-64-9	1	4.5	19.7	225	ug/kg	
4-Nitrophenol	100-02-7	1	43.7	98.5	ND	ug/kg	U
2,4-Dinitrotoluene	121-14-2	1	22.6	98.5	ND	ug/kg	U
Fluorene	86-73-7	1	4.9	19.7	1080	ug/kg	
4-Chlorophenylphenyl ether	7005-72-3	1	6.9	19.7	ND	ug/kg	U
Diethyl phthalate	84-66-2	1	17.4	19.7	ND	ug/kg	U
4-Nitroaniline	100-01-6	1	34.4	98.5	ND	ug/kg	U
4,6-Dinitro-2-methylphenol	534-52-1	1	49.8	197	ND	ug/kg	U
N-Nitrosodiphenylamine	86-30-6	1	9.4	19.7	ND	ug/kg	U
4-Bromophenyl phenyl ether	101-55-3	1	6.0	19.7	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	4.7	19.7	ND	ug/kg	U
Pentachlorophenol	87-86-5	1	30.8	98.5	ND	ug/kg	U
Phenanthrene	85-01-8	1	4.6	19.7	1340	ug/kg	
Anthracene	120-12-7	1	5.8	19.7	334	ug/kg	
Carbazole	86-74-8	1	7.3	19.7	155	ug/kg	
Di-n-Butylphthalate	84-74-2	1	5.2	19.7	35.4	ug/kg	
Fluoranthene	206-44-0	1	4.5	19.7	3150	ug/kg	E
Pyrene	129-00-0	1	5.5	19.7	2310	ug/kg	E
Butylbenzylphthalate	85-68-7	1	7.9	19.7	ND	ug/kg	U
Benzo(a)anthracene	56-55-3	1	5.1	19.7	950	ug/kg	
3,3'-Dichlorobenzidine	91-94-1	1	30.7	98.5	ND	ug/kg	U
Chrysene	218-01-9	1	5.1	19.7	1880	ug/kg	
bis(2-Ethylhexyl)phthalate	117-81-7	1	28.4	49.3	2950	ug/kg	E
Di-n-Octylphthalate	117-84-0	1	8.6	19.7	122	ug/kg	
Benzo(a)fluoranthene, Total		1	10.0	39.4	2900	ug/kg	
Benzo(a)pyrene	50-32-8	1	6.4	19.7	1140	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	5.9	19.7	787	ug/kg	
Dibenzo(a,h)anthracene	53-70-3	1	6.1	19.7	335	ug/kg	
Benzo(g,h,i)perylene	191-24-2	1	5.7	19.7	797	ug/kg	
1-Methylnaphthalene	90-12-0	1	5.9	19.7	120	ug/kg	
Surrogate: 2-Fluorophenol				27-120 %	59.8	%	
Surrogate: Phenol-d5				29-120 %	65.3	%	
Surrogate: 2-Chlorophenol-d4				31-120 %	77.3	%	
Surrogate: 1,2-Dichlorobenzene-d4				32-120 %	74.8	%	
Surrogate: Nitrobenzene-d5				30-120 %	76.5	%	
Surrogate: 2-Fluorobiphenyl				35-120 %	84.9	%	
Surrogate: 2,4,6-Tribromophenol				24-134 %	96.8	%	
Surrogate: p-Terphenyl-d14				37-120 %	84.5	%	



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Reported:
28-Jul-2017 15:26

WC - 3 - Deep
17F0434-04 (Solid)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM

Sampled: 06/27/2017 14:30

Instrument: NT8

Analyzed: 11-Jul-2017 13:19

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0829 Prepared: 30-Jun-2017	Sample Size: 25.07 g (wet) Final Volume: 0.5 mL	Dry Weight: 10.07 g % Solids: 40.18
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0051 Cleaned: 11-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0050 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Naphthalene	91-20-3	1	1.27	4.96	143	ug/kg	
2-Methylnaphthalene	91-57-6	1	1.10	4.96	29.1	ug/kg	
1-Methylnaphthalene	90-12-0	1	0.40	4.96	104	ug/kg	
Acenaphthylene	208-96-8	1	1.08	4.96	17.5	ug/kg	
Acenaphthene	83-32-9	1	0.57	4.96	759	ug/kg	E
Dibenzofuran	132-64-9	1	1.37	4.96	164	ug/kg	
Fluorene	86-73-7	1	0.63	4.96	551	ug/kg	E
Phenanthrene	85-01-8	1	0.71	4.96	692	ug/kg	E
Anthracene	120-12-7	1	0.86	4.96	204	ug/kg	
Fluoranthene	206-44-0	1	0.47	4.96	1490	ug/kg	E
Pyrene	129-00-0	1	0.62	4.96	179	ug/kg	
Benzo(a)anthracene	56-55-3	1	0.82	4.96	558	ug/kg	E
Chrysene	218-01-9	1	1.05	4.96	848	ug/kg	E
Benzo(b)fluoranthene	205-99-2	1	1.36	4.96	779	ug/kg	E
Benzo(k)fluoranthene	207-08-9	1	0.75	4.96	402	ug/kg	
Benzo(j)fluoranthene	205-82-3	1	0.68	4.96	360	ug/kg	
Benzofluoranthenes, Total		1	2.99	9.93	1500	ug/kg	E
Benzo(a)pyrene	50-32-8	1	0.61	4.96	619	ug/kg	E
Indeno(1,2,3-cd)pyrene	193-39-5	1	1.04	4.96	516	ug/kg	E
Dibenzo(a,h)anthracene	53-70-3	1	0.88	4.96	153	ug/kg	
Benzo(g,h,i)perylene	191-24-2	1	1.06	4.96	592	ug/kg	E
Surrogate: 2-Methylnaphthalene-d10				32-120 %	45.0	%	
Surrogate: Dibenzo[a,h]anthracene-d14				21-133 %	61.7	%	
Surrogate: Fluoranthene-d10				36-134 %	52.8	%	



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Reported:
28-Jul-2017 15:26

WC - 3 - Deep
17F0434-04 (Solid)

Butyl Tins

Method: EPA 8270D-SIM

Sampled: 06/27/2017 14:30

Instrument: NT12

Analyzed: 08-Jul-2017 09:08

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		
	Preparation Batch: BFF0827	Sample Size: 13.07 g (wet)	Dry Weight: 5.25 g
	Prepared: 30-Jun-2017	Final Volume: 0.5 mL	% Solids: 40.18
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CFG0024	Initial Volume: 0.5 mL	
	Cleaned: 07-Jul-2017	Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.428	3.68	72.4	ug/kg	
Dibutyltin Ion	14488-53-0	1	1.65	5.50	26.0	ug/kg	
Butyltin Ion	78763-54-9	1	1.80	3.88	10.8	ug/kg	
Tetrabutyltin	1461-25-2	1	4.76	4.76	ND	ug/kg	U
Surrogate: Triphenyltin					30-160 %	47.6 %	
Surrogate: Tripropyltin					30-160 %	54.5 %	



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WC - 3 - Deep
17F0434-04 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 06/27/2017 14:30

Instrument: FID4

Analyzed: 11-Jul-2017 15:20

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0822 Sample Size: 10.02 g (wet) Dry Weight: 4.03 g
Prepared: 30-Jun-2017 Final Volume: 1 mL % Solids: 40.18

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	12.4	323	mg/kg	
Motor Oil Range Organics (C24-C38)		1	24.8	1370	mg/kg	B, E
Surrogate: o-Terphenyl			50-150 %	91.7	%	



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Reported:
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WC - 3 - Deep
17F0434-04 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 14:30

Instrument: ECD6

Analyzed: 11-Jul-2017 17:16

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0825 Prepared: 29-Jun-2017	Sample Size: 31.31 g (wet) Final Volume: 2.5 mL	Dry Weight: 12.58 g % Solids: 40.18
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0049 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0048 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0047 Cleaned: 07-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	5	0.42	2.48	ND	ug/kg	U
beta-BHC	319-85-7	5	0.45	2.48	ND	ug/kg	U
gamma-BHC (Lindane)	58-89-9	5	0.34	2.48	ND	ug/kg	U
delta-BHC	319-86-8	5	0.33	2.48	ND	ug/kg	U
Heptachlor	76-44-8	5	0.23	2.48	ND	ug/kg	U
Aldrin	309-00-2	5	1.83	2.48	ND	ug/kg	U
Heptachlor Epoxide	1024-57-3	5	0.84	2.48	ND	ug/kg	U
trans-Chlordane (beta-Chlordane)	5103-74-2	5	7.45	7.45	ND	ug/kg	Y1, U
cis-Chlordane (alpha-chlordane)	5103-71-9	5	0.55	2.48	ND	ug/kg	U
Endosulfan I	959-98-8	5	0.34	2.48	ND	ug/kg	U
4,4'-DDE	72-55-9	5	0.67	4.97	ND	ug/kg	U
Dieldrin	60-57-1	5	0.57	4.97	ND	ug/kg	U
Endrin	72-20-8	5	0.71	4.97	ND	ug/kg	U
Endosulfan II	33213-65-9	5	1.56	4.97	ND	ug/kg	U
4,4'-DDD	72-54-8	5	1.59	4.97	ND	ug/kg	U
Endrin Aldehyde	7421-93-4	5	1.94	4.97	ND	ug/kg	U
4,4'-DDT	50-29-3	5	1.61	4.97	ND	ug/kg	U
Endosulfan Sulfate	1031-07-8	5	0.61	4.97	ND	ug/kg	U
Endrin Ketone	53494-70-5	5	1.40	4.97	ND	ug/kg	U
Methoxychlor	72-43-5	5	1.48	24.8	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	5	1.70	2.48	ND	ug/kg	U
Hexachlorobenzene	118-74-1	5	0.72	2.48	ND	ug/kg	U
2,4'-DDE	3424-82-6	5	1.24	4.97	ND	ug/kg	U
2,4'-DDD	53-19-0	5	0.97	4.97	ND	ug/kg	U
2,4'-DDT	789-02-6	5	0.93	4.97	ND	ug/kg	U
Oxychlordane	27304-13-8	5	0.64	4.97	ND	ug/kg	U
cis-Nonachlor	5103-73-1	5	1.04	4.97	ND	ug/kg	U



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WC - 3 - Deep
17F0434-04 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 14:30

Instrument: ECD6

Analyzed: 11-Jul-2017 17:16

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
trans-Nonachlor	39765-80-5	5	1.13	4.97	ND	ug/kg	U
Mirex	2385-85-5	5	3.20	4.97	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				30-160 %		NRS	NRS
Surrogate: Decachlorobiphenyl [2C]				30-160 %		NRS	NRS
Surrogate: Tetrachlorometaxylene				30-160 %	100	%	
Surrogate: Tetrachlorometaxylene [2C]				30-160 %	80.1	%	



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Reported:
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WC - 3 - Deep
17F0434-04 (Solid)

Aroclor PCB

Method: EPA 8082A

Sampled: 06/27/2017 14:30

Instrument: ECD7

Analyzed: 07-Jul-2017 18:27

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0826 Prepared: 05-Jul-2017	Sample Size: 13.16 g (wet) Final Volume: 5 mL	Dry Weight: 5.29 g % Solids: 40.18
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0027 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid Cleanup Batch: CFG0025 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0026 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aroclor 1016	12674-11-2	1	7.6	18.9	ND	ug/kg	U
Aroclor 1221	11104-28-2	1	7.6	18.9	ND	ug/kg	U
Aroclor 1232	11141-16-5	1	7.6	18.9	ND	ug/kg	U
Aroclor 1242	53469-21-9	1	7.6	18.9	ND	ug/kg	U
Aroclor 1248	12672-29-6	1	7.6	18.9	ND	ug/kg	U
Aroclor 1254	11097-69-1	1	7.6	18.9	ND	ug/kg	U
Aroclor 1260	11096-82-5	1	8.8	18.9	17.6	ug/kg	P1, J
Aroclor 1262	37324-23-5	1	8.8	18.9	ND	ug/kg	U
Aroclor 1268	11100-14-4	1	8.8	18.9	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				40-133 %	87.1	%	
Surrogate: Tetrachlorometaxylene				53-120 %	72.3	%	
Surrogate: Decachlorobiphenyl [2C]				40-133 %	80.2	%	
Surrogate: Tetrachlorometaxylene [2C]				53-120 %	73.7	%	



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Reported:
28-Jul-2017 15:26

WC - 3 - Deep
17F0434-04 (Solid)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 06/27/2017 14:30

Instrument: ICP2

Analyzed: 07-Jul-2017 19:12

Sample Preparation:

Preparation Method: SWC EPA 3050B

Preparation Batch: BFF0836

Prepared: 30-Jun-2017

Sample Size: 1.011 g (wet)

Final Volume: 50 mL

Dry Weight: 0.47 g

% Solids: 46.37

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Antimony	7440-36-0	2	0.482	10.7	1.27	mg/kg	J
Arsenic	7440-38-2	2	0.598	10.7	9.87	mg/kg	J
Beryllium	7440-41-7	2	0.0123	0.213	0.126	mg/kg	J
Cadmium	7440-43-9	2	0.0264	0.427	0.672	mg/kg	
Chromium	7440-47-3	2	0.100	1.07	32.9	mg/kg	
Copper	7440-50-8	2	0.0526	0.427	41.4	mg/kg	
Lead	7439-92-1	2	0.278	4.27	32.4	mg/kg	
Nickel	7440-02-0	2	0.424	2.13	45.1	mg/kg	
Selenium	7782-49-2	2	1.74	10.7	ND	mg/kg	U
Silver	7440-22-4	2	0.0935	0.640	ND	mg/kg	U
Thallium	7440-28-0	2	0.972	10.7	ND	mg/kg	U
Zinc	7440-66-6	2	0.340	2.13	190	mg/kg	



Shannon & Wilson, Inc
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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 3 - Deep
17F0434-04 (Solid)

Metals and Metallic Compounds

Method: EPA 7471B

Sampled: 06/27/2017 14:30

Instrument: CETAC

Analyzed: 30-Jun-2017 14:16

Sample Preparation:

Preparation Method: SMM EPA 7471B

Preparation Batch: BFF0838

Prepared: 30-Jun-2017

Sample Size: 0.283 g (wet)

Final Volume: 50 mL

Dry Weight: 0.13 g

% Solids: 46.37

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Mercury	7439-97-6	1	0.03810	0.2133	mg/kg	



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Reported:
28-Jul-2017 15:26

WC - 3 - Deep
17F0434-04 (Solid)

Wet Chemistry

Method: Plumb 1981, Combustion IR

Sampled: 06/27/2017 14:30

Instrument: APOLLO1

Analyzed: 17-Jul-2017 13:33

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.46 g

% Solids: 46.37

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	4.70	%	



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Reported:
28-Jul-2017 15:26

WC - 3 - Deep
17F0434-04 (Solid)

Wet Chemistry

Method: PSEP 1986

Sampled: 06/27/2017 14:30

Instrument: N/A

Analyzed: 29-Jun-2017 11:44

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFF0832

Prepared: 29-Jun-2017

Sample Size: 5 g (wet)

Final Volume: 5 g

Dry Weight: 2.32 g

% Solids: 46.37

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids, Sulfide		1	0.040	43.6	%	



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Reported:
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WC - 3 - Deep
17F0434-04 (Solid)

Wet Chemistry

Method: SM 2540 G-97

Sampled: 06/27/2017 14:30

Instrument: N/A

Analyzed: 05-Jul-2017 11:59

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.46 g

% Solids: 46.37

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	46.37	%	



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Reported:
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WC - 3 - Deep
17F0434-04 (Solid)

Wet Chemistry

Method: SM 4500-NO₃⁻ I-00

Sampled: 06/27/2017 14:30

Instrument: LACHAT2

Analyzed: 01-Jul-2017 17:14

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.22 g (wet)

Final Volume: 40 mL

Dry Weight: 1.96 g

% Solids: 46.37

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.20	ND	mg-N/kg	U



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Reported:
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WC - 3 - Deep
17F0434-04 (Solid)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 06/27/2017 14:30

Instrument: UV1800-2

Analyzed: 14-Jul-2017 15:16

Sample Preparation:

Preparation Method: SM 4500-P B-4 Strong Acid

Preparation Batch: BFG0152

Prepared: 13-Jul-2017

Sample Size: 0.3103 g (wet)

Final Volume: 50 mL

Dry Weight: 0.14 g

% Solids: 46.37

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	20	55.6	674	mg-P/kg	D



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Reported:
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WC - 3 - Deep
17F0434-04RE1 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 14:30

Instrument: NT10

Analyzed: 13-Jul-2017 16:19

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0828 Sample Size: 25.26 g (wet) Dry Weight: 10.15 g
Prepared: 29-Jun-2017 Final Volume: 1 mL % Solids: 40.18

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Phenol	108-95-2	2	16.2	39.4	ND	ug/kg	U
bis(2-chloroethyl) ether	111-44-4	2	13.4	39.4	ND	ug/kg	U
2-Chlorophenol	95-57-8	2	12.7	39.4	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	2	10.0	39.4	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	2	8.7	39.4	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	2	9.2	39.4	ND	ug/kg	U
Benzyl Alcohol	100-51-6	2	29.4	39.4	ND	ug/kg	U
2,2'-Oxybis(1-chloropropane)	108-60-1	2	11.2	39.4	ND	ug/kg	U
2-Methylphenol	95-48-7	2	15.4	39.4	ND	ug/kg	U
Hexachloroethane	67-72-1	2	11.1	39.4	ND	ug/kg	U
N-Nitroso-di-n-Propylamine	621-64-7	2	21.3	39.4	ND	ug/kg	U
4-Methylphenol	106-44-5	2	29.0	39.4	ND	ug/kg	U
Nitrobenzene	98-95-3	2	15.7	39.4	ND	ug/kg	U
Isophorone	78-59-1	2	15.3	39.4	ND	ug/kg	U
2-Nitrophenol	88-75-5	2	13.6	39.4	ND	ug/kg	U
2,4-Dimethylphenol	105-67-9	2	52.8	197	ND	ug/kg	U
Bis(2-Chloroethoxy)methane	111-91-1	2	12.5	39.4	ND	ug/kg	U
2,4-Dichlorophenol	120-83-2	2	63.1	197	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	2	11.7	39.4	ND	ug/kg	U
Naphthalene	91-20-3	2	10.3	39.4	188	ug/kg	D
Benzoic acid	65-85-0	2	116	394	401	ug/kg	D
4-Chloroaniline	106-47-8	2	66.4	197	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	2	9.9	39.4	ND	ug/kg	U
4-Chloro-3-Methylphenol	59-50-7	2	56.9	197	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	2	11.2	39.4	31.4	ug/kg	J, D
Hexachlorocyclopentadiene	77-47-4	2	81.4	197	ND	ug/kg	U
2,4,6-Trichlorophenol	88-06-2	2	50.1	197	ND	ug/kg	U
2,4,5-Trichlorophenol	95-95-4	2	53.0	197	ND	ug/kg	U
2-Chloronaphthalene	91-58-7	2	8.7	39.4	ND	ug/kg	U
2-Nitroaniline	88-74-4	2	59.5	197	ND	ug/kg	U
Acenaphthylene	208-96-8	2	9.4	39.4	ND	ug/kg	U
Dimethylphthalate	131-11-3	2	12.7	39.4	ND	ug/kg	U
2,6-Dinitrotoluene	606-20-2	2	52.6	197	ND	ug/kg	U
Acenaphthene	83-32-9	2	10.1	39.4	1550	ug/kg	D
3-Nitroaniline	99-09-2	2	74.3	197	ND	ug/kg	U
2,4-Dinitrophenol	51-28-5	2	81.4	394	ND	ug/kg	U



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WC - 3 - Deep
17F0434-04RE1 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 14:30

Instrument: NT10

Analyzed: 13-Jul-2017 16:19

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dibenzofuran	132-64-9	2	9.1	39.4	ND	ug/kg	U
4-Nitrophenol	100-02-7	2	87.5	197	ND	ug/kg	U
2,4-Dinitrotoluene	121-14-2	2	45.1	197	ND	ug/kg	U
Fluorene	86-73-7	2	9.8	39.4	1020	ug/kg	D
4-Chlorophenylphenyl ether	7005-72-3	2	13.7	39.4	ND	ug/kg	U
Diethyl phthalate	84-66-2	2	34.9	39.4	ND	ug/kg	U
4-Nitroaniline	100-01-6	2	68.8	197	ND	ug/kg	U
4,6-Dinitro-2-methylphenol	534-52-1	2	99.5	394	ND	ug/kg	U
N-Nitrosodiphenylamine	86-30-6	2	18.9	39.4	ND	ug/kg	U
4-Bromophenyl phenyl ether	101-55-3	2	12.0	39.4	ND	ug/kg	U
Hexachlorobenzene	118-74-1	2	9.3	39.4	ND	ug/kg	U
Pentachlorophenol	87-86-5	2	61.7	197	ND	ug/kg	U
Phenanthrene	85-01-8	2	9.2	39.4	1290	ug/kg	D
Anthracene	120-12-7	2	11.7	39.4	319	ug/kg	D
Carbazole	86-74-8	2	14.5	39.4	184	ug/kg	D
Di-n-Butylphthalate	84-74-2	2	10.5	39.4	48.4	ug/kg	D
Fluoranthene	206-44-0	2	8.9	39.4	3340	ug/kg	D
Pyrene	129-00-0	2	10.9	39.4	2360	ug/kg	D
Butylbenzylphthalate	85-68-7	2	15.9	39.4	39.4	ug/kg	J, D
Benzo(a)anthracene	56-55-3	2	10.2	39.4	953	ug/kg	D
3,3'-Dichlorobenzidine	91-94-1	2	61.5	197	ND	ug/kg	U
Chrysene	218-01-9	2	10.3	39.4	1850	ug/kg	D
bis(2-Ethylhexyl)phthalate	117-81-7	2	56.8	98.5	2830	ug/kg	D
Di-n-Octylphthalate	117-84-0	2	17.2	39.4	ND	ug/kg	U
Benzo(a)fluoranthene, Total		2	20.1	78.8	2890	ug/kg	D
Benzo(a)pyrene	50-32-8	2	12.8	39.4	1120	ug/kg	D
Indeno(1,2,3-cd)pyrene	193-39-5	2	11.8	39.4	1000	ug/kg	D
Dibenzo(a,h)anthracene	53-70-3	2	12.1	39.4	409	ug/kg	D
Benzo(g,h,i)perylene	191-24-2	2	11.5	39.4	1130	ug/kg	D
1-Methylnaphthalene	90-12-0	2	11.7	39.4	131	ug/kg	D
Surrogate: 2-Fluorophenol				27-120 %	67.6	%	
Surrogate: Phenol-d5				29-120 %	66.3	%	
Surrogate: 2-Chlorophenol-d4				31-120 %	74.5	%	
Surrogate: 1,2-Dichlorobenzene-d4				32-120 %	70.0	%	
Surrogate: Nitrobenzene-d5				30-120 %	79.5	%	
Surrogate: 2-Fluorobiphenyl				35-120 %	87.7	%	
Surrogate: 2,4,6-Tribromophenol				24-134 %	97.8	%	
Surrogate: p-Terphenyl-d14				37-120 %	92.3	%	



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Reported:
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WC - 3 - Deep
17F0434-04RE1 (Solid)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM

Sampled: 06/27/2017 14:30

Instrument: NT8

Analyzed: 11-Jul-2017 16:50

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0829 Prepared: 30-Jun-2017	Sample Size: 25.07 g (wet) Final Volume: 0.5 mL	Dry Weight: 10.07 g % Solids: 40.18
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0051 Cleaned: 11-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	Added 7/11/2017 by JZ
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0050 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	Added 7/11/2017 by JZ

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Naphthalene	91-20-3	5	6.33	24.8	151	ug/kg	D
2-Methylnaphthalene	91-57-6	5	5.48	24.8	32.1	ug/kg	D
1-Methylnaphthalene	90-12-0	5	1.99	24.8	102	ug/kg	D
Acenaphthylene	208-96-8	5	5.38	24.8	21.6	ug/kg	J, D
Acenaphthene	83-32-9	5	2.83	24.8	969	ug/kg	D
Dibenzofuran	132-64-9	5	6.84	24.8	187	ug/kg	D
Fluorene	86-73-7	5	3.13	24.8	676	ug/kg	D
Phenanthrene	85-01-8	5	3.56	24.8	859	ug/kg	D
Anthracene	120-12-7	5	4.32	24.8	232	ug/kg	D
Fluoranthene	206-44-0	5	2.33	24.8	2120	ug/kg	D
Pyrene	129-00-0	5	3.11	24.8	1470	ug/kg	D
Benzo(a)anthracene	56-55-3	5	4.09	24.8	653	ug/kg	D
Chrysene	218-01-9	5	5.23	24.8	1030	ug/kg	D
Benzo(b)fluoranthene	205-99-2	5	6.81	24.8	874	ug/kg	D
Benzo(k)fluoranthene	207-08-9	5	3.77	24.8	427	ug/kg	D
Benzo(j)fluoranthene	205-82-3	5	3.38	24.8	412	ug/kg	D
Benzofluoranthenes, Total		5	14.9	49.6	1700	ug/kg	D
Benzo(a)pyrene	50-32-8	5	3.05	24.8	720	ug/kg	D
Indeno(1,2,3-cd)pyrene	193-39-5	5	5.21	24.8	587	ug/kg	D
Dibenzo(a,h)anthracene	53-70-3	5	4.42	24.8	168	ug/kg	D
Benzo(g,h,i)perylene	191-24-2	5	5.29	24.8	667	ug/kg	D
Surrogate: 2-Methylnaphthalene-d10				32-120 %	50.7	%	
Surrogate: Dibenzo[a,h]anthracene-d14				21-133 %	66.3	%	
Surrogate: Fluoranthene-d10				36-134 %	55.9	%	



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WC - 3 - Deep
17F0434-04RE1 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 06/27/2017 14:30

Instrument: FID4

Analyzed: 11-Jul-2017 19:56

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0822 Sample Size: 10.02 g (wet) Dry Weight: 4.03 g
Prepared: 30-Jun-2017 Final Volume: 1 mL % Solids: 40.18

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		10	124	435	mg/kg	D
Motor Oil Range Organics (C24-C38)		10	248	1590	mg/kg	D, B
Surrogate: o-Terphenyl			50-150 %	91.1	%	



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WC - 3 - Deep
17F0434-04RE1 (Solid)

Wet Chemistry

Method: SM 4500-NH3 H-97

Sampled: 06/27/2017 14:30

Instrument: LACHAT2

Analyzed: 01-Jul-2017 14:02

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.22 g (wet)

Final Volume: 40 mL

Dry Weight: 1.96 g

% Solids: 46.37

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	2	1.64	28.9	mg/kg NH3-N	D



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Reported:
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WC - 3 - Deep
17F0434-04RE1 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00

Sampled: 06/27/2017 14:30

Instrument: UV1800-2

Analyzed: 30-Jun-2017 12:26

Sample Preparation:

Preparation Method: PSEP 1986

Preparation Batch: BFF0843

Prepared: 29-Jun-2017

Sample Size: 5.031 g (wet)

Final Volume: 100 mL

Dry Weight: 2.19 g

% Solids: 43.60

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	20	45.6	553	mg/kg	D



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Reported:
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WC - 4 - 2 ft
17F0434-05 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 15:30

Instrument: NT5

Analyzed: 07-Jul-2017 13:53

Sample Preparation: Preparation Method: EPA 5035 (Sodium Bisulfate)
Preparation Batch: BFG0114 Sample Size: 5.49 g (wet) Dry Weight: 4.46 g
Prepared: 07-Jul-2017 Final Volume: 5 mL % Solids: 81.29

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.29	1.12	ND	ug/kg	U
Vinyl Chloride	75-01-4	1	0.26	1.12	ND	ug/kg	U
Bromomethane	74-83-9	1	0.21	1.12	ND	ug/kg	U
Chloroethane	75-00-3	1	0.52	1.12	ND	ug/kg	U
Trichlorofluoromethane	75-69-4	1	0.30	1.12	ND	ug/kg	U
Acrolein	107-02-8	1	4.27	5.60	ND	ug/kg	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.32	2.24	ND	ug/kg	U
Acetone	67-64-1	1	0.54	5.60	20.6	ug/kg	
1,1-Dichloroethene	75-35-4	1	0.38	1.12	ND	ug/kg	U
Bromoethane	74-96-4	1	0.49	2.24	ND	ug/kg	U
Iodomethane	74-88-4	1	0.24	1.12	ND	ug/kg	U
Methylene Chloride	75-09-2	1	0.71	2.24	5.19	ug/kg	
Acrylonitrile	107-13-1	1	1.15	5.60	ND	ug/kg	U
Carbon Disulfide	75-15-0	1	0.63	1.12	4.54	ug/kg	
trans-1,2-Dichloroethene	156-60-5	1	0.30	1.12	ND	ug/kg	U
Vinyl Acetate	108-05-4	1	0.43	5.60	ND	ug/kg	U
1,1-Dichloroethane	75-34-3	1	0.23	1.12	ND	ug/kg	U
2-Butanone	78-93-3	1	0.57	5.60	1.88	ug/kg	J
2,2-Dichloropropane	594-20-7	1	0.33	1.12	ND	ug/kg	U
cis-1,2-Dichloroethene	156-59-2	1	0.27	1.12	ND	ug/kg	U
Chloroform	67-66-3	1	0.26	1.12	ND	ug/kg	U
Bromochloromethane	74-97-5	1	0.36	1.12	ND	ug/kg	U
1,1,1-Trichloroethane	71-55-6	1	0.25	1.12	ND	ug/kg	U
1,1-Dichloropropene	563-58-6	1	0.35	1.12	ND	ug/kg	U
Carbon tetrachloride	56-23-5	1	0.24	1.12	ND	ug/kg	U
1,2-Dichloroethane	107-06-2	1	0.21	1.12	ND	ug/kg	U
Benzene	71-43-2	1	0.33	1.12	ND	ug/kg	U
Trichloroethene	79-01-6	1	0.24	1.12	ND	ug/kg	U
1,2-Dichloropropane	78-87-5	1	0.18	1.12	ND	ug/kg	U
Bromodichloromethane	75-27-4	1	0.28	1.12	ND	ug/kg	U
Dibromomethane	74-95-3	1	0.16	1.12	ND	ug/kg	U
2-Chloroethyl vinyl ether	110-75-8	1	0.31	5.60	ND	ug/kg	U
4-Methyl-2-Pentanone	108-10-1	1	0.47	5.60	ND	ug/kg	U
cis-1,3-Dichloropropene	10061-01-5	1	0.25	1.12	ND	ug/kg	U
Toluene	108-88-3	1	0.17	1.12	0.86	ug/kg	J
trans-1,3-Dichloropropene	10061-02-6	1	0.24	1.12	ND	ug/kg	U



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400 N 34th St., Suite 100
Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 4 - 2 ft
17F0434-05 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 15:30

Instrument: NT5

Analyzed: 07-Jul-2017 13:53

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	0.49	5.60	ND	ug/kg	U
1,1,2-Trichloroethane	79-00-5	1	0.32	1.12	ND	ug/kg	U
1,3-Dichloropropane	142-28-9	1	0.23	1.12	ND	ug/kg	U
Tetrachloroethene	127-18-4	1	0.29	1.12	ND	ug/kg	U
Dibromochloromethane	124-48-1	1	0.30	1.12	ND	ug/kg	U
1,2-Dibromoethane	106-93-4	1	0.20	1.12	ND	ug/kg	U
Chlorobenzene	108-90-7	1	0.25	1.12	ND	ug/kg	U
Ethylbenzene	100-41-4	1	0.23	1.12	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.26	1.12	ND	ug/kg	U
m,p-Xylene	179601-23-1	1	0.44	1.12	ND	ug/kg	U
o-Xylene	95-47-6	1	0.25	1.12	ND	ug/kg	U
Xylenes, total	1330-20-7	1	0.69	2.24	ND	ug/kg	U
Styrene	100-42-5	1	0.15	1.12	ND	ug/kg	U
Bromoform	75-25-2	1	0.33	1.12	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	79-34-5	1	0.28	1.12	ND	ug/kg	U
1,2,3-Trichloropropane	96-18-4	1	0.58	2.24	ND	ug/kg	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	0.49	5.60	ND	ug/kg	U
n-Propylbenzene	103-65-1	1	0.30	1.12	ND	ug/kg	U
Bromobenzene	108-86-1	1	0.17	1.12	ND	ug/kg	U
Isopropyl Benzene	98-82-8	1	0.26	1.12	ND	ug/kg	U
2-Chlorotoluene	95-49-8	1	0.34	1.12	ND	ug/kg	U
4-Chlorotoluene	106-43-4	1	0.31	1.12	ND	ug/kg	U
t-Butylbenzene	98-06-6	1	0.34	1.12	ND	ug/kg	U
1,3,5-Trimethylbenzene	108-67-8	1	0.28	1.12	ND	ug/kg	U
1,2,4-Trimethylbenzene	95-63-6	1	0.26	1.12	ND	ug/kg	U
s-Butylbenzene	135-98-8	1	0.27	1.12	ND	ug/kg	U
4-Isopropyl Toluene	99-87-6	1	0.26	1.12	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	0.25	1.12	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	0.26	1.12	ND	ug/kg	U
n-Butylbenzene	104-51-8	1	0.29	1.12	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	0.33	1.12	ND	ug/kg	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.66	5.60	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	0.37	5.60	ND	ug/kg	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.46	5.60	ND	ug/kg	U
Naphthalene	91-20-3	1	0.48	5.60	ND	ug/kg	U
1,2,3-Trichlorobenzene	87-61-6	1	0.34	5.60	ND	ug/kg	U
Dichlorodifluoromethane	75-71-8	1	0.23	1.12	ND	ug/kg	U
Methyl tert-butyl Ether	1634-04-4	1	0.26	1.12	ND	ug/kg	U
2-Pentanone	107-87-9	1	5.60	5.60	ND	ug/kg	U



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Reported:
28-Jul-2017 15:26

WC - 4 - 2 ft
17F0434-05 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 15:30

Instrument: NT5

Analyzed: 07-Jul-2017 13:53

Analyte	CAS Number	Recovery Limits	Recovery	Units	Notes
Surrogate: 1,2-Dichloroethane-d4		80-149 %	109	%	
Surrogate: Toluene-d8		77-120 %	102	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	97.2	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	100	%	



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WC - 4 - 2 ft
17F0434-05 (Solid)

Volatile Organic Compounds

Method: NWTPHg
Instrument: NT3

Sampled: 06/27/2017 15:30

Analyzed: 28-Jun-2017 19:41

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFF0798 Sample Size: 5.319 g (wet) Dry Weight: 4.32 g
Prepared: 28-Jun-2017 Final Volume: 5 mL % Solids: 81.29

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	6930	ND	ug/kg	U
Surrogate: Toluene-d8			80-120 %	97.7	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	96.7	%	



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Reported:
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WC - 4 - 2 ft
17F0434-05 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 15:30

Instrument: NT10

Analyzed: 11-Jul-2017 15:25

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0828 Sample Size: 13.26 g (wet) Dry Weight: 10.78 g
Prepared: 29-Jun-2017 Final Volume: 1 mL % Solids: 81.29

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Phenol	108-95-2	1	7.6	18.6	ND	ug/kg	U
bis(2-chloroethyl) ether	111-44-4	1	6.3	18.6	ND	ug/kg	U
2-Chlorophenol	95-57-8	1	6.0	18.6	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	4.7	18.6	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	4.1	18.6	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	4.3	18.6	ND	ug/kg	U
Benzyl Alcohol	100-51-6	1	13.8	18.6	ND	ug/kg	U
2,2'-Oxybis(1-chloropropane)	108-60-1	1	5.3	18.6	ND	ug/kg	U
2-Methylphenol	95-48-7	1	7.3	18.6	ND	ug/kg	U
Hexachloroethane	67-72-1	1	5.2	18.6	ND	ug/kg	U
N-Nitroso-di-n-Propylamine	621-64-7	1	10.0	18.6	ND	ug/kg	U
4-Methylphenol	106-44-5	1	13.6	18.6	ND	ug/kg	U
Nitrobenzene	98-95-3	1	7.4	18.6	ND	ug/kg	U
Isophorone	78-59-1	1	7.2	18.6	ND	ug/kg	U
2-Nitrophenol	88-75-5	1	6.4	18.6	ND	ug/kg	U
2,4-Dimethylphenol	105-67-9	1	24.9	92.8	ND	ug/kg	U
Bis(2-Chloroethoxy)methane	111-91-1	1	5.9	18.6	ND	ug/kg	U
2,4-Dichlorophenol	120-83-2	1	29.7	92.8	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	5.5	18.6	ND	ug/kg	U
Naphthalene	91-20-3	1	4.9	18.6	ND	ug/kg	U
Benzoic acid	65-85-0	1	54.8	186	ND	ug/kg	U
4-Chloroaniline	106-47-8	1	31.3	92.8	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	4.6	18.6	ND	ug/kg	U
4-Chloro-3-Methylphenol	59-50-7	1	26.8	92.8	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	5.3	18.6	ND	ug/kg	U
Hexachlorocyclopentadiene	77-47-4	1	38.3	92.8	ND	ug/kg	U
2,4,6-Trichlorophenol	88-06-2	1	23.6	92.8	ND	ug/kg	U
2,4,5-Trichlorophenol	95-95-4	1	25.0	92.8	ND	ug/kg	U
2-Chloronaphthalene	91-58-7	1	4.1	18.6	ND	ug/kg	U
2-Nitroaniline	88-74-4	1	28.0	92.8	ND	ug/kg	U
Acenaphthylene	208-96-8	1	4.4	18.6	ND	ug/kg	U
Dimethylphthalate	131-11-3	1	6.0	18.6	ND	ug/kg	U
2,6-Dinitrotoluene	606-20-2	1	24.8	92.8	ND	ug/kg	U
Acenaphthene	83-32-9	1	4.8	18.6	7.7	ug/kg	J
3-Nitroaniline	99-09-2	1	35.0	92.8	ND	ug/kg	U
2,4-Dinitrophenol	51-28-5	1	38.3	186	ND	ug/kg	U



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WC - 4 - 2 ft
17F0434-05 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 15:30

Instrument: NT10

Analyzed: 11-Jul-2017 15:25

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dibenzofuran	132-64-9	1	4.3	18.6	5.9	ug/kg	J
4-Nitrophenol	100-02-7	1	41.2	92.8	ND	ug/kg	U
2,4-Dinitrotoluene	121-14-2	1	21.2	92.8	ND	ug/kg	U
Fluorene	86-73-7	1	4.6	18.6	9.0	ug/kg	J
4-Chlorophenylphenyl ether	7005-72-3	1	6.5	18.6	ND	ug/kg	U
Diethyl phthalate	84-66-2	1	16.4	18.6	ND	ug/kg	U
4-Nitroaniline	100-01-6	1	32.4	92.8	ND	ug/kg	U
4,6-Dinitro-2-methylphenol	534-52-1	1	46.9	186	ND	ug/kg	U
N-Nitrosodiphenylamine	86-30-6	1	8.9	18.6	ND	ug/kg	U
4-Bromophenyl phenyl ether	101-55-3	1	5.6	18.6	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	4.4	18.6	ND	ug/kg	U
Pentachlorophenol	87-86-5	1	29.0	92.8	ND	ug/kg	U
Phenanthrene	85-01-8	1	4.4	18.6	111	ug/kg	
Anthracene	120-12-7	1	5.5	18.6	8.5	ug/kg	J
Carbazole	86-74-8	1	6.8	18.6	11.4	ug/kg	J
Di-n-Butylphthalate	84-74-2	1	4.9	18.6	ND	ug/kg	U
Fluoranthene	206-44-0	1	4.2	18.6	146	ug/kg	
Pyrene	129-00-0	1	5.1	18.6	116	ug/kg	
Butylbenzylphthalate	85-68-7	1	7.5	18.6	ND	ug/kg	U
Benzo(a)anthracene	56-55-3	1	4.8	18.6	33.8	ug/kg	
3,3'-Dichlorobenzidine	91-94-1	1	28.9	92.8	ND	ug/kg	U
Chrysene	218-01-9	1	4.8	18.6	67.9	ug/kg	
bis(2-Ethylhexyl)phthalate	117-81-7	1	26.7	46.4	64.7	ug/kg	
Di-n-Octylphthalate	117-84-0	1	8.1	18.6	ND	ug/kg	U
Benzofluoranthenes, Total		1	9.5	37.1	109	ug/kg	
Benzo(a)pyrene	50-32-8	1	6.0	18.6	49.0	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	5.6	18.6	35.4	ug/kg	
Dibenzo(a,h)anthracene	53-70-3	1	5.7	18.6	ND	ug/kg	U
Benzo(g,h,i)perylene	191-24-2	1	5.4	18.6	40.6	ug/kg	
1-Methylnaphthalene	90-12-0	1	5.5	18.6	ND	ug/kg	U
Surrogate: 2-Fluorophenol				27-120 %	62.7	%	
Surrogate: Phenol-d5				29-120 %	63.0	%	
Surrogate: 2-Chlorophenol-d4				31-120 %	71.6	%	
Surrogate: 1,2-Dichlorobenzene-d4				32-120 %	71.8	%	
Surrogate: Nitrobenzene-d5				30-120 %	70.2	%	
Surrogate: 2-Fluorobiphenyl				35-120 %	82.6	%	
Surrogate: 2,4,6-Tribromophenol				24-134 %	102	%	
Surrogate: p-Terphenyl-d14				37-120 %	89.2	%	



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WC - 4 - 2 ft
17F0434-05 (Solid)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM

Sampled: 06/27/2017 15:30

Instrument: NT8

Analyzed: 11-Jul-2017 13:45

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0829 Prepared: 30-Jun-2017	Sample Size: 13.3 g (wet) Final Volume: 0.5 mL	Dry Weight: 10.81 g % Solids: 81.29
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0051 Cleaned: 11-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0050 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Naphthalene	91-20-3	1	1.18	4.62	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	1.02	4.62	ND	ug/kg	U
1-Methylnaphthalene	90-12-0	1	0.37	4.62	ND	ug/kg	U
Acenaphthylene	208-96-8	1	1.00	4.62	ND	ug/kg	U
Acenaphthene	83-32-9	1	0.53	4.62	ND	ug/kg	U
Dibenzofuran	132-64-9	1	1.28	4.62	ND	ug/kg	U
Fluorene	86-73-7	1	0.58	4.62	ND	ug/kg	U
Phenanthrene	85-01-8	1	0.66	4.62	10.1	ug/kg	
Anthracene	120-12-7	1	0.81	4.62	ND	ug/kg	U
Fluoranthene	206-44-0	1	0.43	4.62	24.2	ug/kg	
Pyrene	129-00-0	1	0.58	4.62	19.8	ug/kg	
Benzo(a)anthracene	56-55-3	1	0.76	4.62	7.63	ug/kg	
Chrysene	218-01-9	1	0.97	4.62	11.1	ug/kg	
Benzo(b)fluoranthene	205-99-2	1	1.27	4.62	10.0	ug/kg	
Benzo(k)fluoranthene	207-08-9	1	0.70	4.62	4.97	ug/kg	
Benzo(j)fluoranthene	205-82-3	1	0.63	4.62	5.02	ug/kg	
Benzofluoranthenes, Total		1	2.78	9.25	19.9	ug/kg	
Benzo(a)pyrene	50-32-8	1	0.57	4.62	8.57	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.97	4.62	8.12	ug/kg	
Dibenzo(a,h)anthracene	53-70-3	1	0.82	4.62	3.15	ug/kg	J
Benzo(g,h,i)perylene	191-24-2	1	0.99	4.62	11.6	ug/kg	
Surrogate: 2-Methylnaphthalene-d10				32-120 %	48.0	%	
Surrogate: Dibenzo[a,h]anthracene-d14				21-133 %	77.8	%	
Surrogate: Fluoranthene-d10				36-134 %	70.0	%	



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WC - 4 - 2 ft
17F0434-05 (Solid)

Butyl Tins

Method: EPA 8270D-SIM

Sampled: 06/27/2017 15:30

Instrument: NT12

Analyzed: 08-Jul-2017 09:21

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		
	Preparation Batch: BFF0827	Sample Size: 6.32 g (wet)	Dry Weight: 5.14 g
	Prepared: 30-Jun-2017	Final Volume: 0.5 mL	% Solids: 81.29
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CFG0024	Initial Volume: 0.5 mL	
	Cleaned: 07-Jul-2017	Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.438	3.76	ND	ug/kg	U
Dibutyltin Ion	14488-53-0	1	1.68	5.63	ND	ug/kg	U
Butyltin Ion	78763-54-9	1	1.84	3.97	ND	ug/kg	U
Tetrabutyltin	1461-25-2	1	4.87	4.87	ND	ug/kg	U
<i>Surrogate: Triphenyltin</i>					30-160 %	67.2 %	
<i>Surrogate: Tripropyltin</i>					30-160 %	60.6 %	



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WC - 4 - 2 ft
17F0434-05 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 06/27/2017 15:30

Instrument: FID4

Analyzed: 11-Jul-2017 15:41

Sample Preparation:

Preparation Method: EPA 3546 (Microwave)

Preparation Batch: BFF0822

Prepared: 30-Jun-2017

Sample Size: 10.15 g (wet)

Final Volume: 1 mL

Dry Weight: 8.25 g

% Solids: 81.29

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.06	23.1	mg/kg	
Motor Oil Range Organics (C24-C38)		1	12.1	121	mg/kg	B
Surrogate: o-Terphenyl			50-150 %	99.0	%	



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WC - 4 - 2 ft
17F0434-05 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 15:30

Instrument: ECD6

Analyzed: 11-Jul-2017 17:34

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0825 Prepared: 29-Jun-2017	Sample Size: 16.1 g (wet) Final Volume: 2.5 mL	Dry Weight: 13.09 g % Solids: 81.29
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0049 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0048 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0047 Cleaned: 07-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	1	0.08	0.48	ND	ug/kg	U
beta-BHC	319-85-7	1	0.09	0.48	ND	ug/kg	U
gamma-BHC (Lindane)	58-89-9	1	0.06	0.48	ND	ug/kg	U
delta-BHC	319-86-8	1	0.06	0.48	ND	ug/kg	U
Heptachlor	76-44-8	1	0.04	0.48	ND	ug/kg	U
Aldrin	309-00-2	1	0.35	0.48	ND	ug/kg	U
Heptachlor Epoxide	1024-57-3	1	0.16	0.48	ND	ug/kg	U
trans-Chlordane (beta-Chlordane)	5103-74-2	1	0.31	0.48	ND	ug/kg	U
cis-Chlordane (alpha-chlordane)	5103-71-9	1	0.11	0.48	ND	ug/kg	U
Endosulfan I	959-98-8	1	0.07	0.48	ND	ug/kg	U
4,4'-DDE	72-55-9	1	0.13	0.96	0.74	ug/kg	J
Dieldrin	60-57-1	1	0.11	0.96	ND	ug/kg	U
Endrin	72-20-8	1	0.14	0.96	ND	ug/kg	U
Endosulfan II	33213-65-9	1	0.30	0.96	ND	ug/kg	U
4,4'-DDD	72-54-8	1	0.31	0.96	2.01	ug/kg	
Endrin Aldehyde	7421-93-4	1	0.37	0.96	ND	ug/kg	U
4,4'-DDT	50-29-3	1	0.31	0.96	ND	ug/kg	U
Endosulfan Sulfate	1031-07-8	1	0.12	0.96	ND	ug/kg	U
Endrin Ketone	53494-70-5	1	0.27	0.96	ND	ug/kg	U
Methoxychlor	72-43-5	1	0.28	4.78	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	0.33	0.48	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	0.14	0.48	ND	ug/kg	U
2,4'-DDE	3424-82-6	1	0.24	0.96	ND	ug/kg	U
2,4'-DDD	53-19-0	1	0.19	0.96	ND	ug/kg	U
2,4'-DDT	789-02-6	1	0.18	0.96	ND	ug/kg	U
Oxychlordane	27304-13-8	1	0.12	0.96	ND	ug/kg	U
cis-Nonachlor	5103-73-1	1	0.20	0.96	ND	ug/kg	U



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WC - 4 - 2 ft
17F0434-05 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 15:30

Instrument: ECD6

Analyzed: 11-Jul-2017 17:34

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
trans-Nonachlor	39765-80-5	1	0.22	0.96	ND	ug/kg	U
Mirex	2385-85-5	1	0.62	0.96	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				30-160 %	114	%	
Surrogate: Decachlorobiphenyl [2C]				30-160 %	69.0	%	
Surrogate: Tetrachlorometaxylene				30-160 %	63.5	%	
Surrogate: Tetrachlorometaxylene [2C]				30-160 %	69.7	%	



Shannon & Wilson, Inc
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Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 4 - 2 ft
17F0434-05 (Solid)

Aroclor PCB

Method: EPA 8082A

Sampled: 06/27/2017 15:30

Instrument: ECD7

Analyzed: 07-Jul-2017 18:49

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0826 Prepared: 05-Jul-2017	Sample Size: 6.33 g (wet) Final Volume: 5 mL	Dry Weight: 5.15 g % Solids: 81.29
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0027 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid Cleanup Batch: CFG0025 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0026 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aroclor 1016	12674-11-2	1	7.8	19.4	ND	ug/kg	U
Aroclor 1221	11104-28-2	1	7.8	19.4	ND	ug/kg	U
Aroclor 1232	11141-16-5	1	7.8	19.4	ND	ug/kg	U
Aroclor 1242	53469-21-9	1	7.8	19.4	ND	ug/kg	U
Aroclor 1248	12672-29-6	1	7.8	19.4	ND	ug/kg	U
Aroclor 1254	11097-69-1	1	7.8	19.4	ND	ug/kg	U
Aroclor 1260	11096-82-5	1	9.0	19.4	ND	ug/kg	U
Aroclor 1262	37324-23-5	1	9.0	19.4	ND	ug/kg	U
Aroclor 1268	11100-14-4	1	9.0	19.4	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				40-133 %	88.8	%	
Surrogate: Tetrachlorometaxylene				53-120 %	82.6	%	
Surrogate: Decachlorobiphenyl [2C]				40-133 %	84.7	%	
Surrogate: Tetrachlorometaxylene [2C]				53-120 %	67.4	%	



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Reported:
28-Jul-2017 15:26

WC - 4 - 2 ft
17F0434-05 (Solid)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 06/27/2017 15:30

Instrument: ICP2

Analyzed: 07-Jul-2017 19:16

Sample Preparation:

Preparation Method: SWC EPA 3050B

Preparation Batch: BFF0836

Prepared: 30-Jun-2017

Sample Size: 1.056 g (wet)

Final Volume: 50 mL

Dry Weight: 0.80 g

% Solids: 75.93

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Antimony	7440-36-0	2	0.282	6.24	0.618	mg/kg	J
Arsenic	7440-38-2	2	0.349	6.24	1.03	mg/kg	J
Beryllium	7440-41-7	2	0.0072	0.125	0.111	mg/kg	J
Cadmium	7440-43-9	2	0.0154	0.249	0.277	mg/kg	
Chromium	7440-47-3	2	0.0587	0.624	28.8	mg/kg	
Copper	7440-50-8	2	0.0308	0.249	9.58	mg/kg	
Lead	7439-92-1	2	0.162	2.49	34.3	mg/kg	
Nickel	7440-02-0	2	0.248	1.25	28.7	mg/kg	
Selenium	7782-49-2	2	1.02	6.24	ND	mg/kg	U
Silver	7440-22-4	2	0.0547	0.374	ND	mg/kg	U
Thallium	7440-28-0	2	0.569	6.24	ND	mg/kg	U
Zinc	7440-66-6	2	0.199	1.25	82.2	mg/kg	



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Reported:
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WC - 4 - 2 ft
17F0434-05 (Solid)

Metals and Metallic Compounds

Method: EPA 7471B

Sampled: 06/27/2017 15:30

Instrument: CETAC

Analyzed: 30-Jun-2017 14:22

Sample Preparation:

Preparation Method: SMM EPA 7471B

Preparation Batch: BFF0838

Prepared: 30-Jun-2017

Sample Size: 0.23 g (wet)

Final Volume: 50 mL

Dry Weight: 0.17 g

% Solids: 75.93

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Mercury	7439-97-6	1	0.02863	ND	mg/kg	U



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Reported:
28-Jul-2017 15:26

WC - 4 - 2 ft
17F0434-05 (Solid)

Wet Chemistry

Method: Plumb 1981, Combustion IR

Sampled: 06/27/2017 15:30

Instrument: APOLLO1

Analyzed: 17-Jul-2017 13:43

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.76 g

% Solids: 75.93

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.18	%	



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Reported:
28-Jul-2017 15:26

WC - 4 - 2 ft
17F0434-05 (Solid)

Wet Chemistry

Method: PSEP 1986

Sampled: 06/27/2017 15:30

Instrument: N/A

Analyzed: 29-Jun-2017 11:44

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFF0832

Prepared: 29-Jun-2017

Sample Size: 5 g (wet)

Final Volume: 5 g

Dry Weight: 3.80 g

% Solids: 75.93

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids, Sulfide		1	0.040	73.3	%	



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Reported:
28-Jul-2017 15:26

WC - 4 - 2 ft
17F0434-05 (Solid)

Wet Chemistry

Method: SM 2540 G-97

Sampled: 06/27/2017 15:30

Instrument: N/A

Analyzed: 05-Jul-2017 11:59

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.76 g

% Solids: 75.93

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	75.93	%	



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Reported:
28-Jul-2017 15:26

WC - 4 - 2 ft
17F0434-05 (Solid)

Wet Chemistry

Method: SM 4500-NH3 H-97

Sampled: 06/27/2017 15:30

Instrument: LACHAT2

Analyzed: 01-Jul-2017 13:43

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.39 g (wet)

Final Volume: 40 mL

Dry Weight: 3.33 g

% Solids: 75.93

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.48	7.50	mg/kg NH3-N	



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Reported:
28-Jul-2017 15:26

WC - 4 - 2 ft
17F0434-05 (Solid)

Wet Chemistry

Method: SM 4500-NO₃⁻ I-00

Sampled: 06/27/2017 15:30

Instrument: LACHAT2

Analyzed: 01-Jul-2017 17:16

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.39 g (wet)

Final Volume: 40 mL

Dry Weight: 3.33 g

% Solids: 75.93

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.12	ND	mg-N/kg	U



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Reported:
28-Jul-2017 15:26

WC - 4 - 2 ft
17F0434-05 (Solid)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 06/27/2017 15:30

Instrument: UV1800-2

Analyzed: 14-Jul-2017 15:16

Sample Preparation:

Preparation Method: SM 4500-P B-4 Strong Acid

Preparation Batch: BFG0152

Sample Size: 0.3314 g (wet)

Dry Weight: 0.25 g

Prepared: 13-Jul-2017

Final Volume: 50 mL

% Solids: 75.93

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	20	31.8	378	mg-P/kg	D



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Reported:
28-Jul-2017 15:26

WC - 4 - 2 ft
17F0434-05RE1 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00

Sampled: 06/27/2017 15:30

Instrument: UV1800-2

Analyzed: 30-Jun-2017 12:26

Sample Preparation:

Preparation Method: PSEP 1986

Preparation Batch: BFF0843

Prepared: 29-Jun-2017

Sample Size: 5.366 g (wet)

Final Volume: 100 mL

Dry Weight: 3.93 g

% Solids: 73.30

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	2	2.54	29.8	mg/kg	D



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Reported:
28-Jul-2017 15:26

WC - 4 - Deep
17F0434-06 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 16:00

Instrument: NT5

Analyzed: 06-Jul-2017 19:54

Sample Preparation: Preparation Method: EPA 5035 (Sodium Bisulfate)
Preparation Batch: BFG0079 Sample Size: 5.93 g (wet) Dry Weight: 4.88 g
Prepared: 06-Jul-2017 Final Volume: 5 mL % Solids: 82.35

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.27	1.02	ND	ug/kg	U
Vinyl Chloride	75-01-4	1	0.24	1.02	ND	ug/kg	U
Bromomethane	74-83-9	1	0.19	1.02	ND	ug/kg	U
Chloroethane	75-00-3	1	0.47	1.02	ND	ug/kg	U
Trichlorofluoromethane	75-69-4	1	0.27	1.02	ND	ug/kg	U
Acrolein	107-02-8	1	3.90	5.12	ND	ug/kg	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.29	2.05	ND	ug/kg	U
Acetone	67-64-1	1	0.49	5.12	21.5	ug/kg	
1,1-Dichloroethene	75-35-4	1	0.34	1.02	ND	ug/kg	U
Bromoethane	74-96-4	1	0.45	2.05	ND	ug/kg	U
Iodomethane	74-88-4	1	0.22	1.02	ND	ug/kg	U
Methylene Chloride	75-09-2	1	0.65	2.05	4.73	ug/kg	B
Acrylonitrile	107-13-1	1	1.05	5.12	ND	ug/kg	U
Carbon Disulfide	75-15-0	1	0.57	1.02	5.41	ug/kg	
trans-1,2-Dichloroethene	156-60-5	1	0.27	1.02	ND	ug/kg	U
Vinyl Acetate	108-05-4	1	0.39	5.12	ND	ug/kg	U
2-Butanone	78-93-3	1	0.53	5.12	2.01	ug/kg	J
2,2-Dichloropropane	594-20-7	1	0.30	1.02	ND	ug/kg	U
cis-1,2-Dichloroethene	156-59-2	1	0.25	1.02	ND	ug/kg	U
Chloroform	67-66-3	1	0.24	1.02	ND	ug/kg	U
Bromochloromethane	74-97-5	1	0.33	1.02	ND	ug/kg	U
1,1,1-Trichloroethane	71-55-6	1	0.23	1.02	ND	ug/kg	U
1,1-Dichloropropene	563-58-6	1	0.32	1.02	ND	ug/kg	U
Carbon tetrachloride	56-23-5	1	0.22	1.02	ND	ug/kg	U
1,2-Dichloroethane	107-06-2	1	0.20	1.02	ND	ug/kg	U
Benzene	71-43-2	1	0.30	1.02	ND	ug/kg	U
Trichloroethene	79-01-6	1	0.22	1.02	ND	ug/kg	U
1,2-Dichloropropane	78-87-5	1	0.17	1.02	ND	ug/kg	U
Bromodichloromethane	75-27-4	1	0.26	1.02	ND	ug/kg	U
Dibromomethane	74-95-3	1	0.15	1.02	ND	ug/kg	U
2-Chloroethyl vinyl ether	110-75-8	1	0.28	5.12	ND	ug/kg	U
4-Methyl-2-Pentanone	108-10-1	1	0.43	5.12	ND	ug/kg	U
cis-1,3-Dichloropropene	10061-01-5	1	0.23	1.02	ND	ug/kg	U
Toluene	108-88-3	1	0.15	1.02	0.88	ug/kg	J
trans-1,3-Dichloropropene	10061-02-6	1	0.22	1.02	ND	ug/kg	U
2-Hexanone	591-78-6	1	0.45	5.12	ND	ug/kg	U



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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 4 - Deep
17F0434-06 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 16:00

Instrument: NT5

Analyzed: 06-Jul-2017 19:54

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
1,1,2-Trichloroethane	79-00-5	1	0.29	1.02	ND	ug/kg	U
1,3-Dichloropropane	142-28-9	1	0.21	1.02	ND	ug/kg	U
Tetrachloroethene	127-18-4	1	0.26	1.02	ND	ug/kg	U
Dibromochloromethane	124-48-1	1	0.27	1.02	ND	ug/kg	U
1,2-Dibromoethane	106-93-4	1	0.18	1.02	ND	ug/kg	U
Chlorobenzene	108-90-7	1	0.22	1.02	ND	ug/kg	U
Ethylbenzene	100-41-4	1	0.21	1.02	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.24	1.02	ND	ug/kg	U
m,p-Xylene	179601-23-1	1	0.40	1.02	ND	ug/kg	U
Xylenes, total	1330-20-7	1	0.63	2.05	ND	ug/kg	U
Styrene	100-42-5	1	0.14	1.02	ND	ug/kg	U
Bromoform	75-25-2	1	0.30	1.02	ND	ug/kg	U
1,1,2,2-Tetrachloroethane	79-34-5	1	0.26	1.02	ND	ug/kg	U
1,2,3-Trichloropropane	96-18-4	1	0.53	2.05	ND	ug/kg	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	0.45	5.12	ND	ug/kg	U
n-Propylbenzene	103-65-1	1	0.28	1.02	ND	ug/kg	U
Bromobenzene	108-86-1	1	0.16	1.02	ND	ug/kg	U
Isopropyl Benzene	98-82-8	1	0.24	1.02	ND	ug/kg	U
2-Chlorotoluene	95-49-8	1	0.31	1.02	ND	ug/kg	U
4-Chlorotoluene	106-43-4	1	0.28	1.02	ND	ug/kg	U
t-Butylbenzene	98-06-6	1	0.31	1.02	ND	ug/kg	U
1,3,5-Trimethylbenzene	108-67-8	1	0.26	1.02	ND	ug/kg	U
1,2,4-Trimethylbenzene	95-63-6	1	0.24	1.02	ND	ug/kg	U
s-Butylbenzene	135-98-8	1	0.25	1.02	ND	ug/kg	U
4-Isopropyl Toluene	99-87-6	1	0.24	1.02	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	0.23	1.02	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	0.24	1.02	ND	ug/kg	U
n-Butylbenzene	104-51-8	1	0.27	1.02	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	0.30	1.02	ND	ug/kg	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.60	5.12	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	0.34	5.12	ND	ug/kg	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.42	5.12	ND	ug/kg	U
Naphthalene	91-20-3	1	0.44	5.12	ND	ug/kg	U
1,2,3-Trichlorobenzene	87-61-6	1	0.31	5.12	ND	ug/kg	U
Dichlorodifluoromethane	75-71-8	1	0.21	1.02	ND	ug/kg	U
Methyl tert-butyl Ether	1634-04-4	1	0.24	1.02	ND	ug/kg	U
2-Pentanone	107-87-9	1	5.12	5.12	ND	ug/kg	U
Surrogate: 1,2-Dichloroethane-d4				80-149 %	114	%	
Surrogate: Toluene-d8				77-120 %	101	%	



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Project: Willow Creek Daylight
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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 4 - Deep
17F0434-06 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 16:00

Instrument: NT5

Analyzed: 06-Jul-2017 19:54

Analyte	CAS Number	Recovery Limits	Recovery	Units	Notes
Surrogate: 4-Bromofluorobenzene		80-120 %	96.9	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	105	%	



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Reported:
28-Jul-2017 15:26

WC - 4 - Deep
17F0434-06 (Solid)

Volatile Organic Compounds

Method: NWTPHg
Instrument: NT3

Sampled: 06/27/2017 16:00
Analyzed: 28-Jun-2017 20:07

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFF0798 Sample Size: 4.693 g (wet) Dry Weight: 3.86 g
Prepared: 28-Jun-2017 Final Volume: 5 mL % Solids: 82.35

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	7540	ND	ug/kg	U
Surrogate: Toluene-d8			80-120 %	97.5	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	93.6	%	



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Reported:
28-Jul-2017 15:26

WC - 4 - Deep
17F0434-06 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 16:00

Instrument: NT10

Analyzed: 11-Jul-2017 16:02

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0828 Sample Size: 12.32 g (wet) Dry Weight: 10.15 g
Prepared: 29-Jun-2017 Final Volume: 1 mL % Solids: 82.35

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Phenol	108-95-2	1	8.1	19.7	9.1	ug/kg	J
bis(2-chloroethyl) ether	111-44-4	1	6.7	19.7	ND	ug/kg	U
2-Chlorophenol	95-57-8	1	6.4	19.7	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	5.0	19.7	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	4.3	19.7	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	4.6	19.7	ND	ug/kg	U
Benzyl Alcohol	100-51-6	1	14.7	19.7	ND	ug/kg	U
2,2'-Oxybis(1-chloropropane)	108-60-1	1	5.6	19.7	ND	ug/kg	U
2-Methylphenol	95-48-7	1	7.7	19.7	ND	ug/kg	U
Hexachloroethane	67-72-1	1	5.6	19.7	ND	ug/kg	U
N-Nitroso-di-n-Propylamine	621-64-7	1	10.6	19.7	ND	ug/kg	U
4-Methylphenol	106-44-5	1	14.5	19.7	ND	ug/kg	U
Nitrobenzene	98-95-3	1	7.8	19.7	ND	ug/kg	U
Isophorone	78-59-1	1	7.6	19.7	ND	ug/kg	U
2-Nitrophenol	88-75-5	1	6.8	19.7	ND	ug/kg	U
2,4-Dimethylphenol	105-67-9	1	26.4	98.6	ND	ug/kg	U
Bis(2-Chloroethoxy)methane	111-91-1	1	6.2	19.7	ND	ug/kg	U
2,4-Dichlorophenol	120-83-2	1	31.5	98.6	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	5.9	19.7	ND	ug/kg	U
Naphthalene	91-20-3	1	5.2	19.7	ND	ug/kg	U
Benzoic acid	65-85-0	1	58.3	197	ND	ug/kg	U
4-Chloroaniline	106-47-8	1	33.2	98.6	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	4.9	19.7	ND	ug/kg	U
4-Chloro-3-Methylphenol	59-50-7	1	28.5	98.6	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	5.6	19.7	ND	ug/kg	U
Hexachlorocyclopentadiene	77-47-4	1	40.7	98.6	ND	ug/kg	U
2,4,6-Trichlorophenol	88-06-2	1	25.0	98.6	ND	ug/kg	U
2,4,5-Trichlorophenol	95-95-4	1	26.5	98.6	ND	ug/kg	U
2-Chloronaphthalene	91-58-7	1	4.4	19.7	ND	ug/kg	U
2-Nitroaniline	88-74-4	1	29.8	98.6	ND	ug/kg	U
Acenaphthylene	208-96-8	1	4.7	19.7	ND	ug/kg	U
Dimethylphthalate	131-11-3	1	6.3	19.7	ND	ug/kg	U
2,6-Dinitrotoluene	606-20-2	1	26.3	98.6	ND	ug/kg	U
Acenaphthene	83-32-9	1	5.1	19.7	ND	ug/kg	U
3-Nitroaniline	99-09-2	1	37.2	98.6	ND	ug/kg	U
2,4-Dinitrophenol	51-28-5	1	40.7	197	ND	ug/kg	U



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 4 - Deep
17F0434-06 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 16:00

Instrument: NT10

Analyzed: 11-Jul-2017 16:02

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dibenzofuran	132-64-9	1	4.5	19.7	ND	ug/kg	U
4-Nitrophenol	100-02-7	1	43.8	98.6	ND	ug/kg	U
2,4-Dinitrotoluene	121-14-2	1	22.6	98.6	ND	ug/kg	U
Fluorene	86-73-7	1	4.9	19.7	ND	ug/kg	U
4-Chlorophenylphenyl ether	7005-72-3	1	6.9	19.7	ND	ug/kg	U
Diethyl phthalate	84-66-2	1	17.4	19.7	ND	ug/kg	U
4-Nitroaniline	100-01-6	1	34.4	98.6	ND	ug/kg	U
4,6-Dinitro-2-methylphenol	534-52-1	1	49.8	197	ND	ug/kg	U
N-Nitrosodiphenylamine	86-30-6	1	9.4	19.7	ND	ug/kg	U
4-Bromophenyl phenyl ether	101-55-3	1	6.0	19.7	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	4.7	19.7	ND	ug/kg	U
Pentachlorophenol	87-86-5	1	30.9	98.6	ND	ug/kg	U
Phenanthrene	85-01-8	1	4.6	19.7	78.0	ug/kg	
Anthracene	120-12-7	1	5.8	19.7	16.3	ug/kg	J
Carbazole	86-74-8	1	7.3	19.7	11.5	ug/kg	J
Di-n-Butylphthalate	84-74-2	1	5.2	19.7	ND	ug/kg	U
Fluoranthene	206-44-0	1	4.5	19.7	144	ug/kg	
Pyrene	129-00-0	1	5.5	19.7	124	ug/kg	
Butylbenzylphthalate	85-68-7	1	7.9	19.7	109	ug/kg	
Benzo(a)anthracene	56-55-3	1	5.1	19.7	55.8	ug/kg	
3,3'-Dichlorobenzidine	91-94-1	1	30.8	98.6	ND	ug/kg	U
Chrysene	218-01-9	1	5.1	19.7	87.2	ug/kg	
bis(2-Ethylhexyl)phthalate	117-81-7	1	28.4	49.3	636	ug/kg	
Di-n-Octylphthalate	117-84-0	1	8.6	19.7	ND	ug/kg	U
Benzofluoranthenes, Total		1	10.1	39.4	126	ug/kg	
Benzo(a)pyrene	50-32-8	1	6.4	19.7	61.8	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	5.9	19.7	45.3	ug/kg	
Dibenzo(a,h)anthracene	53-70-3	1	6.1	19.7	19.8	ug/kg	
Benzo(g,h,i)perylene	191-24-2	1	5.7	19.7	50.9	ug/kg	
1-Methylnaphthalene	90-12-0	1	5.9	19.7	ND	ug/kg	U
Surrogate: 2-Fluorophenol				27-120 %	68.5	%	
Surrogate: Phenol-d5				29-120 %	74.2	%	
Surrogate: 2-Chlorophenol-d4				31-120 %	82.0	%	
Surrogate: 1,2-Dichlorobenzene-d4				32-120 %	82.0	%	
Surrogate: Nitrobenzene-d5				30-120 %	83.7	%	
Surrogate: 2-Fluorobiphenyl				35-120 %	94.8	%	
Surrogate: 2,4,6-Tribromophenol				24-134 %	112	%	
Surrogate: p-Terphenyl-d14				37-120 %	96.5	%	



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Project: Willow Creek Daylight
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Reported:
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WC - 4 - Deep
17F0434-06 (Solid)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM

Sampled: 06/27/2017 16:00

Instrument: NT8

Analyzed: 11-Jul-2017 14:12

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0829 Prepared: 30-Jun-2017	Sample Size: 12.36 g (wet) Final Volume: 0.5 mL	Dry Weight: 10.18 g % Solids: 82.35
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0051 Cleaned: 11-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0050 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Naphthalene	91-20-3	1	1.25	4.91	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	1.08	4.91	ND	ug/kg	U
1-Methylnaphthalene	90-12-0	1	0.39	4.91	ND	ug/kg	U
Acenaphthylene	208-96-8	1	1.06	4.91	ND	ug/kg	U
Acenaphthene	83-32-9	1	0.56	4.91	ND	ug/kg	U
Dibenzofuran	132-64-9	1	1.35	4.91	ND	ug/kg	U
Fluorene	86-73-7	1	0.62	4.91	3.27	ug/kg	J
Phenanthrene	85-01-8	1	0.71	4.91	30.4	ug/kg	
Anthracene	120-12-7	1	0.86	4.91	6.98	ug/kg	
Fluoranthene	206-44-0	1	0.46	4.91	81.0	ug/kg	
Pyrene	129-00-0	1	0.62	4.91	64.2	ug/kg	
Benzo(a)anthracene	56-55-3	1	0.81	4.91	31.7	ug/kg	
Chrysene	218-01-9	1	1.03	4.91	39.3	ug/kg	
Benzo(b)fluoranthene	205-99-2	1	1.35	4.91	33.9	ug/kg	
Benzo(k)fluoranthene	207-08-9	1	0.75	4.91	17.2	ug/kg	
Benzo(j)fluoranthene	205-82-3	1	0.67	4.91	14.7	ug/kg	
Benzofluoranthenes, Total		1	2.96	9.82	67.1	ug/kg	
Benzo(a)pyrene	50-32-8	1	0.60	4.91	33.8	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	1.03	4.91	25.5	ug/kg	
Dibenzo(a,h)anthracene	53-70-3	1	0.88	4.91	7.19	ug/kg	
Benzo(g,h,i)perylene	191-24-2	1	1.05	4.91	29.9	ug/kg	
Surrogate: 2-Methylnaphthalene-d10				32-120 %	58.8	%	
Surrogate: Dibenzo[a,h]anthracene-d14				21-133 %	86.3	%	
Surrogate: Fluoranthene-d10				36-134 %	75.6	%	



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WC - 4 - Deep
17F0434-06 (Solid)

Butyl Tins

Method: EPA 8270D-SIM

Sampled: 06/27/2017 16:00

Instrument: NT12

Analyzed: 08-Jul-2017 09:34

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		
	Preparation Batch: BFF0827	Sample Size: 6.07 g (wet)	Dry Weight: 5.00 g
	Prepared: 30-Jun-2017	Final Volume: 0.5 mL	% Solids: 82.35
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CFG0024	Initial Volume: 0.5 mL	
	Cleaned: 07-Jul-2017	Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.450	3.86	0.551	ug/kg	J
Dibutyltin Ion	14488-53-0	1	1.73	5.78	ND	ug/kg	U
Butyltin Ion	78763-54-9	1	1.89	4.08	2.19	ug/kg	J
Tetrabutyltin	1461-25-2	1	5.00	5.00	ND	ug/kg	U
Surrogate: Triphenyltin					30-160 %	50.6 %	
Surrogate: Tripropyltin					30-160 %	49.5 %	



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Reported:
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WC - 4 - Deep
17F0434-06 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 06/27/2017 16:00

Instrument: FID4

Analyzed: 11-Jul-2017 16:03

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0822 Sample Size: 10.08 g (wet) Dry Weight: 8.30 g
Prepared: 30-Jun-2017 Final Volume: 1 mL % Solids: 82.35

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.02	34.5	mg/kg	
Motor Oil Range Organics (C24-C38)		1	12.0	171	mg/kg	B
Surrogate: o-Terphenyl			50-150 %	104	%	



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Reported:
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WC - 4 - Deep
17F0434-06 (Solid)

Chlorinated Pesticides

Method: EPA 8081B
Instrument: ECD6

Sampled: 06/27/2017 16:00

Analyzed: 11-Jul-2017 17:52

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0825 Prepared: 29-Jun-2017	Sample Size: 15.33 g (wet) Final Volume: 2.5 mL	Dry Weight: 12.62 g % Solids: 82.35
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0049 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0048 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0047 Cleaned: 07-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	1	0.08	0.50	ND	ug/kg	U
beta-BHC	319-85-7	1	0.09	0.50	ND	ug/kg	U
gamma-BHC (Lindane)	58-89-9	1	0.07	0.50	ND	ug/kg	U
delta-BHC	319-86-8	1	0.06	0.50	ND	ug/kg	U
Heptachlor	76-44-8	1	0.05	0.50	ND	ug/kg	U
Aldrin	309-00-2	1	0.37	0.50	ND	ug/kg	U
Heptachlor Epoxide	1024-57-3	1	0.17	0.50	ND	ug/kg	U
trans-Chlordane (beta-Chlordane)	5103-74-2	1	0.32	0.50	ND	ug/kg	U
cis-Chlordane (alpha-chlordane)	5103-71-9	1	0.11	0.50	ND	ug/kg	U
Endosulfan I	959-98-8	1	0.07	0.50	ND	ug/kg	U
4,4'-DDE	72-55-9	1	0.13	0.99	0.93	ug/kg	J
Dieldrin	60-57-1	1	0.11	0.99	ND	ug/kg	U
Endrin	72-20-8	1	0.14	0.99	ND	ug/kg	U
Endosulfan II	33213-65-9	1	0.31	0.99	ND	ug/kg	U
4,4'-DDD	72-54-8	1	0.32	0.99	2.34	ug/kg	
Endrin Aldehyde	7421-93-4	1	0.39	0.99	ND	ug/kg	U
4,4'-DDT	50-29-3	1	0.32	0.99	ND	ug/kg	U
Endosulfan Sulfate	1031-07-8	1	0.12	0.99	ND	ug/kg	U
Endrin Ketone	53494-70-5	1	0.28	0.99	ND	ug/kg	U
Methoxychlor	72-43-5	1	0.30	4.95	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	0.34	0.50	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	0.14	0.50	ND	ug/kg	U
2,4'-DDE	3424-82-6	1	0.25	0.99	ND	ug/kg	U
2,4'-DDD	53-19-0	1	0.19	0.99	ND	ug/kg	U
2,4'-DDT	789-02-6	1	0.19	0.99	ND	ug/kg	U
Oxychlordane	27304-13-8	1	0.13	0.99	ND	ug/kg	U
cis-Nonachlor	5103-73-1	1	0.21	0.99	ND	ug/kg	U



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WC - 4 - Deep
17F0434-06 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 16:00

Instrument: ECD6

Analyzed: 11-Jul-2017 17:52

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
trans-Nonachlor	39765-80-5	1	0.23	0.99	ND	ug/kg	U
Mirex	2385-85-5	1	0.64	0.99	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				30-160 %	134	%	
Surrogate: Decachlorobiphenyl [2C]				30-160 %	81.1	%	
Surrogate: Tetrachlorometaxylene				30-160 %	75.2	%	
Surrogate: Tetrachlorometaxylene [2C]				30-160 %	72.5	%	



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WC - 4 - Deep
17F0434-06 (Solid)

Aroclor PCB

Method: EPA 8082A

Sampled: 06/27/2017 16:00

Instrument: ECD7

Analyzed: 07-Jul-2017 19:11

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0826 Prepared: 05-Jul-2017	Sample Size: 6.18 g (wet) Final Volume: 5 mL	Dry Weight: 5.09 g % Solids: 82.35
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0027 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid Cleanup Batch: CFG0025 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0026 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aroclor 1016	12674-11-2	1	7.9	19.6	ND	ug/kg	U
Aroclor 1221	11104-28-2	1	7.9	19.6	ND	ug/kg	U
Aroclor 1232	11141-16-5	1	7.9	19.6	ND	ug/kg	U
Aroclor 1242	53469-21-9	1	7.9	19.6	ND	ug/kg	U
Aroclor 1248	12672-29-6	1	7.9	19.6	ND	ug/kg	U
Aroclor 1254	11097-69-1	1	7.9	19.6	ND	ug/kg	U
Aroclor 1260	11096-82-5	1	9.1	19.6	ND	ug/kg	U
Aroclor 1262	37324-23-5	1	9.1	19.6	ND	ug/kg	U
Aroclor 1268	11100-14-4	1	9.1	19.6	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				40-133 %	87.7	%	
Surrogate: Tetrachlorometaxylene				53-120 %	81.1	%	
Surrogate: Decachlorobiphenyl [2C]				40-133 %	82.8	%	
Surrogate: Tetrachlorometaxylene [2C]				53-120 %	78.2	%	



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Reported:
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WC - 4 - Deep
17F0434-06 (Solid)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 06/27/2017 16:00

Instrument: ICP2

Analyzed: 07-Jul-2017 19:20

Sample Preparation:

Preparation Method: SWC EPA 3050B

Preparation Batch: BFF0836

Prepared: 30-Jun-2017

Sample Size: 1.091 g (wet)

Final Volume: 50 mL

Dry Weight: 0.83 g

% Solids: 75.62

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Antimony	7440-36-0	2	0.274	6.06	0.515	mg/kg	J
Arsenic	7440-38-2	2	0.340	6.06	0.546	mg/kg	J
Beryllium	7440-41-7	2	0.0070	0.121	0.102	mg/kg	J
Cadmium	7440-43-9	2	0.0150	0.242	0.276	mg/kg	
Chromium	7440-47-3	2	0.0571	0.606	21.5	mg/kg	
Copper	7440-50-8	2	0.0299	0.242	9.94	mg/kg	
Lead	7439-92-1	2	0.158	2.42	23.3	mg/kg	
Nickel	7440-02-0	2	0.241	1.21	28.5	mg/kg	
Selenium	7782-49-2	2	0.989	6.06	ND	mg/kg	U
Silver	7440-22-4	2	0.0532	0.364	ND	mg/kg	U
Thallium	7440-28-0	2	0.553	6.06	ND	mg/kg	U
Zinc	7440-66-6	2	0.193	1.21	82.6	mg/kg	



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WC - 4 - Deep
17F0434-06 (Solid)

Metals and Metallic Compounds

Method: EPA 7471B

Sampled: 06/27/2017 16:00

Instrument: CETAC

Analyzed: 30-Jun-2017 14:23

Sample Preparation:

Preparation Method: SMM EPA 7471B

Preparation Batch: BFF0838

Prepared: 30-Jun-2017

Sample Size: 0.234 g (wet)

Final Volume: 50 mL

Dry Weight: 0.18 g

% Solids: 75.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Mercury	7439-97-6	1	0.02826	ND	mg/kg	U



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Reported:
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WC - 4 - Deep
17F0434-06 (Solid)

Wet Chemistry

Method: Plumb 1981, Combustion IR

Sampled: 06/27/2017 16:00

Instrument: APOLLO1

Analyzed: 17-Jul-2017 13:52

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.76 g

% Solids: 75.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.38	%	



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Reported:
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WC - 4 - Deep
17F0434-06 (Solid)

Wet Chemistry

Method: PSEP 1986

Sampled: 06/27/2017 16:00

Instrument: N/A

Analyzed: 29-Jun-2017 11:44

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFF0832

Prepared: 29-Jun-2017

Sample Size: 5 g (wet)

Final Volume: 5 g

Dry Weight: 3.78 g

% Solids: 75.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids, Sulfide		1	0.040	76.3	%	



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Reported:
28-Jul-2017 15:26

WC - 4 - Deep
17F0434-06 (Solid)

Wet Chemistry

Method: SM 2540 G-97

Sampled: 06/27/2017 16:00

Instrument: N/A

Analyzed: 05-Jul-2017 11:59

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.76 g

% Solids: 75.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	75.62	%	



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WC - 4 - Deep
17F0434-06 (Solid)

Wet Chemistry

Method: SM 4500-NH3 H-97

Sampled: 06/27/2017 16:00

Instrument: LACHAT2

Analyzed: 01-Jul-2017 13:45

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.11 g (wet)

Final Volume: 40 mL

Dry Weight: 3.11 g

% Solids: 75.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.51	5.54	mg/kg NH3-N	



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Reported:
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WC - 4 - Deep
17F0434-06 (Solid)

Wet Chemistry

Method: SM 4500-NO₃⁻ I-00

Sampled: 06/27/2017 16:00

Instrument: LACHAT2

Analyzed: 01-Jul-2017 17:17

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.11 g (wet)

Final Volume: 40 mL

Dry Weight: 3.11 g

% Solids: 75.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.13	ND	mg-N/kg	U



Shannon & Wilson, Inc
400 N 34th St., Suite 100
Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 4 - Deep
17F0434-06 (Solid)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 06/27/2017 16:00

Instrument: UV1800-2

Analyzed: 14-Jul-2017 15:17

Sample Preparation:

Preparation Method: SM 4500-P B-4 Strong Acid

Preparation Batch: BFG0152

Prepared: 13-Jul-2017

Sample Size: 0.3196 g (wet)

Final Volume: 50 mL

Dry Weight: 0.24 g

% Solids: 75.62

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	20	33.1	600	mg-P/kg	D



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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 4 - Deep
17F0434-06 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00

Sampled: 06/27/2017 16:00

Instrument: UV1800-2

Analyzed: 30-Jun-2017 11:30

Sample Preparation:

Preparation Method: PSEP 1986

Preparation Batch: BFF0843

Prepared: 29-Jun-2017

Sample Size: 5.073 g (wet)

Final Volume: 100 mL

Dry Weight: 3.87 g

% Solids: 76.30

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	1.29	10.0	mg/kg	



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Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 17:30

Instrument: NT5

Analyzed: 06-Jul-2017 20:17

Sample Preparation: Preparation Method: EPA 5035 (Sodium Bisulfate)
Preparation Batch: BFG0079 Sample Size: 7.12 g (wet) Dry Weight: 5.61 g
Prepared: 06-Jul-2017 Final Volume: 5 mL % Solids: 78.73

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.23	0.89	ND	ug/kg	U
Vinyl Chloride	75-01-4	1	0.21	0.89	ND	ug/kg	U
Bromomethane	74-83-9	1	0.17	0.89	ND	ug/kg	U
Chloroethane	75-00-3	1	0.41	0.89	ND	ug/kg	U
Trichlorofluoromethane	75-69-4	1	0.24	0.89	ND	ug/kg	U
Acrolein	107-02-8	1	3.40	4.46	ND	ug/kg	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.26	1.78	ND	ug/kg	U
Acetone	67-64-1	1	0.43	4.46	108	ug/kg	
1,1-Dichloroethene	75-35-4	1	0.30	0.89	ND	ug/kg	U
Bromoethane	74-96-4	1	0.39	1.78	ND	ug/kg	U
Iodomethane	74-88-4	1	0.19	0.89	ND	ug/kg	U
Methylene Chloride	75-09-2	1	0.57	1.78	4.82	ug/kg	B
Acrylonitrile	107-13-1	1	0.92	4.46	ND	ug/kg	U
Carbon Disulfide	75-15-0	1	0.50	0.89	5.91	ug/kg	
trans-1,2-Dichloroethene	156-60-5	1	0.24	0.89	ND	ug/kg	U
Vinyl Acetate	108-05-4	1	0.34	4.46	ND	ug/kg	U
1,1-Dichloroethane	75-34-3	1	0.18	0.89	ND	ug/kg	U
2-Butanone	78-93-3	1	0.46	4.46	5.11	ug/kg	
2,2-Dichloropropane	594-20-7	1	0.26	0.89	ND	ug/kg	U
cis-1,2-Dichloroethene	156-59-2	1	0.21	0.89	ND	ug/kg	U
Chloroform	67-66-3	1	0.21	0.89	ND	ug/kg	U
Bromochloromethane	74-97-5	1	0.29	0.89	ND	ug/kg	U
1,1,1-Trichloroethane	71-55-6	1	0.20	0.89	ND	ug/kg	U
1,1-Dichloropropene	563-58-6	1	0.28	0.89	ND	ug/kg	U
Carbon tetrachloride	56-23-5	1	0.19	0.89	ND	ug/kg	U
1,2-Dichloroethane	107-06-2	1	0.17	0.89	ND	ug/kg	U
Benzene	71-43-2	1	0.26	0.89	ND	ug/kg	U
Trichloroethene	79-01-6	1	0.19	0.89	ND	ug/kg	U
1,2-Dichloropropane	78-87-5	1	0.14	0.89	ND	ug/kg	U
Bromodichloromethane	75-27-4	1	0.23	0.89	ND	ug/kg	U
Dibromomethane	74-95-3	1	0.13	0.89	ND	ug/kg	U
2-Chloroethyl vinyl ether	110-75-8	1	0.25	4.46	ND	ug/kg	U
4-Methyl-2-Pentanone	108-10-1	1	0.37	4.46	ND	ug/kg	U
cis-1,3-Dichloropropene	10061-01-5	1	0.20	0.89	ND	ug/kg	U
Toluene	108-88-3	1	0.13	0.89	20.0	ug/kg	
trans-1,3-Dichloropropene	10061-02-6	1	0.19	0.89	ND	ug/kg	U



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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 17:30

Instrument: NT5

Analyzed: 06-Jul-2017 20:17

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	0.39	4.46	7.19	ug/kg	
1,1,2-Trichloroethane	79-00-5	1	0.26	0.89	ND	ug/kg	U
1,3-Dichloropropane	142-28-9	1	0.19	0.89	ND	ug/kg	U
Tetrachloroethene	127-18-4	1	0.23	0.89	ND	ug/kg	U
Dibromochloromethane	124-48-1	1	0.24	0.89	ND	ug/kg	U
1,2-Dibromoethane	106-93-4	1	0.16	0.89	ND	ug/kg	U
Chlorobenzene	108-90-7	1	0.20	0.89	ND	ug/kg	U
Ethylbenzene	100-41-4	1	0.18	0.89	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.21	0.89	ND	ug/kg	U
m,p-Xylene	179601-23-1	1	0.35	0.89	ND	ug/kg	U
o-Xylene	95-47-6	1	0.20	0.89	0.32	ug/kg	J
Xylenes, total	1330-20-7	1	0.55	1.78	ND	ug/kg	U
Styrene	100-42-5	1	0.12	0.89	ND	ug/kg	U
Bromoform	75-25-2	1	0.26	0.89	ND	ug/kg	U
1,1,1,2,2-Tetrachloroethane	79-34-5	1	0.23	0.89	ND	ug/kg	U
1,2,3-Trichloropropane	96-18-4	1	0.46	1.78	ND	ug/kg	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	0.39	4.46	ND	ug/kg	U
n-Propylbenzene	103-65-1	1	0.24	0.89	ND	ug/kg	U
Bromobenzene	108-86-1	1	0.14	0.89	ND	ug/kg	U
Isopropyl Benzene	98-82-8	1	0.21	0.89	ND	ug/kg	U
2-Chlorotoluene	95-49-8	1	0.27	0.89	ND	ug/kg	U
4-Chlorotoluene	106-43-4	1	0.25	0.89	ND	ug/kg	U
t-Butylbenzene	98-06-6	1	0.27	0.89	ND	ug/kg	U
1,3,5-Trimethylbenzene	108-67-8	1	0.23	0.89	ND	ug/kg	U
1,2,4-Trimethylbenzene	95-63-6	1	0.21	0.89	0.45	ug/kg	J
s-Butylbenzene	135-98-8	1	0.21	0.89	ND	ug/kg	U
4-Isopropyl Toluene	99-87-6	1	0.21	0.89	11.6	ug/kg	
1,3-Dichlorobenzene	541-73-1	1	0.20	0.89	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	0.21	0.89	ND	ug/kg	U
n-Butylbenzene	104-51-8	1	0.23	0.89	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	0.26	0.89	ND	ug/kg	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.52	4.46	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	0.30	4.46	ND	ug/kg	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.37	4.46	ND	ug/kg	U
Naphthalene	91-20-3	1	0.38	4.46	ND	ug/kg	U
1,2,3-Trichlorobenzene	87-61-6	1	0.27	4.46	ND	ug/kg	U
Dichlorodifluoromethane	75-71-8	1	0.18	0.89	ND	ug/kg	U
Methyl tert-butyl Ether	1634-04-4	1	0.21	0.89	ND	ug/kg	U
2-Pentanone	107-87-9	1	4.46	4.46	ND	ug/kg	U



Shannon & Wilson, Inc
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Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 17:30

Instrument: NT5

Analyzed: 06-Jul-2017 20:17

Analyte	CAS Number	Recovery Limits	Recovery	Units	Notes
Surrogate: 1,2-Dichloroethane-d4		80-149 %	109	%	
Surrogate: Toluene-d8		77-120 %	101	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	96.1	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	102	%	



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WC - 5 - 2 ft
17F0434-07 (Solid)

Volatile Organic Compounds

Method: NWTPHg

Sampled: 06/27/2017 17:30

Instrument: NT3

Analyzed: 28-Jun-2017 20:33

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFF0798 Sample Size: 7.662 g (wet) Dry Weight: 6.03 g
Prepared: 28-Jun-2017 Final Volume: 5 mL % Solids: 78.73

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	5500	ND	ug/kg	U
Surrogate: Toluene-d8			80-120 %	99.4	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	94.0	%	



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Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 17:30

Instrument: NT10

Analyzed: 11-Jul-2017 16:39

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0828 Sample Size: 13.17 g (wet) Dry Weight: 10.37 g
Prepared: 29-Jun-2017 Final Volume: 1 mL % Solids: 78.73

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Phenol	108-95-2	1	7.9	19.3	ND	ug/kg	U
bis(2-chloroethyl) ether	111-44-4	1	6.5	19.3	ND	ug/kg	U
2-Chlorophenol	95-57-8	1	6.2	19.3	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	4.9	19.3	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	4.2	19.3	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	4.5	19.3	ND	ug/kg	U
Benzyl Alcohol	100-51-6	1	14.4	19.3	ND	ug/kg	U
2,2'-Oxybis(1-chloropropane)	108-60-1	1	5.5	19.3	ND	ug/kg	U
2-Methylphenol	95-48-7	1	7.6	19.3	ND	ug/kg	U
Hexachloroethane	67-72-1	1	5.4	19.3	ND	ug/kg	U
N-Nitroso-di-n-Propylamine	621-64-7	1	10.4	19.3	ND	ug/kg	U
4-Methylphenol	106-44-5	1	14.2	19.3	14.3	ug/kg	J
Nitrobenzene	98-95-3	1	7.7	19.3	ND	ug/kg	U
Isophorone	78-59-1	1	7.5	19.3	ND	ug/kg	U
2-Nitrophenol	88-75-5	1	6.7	19.3	ND	ug/kg	U
2,4-Dimethylphenol	105-67-9	1	25.8	96.4	ND	ug/kg	U
Bis(2-Chloroethoxy)methane	111-91-1	1	6.1	19.3	ND	ug/kg	U
2,4-Dichlorophenol	120-83-2	1	30.9	96.4	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	5.7	19.3	ND	ug/kg	U
Naphthalene	91-20-3	1	5.1	19.3	ND	ug/kg	U
Benzoic acid	65-85-0	1	57.0	193	ND	ug/kg	U
4-Chloroaniline	106-47-8	1	32.5	96.4	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	4.8	19.3	ND	ug/kg	U
4-Chloro-3-Methylphenol	59-50-7	1	27.9	96.4	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	5.5	19.3	ND	ug/kg	U
Hexachlorocyclopentadiene	77-47-4	1	39.8	96.4	ND	ug/kg	U
2,4,6-Trichlorophenol	88-06-2	1	24.5	96.4	ND	ug/kg	U
2,4,5-Trichlorophenol	95-95-4	1	25.9	96.4	ND	ug/kg	U
2-Chloronaphthalene	91-58-7	1	4.3	19.3	ND	ug/kg	U
2-Nitroaniline	88-74-4	1	29.1	96.4	ND	ug/kg	U
Acenaphthylene	208-96-8	1	4.6	19.3	ND	ug/kg	U
Dimethylphthalate	131-11-3	1	6.2	19.3	ND	ug/kg	U
2,6-Dinitrotoluene	606-20-2	1	25.8	96.4	ND	ug/kg	U
Acenaphthene	83-32-9	1	4.9	19.3	11.2	ug/kg	J
3-Nitroaniline	99-09-2	1	36.4	96.4	ND	ug/kg	U
2,4-Dinitrophenol	51-28-5	1	39.8	193	ND	ug/kg	U



Shannon & Wilson, Inc
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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 17:30

Instrument: NT10

Analyzed: 11-Jul-2017 16:39

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dibenzofuran	132-64-9	1	4.4	19.3	7.9	ug/kg	J
4-Nitrophenol	100-02-7	1	42.8	96.4	ND	ug/kg	U
2,4-Dinitrotoluene	121-14-2	1	22.1	96.4	ND	ug/kg	U
Fluorene	86-73-7	1	4.8	19.3	19.6	ug/kg	
4-Chlorophenylphenyl ether	7005-72-3	1	6.7	19.3	ND	ug/kg	U
Diethyl phthalate	84-66-2	1	17.1	19.3	ND	ug/kg	U
4-Nitroaniline	100-01-6	1	33.7	96.4	ND	ug/kg	U
4,6-Dinitro-2-methylphenol	534-52-1	1	48.7	193	ND	ug/kg	U
N-Nitrosodiphenylamine	86-30-6	1	9.2	19.3	ND	ug/kg	U
4-Bromophenyl phenyl ether	101-55-3	1	5.9	19.3	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	4.6	19.3	ND	ug/kg	U
Pentachlorophenol	87-86-5	1	30.2	96.4	ND	ug/kg	U
Phenanthrene	85-01-8	1	4.5	19.3	345	ug/kg	
Anthracene	120-12-7	1	5.7	19.3	63.1	ug/kg	
Carbazole	86-74-8	1	7.1	19.3	81.3	ug/kg	
Di-n-Butylphthalate	84-74-2	1	5.1	19.3	ND	ug/kg	U
Fluoranthene	206-44-0	1	4.4	19.3	695	ug/kg	
Pyrene	129-00-0	1	5.4	19.3	528	ug/kg	
Butylbenzylphthalate	85-68-7	1	7.8	19.3	ND	ug/kg	U
Benzo(a)anthracene	56-55-3	1	5.0	19.3	276	ug/kg	
3,3'-Dichlorobenzidine	91-94-1	1	30.1	96.4	ND	ug/kg	U
Chrysene	218-01-9	1	5.0	19.3	321	ug/kg	
bis(2-Ethylhexyl)phthalate	117-81-7	1	27.8	48.2	ND	ug/kg	U
Di-n-Octylphthalate	117-84-0	1	8.4	19.3	ND	ug/kg	U
Benzofluoranthenes, Total		1	9.8	38.6	500	ug/kg	
Benzo(a)pyrene	50-32-8	1	6.2	19.3	245	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	5.8	19.3	162	ug/kg	
Dibenzo(a,h)anthracene	53-70-3	1	5.9	19.3	53.1	ug/kg	
Benzo(g,h,i)perylene	191-24-2	1	5.6	19.3	178	ug/kg	
1-Methylnaphthalene	90-12-0	1	5.7	19.3	ND	ug/kg	U
Surrogate: 2-Fluorophenol				27-120 %	58.8	%	
Surrogate: Phenol-d5				29-120 %	65.4	%	
Surrogate: 2-Chlorophenol-d4				31-120 %	75.1	%	
Surrogate: 1,2-Dichlorobenzene-d4				32-120 %	68.1	%	
Surrogate: Nitrobenzene-d5				30-120 %	70.8	%	
Surrogate: 2-Fluorobiphenyl				35-120 %	84.4	%	
Surrogate: 2,4,6-Tribromophenol				24-134 %	97.8	%	
Surrogate: p-Terphenyl-d14				37-120 %	86.7	%	



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM

Sampled: 06/27/2017 17:30

Instrument: NT8

Analyzed: 11-Jul-2017 14:38

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0829 Prepared: 30-Jun-2017	Sample Size: 13.03 g (wet) Final Volume: 0.5 mL	Dry Weight: 10.26 g % Solids: 78.73
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0051 Cleaned: 11-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0050 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Naphthalene	91-20-3	1	1.24	4.87	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	1.08	4.87	ND	ug/kg	U
1-Methylnaphthalene	90-12-0	1	0.39	4.87	ND	ug/kg	U
Acenaphthylene	208-96-8	1	1.06	4.87	ND	ug/kg	U
Acenaphthene	83-32-9	1	0.56	4.87	ND	ug/kg	U
Dibenzofuran	132-64-9	1	1.34	4.87	ND	ug/kg	U
Fluorene	86-73-7	1	0.62	4.87	ND	ug/kg	U
Phenanthrene	85-01-8	1	0.70	4.87	9.88	ug/kg	
Anthracene	120-12-7	1	0.85	4.87	ND	ug/kg	U
Fluoranthene	206-44-0	1	0.46	4.87	19.4	ug/kg	
Pyrene	129-00-0	1	0.61	4.87	15.5	ug/kg	
Benzo(a)anthracene	56-55-3	1	0.80	4.87	6.89	ug/kg	
Chrysene	218-01-9	1	1.03	4.87	9.57	ug/kg	
Benzo(b)fluoranthene	205-99-2	1	1.34	4.87	8.70	ug/kg	
Benzo(k)fluoranthene	207-08-9	1	0.74	4.87	4.64	ug/kg	J
Benzo(j)fluoranthene	205-82-3	1	0.66	4.87	4.63	ug/kg	J
Benzofluoranthenes, Total		1	2.93	9.75	16.2	ug/kg	
Benzo(a)pyrene	50-32-8	1	0.60	4.87	7.68	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	1.02	4.87	6.30	ug/kg	
Dibenzo(a,h)anthracene	53-70-3	1	0.87	4.87	ND	ug/kg	U
Benzo(g,h,i)perylene	191-24-2	1	1.04	4.87	8.02	ug/kg	
Surrogate: 2-Methylnaphthalene-d10				32-120 %	48.7	%	
Surrogate: Dibenzo[a,h]anthracene-d14				21-133 %	79.1	%	
Surrogate: Fluoranthene-d10				36-134 %	67.3	%	



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Butyl Tins

Method: EPA 8270D-SIM

Sampled: 06/27/2017 17:30

Instrument: NT12

Analyzed: 08-Jul-2017 09:46

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0827 Prepared: 30-Jun-2017	Sample Size: 7.11 g (wet) Final Volume: 0.5 mL	Dry Weight: 5.60 g % Solids: 78.73
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0024 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.402	3.45	ND	ug/kg	U
Dibutyltin Ion	14488-53-0	1	1.55	5.16	ND	ug/kg	U
Butyltin Ion	78763-54-9	1	1.69	3.64	1.73	ug/kg	J
Tetrabutyltin	1461-25-2	1	4.47	4.47	ND	ug/kg	U
Surrogate: Triphenyltin					30-160 %	47.5 %	
Surrogate: Tripropyltin					30-160 %	45.6 %	



Shannon & Wilson, Inc
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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 06/27/2017 17:30

Instrument: FID4

Analyzed: 11-Jul-2017 16:24

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0822 Sample Size: 10.15 g (wet) Dry Weight: 7.99 g
Prepared: 30-Jun-2017 Final Volume: 1 mL % Solids: 78.73

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.26	18.2	mg/kg	
Motor Oil Range Organics (C24-C38)		1	12.5	90.3	mg/kg	B
Surrogate: o-Terphenyl			50-150 %	98.2	%	



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Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Chlorinated Pesticides

Method: EPA 8081B
Instrument: ECD6

Sampled: 06/27/2017 17:30

Analyzed: 11-Jul-2017 18:10

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0825 Prepared: 29-Jun-2017	Sample Size: 16.09 g (wet) Final Volume: 2.5 mL	Dry Weight: 12.67 g % Solids: 78.73
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0049 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0048 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0047 Cleaned: 07-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	1	0.08	0.49	ND	ug/kg	U
beta-BHC	319-85-7	1	0.09	0.49	ND	ug/kg	U
gamma-BHC (Lindane)	58-89-9	1	0.07	0.49	ND	ug/kg	U
delta-BHC	319-86-8	1	0.06	0.49	ND	ug/kg	U
Heptachlor	76-44-8	1	0.05	0.49	ND	ug/kg	U
Aldrin	309-00-2	1	0.36	0.49	ND	ug/kg	U
Heptachlor Epoxide	1024-57-3	1	0.17	0.49	ND	ug/kg	U
trans-Chlordane (beta-Chlordane)	5103-74-2	1	0.32	0.49	ND	ug/kg	U
cis-Chlordane (alpha-chlordane)	5103-71-9	1	0.11	0.49	ND	ug/kg	U
Endosulfan I	959-98-8	1	0.07	0.49	ND	ug/kg	U
4,4'-DDE	72-55-9	1	0.13	0.99	ND	ug/kg	U
Dieldrin	60-57-1	1	0.11	0.99	ND	ug/kg	U
Endrin	72-20-8	1	0.14	0.99	ND	ug/kg	U
Endosulfan II	33213-65-9	1	0.31	0.99	ND	ug/kg	U
4,4'-DDD	72-54-8	1	0.32	0.99	ND	ug/kg	U
Endrin Aldehyde	7421-93-4	1	0.38	0.99	ND	ug/kg	U
4,4'-DDT	50-29-3	1	0.32	0.99	ND	ug/kg	U
Endosulfan Sulfate	1031-07-8	1	0.12	0.99	ND	ug/kg	U
Endrin Ketone	53494-70-5	1	0.28	0.99	ND	ug/kg	U
Methoxychlor	72-43-5	1	0.29	4.93	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	0.34	0.49	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	0.14	0.49	ND	ug/kg	U
2,4'-DDE	3424-82-6	1	0.25	0.99	ND	ug/kg	U
2,4'-DDD	53-19-0	1	0.19	0.99	ND	ug/kg	U
2,4'-DDT	789-02-6	1	0.18	0.99	ND	ug/kg	U
Oxychlordane	27304-13-8	1	0.13	0.99	ND	ug/kg	U
cis-Nonachlor	5103-73-1	1	0.21	0.99	ND	ug/kg	U



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Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 17:30

Instrument: ECD6

Analyzed: 11-Jul-2017 18:10

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
trans-Nonachlor	39765-80-5	1	0.22	0.99	ND	ug/kg	U
Mirex	2385-85-5	1	0.64	0.99	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				30-160 %	96.9	%	
Surrogate: Decachlorobiphenyl [2C]				30-160 %	81.7	%	
Surrogate: Tetrachlorometaxylene				30-160 %	76.4	%	
Surrogate: Tetrachlorometaxylene [2C]				30-160 %	66.7	%	



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Reported:
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WC - 5 - 2 ft
17F0434-07 (Solid)

Aroclor PCB

Method: EPA 8082A

Sampled: 06/27/2017 17:30

Instrument: ECD7

Analyzed: 07-Jul-2017 19:33

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0826 Prepared: 05-Jul-2017	Sample Size: 7.25 g (wet) Final Volume: 5 mL	Dry Weight: 5.71 g % Solids: 78.73
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0027 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid Cleanup Batch: CFG0025 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0026 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aroclor 1016	12674-11-2	1	7.0	17.5	ND	ug/kg	U
Aroclor 1221	11104-28-2	1	7.0	17.5	ND	ug/kg	U
Aroclor 1232	11141-16-5	1	7.0	17.5	ND	ug/kg	U
Aroclor 1242	53469-21-9	1	7.0	17.5	ND	ug/kg	U
Aroclor 1248	12672-29-6	1	7.0	17.5	ND	ug/kg	U
Aroclor 1254	11097-69-1	1	7.0	17.5	ND	ug/kg	U
Aroclor 1260	11096-82-5	1	8.1	17.5	ND	ug/kg	U
Aroclor 1262	37324-23-5	1	8.1	17.5	ND	ug/kg	U
Aroclor 1268	11100-14-4	1	8.1	17.5	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				40-133 %	86.0	%	
Surrogate: Tetrachlorometaxylene				53-120 %	80.5	%	
Surrogate: Decachlorobiphenyl [2C]				40-133 %	82.8	%	
Surrogate: Tetrachlorometaxylene [2C]				53-120 %	70.0	%	



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Reported:
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WC - 5 - 2 ft
17F0434-07 (Solid)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 06/27/2017 17:30

Instrument: ICP2

Analyzed: 07-Jul-2017 19:24

Sample Preparation: Preparation Method: SWC EPA 3050B
Preparation Batch: BFF0836 Sample Size: 1.054 g (wet) Dry Weight: 0.76 g
Prepared: 30-Jun-2017 Final Volume: 50 mL % Solids: 72.00

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Antimony	7440-36-0	2	0.298	6.59	0.498	mg/kg	J
Arsenic	7440-38-2	2	0.369	6.59	0.925	mg/kg	J
Beryllium	7440-41-7	2	0.0076	0.132	0.0974	mg/kg	J
Cadmium	7440-43-9	2	0.0163	0.264	0.204	mg/kg	J
Chromium	7440-47-3	2	0.0620	0.659	25.6	mg/kg	
Copper	7440-50-8	2	0.0325	0.264	8.11	mg/kg	
Lead	7439-92-1	2	0.172	2.64	5.57	mg/kg	
Nickel	7440-02-0	2	0.262	1.32	30.1	mg/kg	
Selenium	7782-49-2	2	1.08	6.59	ND	mg/kg	U
Silver	7440-22-4	2	0.0578	0.395	ND	mg/kg	U
Thallium	7440-28-0	2	0.601	6.59	ND	mg/kg	U
Zinc	7440-66-6	2	0.210	1.32	89.1	mg/kg	



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Reported:
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WC - 5 - 2 ft
17F0434-07 (Solid)

Metals and Metallic Compounds

Method: EPA 7471B

Sampled: 06/27/2017 17:30

Instrument: CETAC

Analyzed: 30-Jun-2017 14:25

Sample Preparation:

Preparation Method: SMM EPA 7471B

Preparation Batch: BFF0838

Prepared: 30-Jun-2017

Sample Size: 0.23 g (wet)

Final Volume: 50 mL

Dry Weight: 0.17 g

% Solids: 72.00

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Mercury	7439-97-6	1	0.03019	ND	mg/kg	U



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Reported:
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WC - 5 - 2 ft
17F0434-07 (Solid)

Wet Chemistry

Method: Plumb 1981, Combustion IR

Sampled: 06/27/2017 17:30

Instrument: APOLLO1

Analyzed: 17-Jul-2017 14:01

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.72 g

% Solids: 72.00

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.27	%	



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Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Wet Chemistry

Method: PSEP 1986

Sampled: 06/27/2017 17:30

Instrument: N/A

Analyzed: 29-Jun-2017 11:44

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFF0832

Prepared: 29-Jun-2017

Sample Size: 5 g (wet)

Final Volume: 5 g

Dry Weight: 3.60 g

% Solids: 72.00

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids, Sulfide		1	0.040	70.9	%	



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Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Wet Chemistry

Method: SM 2540 G-97

Sampled: 06/27/2017 17:30

Instrument: N/A

Analyzed: 05-Jul-2017 11:59

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.72 g

% Solids: 72.00

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	72.00	%	



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Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Wet Chemistry

Method: SM 4500-NH3 H-97

Sampled: 06/27/2017 17:30

Instrument: LACHAT2

Analyzed: 01-Jul-2017 13:46

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.15 g (wet)

Final Volume: 40 mL

Dry Weight: 2.99 g

% Solids: 72.00

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.54	11.6	mg/kg NH3-N	



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Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07 (Solid)

Wet Chemistry

Method: SM 4500-NO₃⁻ I-00

Sampled: 06/27/2017 17:30

Instrument: LACHAT2

Analyzed: 01-Jul-2017 17:18

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.15 g (wet)

Final Volume: 40 mL

Dry Weight: 2.99 g

% Solids: 72.00

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.13	ND	mg-N/kg	U



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Reported:
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WC - 5 - 2 ft
17F0434-07 (Solid)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 06/27/2017 17:30

Instrument: UV1800-2

Analyzed: 14-Jul-2017 15:17

Sample Preparation:

Preparation Method: SM 4500-P B-4 Strong Acid

Preparation Batch: BFG0152

Prepared: 13-Jul-2017

Sample Size: 0.342 g (wet)

Final Volume: 50 mL

Dry Weight: 0.25 g

% Solids: 72.00

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	20	32.5	382	mg-P/kg	D



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Reported:
28-Jul-2017 15:26

WC - 5 - 2 ft
17F0434-07RE1 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00

Sampled: 06/27/2017 17:30

Instrument: UV1800-2

Analyzed: 30-Jun-2017 12:27

Sample Preparation:

Preparation Method: PSEP 1986

Preparation Batch: BFF0843

Prepared: 29-Jun-2017

Sample Size: 5.357 g (wet)

Final Volume: 100 mL

Dry Weight: 3.80 g

% Solids: 70.90

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	2	2.63	31.2	mg/kg	D



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Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 18:00

Instrument: NT5

Analyzed: 07-Jul-2017 14:16

Sample Preparation: Preparation Method: EPA 5035 (Sodium Bisulfate)
Preparation Batch: BFG0114 Sample Size: 6.06 g (wet) Dry Weight: 4.87 g
Prepared: 07-Jul-2017 Final Volume: 5 mL % Solids: 80.38

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.27	1.03	ND	ug/kg	U
Vinyl Chloride	75-01-4	1	0.24	1.03	ND	ug/kg	U
Bromomethane	74-83-9	1	0.19	1.03	ND	ug/kg	U
Chloroethane	75-00-3	1	0.47	1.03	ND	ug/kg	U
Trichlorofluoromethane	75-69-4	1	0.27	1.03	ND	ug/kg	U
Acrolein	107-02-8	1	3.91	5.13	ND	ug/kg	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.29	2.05	ND	ug/kg	U
Acetone	67-64-1	1	0.49	5.13	120	ug/kg	M
1,1-Dichloroethene	75-35-4	1	0.34	1.03	ND	ug/kg	U
Bromoethane	74-96-4	1	0.45	2.05	ND	ug/kg	U
Iodomethane	74-88-4	1	0.22	1.03	ND	ug/kg	U
Methylene Chloride	75-09-2	1	0.65	2.05	3.58	ug/kg	
Acrylonitrile	107-13-1	1	1.06	5.13	ND	ug/kg	U
Carbon Disulfide	75-15-0	1	0.57	1.03	4.29	ug/kg	
trans-1,2-Dichloroethene	156-60-5	1	0.27	1.03	ND	ug/kg	U
Vinyl Acetate	108-05-4	1	0.39	5.13	ND	ug/kg	U
1,1-Dichloroethane	75-34-3	1	0.21	1.03	ND	ug/kg	U
2-Butanone	78-93-3	1	0.53	5.13	4.41	ug/kg	J
2,2-Dichloropropane	594-20-7	1	0.30	1.03	ND	ug/kg	U
cis-1,2-Dichloroethene	156-59-2	1	0.25	1.03	ND	ug/kg	U
Chloroform	67-66-3	1	0.24	1.03	ND	ug/kg	U
Bromochloromethane	74-97-5	1	0.33	1.03	ND	ug/kg	U
1,1,1-Trichloroethane	71-55-6	1	0.23	1.03	ND	ug/kg	U
1,1-Dichloropropene	563-58-6	1	0.32	1.03	ND	ug/kg	U
Carbon tetrachloride	56-23-5	1	0.22	1.03	ND	ug/kg	U
1,2-Dichloroethane	107-06-2	1	0.20	1.03	ND	ug/kg	U
Benzene	71-43-2	1	0.30	1.03	ND	ug/kg	U
Trichloroethene	79-01-6	1	0.22	1.03	ND	ug/kg	U
1,2-Dichloropropane	78-87-5	1	0.17	1.03	ND	ug/kg	U
Bromodichloromethane	75-27-4	1	0.26	1.03	ND	ug/kg	U
Dibromomethane	74-95-3	1	0.15	1.03	ND	ug/kg	U
2-Chloroethyl vinyl ether	110-75-8	1	0.28	5.13	ND	ug/kg	U
4-Methyl-2-Pentanone	108-10-1	1	0.43	5.13	ND	ug/kg	U
cis-1,3-Dichloropropene	10061-01-5	1	0.23	1.03	ND	ug/kg	U
Toluene	108-88-3	1	0.15	1.03	13.4	ug/kg	
trans-1,3-Dichloropropene	10061-02-6	1	0.22	1.03	ND	ug/kg	U



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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 18:00

Instrument: NT5

Analyzed: 07-Jul-2017 14:16

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	0.45	5.13	ND	ug/kg	U
1,1,2-Trichloroethane	79-00-5	1	0.29	1.03	ND	ug/kg	U
1,3-Dichloropropane	142-28-9	1	0.21	1.03	ND	ug/kg	U
Tetrachloroethene	127-18-4	1	0.26	1.03	ND	ug/kg	U
Dibromochloromethane	124-48-1	1	0.27	1.03	ND	ug/kg	U
1,2-Dibromoethane	106-93-4	1	0.18	1.03	ND	ug/kg	U
Chlorobenzene	108-90-7	1	0.22	1.03	ND	ug/kg	U
Ethylbenzene	100-41-4	1	0.21	1.03	0.27	ug/kg	J
1,1,1,2-Tetrachloroethane	630-20-6	1	0.24	1.03	ND	ug/kg	U
m,p-Xylene	179601-23-1	1	0.40	1.03	ND	ug/kg	U
o-Xylene	95-47-6	1	0.23	1.03	ND	ug/kg	U
Xylenes, total	1330-20-7	1	0.63	2.05	ND	ug/kg	U
Styrene	100-42-5	1	0.14	1.03	ND	ug/kg	U
Bromoform	75-25-2	1	0.30	1.03	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	79-34-5	1	0.26	1.03	ND	ug/kg	U
1,2,3-Trichloropropane	96-18-4	1	0.53	2.05	ND	ug/kg	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	0.45	5.13	ND	ug/kg	U
n-Propylbenzene	103-65-1	1	0.28	1.03	ND	ug/kg	U
Bromobenzene	108-86-1	1	0.16	1.03	ND	ug/kg	U
Isopropyl Benzene	98-82-8	1	0.24	1.03	ND	ug/kg	U
2-Chlorotoluene	95-49-8	1	0.31	1.03	ND	ug/kg	U
4-Chlorotoluene	106-43-4	1	0.28	1.03	ND	ug/kg	U
t-Butylbenzene	98-06-6	1	0.31	1.03	ND	ug/kg	U
1,3,5-Trimethylbenzene	108-67-8	1	0.26	1.03	ND	ug/kg	U
1,2,4-Trimethylbenzene	95-63-6	1	0.24	1.03	ND	ug/kg	U
s-Butylbenzene	135-98-8	1	0.25	1.03	ND	ug/kg	U
4-Isopropyl Toluene	99-87-6	1	0.24	1.03	4.94	ug/kg	
1,3-Dichlorobenzene	541-73-1	1	0.23	1.03	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	0.24	1.03	ND	ug/kg	U
n-Butylbenzene	104-51-8	1	0.27	1.03	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	0.30	1.03	ND	ug/kg	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.60	5.13	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	0.34	5.13	ND	ug/kg	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.42	5.13	ND	ug/kg	U
Naphthalene	91-20-3	1	0.44	5.13	ND	ug/kg	U
1,2,3-Trichlorobenzene	87-61-6	1	0.31	5.13	ND	ug/kg	U
Dichlorodifluoromethane	75-71-8	1	0.21	1.03	ND	ug/kg	U
Methyl tert-butyl Ether	1634-04-4	1	0.24	1.03	ND	ug/kg	U
2-Pentanone	107-87-9	1	5.13	5.13	ND	ug/kg	U



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 18:00

Instrument: NT5

Analyzed: 07-Jul-2017 14:16

Analyte	CAS Number	Recovery Limits	Recovery	Units	Notes
Surrogate: 1,2-Dichloroethane-d4		80-149 %	108	%	
Surrogate: Toluene-d8		77-120 %	103	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	93.2	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	101	%	



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WC - 5 - Deep
17F0434-08 (Solid)

Volatile Organic Compounds

Method: NWTPHg
Instrument: NT3

Sampled: 06/27/2017 18:00

Analyzed: 28-Jun-2017 20:59

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFF0798 Sample Size: 6.938 g (wet) Dry Weight: 5.58 g
Prepared: 28-Jun-2017 Final Volume: 5 mL % Solids: 80.38

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	5700	ND	ug/kg	U
Surrogate: Toluene-d8			80-120 %	98.1	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	94.7	%	



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WC - 5 - Deep
17F0434-08 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 18:00

Instrument: NT10

Analyzed: 11-Jul-2017 17:15

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0828 Sample Size: 13.01 g (wet) Dry Weight: 10.46 g
Prepared: 29-Jun-2017 Final Volume: 1 mL % Solids: 80.38

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Phenol	108-95-2	1	7.9	19.1	ND	ug/kg	U
bis(2-chloroethyl) ether	111-44-4	1	6.5	19.1	ND	ug/kg	U
2-Chlorophenol	95-57-8	1	6.2	19.1	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	4.8	19.1	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	4.2	19.1	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	4.5	19.1	ND	ug/kg	U
Benzyl Alcohol	100-51-6	1	14.2	19.1	ND	ug/kg	U
2,2'-Oxybis(1-chloropropane)	108-60-1	1	5.4	19.1	ND	ug/kg	U
2-Methylphenol	95-48-7	1	7.5	19.1	ND	ug/kg	U
Hexachloroethane	67-72-1	1	5.4	19.1	ND	ug/kg	U
N-Nitroso-di-n-Propylamine	621-64-7	1	10.3	19.1	ND	ug/kg	U
4-Methylphenol	106-44-5	1	14.1	19.1	ND	ug/kg	U
Nitrobenzene	98-95-3	1	7.6	19.1	ND	ug/kg	U
Isophorone	78-59-1	1	7.4	19.1	ND	ug/kg	U
2-Nitrophenol	88-75-5	1	6.6	19.1	ND	ug/kg	U
2,4-Dimethylphenol	105-67-9	1	25.6	95.6	ND	ug/kg	U
Bis(2-Chloroethoxy)methane	111-91-1	1	6.1	19.1	ND	ug/kg	U
2,4-Dichlorophenol	120-83-2	1	30.6	95.6	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	5.7	19.1	ND	ug/kg	U
Naphthalene	91-20-3	1	5.0	19.1	ND	ug/kg	U
Benzoic acid	65-85-0	1	56.5	191	ND	ug/kg	U
4-Chloroaniline	106-47-8	1	32.2	95.6	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	4.8	19.1	ND	ug/kg	U
4-Chloro-3-Methylphenol	59-50-7	1	27.6	95.6	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	5.4	19.1	ND	ug/kg	U
Hexachlorocyclopentadiene	77-47-4	1	39.5	95.6	ND	ug/kg	U
2,4,6-Trichlorophenol	88-06-2	1	24.3	95.6	ND	ug/kg	U
2,4,5-Trichlorophenol	95-95-4	1	25.7	95.6	ND	ug/kg	U
2-Chloronaphthalene	91-58-7	1	4.2	19.1	ND	ug/kg	U
2-Nitroaniline	88-74-4	1	28.9	95.6	ND	ug/kg	U
Acenaphthylene	208-96-8	1	4.6	19.1	ND	ug/kg	U
Dimethylphthalate	131-11-3	1	6.2	19.1	ND	ug/kg	U
2,6-Dinitrotoluene	606-20-2	1	25.5	95.6	ND	ug/kg	U
Acenaphthene	83-32-9	1	4.9	19.1	ND	ug/kg	U
3-Nitroaniline	99-09-2	1	36.1	95.6	ND	ug/kg	U
2,4-Dinitrophenol	51-28-5	1	39.5	191	ND	ug/kg	U



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Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 18:00

Instrument: NT10

Analyzed: 11-Jul-2017 17:15

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dibenzofuran	132-64-9	1	4.4	19.1	ND	ug/kg	U
4-Nitrophenol	100-02-7	1	42.5	95.6	ND	ug/kg	U
2,4-Dinitrotoluene	121-14-2	1	21.9	95.6	ND	ug/kg	U
Fluorene	86-73-7	1	4.7	19.1	ND	ug/kg	U
4-Chlorophenylphenyl ether	7005-72-3	1	6.7	19.1	ND	ug/kg	U
Diethyl phthalate	84-66-2	1	16.9	19.1	ND	ug/kg	U
4-Nitroaniline	100-01-6	1	33.4	95.6	ND	ug/kg	U
4,6-Dinitro-2-methylphenol	534-52-1	1	48.3	191	ND	ug/kg	U
N-Nitrosodiphenylamine	86-30-6	1	9.2	19.1	ND	ug/kg	U
4-Bromophenyl phenyl ether	101-55-3	1	5.8	19.1	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	4.5	19.1	ND	ug/kg	U
Pentachlorophenol	87-86-5	1	29.9	95.6	ND	ug/kg	U
Phenanthrene	85-01-8	1	4.5	19.1	12.4	ug/kg	J
Anthracene	120-12-7	1	5.7	19.1	ND	ug/kg	U
Carbazole	86-74-8	1	7.0	19.1	ND	ug/kg	U
Di-n-Butylphthalate	84-74-2	1	5.1	19.1	ND	ug/kg	U
Fluoranthene	206-44-0	1	4.3	19.1	27.7	ug/kg	
Pyrene	129-00-0	1	5.3	19.1	24.5	ug/kg	
Butylbenzylphthalate	85-68-7	1	7.7	19.1	ND	ug/kg	U
Benzo(a)anthracene	56-55-3	1	5.0	19.1	11.1	ug/kg	J
3,3'-Dichlorobenzidine	91-94-1	1	29.8	95.6	ND	ug/kg	U
Chrysene	218-01-9	1	5.0	19.1	18.9	ug/kg	J
bis(2-Ethylhexyl)phthalate	117-81-7	1	27.5	47.8	32.5	ug/kg	J
Di-n-Octylphthalate	117-84-0	1	8.3	19.1	ND	ug/kg	U
Benzo(a)fluoranthene, Total		1	9.8	38.3	29.6	ug/kg	J
Benzo(a)pyrene	50-32-8	1	6.2	19.1	12.0	ug/kg	J
Indeno(1,2,3-cd)pyrene	193-39-5	1	5.7	19.1	8.1	ug/kg	J
Dibenzo(a,h)anthracene	53-70-3	1	5.9	19.1	ND	ug/kg	U
Benzo(g,h,i)perylene	191-24-2	1	5.6	19.1	14.1	ug/kg	J
1-Methylnaphthalene	90-12-0	1	5.7	19.1	ND	ug/kg	U
Surrogate: 2-Fluorophenol				27-120 %	62.7	%	
Surrogate: Phenol-d5				29-120 %	67.8	%	
Surrogate: 2-Chlorophenol-d4				31-120 %	75.8	%	
Surrogate: 1,2-Dichlorobenzene-d4				32-120 %	71.2	%	
Surrogate: Nitrobenzene-d5				30-120 %	75.0	%	
Surrogate: 2-Fluorobiphenyl				35-120 %	83.4	%	
Surrogate: 2,4,6-Tribromophenol				24-134 %	100	%	
Surrogate: p-Terphenyl-d14				37-120 %	88.7	%	



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Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM

Sampled: 06/27/2017 18:00

Instrument: NT8

Analyzed: 11-Jul-2017 15:04

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0829 Prepared: 30-Jun-2017	Sample Size: 13.12 g (wet) Final Volume: 0.5 mL	Dry Weight: 10.55 g % Solids: 80.38
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0051 Cleaned: 11-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0050 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Naphthalene	91-20-3	1	1.21	4.74	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	1.05	4.74	ND	ug/kg	U
1-Methylnaphthalene	90-12-0	1	0.38	4.74	ND	ug/kg	U
Acenaphthylene	208-96-8	1	1.03	4.74	ND	ug/kg	U
Acenaphthene	83-32-9	1	0.54	4.74	ND	ug/kg	U
Dibenzofuran	132-64-9	1	1.31	4.74	ND	ug/kg	U
Fluorene	86-73-7	1	0.60	4.74	ND	ug/kg	U
Phenanthrene	85-01-8	1	0.68	4.74	13.4	ug/kg	
Anthracene	120-12-7	1	0.83	4.74	ND	ug/kg	U
Fluoranthene	206-44-0	1	0.45	4.74	29.9	ug/kg	
Pyrene	129-00-0	1	0.59	4.74	26.0	ug/kg	
Benzo(a)anthracene	56-55-3	1	0.78	4.74	11.8	ug/kg	
Chrysene	218-01-9	1	1.00	4.74	14.0	ug/kg	
Benzo(b)fluoranthene	205-99-2	1	1.30	4.74	13.5	ug/kg	
Benzo(k)fluoranthene	207-08-9	1	0.72	4.74	6.51	ug/kg	
Benzo(j)fluoranthene	205-82-3	1	0.64	4.74	5.95	ug/kg	
Benzofluoranthenes, Total		1	2.85	9.48	24.3	ug/kg	
Benzo(a)pyrene	50-32-8	1	0.58	4.74	10.9	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	1.00	4.74	9.10	ug/kg	
Dibenzo(a,h)anthracene	53-70-3	1	0.84	4.74	2.87	ug/kg	J
Benzo(g,h,i)perylene	191-24-2	1	1.01	4.74	11.6	ug/kg	
Surrogate: 2-Methylnaphthalene-d10				32-120 %	48.2	%	
Surrogate: Dibenzo[a,h]anthracene-d14				21-133 %	79.9	%	
Surrogate: Fluoranthene-d10				36-134 %	67.7	%	



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Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Butyl Tins

Method: EPA 8270D-SIM

Sampled: 06/27/2017 18:00

Instrument: NT12

Analyzed: 08-Jul-2017 09:59

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		
	Preparation Batch: BFF0827	Sample Size: 7.12 g (wet)	Dry Weight: 5.72 g
	Prepared: 30-Jun-2017	Final Volume: 0.5 mL	% Solids: 80.38
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CFG0024	Initial Volume: 0.5 mL	
	Cleaned: 07-Jul-2017	Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.393	3.37	0.572	ug/kg	J
Dibutyltin Ion	14488-53-0	1	1.51	5.05	ND	ug/kg	U
Butyltin Ion	78763-54-9	1	1.65	3.56	ND	ug/kg	U
Tetrabutyltin	1461-25-2	1	4.37	4.37	ND	ug/kg	U
Surrogate: Triphenyltin					30-160 %	49.6 %	
Surrogate: Tripropyltin					30-160 %	50.4 %	



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WC - 5 - Deep
17F0434-08 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 06/27/2017 18:00

Instrument: FID4

Analyzed: 11-Jul-2017 16:45

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0822 Sample Size: 10.22 g (wet) Dry Weight: 8.21 g
Prepared: 30-Jun-2017 Final Volume: 1 mL % Solids: 80.38

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.09	16.2	mg/kg	
Motor Oil Range Organics (C24-C38)		1	12.2	99.9	mg/kg	B
Surrogate: o-Terphenyl			50-150 %	97.9	%	



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Reported:
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WC - 5 - Deep
17F0434-08 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 18:00

Instrument: ECD6

Analyzed: 11-Jul-2017 18:27

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0825 Prepared: 29-Jun-2017	Sample Size: 16.12 g (wet) Final Volume: 2.5 mL	Dry Weight: 12.96 g % Solids: 80.38
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0049 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0048 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0047 Cleaned: 07-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	1	0.08	0.48	ND	ug/kg	U
beta-BHC	319-85-7	1	0.09	0.48	ND	ug/kg	U
gamma-BHC (Lindane)	58-89-9	1	0.07	0.48	ND	ug/kg	U
delta-BHC	319-86-8	1	0.06	0.48	ND	ug/kg	U
Heptachlor	76-44-8	1	0.04	0.48	ND	ug/kg	U
Aldrin	309-00-2	1	0.36	0.48	ND	ug/kg	U
Heptachlor Epoxide	1024-57-3	1	0.16	0.48	ND	ug/kg	U
trans-Chlordane (beta-Chlordane)	5103-74-2	1	0.32	0.48	ND	ug/kg	U
cis-Chlordane (alpha-chlordane)	5103-71-9	1	0.11	0.48	ND	ug/kg	U
Endosulfan I	959-98-8	1	0.07	0.48	ND	ug/kg	U
4,4'-DDE	72-55-9	1	0.13	0.96	ND	ug/kg	U
Dieldrin	60-57-1	1	0.11	0.96	ND	ug/kg	U
Endrin	72-20-8	1	0.14	0.96	ND	ug/kg	U
Endosulfan II	33213-65-9	1	0.30	0.96	ND	ug/kg	U
4,4'-DDD	72-54-8	1	0.31	0.96	ND	ug/kg	U
Endrin Aldehyde	7421-93-4	1	0.38	0.96	ND	ug/kg	U
4,4'-DDT	50-29-3	1	0.31	0.96	ND	ug/kg	U
Endosulfan Sulfate	1031-07-8	1	0.12	0.96	ND	ug/kg	U
Endrin Ketone	53494-70-5	1	0.27	0.96	ND	ug/kg	U
Methoxychlor	72-43-5	1	0.29	4.82	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	0.33	0.48	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	0.14	0.48	ND	ug/kg	U
2,4'-DDE	3424-82-6	1	0.24	0.96	ND	ug/kg	U
2,4'-DDD	53-19-0	1	0.19	0.96	ND	ug/kg	U
2,4'-DDT	789-02-6	1	0.18	0.96	ND	ug/kg	U
Oxychlordane	27304-13-8	1	0.12	0.96	ND	ug/kg	U
cis-Nonachlor	5103-73-1	1	0.20	0.96	ND	ug/kg	U



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Reported:
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WC - 5 - Deep
17F0434-08 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 18:00

Instrument: ECD6

Analyzed: 11-Jul-2017 18:27

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
trans-Nonachlor	39765-80-5	1	0.22	0.96	ND	ug/kg	U
Mirex	2385-85-5	1	0.62	0.96	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				30-160 %	79.4	%	
Surrogate: Decachlorobiphenyl [2C]				30-160 %	73.1	%	
Surrogate: Tetrachlorometaxylene				30-160 %	67.0	%	
Surrogate: Tetrachlorometaxylene [2C]				30-160 %	62.2	%	



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Reported:
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WC - 5 - Deep
17F0434-08 (Solid)

Aroclor PCB

Method: EPA 8082A

Sampled: 06/27/2017 18:00

Instrument: ECD7

Analyzed: 07-Jul-2017 19:55

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0826 Prepared: 05-Jul-2017	Sample Size: 7.07 g (wet) Final Volume: 5 mL	Dry Weight: 5.68 g % Solids: 80.38
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0027 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid Cleanup Batch: CFG0025 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0026 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aroclor 1016	12674-11-2	1	7.0	17.6	ND	ug/kg	U
Aroclor 1221	11104-28-2	1	7.0	17.6	ND	ug/kg	U
Aroclor 1232	11141-16-5	1	7.0	17.6	ND	ug/kg	U
Aroclor 1242	53469-21-9	1	7.0	17.6	ND	ug/kg	U
Aroclor 1248	12672-29-6	1	7.0	17.6	ND	ug/kg	U
Aroclor 1254	11097-69-1	1	7.0	17.6	ND	ug/kg	U
Aroclor 1260	11096-82-5	1	8.2	17.6	ND	ug/kg	U
Aroclor 1262	37324-23-5	1	8.2	17.6	ND	ug/kg	U
Aroclor 1268	11100-14-4	1	8.2	17.6	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				40-133 %	86.4	%	
Surrogate: Tetrachlorometaxylene				53-120 %	79.6	%	
Surrogate: Decachlorobiphenyl [2C]				40-133 %	82.5	%	
Surrogate: Tetrachlorometaxylene [2C]				53-120 %	76.0	%	



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Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 06/27/2017 18:00

Instrument: ICP2

Analyzed: 07-Jul-2017 19:28

Sample Preparation:

Preparation Method: SWC EPA 3050B

Preparation Batch: BFF0836

Prepared: 30-Jun-2017

Sample Size: 1.095 g (wet)

Final Volume: 50 mL

Dry Weight: 0.85 g

% Solids: 77.32

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Antimony	7440-36-0	2	0.267	5.91	0.542	mg/kg	J
Arsenic	7440-38-2	2	0.331	5.91	0.596	mg/kg	J
Beryllium	7440-41-7	2	0.0068	0.118	0.0872	mg/kg	J
Cadmium	7440-43-9	2	0.0146	0.236	0.179	mg/kg	J
Chromium	7440-47-3	2	0.0556	0.591	19.6	mg/kg	
Copper	7440-50-8	2	0.0291	0.236	9.41	mg/kg	
Lead	7439-92-1	2	0.154	2.36	9.29	mg/kg	
Nickel	7440-02-0	2	0.235	1.18	23.5	mg/kg	
Selenium	7782-49-2	2	0.964	5.91	ND	mg/kg	U
Silver	7440-22-4	2	0.0518	0.354	ND	mg/kg	U
Thallium	7440-28-0	2	0.539	5.91	ND	mg/kg	U
Zinc	7440-66-6	2	0.188	1.18	120	mg/kg	



Shannon & Wilson, Inc
400 N 34th St., Suite 100
Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Metals and Metallic Compounds

Method: EPA 7471B

Sampled: 06/27/2017 18:00

Instrument: CETAC

Analyzed: 30-Jun-2017 14:27

Sample Preparation:

Preparation Method: SMM EPA 7471B

Preparation Batch: BFF0838

Prepared: 30-Jun-2017

Sample Size: 0.221 g (wet)

Final Volume: 50 mL

Dry Weight: 0.17 g

% Solids: 77.32

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Mercury	7439-97-6	1	0.02926	ND	mg/kg	U



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Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Wet Chemistry

Method: Plumb 1981, Combustion IR

Sampled: 06/27/2017 18:00

Instrument: APOLLO1

Analyzed: 17-Jul-2017 14:11

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.77 g

% Solids: 77.32

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.50	%	



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Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Wet Chemistry

Method: PSEP 1986

Sampled: 06/27/2017 18:00

Instrument: N/A

Analyzed: 29-Jun-2017 11:44

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFF0832

Prepared: 29-Jun-2017

Sample Size: 5 g (wet)

Final Volume: 5 g

Dry Weight: 3.87 g

% Solids: 77.32

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids, Sulfide		1	0.040	73.6	%	



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Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Wet Chemistry

Method: SM 2540 G-97

Sampled: 06/27/2017 18:00

Instrument: N/A

Analyzed: 05-Jul-2017 11:59

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.77 g

% Solids: 77.32

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	77.32	%	



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Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Wet Chemistry

Method: SM 4500-NH3 H-97

Sampled: 06/27/2017 18:00

Instrument: LACHAT2

Analyzed: 01-Jul-2017 13:47

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.18 g (wet)

Final Volume: 40 mL

Dry Weight: 3.23 g

% Solids: 77.32

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.50	4.71	mg/kg NH3-N	



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Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Wet Chemistry

Method: SM 4500-NO₃⁻ I-00

Sampled: 06/27/2017 18:00

Instrument: LACHAT2

Analyzed: 01-Jul-2017 17:19

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.18 g (wet)

Final Volume: 40 mL

Dry Weight: 3.23 g

% Solids: 77.32

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.12	ND	mg-N/kg	U



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WC - 5 - Deep
17F0434-08 (Solid)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 06/27/2017 18:00

Instrument: UV1800-2

Analyzed: 14-Jul-2017 15:20

Sample Preparation:

Preparation Method: SM 4500-P B-4 Strong Acid

Preparation Batch: BFG0152

Prepared: 13-Jul-2017

Sample Size: 0.3354 g (wet)

Final Volume: 50 mL

Dry Weight: 0.26 g

% Solids: 77.32

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	20	30.8	443	mg-P/kg	D



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Reported:
28-Jul-2017 15:26

WC - 5 - Deep
17F0434-08 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00

Sampled: 06/27/2017 18:00

Instrument: UV1800-2

Analyzed: 30-Jun-2017 11:44

Sample Preparation:

Preparation Method: PSEP 1986

Preparation Batch: BFF0843

Prepared: 29-Jun-2017

Sample Size: 5.34 g (wet)

Final Volume: 100 mL

Dry Weight: 3.93 g

% Solids: 73.60

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	1.27	19.7	mg/kg	



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WC - 6
17F0434-09 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 11:45

Instrument: NT5

Analyzed: 07-Jul-2017 14:39

Sample Preparation: Preparation Method: EPA 5035 (Sodium Bisulfate)
Preparation Batch: BFG0114 Sample Size: 5.86 g (wet) Dry Weight: 4.78 g
Prepared: 07-Jul-2017 Final Volume: 5 mL % Solids: 81.65

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.27	1.05	ND	ug/kg	U
Vinyl Chloride	75-01-4	1	0.25	1.05	ND	ug/kg	U
Bromomethane	74-83-9	1	0.20	1.05	ND	ug/kg	U
Chloroethane	75-00-3	1	0.48	1.05	ND	ug/kg	U
Trichlorofluoromethane	75-69-4	1	0.28	1.05	ND	ug/kg	U
Acrolein	107-02-8	1	3.98	5.22	ND	ug/kg	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.30	2.09	ND	ug/kg	U
Acetone	67-64-1	1	0.50	5.22	106	ug/kg	
1,1-Dichloroethene	75-35-4	1	0.35	1.05	ND	ug/kg	U
Bromoethane	74-96-4	1	0.46	2.09	ND	ug/kg	U
Iodomethane	74-88-4	1	0.22	1.05	ND	ug/kg	U
Methylene Chloride	75-09-2	1	0.66	2.09	4.52	ug/kg	
Acrylonitrile	107-13-1	1	1.08	5.22	ND	ug/kg	U
Carbon Disulfide	75-15-0	1	0.58	1.05	4.21	ug/kg	
trans-1,2-Dichloroethene	156-60-5	1	0.28	1.05	ND	ug/kg	U
Vinyl Acetate	108-05-4	1	0.40	5.22	ND	ug/kg	U
1,1-Dichloroethane	75-34-3	1	0.21	1.05	ND	ug/kg	U
2-Butanone	78-93-3	1	0.54	5.22	4.91	ug/kg	J
2,2-Dichloropropane	594-20-7	1	0.31	1.05	ND	ug/kg	U
cis-1,2-Dichloroethene	156-59-2	1	0.25	1.05	ND	ug/kg	U
Chloroform	67-66-3	1	0.24	1.05	ND	ug/kg	U
Bromochloromethane	74-97-5	1	0.34	1.05	ND	ug/kg	U
1,1,1-Trichloroethane	71-55-6	1	0.24	1.05	ND	ug/kg	U
1,1-Dichloropropene	563-58-6	1	0.33	1.05	ND	ug/kg	U
Carbon tetrachloride	56-23-5	1	0.22	1.05	ND	ug/kg	U
1,2-Dichloroethane	107-06-2	1	0.20	1.05	ND	ug/kg	U
Benzene	71-43-2	1	0.31	1.05	ND	ug/kg	U
Trichloroethene	79-01-6	1	0.22	1.05	ND	ug/kg	U
1,2-Dichloropropane	78-87-5	1	0.17	1.05	ND	ug/kg	U
Bromodichloromethane	75-27-4	1	0.27	1.05	ND	ug/kg	U
Dibromomethane	74-95-3	1	0.15	1.05	ND	ug/kg	U
2-Chloroethyl vinyl ether	110-75-8	1	0.29	5.22	ND	ug/kg	U
4-Methyl-2-Pentanone	108-10-1	1	0.44	5.22	ND	ug/kg	U
cis-1,3-Dichloropropene	10061-01-5	1	0.24	1.05	ND	ug/kg	U
Toluene	108-88-3	1	0.16	1.05	0.98	ug/kg	J
trans-1,3-Dichloropropene	10061-02-6	1	0.23	1.05	ND	ug/kg	U



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Reported:
28-Jul-2017 15:26

WC - 6
17F0434-09 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 11:45

Instrument: NT5

Analyzed: 07-Jul-2017 14:39

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	0.46	5.22	ND	ug/kg	U
1,1,2-Trichloroethane	79-00-5	1	0.30	1.05	ND	ug/kg	U
1,3-Dichloropropane	142-28-9	1	0.22	1.05	ND	ug/kg	U
Tetrachloroethene	127-18-4	1	0.27	1.05	ND	ug/kg	U
Dibromochloromethane	124-48-1	1	0.28	1.05	ND	ug/kg	U
1,2-Dibromoethane	106-93-4	1	0.18	1.05	ND	ug/kg	U
Chlorobenzene	108-90-7	1	0.23	1.05	ND	ug/kg	U
Ethylbenzene	100-41-4	1	0.21	1.05	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.24	1.05	ND	ug/kg	U
m,p-Xylene	179601-23-1	1	0.41	1.05	ND	ug/kg	U
o-Xylene	95-47-6	1	0.23	1.05	ND	ug/kg	U
Xylenes, total	1330-20-7	1	0.64	2.09	ND	ug/kg	U
Styrene	100-42-5	1	0.14	1.05	ND	ug/kg	U
Bromoform	75-25-2	1	0.31	1.05	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	79-34-5	1	0.26	1.05	ND	ug/kg	U
1,2,3-Trichloropropane	96-18-4	1	0.54	2.09	ND	ug/kg	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	0.46	5.22	ND	ug/kg	U
n-Propylbenzene	103-65-1	1	0.28	1.05	ND	ug/kg	U
Bromobenzene	108-86-1	1	0.16	1.05	ND	ug/kg	U
Isopropyl Benzene	98-82-8	1	0.24	1.05	ND	ug/kg	U
2-Chlorotoluene	95-49-8	1	0.31	1.05	ND	ug/kg	U
4-Chlorotoluene	106-43-4	1	0.29	1.05	ND	ug/kg	U
t-Butylbenzene	98-06-6	1	0.32	1.05	ND	ug/kg	U
1,3,5-Trimethylbenzene	108-67-8	1	0.27	1.05	ND	ug/kg	U
1,2,4-Trimethylbenzene	95-63-6	1	0.24	1.05	ND	ug/kg	U
s-Butylbenzene	135-98-8	1	0.25	1.05	ND	ug/kg	U
4-Isopropyl Toluene	99-87-6	1	0.25	1.05	1.96	ug/kg	
1,3-Dichlorobenzene	541-73-1	1	0.24	1.05	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	0.24	1.05	ND	ug/kg	U
n-Butylbenzene	104-51-8	1	0.27	1.05	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	0.31	1.05	ND	ug/kg	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.61	5.22	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	0.35	5.22	ND	ug/kg	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.43	5.22	ND	ug/kg	U
Naphthalene	91-20-3	1	0.45	5.22	ND	ug/kg	U
1,2,3-Trichlorobenzene	87-61-6	1	0.32	5.22	ND	ug/kg	U
Dichlorodifluoromethane	75-71-8	1	0.22	1.05	ND	ug/kg	U
Methyl tert-butyl Ether	1634-04-4	1	0.24	1.05	ND	ug/kg	U
2-Pentanone	107-87-9	1	5.22	5.22	ND	ug/kg	U



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 6
17F0434-09 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 11:45

Instrument: NT5

Analyzed: 07-Jul-2017 14:39

Analyte	CAS Number	Recovery Limits	Recovery	Units	Notes
Surrogate: 1,2-Dichloroethane-d4		80-149 %	111	%	
Surrogate: Toluene-d8		77-120 %	102	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	93.9	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	101	%	



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WC - 6
17F0434-09 (Solid)

Volatile Organic Compounds

Method: NWTPHg

Sampled: 06/27/2017 11:45

Instrument: NT3

Analyzed: 28-Jun-2017 21:25

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFF0798 Sample Size: 5.582 g (wet) Dry Weight: 4.56 g
Prepared: 28-Jun-2017 Final Volume: 5 mL % Solids: 81.65

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	6610	ND	ug/kg	U
Surrogate: Toluene-d8			80-120 %	99.3	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	94.6	%	



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Reported:
28-Jul-2017 15:26

WC - 6
17F0434-09 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 11:45

Instrument: NT10

Analyzed: 11-Jul-2017 17:51

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0828 Sample Size: 13 g (wet) Dry Weight: 10.61 g
Prepared: 29-Jun-2017 Final Volume: 1 mL % Solids: 81.65

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Phenol	108-95-2	1	7.8	18.8	8.4	ug/kg	J
bis(2-chloroethyl) ether	111-44-4	1	6.4	18.8	ND	ug/kg	U
2-Chlorophenol	95-57-8	1	6.1	18.8	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	4.8	18.8	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	4.1	18.8	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	4.4	18.8	ND	ug/kg	U
Benzyl Alcohol	100-51-6	1	14.0	18.8	ND	ug/kg	U
2,2'-Oxybis(1-chloropropane)	108-60-1	1	5.3	18.8	ND	ug/kg	U
2-Methylphenol	95-48-7	1	7.4	18.8	ND	ug/kg	U
Hexachloroethane	67-72-1	1	5.3	18.8	ND	ug/kg	U
N-Nitroso-di-n-Propylamine	621-64-7	1	10.2	18.8	ND	ug/kg	U
4-Methylphenol	106-44-5	1	13.8	18.8	ND	ug/kg	U
Nitrobenzene	98-95-3	1	7.5	18.8	ND	ug/kg	U
Isophorone	78-59-1	1	7.3	18.8	ND	ug/kg	U
2-Nitrophenol	88-75-5	1	6.5	18.8	ND	ug/kg	U
2,4-Dimethylphenol	105-67-9	1	25.2	94.2	ND	ug/kg	U
Bis(2-Chloroethoxy)methane	111-91-1	1	6.0	18.8	ND	ug/kg	U
2,4-Dichlorophenol	120-83-2	1	30.1	94.2	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	5.6	18.8	ND	ug/kg	U
Naphthalene	91-20-3	1	4.9	18.8	ND	ug/kg	U
Benzoic acid	65-85-0	1	55.7	188	ND	ug/kg	U
4-Chloroaniline	106-47-8	1	31.7	94.2	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	4.7	18.8	ND	ug/kg	U
4-Chloro-3-Methylphenol	59-50-7	1	27.2	94.2	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	5.3	18.8	ND	ug/kg	U
Hexachlorocyclopentadiene	77-47-4	1	38.9	94.2	ND	ug/kg	U
2,4,6-Trichlorophenol	88-06-2	1	23.9	94.2	ND	ug/kg	U
2,4,5-Trichlorophenol	95-95-4	1	25.3	94.2	ND	ug/kg	U
2-Chloronaphthalene	91-58-7	1	4.2	18.8	ND	ug/kg	U
2-Nitroaniline	88-74-4	1	28.5	94.2	ND	ug/kg	U
Acenaphthylene	208-96-8	1	4.5	18.8	ND	ug/kg	U
Dimethylphthalate	131-11-3	1	6.1	18.8	ND	ug/kg	U
2,6-Dinitrotoluene	606-20-2	1	25.2	94.2	ND	ug/kg	U
Acenaphthene	83-32-9	1	4.8	18.8	11.0	ug/kg	J
3-Nitroaniline	99-09-2	1	35.5	94.2	ND	ug/kg	U
2,4-Dinitrophenol	51-28-5	1	38.9	188	ND	ug/kg	U



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 6
17F0434-09 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 11:45

Instrument: NT10

Analyzed: 11-Jul-2017 17:51

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dibenzofuran	132-64-9	1	4.3	18.8	8.3	ug/kg	J
4-Nitrophenol	100-02-7	1	41.8	94.2	ND	ug/kg	U
2,4-Dinitrotoluene	121-14-2	1	21.6	94.2	ND	ug/kg	U
Fluorene	86-73-7	1	4.7	18.8	15.4	ug/kg	J
4-Chlorophenylphenyl ether	7005-72-3	1	6.6	18.8	ND	ug/kg	U
Diethyl phthalate	84-66-2	1	16.7	18.8	ND	ug/kg	U
4-Nitroaniline	100-01-6	1	32.9	94.2	ND	ug/kg	U
4,6-Dinitro-2-methylphenol	534-52-1	1	47.6	188	ND	ug/kg	U
N-Nitrosodiphenylamine	86-30-6	1	9.0	18.8	ND	ug/kg	U
4-Bromophenyl phenyl ether	101-55-3	1	5.7	18.8	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	4.5	18.8	ND	ug/kg	U
Pentachlorophenol	87-86-5	1	29.5	94.2	ND	ug/kg	U
Phenanthrene	85-01-8	1	4.4	18.8	325	ug/kg	
Anthracene	120-12-7	1	5.6	18.8	43.3	ug/kg	
Carbazole	86-74-8	1	6.9	18.8	52.7	ug/kg	
Di-n-Butylphthalate	84-74-2	1	5.0	18.8	ND	ug/kg	U
Fluoranthene	206-44-0	1	4.3	18.8	578	ug/kg	
Pyrene	129-00-0	1	5.2	18.8	446	ug/kg	
Butylbenzylphthalate	85-68-7	1	7.6	18.8	ND	ug/kg	U
Benzo(a)anthracene	56-55-3	1	4.9	18.8	199	ug/kg	
3,3'-Dichlorobenzidine	91-94-1	1	29.4	94.2	ND	ug/kg	U
Chrysene	218-01-9	1	4.9	18.8	278	ug/kg	
bis(2-Ethylhexyl)phthalate	117-81-7	1	27.1	47.1	66.5	ug/kg	
Di-n-Octylphthalate	117-84-0	1	8.2	18.8	ND	ug/kg	U
Benzofluoranthenes, Total		1	9.6	37.7	441	ug/kg	
Benzo(a)pyrene	50-32-8	1	6.1	18.8	209	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	5.6	18.8	144	ug/kg	
Dibenzo(a,h)anthracene	53-70-3	1	5.8	18.8	51.6	ug/kg	
Benzo(g,h,i)perylene	191-24-2	1	5.5	18.8	164	ug/kg	
1-Methylnaphthalene	90-12-0	1	5.6	18.8	ND	ug/kg	U
Surrogate: 2-Fluorophenol				27-120 %	62.2	%	
Surrogate: Phenol-d5				29-120 %	66.1	%	
Surrogate: 2-Chlorophenol-d4				31-120 %	76.2	%	
Surrogate: 1,2-Dichlorobenzene-d4				32-120 %	73.2	%	
Surrogate: Nitrobenzene-d5				30-120 %	69.0	%	
Surrogate: 2-Fluorobiphenyl				35-120 %	82.0	%	
Surrogate: 2,4,6-Tribromophenol				24-134 %	95.4	%	
Surrogate: p-Terphenyl-d14				37-120 %	84.3	%	



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 6
17F0434-09 (Solid)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM

Sampled: 06/27/2017 11:45

Instrument: NT8

Analyzed: 11-Jul-2017 15:31

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0829 Prepared: 30-Jun-2017	Sample Size: 13.16 g (wet) Final Volume: 0.5 mL	Dry Weight: 10.75 g % Solids: 81.65
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0051 Cleaned: 11-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0050 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Naphthalene	91-20-3	1	1.19	4.65	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	1.03	4.65	ND	ug/kg	U
1-Methylnaphthalene	90-12-0	1	0.37	4.65	ND	ug/kg	U
Acenaphthylene	208-96-8	1	1.01	4.65	ND	ug/kg	U
Acenaphthene	83-32-9	1	0.53	4.65	2.73	ug/kg	J
Dibenzofuran	132-64-9	1	1.28	4.65	2.67	ug/kg	J
Fluorene	86-73-7	1	0.59	4.65	4.11	ug/kg	J
Phenanthrene	85-01-8	1	0.67	4.65	73.6	ug/kg	
Anthracene	120-12-7	1	0.81	4.65	11.1	ug/kg	
Fluoranthene	206-44-0	1	0.44	4.65	180	ug/kg	
Pyrene	129-00-0	1	0.58	4.65	143	ug/kg	
Benzo(a)anthracene	56-55-3	1	0.77	4.65	70.3	ug/kg	
Chrysene	218-01-9	1	0.98	4.65	86.0	ug/kg	
Benzo(b)fluoranthene	205-99-2	1	1.28	4.65	78.9	ug/kg	
Benzo(k)fluoranthene	207-08-9	1	0.71	4.65	42.6	ug/kg	
Benzo(j)fluoranthene	205-82-3	1	0.63	4.65	38.6	ug/kg	
Benzofluoranthenes, Total		1	2.80	9.31	157	ug/kg	
Benzo(a)pyrene	50-32-8	1	0.57	4.65	77.3	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	0.98	4.65	56.1	ug/kg	
Dibenzo(a,h)anthracene	53-70-3	1	0.83	4.65	15.4	ug/kg	
Benzo(g,h,i)perylene	191-24-2	1	0.99	4.65	65.7	ug/kg	
Surrogate: 2-Methylnaphthalene-d10				32-120 %	53.2	%	
Surrogate: Dibenzo[a,h]anthracene-d14				21-133 %	84.3	%	
Surrogate: Fluoranthene-d10				36-134 %	71.6	%	



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Reported:
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WC - 6
17F0434-09 (Solid)

Butyl Tins

Method: EPA 8270D-SIM

Sampled: 06/27/2017 11:45

Instrument: NT12

Analyzed: 08-Jul-2017 10:12

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		
	Preparation Batch: BFF0827	Sample Size: 6.34 g (wet)	Dry Weight: 5.18 g
	Prepared: 30-Jun-2017	Final Volume: 0.5 mL	% Solids: 81.65
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CFG0024	Initial Volume: 0.5 mL	
	Cleaned: 07-Jul-2017	Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.435	3.73	ND	ug/kg	U
Dibutyltin Ion	14488-53-0	1	1.67	5.58	ND	ug/kg	U
Butyltin Ion	78763-54-9	1	1.83	3.94	ND	ug/kg	U
Tetrabutyltin	1461-25-2	1	4.83	4.83	ND	ug/kg	U
Surrogate: Triphenyltin				30-160 %	47.9	%	
Surrogate: Tripropyltin				30-160 %	47.8	%	



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Reported:
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WC - 6
17F0434-09 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 06/27/2017 11:45

Instrument: FID4

Analyzed: 11-Jul-2017 17:06

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0822 Sample Size: 10.13 g (wet) Dry Weight: 8.27 g
Prepared: 30-Jun-2017 Final Volume: 1 mL % Solids: 81.65

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.05	21.3	mg/kg	
Motor Oil Range Organics (C24-C38)		1	12.1	116	mg/kg	B
Surrogate: o-Terphenyl			50-150 %	85.5	%	



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Reported:
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WC - 6
17F0434-09 (Solid)

Chlorinated Pesticides

Method: EPA 8081B
Instrument: ECD6

Sampled: 06/27/2017 11:45

Analyzed: 11-Jul-2017 18:45

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0825 Prepared: 29-Jun-2017	Sample Size: 16 g (wet) Final Volume: 2.5 mL	Dry Weight: 13.06 g % Solids: 81.65
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0049 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0048 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0047 Cleaned: 07-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	1	0.08	0.48	ND	ug/kg	U
beta-BHC	319-85-7	1	0.09	0.48	ND	ug/kg	U
gamma-BHC (Lindane)	58-89-9	1	0.06	0.48	ND	ug/kg	U
delta-BHC	319-86-8	1	0.06	0.48	ND	ug/kg	U
Heptachlor	76-44-8	1	0.04	0.48	ND	ug/kg	U
Aldrin	309-00-2	1	0.35	0.48	ND	ug/kg	U
Heptachlor Epoxide	1024-57-3	1	0.16	0.48	ND	ug/kg	U
trans-Chlordane (beta-Chlordane)	5103-74-2	1	0.31	0.48	ND	ug/kg	U
cis-Chlordane (alpha-chlordane)	5103-71-9	1	0.11	0.48	ND	ug/kg	U
Endosulfan I	959-98-8	1	0.07	0.48	ND	ug/kg	U
4,4'-DDE	72-55-9	1	0.13	0.96	ND	ug/kg	U
Dieldrin	60-57-1	1	0.11	0.96	ND	ug/kg	U
Endrin	72-20-8	1	0.14	0.96	ND	ug/kg	U
Endosulfan II	33213-65-9	1	0.30	0.96	ND	ug/kg	U
4,4'-DDD	72-54-8	1	0.31	0.96	ND	ug/kg	U
Endrin Aldehyde	7421-93-4	1	0.37	0.96	ND	ug/kg	U
4,4'-DDT	50-29-3	1	0.31	0.96	ND	ug/kg	U
Endosulfan Sulfate	1031-07-8	1	0.12	0.96	ND	ug/kg	U
Endrin Ketone	53494-70-5	1	0.27	0.96	ND	ug/kg	U
Methoxychlor	72-43-5	1	0.29	4.78	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	0.33	0.48	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	0.14	0.48	ND	ug/kg	U
2,4'-DDE	3424-82-6	1	0.24	0.96	ND	ug/kg	U
2,4'-DDD	53-19-0	1	0.19	0.96	ND	ug/kg	U
2,4'-DDT	789-02-6	1	0.18	0.96	ND	ug/kg	U
Oxychlordane	27304-13-8	1	0.12	0.96	ND	ug/kg	U
cis-Nonachlor	5103-73-1	1	0.20	0.96	ND	ug/kg	U



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WC - 6
17F0434-09 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 11:45

Instrument: ECD6

Analyzed: 11-Jul-2017 18:45

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
trans-Nonachlor	39765-80-5	1	0.22	0.96	ND	ug/kg	U
Mirex	2385-85-5	1	0.62	0.96	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				30-160 %	102	%	
Surrogate: Decachlorobiphenyl [2C]				30-160 %	91.5	%	
Surrogate: Tetrachlorometaxylene				30-160 %	82.7	%	
Surrogate: Tetrachlorometaxylene [2C]				30-160 %	75.6	%	



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Reported:
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WC - 6
17F0434-09 (Solid)

Aroclor PCB

Method: EPA 8082A

Sampled: 06/27/2017 11:45

Instrument: ECD7

Analyzed: 07-Jul-2017 20:17

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0826 Prepared: 05-Jul-2017	Sample Size: 6.36 g (wet) Final Volume: 5 mL	Dry Weight: 5.19 g % Solids: 81.65
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0027 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid Cleanup Batch: CFG0025 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0026 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aroclor 1016	12674-11-2	1	7.7	19.3	ND	ug/kg	U
Aroclor 1221	11104-28-2	1	7.7	19.3	ND	ug/kg	U
Aroclor 1232	11141-16-5	1	7.7	19.3	ND	ug/kg	U
Aroclor 1242	53469-21-9	1	7.7	19.3	ND	ug/kg	U
Aroclor 1248	12672-29-6	1	7.7	19.3	ND	ug/kg	U
Aroclor 1254	11097-69-1	1	7.7	19.3	ND	ug/kg	U
Aroclor 1260	11096-82-5	1	8.9	19.3	ND	ug/kg	U
Aroclor 1262	37324-23-5	1	8.9	19.3	ND	ug/kg	U
Aroclor 1268	11100-14-4	1	8.9	19.3	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				40-133 %	82.6	%	
Surrogate: Tetrachlorometaxylene				53-120 %	76.5	%	
Surrogate: Decachlorobiphenyl [2C]				40-133 %	79.1	%	
Surrogate: Tetrachlorometaxylene [2C]				53-120 %	62.3	%	



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Project Number: Willow Creek Daylight
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Reported:
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WC - 6
17F0434-09 (Solid)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 06/27/2017 11:45

Instrument: ICP2

Analyzed: 07-Jul-2017 19:32

Sample Preparation: Preparation Method: SWC EPA 3050B
Preparation Batch: BFF0836 Sample Size: 1.018 g (wet) Dry Weight: 0.84 g
Prepared: 30-Jun-2017 Final Volume: 50 mL % Solids: 82.38

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Antimony	7440-36-0	2	0.270	5.96	0.409	mg/kg	J
Arsenic	7440-38-2	2	0.334	5.96	1.60	mg/kg	J
Beryllium	7440-41-7	2	0.0069	0.119	0.0890	mg/kg	J
Cadmium	7440-43-9	2	0.0148	0.238	0.144	mg/kg	J
Chromium	7440-47-3	2	0.0561	0.596	29.5	mg/kg	
Copper	7440-50-8	2	0.0294	0.238	8.92	mg/kg	
Lead	7439-92-1	2	0.155	2.38	6.22	mg/kg	
Nickel	7440-02-0	2	0.237	1.19	25.0	mg/kg	
Selenium	7782-49-2	2	0.973	5.96	ND	mg/kg	U
Silver	7440-22-4	2	0.0523	0.358	ND	mg/kg	U
Thallium	7440-28-0	2	0.544	5.96	ND	mg/kg	U
Zinc	7440-66-6	2	0.190	1.19	84.4	mg/kg	



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WC - 6
17F0434-09 (Solid)

Metals and Metallic Compounds

Method: EPA 7471B

Sampled: 06/27/2017 11:45

Instrument: CETAC

Analyzed: 30-Jun-2017 14:28

Sample Preparation:

Preparation Method: SMM EPA 7471B

Preparation Batch: BFF0838

Prepared: 30-Jun-2017

Sample Size: 0.252 g (wet)

Final Volume: 50 mL

Dry Weight: 0.21 g

% Solids: 82.38

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Mercury	7439-97-6	1	0.02409	ND	mg/kg	U



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Reported:
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WC - 6
17F0434-09 (Solid)

Wet Chemistry

Method: Plumb 1981, Combustion IR

Sampled: 06/27/2017 11:45

Instrument: APOLLO1

Analyzed: 17-Jul-2017 14:21

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.82 g

% Solids: 82.38

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.69	%	



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Reported:
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WC - 6
17F0434-09 (Solid)

Wet Chemistry

Method: PSEP 1986

Sampled: 06/27/2017 11:45

Instrument: N/A

Analyzed: 29-Jun-2017 11:44

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFF0832

Prepared: 29-Jun-2017

Sample Size: 5 g (wet)

Final Volume: 5 g

Dry Weight: 4.12 g

% Solids: 82.38

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids, Sulfide		1	0.040	72.9	%	



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Reported:
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WC - 6
17F0434-09 (Solid)

Wet Chemistry

Method: SM 2540 G-97

Sampled: 06/27/2017 11:45

Instrument: N/A

Analyzed: 05-Jul-2017 11:59

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.82 g

% Solids: 82.38

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	82.38	%	



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Reported:
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WC - 6
17F0434-09 (Solid)

Wet Chemistry

Method: SM 4500-NH3 H-97

Sampled: 06/27/2017 11:45

Instrument: LACHAT2

Analyzed: 01-Jul-2017 13:48

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.42 g (wet)

Final Volume: 40 mL

Dry Weight: 3.64 g

% Solids: 82.38

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.44	2.44	mg/kg NH3-N	



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Reported:
28-Jul-2017 15:26

WC - 6
17F0434-09 (Solid)

Wet Chemistry

Method: SM 4500-NO₃⁻ I-00

Sampled: 06/27/2017 11:45

Instrument: LACHAT2

Analyzed: 01-Jul-2017 17:20

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.42 g (wet)

Final Volume: 40 mL

Dry Weight: 3.64 g

% Solids: 82.38

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.11	ND	mg-N/kg	U



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Reported:
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WC - 6
17F0434-09 (Solid)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 06/27/2017 11:45

Instrument: UV1800-2

Analyzed: 14-Jul-2017 15:20

Sample Preparation:

Preparation Method: SM 4500-P B-4 Strong Acid

Preparation Batch: BFG0152

Prepared: 13-Jul-2017

Sample Size: 0.3151 g (wet)

Final Volume: 50 mL

Dry Weight: 0.26 g

% Solids: 82.38

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	20	30.8	339	mg-P/kg	D



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Reported:
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WC - 6
17F0434-09 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00

Sampled: 06/27/2017 11:45

Instrument: UV1800-2

Analyzed: 30-Jun-2017 11:45

Sample Preparation:

Preparation Method: PSEP 1986

Preparation Batch: BFF0843

Prepared: 29-Jun-2017

Sample Size: 5.099 g (wet)

Final Volume: 100 mL

Dry Weight: 3.72 g

% Solids: 72.90

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	1.35	ND	mg/kg	U



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Reported:
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WC - 7
17F0434-10 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 13:05

Instrument: NT5

Analyzed: 07-Jul-2017 15:02

Sample Preparation: Preparation Method: EPA 5035 (Sodium Bisulfate)
Preparation Batch: BFG0114 Sample Size: 5.7 g (wet) Dry Weight: 4.69 g
Prepared: 07-Jul-2017 Final Volume: 5 mL % Solids: 82.36

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.28	1.07	ND	ug/kg	U
Vinyl Chloride	75-01-4	1	0.25	1.07	ND	ug/kg	U
Bromomethane	74-83-9	1	0.20	1.07	ND	ug/kg	U
Chloroethane	75-00-3	1	0.49	1.07	ND	ug/kg	U
Trichlorofluoromethane	75-69-4	1	0.28	1.07	ND	ug/kg	U
Acrolein	107-02-8	1	4.06	5.33	ND	ug/kg	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.31	2.13	ND	ug/kg	U
Acetone	67-64-1	1	0.51	5.33	118	ug/kg	
1,1-Dichloroethene	75-35-4	1	0.36	1.07	ND	ug/kg	U
Bromoethane	74-96-4	1	0.47	2.13	ND	ug/kg	U
Iodomethane	74-88-4	1	0.23	1.07	ND	ug/kg	U
Methylene Chloride	75-09-2	1	0.68	2.13	4.85	ug/kg	
Acrylonitrile	107-13-1	1	1.10	5.33	ND	ug/kg	U
Carbon Disulfide	75-15-0	1	0.60	1.07	4.54	ug/kg	
trans-1,2-Dichloroethene	156-60-5	1	0.28	1.07	ND	ug/kg	U
Vinyl Acetate	108-05-4	1	0.41	5.33	ND	ug/kg	U
1,1-Dichloroethane	75-34-3	1	0.22	1.07	ND	ug/kg	U
2-Butanone	78-93-3	1	0.55	5.33	4.74	ug/kg	J
2,2-Dichloropropane	594-20-7	1	0.31	1.07	ND	ug/kg	U
cis-1,2-Dichloroethene	156-59-2	1	0.26	1.07	ND	ug/kg	U
Chloroform	67-66-3	1	0.25	1.07	ND	ug/kg	U
Bromochloromethane	74-97-5	1	0.34	1.07	ND	ug/kg	U
1,1,1-Trichloroethane	71-55-6	1	0.24	1.07	ND	ug/kg	U
1,1-Dichloropropene	563-58-6	1	0.33	1.07	ND	ug/kg	U
Carbon tetrachloride	56-23-5	1	0.23	1.07	ND	ug/kg	U
1,2-Dichloroethane	107-06-2	1	0.20	1.07	ND	ug/kg	U
Benzene	71-43-2	1	0.32	1.07	ND	ug/kg	U
Trichloroethene	79-01-6	1	0.23	1.07	ND	ug/kg	U
1,2-Dichloropropane	78-87-5	1	0.17	1.07	ND	ug/kg	U
Bromodichloromethane	75-27-4	1	0.27	1.07	ND	ug/kg	U
Dibromomethane	74-95-3	1	0.16	1.07	ND	ug/kg	U
2-Chloroethyl vinyl ether	110-75-8	1	0.29	5.33	ND	ug/kg	U
4-Methyl-2-Pentanone	108-10-1	1	0.45	5.33	ND	ug/kg	U
cis-1,3-Dichloropropene	10061-01-5	1	0.24	1.07	ND	ug/kg	U
Toluene	108-88-3	1	0.16	1.07	0.88	ug/kg	J
trans-1,3-Dichloropropene	10061-02-6	1	0.23	1.07	ND	ug/kg	U



Shannon & Wilson, Inc
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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 13:05

Instrument: NT5

Analyzed: 07-Jul-2017 15:02

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	0.47	5.33	ND	ug/kg	U
1,1,2-Trichloroethane	79-00-5	1	0.30	1.07	ND	ug/kg	U
1,3-Dichloropropane	142-28-9	1	0.22	1.07	ND	ug/kg	U
Tetrachloroethene	127-18-4	1	0.27	1.07	ND	ug/kg	U
Dibromochloromethane	124-48-1	1	0.28	1.07	ND	ug/kg	U
1,2-Dibromoethane	106-93-4	1	0.19	1.07	ND	ug/kg	U
Chlorobenzene	108-90-7	1	0.23	1.07	ND	ug/kg	U
Ethylbenzene	100-41-4	1	0.22	1.07	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.25	1.07	ND	ug/kg	U
m,p-Xylene	179601-23-1	1	0.42	1.07	ND	ug/kg	U
o-Xylene	95-47-6	1	0.24	1.07	ND	ug/kg	U
Xylenes, total	1330-20-7	1	0.66	2.13	ND	ug/kg	U
Styrene	100-42-5	1	0.15	1.07	ND	ug/kg	U
Bromoform	75-25-2	1	0.32	1.07	ND	ug/kg	U
1,1,1,2-Tetrachloroethane	79-34-5	1	0.27	1.07	ND	ug/kg	U
1,2,3-Trichloropropane	96-18-4	1	0.55	2.13	ND	ug/kg	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	0.47	5.33	ND	ug/kg	U
n-Propylbenzene	103-65-1	1	0.29	1.07	ND	ug/kg	U
Bromobenzene	108-86-1	1	0.16	1.07	ND	ug/kg	U
Isopropyl Benzene	98-82-8	1	0.25	1.07	ND	ug/kg	U
2-Chlorotoluene	95-49-8	1	0.32	1.07	ND	ug/kg	U
4-Chlorotoluene	106-43-4	1	0.30	1.07	ND	ug/kg	U
t-Butylbenzene	98-06-6	1	0.33	1.07	ND	ug/kg	U
1,3,5-Trimethylbenzene	108-67-8	1	0.27	1.07	ND	ug/kg	U
1,2,4-Trimethylbenzene	95-63-6	1	0.24	1.07	ND	ug/kg	U
s-Butylbenzene	135-98-8	1	0.26	1.07	ND	ug/kg	U
4-Isopropyl Toluene	99-87-6	1	0.25	1.07	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	0.24	1.07	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	0.25	1.07	ND	ug/kg	U
n-Butylbenzene	104-51-8	1	0.28	1.07	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	0.31	1.07	ND	ug/kg	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.62	5.33	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	0.35	5.33	ND	ug/kg	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.44	5.33	ND	ug/kg	U
Naphthalene	91-20-3	1	0.46	5.33	ND	ug/kg	U
1,2,3-Trichlorobenzene	87-61-6	1	0.32	5.33	ND	ug/kg	U
Dichlorodifluoromethane	75-71-8	1	0.22	1.07	ND	ug/kg	U
Methyl tert-butyl Ether	1634-04-4	1	0.25	1.07	ND	ug/kg	U
2-Pentanone	107-87-9	1	5.33	5.33	ND	ug/kg	U



Shannon & Wilson, Inc
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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 13:05

Instrument: NT5

Analyzed: 07-Jul-2017 15:02

Analyte	CAS Number	Recovery Limits	Recovery	Units	Notes
Surrogate: 1,2-Dichloroethane-d4		80-149 %	107	%	
Surrogate: Toluene-d8		77-120 %	101	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	95.6	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	102	%	



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Reported:
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WC - 7
17F0434-10 (Solid)

Volatile Organic Compounds

Method: NWTPHg
Instrument: NT3

Sampled: 06/27/2017 13:05

Analyzed: 28-Jun-2017 21:50

Sample Preparation: Preparation Method: EPA 5035 (Methanol Extraction)
Preparation Batch: BFF0798 Sample Size: 5.669 g (wet) Dry Weight: 4.67 g
Prepared: 28-Jun-2017 Final Volume: 5 mL % Solids: 82.36

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Gasoline Range Organics (Tol-Nap)		50	6430	ND	ug/kg	U
Surrogate: Toluene-d8			80-120 %	102	%	
Surrogate: 4-Bromofluorobenzene			78-123 %	96.3	%	



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 13:05

Instrument: NT10

Analyzed: 11-Jul-2017 18:28

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0828 Sample Size: 12.32 g (wet) Dry Weight: 10.15 g
Prepared: 29-Jun-2017 Final Volume: 1 mL % Solids: 82.36

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Phenol	108-95-2	1	8.1	19.7	ND	ug/kg	U
bis(2-chloroethyl) ether	111-44-4	1	6.7	19.7	ND	ug/kg	U
2-Chlorophenol	95-57-8	1	6.4	19.7	ND	ug/kg	U
1,3-Dichlorobenzene	541-73-1	1	5.0	19.7	ND	ug/kg	U
1,4-Dichlorobenzene	106-46-7	1	4.3	19.7	ND	ug/kg	U
1,2-Dichlorobenzene	95-50-1	1	4.6	19.7	ND	ug/kg	U
Benzyl Alcohol	100-51-6	1	14.7	19.7	ND	ug/kg	U
2,2'-Oxybis(1-chloropropane)	108-60-1	1	5.6	19.7	ND	ug/kg	U
2-Methylphenol	95-48-7	1	7.7	19.7	ND	ug/kg	U
Hexachloroethane	67-72-1	1	5.6	19.7	ND	ug/kg	U
N-Nitroso-di-n-Propylamine	621-64-7	1	10.6	19.7	ND	ug/kg	U
4-Methylphenol	106-44-5	1	14.5	19.7	ND	ug/kg	U
Nitrobenzene	98-95-3	1	7.8	19.7	ND	ug/kg	U
Isophorone	78-59-1	1	7.6	19.7	ND	ug/kg	U
2-Nitrophenol	88-75-5	1	6.8	19.7	ND	ug/kg	U
2,4-Dimethylphenol	105-67-9	1	26.4	98.6	ND	ug/kg	U
Bis(2-Chloroethoxy)methane	111-91-1	1	6.2	19.7	ND	ug/kg	U
2,4-Dichlorophenol	120-83-2	1	31.5	98.6	ND	ug/kg	U
1,2,4-Trichlorobenzene	120-82-1	1	5.9	19.7	ND	ug/kg	U
Naphthalene	91-20-3	1	5.2	19.7	ND	ug/kg	U
Benzoic acid	65-85-0	1	58.2	197	ND	ug/kg	U
4-Chloroaniline	106-47-8	1	33.2	98.6	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	4.9	19.7	ND	ug/kg	U
4-Chloro-3-Methylphenol	59-50-7	1	28.5	98.6	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	5.6	19.7	ND	ug/kg	U
Hexachlorocyclopentadiene	77-47-4	1	40.7	98.6	ND	ug/kg	U
2,4,6-Trichlorophenol	88-06-2	1	25.0	98.6	ND	ug/kg	U
2,4,5-Trichlorophenol	95-95-4	1	26.5	98.6	ND	ug/kg	U
2-Chloronaphthalene	91-58-7	1	4.4	19.7	ND	ug/kg	U
2-Nitroaniline	88-74-4	1	29.8	98.6	ND	ug/kg	U
Acenaphthylene	208-96-8	1	4.7	19.7	ND	ug/kg	U
Dimethylphthalate	131-11-3	1	6.3	19.7	ND	ug/kg	U
2,6-Dinitrotoluene	606-20-2	1	26.3	98.6	ND	ug/kg	U
Acenaphthene	83-32-9	1	5.1	19.7	ND	ug/kg	U
3-Nitroaniline	99-09-2	1	37.2	98.6	ND	ug/kg	U
2,4-Dinitrophenol	51-28-5	1	40.7	197	ND	ug/kg	U



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Project: Willow Creek Daylight
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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Semivolatile Organic Compounds

Method: EPA 8270D

Sampled: 06/27/2017 13:05

Instrument: NT10

Analyzed: 11-Jul-2017 18:28

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dibenzofuran	132-64-9	1	4.5	19.7	ND	ug/kg	U
4-Nitrophenol	100-02-7	1	43.8	98.6	ND	ug/kg	U
2,4-Dinitrotoluene	121-14-2	1	22.6	98.6	ND	ug/kg	U
Fluorene	86-73-7	1	4.9	19.7	ND	ug/kg	U
4-Chlorophenylphenyl ether	7005-72-3	1	6.9	19.7	ND	ug/kg	U
Diethyl phthalate	84-66-2	1	17.4	19.7	ND	ug/kg	U
4-Nitroaniline	100-01-6	1	34.4	98.6	ND	ug/kg	U
4,6-Dinitro-2-methylphenol	534-52-1	1	49.8	197	ND	ug/kg	U
N-Nitrosodiphenylamine	86-30-6	1	9.4	19.7	ND	ug/kg	U
4-Bromophenyl phenyl ether	101-55-3	1	6.0	19.7	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	4.7	19.7	ND	ug/kg	U
Pentachlorophenol	87-86-5	1	30.8	98.6	ND	ug/kg	U
Phenanthrene	85-01-8	1	4.6	19.7	38.0	ug/kg	
Anthracene	120-12-7	1	5.8	19.7	ND	ug/kg	U
Carbazole	86-74-8	1	7.3	19.7	ND	ug/kg	U
Di-n-Butylphthalate	84-74-2	1	5.2	19.7	ND	ug/kg	U
Fluoranthene	206-44-0	1	4.5	19.7	62.7	ug/kg	
Pyrene	129-00-0	1	5.5	19.7	49.6	ug/kg	
Butylbenzylphthalate	85-68-7	1	7.9	19.7	ND	ug/kg	U
Benzo(a)anthracene	56-55-3	1	5.1	19.7	22.5	ug/kg	
3,3'-Dichlorobenzidine	91-94-1	1	30.7	98.6	ND	ug/kg	U
Chrysene	218-01-9	1	5.1	19.7	38.9	ug/kg	
bis(2-Ethylhexyl)phthalate	117-81-7	1	28.4	49.3	42.6	ug/kg	J
Di-n-Octylphthalate	117-84-0	1	8.6	19.7	ND	ug/kg	U
Benzo(a)fluoranthene, Total		1	10.1	39.4	65.4	ug/kg	
Benzo(a)pyrene	50-32-8	1	6.4	19.7	29.1	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	5.9	19.7	19.2	ug/kg	J
Dibenzo(a,h)anthracene	53-70-3	1	6.1	19.7	9.7	ug/kg	J
Benzo(g,h,i)perylene	191-24-2	1	5.7	19.7	24.7	ug/kg	
1-Methylnaphthalene	90-12-0	1	5.9	19.7	ND	ug/kg	U
Surrogate: 2-Fluorophenol				27-120 %	60.4	%	
Surrogate: Phenol-d5				29-120 %	65.1	%	
Surrogate: 2-Chlorophenol-d4				31-120 %	75.9	%	
Surrogate: 1,2-Dichlorobenzene-d4				32-120 %	71.5	%	
Surrogate: Nitrobenzene-d5				30-120 %	71.8	%	
Surrogate: 2-Fluorobiphenyl				35-120 %	84.6	%	
Surrogate: 2,4,6-Tribromophenol				24-134 %	98.6	%	
Surrogate: p-Terphenyl-d14				37-120 %	86.5	%	



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Semivolatile Organic Compounds - SIM

Method: EPA 8270D-SIM

Sampled: 06/27/2017 13:05

Instrument: NT8

Analyzed: 11-Jul-2017 15:57

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0829 Prepared: 30-Jun-2017	Sample Size: 12.33 g (wet) Final Volume: 0.5 mL	Dry Weight: 10.15 g % Solids: 82.36
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0051 Cleaned: 11-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0050 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Naphthalene	91-20-3	1	1.26	4.92	ND	ug/kg	U
2-Methylnaphthalene	91-57-6	1	1.09	4.92	ND	ug/kg	U
1-Methylnaphthalene	90-12-0	1	0.39	4.92	ND	ug/kg	U
Acenaphthylene	208-96-8	1	1.07	4.92	ND	ug/kg	U
Acenaphthene	83-32-9	1	0.56	4.92	ND	ug/kg	U
Dibenzofuran	132-64-9	1	1.36	4.92	ND	ug/kg	U
Fluorene	86-73-7	1	0.62	4.92	ND	ug/kg	U
Phenanthrene	85-01-8	1	0.71	4.92	10.8	ug/kg	
Anthracene	120-12-7	1	0.86	4.92	ND	ug/kg	U
Fluoranthene	206-44-0	1	0.46	4.92	24.1	ug/kg	
Pyrene	129-00-0	1	0.62	4.92	20.6	ug/kg	
Benzo(a)anthracene	56-55-3	1	0.81	4.92	9.93	ug/kg	
Chrysene	218-01-9	1	1.04	4.92	14.6	ug/kg	
Benzo(b)fluoranthene	205-99-2	1	1.35	4.92	11.5	ug/kg	
Benzo(k)fluoranthene	207-08-9	1	0.75	4.92	5.87	ug/kg	
Benzo(j)fluoranthene	205-82-3	1	0.67	4.92	6.05	ug/kg	
Benzofluoranthenes, Total		1	2.96	9.85	22.6	ug/kg	
Benzo(a)pyrene	50-32-8	1	0.60	4.92	10.3	ug/kg	
Indeno(1,2,3-cd)pyrene	193-39-5	1	1.03	4.92	8.31	ug/kg	
Dibenzo(a,h)anthracene	53-70-3	1	0.88	4.92	3.72	ug/kg	J
Benzo(g,h,i)perylene	191-24-2	1	1.05	4.92	10.6	ug/kg	
Surrogate: 2-Methylnaphthalene-d10				32-120 %	50.7	%	
Surrogate: Dibenzo[a,h]anthracene-d14				21-133 %	75.7	%	
Surrogate: Fluoranthene-d10				36-134 %	67.0	%	



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Butyl Tins

Method: EPA 8270D-SIM

Sampled: 06/27/2017 13:05

Instrument: NT12

Analyzed: 08-Jul-2017 10:25

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0827 Prepared: 30-Jun-2017	Sample Size: 6.19 g (wet) Final Volume: 0.5 mL	Dry Weight: 5.10 g % Solids: 82.36
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0024 Cleaned: 07-Jul-2017	Initial Volume: 0.5 mL Final Volume: 0.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Tributyltin Ion	36643-28-4	1	0.441	3.79	ND	ug/kg	U
Dibutyltin Ion	14488-53-0	1	1.70	5.67	ND	ug/kg	U
Butyltin Ion	78763-54-9	1	1.85	4.00	ND	ug/kg	U
Tetrabutyltin	1461-25-2	1	4.90	4.90	ND	ug/kg	U
Surrogate: Triphenyltin					30-160 %	38.6 %	
Surrogate: Tripropyltin					30-160 %	37.9 %	



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WC - 7
17F0434-10 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 06/27/2017 13:05

Instrument: FID4

Analyzed: 11-Jul-2017 17:27

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFF0822 Sample Size: 10.02 g (wet) Dry Weight: 8.25 g
Prepared: 30-Jun-2017 Final Volume: 1 mL % Solids: 82.36

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	6.06	43.6	mg/kg	
Motor Oil Range Organics (C24-C38)		1	12.1	136	mg/kg	B
Surrogate: o-Terphenyl			50-150 %	91.1	%	



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Reported:
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WC - 7
17F0434-10 (Solid)

Chlorinated Pesticides

Method: EPA 8081B
Instrument: ECD6

Sampled: 06/27/2017 13:05

Analyzed: 11-Jul-2017 19:03

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0825 Prepared: 29-Jun-2017	Sample Size: 15.34 g (wet) Final Volume: 2.5 mL	Dry Weight: 12.63 g % Solids: 82.36
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0049 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0048 Cleaned: 10-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	
Sample Cleanup:	Cleanup Method: GPC Cleanup Batch: CFG0047 Cleaned: 07-Jul-2017	Initial Volume: 2.5 mL Final Volume: 2.5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
alpha-BHC	319-84-6	1	0.08	0.49	ND	ug/kg	U
beta-BHC	319-85-7	1	0.09	0.49	ND	ug/kg	U
gamma-BHC (Lindane)	58-89-9	1	0.07	0.49	ND	ug/kg	U
delta-BHC	319-86-8	1	0.06	0.49	ND	ug/kg	U
Heptachlor	76-44-8	1	0.05	0.49	ND	ug/kg	U
Aldrin	309-00-2	1	0.37	0.49	ND	ug/kg	U
Heptachlor Epoxide	1024-57-3	1	0.17	0.49	ND	ug/kg	U
trans-Chlordane (beta-Chlordane)	5103-74-2	1	0.32	0.49	ND	ug/kg	U
cis-Chlordane (alpha-chlordane)	5103-71-9	1	0.11	0.49	ND	ug/kg	U
Endosulfan I	959-98-8	1	0.07	0.49	ND	ug/kg	U
4,4'-DDE	72-55-9	1	0.13	0.99	0.68	ug/kg	J
Dieldrin	60-57-1	1	0.11	0.99	ND	ug/kg	U
Endrin	72-20-8	1	0.14	0.99	ND	ug/kg	U
Endosulfan II	33213-65-9	1	0.31	0.99	ND	ug/kg	U
4,4'-DDD	72-54-8	1	0.32	0.99	ND	ug/kg	U
Endrin Aldehyde	7421-93-4	1	0.39	0.99	ND	ug/kg	U
4,4'-DDT	50-29-3	1	0.32	0.99	ND	ug/kg	U
Endosulfan Sulfate	1031-07-8	1	0.12	0.99	ND	ug/kg	U
Endrin Ketone	53494-70-5	1	0.28	0.99	ND	ug/kg	U
Methoxychlor	72-43-5	1	0.29	4.95	ND	ug/kg	U
Hexachlorobutadiene	87-68-3	1	0.34	0.49	ND	ug/kg	U
Hexachlorobenzene	118-74-1	1	0.14	0.49	ND	ug/kg	U
2,4'-DDE	3424-82-6	1	0.25	0.99	ND	ug/kg	U
2,4'-DDD	53-19-0	1	0.19	0.99	ND	ug/kg	U
2,4'-DDT	789-02-6	1	0.19	0.99	ND	ug/kg	U
Oxychlordane	27304-13-8	1	0.13	0.99	ND	ug/kg	U
cis-Nonachlor	5103-73-1	1	0.21	0.99	ND	ug/kg	U



Shannon & Wilson, Inc
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Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Chlorinated Pesticides

Method: EPA 8081B

Sampled: 06/27/2017 13:05

Instrument: ECD6

Analyzed: 11-Jul-2017 19:03

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
trans-Nonachlor	39765-80-5	1	0.23	0.99	ND	ug/kg	U
Mirex	2385-85-5	1	0.64	0.99	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				30-160 %	90.5	%	
Surrogate: Decachlorobiphenyl [2C]				30-160 %	86.9	%	
Surrogate: Tetrachlorometaxylene				30-160 %	73.5	%	
Surrogate: Tetrachlorometaxylene [2C]				30-160 %	72.0	%	



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Aroclor PCB

Method: EPA 8082A

Sampled: 06/27/2017 13:05

Instrument: ECD7

Analyzed: 07-Jul-2017 20:39

Sample Preparation:	Preparation Method: EPA 3546 (Microwave) Preparation Batch: BFF0826 Prepared: 05-Jul-2017	Sample Size: 6.16 g (wet) Final Volume: 5 mL	Dry Weight: 5.07 g % Solids: 82.36
Sample Cleanup:	Cleanup Method: Silica Gel Cleanup Batch: CFG0027 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid Cleanup Batch: CFG0025 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	
Sample Cleanup:	Cleanup Method: Sulfur Cleanup Batch: CFG0026 Cleaned: 07-Jul-2017	Initial Volume: 5 mL Final Volume: 5 mL	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aroclor 1016	12674-11-2	1	7.9	19.7	ND	ug/kg	U
Aroclor 1221	11104-28-2	1	7.9	19.7	ND	ug/kg	U
Aroclor 1232	11141-16-5	1	7.9	19.7	ND	ug/kg	U
Aroclor 1242	53469-21-9	1	7.9	19.7	ND	ug/kg	U
Aroclor 1248	12672-29-6	1	7.9	19.7	ND	ug/kg	U
Aroclor 1254	11097-69-1	1	7.9	19.7	ND	ug/kg	U
Aroclor 1260	11096-82-5	1	9.1	19.7	ND	ug/kg	U
Aroclor 1262	37324-23-5	1	9.1	19.7	ND	ug/kg	U
Aroclor 1268	11100-14-4	1	9.1	19.7	ND	ug/kg	U
Surrogate: Decachlorobiphenyl				40-133 %	87.5	%	
Surrogate: Tetrachlorometaxylene				53-120 %	79.7	%	
Surrogate: Decachlorobiphenyl [2C]				40-133 %	83.1	%	
Surrogate: Tetrachlorometaxylene [2C]				53-120 %	76.7	%	



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 06/27/2017 13:05

Instrument: ICP2

Analyzed: 07-Jul-2017 19:36

Sample Preparation:

Preparation Method: SWC EPA 3050B

Preparation Batch: BFF0836

Prepared: 30-Jun-2017

Sample Size: 1.049 g (wet)

Final Volume: 50 mL

Dry Weight: 0.82 g

% Solids: 78.31

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Antimony	7440-36-0	2	0.275	6.09	0.937	mg/kg	J
Arsenic	7440-38-2	2	0.341	6.09	3.08	mg/kg	J
Beryllium	7440-41-7	2	0.0070	0.122	0.140	mg/kg	
Cadmium	7440-43-9	2	0.0151	0.243	0.296	mg/kg	
Chromium	7440-47-3	2	0.0573	0.609	28.3	mg/kg	
Copper	7440-50-8	2	0.0300	0.243	15.0	mg/kg	
Lead	7439-92-1	2	0.159	2.43	56.7	mg/kg	
Nickel	7440-02-0	2	0.242	1.22	37.3	mg/kg	
Selenium	7782-49-2	2	0.994	6.09	1.01	mg/kg	J
Silver	7440-22-4	2	0.0534	0.365	0.0874	mg/kg	J
Thallium	7440-28-0	2	0.555	6.09	ND	mg/kg	U
Zinc	7440-66-6	2	0.194	1.22	97.3	mg/kg	



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Metals and Metallic Compounds

Method: EPA 7471B

Sampled: 06/27/2017 13:05

Instrument: CETAC

Analyzed: 30-Jun-2017 14:30

Sample Preparation:

Preparation Method: SMM EPA 7471B

Preparation Batch: BFF0838

Prepared: 30-Jun-2017

Sample Size: 0.229 g (wet)

Final Volume: 50 mL

Dry Weight: 0.18 g

% Solids: 78.31

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Mercury	7439-97-6	1	0.02788	ND	mg/kg	U



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Wet Chemistry

Method: Plumb 1981, Combustion IR

Sampled: 06/27/2017 13:05

Instrument: APOLLO1

Analyzed: 17-Jul-2017 14:33

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.78 g

% Solids: 78.31

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.30	%	



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Wet Chemistry

Method: PSEP 1986

Sampled: 06/27/2017 13:05

Instrument: N/A

Analyzed: 29-Jun-2017 11:44

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFF0832

Prepared: 29-Jun-2017

Sample Size: 5 g (wet)

Final Volume: 5 g

Dry Weight: 3.92 g

% Solids: 78.31

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids, Sulfide		1	0.040	73.0	%	



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Wet Chemistry

Method: SM 2540 G-97

Sampled: 06/27/2017 13:05

Instrument: N/A

Analyzed: 05-Jul-2017 11:59

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFG0041

Prepared: 05-Jul-2017

Sample Size: 1 g (wet)

Final Volume: 1 g

Dry Weight: 0.78 g

% Solids: 78.31

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	78.31	%	



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Wet Chemistry

Method: SM 4500-NH3 H-97

Sampled: 06/27/2017 13:05

Instrument: LACHAT2

Analyzed: 01-Jul-2017 13:49

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.29 g (wet)

Final Volume: 40 mL

Dry Weight: 3.36 g

% Solids: 78.31

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Ammonia-N	7664-41-7	1	0.48	3.63	mg/kg NH3-N	



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Wet Chemistry

Method: SM 4500-NO₃⁻ I-00

Sampled: 06/27/2017 13:05

Instrument: LACHAT2

Analyzed: 01-Jul-2017 17:22

Sample Preparation:

Preparation Method: MSA 33.3

Preparation Batch: BFF0835

Prepared: 01-Jul-2017

Sample Size: 4.29 g (wet)

Final Volume: 40 mL

Dry Weight: 3.36 g

% Solids: 78.31

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Nitrate + Nitrite as N		1	0.12	ND	mg-N/kg	U



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 06/27/2017 13:05

Instrument: UV1800-2

Analyzed: 14-Jul-2017 15:21

Sample Preparation:	Preparation Method: SM 4500-P B-4 Strong Acid	Sample Size: 0.3099 g (wet)	Dry Weight: 0.24 g
	Preparation Batch: BFG0152	Final Volume: 50 mL	% Solids: 78.31
	Prepared: 13-Jul-2017		

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	20	33.0	367	mg-P/kg	D



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Reported:
28-Jul-2017 15:26

WC - 7
17F0434-10 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00
Instrument: UV1800-2

Sampled: 06/27/2017 13:05

Analyzed: 30-Jun-2017 11:46

Sample Preparation:	Preparation Method: PSEP 1986	Sample Size: 5.078 g (wet)	Dry Weight: 3.71 g
	Preparation Batch: BFF0843	Final Volume: 100 mL	% Solids: 73.00
	Prepared: 29-Jun-2017		

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	1.35	ND	mg/kg	U



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Project: Willow Creek Daylight
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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Trip Blank
17F0434-11 (Water)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 08:30

Instrument: NT3

Analyzed: 28-Jun-2017 15:21

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap)
Preparation Batch: BFF0797 Sample Size: 10 mL
Prepared: 28-Jun-2017 Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloromethane	74-87-3	1	0.09	0.50	ND	ug/L	U
Vinyl Chloride	75-01-4	1	0.06	0.20	ND	ug/L	U
Bromomethane	74-83-9	1	0.25	1.00	ND	ug/L	U
Chloroethane	75-00-3	1	0.09	0.20	ND	ug/L	U
Trichlorofluoromethane	75-69-4	1	0.04	0.20	ND	ug/L	U
Acrolein	107-02-8	1	2.48	5.00	ND	ug/L	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1	0.04	0.20	ND	ug/L	U
Acetone	67-64-1	1	2.06	5.00	ND	ug/L	U
1,1-Dichloroethene	75-35-4	1	0.05	0.20	ND	ug/L	U
Bromoethane	74-96-4	1	0.04	0.20	ND	ug/L	U
Iodomethane	74-88-4	1	0.23	1.00	ND	ug/L	U
Methylene Chloride	75-09-2	1	0.49	1.00	ND	ug/L	U
Acrylonitrile	107-13-1	1	0.60	1.00	ND	ug/L	U
Carbon Disulfide	75-15-0	1	0.04	0.20	ND	ug/L	U
trans-1,2-Dichloroethene	156-60-5	1	0.05	0.20	ND	ug/L	U
Vinyl Acetate	108-05-4	1	0.07	0.20	ND	ug/L	U
1,1-Dichloroethane	75-34-3	1	0.05	0.20	ND	ug/L	U
2-Butanone	78-93-3	1	0.81	5.00	ND	ug/L	U
2,2-Dichloropropane	594-20-7	1	0.05	0.20	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.04	0.20	ND	ug/L	U
Chloroform	67-66-3	1	0.03	0.20	ND	ug/L	U
Bromochloromethane	74-97-5	1	0.06	0.20	ND	ug/L	U
1,1,1-Trichloroethane	71-55-6	1	0.04	0.20	ND	ug/L	U
1,1-Dichloropropene	563-58-6	1	0.03	0.20	ND	ug/L	U
Carbon tetrachloride	56-23-5	1	0.04	0.20	ND	ug/L	U
1,2-Dichloroethane	107-06-2	1	0.07	0.20	ND	ug/L	U
Benzene	71-43-2	1	0.03	0.20	ND	ug/L	U
Trichloroethene	79-01-6	1	0.05	0.20	ND	ug/L	U
1,2-Dichloropropane	78-87-5	1	0.04	0.20	ND	ug/L	U
Bromodichloromethane	75-27-4	1	0.05	0.20	ND	ug/L	U
Dibromomethane	74-95-3	1	0.15	0.20	ND	ug/L	U
2-Chloroethyl vinyl ether	110-75-8	1	0.25	1.00	ND	ug/L	U
4-Methyl-2-Pentanone	108-10-1	1	0.97	5.00	ND	ug/L	U
cis-1,3-Dichloropropene	10061-01-5	1	0.06	0.20	ND	ug/L	U
Toluene	108-88-3	1	0.04	0.20	ND	ug/L	U
trans-1,3-Dichloropropene	10061-02-6	1	0.08	0.20	ND	ug/L	U



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Project: Willow Creek Daylight
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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Trip Blank
17F0434-11 (Water)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 08:30

Instrument: NT3

Analyzed: 28-Jun-2017 15:21

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
2-Hexanone	591-78-6	1	0.90	5.00	ND	ug/L	U
1,1,2-Trichloroethane	79-00-5	1	0.13	0.20	ND	ug/L	U
1,3-Dichloropropane	142-28-9	1	0.06	0.20	ND	ug/L	U
Tetrachloroethene	127-18-4	1	0.05	0.20	ND	ug/L	U
Dibromochloromethane	124-48-1	1	0.05	0.20	ND	ug/L	U
1,2-Dibromoethane	106-93-4	1	0.07	0.20	ND	ug/L	U
Chlorobenzene	108-90-7	1	0.02	0.20	ND	ug/L	U
Ethylbenzene	100-41-4	1	0.04	0.20	ND	ug/L	U
1,1,1,2-Tetrachloroethane	630-20-6	1	0.04	0.20	ND	ug/L	U
m,p-Xylene	179601-23-1	1	0.05	0.40	ND	ug/L	U
o-Xylene	95-47-6	1	0.03	0.20	ND	ug/L	U
Xylenes, total	1330-20-7	1	0.09	0.60	ND	ug/L	U
Styrene	100-42-5	1	0.05	0.20	ND	ug/L	U
Bromoform	75-25-2	1	0.06	0.20	ND	ug/L	U
1,1,1,2,2-Tetrachloroethane	79-34-5	1	0.06	0.20	ND	ug/L	U
1,2,3-Trichloropropane	96-18-4	1	0.13	0.50	ND	ug/L	U
trans-1,4-Dichloro 2-Butene	110-57-6	1	0.32	1.00	ND	ug/L	U
n-Propylbenzene	103-65-1	1	0.02	0.20	ND	ug/L	U
Bromobenzene	108-86-1	1	0.06	0.20	ND	ug/L	U
Isopropyl Benzene	98-82-8	1	0.02	0.20	ND	ug/L	U
2-Chlorotoluene	95-49-8	1	0.02	0.20	ND	ug/L	U
4-Chlorotoluene	106-43-4	1	0.02	0.20	ND	ug/L	U
t-Butylbenzene	98-06-6	1	0.03	0.20	ND	ug/L	U
1,3,5-Trimethylbenzene	108-67-8	1	0.02	0.20	ND	ug/L	U
1,2,4-Trimethylbenzene	95-63-6	1	0.02	0.20	ND	ug/L	U
s-Butylbenzene	135-98-8	1	0.02	0.20	ND	ug/L	U
4-Isopropyl Toluene	99-87-6	1	0.03	0.20	0.46	ug/L	
1,3-Dichlorobenzene	541-73-1	1	0.04	0.20	ND	ug/L	U
1,4-Dichlorobenzene	106-46-7	1	0.04	0.20	ND	ug/L	U
n-Butylbenzene	104-51-8	1	0.02	0.20	ND	ug/L	U
1,2-Dichlorobenzene	95-50-1	1	0.04	0.20	ND	ug/L	U
1,2-Dibromo-3-chloropropane	96-12-8	1	0.37	0.50	ND	ug/L	U
1,2,4-Trichlorobenzene	120-82-1	1	0.11	0.50	ND	ug/L	U
Hexachloro-1,3-Butadiene	87-68-3	1	0.07	0.50	ND	ug/L	U
Naphthalene	91-20-3	1	0.12	0.50	ND	ug/L	U
1,2,3-Trichlorobenzene	87-61-6	1	0.11	0.50	ND	ug/L	U
Dichlorodifluoromethane	75-71-8	1	0.05	0.20	ND	ug/L	U
Methyl tert-butyl Ether	1634-04-4	1	0.07	0.50	ND	ug/L	U
2-Pentanone	107-87-9	1	5.00	5.00	ND	ug/L	U



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Trip Blank
17F0434-11 (Water)

Volatile Organic Compounds

Method: EPA 8260C

Sampled: 06/27/2017 08:30

Instrument: NT3

Analyzed: 28-Jun-2017 15:21

Analyte	CAS Number	Recovery Limits	Recovery	Units	Notes
Surrogate: 1,2-Dichloroethane-d4		80-129 %	97.8	%	
Surrogate: Toluene-d8		80-120 %	101	%	
Surrogate: 4-Bromofluorobenzene		80-120 %	96.2	%	
Surrogate: 1,2-Dichlorobenzene-d4		80-120 %	105	%	



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Reported:
28-Jul-2017 15:26

Volatile Organic Compounds - Quality Control

Batch BFF0797 - EPA 5030 (Purge and Trap)

Instrument: NT3 Analyst: PC

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0797-BLK1)						Prepared: 28-Jun-2017 Analyzed: 28-Jun-2017 14:03					
Chloromethane	ND	0.09	0.50	ug/L							U
Vinyl Chloride	ND	0.06	0.20	ug/L							U
Bromomethane	ND	0.25	1.00	ug/L							U
Chloroethane	ND	0.09	0.20	ug/L							U
Trichlorofluoromethane	ND	0.04	0.20	ug/L							U
Acrolein	ND	2.48	5.00	ug/L							U
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.04	0.20	ug/L							U
Acetone	ND	2.06	5.00	ug/L							U
1,1-Dichloroethene	ND	0.05	0.20	ug/L							U
Bromoethane	ND	0.04	0.20	ug/L							U
Iodomethane	ND	0.23	1.00	ug/L							U
Methylene Chloride	ND	0.49	1.00	ug/L							U
Acrylonitrile	ND	0.60	1.00	ug/L							U
Carbon Disulfide	ND	0.04	0.20	ug/L							U
trans-1,2-Dichloroethene	ND	0.05	0.20	ug/L							U
Vinyl Acetate	ND	0.07	0.20	ug/L							U
1,1-Dichloroethane	ND	0.05	0.20	ug/L							U
2-Butanone	ND	0.81	5.00	ug/L							U
2,2-Dichloropropane	ND	0.05	0.20	ug/L							U
cis-1,2-Dichloroethene	ND	0.04	0.20	ug/L							U
Chloroform	ND	0.03	0.20	ug/L							U
Bromochloromethane	ND	0.06	0.20	ug/L							U
1,1,1-Trichloroethane	ND	0.04	0.20	ug/L							U
1,1-Dichloropropene	ND	0.03	0.20	ug/L							U
Carbon tetrachloride	ND	0.04	0.20	ug/L							U
1,2-Dichloroethane	ND	0.07	0.20	ug/L							U
Benzene	ND	0.03	0.20	ug/L							U
Trichloroethene	ND	0.05	0.20	ug/L							U
1,2-Dichloropropane	ND	0.04	0.20	ug/L							U
Bromodichloromethane	ND	0.05	0.20	ug/L							U
Dibromomethane	ND	0.15	0.20	ug/L							U
2-Chloroethyl vinyl ether	ND	0.25	1.00	ug/L							U
4-Methyl-2-Pentanone	ND	0.97	5.00	ug/L							U
cis-1,3-Dichloropropene	ND	0.06	0.20	ug/L							U
Toluene	ND	0.04	0.20	ug/L							U



Shannon & Wilson, Inc
400 N 34th St., Suite 100
Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Volatile Organic Compounds - Quality Control

Batch BFF0797 - EPA 5030 (Purge and Trap)

Instrument: NT3 Analyst: PC

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0797-BLK1)						Prepared: 28-Jun-2017 Analyzed: 28-Jun-2017 14:03					
trans-1,3-Dichloropropene	ND	0.08	0.20	ug/L							U
2-Hexanone	ND	0.90	5.00	ug/L							U
1,1,2-Trichloroethane	ND	0.13	0.20	ug/L							U
1,3-Dichloropropane	ND	0.06	0.20	ug/L							U
Tetrachloroethene	ND	0.05	0.20	ug/L							U
Dibromochloromethane	ND	0.05	0.20	ug/L							U
1,2-Dibromoethane	ND	0.07	0.20	ug/L							U
Chlorobenzene	ND	0.02	0.20	ug/L							U
Ethylbenzene	ND	0.04	0.20	ug/L							U
1,1,1,2-Tetrachloroethane	ND	0.04	0.20	ug/L							U
m,p-Xylene	ND	0.05	0.40	ug/L							U
o-Xylene	ND	0.03	0.20	ug/L							U
Xylenes, total	ND	0.09	0.60	ug/L							U
Styrene	ND	0.05	0.20	ug/L							U
Bromoform	ND	0.06	0.20	ug/L							U
1,1,2,2-Tetrachloroethane	ND	0.06	0.20	ug/L							U
1,2,3-Trichloropropane	ND	0.13	0.50	ug/L							U
trans-1,4-Dichloro 2-Butene	ND	0.32	1.00	ug/L							U
n-Propylbenzene	ND	0.02	0.20	ug/L							U
Bromobenzene	ND	0.06	0.20	ug/L							U
Isopropyl Benzene	ND	0.02	0.20	ug/L							U
2-Chlorotoluene	ND	0.02	0.20	ug/L							U
4-Chlorotoluene	ND	0.02	0.20	ug/L							U
t-Butylbenzene	ND	0.03	0.20	ug/L							U
1,3,5-Trimethylbenzene	ND	0.02	0.20	ug/L							U
1,2,4-Trimethylbenzene	ND	0.02	0.20	ug/L							U
s-Butylbenzene	ND	0.02	0.20	ug/L							U
4-Isopropyl Toluene	ND	0.03	0.20	ug/L							U
1,3-Dichlorobenzene	ND	0.04	0.20	ug/L							U
1,4-Dichlorobenzene	ND	0.04	0.20	ug/L							U
n-Butylbenzene	ND	0.02	0.20	ug/L							U
1,2-Dichlorobenzene	ND	0.04	0.20	ug/L							U
1,2-Dibromo-3-chloropropane	ND	0.37	0.50	ug/L							U
1,2,4-Trichlorobenzene	ND	0.11	0.50	ug/L							U
Hexachloro-1,3-Butadiene	ND	0.07	0.50	ug/L							U



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Volatile Organic Compounds - Quality Control

Batch BFF0797 - EPA 5030 (Purge and Trap)

Instrument: NT3 Analyst: PC

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0797-BLK1)						Prepared: 28-Jun-2017 Analyzed: 28-Jun-2017 14:03					
Naphthalene	0.14	0.12	0.50	ug/L							J
1,2,3-Trichlorobenzene	0.14	0.11	0.50	ug/L							J
Dichlorodifluoromethane	ND	0.05	0.20	ug/L							U
Methyl tert-butyl Ether	ND	0.07	0.50	ug/L							U
2-Pentanone	ND	5.00	5.00	ug/L							U
Surrogate: 1,2-Dichloroethane-d4		4.90		ug/L	5.00		98.1	80-129			
Surrogate: Toluene-d8		4.94		ug/L	5.00		98.8	80-120			
Surrogate: 4-Bromofluorobenzene		4.81		ug/L	5.00		96.2	80-120			
Surrogate: 1,2-Dichlorobenzene-d4		5.12		ug/L	5.00		102	80-120			
LCS (BFF0797-BS1)						Prepared: 28-Jun-2017 Analyzed: 28-Jun-2017 11:01					
Chloromethane	8.59	0.09	0.50	ug/L	10.0		85.9	60-138			
Vinyl Chloride	9.13	0.06	0.20	ug/L	10.0		91.3	66-133			
Bromomethane	8.46	0.25	1.00	ug/L	10.0		84.6	72-131			
Chloroethane	8.17	0.09	0.20	ug/L	10.0		81.7	60-155			
Trichlorofluoromethane	9.69	0.04	0.20	ug/L	10.0		96.9	80-129			
Acrolein	38.2	2.48	5.00	ug/L	50.0		76.4	52-144			Q
1,1,2-Trichloro-1,2,2-Trifluoroethane	9.48	0.04	0.20	ug/L	10.0		94.8	76-129			
Acetone	37.3	2.06	5.00	ug/L	50.0		74.6	58-142			Q
1,1-Dichloroethene	8.93	0.05	0.20	ug/L	10.0		89.3	69-135			
Bromoethane	9.28	0.04	0.20	ug/L	10.0		92.8	78-128			
Iodomethane	9.08	0.23	1.00	ug/L	10.0		90.8	56-147			
Methylene Chloride	9.24	0.49	1.00	ug/L	10.0		92.4	65-135			
Acrylonitrile	7.54	0.60	1.00	ug/L	10.0		75.4	64-134			Q
Carbon Disulfide	9.11	0.04	0.20	ug/L	10.0		91.1	78-125			
trans-1,2-Dichloroethene	9.35	0.05	0.20	ug/L	10.0		93.5	78-128			
Vinyl Acetate	7.73	0.07	0.20	ug/L	10.0		77.3	55-138			Q
1,1-Dichloroethane	8.81	0.05	0.20	ug/L	10.0		88.1	76-124			
2-Butanone	36.8	0.81	5.00	ug/L	50.0		73.6	61-140			Q
2,2-Dichloropropane	10.1	0.05	0.20	ug/L	10.0		101	78-125			
cis-1,2-Dichloroethene	9.27	0.04	0.20	ug/L	10.0		92.7	80-121			
Chloroform	9.41	0.03	0.20	ug/L	10.0		94.1	80-122			
Bromochloromethane	9.09	0.06	0.20	ug/L	10.0		90.9	80-121			
1,1,1-Trichloroethane	9.37	0.04	0.20	ug/L	10.0		93.7	79-123			
1,1-Dichloropropene	9.85	0.03	0.20	ug/L	10.0		98.5	80-120			



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Volatile Organic Compounds - Quality Control

Batch BFF0797 - EPA 5030 (Purge and Trap)

Instrument: NT3 Analyst: PC

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFF0797-BS1)						Prepared: 28-Jun-2017 Analyzed: 28-Jun-2017 11:01					
Carbon tetrachloride	9.97	0.04	0.20	ug/L	10.0		99.7	53-137			
1,2-Dichloroethane	9.39	0.07	0.20	ug/L	10.0		93.9	75-123			
Benzene	9.99	0.03	0.20	ug/L	10.0		99.9	80-120			
Trichloroethene	10.3	0.05	0.20	ug/L	10.0		103	80-120			
1,2-Dichloropropane	9.42	0.04	0.20	ug/L	10.0		94.2	80-120			
Bromodichloromethane	9.65	0.05	0.20	ug/L	10.0		96.5	80-121			
Dibromomethane	9.52	0.15	0.20	ug/L	10.0		95.2	80-120			
2-Chloroethyl vinyl ether	8.39	0.25	1.00	ug/L	10.0		83.9	74-127			
4-Methyl-2-Pentanone	40.1	0.97	5.00	ug/L	50.0		80.1	67-133			
cis-1,3-Dichloropropene	9.72	0.06	0.20	ug/L	10.0		97.2	80-124			
Toluene	10.1	0.04	0.20	ug/L	10.0		101	80-120			
trans-1,3-Dichloropropene	9.97	0.08	0.20	ug/L	10.0		99.7	71-127			
2-Hexanone	39.0	0.90	5.00	ug/L	50.0		78.1	69-133			Q
1,1,2-Trichloroethane	9.53	0.13	0.20	ug/L	10.0		95.3	80-121			
1,3-Dichloropropane	9.33	0.06	0.20	ug/L	10.0		93.3	80-120			
Tetrachloroethene	10.5	0.05	0.20	ug/L	10.0		105	80-120			
Dibromochloromethane	9.80	0.05	0.20	ug/L	10.0		98.0	65-135			
1,2-Dibromoethane	9.36	0.07	0.20	ug/L	10.0		93.6	80-121			
Chlorobenzene	9.93	0.02	0.20	ug/L	10.0		99.3	80-120			
Ethylbenzene	10.3	0.04	0.20	ug/L	10.0		103	80-120			
1,1,1,2-Tetrachloroethane	10.3	0.04	0.20	ug/L	10.0		103	80-120			
m,p-Xylene	21.0	0.05	0.40	ug/L	20.0		105	80-121			
o-Xylene	10.1	0.03	0.20	ug/L	10.0		101	80-121			
Xylenes, total	31.2	0.09	0.60	ug/L	30.0		104	76-127			
Styrene	10.7	0.05	0.20	ug/L	10.0		107	80-124			
Bromoform	9.31	0.06	0.20	ug/L	10.0		93.1	51-134			
1,1,2,2-Tetrachloroethane	8.88	0.06	0.20	ug/L	10.0		88.8	77-123			
1,2,3-Trichloropropane	8.69	0.13	0.50	ug/L	10.0		86.9	76-125			
trans-1,4-Dichloro 2-Butene	8.64	0.32	1.00	ug/L	10.0		86.4	55-129			
n-Propylbenzene	10.4	0.02	0.20	ug/L	10.0		104	78-130			
Bromobenzene	9.56	0.06	0.20	ug/L	10.0		95.6	80-120			
Isopropyl Benzene	10.1	0.02	0.20	ug/L	10.0		101	80-128			
2-Chlorotoluene	9.73	0.02	0.20	ug/L	10.0		97.3	78-122			
4-Chlorotoluene	9.87	0.02	0.20	ug/L	10.0		98.7	80-121			
t-Butylbenzene	9.97	0.03	0.20	ug/L	10.0		99.7	78-125			



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Volatile Organic Compounds - Quality Control

Batch BFF0797 - EPA 5030 (Purge and Trap)

Instrument: NT3 Analyst: PC

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFF0797-BS1)						Prepared: 28-Jun-2017 Analyzed: 28-Jun-2017 11:01					
1,3,5-Trimethylbenzene	10.2	0.02	0.20	ug/L	10.0		102	80-129			
1,2,4-Trimethylbenzene	10.2	0.02	0.20	ug/L	10.0		102	80-127			
s-Butylbenzene	10.3	0.02	0.20	ug/L	10.0		103	78-129			
4-Isopropyl Toluene	10.4	0.03	0.20	ug/L	10.0		104	79-130			
1,3-Dichlorobenzene	9.91	0.04	0.20	ug/L	10.0		99.1	80-120			
1,4-Dichlorobenzene	9.75	0.04	0.20	ug/L	10.0		97.5	80-120			
n-Butylbenzene	10.5	0.02	0.20	ug/L	10.0		105	74-129			
1,2-Dichlorobenzene	9.51	0.04	0.20	ug/L	10.0		95.1	80-120			
1,2-Dibromo-3-chloropropane	7.06	0.37	0.50	ug/L	10.0		70.6	62-123			Q
1,2,4-Trichlorobenzene	9.16	0.11	0.50	ug/L	10.0		91.6	64-124			
Hexachloro-1,3-Butadiene	10.2	0.07	0.50	ug/L	10.0		102	58-123			
Naphthalene	8.94	0.12	0.50	ug/L	10.0		89.4	50-134			
1,2,3-Trichlorobenzene	8.36	0.11	0.50	ug/L	10.0		83.6	49-133			
Dichlorodifluoromethane	9.59	0.05	0.20	ug/L	10.0		95.9	48-147			
Methyl tert-butyl Ether	8.19	0.07	0.50	ug/L	10.0		81.9	71-132			
2-Pentanone	40.1	5.00	5.00	ug/L	50.0		80.3	69-134			
Surrogate: 1,2-Dichloroethane-d4		4.55		ug/L	5.00		91.0	80-129			
Surrogate: Toluene-d8		5.06		ug/L	5.00		101	80-120			
Surrogate: 4-Bromofluorobenzene		4.78		ug/L	5.00		95.6	80-120			
Surrogate: 1,2-Dichlorobenzene-d4		4.92		ug/L	5.00		98.4	80-120			
LCS Dup (BFF0797-BSD1)						Prepared: 28-Jun-2017 Analyzed: 28-Jun-2017 11:27					
Chloromethane	9.40	0.09	0.50	ug/L	10.0		94.0	60-138	9.09	30	
Vinyl Chloride	9.84	0.06	0.20	ug/L	10.0		98.4	66-133	7.44	30	
Bromomethane	10.6	0.25	1.00	ug/L	10.0		106	72-131	22.00	30	
Chloroethane	9.42	0.09	0.20	ug/L	10.0		94.2	60-155	14.20	30	
Trichlorofluoromethane	11.0	0.04	0.20	ug/L	10.0		110	80-129	12.70	30	
Acrolein	42.2	2.48	5.00	ug/L	50.0		84.5	52-144	10.10	30	Q
1,1,2-Trichloro-1,2,2-Trifluoroethane	10.1	0.04	0.20	ug/L	10.0		101	76-129	6.27	30	
Acetone	43.1	2.06	5.00	ug/L	50.0		86.1	58-142	14.40	30	Q
1,1-Dichloroethene	9.46	0.05	0.20	ug/L	10.0		94.6	69-135	5.81	30	
Bromoethane	10.3	0.04	0.20	ug/L	10.0		103	78-128	10.80	30	
Iodomethane	10.5	0.23	1.00	ug/L	10.0		105	56-147	14.40	30	
Methylene Chloride	10.3	0.49	1.00	ug/L	10.0		103	65-135	11.00	30	
Acrylonitrile	9.06	0.60	1.00	ug/L	10.0		90.6	64-134	18.30	30	Q



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Volatile Organic Compounds - Quality Control

Batch BFF0797 - EPA 5030 (Purge and Trap)

Instrument: NT3 Analyst: PC

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFF0797-BSD1)						Prepared: 28-Jun-2017 Analyzed: 28-Jun-2017 11:27					
Carbon Disulfide	9.87	0.04	0.20	ug/L	10.0		98.7	78-125	7.98	30	
trans-1,2-Dichloroethene	10.4	0.05	0.20	ug/L	10.0		104	78-128	10.40	30	
Vinyl Acetate	8.93	0.07	0.20	ug/L	10.0		89.3	55-138	14.40	30	Q
1,1-Dichloroethane	9.61	0.05	0.20	ug/L	10.0		96.1	76-124	8.71	30	
2-Butanone	43.7	0.81	5.00	ug/L	50.0		87.3	61-140	17.10	30	Q
2,2-Dichloropropane	11.2	0.05	0.20	ug/L	10.0		112	78-125	10.30	30	
cis-1,2-Dichloroethene	10.2	0.04	0.20	ug/L	10.0		102	80-121	9.08	30	
Chloroform	10.1	0.03	0.20	ug/L	10.0		101	80-122	7.27	30	
Bromochloromethane	10.2	0.06	0.20	ug/L	10.0		102	80-121	11.90	30	
1,1,1-Trichloroethane	10.2	0.04	0.20	ug/L	10.0		102	79-123	8.59	30	
1,1-Dichloropropene	10.0	0.03	0.20	ug/L	10.0		100	80-120	1.63	30	
Carbon tetrachloride	10.6	0.04	0.20	ug/L	10.0		106	53-137	6.36	30	
1,2-Dichloroethane	9.93	0.07	0.20	ug/L	10.0		99.3	75-123	5.58	30	
Benzene	10.2	0.03	0.20	ug/L	10.0		102	80-120	2.25	30	
Trichloroethene	10.7	0.05	0.20	ug/L	10.0		107	80-120	3.53	30	
1,2-Dichloropropane	9.87	0.04	0.20	ug/L	10.0		98.7	80-120	4.64	30	
Bromodichloromethane	10.2	0.05	0.20	ug/L	10.0		102	80-121	5.51	30	
Dibromomethane	10.4	0.15	0.20	ug/L	10.0		104	80-120	8.83	30	
2-Chloroethyl vinyl ether	9.71	0.25	1.00	ug/L	10.0		97.1	74-127	14.50	30	
4-Methyl-2-Pentanone	45.9	0.97	5.00	ug/L	50.0		91.8	67-133	13.60	30	
cis-1,3-Dichloropropene	10.4	0.06	0.20	ug/L	10.0		104	80-124	6.52	30	
Toluene	10.2	0.04	0.20	ug/L	10.0		102	80-120	1.76	30	
trans-1,3-Dichloropropene	10.4	0.08	0.20	ug/L	10.0		104	71-127	4.25	30	
2-Hexanone	45.5	0.90	5.00	ug/L	50.0		91.1	69-133	15.40	30	Q
1,1,2-Trichloroethane	10.2	0.13	0.20	ug/L	10.0		102	80-121	6.53	30	
1,3-Dichloropropane	10.0	0.06	0.20	ug/L	10.0		100	80-120	7.40	30	
Tetrachloroethene	11.0	0.05	0.20	ug/L	10.0		110	80-120	3.93	30	
Dibromochloromethane	10.9	0.05	0.20	ug/L	10.0		109	65-135	10.70	30	
1,2-Dibromoethane	10.1	0.07	0.20	ug/L	10.0		101	80-121	7.41	30	
Chlorobenzene	10.4	0.02	0.20	ug/L	10.0		104	80-120	4.88	30	
Ethylbenzene	10.8	0.04	0.20	ug/L	10.0		108	80-120	5.39	30	
1,1,1,2-Tetrachloroethane	10.8	0.04	0.20	ug/L	10.0		108	80-120	4.92	30	
m,p-Xylene	21.9	0.05	0.40	ug/L	20.0		109	80-121	3.91	30	
o-Xylene	10.9	0.03	0.20	ug/L	10.0		109	80-121	7.32	30	
Xylenes, total	32.8	0.09	0.60	ug/L	30.0		109	76-127	5.03	30	



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Batch BFF0797 - EPA 5030 (Purge and Trap)

Instrument: NT3 Analyst: PC

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFF0797-BSD1)					Prepared: 28-Jun-2017 Analyzed: 28-Jun-2017 11:27						
Styrene	11.2	0.05	0.20	ug/L	10.0		112	80-124	4.41	30	
Bromoform	10.9	0.06	0.20	ug/L	10.0		109	51-134	15.30	30	
1,1,2,2-Tetrachloroethane	10.4	0.06	0.20	ug/L	10.0		104	77-123	15.70	30	
1,2,3-Trichloropropane	10.3	0.13	0.50	ug/L	10.0		103	76-125	17.40	30	
trans-1,4-Dichloro 2-Butene	10.5	0.32	1.00	ug/L	10.0		105	55-129	19.20	30	
n-Propylbenzene	11.2	0.02	0.20	ug/L	10.0		112	78-130	7.40	30	
Bromobenzene	10.8	0.06	0.20	ug/L	10.0		108	80-120	12.00	30	
Isopropyl Benzene	11.0	0.02	0.20	ug/L	10.0		110	80-128	8.21	30	
2-Chlorotoluene	10.7	0.02	0.20	ug/L	10.0		107	78-122	9.40	30	
4-Chlorotoluene	10.8	0.02	0.20	ug/L	10.0		108	80-121	8.85	30	
t-Butylbenzene	10.9	0.03	0.20	ug/L	10.0		109	78-125	8.76	30	
1,3,5-Trimethylbenzene	11.2	0.02	0.20	ug/L	10.0		112	80-129	9.28	30	
1,2,4-Trimethylbenzene	11.1	0.02	0.20	ug/L	10.0		111	80-127	9.27	30	
s-Butylbenzene	11.1	0.02	0.20	ug/L	10.0		111	78-129	7.63	30	
4-Isopropyl Toluene	11.1	0.03	0.20	ug/L	10.0		111	79-130	7.37	30	
1,3-Dichlorobenzene	11.0	0.04	0.20	ug/L	10.0		110	80-120	9.99	30	
1,4-Dichlorobenzene	10.7	0.04	0.20	ug/L	10.0		107	80-120	9.41	30	
n-Butylbenzene	11.3	0.02	0.20	ug/L	10.0		113	74-129	7.33	30	
1,2-Dichlorobenzene	10.6	0.04	0.20	ug/L	10.0		106	80-120	10.70	30	
1,2-Dibromo-3-chloropropane	8.59	0.37	0.50	ug/L	10.0		85.9	62-123	19.50	30	Q
1,2,4-Trichlorobenzene	10.6	0.11	0.50	ug/L	10.0		106	64-124	14.90	30	
Hexachloro-1,3-Butadiene	10.9	0.07	0.50	ug/L	10.0		109	58-123	6.48	30	
Naphthalene	10.4	0.12	0.50	ug/L	10.0		104	50-134	14.80	30	
1,2,3-Trichlorobenzene	10.4	0.11	0.50	ug/L	10.0		104	49-133	21.40	30	
Dichlorodifluoromethane	9.77	0.05	0.20	ug/L	10.0		97.7	48-147	1.87	30	
Methyl tert-butyl Ether	9.46	0.07	0.50	ug/L	10.0		94.6	71-132	14.40	30	
2-Pentanone	46.7	5.00	5.00	ug/L	50.0		93.5	69-134	15.20	30	
Surrogate: 1,2-Dichloroethane-d4		4.96		ug/L	5.00		99.2	80-129			
Surrogate: Toluene-d8		5.07		ug/L	5.00		101	80-120			
Surrogate: 4-Bromofluorobenzene		5.09		ug/L	5.00		102	80-120			
Surrogate: 1,2-Dichlorobenzene-d4		5.06		ug/L	5.00		101	80-120			



Shannon & Wilson, Inc
400 N 34th St., Suite 100
Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Volatile Organic Compounds - Quality Control

Batch BFF0798 - EPA 5035 (Methanol Extraction)

Instrument: NT3 Analyst: PC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0798-BLK1) Prepared: 28-Jun-2017 Analyzed: 28-Jun-2017 14:03										
Gasoline Range Organics (Tol-Nap)	ND	5000	ug/kg							U
Surrogate: Toluene-d8	4.94		ug/kg	5.00		98.8	80-120			
Surrogate: 4-Bromofluorobenzene	4.81		ug/kg	5.00		96.2	78-123			
LCS (BFF0798-BS1) Prepared: 28-Jun-2017 Analyzed: 28-Jun-2017 11:53										
Gasoline Range Organics (Tol-Nap)	56200		ug/kg	50000		112	70-121			
Surrogate: Toluene-d8	5.08		ug/kg	5.00		102	80-120			
Surrogate: 4-Bromofluorobenzene	4.99		ug/kg	5.00		99.8	78-123			
LCS Dup (BFF0798-BSD1) Prepared: 28-Jun-2017 Analyzed: 28-Jun-2017 12:19										
Gasoline Range Organics (Tol-Nap)	58000		ug/kg	50000		116	70-121	3.16	30	
Surrogate: Toluene-d8	4.99		ug/kg	5.00		99.9	80-120			
Surrogate: 4-Bromofluorobenzene	4.83		ug/kg	5.00		96.5	78-123			



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Project: Willow Creek Daylight
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Volatile Organic Compounds - Quality Control

Batch BFG0079 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFG0079-BLK1)						Prepared: 06-Jul-2017 Analyzed: 06-Jul-2017 14:33					
Chloromethane	ND	0.26	1.00	ug/kg							U
Vinyl Chloride	ND	0.24	1.00	ug/kg							U
Bromomethane	ND	0.19	1.00	ug/kg							U
Chloroethane	ND	0.46	1.00	ug/kg							U
Trichlorofluoromethane	ND	0.27	1.00	ug/kg							U
Acrolein	ND	3.81	5.00	ug/kg							U
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.29	2.00	ug/kg							U
Acetone	ND	0.48	5.00	ug/kg							U
1,1-Dichloroethene	ND	0.34	1.00	ug/kg							U
Bromoethane	ND	0.44	2.00	ug/kg							U
Iodomethane	ND	0.22	1.00	ug/kg							U
Methylene Chloride	2.99	0.64	2.00	ug/kg							
Acrylonitrile	ND	1.03	5.00	ug/kg							U
Carbon Disulfide	ND	0.56	1.00	ug/kg							U
trans-1,2-Dichloroethene	ND	0.27	1.00	ug/kg							U
Vinyl Acetate	ND	0.38	5.00	ug/kg							U
1,1-Dichloroethane	ND	0.20	1.00	ug/kg							U
2-Butanone	ND	0.51	5.00	ug/kg							U
2,2-Dichloropropane	ND	0.29	1.00	ug/kg							U
cis-1,2-Dichloroethene	ND	0.24	1.00	ug/kg							U
Chloroform	ND	0.23	1.00	ug/kg							U
Bromochloromethane	ND	0.32	1.00	ug/kg							U
1,1,1-Trichloroethane	ND	0.23	1.00	ug/kg							U
1,1-Dichloropropene	0.94	0.31	1.00	ug/kg							J
Carbon tetrachloride	ND	0.21	1.00	ug/kg							U
1,2-Dichloroethane	ND	0.19	1.00	ug/kg							U
Benzene	ND	0.30	1.00	ug/kg							U
Trichloroethene	ND	0.21	1.00	ug/kg							U
1,2-Dichloropropane	ND	0.16	1.00	ug/kg							U
Bromodichloromethane	ND	0.25	1.00	ug/kg							U
Dibromomethane	ND	0.15	1.00	ug/kg							U
2-Chloroethyl vinyl ether	ND	0.28	5.00	ug/kg							U
4-Methyl-2-Pentanone	ND	0.42	5.00	ug/kg							U
cis-1,3-Dichloropropene	ND	0.23	1.00	ug/kg							U
Toluene	ND	0.15	1.00	ug/kg							U



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Volatile Organic Compounds - Quality Control

Batch BFG0079 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFG0079-BLK1)						Prepared: 06-Jul-2017 Analyzed: 06-Jul-2017 14:33					
trans-1,3-Dichloropropene	ND	0.22	1.00	ug/kg							U
2-Hexanone	0.95	0.44	5.00	ug/kg							J
1,1,2-Trichloroethane	ND	0.29	1.00	ug/kg							U
1,3-Dichloropropane	ND	0.21	1.00	ug/kg							U
Tetrachloroethene	ND	0.26	1.00	ug/kg							U
Dibromochloromethane	ND	0.27	1.00	ug/kg							U
1,2-Dibromoethane	ND	0.18	1.00	ug/kg							U
Chlorobenzene	ND	0.22	1.00	ug/kg							U
Ethylbenzene	ND	0.20	1.00	ug/kg							U
1,1,1,2-Tetrachloroethane	ND	0.23	1.00	ug/kg							U
m,p-Xylene	ND	0.39	1.00	ug/kg							U
o-Xylene	ND	0.22	1.00	ug/kg							U
Xylenes, total	ND	0.62	2.00	ug/kg							U
Styrene	ND	0.14	1.00	ug/kg							U
Bromoform	ND	0.30	1.00	ug/kg							U
1,1,2,2-Tetrachloroethane	ND	0.25	1.00	ug/kg							U
1,2,3-Trichloropropane	ND	0.52	2.00	ug/kg							U
trans-1,4-Dichloro 2-Butene	ND	0.44	5.00	ug/kg							U
n-Propylbenzene	ND	0.27	1.00	ug/kg							U
Bromobenzene	ND	0.15	1.00	ug/kg							U
Isopropyl Benzene	ND	0.23	1.00	ug/kg							U
2-Chlorotoluene	ND	0.30	1.00	ug/kg							U
4-Chlorotoluene	ND	0.28	1.00	ug/kg							U
t-Butylbenzene	ND	0.31	1.00	ug/kg							U
1,3,5-Trimethylbenzene	ND	0.25	1.00	ug/kg							U
1,2,4-Trimethylbenzene	ND	0.23	1.00	ug/kg							U
s-Butylbenzene	ND	0.24	1.00	ug/kg							U
4-Isopropyl Toluene	ND	0.24	1.00	ug/kg							U
1,3-Dichlorobenzene	0.26	0.23	1.00	ug/kg							J
1,4-Dichlorobenzene	0.38	0.23	1.00	ug/kg							J
n-Butylbenzene	0.27	0.26	1.00	ug/kg							J
1,2-Dichlorobenzene	0.30	0.29	1.00	ug/kg							J
1,2-Dibromo-3-chloropropane	ND	0.59	5.00	ug/kg							U
1,2,4-Trichlorobenzene	0.62	0.33	5.00	ug/kg							J
Hexachloro-1,3-Butadiene	ND	0.41	5.00	ug/kg							U



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Volatile Organic Compounds - Quality Control

Batch BFG0079 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFG0079-BLK1)											
						Prepared: 06-Jul-2017 Analyzed: 06-Jul-2017 14:33					
Naphthalene	1.08	0.43	5.00	ug/kg							J
1,2,3-Trichlorobenzene	0.77	0.31	5.00	ug/kg							J
Dichlorodifluoromethane	ND	0.21	1.00	ug/kg							U
Methyl tert-butyl Ether	ND	0.23	1.00	ug/kg							U
2-Pentanone	ND	5.00	5.00	ug/kg							U
Surrogate: 1,2-Dichloroethane-d4		50.2		ug/kg	50.0		100	80-149			
Surrogate: Toluene-d8		49.5		ug/kg	50.0		99.1	77-120			
Surrogate: 4-Bromofluorobenzene		48.2		ug/kg	50.0		96.4	80-120			
Surrogate: 1,2-Dichlorobenzene-d4		51.0		ug/kg	50.0		102	80-120			
LCS (BFG0079-BS1)											
						Prepared: 06-Jul-2017 Analyzed: 06-Jul-2017 13:47					
Chloromethane	44.1			ug/kg	50.0		88.3	64-132			
Vinyl Chloride	50.9			ug/kg	50.0		102	74-135			
Bromomethane	39.9			ug/kg	50.0		79.9	53-144			Q
Chloroethane	87.8			ug/kg	50.0		176	55-149			*, Q
Trichlorofluoromethane	104			ug/kg	50.0		207	61-164			*, Q, E
Acrolein	242			ug/kg	250		96.9	59-140			
1,1,2-Trichloro-1,2,2-Trifluoroethane	36.2			ug/kg	50.0		72.4	74-143			*, Q
Acetone	267			ug/kg	250		107	48-137			
1,1-Dichloroethene	35.9			ug/kg	50.0		71.8	77-134			*, Q
Bromoethane	42.2			ug/kg	50.0		84.5	65-145			
Iodomethane	39.3			ug/kg	50.0		78.7	31-162			Q
Methylene Chloride	56.7			ug/kg	50.0		113	69-129			B
Acrylonitrile	49.0			ug/kg	50.0		97.9	69-134			
Carbon Disulfide	35.2			ug/kg	50.0		70.5	71-137			*, Q
trans-1,2-Dichloroethene	54.5			ug/kg	50.0		109	79-130			
Vinyl Acetate	50.6			ug/kg	50.0		101	66-141			
1,1-Dichloroethane	49.8			ug/kg	50.0		99.6	80-126			
2-Butanone	222			ug/kg	250		88.9	70-132			
2,2-Dichloropropane	51.3			ug/kg	50.0		103	77-138			
cis-1,2-Dichloroethene	50.4			ug/kg	50.0		101	80-125			
Chloroform	50.3			ug/kg	50.0		101	80-126			
Bromochloromethane	50.4			ug/kg	50.0		101	80-129			
1,1,1-Trichloroethane	48.0			ug/kg	50.0		95.9	78-133			
1,1-Dichloropropene	38.0			ug/kg	50.0		76.1	79-120			*, Q



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Volatile Organic Compounds - Quality Control

Batch BFG0079 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFG0079-BS1)					Prepared: 06-Jul-2017 Analyzed: 06-Jul-2017 13:47						
Carbon tetrachloride	52.0			ug/kg	50.0		104	71-129			
1,2-Dichloroethane	46.2			ug/kg	50.0		92.4	76-120			
Benzene	49.4			ug/kg	50.0		98.8	80-120			
Trichloroethene	48.7			ug/kg	50.0		97.4	80-120			
1,2-Dichloropropane	47.7			ug/kg	50.0		95.3	79-120			
Bromodichloromethane	49.7			ug/kg	50.0		99.4	80-122			
Dibromomethane	47.4			ug/kg	50.0		94.7	80-120			
2-Chloroethyl vinyl ether	49.8			ug/kg	50.0		99.7	51-129			
4-Methyl-2-Pentanone	242			ug/kg	250		96.6	73-121			
cis-1,3-Dichloropropene	48.6			ug/kg	50.0		97.2	80-120			
Toluene	49.5			ug/kg	50.0		99.0	75-120			
trans-1,3-Dichloropropene	50.3			ug/kg	50.0		101	80-124			
2-Hexanone	245			ug/kg	250		98.0	68-122			
1,1,2-Trichloroethane	48.1			ug/kg	50.0		96.2	79-120			
1,3-Dichloropropane	47.8			ug/kg	50.0		95.5	78-120			
Tetrachloroethene	51.2			ug/kg	50.0		102	74-124			
Dibromochloromethane	49.8			ug/kg	50.0		99.6	74-125			
1,2-Dibromoethane	48.4			ug/kg	50.0		96.8	80-120			
Chlorobenzene	49.3			ug/kg	50.0		98.5	78-120			
Ethylbenzene	51.8			ug/kg	50.0		104	80-125			
1,1,1,2-Tetrachloroethane	48.4			ug/kg	50.0		96.9	80-120			
m,p-Xylene	101			ug/kg	100		101	76-121			
o-Xylene	49.9			ug/kg	50.0		99.9	67-132			
Xylenes, total	151			ug/kg	150		101	67-132			
Styrene	48.2			ug/kg	50.0		96.4	80-120			
Bromoform	47.9			ug/kg	50.0		95.8	64-128			
1,1,2,2-Tetrachloroethane	49.0			ug/kg	50.0		98.0	74-120			
1,2,3-Trichloropropane	49.9			ug/kg	50.0		99.8	73-120			
trans-1,4-Dichloro 2-Butene	46.9			ug/kg	50.0		93.8	65-125			
n-Propylbenzene	50.3			ug/kg	50.0		101	72-124			
Bromobenzene	47.9			ug/kg	50.0		95.9	76-120			
Isopropyl Benzene	50.1			ug/kg	50.0		100	74-121			
2-Chlorotoluene	49.0			ug/kg	50.0		98.1	75-120			
4-Chlorotoluene	49.5			ug/kg	50.0		99.1	69-124			
t-Butylbenzene	49.5			ug/kg	50.0		99.0	72-122			



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Volatile Organic Compounds - Quality Control

Batch BFG0079 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFG0079-BS1)											
						Prepared: 06-Jul-2017 Analyzed: 06-Jul-2017 13:47					
1,3,5-Trimethylbenzene	49.6			ug/kg	50.0		99.2	74-122			
1,2,4-Trimethylbenzene	49.5			ug/kg	50.0		98.9	75-121			
s-Butylbenzene	49.7			ug/kg	50.0		99.5	70-128			
4-Isopropyl Toluene	50.2			ug/kg	50.0		100	75-125			
1,3-Dichlorobenzene	49.0			ug/kg	50.0		97.9	75-120			
1,4-Dichlorobenzene	47.1			ug/kg	50.0		94.2	73-120			
n-Butylbenzene	50.2			ug/kg	50.0		100	73-130			
1,2-Dichlorobenzene	47.6			ug/kg	50.0		95.2	76-120			
1,2-Dibromo-3-chloropropane	49.4			ug/kg	50.0		98.8	65-126			
1,2,4-Trichlorobenzene	48.6			ug/kg	50.0		97.2	66-140			
Hexachloro-1,3-Butadiene	50.1			ug/kg	50.0		100	67-133			
Naphthalene	48.5			ug/kg	50.0		97.1	69-125			
1,2,3-Trichlorobenzene	47.8			ug/kg	50.0		95.6	68-132			
Dichlorodifluoromethane	52.3			ug/kg	50.0		105	67-142			
Methyl tert-butyl Ether	49.8			ug/kg	50.0		99.7	79-127			
2-Pentanone	239			ug/kg	250		95.6	77-120			
Surrogate: 1,2-Dichloroethane-d4		50.1		ug/kg	50.0		100	80-149			
Surrogate: Toluene-d8		49.7		ug/kg	50.0		99.3	77-120			
Surrogate: 4-Bromofluorobenzene		49.1		ug/kg	50.0		98.2	80-120			
Surrogate: 1,2-Dichlorobenzene-d4		49.5		ug/kg	50.0		99.1	80-120			
LCS Dup (BFG0079-BSD1)											
						Prepared: 06-Jul-2017 Analyzed: 06-Jul-2017 14:10					
Chloromethane	47.8			ug/kg	50.0		95.5	64-132	7.92	30	
Vinyl Chloride	56.3			ug/kg	50.0		113	74-135	10.10	30	
Bromomethane	44.2			ug/kg	50.0		88.3	53-144	10.00	30	Q
Chloroethane	55.2			ug/kg	50.0		110	55-149	45.60	30	*, Q
Trichlorofluoromethane	51.0			ug/kg	50.0		102	61-164	68.20	30	Q, *
Acrolein	277			ug/kg	250		111	59-140	13.40	30	
1,1,2-Trichloro-1,2,2-Trifluoroethane	57.3			ug/kg	50.0		115	74-143	45.20	30	*, Q
Acetone	293			ug/kg	250		117	48-137	9.10	30	
1,1-Dichloroethene	56.7			ug/kg	50.0		113	77-134	44.90	30	*, Q
Bromoethane	56.1			ug/kg	50.0		112	65-145	28.20	30	
Iodomethane	59.6			ug/kg	50.0		119	31-162	40.90	30	*, Q
Methylene Chloride	61.0			ug/kg	50.0		122	69-129	7.37	30	B
Acrylonitrile	53.7			ug/kg	50.0		107	69-134	9.23	30	



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Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Volatile Organic Compounds - Quality Control

Batch BFG0079 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFG0079-BSD1)					Prepared: 06-Jul-2017 Analyzed: 06-Jul-2017 14:10						
Carbon Disulfide	55.9			ug/kg	50.0		112	71-137	45.30	30	*, Q
trans-1,2-Dichloroethene	55.5			ug/kg	50.0		111	79-130	1.95	30	
Vinyl Acetate	48.1			ug/kg	50.0		96.3	66-141	4.97	30	
1,1-Dichloroethane	51.6			ug/kg	50.0		103	80-126	3.54	30	
2-Butanone	242			ug/kg	250		96.9	70-132	8.54	30	
2,2-Dichloropropane	51.6			ug/kg	50.0		103	77-138	0.55	30	
cis-1,2-Dichloroethene	52.5			ug/kg	50.0		105	80-125	4.12	30	
Chloroform	52.0			ug/kg	50.0		104	80-126	3.32	30	
Bromochloromethane	52.1			ug/kg	50.0		104	80-129	3.18	30	
1,1,1-Trichloroethane	49.3			ug/kg	50.0		98.7	78-133	2.82	30	
1,1-Dichloropropene	54.6			ug/kg	50.0		109	79-120	35.80	30	*, Q
Carbon tetrachloride	54.1			ug/kg	50.0		108	71-129	3.93	30	
1,2-Dichloroethane	49.4			ug/kg	50.0		98.7	76-120	6.65	30	
Benzene	51.7			ug/kg	50.0		103	80-120	4.48	30	
Trichloroethene	51.0			ug/kg	50.0		102	80-120	4.52	30	
1,2-Dichloropropane	50.3			ug/kg	50.0		101	79-120	5.45	30	
Bromodichloromethane	51.4			ug/kg	50.0		103	80-122	3.33	30	
Dibromomethane	50.2			ug/kg	50.0		100	80-120	5.86	30	
2-Chloroethyl vinyl ether	50.7			ug/kg	50.0		101	51-129	1.75	30	
4-Methyl-2-Pentanone	263			ug/kg	250		105	73-121	8.66	30	
cis-1,3-Dichloropropene	51.1			ug/kg	50.0		102	80-120	5.13	30	
Toluene	51.9			ug/kg	50.0		104	75-120	4.73	30	
trans-1,3-Dichloropropene	52.5			ug/kg	50.0		105	80-124	4.23	30	
2-Hexanone	266			ug/kg	250		106	68-122	8.34	30	
1,1,2-Trichloroethane	50.9			ug/kg	50.0		102	79-120	5.74	30	
1,3-Dichloropropane	49.8			ug/kg	50.0		99.7	78-120	4.25	30	
Tetrachloroethene	50.5			ug/kg	50.0		101	74-124	1.45	30	
Dibromochloromethane	51.9			ug/kg	50.0		104	74-125	4.26	30	
1,2-Dibromoethane	50.4			ug/kg	50.0		101	80-120	4.14	30	
Chlorobenzene	50.6			ug/kg	50.0		101	78-120	2.59	30	
Ethylbenzene	52.5			ug/kg	50.0		105	80-125	1.38	30	
1,1,1,2-Tetrachloroethane	50.0			ug/kg	50.0		100	80-120	3.26	30	
m,p-Xylene	103			ug/kg	100		103	76-121	1.46	30	
o-Xylene	50.6			ug/kg	50.0		101	67-132	1.29	30	
Xylenes, total	153			ug/kg	150		102	67-132	1.40	30	



Shannon & Wilson, Inc
400 N 34th St., Suite 100
Seattle WA, 98103-8636

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Reported:
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Volatile Organic Compounds - Quality Control

Batch BFG0079 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFG0079-BSD1)					Prepared: 06-Jul-2017 Analyzed: 06-Jul-2017 14:10						
Styrene	51.5			ug/kg	50.0		103	80-120	6.66	30	
Bromoform	51.1			ug/kg	50.0		102	64-128	6.37	30	
1,1,2,2-Tetrachloroethane	52.1			ug/kg	50.0		104	74-120	6.12	30	
1,2,3-Trichloropropane	52.8			ug/kg	50.0		106	73-120	5.56	30	
trans-1,4-Dichloro 2-Butene	51.4			ug/kg	50.0		103	65-125	9.08	30	
n-Propylbenzene	51.2			ug/kg	50.0		102	72-124	1.76	30	
Bromobenzene	50.2			ug/kg	50.0		100	76-120	4.66	30	
Isopropyl Benzene	51.5			ug/kg	50.0		103	74-121	2.71	30	
2-Chlorotoluene	51.0			ug/kg	50.0		102	75-120	3.89	30	
4-Chlorotoluene	51.3			ug/kg	50.0		103	69-124	3.46	30	
t-Butylbenzene	51.3			ug/kg	50.0		103	72-122	3.60	30	
1,3,5-Trimethylbenzene	50.9			ug/kg	50.0		102	74-122	2.48	30	
1,2,4-Trimethylbenzene	51.3			ug/kg	50.0		103	75-121	3.55	30	
s-Butylbenzene	51.1			ug/kg	50.0		102	70-128	2.72	30	
4-Isopropyl Toluene	50.8			ug/kg	50.0		102	75-125	1.30	30	
1,3-Dichlorobenzene	49.7			ug/kg	50.0		99.4	75-120	1.52	30	
1,4-Dichlorobenzene	48.7			ug/kg	50.0		97.3	73-120	3.23	30	
n-Butylbenzene	50.2			ug/kg	50.0		100	73-130	0.03	30	
1,2-Dichlorobenzene	49.5			ug/kg	50.0		99.0	76-120	3.83	30	
1,2-Dibromo-3-chloropropane	54.1			ug/kg	50.0		108	65-126	9.15	30	
1,2,4-Trichlorobenzene	49.8			ug/kg	50.0		99.6	66-140	2.42	30	
Hexachloro-1,3-Butadiene	50.2			ug/kg	50.0		100	67-133	0.34	30	
Naphthalene	51.6			ug/kg	50.0		103	69-125	6.18	30	
1,2,3-Trichlorobenzene	50.4			ug/kg	50.0		101	68-132	5.24	30	
Dichlorodifluoromethane	51.1			ug/kg	50.0		102	67-142	2.33	30	
Methyl tert-butyl Ether	52.6			ug/kg	50.0		105	79-127	5.39	30	
2-Pentanone	265			ug/kg	250		106	77-120	10.20	30	
Surrogate: 1,2-Dichloroethane-d4		49.6		ug/kg	50.0		99.2	80-149			
Surrogate: Toluene-d8		50.3		ug/kg	50.0		101	77-120			
Surrogate: 4-Bromofluorobenzene		49.3		ug/kg	50.0		98.6	80-120			
Surrogate: 1,2-Dichlorobenzene-d4		50.8		ug/kg	50.0		102	80-120			



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Project: Willow Creek Daylight
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Project Manager: Christopher Helland

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Volatile Organic Compounds - Quality Control

Batch BFG0114 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFG0114-BLK1)						Prepared: 07-Jul-2017 Analyzed: 07-Jul-2017 10:22					
Chloromethane	ND	0.26	1.00	ug/kg							U
Vinyl Chloride	ND	0.24	1.00	ug/kg							U
Bromomethane	0.36	0.19	1.00	ug/kg							J
Chloroethane	ND	0.46	1.00	ug/kg							U
Trichlorofluoromethane	ND	0.27	1.00	ug/kg							U
Acrolein	ND	3.81	5.00	ug/kg							U
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	0.29	2.00	ug/kg							U
Acetone	ND	0.48	5.00	ug/kg							U
1,1-Dichloroethene	ND	0.34	1.00	ug/kg							U
Bromoethane	ND	0.44	2.00	ug/kg							U
Iodomethane	ND	0.22	1.00	ug/kg							U
Methylene Chloride	ND	0.64	2.00	ug/kg							U
Acrylonitrile	ND	1.03	5.00	ug/kg							U
Carbon Disulfide	ND	0.56	1.00	ug/kg							U
trans-1,2-Dichloroethene	ND	0.27	1.00	ug/kg							U
Vinyl Acetate	ND	0.38	5.00	ug/kg							U
1,1-Dichloroethane	ND	0.20	1.00	ug/kg							U
2-Butanone	ND	0.51	5.00	ug/kg							U
2,2-Dichloropropane	ND	0.29	1.00	ug/kg							U
cis-1,2-Dichloroethene	ND	0.24	1.00	ug/kg							U
Chloroform	ND	0.23	1.00	ug/kg							U
Bromochloromethane	ND	0.32	1.00	ug/kg							U
1,1,1-Trichloroethane	ND	0.23	1.00	ug/kg							U
1,1-Dichloropropene	ND	0.31	1.00	ug/kg							U
Carbon tetrachloride	ND	0.21	1.00	ug/kg							U
1,2-Dichloroethane	ND	0.19	1.00	ug/kg							U
Benzene	ND	0.30	1.00	ug/kg							U
Trichloroethene	ND	0.21	1.00	ug/kg							U
1,2-Dichloropropane	ND	0.16	1.00	ug/kg							U
Bromodichloromethane	ND	0.25	1.00	ug/kg							U
Dibromomethane	ND	0.15	1.00	ug/kg							U
2-Chloroethyl vinyl ether	ND	0.28	5.00	ug/kg							U
4-Methyl-2-Pentanone	ND	0.42	5.00	ug/kg							U
cis-1,3-Dichloropropene	ND	0.23	1.00	ug/kg							U
Toluene	ND	0.15	1.00	ug/kg							U



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Volatile Organic Compounds - Quality Control

Batch BFG0114 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFG0114-BLK1)						Prepared: 07-Jul-2017 Analyzed: 07-Jul-2017 10:22					
trans-1,3-Dichloropropene	ND	0.22	1.00	ug/kg							U
2-Hexanone	1.26	0.44	5.00	ug/kg							J
1,1,2-Trichloroethane	ND	0.29	1.00	ug/kg							U
1,3-Dichloropropane	ND	0.21	1.00	ug/kg							U
Tetrachloroethene	ND	0.26	1.00	ug/kg							U
Dibromochloromethane	ND	0.27	1.00	ug/kg							U
1,2-Dibromoethane	ND	0.18	1.00	ug/kg							U
Chlorobenzene	ND	0.22	1.00	ug/kg							U
Ethylbenzene	ND	0.20	1.00	ug/kg							U
1,1,1,2-Tetrachloroethane	ND	0.23	1.00	ug/kg							U
m,p-Xylene	ND	0.39	1.00	ug/kg							U
o-Xylene	ND	0.22	1.00	ug/kg							U
Xylenes, total	ND	0.62	2.00	ug/kg							U
Styrene	ND	0.14	1.00	ug/kg							U
Bromoform	ND	0.30	1.00	ug/kg							U
1,1,2,2-Tetrachloroethane	ND	0.25	1.00	ug/kg							U
1,2,3-Trichloropropane	ND	0.52	2.00	ug/kg							U
trans-1,4-Dichloro 2-Butene	ND	0.44	5.00	ug/kg							U
n-Propylbenzene	ND	0.27	1.00	ug/kg							U
Bromobenzene	ND	0.15	1.00	ug/kg							U
Isopropyl Benzene	ND	0.23	1.00	ug/kg							U
2-Chlorotoluene	ND	0.30	1.00	ug/kg							U
4-Chlorotoluene	ND	0.28	1.00	ug/kg							U
t-Butylbenzene	ND	0.31	1.00	ug/kg							U
1,3,5-Trimethylbenzene	ND	0.25	1.00	ug/kg							U
1,2,4-Trimethylbenzene	ND	0.23	1.00	ug/kg							U
s-Butylbenzene	ND	0.24	1.00	ug/kg							U
4-Isopropyl Toluene	ND	0.24	1.00	ug/kg							U
1,3-Dichlorobenzene	ND	0.23	1.00	ug/kg							U
1,4-Dichlorobenzene	0.31	0.23	1.00	ug/kg							J
n-Butylbenzene	ND	0.26	1.00	ug/kg							U
1,2-Dichlorobenzene	ND	0.29	1.00	ug/kg							U
1,2-Dibromo-3-chloropropane	ND	0.59	5.00	ug/kg							U
1,2,4-Trichlorobenzene	0.46	0.33	5.00	ug/kg							J
Hexachloro-1,3-Butadiene	ND	0.41	5.00	ug/kg							U



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Volatile Organic Compounds - Quality Control

Batch BFG0114 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFG0114-BLK1)											
						Prepared: 07-Jul-2017 Analyzed: 07-Jul-2017 10:22					
Naphthalene	0.75	0.43	5.00	ug/kg							J
1,2,3-Trichlorobenzene	0.48	0.31	5.00	ug/kg							J
Dichlorodifluoromethane	ND	0.21	1.00	ug/kg							U
Methyl tert-butyl Ether	ND	0.23	1.00	ug/kg							U
2-Pentanone	ND	5.00	5.00	ug/kg							U
Surrogate: 1,2-Dichloroethane-d4		50.7		ug/kg	50.0		101	80-149			
Surrogate: Toluene-d8		50.2		ug/kg	50.0		100	77-120			
Surrogate: 4-Bromofluorobenzene		47.2		ug/kg	50.0		94.3	80-120			
Surrogate: 1,2-Dichlorobenzene-d4		50.9		ug/kg	50.0		102	80-120			
LCS (BFG0114-BS1)											
						Prepared: 07-Jul-2017 Analyzed: 07-Jul-2017 09:36					
Chloromethane	32.8	0.26	1.00	ug/kg	50.0		65.6	64-132			Q
Vinyl Chloride	50.5	0.24	1.00	ug/kg	50.0		101	74-135			
Bromomethane	15.1	0.19	1.00	ug/kg	50.0		30.3	53-144			*, Q
Chloroethane	51.4	0.46	1.00	ug/kg	50.0		103	55-149			
Trichlorofluoromethane	57.8	0.27	1.00	ug/kg	50.0		116	61-164			
Acrolein	248	3.81	5.00	ug/kg	250		99.4	59-140			
1,1,2-Trichloro-1,2,2-Trifluoroethane	60.8	0.29	2.00	ug/kg	50.0		122	74-143			Q
Acetone	270	0.48	5.00	ug/kg	250		108	48-137			
1,1-Dichloroethene	58.4	0.34	1.00	ug/kg	50.0		117	77-134			
Bromoethane	57.7	0.44	2.00	ug/kg	50.0		115	65-145			
Iodomethane	13.0	0.22	1.00	ug/kg	50.0		26.0	31-162			*, Q
Methylene Chloride	58.9	0.64	2.00	ug/kg	50.0		118	69-129			
Acrylonitrile	49.3	1.03	5.00	ug/kg	50.0		98.5	69-134			
Carbon Disulfide	59.8	0.56	1.00	ug/kg	50.0		120	71-137			
trans-1,2-Dichloroethene	58.2	0.27	1.00	ug/kg	50.0		116	79-130			
Vinyl Acetate	53.1	0.38	5.00	ug/kg	50.0		106	66-141			
1,1-Dichloroethane	54.1	0.20	1.00	ug/kg	50.0		108	80-126			
2-Butanone	229	0.51	5.00	ug/kg	250		91.7	70-132			
2,2-Dichloropropane	54.8	0.29	1.00	ug/kg	50.0		110	77-138			
cis-1,2-Dichloroethene	54.7	0.24	1.00	ug/kg	50.0		109	80-125			
Chloroform	54.7	0.23	1.00	ug/kg	50.0		109	80-126			
Bromochloromethane	54.8	0.32	1.00	ug/kg	50.0		110	80-129			
1,1,1-Trichloroethane	68.3	0.23	1.00	ug/kg	50.0		137	78-133			*, Q
1,1-Dichloropropene	57.6	0.31	1.00	ug/kg	50.0		115	79-120			



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Volatile Organic Compounds - Quality Control

Batch BFG0114 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFG0114-BS1)						Prepared: 07-Jul-2017 Analyzed: 07-Jul-2017 09:36					
Carbon tetrachloride	72.1	0.21	1.00	ug/kg	50.0		144	71-129			Q, *
1,2-Dichloroethane	50.2	0.19	1.00	ug/kg	50.0		100	76-120			
Benzene	53.9	0.30	1.00	ug/kg	50.0		108	80-120			
Trichloroethene	52.4	0.21	1.00	ug/kg	50.0		105	80-120			
1,2-Dichloropropane	51.8	0.16	1.00	ug/kg	50.0		104	79-120			
Bromodichloromethane	53.9	0.25	1.00	ug/kg	50.0		108	80-122			
Dibromomethane	51.6	0.15	1.00	ug/kg	50.0		103	80-120			
2-Chloroethyl vinyl ether	43.8	0.28	5.00	ug/kg	50.0		87.6	51-129			
4-Methyl-2-Pentanone	248	0.42	5.00	ug/kg	250		99.1	73-121			
cis-1,3-Dichloropropene	52.9	0.23	1.00	ug/kg	50.0		106	80-120			
Toluene	53.3	0.15	1.00	ug/kg	50.0		107	75-120			
trans-1,3-Dichloropropene	53.3	0.22	1.00	ug/kg	50.0		107	80-124			
2-Hexanone	242	0.44	5.00	ug/kg	250		96.7	68-122			
1,1,2-Trichloroethane	51.5	0.29	1.00	ug/kg	50.0		103	79-120			
1,3-Dichloropropane	50.4	0.21	1.00	ug/kg	50.0		101	78-120			
Tetrachloroethene	52.8	0.26	1.00	ug/kg	50.0		106	74-124			
Dibromochloromethane	53.1	0.27	1.00	ug/kg	50.0		106	74-125			
1,2-Dibromoethane	51.1	0.18	1.00	ug/kg	50.0		102	80-120			
Chlorobenzene	52.5	0.22	1.00	ug/kg	50.0		105	78-120			
Ethylbenzene	54.9	0.20	1.00	ug/kg	50.0		110	80-125			
1,1,1,2-Tetrachloroethane	51.1	0.23	1.00	ug/kg	50.0		102	80-120			
m,p-Xylene	107	0.39	1.00	ug/kg	100		107	76-121			
o-Xylene	53.6	0.22	1.00	ug/kg	50.0		107	67-132			
Xylenes, total	161	0.62	2.00	ug/kg	150		107	67-132			
Styrene	52.8	0.14	1.00	ug/kg	50.0		106	80-120			
Bromoform	49.7	0.30	1.00	ug/kg	50.0		99.3	64-128			
1,1,2,2-Tetrachloroethane	51.8	0.25	1.00	ug/kg	50.0		104	74-120			
1,2,3-Trichloropropane	50.9	0.52	2.00	ug/kg	50.0		102	73-120			
trans-1,4-Dichloro 2-Butene	45.9	0.44	5.00	ug/kg	50.0		91.7	65-125			
n-Propylbenzene	52.5	0.27	1.00	ug/kg	50.0		105	72-124			
Bromobenzene	50.0	0.15	1.00	ug/kg	50.0		100	76-120			
Isopropyl Benzene	52.5	0.23	1.00	ug/kg	50.0		105	74-121			
2-Chlorotoluene	52.1	0.30	1.00	ug/kg	50.0		104	75-120			
4-Chlorotoluene	51.9	0.28	1.00	ug/kg	50.0		104	69-124			
t-Butylbenzene	52.5	0.31	1.00	ug/kg	50.0		105	72-122			



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Volatile Organic Compounds - Quality Control

Batch BFG0114 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFG0114-BS1)											
						Prepared: 07-Jul-2017 Analyzed: 07-Jul-2017 09:36					
1,3,5-Trimethylbenzene	52.3	0.25	1.00	ug/kg	50.0		105	74-122			
1,2,4-Trimethylbenzene	52.4	0.23	1.00	ug/kg	50.0		105	75-121			
s-Butylbenzene	52.7	0.24	1.00	ug/kg	50.0		105	70-128			
4-Isopropyl Toluene	52.8	0.24	1.00	ug/kg	50.0		106	75-125			
1,3-Dichlorobenzene	50.6	0.23	1.00	ug/kg	50.0		101	75-120			
1,4-Dichlorobenzene	50.1	0.23	1.00	ug/kg	50.0		100	73-120			
n-Butylbenzene	52.9	0.26	1.00	ug/kg	50.0		106	73-130			
1,2-Dichlorobenzene	50.3	0.29	1.00	ug/kg	50.0		101	76-120			
1,2-Dibromo-3-chloropropane	50.8	0.59	5.00	ug/kg	50.0		102	65-126			
1,2,4-Trichlorobenzene	52.5	0.33	5.00	ug/kg	50.0		105	66-140			
Hexachloro-1,3-Butadiene	51.2	0.41	5.00	ug/kg	50.0		102	67-133			
Naphthalene	51.0	0.43	5.00	ug/kg	50.0		102	69-125			
1,2,3-Trichlorobenzene	51.2	0.31	5.00	ug/kg	50.0		102	68-132			
Dichlorodifluoromethane	61.8	0.21	1.00	ug/kg	50.0		124	67-142			Q
Methyl tert-butyl Ether	53.9	0.23	1.00	ug/kg	50.0		108	79-127			
2-Pentanone	244	5.00	5.00	ug/kg	250		97.6	77-120			
Surrogate: 1,2-Dichloroethane-d4		50.3		ug/kg	50.0		101	80-149			
Surrogate: Toluene-d8		50.4		ug/kg	50.0		101	77-120			
Surrogate: 4-Bromofluorobenzene		49.7		ug/kg	50.0		99.4	80-120			
Surrogate: 1,2-Dichlorobenzene-d4		49.6		ug/kg	50.0		99.3	80-120			
LCS Dup (BFG0114-BSD1)											
						Prepared: 07-Jul-2017 Analyzed: 07-Jul-2017 09:59					
Chloromethane	32.7	0.26	1.00	ug/kg	50.0		65.4	64-132	0.39	30	Q
Vinyl Chloride	50.1	0.24	1.00	ug/kg	50.0		100	74-135	0.72	30	
Bromomethane	15.3	0.19	1.00	ug/kg	50.0		30.7	53-144	1.27	30	*, Q
Chloroethane	49.3	0.46	1.00	ug/kg	50.0		98.7	55-149	4.11	30	
Trichlorofluoromethane	52.2	0.27	1.00	ug/kg	50.0		104	61-164	10.20	30	
Acrolein	256	3.81	5.00	ug/kg	250		102	59-140	3.01	30	
1,1,2-Trichloro-1,2,2-Trifluoroethane	57.7	0.29	2.00	ug/kg	50.0		115	74-143	5.31	30	Q
Acetone	271	0.48	5.00	ug/kg	250		108	48-137	0.25	30	
1,1-Dichloroethene	55.7	0.34	1.00	ug/kg	50.0		111	77-134	4.67	30	
Bromoethane	56.7	0.44	2.00	ug/kg	50.0		113	65-145	1.83	30	
Iodomethane	12.9	0.22	1.00	ug/kg	50.0		25.8	31-162	0.50	30	*, Q
Methylene Chloride	59.4	0.64	2.00	ug/kg	50.0		119	69-129	1.00	30	
Acrylonitrile	49.1	1.03	5.00	ug/kg	50.0		98.1	69-134	0.45	30	



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Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Volatile Organic Compounds - Quality Control

Batch BFG0114 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFG0114-BS01)						Prepared: 07-Jul-2017 Analyzed: 07-Jul-2017 09:59					
Carbon Disulfide	56.4	0.56	1.00	ug/kg	50.0		113	71-137	5.87	30	
trans-1,2-Dichloroethene	55.3	0.27	1.00	ug/kg	50.0		111	79-130	5.12	30	
Vinyl Acetate	52.3	0.38	5.00	ug/kg	50.0		105	66-141	1.55	30	
1,1-Dichloroethane	52.0	0.20	1.00	ug/kg	50.0		104	80-126	3.92	30	
2-Butanone	227	0.51	5.00	ug/kg	250		90.7	70-132	1.05	30	
2,2-Dichloropropane	52.5	0.29	1.00	ug/kg	50.0		105	77-138	4.23	30	
cis-1,2-Dichloroethene	52.3	0.24	1.00	ug/kg	50.0		105	80-125	4.58	30	
Chloroform	52.0	0.23	1.00	ug/kg	50.0		104	80-126	5.09	30	
Bromochloromethane	52.6	0.32	1.00	ug/kg	50.0		105	80-129	4.26	30	
1,1,1-Trichloroethane	60.5	0.23	1.00	ug/kg	50.0		121	78-133	12.10	30	Q
1,1-Dichloropropene	53.7	0.31	1.00	ug/kg	50.0		107	79-120	6.86	30	
Carbon tetrachloride	53.0	0.21	1.00	ug/kg	50.0		106	71-129	30.60	30	*, Q
1,2-Dichloroethane	48.4	0.19	1.00	ug/kg	50.0		96.8	76-120	3.64	30	
Benzene	51.2	0.30	1.00	ug/kg	50.0		102	80-120	5.22	30	
Trichloroethene	48.2	0.21	1.00	ug/kg	50.0		96.4	80-120	8.43	30	
1,2-Dichloropropane	49.2	0.16	1.00	ug/kg	50.0		98.3	79-120	5.19	30	
Bromodichloromethane	51.6	0.25	1.00	ug/kg	50.0		103	80-122	4.46	30	
Dibromomethane	50.2	0.15	1.00	ug/kg	50.0		100	80-120	2.92	30	
2-Chloroethyl vinyl ether	43.8	0.28	5.00	ug/kg	50.0		87.7	51-129	0.06	30	
4-Methyl-2-Pentanone	244	0.42	5.00	ug/kg	250		97.6	73-121	1.52	30	
cis-1,3-Dichloropropene	50.4	0.23	1.00	ug/kg	50.0		101	80-120	4.90	30	
Toluene	50.8	0.15	1.00	ug/kg	50.0		102	75-120	4.72	30	
trans-1,3-Dichloropropene	51.7	0.22	1.00	ug/kg	50.0		103	80-124	2.97	30	
2-Hexanone	242	0.44	5.00	ug/kg	250		96.6	68-122	0.05	30	
1,1,2-Trichloroethane	50.2	0.29	1.00	ug/kg	50.0		100	79-120	2.49	30	
1,3-Dichloropropane	48.6	0.21	1.00	ug/kg	50.0		97.3	78-120	3.59	30	
Tetrachloroethene	50.1	0.26	1.00	ug/kg	50.0		100	74-124	5.26	30	
Dibromochloromethane	52.4	0.27	1.00	ug/kg	50.0		105	74-125	1.41	30	
1,2-Dibromoethane	49.9	0.18	1.00	ug/kg	50.0		99.7	80-120	2.55	30	
Chlorobenzene	50.1	0.22	1.00	ug/kg	50.0		100	78-120	4.61	30	
Ethylbenzene	52.1	0.20	1.00	ug/kg	50.0		104	80-125	5.19	30	
1,1,1,2-Tetrachloroethane	48.5	0.23	1.00	ug/kg	50.0		97.0	80-120	5.16	30	
m,p-Xylene	101	0.39	1.00	ug/kg	100		101	76-121	5.71	30	
o-Xylene	50.5	0.22	1.00	ug/kg	50.0		101	67-132	5.97	30	
Xylenes, total	151	0.62	2.00	ug/kg	150		101	67-132	5.80	30	



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Project Manager: Christopher Helland

Reported:
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Volatile Organic Compounds - Quality Control

Batch BFG0114 - EPA 5035 (Sodium Bisulfate)

Instrument: NT5 Analyst: LH

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BFG0114-BSD1)						Prepared: 07-Jul-2017 Analyzed: 07-Jul-2017 09:59					
Styrene	50.6	0.14	1.00	ug/kg	50.0		101	80-120	4.39	30	
Bromoform	49.8	0.30	1.00	ug/kg	50.0		99.6	64-128	0.25	30	
1,1,2,2-Tetrachloroethane	51.3	0.25	1.00	ug/kg	50.0		103	74-120	1.02	30	
1,2,3-Trichloropropane	51.5	0.52	2.00	ug/kg	50.0		103	73-120	1.21	30	
trans-1,4-Dichloro 2-Butene	46.6	0.44	5.00	ug/kg	50.0		93.3	65-125	1.67	30	
n-Propylbenzene	50.8	0.27	1.00	ug/kg	50.0		102	72-124	3.35	30	
Bromobenzene	48.7	0.15	1.00	ug/kg	50.0		97.4	76-120	2.71	30	
Isopropyl Benzene	51.6	0.23	1.00	ug/kg	50.0		103	74-121	1.83	30	
2-Chlorotoluene	50.6	0.30	1.00	ug/kg	50.0		101	75-120	2.84	30	
4-Chlorotoluene	50.0	0.28	1.00	ug/kg	50.0		99.9	69-124	3.76	30	
t-Butylbenzene	50.2	0.31	1.00	ug/kg	50.0		100	72-122	4.42	30	
1,3,5-Trimethylbenzene	50.4	0.25	1.00	ug/kg	50.0		101	74-122	3.59	30	
1,2,4-Trimethylbenzene	50.8	0.23	1.00	ug/kg	50.0		102	75-121	3.14	30	
s-Butylbenzene	50.7	0.24	1.00	ug/kg	50.0		101	70-128	3.90	30	
4-Isopropyl Toluene	50.6	0.24	1.00	ug/kg	50.0		101	75-125	4.33	30	
1,3-Dichlorobenzene	49.3	0.23	1.00	ug/kg	50.0		98.6	75-120	2.57	30	
1,4-Dichlorobenzene	48.3	0.23	1.00	ug/kg	50.0		96.5	73-120	3.67	30	
n-Butylbenzene	50.5	0.26	1.00	ug/kg	50.0		101	73-130	4.52	30	
1,2-Dichlorobenzene	48.7	0.29	1.00	ug/kg	50.0		97.4	76-120	3.23	30	
1,2-Dibromo-3-chloropropane	50.6	0.59	5.00	ug/kg	50.0		101	65-126	0.33	30	
1,2,4-Trichlorobenzene	49.3	0.33	5.00	ug/kg	50.0		98.5	66-140	6.34	30	
Hexachloro-1,3-Butadiene	47.7	0.41	5.00	ug/kg	50.0		95.5	67-133	6.92	30	
Naphthalene	50.9	0.43	5.00	ug/kg	50.0		102	69-125	0.16	30	
1,2,3-Trichlorobenzene	48.5	0.31	5.00	ug/kg	50.0		97.1	68-132	5.32	30	
Dichlorodifluoromethane	53.9	0.21	1.00	ug/kg	50.0		108	67-142	13.70	30	Q
Methyl tert-butyl Ether	52.3	0.23	1.00	ug/kg	50.0		105	79-127	3.07	30	
2-Pentanone	242	5.00	5.00	ug/kg	250		96.7	77-120	0.99	30	
Surrogate: 1,2-Dichloroethane-d4		49.7		ug/kg	50.0		99.3	80-149			
Surrogate: Toluene-d8		49.9		ug/kg	50.0		99.7	77-120			
Surrogate: 4-Bromofluorobenzene		49.1		ug/kg	50.0		98.3	80-120			
Surrogate: 1,2-Dichlorobenzene-d4		50.1		ug/kg	50.0		100	80-120			



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Semivolatile Organic Compounds - Quality Control

Batch BFF0828 - EPA 3546 (Microwave)

Instrument: NT10 Analyst: VTS

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0828-BLK1)						Prepared: 29-Jun-2017 Analyzed: 11-Jul-2017 11:46					
Phenol	ND	8.2	20.0	ug/kg							U
bis(2-chloroethyl) ether	ND	6.8	20.0	ug/kg							U
2-Chlorophenol	ND	6.5	20.0	ug/kg							U
1,3-Dichlorobenzene	ND	5.1	20.0	ug/kg							U
1,4-Dichlorobenzene	ND	4.4	20.0	ug/kg							U
1,2-Dichlorobenzene	ND	4.7	20.0	ug/kg							U
Benzyl Alcohol	ND	14.9	20.0	ug/kg							U
2,2'-Oxybis(1-chloropropane)	ND	5.7	20.0	ug/kg							U
2-Methylphenol	ND	7.8	20.0	ug/kg							U
Hexachloroethane	ND	5.7	20.0	ug/kg							U
N-Nitroso-di-n-Propylamine	ND	10.8	20.0	ug/kg							U
4-Methylphenol	ND	14.7	20.0	ug/kg							U
Nitrobenzene	ND	8.0	20.0	ug/kg							U
Isophorone	ND	7.8	20.0	ug/kg							U
2-Nitrophenol	ND	6.9	20.0	ug/kg							U
2,4-Dimethylphenol	ND	26.8	100	ug/kg							U
Bis(2-Chloroethoxy)methane	ND	6.3	20.0	ug/kg							U
2,4-Dichlorophenol	ND	32.0	100	ug/kg							U
1,2,4-Trichlorobenzene	ND	6.0	20.0	ug/kg							U
Naphthalene	ND	5.3	20.0	ug/kg							U
Benzoic acid	ND	59.1	200	ug/kg							U
4-Chloroaniline	ND	33.7	100	ug/kg							U
Hexachlorobutadiene	ND	5.0	20.0	ug/kg							U
4-Chloro-3-Methylphenol	ND	28.9	100	ug/kg							U
2-Methylnaphthalene	ND	5.7	20.0	ug/kg							U
Hexachlorocyclopentadiene	ND	41.3	100	ug/kg							U
2,4,6-Trichlorophenol	ND	25.4	100	ug/kg							U
2,4,5-Trichlorophenol	ND	26.9	100	ug/kg							U
2-Chloronaphthalene	ND	4.4	20.0	ug/kg							U
2-Nitroaniline	ND	30.2	100	ug/kg							U
Acenaphthylene	ND	4.8	20.0	ug/kg							U
Dimethylphthalate	ND	6.4	20.0	ug/kg							U
2,6-Dinitrotoluene	ND	26.7	100	ug/kg							U
Acenaphthene	ND	5.1	20.0	ug/kg							U
3-Nitroaniline	ND	37.7	100	ug/kg							U



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Semivolatile Organic Compounds - Quality Control

Batch BFF0828 - EPA 3546 (Microwave)

Instrument: NT10 Analyst: VTS

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0828-BLK1)						Prepared: 29-Jun-2017 Analyzed: 11-Jul-2017 11:46					
2,4-Dinitrophenol	ND	41.3	200	ug/kg							U
Dibenzofuran	ND	4.6	20.0	ug/kg							U
4-Nitrophenol	ND	44.4	100	ug/kg							U
2,4-Dinitrotoluene	ND	22.9	100	ug/kg							U
Fluorene	ND	5.0	20.0	ug/kg							U
4-Chlorophenylphenyl ether	ND	7.0	20.0	ug/kg							U
Diethyl phthalate	ND	17.7	20.0	ug/kg							U
4-Nitroaniline	ND	34.9	100	ug/kg							U
4,6-Dinitro-2-methylphenol	ND	50.5	200	ug/kg							U
N-Nitrosodiphenylamine	ND	9.6	20.0	ug/kg							U
4-Bromophenyl phenyl ether	ND	6.1	20.0	ug/kg							U
Hexachlorobenzene	ND	4.7	20.0	ug/kg							U
Pentachlorophenol	ND	31.3	100	ug/kg							U
Phenanthrene	ND	4.7	20.0	ug/kg							U
Anthracene	ND	5.9	20.0	ug/kg							U
Carbazole	ND	7.4	20.0	ug/kg							U
Di-n-Butylphthalate	ND	5.3	20.0	ug/kg							U
Fluoranthene	ND	4.5	20.0	ug/kg							U
Pyrene	ND	5.6	20.0	ug/kg							U
Butylbenzylphthalate	ND	8.1	20.0	ug/kg							U
Benzo(a)anthracene	ND	5.2	20.0	ug/kg							U
3,3'-Dichlorobenzidine	ND	31.2	100	ug/kg							U
Chrysene	ND	5.2	20.0	ug/kg							U
bis(2-Ethylhexyl)phthalate	ND	28.8	50.0	ug/kg							U
Di-n-Octylphthalate	ND	8.7	20.0	ug/kg							U
Benzo(a)fluoranthene, Total	ND	10.2	40.0	ug/kg							U
Benzo(a)pyrene	ND	6.5	20.0	ug/kg							U
Indeno(1,2,3-cd)pyrene	ND	6.0	20.0	ug/kg							U
Dibenzo(a,h)anthracene	ND	6.2	20.0	ug/kg							U
Benzo(g,h,i)perylene	ND	5.8	20.0	ug/kg							U
1-Methylnaphthalene	ND	6.0	20.0	ug/kg							U
Surrogate: 2-Fluorophenol		465		ug/kg	750		61.9	27-120			
Surrogate: Phenol-d5		481		ug/kg	750		64.1	29-120			
Surrogate: 2-Chlorophenol-d4		546		ug/kg	750		72.9	31-120			
Surrogate: 1,2-Dichlorobenzene-d4		384		ug/kg	500		76.7	32-120			



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Semivolatile Organic Compounds - Quality Control

Batch BFF0828 - EPA 3546 (Microwave)

Instrument: NT10 Analyst: VTS

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0828-BLK1)						Prepared: 29-Jun-2017 Analyzed: 11-Jul-2017 11:46					
Surrogate: Nitrobenzene-d5		389		ug/kg	500		77.7	30-120			
Surrogate: 2-Fluorobiphenyl		433		ug/kg	500		86.6	35-120			
Surrogate: 2,4,6-Tribromophenol		669		ug/kg	750		89.3	24-134			
Surrogate: p-Terphenyl-d14		493		ug/kg	500		98.6	37-120			
LCS (BFF0828-BS1)						Prepared: 29-Jun-2017 Analyzed: 11-Jul-2017 12:23					
Phenol	328	8.2	20.0	ug/kg	500		65.6	34-120			
bis(2-chloroethyl) ether	421	6.8	20.0	ug/kg	500		84.2	36-120			
2-Chlorophenol	355	6.5	20.0	ug/kg	500		71.0	39-120			
1,3-Dichlorobenzene	402	5.1	20.0	ug/kg	500		80.4	40-120			
1,4-Dichlorobenzene	429	4.4	20.0	ug/kg	500		85.8	39-120			
1,2-Dichlorobenzene	428	4.7	20.0	ug/kg	500		85.6	40-120			
Benzyl Alcohol	466	14.9	20.0	ug/kg	500		93.2	19-120			
2,2'-Oxybis(1-chloropropane)	417	5.7	20.0	ug/kg	500		83.4	32-120			
2-Methylphenol	404	7.8	20.0	ug/kg	500		80.7	28-120			
Hexachloroethane	410	5.7	20.0	ug/kg	500		81.9	38-120			
N-Nitroso-di-n-Propylamine	367	10.8	20.0	ug/kg	500		73.4	34-120			
4-Methylphenol	432	14.7	20.0	ug/kg	500		86.4	29-120			
Nitrobenzene	421	8.0	20.0	ug/kg	500		84.2	36-120			
Isophorone	391	7.8	20.0	ug/kg	500		78.2	37-120			
2-Nitrophenol	382	6.9	20.0	ug/kg	500		76.4	30-120			
2,4-Dimethylphenol	898	26.8	100	ug/kg	1500		59.8	10-120			
Bis(2-Chloroethoxy)methane	392	6.3	20.0	ug/kg	500		78.3	39-120			
2,4-Dichlorophenol	1370	32.0	100	ug/kg	1500		91.4	28-120			
1,2,4-Trichlorobenzene	421	6.0	20.0	ug/kg	500		84.1	35-120			
Naphthalene	450	5.3	20.0	ug/kg	500		89.9	43-120			
Benzoic acid	1310	59.1	200	ug/kg	2750		47.6	10-120			
4-Chloroaniline	138	33.7	100	ug/kg	1500		9.23	11-120			*
Hexachlorobutadiene	467	5.0	20.0	ug/kg	500		93.3	37-120			
4-Chloro-3-Methylphenol	1260	28.9	100	ug/kg	1500		84.0	32-120			
2-Methylnaphthalene	437	5.7	20.0	ug/kg	500		87.3	43-120			
Hexachlorocyclopentadiene	984	41.3	100	ug/kg	1500		65.6	10-120			
2,4,6-Trichlorophenol	1250	25.4	100	ug/kg	1500		83.5	30-120			
2,4,5-Trichlorophenol	1380	26.9	100	ug/kg	1500		91.8	28-120			
2-Chloronaphthalene	458	4.4	20.0	ug/kg	500		91.6	40-120			



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400 N 34th St., Suite 100
Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Semivolatile Organic Compounds - Quality Control

Batch BFF0828 - EPA 3546 (Microwave)

Instrument: NT10 Analyst: VTS

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFF0828-BS1)						Prepared: 29-Jun-2017 Analyzed: 11-Jul-2017 12:23					
2-Nitroaniline	1510	30.2	100	ug/kg	1500		101	31-126			
Acenaphthylene	473	4.8	20.0	ug/kg	500		94.6	42-120			
Dimethylphthalate	503	6.4	20.0	ug/kg	500		101	43-120			
2,6-Dinitrotoluene	1480	26.7	100	ug/kg	1500		99.0	33-123			
Acenaphthene	467	5.1	20.0	ug/kg	500		93.5	45-120			
3-Nitroaniline	424	37.7	100	ug/kg	1500		28.3	22-120			
2,4-Dinitrophenol	2240	41.3	200	ug/kg	2750		81.6	10-120			
Dibenzofuran	454	4.6	20.0	ug/kg	500		90.8	43-120			
4-Nitrophenol	1320	44.4	100	ug/kg	1500		88.1	15-138			
2,4-Dinitrotoluene	1570	22.9	100	ug/kg	1500		104	35-127			
Fluorene	554	5.0	20.0	ug/kg	500		111	45-120			
4-Chlorophenylphenyl ether	561	7.0	20.0	ug/kg	500		112	32-120			
Diethyl phthalate	491	17.7	20.0	ug/kg	500		98.3	50-120			
4-Nitroaniline	1020	34.9	100	ug/kg	1500		68.2	24-125			
4,6-Dinitro-2-methylphenol	2420	50.5	200	ug/kg	2750		88.1	24-120			
N-Nitrosodiphenylamine	406	9.6	20.0	ug/kg	500		81.3	36-120			
4-Bromophenyl phenyl ether	494	6.1	20.0	ug/kg	500		98.8	39-120			
Hexachlorobenzene	493	4.7	20.0	ug/kg	500		98.6	33-120			
Pentachlorophenol	789	31.3	100	ug/kg	1500		52.6	16-120			
Phenanthrene	494	4.7	20.0	ug/kg	500		98.7	49-120			
Anthracene	442	5.9	20.0	ug/kg	500		88.5	45-120			
Carbazole	463	7.4	20.0	ug/kg	500		92.7	43-135			
Di-n-Butylphthalate	470	5.3	20.0	ug/kg	500		94.1	48-126			
Fluoranthene	514	4.5	20.0	ug/kg	500		103	53-120			
Pyrene	491	5.6	20.0	ug/kg	500		98.1	48-121			
Butylbenzylphthalate	452	8.1	20.0	ug/kg	500		90.5	45-132			
Benzo(a)anthracene	456	5.2	20.0	ug/kg	500		91.3	49-120			
3,3'-Dichlorobenzidine	152	31.2	100	ug/kg	1500		10.1	10-120			
Chrysene	491	5.2	20.0	ug/kg	500		98.3	47-120			
bis(2-Ethylhexyl)phthalate	511	28.8	50.0	ug/kg	500		102	34-130			
Di-n-Octylphthalate	487	8.7	20.0	ug/kg	500		97.4	28-124			
Benzo(a)fluoranthene, Total	966	10.2	40.0	ug/kg	1000		96.6	30-160			
Benzo(a)pyrene	461	6.5	20.0	ug/kg	500		92.1	42-120			
Indeno(1,2,3-cd)pyrene	521	6.0	20.0	ug/kg	500		104	42-123			
Dibenzo(a,h)anthracene	524	6.2	20.0	ug/kg	500		105	30-133			



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Semivolatile Organic Compounds - Quality Control

Batch BFF0828 - EPA 3546 (Microwave)

Instrument: NT10 Analyst: VTS

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
LCS (BFF0828-BS1)										
					Prepared: 29-Jun-2017 Analyzed: 11-Jul-2017 12:23					
Benzo(g,h,i)perylene	545	5.8	20.0	ug/kg	500		109	38-126		
1-Methylnaphthalene	391	6.0	20.0	ug/kg	500		78.3	42-120		
Surrogate: 2-Fluorophenol		572		ug/kg	750		76.3	27-120		
Surrogate: Phenol-d5		574		ug/kg	750		76.5	29-120		
Surrogate: 2-Chlorophenol-d4		664		ug/kg	750		88.6	31-120		
Surrogate: 1,2-Dichlorobenzene-d4		395		ug/kg	500		79.1	32-120		
Surrogate: Nitrobenzene-d5		428		ug/kg	500		85.6	30-120		
Surrogate: 2-Fluorobiphenyl		467		ug/kg	500		93.4	35-120		
Surrogate: 2,4,6-Tribromophenol		777		ug/kg	750		104	24-134		
Surrogate: p-Terphenyl-d14		523		ug/kg	500		105	37-120		



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Project: Willow Creek Daylight
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Project Manager: Christopher Helland

Reported:
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Semivolatile Organic Compounds - SIM - Quality Control

Batch BFF0829 - EPA 3546 (Microwave)

Instrument: NT8 Analyst: JZ

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0829-BLK1)											
						Prepared: 30-Jun-2017 Analyzed: 11-Jul-2017 11:07					
Naphthalene	ND	1.28	5.00	ug/kg							U
2-Methylnaphthalene	ND	1.10	5.00	ug/kg							U
1-Methylnaphthalene	ND	0.40	5.00	ug/kg							U
Acenaphthylene	ND	1.08	5.00	ug/kg							U
Acenaphthene	ND	0.57	5.00	ug/kg							U
Dibenzofuran	ND	1.38	5.00	ug/kg							U
Fluorene	ND	0.63	5.00	ug/kg							U
Phenanthrene	ND	0.72	5.00	ug/kg							U
Anthracene	ND	0.87	5.00	ug/kg							U
Fluoranthene	ND	0.47	5.00	ug/kg							U
Pyrene	ND	0.63	5.00	ug/kg							U
Benzo(a)anthracene	ND	0.82	5.00	ug/kg							U
Chrysene	ND	1.05	5.00	ug/kg							U
Benzo(b)fluoranthene	ND	1.37	5.00	ug/kg							U
Benzo(k)fluoranthene	ND	0.76	5.00	ug/kg							U
Benzo(j)fluoranthene	ND	0.68	5.00	ug/kg							U
Benzofluoranthenes, Total	ND	3.01	10.0	ug/kg							U
Benzo(a)pyrene	ND	0.61	5.00	ug/kg							U
Indeno(1,2,3-cd)pyrene	ND	1.05	5.00	ug/kg							U
Dibenzo(a,h)anthracene	ND	0.89	5.00	ug/kg							U
Benzo(g,h,i)perylene	ND	1.07	5.00	ug/kg							U
Surrogate: 2-Methylnaphthalene-d10		63.3		ug/kg	150		42.2	32-120			
Surrogate: Dibenzo[a,h]anthracene-d14		90.2		ug/kg	150		60.1	21-133			
Surrogate: Fluoranthene-d10		90.2		ug/kg	150		60.1	36-134			

LCS (BFF0829-BS1)											
						Prepared: 30-Jun-2017 Analyzed: 11-Jul-2017 11:33					
Naphthalene	62.9	1.28	5.00	ug/kg	150		41.9	36-120			
2-Methylnaphthalene	62.9	1.10	5.00	ug/kg	150		41.9	35-120			
1-Methylnaphthalene	67.0	0.40	5.00	ug/kg	150		44.6	39-120			
Acenaphthylene	66.7	1.08	5.00	ug/kg	150		44.5	35-120			
Acenaphthene	62.1	0.57	5.00	ug/kg	150		41.4	39-120			
Dibenzofuran	68.3	1.38	5.00	ug/kg	150		45.6	38-120			
Fluorene	70.5	0.63	5.00	ug/kg	150		47.0	41-120			
Phenanthrene	80.1	0.72	5.00	ug/kg	150		53.4	46-120			
Anthracene	78.9	0.87	5.00	ug/kg	150		52.6	36-120			



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Reported:
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Semivolatile Organic Compounds - SIM - Quality Control

Batch BFF0829 - EPA 3546 (Microwave)

Instrument: NT8 Analyst: JZ

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
LCS (BFF0829-BS1)										
Prepared: 30-Jun-2017 Analyzed: 11-Jul-2017 11:33										
Fluoranthene	92.2	0.47	5.00	ug/kg	150		61.5 46-120			
Pyrene	95.2	0.63	5.00	ug/kg	150		63.4 49-120			
Benzo(a)anthracene	96.7	0.82	5.00	ug/kg	150		64.4 42-120			
Chrysene	92.2	1.05	5.00	ug/kg	150		61.5 48-120			
Benzo(b)fluoranthene	99.7	1.37	5.00	ug/kg	150		66.4 35-127			
Benzo(k)fluoranthene	95.6	0.76	5.00	ug/kg	150		63.7 37-129			
Benzo(j)fluoranthene	92.9	0.68	5.00	ug/kg	150		61.9 40-120			
Benzo(a)pyrene	79.2	0.61	5.00	ug/kg	150		52.8 36-120			
Indeno(1,2,3-cd)pyrene	94.8	1.05	5.00	ug/kg	150		63.2 40-120			
Dibenzo(a,h)anthracene	102	0.89	5.00	ug/kg	150		68.3 38-120			
Benzo(g,h,i)perylene	96.3	1.07	5.00	ug/kg	150		64.2 38-120			
Surrogate: 2-Methylnaphthalene-d10		71.5		ug/kg	150		47.6 32-120			
Surrogate: Dibenzo[a,h]anthracene-d14		119		ug/kg	150		79.3 21-133			
Surrogate: Fluoranthene-d10		106		ug/kg	150		70.8 36-134			



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Reported:
28-Jul-2017 15:26

Butyl Tins - Quality Control

Batch BFF0827 - EPA 3546 (Microwave)

Instrument: NT12 Analyst: VTS

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0827-BLK1) Prepared: 30-Jun-2017 Analyzed: 08-Jul-2017 07:46											
Tributyltin Ion	ND	0.450	3.86	ug/kg							U
Dibutyltin Ion	ND	1.73	5.78	ug/kg							U
Butyltin Ion	ND	1.89	4.08	ug/kg							U
Tetrabutyltin	ND	5.00	5.00	ug/kg							U
Surrogate: Triphenyltin		27.0		ug/kg	45.2		59.8	30-160			
Surrogate: Tripropyltin		25.6		ug/kg	43.7		58.4	30-160			
LCS (BFF0827-BS1) Prepared: 30-Jun-2017 Analyzed: 08-Jul-2017 07:58											
Tributyltin Ion	29.2	0.450	3.86	ug/kg	44.6		65.5	30-160			
Dibutyltin Ion	26.6	1.73	5.78	ug/kg	38.4		69.3	30-160			
Butyltin Ion	19.1	1.89	4.08	ug/kg	31.2		61.4	30-160			
Surrogate: Triphenyltin		26.8		ug/kg	45.2		59.3	30-160			
Surrogate: Tripropyltin		24.7		ug/kg	43.7		56.4	30-160			
LCS Dup (BFF0827-BSD1) Prepared: 30-Jun-2017 Analyzed: 08-Jul-2017 08:11											
Tributyltin Ion	31.2	0.450	3.86	ug/kg	44.6		70.0	30-160	6.65	30	
Dibutyltin Ion	31.6	1.73	5.78	ug/kg	38.4		82.3	30-160	17.10	30	
Butyltin Ion	20.7	1.89	4.08	ug/kg	31.2		66.4	30-160	7.88	30	
Surrogate: Triphenyltin		28.6		ug/kg	45.2		63.4	30-160			
Surrogate: Tripropyltin		26.2		ug/kg	43.7		59.9	30-160			



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Reported:
28-Jul-2017 15:26

Petroleum Hydrocarbons - Quality Control

Batch BFF0822 - EPA 3546 (Microwave)

Instrument: FID4 Analyst: ML

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0822-BLK1) Prepared: 30-Jun-2017 Analyzed: 11-Jul-2017 13:34									
Diesel Range Organics (C12-C24)	ND	5.00	mg/kg						U
Motor Oil Range Organics (C24-C38)	10.2	10.0	mg/kg						
Surrogate: o-Terphenyl	21.8		mg/kg	22.5		97.0	50-150		
LCS (BFF0822-BS1) Prepared: 30-Jun-2017 Analyzed: 11-Jul-2017 13:56									
Diesel Range Organics (C12-C24)	164	5.00	mg/kg	150		109	63-120		
Surrogate: o-Terphenyl	23.0		mg/kg	22.5		102	50-150		



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Chlorinated Pesticides - Quality Control

Batch BFF0825 - EPA 3546 (Microwave)

Instrument: ECD6 Analyst: YZ

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0825-BLK1)											
						Prepared: 29-Jun-2017 Analyzed: 11-Jul-2017 15:46					
alpha-BHC	ND	0.08	0.50	ug/kg							U
beta-BHC	ND	0.09	0.50	ug/kg							U
gamma-BHC (Lindane)	ND	0.07	0.50	ug/kg							U
delta-BHC	ND	0.07	0.50	ug/kg							U
Heptachlor	ND	0.05	0.50	ug/kg							U
Aldrin	ND	0.37	0.50	ug/kg							U
Heptachlor Epoxide	ND	0.17	0.50	ug/kg							U
trans-Chlordane (beta-Chlordane)	ND	0.33	0.50	ug/kg							U
cis-Chlordane (alpha-chlordane)	ND	0.11	0.50	ug/kg							U
Endosulfan I	ND	0.07	0.50	ug/kg							U
4,4'-DDE	ND	0.14	1.00	ug/kg							U
Dieldrin	ND	0.12	1.00	ug/kg							U
Endrin	ND	0.14	1.00	ug/kg							U
Endosulfan II	ND	0.31	1.00	ug/kg							U
4,4'-DDD	ND	0.32	1.00	ug/kg							U
Endrin Aldehyde	ND	0.39	1.00	ug/kg							U
4,4'-DDT	ND	0.33	1.00	ug/kg							U
Endosulfan Sulfate	ND	0.12	1.00	ug/kg							U
Endrin Ketone	ND	0.28	1.00	ug/kg							U
Methoxychlor	ND	0.30	5.00	ug/kg							U
Hexachlorobutadiene	ND	0.34	0.50	ug/kg							U
Hexachlorobenzene	ND	0.15	0.50	ug/kg							U
2,4'-DDE	ND	0.25	1.00	ug/kg							U
2,4'-DDD	ND	0.20	1.00	ug/kg							U
2,4'-DDT	ND	0.19	1.00	ug/kg							U
Oxychlordane	ND	0.13	1.00	ug/kg							U
cis-Nonachlor	ND	0.21	1.00	ug/kg							U
trans-Nonachlor	ND	0.23	1.00	ug/kg							U
Mirex	ND	0.64	1.00	ug/kg							U
Surrogate: Decachlorobiphenyl		8.17		ug/kg	8.00		102	30-160			
Surrogate: Decachlorobiphenyl [2C]		8.31		ug/kg	8.00		104	30-160			
Surrogate: Tetrachlorometaxylene		5.76		ug/kg	8.00		72.0	30-160			
Surrogate: Tetrachlorometaxylene [2C]		5.95		ug/kg	8.00		74.4	30-160			

LCS (BFF0825-BS1)

Prepared: 29-Jun-2017 Analyzed: 11-Jul-2017 16:04



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Chlorinated Pesticides - Quality Control

Batch BFF0825 - EPA 3546 (Microwave)

Instrument: ECD6 Analyst: YZ

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFF0825-BS1)						Prepared: 29-Jun-2017 Analyzed: 11-Jul-2017 16:04					
alpha-BHC	3.09	0.08	0.50	ug/kg	4.00		77.4	41-120			
beta-BHC	3.23	0.09	0.50	ug/kg	4.00		80.8	42-120			
gamma-BHC (Lindane)	3.35	0.07	0.50	ug/kg	4.00		83.8	49-120			
delta-BHC	3.34	0.07	0.50	ug/kg	4.00		83.5	19-140			
Heptachlor	3.10	0.05	0.50	ug/kg	4.00		77.4	39-120			
Aldrin	3.06	0.37	0.50	ug/kg	4.00		76.6	41-120			
Heptachlor Epoxide	3.44	0.17	0.50	ug/kg	4.00		86.0	42-132			
trans-Chlordane (beta-Chlordane)	3.33	0.33	0.50	ug/kg	4.00		83.2	45-130			
cis-Chlordane (alpha-chlordane)	3.31	0.11	0.50	ug/kg	4.00		82.7	44-129			
Endosulfan I	3.39	0.07	0.50	ug/kg	4.00		84.8	39-141			
4,4'-DDE	6.81	0.14	1.00	ug/kg	8.00		85.1	57-143			
Dieldrin	6.99	0.12	1.00	ug/kg	8.00		87.4	44-135			
Endrin	8.34	0.14	1.00	ug/kg	8.00		104	53-129			
Endosulfan II	8.30	0.31	1.00	ug/kg	8.00		104	32-139			
4,4'-DDD	8.36	0.32	1.00	ug/kg	8.00		105	55-124			
Endrin Aldehyde	6.02	0.39	1.00	ug/kg	8.00		75.3	13-120			
4,4'-DDT	7.59	0.33	1.00	ug/kg	8.00		94.8	45-133			
Endosulfan Sulfate	8.30	0.12	1.00	ug/kg	8.00		104	16-152			
Endrin Ketone	8.03	0.28	1.00	ug/kg	8.00		100	26-144			
Methoxychlor	37.7	0.30	5.00	ug/kg	40.0		94.2	43-125			
Hexachlorobutadiene	4.30	0.34	0.50	ug/kg	4.00		107	30-120			
Hexachlorobenzene	3.58	0.15	0.50	ug/kg	4.00		89.5	26-120			
Surrogate: Decachlorobiphenyl		8.08		ug/kg	8.00		101	30-160			
Surrogate: Decachlorobiphenyl [2C]		9.09		ug/kg	8.00		114	30-160			
Surrogate: Tetrachlorometaxylene		5.81		ug/kg	8.00		72.6	30-160			
Surrogate: Tetrachlorometaxylene [2C]		6.02		ug/kg	8.00		75.3	30-160			



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Reported:
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Aroclor PCB - Quality Control

Batch BFF0826 - EPA 3546 (Microwave)

Instrument: ECD7 Analyst: JR

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0826-BLK1)											
						Prepared: 05-Jul-2017 Analyzed: 07-Jul-2017 16:37					
Aroclor 1016	ND	8.0	20.0	ug/kg							U
Aroclor 1221	ND	8.0	20.0	ug/kg							U
Aroclor 1232	ND	8.0	20.0	ug/kg							U
Aroclor 1242	ND	8.0	20.0	ug/kg							U
Aroclor 1248	ND	8.0	20.0	ug/kg							U
Aroclor 1254	ND	8.0	20.0	ug/kg							U
Aroclor 1260	ND	9.3	20.0	ug/kg							U
Aroclor 1262	ND	9.3	20.0	ug/kg							U
Aroclor 1268	ND	9.3	20.0	ug/kg							U
Surrogate: Decachlorobiphenyl		35.9		ug/kg	40.0		89.7	40-133			
Surrogate: Tetrachlorometaxylene		31.6		ug/kg	40.0		78.9	53-120			
Surrogate: Decachlorobiphenyl [2C]		35.0		ug/kg	40.0		87.6	40-133			
Surrogate: Tetrachlorometaxylene [2C]		27.2		ug/kg	40.0		68.1	53-120			
LCS (BFF0826-BS1)											
						Prepared: 05-Jul-2017 Analyzed: 07-Jul-2017 16:59					
Aroclor 1016	428	8.0	20.0	ug/kg	500		85.5	52-120			
Aroclor 1260	433	9.3	20.0	ug/kg	500		86.6	57-120			
Surrogate: Decachlorobiphenyl		35.5		ug/kg	40.0		88.7	40-133			
Surrogate: Tetrachlorometaxylene		31.3		ug/kg	40.0		78.3	53-120			
Surrogate: Decachlorobiphenyl [2C]		34.5		ug/kg	40.0		86.3	40-133			
Surrogate: Tetrachlorometaxylene [2C]		30.9		ug/kg	40.0		77.2	53-120			



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Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Metals and Metallic Compounds - Quality Control

Batch BFF0836 - SWC EPA 3050B

Instrument: ICP2 Analyst: CC

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0836-BLK1) Prepared: 30-Jun-2017 Analyzed: 06-Jul-2017 21:38											
Antimony	ND	0.226	5.00	mg/kg							U
Arsenic	ND	0.280	5.00	mg/kg							U
Beryllium	ND	0.0058	0.100	mg/kg							U
Cadmium	ND	0.0124	0.200	mg/kg							U
Chromium	0.128	0.0471	0.500	mg/kg							J
Copper	ND	0.0247	0.200	mg/kg							U
Lead	ND	0.130	2.00	mg/kg							U
Nickel	ND	0.199	1.00	mg/kg							U
Selenium	ND	0.816	5.00	mg/kg							U
Silver	ND	0.0439	0.300	mg/kg							U
Thallium	ND	0.456	5.00	mg/kg							U
Zinc	ND	0.160	1.00	mg/kg							U

LCS (BFF0836-BS1) Prepared: 30-Jun-2017 Analyzed: 06-Jul-2017 21:56											
Antimony	221	0.226	5.00	mg/kg	200		110	80-120			
Arsenic	197	0.280	5.00	mg/kg	200		98.6	80-120			
Beryllium	47.7	0.0058	0.100	mg/kg	50.0		95.4	80-120			
Cadmium	52.2	0.0124	0.200	mg/kg	50.0		104	80-120			
Chromium	52.3	0.0471	0.500	mg/kg	50.0		105	80-120			
Copper	50.5	0.0247	0.200	mg/kg	50.0		101	80-120			
Lead	191	0.130	2.00	mg/kg	200		95.3	80-120			
Nickel	48.2	0.199	1.00	mg/kg	50.0		96.4	80-120			
Selenium	197	0.816	5.00	mg/kg	200		98.4	80-120			
Silver	50.1	0.0439	0.300	mg/kg	50.0		100	80-120			
Thallium	196	0.456	5.00	mg/kg	200		97.8	80-120			
Zinc	46.9	0.160	1.00	mg/kg	50.0		93.7	80-120			

Duplicate (BFF0836-DUP1) Source: 17F0434-01 Prepared: 30-Jun-2017 Analyzed: 06-Jul-2017 21:43											
Antimony	1.00	0.258	5.70	mg/kg		1.07			6.67	20	J
Arsenic	3.76	0.319	5.70	mg/kg		4.57			19.30	20	J
Beryllium	0.111	0.0066	0.114	mg/kg		0.120			7.68	20	J
Cadmium	0.138	0.0141	0.228	mg/kg		0.158			13.40	20	J
Chromium	15.5	0.0537	0.570	mg/kg		15.5			0.52	20	
Copper	9.63	0.0281	0.228	mg/kg		10.7			10.90	20	
Lead	3.46	0.149	2.28	mg/kg		3.79			9.16	20	



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Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Metals and Metallic Compounds - Quality Control

Batch BFF0836 - SWC EPA 3050B

Instrument: ICP2 Analyst: CC

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Duplicate (BFF0836-DUP1)											
Source: 17F0434-01				Prepared: 30-Jun-2017 Analyzed: 06-Jul-2017 21:43							
Nickel	15.5	0.226	1.14	mg/kg		17.9			14.40	20	
Selenium	ND	0.930	5.70	mg/kg		ND					U
Silver	ND	0.0500	0.342	mg/kg		ND					U
Thallium	ND	0.520	5.70	mg/kg		ND					U
Zinc	24.9	0.182	1.14	mg/kg		30.1			18.80	20	
Matrix Spike (BFF0836-MS1)											
Source: 17F0434-01				Prepared: 30-Jun-2017 Analyzed: 06-Jul-2017 21:51							
Antimony	124	0.258	5.71	mg/kg	228	1.07	53.6	75-125			*
Arsenic	235	0.320	5.71	mg/kg	228	4.57	101	75-125			
Beryllium	56.6	0.0066	0.114	mg/kg	57.1	0.120	98.9	75-125			
Cadmium	61.3	0.0141	0.228	mg/kg	57.1	0.158	107	75-125			
Chromium	73.4	0.0538	0.571	mg/kg	57.1	15.5	101	75-125			
Copper	71.6	0.0282	0.228	mg/kg	57.1	10.7	107	75-125			
Lead	223	0.149	2.28	mg/kg	228	3.79	96.0	75-125			
Nickel	69.6	0.227	1.14	mg/kg	57.1	17.9	90.5	75-125			
Selenium	232	0.932	5.71	mg/kg	228	ND	102	75-125			
Silver	58.5	0.0501	0.343	mg/kg	57.1	ND	102	75-125			
Thallium	211	0.521	5.71	mg/kg	228	ND	92.5	75-125			
Zinc	80.4	0.182	1.14	mg/kg	57.1	30.1	88.1	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.



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Metals and Metallic Compounds - Quality Control

Batch BFF0838 - SMM EPA 7471B

Instrument: CETAC Analyst: MCB

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0838-BLK1)										
					Prepared: 30-Jun-2017 Analyzed: 30-Jun-2017 13:48					
Mercury	ND	0.02500	mg/kg							U
LCS (BFF0838-BS1)										
					Prepared: 30-Jun-2017 Analyzed: 30-Jun-2017 13:50					
Mercury	0.5225	0.02500	mg/kg	0.5000		105	80-120			
Duplicate (BFF0838-DUP1)										
		Source: 17F0434-01			Prepared: 30-Jun-2017 Analyzed: 30-Jun-2017 14:10					
Mercury	ND	0.02657	mg/kg		ND					U
Matrix Spike (BFF0838-MS1)										
		Source: 17F0434-01			Prepared: 30-Jun-2017 Analyzed: 30-Jun-2017 14:11					
Mercury	0.2780	0.02622	mg/kg	0.2622	ND	106	75-125			

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Wet Chemistry - Quality Control

Batch BFF0832 - No Prep Wet Chem

Instrument: N/A

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0832-BLK1)									
					Prepared: 29-Jun-2017 Analyzed: 29-Jun-2017 11:44				
Total Solids, Sulfide	ND	0.040	%						U
Duplicate (BFF0832-DUP1)									
		Source: 17F0434-01		Prepared: 29-Jun-2017 Analyzed: 29-Jun-2017 11:44					
Total Solids, Sulfide	86.8	0.040	%		87.7		1.08	20	
Duplicate (BFF0832-DUP2)									
		Source: 17F0434-01		Prepared: 29-Jun-2017 Analyzed: 29-Jun-2017 11:44					
Total Solids, Sulfide	84.9	0.040	%		87.7		3.31	20	



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Wet Chemistry - Quality Control

Batch BFF0835 - MSA 33.3

Instrument: LACHAT2 Analyst: KK

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0835-BLK1) Prepared: 01-Jul-2017 Analyzed: 01-Jul-2017 13:26										
Ammonia-N	ND	0.40	mg/kg NH3-N							U
Blank (BFF0835-BLK2) Prepared: 01-Jul-2017 Analyzed: 01-Jul-2017 17:01										
Nitrate + Nitrite as N	ND	0.10	mg-N/kg							U
LCS (BFF0835-BS2) Prepared: 01-Jul-2017 Analyzed: 01-Jul-2017 17:03										
Nitrate + Nitrite as N	103	2.00	mg-N/kg	100		103	90-110			D
Duplicate (BFF0835-DUP1) Source: 17F0434-01 Prepared: 01-Jul-2017 Analyzed: 01-Jul-2017 13:29										
Ammonia-N	ND	0.41	mg/kg NH3-N		ND					U
Duplicate (BFF0835-DUP2) Source: 17F0434-01 Prepared: 01-Jul-2017 Analyzed: 01-Jul-2017 13:31										
Ammonia-N	ND	0.46	mg/kg NH3-N		ND					U
Duplicate (BFF0835-DUP3) Source: 17F0434-01 Prepared: 01-Jul-2017 Analyzed: 01-Jul-2017 17:05										
Nitrate + Nitrite as N	0.19	0.10	mg-N/kg		0.19			0.22	20	
Duplicate (BFF0835-DUP4) Source: 17F0434-01 Prepared: 01-Jul-2017 Analyzed: 01-Jul-2017 17:06										
Nitrate + Nitrite as N	0.17	0.11	mg-N/kg		0.19			8.75	20	
Matrix Spike (BFF0835-MS2) Source: 17F0434-01 Prepared: 01-Jul-2017 Analyzed: 01-Jul-2017 17:07										
Nitrate + Nitrite as N	114	2.33	mg-N/kg	117	0.19	97.9	75-125			D

Recovery limits for target analytes in MS/MSD QC samples are advisory only.



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Wet Chemistry - Quality Control

Batch BFF0843 - PSEP 1986

Instrument: UV1800-2 Analyst: GM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Blank (BFF0843-BLK1) Prepared: 29-Jun-2017 Analyzed: 30-Jun-2017 11:22									
Sulfide	ND	1.00	mg/kg						U
LCS (BFF0843-BS1) Prepared: 29-Jun-2017 Analyzed: 30-Jun-2017 11:24									
Sulfide	154	10.0	mg/kg	150		103 75-125			D
Duplicate (BFF0843-DUP1) Source: 17F0434-01 Prepared: 29-Jun-2017 Analyzed: 30-Jun-2017 11:26									
Sulfide	ND	1.13	mg/kg		ND				U
Matrix Spike (BFF0843-MS1) Source: 17F0434-01 Prepared: 29-Jun-2017 Analyzed: 30-Jun-2017 11:26									
Sulfide	142	11.1	mg/kg	164	ND	86.9 75-125			D

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Wet Chemistry - Quality Control

Batch BFG0041 - No Prep Wet Chem

Instrument: APOLLO1 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFG0041-BLK1)		Prepared: 05-Jul-2017 Analyzed: 13-Jul-2017 13:53								
Total Organic Carbon	ND	0.02	%							U
Total Solids	ND	0.04	%							U
Duplicate (BFG0041-DUP1)		Source: 17F0434-01RE1		Prepared: 05-Jul-2017 Analyzed: 17-Jul-2017 11:55						
Total Organic Carbon	0.04	0.02	%		0.04			4.88	20	
Total Solids	84.47	0.04	%		83.62			1.01	20	
Duplicate (BFG0041-DUP2)		Source: 17F0434-01RE1		Prepared: 05-Jul-2017 Analyzed: 17-Jul-2017 12:04						
Total Organic Carbon	0.04	0.02	%		0.04			15.30	20	
Total Solids	83.66	0.04	%		83.62			0.04	20	
Matrix Spike (BFG0041-MS3)		Source: 17F0434-01RE1		Prepared: 05-Jul-2017 Analyzed: 17-Jul-2017 12:34						
Total Organic Carbon	1.39	0.02	%	1.85	0.04	72.8	75-125			*
Recovery limits for target analytes in MS/MSD QC samples are advisory only.										
Reference (BFG0041-SRM1)		Prepared: 05-Jul-2017 Analyzed: 13-Jul-2017 14:07								
Total Organic Carbon	2.01	0.02	%	2.45		82.3	75-125			



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Wet Chemistry - Quality Control

Batch BFG0152 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: RMH2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFG0152-BLK1) Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 14:19										
Total Phosphorus	ND	0.0160	mg-P/kg							U
Blank (BFG0152-BLK2) Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 15:18										
Total Phosphorus	ND	0.0160	mg-P/kg							U
Blank (BFG0152-BLK3) Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 15:35										
Total Phosphorus	ND	0.0160	mg-P/kg							U
Blank (BFG0152-BLK4) Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 16:47										
Total Phosphorus	ND	0.0160	mg-P/kg							U
DL (BFG0152-BLK5) Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 16:51										
Total Phosphorus	ND	0.0160	mg-P/kg							U
LCS (BFG0152-BS1) Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 14:20										
Total Phosphorus	0.296	0.0160	mg-P/kg	0.300		98.7	90-110			
DL (BFG0152-BS2) Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 15:18										
Total Phosphorus	0.304	0.0160	mg-P/kg	0.300		101	90-110			
LCS (BFG0152-BS3) Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 15:35										
Total Phosphorus	0.310	0.0160	mg-P/kg	0.300		103	90-110			
LCS (BFG0152-BS4) Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 16:48										
Total Phosphorus	0.304	0.0160	mg-P/kg	0.300		101	90-110			
DL (BFG0152-BS5) Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 16:52										
Total Phosphorus	0.306	0.0160	mg-P/kg	0.300		102	90-110			
Duplicate (BFG0152-DUP1) Source: 17F0434-01 Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 14:54										
Total Phosphorus	286	30.1	mg-P/kg		465			47.80	20	*, D
LCS (BFG0152-DUP2) Source: 17F0434-01RE1 Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 15:24										
Total Phosphorus	271	30.1	mg-P/kg		257			5.26	20	D
Matrix Spike (BFG0152-MS1) Source: 17F0434-01 Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 14:54										
Total Phosphorus	322	31.4	mg-P/kg	19.6	465	NR	75-125			HC, D



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Wet Chemistry - Quality Control

Batch BFG0152 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: RMH2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

MRL Check (BFG0152-MS2) Source: 17F0434-01RE1 Prepared: 13-Jul-2017 Analyzed: 14-Jul-2017 15:24

Total Phosphorus	314	31.4	mg-P/kg	19.6	257	293	75-125			HC, D

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Certified Analyses included in this Report

Analyte	Certifications
EPA 6010C in Solid	
Silver	NELAP,WADOE,DoD-ELAP
Arsenic	NELAP,WADOE,DoD-ELAP,ADEC
Beryllium	NELAP,WADOE,DoD-ELAP
Cadmium	NELAP,WADOE,DoD-ELAP,ADEC
Chromium	NELAP,WADOE,DoD-ELAP,ADEC
Copper	NELAP,WADOE,DoD-ELAP
Nickel	NELAP,WADOE,DoD-ELAP,ADEC
Lead	NELAP,WADOE,DoD-ELAP,ADEC
Antimony	NELAP,WADOE,DoD-ELAP
Selenium	NELAP,WADOE,DoD-ELAP
Thallium	NELAP,WADOE,DoD-ELAP
Zinc	NELAP,WADOE,DoD-ELAP
EPA 7471B in Solid	
Mercury	WADOE,NELAP,DoD-ELAP,CALAP
EPA 8081B in Solid	
alpha-BHC	DoD-ELAP,NELAP,CALAP,WADOE
alpha-BHC [2C]	DoD-ELAP,NELAP,CALAP,WADOE
beta-BHC	DoD-ELAP,NELAP,CALAP,WADOE
beta-BHC [2C]	DoD-ELAP,NELAP,CALAP,WADOE
gamma-BHC (Lindane)	DoD-ELAP,NELAP,CALAP,WADOE
gamma-BHC (Lindane) [2C]	DoD-ELAP,NELAP,CALAP,WADOE
delta-BHC	DoD-ELAP,NELAP,CALAP,WADOE
delta-BHC [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Heptachlor	DoD-ELAP,NELAP,CALAP,WADOE
Heptachlor [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Aldrin	DoD-ELAP,NELAP,CALAP,WADOE
Aldrin [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Heptachlor Epoxide	DoD-ELAP,NELAP,CALAP,WADOE
Heptachlor Epoxide [2C]	DoD-ELAP,NELAP,CALAP,WADOE
trans-Chlordane (beta-Chlordane)	DoD-ELAP,NELAP,CALAP
trans-Chlordane (beta-Chlordane) [2C]	DoD-ELAP,NELAP,CALAP
cis-Chlordane (alpha-chlordane)	DoD-ELAP,NELAP,CALAP,WADOE
cis-Chlordane (alpha-chlordane) [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Endosulfan I	DoD-ELAP,NELAP,CALAP,WADOE
Endosulfan I [2C]	DoD-ELAP,NELAP,CALAP,WADOE



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4,4'-DDE	DoD-ELAP,NELAP,CALAP,WADOE
4,4'-DDE [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Dieldrin	DoD-ELAP,NELAP,CALAP,WADOE
Dieldrin [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Endrin	DoD-ELAP,NELAP,CALAP,WADOE
Endrin [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Endosulfan II	DoD-ELAP,NELAP,CALAP,WADOE
Endosulfan II [2C]	DoD-ELAP,NELAP,CALAP,WADOE
4,4'-DDD	DoD-ELAP,NELAP,CALAP,WADOE
4,4'-DDD [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Endrin Aldehyde	DoD-ELAP,NELAP,CALAP,WADOE
Endrin Aldehyde [2C]	DoD-ELAP,NELAP,CALAP,WADOE
4,4'-DDT	DoD-ELAP,NELAP,CALAP,WADOE
4,4'-DDT [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Endosulfan Sulfate	DoD-ELAP,NELAP,CALAP,WADOE
Endosulfan Sulfate [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Endrin Ketone	DoD-ELAP,NELAP,CALAP,WADOE
Endrin Ketone [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Methoxychlor	DoD-ELAP,NELAP,CALAP,WADOE
Methoxychlor [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Hexachlorobutadiene	DoD-ELAP,NELAP,CALAP,WADOE
Hexachlorobutadiene [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Hexachlorobenzene	DoD-ELAP,NELAP,CALAP,WADOE
Hexachlorobenzene [2C]	DoD-ELAP,NELAP,CALAP,WADOE
2,4'-DDE	DoD-ELAP,NELAP,CALAP,WADOE
2,4'-DDE [2C]	DoD-ELAP,NELAP,CALAP,WADOE
2,4'-DDD	DoD-ELAP,NELAP,CALAP,WADOE
2,4'-DDD [2C]	DoD-ELAP,NELAP,CALAP,WADOE
2,4'-DDT	DoD-ELAP,NELAP,CALAP,WADOE
2,4'-DDT [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Oxychlorane	DoD-ELAP,NELAP,CALAP,WADOE
Oxychlorane [2C]	DoD-ELAP,NELAP,CALAP,WADOE
cis-Nonachlor	DoD-ELAP,NELAP,CALAP,WADOE
cis-Nonachlor [2C]	DoD-ELAP,NELAP,CALAP,WADOE
trans-Nonachlor	DoD-ELAP,NELAP,CALAP,WADOE
trans-Nonachlor [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Mirex	DoD-ELAP,NELAP,CALAP,WADOE
Mirex [2C]	DoD-ELAP,NELAP,CALAP,WADOE
Hexachloroethane	DoD-ELAP,NELAP,CALAP,WADOE
Hexachloroethane [2C]	DoD-ELAP,NELAP,CALAP,WADOE



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Toxaphene	DoD-ELAP,NELAP,WADOE
Toxaphene [2C]	DoD-ELAP,NELAP,WADOE
Chlordane, technical	DoD-ELAP,NELAP,WADOE
Chlordane, technical [2C]	DoD-ELAP,NELAP,WADOE

EPA 8082A in Solid

Aroclor 1016	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1016 [2C]	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1221	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1221 [2C]	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1232	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1232 [2C]	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1242	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1242 [2C]	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1248	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1248 [2C]	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1254	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1254 [2C]	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1260	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1260 [2C]	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1262	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1262 [2C]	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1268	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Aroclor 1268 [2C]	WADOE,DoD-ELAP,NELAP,CALAP,ADEC

EPA 8260C in Solid

Chloromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Vinyl Chloride	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Bromomethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Chloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Trichlorofluoromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Acrolein	WADOE,DoD-ELAP,NELAP,CALAP
1,1,2-Trichloro-1,2,2-Trifluoroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Acetone	WADOE,DoD-ELAP,NELAP,CALAP
1,1-Dichloroethene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Bromoethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Iodomethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Methylene Chloride	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Acrylonitrile	WADOE,DoD-ELAP,NELAP,CALAP
Carbon Disulfide	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
trans-1,2-Dichloroethene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC



Shannon & Wilson, Inc
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Vinyl Acetate	WADOE,DoD-ELAP,NELAP,CALAP
1,1-Dichloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
2-Butanone	WADOE,DoD-ELAP,NELAP,CALAP
2,2-Dichloropropane	WADOE,DoD-ELAP,NELAP,CALAP
cis-1,2-Dichloroethene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Chloroform	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Bromochloromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,1,1-Trichloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,1-Dichloropropene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Carbon tetrachloride	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2-Dichloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Benzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Trichloroethene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2-Dichloropropane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Bromodichloromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Dibromomethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
2-Chloroethyl vinyl ether	WADOE,DoD-ELAP,NELAP
4-Methyl-2-Pentanone	WADOE,DoD-ELAP,NELAP,CALAP
cis-1,3-Dichloropropene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Toluene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
trans-1,3-Dichloropropene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
2-Hexanone	WADOE,DoD-ELAP,NELAP,CALAP
1,1,2-Trichloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,3-Dichloropropane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Tetrachloroethene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Dibromochloromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2-Dibromoethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Chlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Ethylbenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,1,1,2-Tetrachloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
m,p-Xylene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
o-Xylene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Xylenes, total	WADOE
Styrene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Bromoform	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,1,2,2-Tetrachloroethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2,3-Trichloropropane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
trans-1,4-Dichloro 2-Butene	WADOE,DoD-ELAP,NELAP
n-Propylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
Bromobenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC



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Isopropyl Benzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
2-Chlorotoluene	WADOE,DoD-ELAP,NELAP,CALAP
4-Chlorotoluene	WADOE,DoD-ELAP,NELAP,CALAP
t-Butylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,3,5-Trimethylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,2,4-Trimethylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
s-Butylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
4-Isopropyl Toluene	WADOE,DoD-ELAP,NELAP,CALAP
1,3-Dichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,4-Dichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP
n-Butylbenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,2-Dichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP
1,2-Dibromo-3-chloropropane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
1,2,4-Trichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Hexachloro-1,3-Butadiene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Naphthalene	WADOE,DoD-ELAP,NELAP,CALAP
1,2,3-Trichlorobenzene	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Dichlorodifluoromethane	WADOE,DoD-ELAP,NELAP,CALAP,ADEC
Methyl tert-butyl Ether	WADOE,DoD-ELAP,NELAP,CALAP
n-Hexane	WADOE
2-Pentanone	WADOE
Dibromofluoromethane	WADOE
4-Bromofluorobenzene	WADOE

EPA 8260C in Water

Chloromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Vinyl Chloride	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Bromomethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Chloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Trichlorofluoromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Acrolein	DoD-ELAP,NELAP,CALAP,WADOE
1,1,2-Trichloro-1,2,2-Trifluoroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Acetone	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,1-Dichloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Bromoethane	DoD-ELAP,NELAP,CALAP,WADOE
Iodomethane	DoD-ELAP,NELAP,CALAP,WADOE
Methylene Chloride	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Acrylonitrile	DoD-ELAP,NELAP,CALAP,WADOE
Carbon Disulfide	DoD-ELAP,NELAP,CALAP,WADOE
trans-1,2-Dichloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE



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Vinyl Acetate	DoD-ELAP,NELAP,CALAP,WADOE
1,1-Dichloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
2-Butanone	DoD-ELAP,NELAP,CALAP,WADOE
2,2-Dichloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
cis-1,2-Dichloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Chloroform	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Bromochloromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,1,1-Trichloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,1-Dichloropropene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Carbon tetrachloride	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2-Dichloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Benzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Trichloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2-Dichloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Bromodichloromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Dibromomethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
2-Chloroethyl vinyl ether	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
4-Methyl-2-Pentanone	DoD-ELAP,NELAP,CALAP,WADOE
cis-1,3-Dichloropropene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Toluene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
trans-1,3-Dichloropropene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
2-Hexanone	DoD-ELAP,NELAP,CALAP,WADOE
1,1,2-Trichloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,3-Dichloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Tetrachloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Dibromochloromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2-Dibromoethane	DoD-ELAP,NELAP,CALAP,WADOE
Chlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Ethylbenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,1,1,2-Tetrachloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
m,p-Xylene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
o-Xylene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Styrene	DoD-ELAP,NELAP,CALAP,WADOE
Bromoform	DoD-ELAP,NELAP,CALAP,WADOE
1,1,2,2-Tetrachloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2,3-Trichloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
trans-1,4-Dichloro 2-Butene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
n-Propylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
Bromobenzene	DoD-ELAP,NELAP,CALAP,WADOE
Isopropyl Benzene	DoD-ELAP,NELAP,CALAP,WADOE



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2-Chlorotoluene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
4-Chlorotoluene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
t-Butylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
1,3,5-Trimethylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
1,2,4-Trimethylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
s-Butylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
4-Isopropyl Toluene	DoD-ELAP,NELAP,CALAP,WADOE
1,3-Dichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,4-Dichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
n-Butylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
1,2-Dichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2-Dibromo-3-chloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2,4-Trichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Hexachloro-1,3-Butadiene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Naphthalene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2,3-Trichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Dichlorodifluoromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Methyl tert-butyl Ether	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
n-Hexane	WADOE
2-Pentanone	WADOE

EPA 8270D in Solid

Phenol	DoD-ELAP,CALAP,WADOE,NELAP
bis(2-chloroethyl) ether	DoD-ELAP,CALAP,WADOE,NELAP
2-Chlorophenol	DoD-ELAP,CALAP,WADOE,NELAP
1,3-Dichlorobenzene	DoD-ELAP,CALAP,WADOE,NELAP
1,4-Dichlorobenzene	DoD-ELAP,CALAP,WADOE,NELAP
1,2-Dichlorobenzene	DoD-ELAP,CALAP,WADOE,NELAP
Benzyl Alcohol	DoD-ELAP,CALAP,WADOE,NELAP
2,2'-Oxybis(1-chloropropane)	DoD-ELAP,NELAP
2-Methylphenol	DoD-ELAP,CALAP,WADOE,NELAP
Hexachloroethane	DoD-ELAP,CALAP,WADOE,NELAP
N-Nitroso-di-n-Propylamine	DoD-ELAP,CALAP,WADOE,NELAP
4-Methylphenol	DoD-ELAP,CALAP,WADOE,NELAP
Nitrobenzene	DoD-ELAP,CALAP,WADOE,NELAP
Isophorone	DoD-ELAP,CALAP,WADOE,NELAP
2-Nitrophenol	DoD-ELAP,CALAP,WADOE,NELAP
2,4-Dimethylphenol	DoD-ELAP,CALAP,WADOE,NELAP
Bis(2-Chloroethoxy)methane	DoD-ELAP,CALAP,WADOE,NELAP
2,4-Dichlorophenol	DoD-ELAP,CALAP,WADOE,NELAP



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1,2,4-Trichlorobenzene	DoD-ELAP,CALAP,WADOE,NELAP
Naphthalene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
Benzoic acid	DoD-ELAP,CALAP,WADOE,NELAP
4-Chloroaniline	DoD-ELAP,CALAP,WADOE,NELAP
Hexachlorobutadiene	DoD-ELAP,CALAP,WADOE,NELAP
4-Chloro-3-Methylphenol	DoD-ELAP,CALAP,WADOE,NELAP
2-Methylnaphthalene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
Hexachlorocyclopentadiene	DoD-ELAP,CALAP,WADOE,NELAP
2,4,6-Trichlorophenol	DoD-ELAP,CALAP,WADOE,NELAP
2,4,5-Trichlorophenol	DoD-ELAP,CALAP,WADOE,NELAP
2-Chloronaphthalene	DoD-ELAP,CALAP,WADOE,NELAP
2-Nitroaniline	DoD-ELAP,CALAP,WADOE,NELAP
Acenaphthylene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
Dimethylphthalate	DoD-ELAP,CALAP,WADOE,NELAP
2,6-Dinitrotoluene	DoD-ELAP,CALAP,WADOE,NELAP
Acenaphthene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
3-Nitroaniline	DoD-ELAP,CALAP,WADOE,NELAP
2,4-Dinitrophenol	DoD-ELAP,CALAP,WADOE,NELAP
Dibenzofuran	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
4-Nitrophenol	DoD-ELAP,CALAP,WADOE,NELAP
2,4-Dinitrotoluene	DoD-ELAP,CALAP,WADOE,NELAP
Fluorene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
4-Chlorophenylphenyl ether	DoD-ELAP,CALAP,NELAP
Diethyl phthalate	DoD-ELAP,CALAP,WADOE,NELAP
4-Nitroaniline	DoD-ELAP,CALAP,WADOE,NELAP
4,6-Dinitro-2-methylphenol	DoD-ELAP,CALAP,WADOE,NELAP
N-Nitrosodiphenylamine	DoD-ELAP,WADOE,NELAP
4-Bromophenyl phenyl ether	DoD-ELAP,CALAP,WADOE,NELAP
Hexachlorobenzene	DoD-ELAP,CALAP,WADOE,NELAP
Pentachlorophenol	DoD-ELAP,CALAP,WADOE,NELAP
Phenanthrene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
Anthracene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
Carbazole	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
Di-n-Butylphthalate	DoD-ELAP,CALAP,WADOE,NELAP
Fluoranthene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
Pyrene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
Butylbenzylphthalate	DoD-ELAP,CALAP,WADOE,NELAP
Benzo(a)anthracene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
3,3'-Dichlorobenzidine	DoD-ELAP,WADOE,NELAP
Chrysene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP



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bis(2-Ethylhexyl)phthalate	DoD-ELAP,CALAP,WADOE,NELAP
Di-n-Octylphthalate	DoD-ELAP,CALAP,WADOE,NELAP
Benzo(b)fluoranthene	DoD-ELAP,WADOE,ADEC,NELAP
Benzo(k)fluoranthene	DoD-ELAP,WADOE,ADEC,NELAP
Benzofluoranthenes, Total	CALAP,WADOE,ADEC
Benzo(a)pyrene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
Indeno(1,2,3-cd)pyrene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
Dibenzo(a,h)anthracene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
Benzo(g,h,i)perylene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
N-Nitrosodimethylamine	DoD-ELAP,CALAP,WADOE,NELAP
Aniline	DoD-ELAP,CALAP,WADOE,NELAP
Retene	DoD-ELAP,CALAP,WADOE,NELAP
Pyridine	DoD-ELAP,CALAP,WADOE,NELAP
1-Methylnaphthalene	DoD-ELAP,CALAP,WADOE,ADEC,NELAP
Azobenzene (1,2-DP-Hydrazine)	DoD-ELAP,CALAP,WADOE,NELAP
2,3,4,6-Tetrachlorophenol	DoD-ELAP,WADOE
Benzidine	DoD-ELAP,NELAP
Tetrachloroguaiacol	DoD-ELAP,WADOE
3,4,5-Trichloroguaiacol	DoD-ELAP,WADOE
3,4,6-Trichloroguaiacol	DoD-ELAP,WADOE
4,5,6-Trichloroguaiacol	DoD-ELAP,WADOE
Guaiacol	DoD-ELAP,WADOE

EPA 8270D-SIM in Solid

Tributyltin Ion	WADOE,DoD-ELAP
Dibutyltin Ion	WADOE,DoD-ELAP
Butyltin Ion	WADOE
Naphthalene	ADEC,DoD-ELAP,NELAP,WADOE
2-Methylnaphthalene	ADEC,DoD-ELAP,NELAP
1-Methylnaphthalene	ADEC,DoD-ELAP,NELAP,WADOE
Biphenyl	ADEC,DoD-ELAP,NELAP
2,6-Dimethylnaphthalene	ADEC,WADOE
Acenaphthylene	ADEC,DoD-ELAP,NELAP,WADOE
Acenaphthene	ADEC,DoD-ELAP,NELAP,WADOE
Dibenzofuran	ADEC,DoD-ELAP,NELAP
Fluorene	ADEC,DoD-ELAP,NELAP,WADOE
Phenanthrene	ADEC,DoD-ELAP,NELAP,WADOE
Anthracene	ADEC,DoD-ELAP,NELAP,WADOE
Carbazole	ADEC,DoD-ELAP,NELAP
1-Methylphenanthrene	ADEC



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Fluoranthene	ADEC, DoD-ELAP, NELAP, WADOE
Pyrene	ADEC, DoD-ELAP, NELAP, WADOE
Benzo(a)anthracene	ADEC, DoD-ELAP, NELAP, WADOE
Chrysene	ADEC, DoD-ELAP, NELAP, WADOE
Benzo(b)fluoranthene	ADEC, DoD-ELAP, NELAP, WADOE
Benzo(k)fluoranthene	ADEC, DoD-ELAP, NELAP, WADOE
Benzo(j)fluoranthene	ADEC, DoD-ELAP, NELAP, WADOE
Benzo(e)pyrene	ADEC, NELAP
Benzo(a)pyrene	ADEC, DoD-ELAP, NELAP, WADOE
Perylene	ADEC, NELAP
Indeno(1,2,3-cd)pyrene	ADEC, DoD-ELAP, NELAP, WADOE
Dibenzo(a,h)anthracene	ADEC, DoD-ELAP
Benzo(g,h,i)perylene	ADEC, DoD-ELAP, NELAP, WADOE

NWTPH-Dx in Solid

Diesel Range Organics (C12-C24)	DoD-ELAP, NELAP, WADOE
Diesel Range Organics (C10-C25)	DoD-ELAP, NELAP, WADOE
Diesel Range Organics (Tol-C18)	DoD-ELAP, NELAP, WADOE
Diesel Range Organics (C10-24)	DoD-ELAP, NELAP, WADOE
Diesel Range Organics (C10-C28)	DoD-ELAP, NELAP, WADOE
Motor Oil Range Organics (C24-C38)	DoD-ELAP, NELAP, WADOE
Motor Oil Range Organics (C25-C36)	DoD-ELAP, NELAP, WADOE
Motor Oil Range Organics (C24-C40)	DoD-ELAP, NELAP, WADOE
Mineral Oil Range Organics (C16-C28)	DoD-ELAP, NELAP, WADOE
Mineral Spirits Range Organics (Tol-C12)	DoD-ELAP, NELAP, WADOE
JP8 Range Organics (C8-C18)	DoD-ELAP, NELAP, WADOE
JP5 Range Organics (C10-C16)	DoD-ELAP, NELAP, WADOE
JP4 Range Organics (Tol-C14)	DoD-ELAP, NELAP, WADOE
Jet-A Range Organics (C10-C18)	DoD-ELAP, NELAP, WADOE
Kerosene Range Organics (Tol-C18)	DoD-ELAP, NELAP, WADOE
Stoddard Range Organics (C8-C12)	DoD-ELAP, NELAP, WADOE
Creosote Range Organics (C12-C22)	DoD-ELAP, NELAP, WADOE
Bunker C Range Organics (C10-C38)	DoD-ELAP, NELAP, WADOE
Transformer Oil Range Organics (C12-C28)	DoD-ELAP, NELAP, WADOE

Plumb 1981, Combustion IR in Solid

Total Organic Carbon	DoD-ELAP

SM 4500-NH₃ H-97 in Solid

Ammonia-N	WADOE, NELAP

SM 4500-NO₃⁻ I-00 in Solid



Shannon & Wilson, Inc
400 N 34th St., Suite 100
Seattle WA, 98103-8636

Project: Willow Creek Daylight
Project Number: Willow Creek Daylight
Project Manager: Christopher Helland

Reported:
28-Jul-2017 15:26

Nitrate + Nitrite as N

DoD-ELAP,WADOE,NELAP

SM 4500-P E-99 in Solid

Total Phosphorus

WADOE,NELAP

SM 4500-S2 D-00 in Solid

Sulfide

DoD-ELAP,NELAP,WADOE

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	09/01/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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Reported:
28-Jul-2017 15:26

Notes and Definitions

Y1	Raised reporting limit due to interference
U	This analyte is not detected above the applicable reporting or detection limit.
Q	Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20% RSD, <20% drift or minimum RRF)
P1	The reported value is greater than 40% difference between the concentrations determined on two GC columns where applicable.
NRS	This surrogate not reported due to chromatographic interference
M	Estimated value for a GC/MS analyte detected and confirmed by an analyst but with low spectral match parameters.
J	Estimated concentration value detected below the reporting limit.
HC	The natural concentration of the spiked analyte is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
H	Hold time violation - Hold time was exceeded.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL)
D	The reported value is from a dilution
B	This analyte was detected in the method blank.
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

**Analysis of biological samples:
Technical summary of methods and quality assurance procedures
Prepared for Shannon & Wilson, Inc.
Dave Cline, Project Manager
February 6, 2018**



by
W. Bollman, Chief Biologist
Rhithron Associates, Inc.
Missoula, Montana

METHODS

Sample processing

Seven macroinvertebrate and 7 periphyton samples collected for the Willow Creek Daylight Project (SW project 21-1-12588) were delivered to Rhithron's laboratory facility in Missoula, Montana on October 9, 2017. All samples arrived in good condition. A chain of custody document containing sample identification information was provided by the Shannon & Wilson (SW) Project Manager. Upon arrival, samples were unpacked and examined, and checked against the SW chain of custody. An inventory spreadsheet was created and uploaded into the Rhithron database prior to sample processing.

Macroinvertebrates

Standard sorting protocols (Plotnikoff and Wiseman 2001) were applied in an attempt to achieve representative subsamples of a minimum of 500 organisms. Caton sub-sampling devices (Caton 1991), divided into 30 grids, each approximately 6 cm by 6 cm were used. Each individual sample was thoroughly mixed in its jar(s), poured out and evenly spread into the Caton tray, and individual grids were randomly selected. The contents of each grid were examined under stereoscopic microscopes using 10x-30x magnification. All aquatic invertebrates from each selected grid were sorted from the substrate, and placed in 80% ethanol for subsequent identification. Grid selection, examination, and sorting continued until at least 500 organisms were sorted or until the entire sample was processed. The final grid was completely sorted of all organisms, and the number of grids sorted was recorded.

After the target number of organisms was obtained in the subsample, an intensive search for New Zealand mudsnails was performed. No specimens of New Zealand mudsnails were found in any sample. All unsorted sample fractions were re-preserved and archived at the Rhithron laboratory.

Organisms were individually examined by certified taxonomists, using 10x – 80x stereoscopic dissecting scopes (Leica S8E) and identified to target taxonomic levels consistent with B-IBI for Puget Sound Lowlands streams protocols (Karr and Chu 1999), using appropriate published taxonomic references and keys.

Chironomids were carefully morphotyped using 10x – 80x stereoscopic dissecting microscopes (Leica S8E) and representative specimens were slide mounted and examined at 200x – 1000x magnification using an Olympus BX 51 or Leica DM 1000 compound microscope. Slide mounted organisms were archived at the Rhithron laboratory.

Identification, counts, life stages, and information about the condition of specimens were recorded on electronic bench sheets. Organisms that could not be identified to the taxonomic targets because of immaturity, poor condition, or lack of complete current regionally-applicable published keys were left at appropriate taxonomic levels that were coarser than those specified. To obtain accuracy in richness measures, these organisms were designated as “not unique” if other specimens from the same group could be taken to target levels. Organisms designated as “unique” were those that could be definitively distinguished from other organisms in the sample.

Identified organisms were preserved in 80% ethanol in labeled vials, and archived at the Rhithron laboratory.

Periphyton

The periphyton samples were preserved with Lugol's solution, and initial sample volumes were measured and recorded. The samples were thoroughly mixed by shaking, and split into 2 aliquots for diatom and soft-bodied algae analyses.

Permanent diatom slides were prepared: subsamples were taken and treated with 70% Nitric acid (HNO₃) and digested using a closed-vessel microwave digestion system (Milestone Ethos EZ), following the method developed by the Academy of Natural Sciences, Philadelphia (ANSP 2002). The samples were neutralized by rinses with distilled water, and subsample volumes were adjusted to obtain adequate densities for slide mounts. Dilution and concentration factors, as appropriate, were recorded for each sample. Subsamples were dried onto 22-mm square coverslips. Coverslips were mounted on slides using Naphrax diatom mount. To ensure a high quality mount for identification and to make replicates available for archives, 2 slide mounts were made from each sample. One of the replicates was selected from each sample batch for identification. A diamond scribe mark was made to define a transect line on the cover slip, and a minimum of 600 diatom valves were identified along the transect mark. A Leica DM 2500 compound microscope, Nomarski contrast, and 1000x magnification were used for identifications. Diatoms were identified to the lowest possible taxonomic level, generally species, following standard taxonomic references.

For soft-bodied algae samples, the raw periphyton sample was manually homogenized and emptied into a porcelain evaporating dish. A small, random sub-sample of algal material was pipetted into a standard Palmer-Maloney counting chamber using a disposable Pasteur pipette. Visible (macroscopic) algae were also sub-sampled, in proportion to their estimated abundance relative to the total volume of algal material in the sample, and added to the liquid fraction on the slide. The Palmer-Maloney cell was then covered with a 22 x 30 mm coverslip.

Soft-bodied algae were identified to genus using a Leica DM 2500 compound microscope under 200X and 400X magnification, following standard taxonomic references. Three hundred cells or natural units of algae were identified, when possible. Living diatom cells were included in these counts. (Including these cells will allow for the calculation of diatom species abundance.)

Quality control procedures

Quality control procedures for initial sample processing and subsampling involved checking sorting efficiency. These checks were conducted on a random selection of 10% of the samples by independent observers who microscopically re-examined 100% of sorted substrate from each sample. Quality control procedures for each sample proceeded as follows:

The quality control technician poured the sorted substrate from a processed sample out into a Caton tray, redistributing the substrate so that it could be accurately lifted out by removing entire grids in a random fashion. Grids were selected, and re-examined until all of the substrate was re-sorted. All organisms that were missed were counted and this number was added to the total number obtained in the original sort. Sorting efficiency was evaluated by applying the following calculation:

$$SE = \frac{n_1}{n_1 + n_2} \times 100$$

where: SE is the sorting efficiency, expressed as a percentage, n_1 is the total number of specimens in the first sort, and n_2 is the total number of specimens in the second sort.

Quality control procedures for taxonomic determinations of invertebrates involved checking accuracy, precision and enumeration. One sample was randomly selected and all organisms re-identified and counted by an independent taxonomist. Taxa lists and enumerations were compared by calculating a Bray-Curtis similarity statistic (Bray and Curtis 1957), Percent Taxonomic Disagreement (PTD) and Percent Difference in Enumeration (PDE). Routinely,

discrepancies between the original identifications and the QC identifications are discussed among the taxonomists, and necessary rectifications to the data are made. Discrepancies that cannot be rectified by discussions are routinely sent out to taxonomic specialists for identification.

Data analysis

Taxa and counts for each sample were entered into Rhithron's customized laboratory information management system (LIMS). Standard metric calculations for aquatic invertebrate and periphyton assemblages were made using Rhithron's customized LIMS. Metric calculations and scoring for the B-IBI for Puget Sound Lowlands streams (Karr and Chu 1999) were also performed for the invertebrate samples. A sites-by-taxa and sites-by-metrics data matrix was compiled in Microsoft Excel. Diatom and non-diatom algae identifications were also compiled in Microsoft Excel.

RESULTS

Quality Control Procedures

Results of quality control procedures for subsampling and taxonomy are given in Table 1. Sorting efficiency was 97.40% for the randomly selected sort QC sample. Taxonomic precision for identification and enumeration measured by the Bray-Curtis index was 99.44%, PTD was 1.10% and PDE was 0.56% for the randomly selected taxonomy QC sample, and data entry efficiency averaged 100% for the project. These similarity statistics fall within acceptable industry criteria (Stribling et al. 2003).

Data analysis

Taxa lists and counts, and values and scores for various standard bioassessment metrics and indices calculated by Rhithron are given in the Appendix.

Electronic spreadsheets were provided to the SW Project Manager via e-mail.

REFERENCES

ANSP. 2002. Protocols for the analysis of algal samples collected as part of the U.S. Geological Survey National Water-Quality Assessment Program. The Academy of Natural Sciences Patrick Center for Environmental Research: Report No. 02-06. May 2002.

Bray, J. R. and J. T. Curtis. 1957. An ordination of upland forest communities of southern Wisconsin. *Ecological Monographs* 27: 325-349.

Caton, L. W. 1991. Improving subsampling methods for the EPA's "Rapid Bioassessment" benthic protocols. *Bulletin of the North American Benthological Society*. 8(3): 317-319.

Karr, J. R. and E. W. Chu. 1999. *Restoring Life in Running Waters*. Island Press.

Plotnikoff, R. and C. Wiseman. 2001. Benthic Macroinvertebrate Biological Monitoring Protocols for Rivers and Streams: 2001 Revision. Washington Department of Ecology. Olympia.

Stribling, J.B., S.R Moulton II and G.T. Lester. 2003. Determining the quality of taxonomic data. *J.N. Am. Benthol. Soc.* 22(4): 621-631.

Table 1. *Results of quality control procedures for invertebrate subsampling and taxonomy.*
Willow Creek Daylight Project 2017.

RAI Sample ID	Station Name	Station ID	Sorting efficiency	Bray-Curtis similarity for taxonomy and enumeration	Percent Taxonomic Disagreement (PTD)	Percent Difference in Enumeration (PDE)
SW17CHM001	Puget Sound	WC-01	97.40%			
SW17CHM002	Lower Willow Creek	WC-02				
SW17CHM003	Willow Creek Marsh	WC-03		99.44%	1.10%	0.56%
SW17CHM004	Willow Creek Marsh	WC-04				
SW17CHM005	Willow Creek Marsh	WC-05				
SW17CHM006	Upper Willow Creek	WC-06				
SW17CHM007	Upper Shellebarger Creek	WC-07				

APPENDIX

**Invertebrate taxa lists and metric summaries
Periphyton taxa lists and metric summaries**

Willow Creek Daylight Project

2017

Taxa Listing

Project ID: SW17CHM
RAI No.: SW17CHM001

RAI No.: SW17CHM001

Sta. Name: Puget Sound

Client ID: WC-01

Date Coll.: 9/20/2017

No. Jars: 2

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Other Non-Insect							
Nemata							
Nemata	17	7.56%	Yes	Unknown		5	UN
Oligochaeta							
Oligochaeta	1	0.44%	Yes	Unknown		10	CG
Polychaeta							
Polychaeta	2	0.89%	Yes	Unknown	Damaged	11	UN
Bivalvia							
Bivalvia	64	28.44%	Yes	Immature		11	CF
Cardiidae							
Cardiidae	2	0.89%	Yes	Unknown		11	UN
Veneridae							
Veneridae	33	14.67%	Yes	Unknown		11	UN
Gastropoda							
Gastropoda	3	1.33%	Yes	Immature		7	SC
Amphipoda							
Amphipoda	12	5.33%	Yes	Unknown	Damaged	4	CG
Anisogammaridae							
<i>Anisogammarus</i> sp.	4	1.78%	Yes	Unknown		11	UN
Corophiidae							
<i>Monocorophium</i> sp.	6	2.67%	Yes	Unknown		11	UN
Caprellidae							
<i>Caprella</i> sp.	6	2.67%	Yes	Unknown		11	UN
Pleustidae							
Pleustidae	14	6.22%	Yes	Unknown	Damaged	11	UN
Phoxocephalidae							
Phoxocephalidae	28	12.44%	Yes	Unknown	Damaged	11	UN
Decapoda							
Decapoda	3	1.33%	Yes	Unknown	Damaged	6	SH
Isopoda							
Isopoda	5	2.22%	Yes	Unknown	Damaged	8	CG
Sphaeromatidae							
<i>Gnorimosphaeroma</i> sp.	4	1.78%	Yes	Unknown		11	UN
Cumacea							
Cumacea	12	5.33%	Yes	Unknown		11	UN
Leptocheliidae							
<i>Leptochelia</i> sp.	2	0.89%	Yes	Unknown		11	UN
Copepoda							
Copepoda	5	2.22%	Yes	Unknown		8	CG
Ostracoda							
Ostracoda	2	0.89%	Yes	Unknown		8	CG
Sample Count	225						

Taxa Listing

Project ID: SW17CHM
RAI No.: SW17CHM002

RAI No.: SW17CHM002

Sta. Name: Lower Willow Creek

Client ID: WC-02

Date Coll.: 9/20/2017

No. Jars: 2

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Oligochaeta							
Oligochaeta							
Oligochaeta	18	2.92%	Yes	Unknown		10	CG
Anisogammaridae							
Eogammarus sp.	82	13.31%	Yes	Unknown		11	UN
Decapoda							
Decapoda	3	0.49%	Yes	Unknown	Damaged	6	SH
Sphaeromatidae							
Gnorimosphaeroma sp.	2	0.32%	Yes	Unknown		11	UN
Copepoda							
Copepoda	4	0.65%	Yes	Unknown		8	CG
Ostracoda							
Ostracoda	501	81.33%	Yes	Unknown		8	CG
Diptera							
Ceratopogonidae							
Dasyhelea sp.	3	0.49%	Yes	Larva		11	CG
Chironomidae							
Chironominae							
Chironomus sp.	3	0.49%	Yes	Larva		10	CG
Sample Count	616						

Taxa Listing

Project ID: SW17CHM
RAI No.: SW17CHM003

RAI No.: SW17CHM003

Sta. Name: Willow Creek Marsh

Client ID: WC-03

Date Coll.: 9/20/2017

No. Jars: 2

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Oligochaeta							
Oligochaeta							
Oligochaeta	8	4.28%	Yes	Unknown		10	CG
Physidae							
Physidae	19	10.16%	Yes	Unknown		8	SC
Planorbidae							
Planorbidae	1	0.53%	Yes	Unknown	Damaged	6	SC
Diplostraca							
Cladocera	3	1.60%	Yes	Unknown		8	CF
Crangonyctidae							
<i>Crangonyx</i> sp.	47	25.13%	Yes	Unknown		6	CG
Copepoda							
Copepoda	21	11.23%	Yes	Unknown		8	CG
Diptera							
Ceratopogonidae							
Ceratopogoninae	3	1.60%	Yes	Larva		6	PR
Culicidae							
Culicidae	71	37.97%	Yes	Larva	Damaged	10	CG
Dixidae							
<i>Dixella</i> sp.	3	1.60%	Yes	Larva		4	CG
Chironomidae							
Chironominae							
<i>Chironomus</i> sp.	9	4.81%	Yes	Larva		10	CG
<i>Polypedilum</i> sp.	1	0.53%	Yes	Larva		6	SH
Tanypodinae							
<i>Procladius</i> sp.	1	0.53%	Yes	Larva		9	PR
Sample Count	187						

Taxa Listing

Project ID: SW17CHM
RAI No.: SW17CHM004

RAI No.: SW17CHM004

Sta. Name: Willow Creek Marsh

Client ID: WC-04

Date Coll.: 9/20/2017

No. Jars: 2

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Other Non-Insect							
Asellidae							
<i>Caecidotea</i> sp.	1	50.00%	Yes	Unknown		8	CG
Diptera							
Ceratopogonidae							
Ceratopogoninae	1	50.00%	Yes	Larva		6	PR
Sample Count	2						

Taxa Listing

Project ID: SW17CHM
RAI No.: SW17CHM005

RAI No.: SW17CHM005

Sta. Name: Willow Creek Marsh

Client ID: WC-05

Date Coll.: 9/20/2017

No. Jars: 2

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Other Non-Insect							
Erpobdellidae							
Erpobdellidae	10	32.26%	Yes	Unknown		8	PR
Oligochaeta							
Oligochaeta	1	3.23%	Yes	Unknown		10	CG
Sphaeriidae							
Sphaeriidae	8	25.81%	Yes	Unknown		8	CF
Plecoptera							
Nemouridae							
<i>Malenka</i> sp.	1	3.23%	Yes	Larva		1	SH
Chironomidae							
Chironominae							
<i>Polypedilum</i> sp.	6	19.35%	Yes	Larva		6	SH
Chironominae							
<i>Rheotanytarsus</i> sp.	1	3.23%	Yes	Larva		6	CF
Orthocladiinae							
<i>Parametriocnemus</i> sp.	1	3.23%	Yes	Larva		5	CG
Prodiamesinae							
<i>Prodiamesa</i> sp.	3	9.68%	Yes	Larva		3	CG
Sample Count	31						

Taxa Listing

Project ID: SW17CHM
RAI No.: SW17CHM006

RAI No.: SW17CHM006

Sta. Name: Upper Willow Creek

Client ID: WC-06

Date Coll.: 9/20/2017

No. Jars: 2

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Other Non-Insect							
Trepaxonemata							
Trepaxonemata	7	1.30%	Yes	Unknown		4	PR
Nemata							
Nemata	5	0.93%	Yes	Unknown		5	UN
Oligochaeta							
Oligochaeta	70	13.01%	Yes	Unknown		10	CG
Sphaeriidae							
Sphaeriidae	5	0.93%	Yes	Unknown		8	CF
Crangonyctidae							
<i>Crangonyx</i> sp.	203	37.73%	Yes	Unknown		6	CG
Acari							
Acari	1	0.19%	Yes	Unknown		5	PR
Ephemeroptera							
Baetidae							
Baetis tricaudatus complex	69	12.83%	Yes	Larva		5	CG
Heptageniidae							
<i>Cinygma</i> sp.	6	1.12%	Yes	Larva		0	SC
Plecoptera							
Chloroperlidae							
<i>Sweltsa</i> sp.	4	0.74%	Yes	Larva		0	PR
Nemouridae							
<i>Malenka</i> sp.	51	9.48%	Yes	Larva		1	SH
<i>Zapada cinctipes</i>	2	0.37%	Yes	Larva		3	SH
Trichoptera							
Hydropsychidae							
<i>Parapsyche</i> sp.	4	0.74%	Yes	Larva		0	PR
Diptera							
Dixidae							
<i>Dixa</i> sp.	4	0.74%	Yes	Larva		1	CG
Psychodidae							
Psychodidae	2	0.37%	Yes	Larva	Early Instar	4	CG
Simuliidae							
<i>Simulium</i> sp.	86	15.99%	Yes	Larva		6	CF
<i>Simulium</i> sp.	2	0.37%	No	Pupa		6	CF
Tipulidae							
<i>Dicranota</i> sp.	1	0.19%	Yes	Larva		3	PR
Chironomidae							
Chironominae							
<i>Micropsectra</i> sp.	2	0.37%	Yes	Larva		4	CG
Orthocladiinae							
<i>Brillia</i> sp.	10	1.86%	Yes	Larva		4	SH
<i>Parametriocnemus</i> sp.	3	0.56%	Yes	Larva		5	CG
<i>Tvetenia Bavarica</i> Gr.	1	0.19%	Yes	Larva		5	CG
Sample Count		538					

Tuesday, February 06, 2018

Taxa Listing

Project ID: SW17CHM
RAI No.: SW17CHM007

RAI No.: SW17CHM007

Sta. Name: Upper Shellebarger Creek

Client ID: WC-07

Date Coll.: 9/20/2017

No. Jars: 2

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Other Non-Insect							
Trepaxonemata							
Trepaxonemata	21	5.24%	Yes	Unknown		4	PR
Nemata							
Nemata	1	0.25%	Yes	Unknown		5	UN
Erpobdellidae							
Erpobdellidae	1	0.25%	Yes	Unknown		8	PR
Oligochaeta							
Oligochaeta	11	2.74%	Yes	Unknown		10	CG
Sphaeriidae							
Sphaeriidae	3	0.75%	Yes	Unknown		8	CF
Crangonyctidae							
<i>Crangonyx</i> sp.	44	10.97%	Yes	Unknown		6	CG
Acari							
Acari	2	0.50%	Yes	Unknown		5	PR
Ephemeroptera							
Baetidae							
Baetis tricaudatus complex	44	10.97%	Yes	Larva		5	CG
Leptohyphidae							
<i>Tricorythodes</i> sp.	1	0.25%	Yes	Larva		4	CG
Plecoptera							
Nemouridae							
<i>Malenka</i> sp.	29	7.23%	Yes	Larva		1	SH
Trichoptera							
Hydropsychidae							
<i>Parapsyche</i> sp.	1	0.25%	Yes	Larva		0	PR
Diptera							
Psychodidae							
Psychodidae	1	0.25%	Yes	Larva	Damaged	4	CG
Simuliidae							
<i>Simulium</i> sp.	19	4.74%	No	Pupa		6	CF
<i>Simulium</i> sp.	221	55.11%	Yes	Larva		6	CF
Chironomidae							
Orthocladiinae							
Eukiefferiella Claripennis Gr.	1	0.25%	Yes	Larva		8	CG
Tvetenia Bavarica Gr.	1	0.25%	Yes	Larva		5	CG
Sample Count	401						

Metrics Report

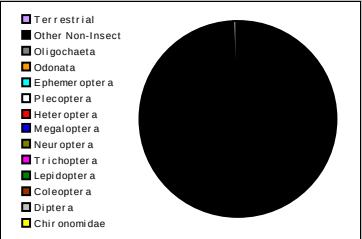
Project ID: SW17CHM
RAI No.: SW17CHM001
Sta. Name: Puget Sound
Client ID: WC-01
STORET ID
Coll. Date: 9/20/2017
Latitude: **Longitude:**

Abundance Measures

Sample Count: 225
Sample Abundance: 225.00 100.00% of sample used
Coll. Procedure:
Sample Notes: depth of 10cm 0% riparian cover

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	19	224	99.56%
Oligochaeta	1	1	0.44%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera			
Lepidoptera			
Coleoptera			
Diptera			
Chironomidae			

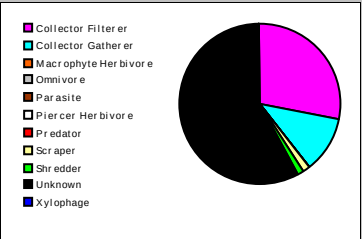


Dominant Taxa

Category	A	PRA
Bivalvia	64	28.44%
Veneridae	33	14.67%
Phoxocephalidae	28	12.44%
Nemata	17	7.56%
Pleustidae	14	6.22%
Cumacea	12	5.33%
Amphipoda	12	5.33%
Monocorophium	6	2.67%
Caprella	6	2.67%
Isopoda	5	2.22%
Copepoda	5	2.22%
Gnoriomphaeroma	4	1.78%
Anisogammarus	4	1.78%
Gastropoda	3	1.33%
Decapoda	3	1.33%

Functional Composition

Category	R	A	PRA
Predator			
Parasite			
Collector Gatherer	5	25	11.11%
Collector Filterer	1	64	28.44%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	1	3	1.33%
Shredder	1	3	1.33%
Omnivore			
Unknown	12	130	57.78%



Metric Values and Scores

Metric	Value
<i>Composition</i>	
Taxa Richness	20
E Richness	0
P Richness	0
T Richness	0
EPT Richness	0
EPT Percent	0.00%
All Non-Insect Abundance	225
All Non-Insect Richness	20
All Non-Insect Percent	100.00%
Oligochaeta+Hirudinea Percent	0.44%
Baetidae/Ephemeroptera	0.000
Hydropsychidae/Trichoptera	0.000

<i>Dominance</i>	
Dominant Taxon Percent	28.44%
Dominant Taxa (2) Percent	43.11%
Dominant Taxa (3) Percent	55.56%
Dominant Taxa (10) Percent	87.56%

<i>Diversity</i>	
Shannon H (loge)	2.392
Shannon H (log2)	3.451
Margalef D	3.508
Simpson D	0.133
Evenness	0.077

<i>Function</i>	
Predator Richness	0
Predator Percent	0.00%
Filterer Richness	1
Filterer Percent	28.44%
Collector Percent	39.56%
Scraper+Shredder Percent	2.67%
Scraper/Filterer	0.047
Scraper/Scraper+Filterer	0.045

<i>Habit</i>	
Burrower Richness	0
Burrower Percent	0.00%
Swimmer Richness	0
Swimmer Percent	0.00%
Clinger Richness	0
Clinger Percent	0.00%

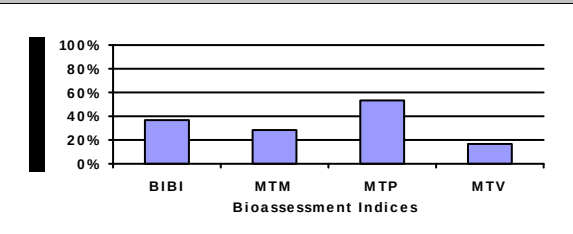
<i>Characteristics</i>	
Cold Stenotherm Richness	0
Cold Stenotherm Percent	0.00%
Hemoglobin Bearer Richness	0
Hemoglobin Bearer Percent	0.00%
Air Breather Richness	0
Air Breather Percent	0.00%

<i>Voltinism</i>	
Univoltine Richness	4
Semivoltine Richness	1
Multivoltine Percent	3.11%

<i>Tolerance</i>	
Sediment Tolerant Richness	1
Sediment Tolerant Percent	0.44%
Sediment Sensitive Richness	0
Sediment Sensitive Percent	0.00%
Metals Tolerance Index	4.700
Pollution Sensitive Richness	0
Pollution Tolerant Percent	2.22%
Hilsenhoff Biotic Index	5.792
Intolerant Percent	0.00%
Supertolerant Percent	5.78%
CTQa	108.000

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	18	36.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	16	53.33%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	3	16.67%	Severe
MTM	Montana DEQ Mountains (Bukantis 1998)	6	28.57%	Moderate



Metrics Report

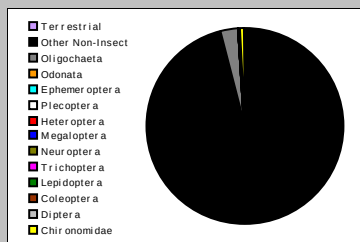
Project ID: SW17CHM
RAI No.: SW17CHM002
Sta. Name: Lower Willow Creek
Client ID: WC-02
STORET ID
Coll. Date: 9/20/2017
Latitude: **Longitude:**

Abundance Measures

Sample Count: 616
Sample Abundance: 616.00 100.00% of sample used
Coll. Procedure:
Sample Notes: depth of 15cm 0% riparian cover

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	5	592	96.10%
Oligochaeta	1	18	2.92%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera			
Lepidoptera			
Coleoptera			
Diptera	1	3	0.49%
Chironomidae	1	3	0.49%

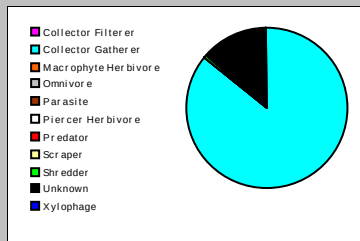


Dominant Taxa

Category	A	PRA
Ostracoda	501	81.33%
Eogammarus	82	13.31%
Oligochaeta	18	2.92%
Copepoda	4	0.65%
Decapoda	3	0.49%
Dasyhelea	3	0.49%
Chironomus	3	0.49%
Gnoriomphaeroma	2	0.32%

Functional Composition

Category	R	A	PRA
Predator			
Parasite			
Collector Gatherer	5	529	85.88%
Collector Filterer			
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper			
Shredder	1	3	0.49%
Omnivore			
Unknown	2	84	13.64%



Metric Values and Scores

Metric	Value
<i>Composition</i>	
Taxa Richness	8
E Richness	0
P Richness	0
T Richness	0
EPT Richness	0
EPT Percent	0.00%
All Non-Insect Abundance	610
All Non-Insect Richness	6
All Non-Insect Percent	99.03%
Oligochaeta+Hirudinea Percent	2.92%
Baetidae/Ephemeroptera	0.000
Hydropsychidae/Trichoptera	0.000

<i>Dominance</i>	
Dominant Taxon Percent	81.33%
Dominant Taxa (2) Percent	94.64%
Dominant Taxa (3) Percent	97.57%
Dominant Taxa (10) Percent	100.00%

<i>Diversity</i>	
Shannon H (loge)	0.669
Shannon H (log2)	0.965
Margalef D	1.090
Simpson D	0.680
Evenness	0.085

<i>Function</i>	
Predator Richness	0
Predator Percent	0.00%
Filterer Richness	0
Filterer Percent	0.00%
Collector Percent	85.88%
Scraper+Shredder Percent	0.49%
Scraper/Filterer	0.000
Scraper/Scraper+Filterer	0.000

<i>Habit</i>	
Burrower Richness	1
Burrower Percent	0.49%
Swimmer Richness	0
Swimmer Percent	0.00%
Clinger Richness	0
Clinger Percent	0.00%

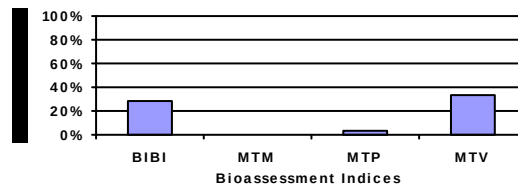
<i>Characteristics</i>	
Cold Stenotherm Richness	0
Cold Stenotherm Percent	0.00%
Hemoglobin Bearer Richness	1
Hemoglobin Bearer Percent	0.49%
Air Breather Richness	0
Air Breather Percent	0.00%

<i>Voltinism</i>	
Univoltine Richness	2
Semivoltine Richness	1
Multivoltine Percent	82.47%

<i>Tolerance</i>	
Sediment Tolerant Richness	1
Sediment Tolerant Percent	2.92%
Sediment Sensitive Richness	0
Sediment Sensitive Percent	0.00%
Metals Tolerance Index	3.500
Pollution Sensitive Richness	0
Pollution Tolerant Percent	0.49%
Hilsenhoff Biotic Index	8.068
Intolerant Percent	0.00%
Supertolerant Percent	85.39%
CTQa	108.000

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	14	28.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	1	3.33%	Severe
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	6	33.33%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	0	0.00%	Severe



Metrics Report

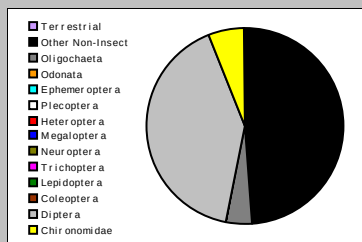
Project ID: SW17CHM
RAI No.: SW17CHM003
Sta. Name: Willow Creek Marsh
Client ID: WC-03
STORET ID
Coll. Date: 9/20/2017
Latitude: **Longitude:**

Abundance Measures

Sample Count: 187
Sample Abundance: 187.00 100.00% of sample used
Coll. Procedure:
Sample Notes: depth of 8cm 100% riparian cover

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	5	91	48.66%
Oligochaeta	1	8	4.28%
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera			
Lepidoptera			
Coleoptera			
Diptera	3	77	41.18%
Chironomidae	3	11	5.88%

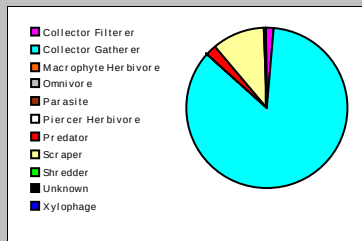


Dominant Taxa

Category	A	PRA
Culicidae	71	37.97%
Cranionyx	47	25.13%
Copepoda	21	11.23%
Physidae	19	10.16%
Chironomus	9	4.81%
Oligochaeta	8	4.28%
Dixella	3	1.60%
Cladocera	3	1.60%
Ceratopogoninae	3	1.60%
Procladius	1	0.53%
Polypedium	1	0.53%
Planorbidae	1	0.53%

Functional Composition

Category	R	A	PRA
Predator	2	4	2.14%
Parasite			
Collector Gatherer	6	159	85.03%
Collector Filterer	1	3	1.60%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	2	20	10.70%
Shredder	1	1	0.53%
Omnivore			
Unknown			

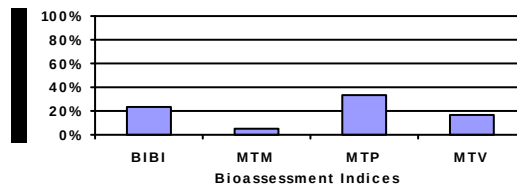


Metric Values and Scores

Metric	Value
<i>Composition</i>	
Taxa Richness	12
E Richness	0
P Richness	0
T Richness	0
EPT Richness	0
EPT Percent	0.00%
All Non-Insect Abundance	99
All Non-Insect Richness	6
All Non-Insect Percent	52.94%
Oligochaeta+Hirudinea Percent	4.28%
Baetidae/Ephemeroptera	0.000
Hydropsychidae/Trichoptera	0.000
<i>Dominance</i>	
Dominant Taxon Percent	37.97%
Dominant Taxa (2) Percent	63.10%
Dominant Taxa (3) Percent	74.33%
Dominant Taxa (10) Percent	98.93%
<i>Diversity</i>	
Shannon H (loge)	1.756
Shannon H (log2)	2.534
Margalef D	2.103
Simpson D	0.231
Evenness	0.118
<i>Function</i>	
Predator Richness	2
Predator Percent	2.14%
Filterer Richness	1
Filterer Percent	1.60%
Collector Percent	86.63%
Scraper+Shredder Percent	11.23%
Scraper/Filterer	6.667
Scraper/Scraper+Filterer	0.870
<i>Habit</i>	
Burrower Richness	1
Burrower Percent	4.81%
Swimmer Richness	2
Swimmer Percent	39.57%
Clinger Richness	0
Clinger Percent	0.00%
<i>Characteristics</i>	
Cold Stenotherm Richness	0
Cold Stenotherm Percent	0.00%
Hemoglobin Bearer Richness	4
Hemoglobin Bearer Percent	6.42%
Air Breather Richness	1
Air Breather Percent	37.97%
<i>Voltinism</i>	
Univoltine Richness	7
Semivoltine Richness	0
Multivoltine Percent	18.72%
<i>Tolerance</i>	
Sediment Tolerant Richness	2
Sediment Tolerant Percent	4.81%
Sediment Sensitive Richness	0
Sediment Sensitive Percent	0.00%
Metals Tolerance Index	3.441
Pollution Sensitive Richness	0
Pollution Tolerant Percent	54.01%
Hilsenhoff Biotic Index	8.326
Intolerant Percent	0.00%
Supertolerant Percent	70.59%
CTQa	108.000

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	12	24.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	10	33.33%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	3	16.67%	Severe
MTM	Montana DEQ Mountains (Bukantis 1998)	1	4.76%	Severe



Metrics Report

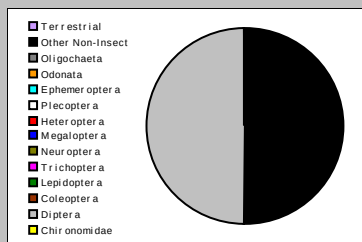
Project ID: SW17CHM
RAI No.: SW17CHM004
Sta. Name: Willow Creek Marsh
Client ID: WC-04
STORET ID
Coll. Date: 9/20/2017
Latitude: **Longitude:**

Abundance Measures

Sample Count: 2
Sample Abundance: 2.00 100.00% of sample used
Coll. Procedure:
Sample Notes: depth of 30cm 20% riparian cover

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	1	1	50.00%
Oligochaeta			
Odonata			
Ephemeroptera			
Plecoptera			
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera			
Lepidoptera			
Coleoptera			
Diptera	1	1	50.00%
Chironomidae			

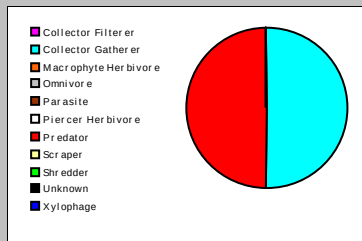


Dominant Taxa

Category	A	PRA
Ceratopogoninae	1	50.00%
Caecidotea	1	50.00%

Functional Composition

Category	R	A	PRA
Predator	1	1	50.00%
Parasite			
Collector Gatherer	1	1	50.00%
Collector Filterer			
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper			
Shredder			
Omnivore			
Unknown			



Metric Values and Scores

Metric	Value
<i>Composition</i>	
Taxa Richness	2
E Richness	0
P Richness	0
T Richness	0
EPT Richness	0
EPT Percent	0.00%
All Non-Insect Abundance	1
All Non-Insect Richness	1
All Non-Insect Percent	50.00%
Oligochaeta+Hirudinea Percent	0.00%
Baetidae/Ephemeroptera	0.000
Hydropsychidae/Trichoptera	0.000

<i>Dominance</i>	
Dominant Taxon Percent	50.00%
Dominant Taxa (2) Percent	100.00%
Dominant Taxa (3) Percent	100.00%
Dominant Taxa (10) Percent	100.00%

<i>Diversity</i>	
Shannon H (loge)	0.693
Shannon H (log2)	1.000
Margalef D	1.443
Simpson D	0.000
Evenness	0.500

<i>Function</i>	
Predator Richness	1
Predator Percent	50.00%
Filterer Richness	0
Filterer Percent	0.00%
Collector Percent	50.00%
Scraper+Shredder Percent	0.00%
Scraper/Filterer	0.000
Scraper/Scraper+Filterer	0.000

<i>Habit</i>	
Burrower Richness	0
Burrower Percent	0.00%
Swimmer Richness	0
Swimmer Percent	0.00%
Clinger Richness	0
Clinger Percent	0.00%

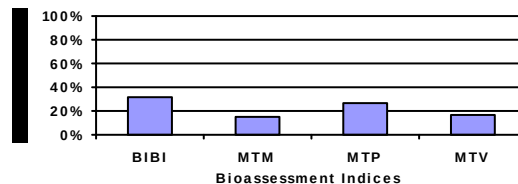
<i>Characteristics</i>	
Cold Stenotherm Richness	0
Cold Stenotherm Percent	0.00%
Hemoglobin Bearer Richness	0
Hemoglobin Bearer Percent	0.00%
Air Breather Richness	0
Air Breather Percent	0.00%

<i>Voltinism</i>	
Univoltine Richness	1
Semivoltine Richness	0
Multivoltine Percent	0.00%

<i>Tolerance</i>	
Sediment Tolerant Richness	0
Sediment Tolerant Percent	0.00%
Sediment Sensitive Richness	0
Sediment Sensitive Percent	0.00%
Metals Tolerance Index	4.500
Pollution Sensitive Richness	0
Pollution Tolerant Percent	50.00%
Hilsenhoff Biotic Index	7.000
Intolerant Percent	0.00%
Supertolerant Percent	50.00%
CTQa	108.000

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	16	32.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	8	26.67%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	3	16.67%	Severe
MTM	Montana DEQ Mountains (Bukantis 1998)	3	14.29%	Severe



Metrics Report

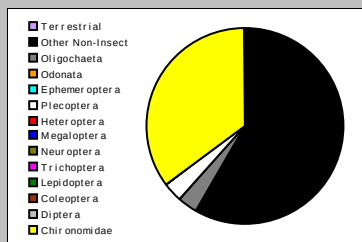
Project ID: SW17CHM
RAI No.: SW17CHM005
Sta. Name: Willow Creek Marsh
Client ID: WC-05
STORET ID
Coll. Date: 9/20/2017
Latitude: **Longitude:**

Abundance Measures

Sample Count: 31
Sample Abundance: 31.00 100.00% of sample used
Coll. Procedure:
Sample Notes: depth of 14cm 65% riparian cover

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	2	18	58.06%
Oligochaeta	1	1	3.23%
Odonata			
Ephemeroptera			
Plecoptera	1	1	3.23%
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera			
Lepidoptera			
Coleoptera			
Diptera			
Chironomidae	4	11	35.48%

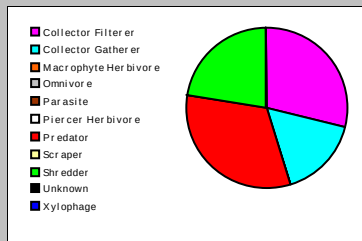


Dominant Taxa

Category	A	PRA
Erpobdellidae	10	32.26%
Sphaeriidae	8	25.81%
Polypedium	6	19.35%
Prodiamesa	3	9.68%
Rheotanytarsus	1	3.23%
Parametriocnemus	1	3.23%
Oligochaeta	1	3.23%
Malenka	1	3.23%

Functional Composition

Category	R	A	PRA
Predator	1	10	32.26%
Parasite			
Collector Gatherer	3	5	16.13%
Collector Filterer	2	9	29.03%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper			
Shredder	2	7	22.58%
Omnivore			
Unknown			



Metric Values and Scores

Metric	Value
<i>Composition</i>	
Taxa Richness	8
E Richness	0
P Richness	1
T Richness	0
EPT Richness	1
EPT Percent	3.23%
All Non-Insect Abundance	19
All Non-Insect Richness	3
All Non-Insect Percent	61.29%
Oligochaeta+Hirudinea Percent	35.48%
Baetidae/Ephemeroptera	0.000
Hydropsychidae/Trichoptera	0.000

<i>Dominance</i>	
Dominant Taxon Percent	32.26%
Dominant Taxa (2) Percent	58.06%
Dominant Taxa (3) Percent	77.42%
Dominant Taxa (10) Percent	100.00%

<i>Diversity</i>	
Shannon H (loge)	1.701
Shannon H (log2)	2.455
Margalef D	2.038
Simpson D	0.196
Evenness	0.147

<i>Function</i>	
Predator Richness	1
Predator Percent	32.26%
Filterer Richness	2
Filterer Percent	29.03%
Collector Percent	45.16%
Scraper+Shredder Percent	22.58%
Scraper/Filterer	0.000
Scraper/Scraper+Filterer	0.000

<i>Habit</i>	
Burrower Richness	0
Burrower Percent	0.00%
Swimmer Richness	0
Swimmer Percent	0.00%
Clinger Richness	2
Clinger Percent	6.45%

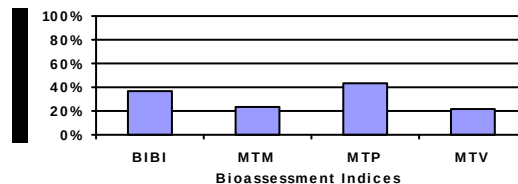
<i>Characteristics</i>	
Cold Stenotherm Richness	0
Cold Stenotherm Percent	0.00%
Hemoglobin Bearer Richness	1
Hemoglobin Bearer Percent	19.35%
Air Breather Richness	0
Air Breather Percent	0.00%

<i>Voltinism</i>	
Univoltine Richness	3
Semivoltine Richness	0
Multivoltine Percent	35.48%

<i>Tolerance</i>	
Sediment Tolerant Richness	1
Sediment Tolerant Percent	3.23%
Sediment Sensitive Richness	0
Sediment Sensitive Percent	0.00%
Metals Tolerance Index	3.433
Pollution Sensitive Richness	0
Pollution Tolerant Percent	0.00%
Hilsenhoff Biotic Index	6.806
Intolerant Percent	3.23%
Supertolerant Percent	61.29%
CTQa	97.714

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	18	36.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	13	43.33%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	4	22.22%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	5	23.81%	Moderate



Metrics Report

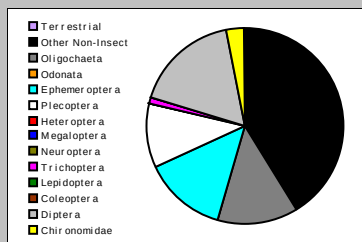
Project ID: SW17CHM
RAI No.: SW17CHM006
Sta. Name: Upper Willow Creek
Client ID: WC-06
STORET ID
Coll. Date: 9/20/2017
Latitude: **Longitude:**

Abundance Measures

Sample Count: 538
Sample Abundance: 896.67 60.00% of sample used
Coll. Procedure:
Sample Notes: depth of 14cm 90% riparian cover

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	5	221	41.08%
Oligochaeta	1	70	13.01%
Odonata			
Ephemeroptera	2	75	13.94%
Plecoptera	3	57	10.59%
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera	1	4	0.74%
Lepidoptera			
Coleoptera			
Diptera	4	95	17.66%
Chironomidae	4	16	2.97%

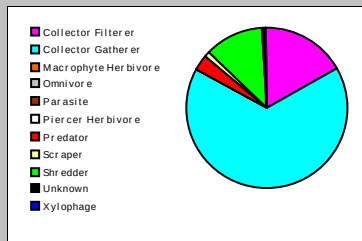


Dominant Taxa

Category	A	PRA
Cranionyx	203	37.73%
Simulium	88	16.36%
Oligochaeta	70	13.01%
Baetis tricaudatus complex	69	12.83%
Malenka	51	9.48%
Brillia	10	1.86%
Trepaxonemata	7	1.30%
Cinygma	6	1.12%
Sphaeriidae	5	0.93%
Nemata	5	0.93%
Sweltsa	4	0.74%
Parapsyche	4	0.74%
Dixa	4	0.74%
Parametriochnemus	3	0.56%
Zapada cinctipes	2	0.37%

Functional Composition

Category	R	A	PRA
Predator	5	17	3.16%
Parasite			
Collector Gatherer	8	354	65.80%
Collector Filterer	2	93	17.29%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	1	6	1.12%
Shredder	3	63	11.71%
Omnivore			
Unknown	1	5	0.93%

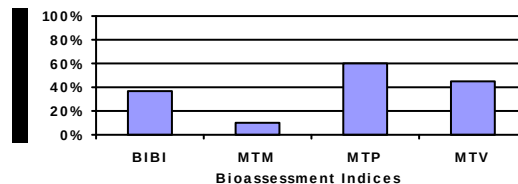


Metric Values and Scores

Metric	Value
<i>Composition</i>	
Taxa Richness	20
E Richness	2
P Richness	3
T Richness	1
EPT Richness	6
EPT Percent	25.28%
All Non-Insect Abundance	291
All Non-Insect Richness	6
All Non-Insect Percent	54.09%
Oligochaeta+Hirudinea Percent	13.01%
Baetidae/Ephemeroptera	0.920
Hydropsychidae/Trichoptera	1.000
<i>Dominance</i>	
Dominant Taxon Percent	37.73%
Dominant Taxa (2) Percent	54.09%
Dominant Taxa (3) Percent	67.10%
Dominant Taxa (10) Percent	95.54%
<i>Diversity</i>	
Shannon H (loge)	1.920
Shannon H (log2)	2.770
Margalef D	3.023
Simpson D	0.211
Evenness	0.094
<i>Function</i>	
Predator Richness	5
Predator Percent	3.16%
Filterer Richness	2
Filterer Percent	17.29%
Collector Percent	83.09%
Scraper+Shredder Percent	12.83%
Scraper/Filterer	0.065
Scraper/Scraper+Filterer	0.061
<i>Habit</i>	
Burrower Richness	2
Burrower Percent	2.23%
Swimmer Richness	2
Swimmer Percent	13.57%
Clinger Richness	6
Clinger Percent	28.81%
<i>Characteristics</i>	
Cold Stenotherm Richness	1
Cold Stenotherm Percent	1.12%
Hemoglobin Bearer Richness	0
Hemoglobin Bearer Percent	0.00%
Air Breather Richness	2
Air Breather Percent	0.56%
<i>Voltinism</i>	
Univoltine Richness	11
Semivoltine Richness	1
Multivoltine Percent	17.29%
<i>Tolerance</i>	
Sediment Tolerant Richness	2
Sediment Tolerant Percent	13.20%
Sediment Sensitive Richness	0
Sediment Sensitive Percent	0.00%
Metals Tolerance Index	3.931
Pollution Sensitive Richness	1
Pollution Tolerant Percent	0.00%
Hilsenhoff Biotic Index	5.630
Intolerant Percent	12.83%
Supertolerant Percent	13.94%
CTQa	85.000

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	18	36.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	18	60.00%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	8	44.44%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	2	9.52%	Severe



Metrics Report

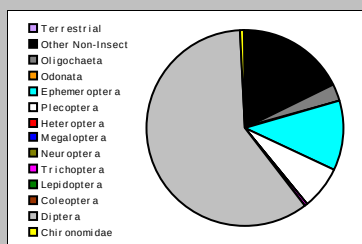
Project ID: SW17CHM
RAI No.: SW17CHM007
Sta. Name: Upper Shellebarger Creek
Client ID: WC-07
STORET ID
Coll. Date: 9/20/2017
Latitude: **Longitude:**

Abundance Measures

Sample Count: 401
Sample Abundance: 401.00 100.00% of sample used
Coll. Procedure:
Sample Notes: depth of 8cm 100% riparian cover

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	6	72	17.96%
Oligochaeta	1	11	2.74%
Odonata			
Ephemeroptera	2	45	11.22%
Plecoptera	1	29	7.23%
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera	1	1	0.25%
Lepidoptera			
Coleoptera			
Diptera	2	241	60.10%
Chironomidae	2	2	0.50%

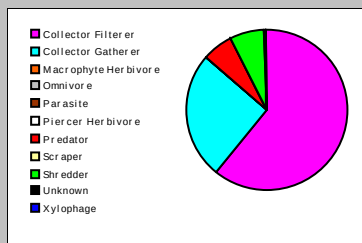


Dominant Taxa

Category	A	PRA
Simulium	240	59.85%
Cranonyx	44	10.97%
Baetis tricaudatus complex	44	10.97%
Malenka	29	7.23%
Trepaxonemata	21	5.24%
Oligochaeta	11	2.74%
Sphaeriidae	3	0.75%
Acari	2	0.50%
Tvetenia Bavarica Gr.	1	0.25%
Tricorythodes	1	0.25%
Psychodidae	1	0.25%
Parapsyche	1	0.25%
Nemata	1	0.25%
Eukiefferiella Claripennis Gr.	1	0.25%
Erpobdellidae	1	0.25%

Functional Composition

Category	R	A	PRA
Predator	4	25	6.23%
Parasite			
Collector Gatherer	7	103	25.69%
Collector Filterer	2	243	60.60%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper			
Shredder	1	29	7.23%
Omnivore			
Unknown	1	1	0.25%

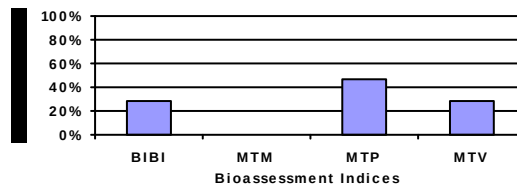


Metric Values and Scores

Metric	Value
<i>Composition</i>	
Taxa Richness	15
E Richness	2
P Richness	1
T Richness	1
EPT Richness	4
EPT Percent	18.70%
All Non-Insect Abundance	83
All Non-Insect Richness	7
All Non-Insect Percent	20.70%
Oligochaeta+Hirudinea Percent	2.99%
Baetidae/Ephemeroptera	0.978
Hydropsychidae/Trichoptera	1.000
<i>Dominance</i>	
Dominant Taxon Percent	59.85%
Dominant Taxa (2) Percent	70.82%
Dominant Taxa (3) Percent	81.80%
Dominant Taxa (10) Percent	98.75%
<i>Diversity</i>	
Shannon H (loge)	1.446
Shannon H (log2)	2.087
Margalef D	2.355
Simpson D	0.369
Evenness	0.099
<i>Function</i>	
Predator Richness	4
Predator Percent	6.23%
Filterer Richness	2
Filterer Percent	60.60%
Collector Percent	86.28%
Scraper+Shredder Percent	7.23%
Scraper/Filterer	0.000
Scraper/Scraper+Filterer	0.000
<i>Habit</i>	
Burrower Richness	1
Burrower Percent	0.25%
Swimmer Richness	1
Swimmer Percent	10.97%
Clinger Richness	3
Clinger Percent	67.33%
<i>Characteristics</i>	
Cold Stenotherm Richness	0
Cold Stenotherm Percent	0.00%
Hemoglobin Bearer Richness	0
Hemoglobin Bearer Percent	0.00%
Air Breather Richness	1
Air Breather Percent	0.25%
<i>Voltinism</i>	
Univoltine Richness	7
Semivoltine Richness	1
Multivoltine Percent	17.21%
<i>Tolerance</i>	
Sediment Tolerant Richness	2
Sediment Tolerant Percent	2.99%
Sediment Sensitive Richness	0
Sediment Sensitive Percent	0.00%
Metals Tolerance Index	4.566
Pollution Sensitive Richness	0
Pollution Tolerant Percent	0.25%
Hilsenhoff Biotic Index	5.524
Intolerant Percent	7.48%
Supertolerant Percent	3.99%
CTQa	97.200

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	14	28.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	14	46.67%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	5	27.78%	Moderate
MTM	Montana DEQ Mountains (Bukantis 1998)	0	0.00%	Severe



Taxa Listing

Project ID: SW17CHP
RAI No.: SW17CHP001

RAI No.: SW17CHP001 Sta. Name: Puget Sound
Client ID: WC-01
Date Coll.: 9/20/2017 No Jars: 1 STORET ID: WC-01
Sample Notes: Periphyton Area 4.5cm x 5cm, 5cm x 6.5cm (cobbles)

Taxonomic Name	Count	PRA	Cell Count	Comment
Algae				
Bacillariophyta				
Diatoms	345	87.56%	345	
Chlorophyta				
Ulva sp.	2	0.51%	2	
Diatoms				
Bacillariophyta				
Achnanthes parvula	1	0.17%		
Achnanthes pseudogroenlandica	1	0.17%		
Achnantheidium rivulare	14	2.33%		
Amphora pediculus	29	4.83%		
Cocconeis costata v. costata	1	0.17%		
Cocconeis scutellum v. parva	53	8.83%		
Diploneis sp.	1	0.17%		Very lightly silicified cell
Gomphonema pumilum v. rigidum	47	7.83%		6 girdle views
Grammatophora oceanica	1	0.17%		
Halamphora coffeaeformis	5	0.83%		
Licmophora communis	7	1.17%		
Melosira lineata	4	0.67%		
Navicula abunda	108	18.00%		
Navicula halinae	6	1.00%		
Navicula perminuta	50	8.33%		
Navicula salinicola	46	7.67%		
Nitzschia sp.	1	0.17%		obscure view
Nitzschia inconspicua	63	10.50%		
Opephora mutabilis	3	0.50%		
Parlibellus berkeleyi	6	1.00%		
Planothidium delicatulum	25	4.17%		
Planothidium dubium	1	0.17%		
Rhoicosphenia abbreviata	2	0.33%		
Tabularia fasciculata	124	20.67%		
Trachyneis aspera	1	0.17%		
Sample Count	947			

Taxa Listing

Project ID: SW17CHP

RAI No.: SW17CHP002

RAI No.: SW17CHP002

Client ID: WC-02

Date Coll.: 9/20/2017

No Jars: 1

Sta. Name: Lower Willow Creek

STORET ID: WC-02

Sample Notes: Periphyton Area 9.5cm x 6cm (cobble)

Taxonomic Name	Count	PRA	Cell Count	Comment
Algae				
Bacillariophyta				
Diatoms	300	69.93%	300	
Diatoms				
Bacillariophyta				
<i>Achnanthes placentuloides</i>	1	0.17%		A. placentuloides
<i>Berkeleya rutilans</i>	3	0.50%		
<i>Gomphonema</i> sp.	1	0.17%		Girdle view
<i>Halamphora coffeaeformis</i>	20	3.33%		A. coffeaeformis
<i>Navicula abunda</i>	118	19.67%		N. abundans
<i>Navicula gregaria</i>	14	2.33%		
<i>Navicula paul-schulzii</i>	6	1.00%		paul schulzii
<i>Navicula perminuta</i>	34	5.67%		
<i>Navicula perminuta</i>	2	0.33%		cf big perminuta, because bigger in size.
<i>Nitzschia amplexans</i>	10	1.67%		without striae
<i>Nitzschia dissipata</i>	1	0.17%		
<i>Nitzschia frustulum</i>	21	3.50%		
<i>Nitzschia inconspicua</i>	330	55.00%		
<i>Nitzschia levidensis</i>	2	0.33%		
<i>Nitzschia palea</i>	2	0.33%		
<i>Opephora mutabilis</i>	17	2.83%		2 girdle views
<i>Planothidium delicatulum</i>	11	1.83%		
<i>Planothidium engelbrechtii</i>	3	0.50%		
<i>Staurosira punctiformis</i>	3	0.50%		
<i>Tabularia fasciculata</i>	1	0.17%		
Sample Count	900			

Taxa Listing

Project ID: SW17CHP

RAI No.: SW17CHP003

RAI No.: SW17CHP003

Sta. Name: Willow Creek Marsh

Client ID: WC-03

Date Coll.: 9/20/2017

No Jars: 1

STORET ID: WC-03

Sample Notes: Periphyton Area 1cm x 45cm (water parsley stem)

Taxonomic Name	Count	PRA	Cell Count	Comment
Algae				
Bacillariophyta				
Diatoms	52	89.66%	52	
Diatoms				
Bacillariophyta				
<i>Achnanthyrium minutissimum</i>	21	6.69%		
<i>Amphora pediculus</i>	12	3.82%		
<i>Brachysira microcephala</i>	1	0.32%		
<i>Cocconeis placentula sensu lato</i>	53	16.88%		
<i>Diploneis krammeri</i>	1	0.32%		
<i>Epithemia</i> sp.	1	0.32%		broken valve
<i>Eunotia trinacria</i>	1	0.32%		
<i>Frustulia vulgaris</i>	4	1.27%		2 broken valve
<i>Gomphonema</i> sp.	2	0.64%		broken valve
<i>Gomphonema angustatum</i>	1	0.32%		
<i>Gomphonema kobayashii</i>	2	0.64%		
<i>Gomphonema parvulum</i>	2	0.64%		
<i>Melosira lineata</i>	1	0.32%		
<i>Meridion circulare</i>	3	0.96%		broken valve
<i>Navicula cincta</i>	3	0.96%		
<i>Navicula cryptocephala</i>	20	6.37%		
<i>Navicula cryptotenella</i>	10	3.18%		
<i>Navicula tripunctata</i>	10	3.18%		
<i>Nitzschia</i> sp.	5	1.59%		half broken valve
<i>Nitzschia dissipata</i>	6	1.91%		
<i>Nitzschia frustulum</i>	5	1.59%		
<i>Nitzschia inconspicua</i>	14	4.46%		
<i>Nitzschia linearis</i>	1	0.32%		
<i>Nitzschia palea</i>	2	0.64%		
<i>Pinnularia brebissonii</i>	1	0.32%		
<i>Pinnularia rupestris</i>	7	2.23%		
<i>Pinnularia saprophila</i>	19	6.05%		
<i>Pinnularia subundulata</i>	2	0.64%		
<i>Placoneis clementis</i>	8	2.55%		
<i>Placoneis porifera</i>	1	0.32%		
<i>Planothidium frequentissimum</i>	16	5.10%		
<i>Planothidium haynaldii</i>	2	0.64%		
<i>Planothidium lanceolatum</i>	38	12.10%		
<i>Psammothidium bioretii</i>	2	0.64%		
<i>Pseudostaurosira parasitica</i>	1	0.32%		
<i>Reimeria sinuata</i>	1	0.32%		
<i>Rhoicosphenia abbreviata</i>	5	1.59%		
<i>Rossithidium pusillum</i>	1	0.32%		

Taxa Listing

Project ID: SW17CHP
RAI No.: SW17CHP003

RAI No.: SW17CHP003 Sta. Name: Willow Creek Marsh
Client ID: WC-03
Date Coll.: 9/20/2017 No Jars: 1 STORET ID: WC-03
Sample Notes: Periphyton Area 1cm x 45cm (water parsley stem)

Taxonomic Name	Count	PRA	Cell Count	Comment
<i>Sellaphora atomoides</i>	15	4.78%		
<i>Sellaphora nigri</i>	2	0.64%		
<i>Sellaphora pupula</i>	1	0.32%		
<i>Sellaphora saugerresii</i>	3	0.96%		
<i>Sellaphora seminulum</i>	2	0.64%		
<i>Stauroneis gracilis</i>	2	0.64%		
<i>Stauroneis kriegeri</i>	2	0.64%		
<i>Staurosirella pinnata</i>	2	0.64%		
Sample Count	366			

Taxa Listing

Project ID: SW17CHP

RAI No.: SW17CHP004

RAI No.: SW17CHP004

Client ID: WC-04

Date Coll.: 9/20/2017

No Jars: 1

Sta. Name: Willow Creek Marsh

STORET ID: WC-04

Sample Notes: Periphyton Area 2cm x 30cm (wooden stake)

Taxonomic Name	Count	PRA	Cell Count	Comment
Algae				
Bacillariophyta				
Diatoms	296	84.57%	296	
Cyanophyta				
<i>Leptolyngbya</i> sp.	4	1.14%	56	
Diatoms				
Bacillariophyta				
<i>Achnanthyidium</i> sp.	1	0.17%		big Raphless valve only
<i>Achnanthyidium deflexum</i>	2	0.33%		
<i>Achnanthyidium minutissimum</i>	55	9.17%		
<i>Achnanthyidium rivulare</i>	2	0.33%		
<i>Amphora copulata</i>	2	0.33%		
<i>Amphora pediculus</i>	204	34.00%		
<i>Cocconeis placentula</i> sensu lato	25	4.17%		
<i>Diploneis smithii</i> v. <i>pumila</i>	1	0.17%		
<i>Epithemia sores</i>	1	0.17%		
<i>Eunotia rushforthii</i>	1	0.17%		
<i>Fragilaria vaucheriae</i>	5	0.83%		
<i>Gomphonema</i> sp.	1	0.17%		girdle view
<i>Gomphonema angustatum</i>	2	0.33%		
<i>Gomphonema parvulum</i>	3	0.50%		
<i>Hippodonta</i> sp.	1	0.17%		girdle view only
<i>Hippodonta capitata</i>	1	0.17%		
<i>Lemnicola hungarica</i>	2	0.33%		
<i>Luticola mutica</i>	1	0.17%		
<i>Mayamaea atomus</i>	2	0.33%		
<i>Melosira lineata</i>	3	0.50%		
<i>Navicula abunda</i>	1	0.17%		
<i>Navicula cincta</i>	1	0.17%		
<i>Navicula cryptocephala</i>	12	2.00%		
<i>Navicula cryptotenella</i>	5	0.83%		
<i>Navicula gregaria</i>	3	0.50%		
<i>Navicula lanceolata</i>	3	0.50%		
<i>Navicula reichardtiana</i>	1	0.17%		
<i>Nitzschia</i> sp.	4	0.67%		Girdle view and broken valve
<i>Nitzschia dissipata</i>	9	1.50%		
<i>Nitzschia frustulum</i>	12	2.00%		
<i>Nitzschia hantzschiana</i>	3	0.50%		
<i>Nitzschia inconspicua</i>	8	1.33%		
<i>Nitzschia linearis</i>	6	1.00%		
<i>Nitzschia palea</i>	4	0.67%		
<i>Planothidium frequentissimum</i>	28	4.67%		
<i>Planothidium haynaldii</i>	2	0.33%		
<i>Planothidium lanceolatum</i>	105	17.50%		2 girdle views

Taxa Listing

Project ID: SW17CHP

RAI No.: SW17CHP004

RAI No.: SW17CHP004

Client ID: WC-04

Date Coll.: 9/20/2017

No Jars: 1

Sta. Name: Willow Creek Marsh

STORET ID: WC-04

Sample Notes: Periphyton Area 2cm x 30cm (wooden stake)

Taxonomic Name	Count	PRA	Cell Count	Comment
<i>Platessa hustedtii</i>	1	0.17%		
<i>Rhoicosphenia abbreviata</i>	20	3.33%		
<i>Sellaphora</i> sp.	5	0.83%		Girdle views
<i>Sellaphora atomoides</i>	19	3.17%		
<i>Sellaphora hustedtii</i>	1	0.17%		
<i>Sellaphora nigri</i>	8	1.33%		
<i>Sellaphora pupula</i>	1	0.17%		
<i>Sellaphora saugerresii</i>	9	1.50%		
<i>Sellaphora seminulum</i>	3	0.50%		
<i>Staurosira construens</i> v. <i>venter</i>	5	0.83%		
<i>Staurosirella leptostauron</i>	4	0.67%		
<i>Ulnaria ulna</i>	2	0.33%		broken valves
Sample Count	900			

Taxa Listing

Project ID: SW17CHP

RAI No.: SW17CHP005

RAI No.: SW17CHP005

Sta. Name: Willow Creek Marsh

Client ID: WC-05

Date Coll.: 9/20/2017

No Jars: 1

STORET ID: WC-05

Sample Notes: Periphyton Area 3cm x 25cm (skunk cabbage stem)

Taxonomic Name	Count	PRA	Cell Count	Comment
Algae				
Bacillariophyta				
Diatoms	238	63.47%	238	
Cryptophyta				
<i>Cryptomonas</i> sp.	1	0.27%	1	
Cyanophyta				
<i>Leptolyngbya</i> sp.	61	16.27%	1708	
Diatoms				
Bacillariophyta				
<i>Achnanthyrium minutissimum</i>	35	5.83%		
<i>Achnanthyrium rivulare</i>	3	0.50%		
<i>Amphora copulata</i>	2	0.33%		
<i>Amphora pediculus</i>	42	7.00%		
<i>Aulacoseira italica</i>	2	0.33%		
<i>Caloneis bacillum</i>	2	0.33%		1 girdle view
<i>Cocconeis placentula</i> sensu lato	223	37.17%		
<i>Diatoma vulgare</i>	1	0.17%		
<i>Diploneis smithii</i>	1	0.17%		
<i>Eunotia rushforthii</i>	3	0.50%		1 girdle
<i>Fragilaria vaucheriae</i>	2	0.33%		
<i>Gomphonema angustatum</i>	4	0.67%		
<i>Gomphonema parvulum</i>	5	0.83%		1 girdle view
<i>Halamphora coffeaeformis</i>	4	0.67%		
<i>Mayamaea atomus</i>	2	0.33%		
<i>Melosira lineata</i>	8	1.33%		
<i>Meridion circulare</i>	1	0.17%		
<i>Navicula</i> sp.	2	0.33%		girdle view
<i>Navicula cryptocephala</i>	3	0.50%		
<i>Navicula gregaria</i>	4	0.67%		
<i>Navicula lanceolata</i>	1	0.17%		broken valve
<i>Navicula reichardtiana</i>	1	0.17%		
<i>Nitzschia acidoclinata</i>	1	0.17%		
<i>Nitzschia desertorum</i>	2	0.33%		
<i>Nitzschia dissipata</i>	8	1.33%		
<i>Nitzschia fonticola</i>	1	0.17%		
<i>Nitzschia frustulum</i>	1	0.17%		
<i>Nitzschia inconspicua</i>	9	1.50%		
<i>Nitzschia linearis</i>	6	1.00%		
<i>Nitzschia palea</i>	3	0.50%		
<i>Pinnularia rupestris</i>	4	0.67%		3 girdle views
<i>Planothidium dubium</i>	1	0.17%		
<i>Planothidium frequentissimum</i>	34	5.67%		
<i>Planothidium haynaldii</i>	3	0.50%		
<i>Planothidium lanceolatum</i>	121	20.17%		

Taxa Listing

Project ID: SW17CHP

RAI No.: SW17CHP005

RAI No.: SW17CHP005

Sta. Name: Willow Creek Marsh

Client ID: WC-05

Date Coll.: 9/20/2017

No Jars: 1

STORET ID: WC-05

Sample Notes: Periphyton Area 3cm x 25cm (skunk cabbage stem)

Taxonomic Name	Count	PRA	Cell Count	Comment
<i>Platessa hustedtii</i>	4	0.67%		
<i>Rhoicosphenia abbreviata</i>	15	2.50%		
<i>Rhopalodia gibberula</i>	2	0.33%		
<i>Rhopalodia musculus</i>	1	0.17%		
<i>Sellaphora atomoides</i>	8	1.33%		
<i>Sellaphora nigri</i>	3	0.50%		
<i>Sellaphora pupula</i>	1	0.17%		
<i>Sellaphora saugerresii</i>	5	0.83%		
<i>Sellaphora seminulum</i>	6	1.00%		
<i>Stauroneis kriegeri</i>	1	0.17%		
<i>Staurosira construens v. venter</i>	2	0.33%		1 girdle view
<i>Staurosirella leptostauron</i>	2	0.33%		girdle view
<i>Surirella angusta</i>	1	0.17%		
<i>Ulnaria ulna</i>	4	0.67%		
Sample Count	900			

Taxa Listing

Project ID: SW17CHP

RAI No.: SW17CHP006

RAI No.: SW17CHP006

Client ID: WC-06

Date Coll.: 9/20/2017

No Jars: 1

Sta. Name: Upper Willow Creek

STORET ID: WC-06

Sample Notes: Periphyton Area 8cm x 4.5cm (cobble)

Taxonomic Name	Count	PRA	Cell Count	Comment
Algae				
Bacillariophyta				
Diatoms	54	62.79%	54	
Cyanophyta				
<i>Leptolyngbya</i> sp.	7	8.14%	56	
Diatoms				
Bacillariophyta				
<i>Achnanthyidium exiguum</i>	1	0.17%		
<i>Achnanthyidium gracillimum</i>	5	0.83%		
<i>Achnanthyidium minutissimum</i>	34	5.67%		
<i>Amphora pediculus</i>	28	4.67%		
<i>Aulacoseira italica</i>	2	0.33%		1 broken valve
<i>Cocconeis placentula</i> sensu lato	315	52.50%		Mostly broken valve
<i>Fragilaria capucina</i> v. <i>gracilis</i>	2	0.33%		
<i>Gomphonema angustatum</i>	2	0.33%		
<i>Gomphonema parvulum</i>	2	0.33%		
<i>Gomphonema productum</i>	1	0.17%		
<i>Mayamaea atomus</i>	2	0.33%		
<i>Melosira lineata</i>	1	0.17%		
<i>Navicula cryptocephala</i>	4	0.67%		1 broken valve
<i>Navicula cryptotenella</i>	10	1.67%		
<i>Navicula reichardtiana</i>	1	0.17%		
<i>Nitzschia dissipata</i>	2	0.33%		
<i>Nitzschia frustulum</i>	1	0.17%		
<i>Nitzschia inconspicua</i>	7	1.17%		
<i>Nitzschia linearis</i>	5	0.83%		
<i>Nitzschia palea</i>	2	0.33%		broken valve
<i>Pinnularia decrescens</i>	1	0.17%		P. decrescens
<i>Planothidium frequentissimum</i>	16	2.67%		
<i>Planothidium haynaldii</i>	3	0.50%		
<i>Planothidium lanceolatum</i>	82	13.67%		
<i>Reimeria sinuata</i>	3	0.50%		
<i>Rhoicosphenia abbreviata</i>	26	4.33%		
<i>Rossithidium pusillum</i>	4	0.67%		
<i>Sellaphora atomoides</i>	14	2.33%		
<i>Sellaphora nigri</i>	10	1.67%		
<i>Sellaphora pulchra</i>	1	0.17%		
<i>Sellaphora saugerresii</i>	5	0.83%		
<i>Sellaphora seminulum</i>	2	0.33%		
<i>Stauroneis kriegeri</i>	1	0.17%		
<i>Staurosira construens</i> v. <i>venter</i>	2	0.33%		
<i>Staurosirella pinnata</i>	2	0.33%		
<i>Ulnaria ulna</i>	1	0.17%		broken valve

Taxa Listing

Project ID: SW17CHP
RAI No.: SW17CHP006

RAI No.: SW17CHP006 Sta. Name: Upper Willow Creek
Client ID: WC-06
Date Coll.: 9/20/2017 No Jars: 1 STORET ID: WC-06
Sample Notes: Periphyton Area 8cm x 4.5cm (cobble)

Taxonomic Name	Count	PRA	Cell Count	Comment
Sample Count	661			

Taxa Listing

Project ID: SW17CHP

RAI No.: SW17CHP007

RAI No.: SW17CHP007

Client ID: WC-07

Date Coll.: 9/20/2017

No Jars: 1

Sta. Name: Upper Shellebarger Creek

STORET ID: WC-07

Sample Notes: Periphyton Area 8cm x 5.5cm (cobble)

Taxonomic Name	Count	PRA	Cell Count	Comment
Algae				
Bacillariophyta				
Diatoms	92	90.20%	92	
Diatoms				
Bacillariophyta				
<i>Achnanthidium minutissimum</i>	2	0.33%		
<i>Achnanthidium rivulare</i>	1	0.17%		
<i>Amphora pediculus</i>	8	1.33%		
<i>Cocconeis placentula</i> sensu lato	505	84.17%		Mostly broken valves
<i>Navicula cryptocephala</i>	1	0.17%		
<i>Navicula cryptotenella</i>	2	0.33%		
<i>Nitzschia</i> sp.	1	0.17%		broken valve
<i>Nitzschia inconspicua</i>	3	0.50%		
<i>Placoneis clementis</i>	1	0.17%		
<i>Planothidium frequentissimum</i>	7	1.17%		
<i>Planothidium lanceolatum</i>	57	9.50%		
<i>Reimeria sinuata</i>	3	0.50%		
<i>Rhoicosphenia abbreviata</i>	4	0.67%		
<i>Sellaphora seminulum</i>	1	0.17%		
<i>Staurosira construens</i> v. <i>venter</i>	3	0.50%		
<i>Ulnaria ulna</i>	1	0.17%		
Sample Count	692			

Metrics Report

Project ID: SW17CHP
Sample ID: SW17CHP001
Station Name: Puget Sound
Client ID: WC-01
STORET ID: WC-01
Date Collected: 9/20/2017
Count Of Taxon: 25
Sum Of Count: 600

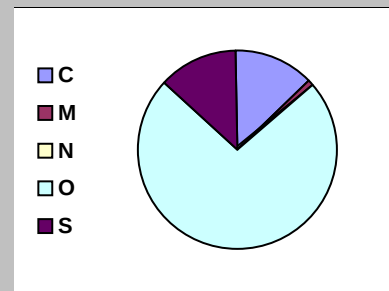
Metrics (Bahls 1993)

Metric	Value	MTM	MTP
<i>Community Structure</i>			
Shannon H (log2)	3.468	Excellent	Good
Species Richness	25	Good	Fair
Native Taxa Percent	2.33%		
Cosmopolitan Taxa Percent	45.50%		
Mountains Rare Taxa Percent	2.33%		
Plains Rare Taxa Percent	0.00%		
Dominant Taxon Percent	20.67%	Excellent	Excellent
<i>Sediment</i>			
Siltation Taxa Percent	46.67%	Fair	Excellent
Motile Taxa Percent	32.50%		
Mountains Brackish Taxa Percent	5.17%		
Plains Brackish Taxa Percent	0.00%		
<i>Organic Nutrients</i>			
Pollution Index	2.112	Good	Good
Nitrogen Heterotroph Taxa Percent	10.50%		
Polysaprobous Taxa Percent	32.00%		
Low DO Taxa Percent	0.00%		
<i>Inorganic Nutrients</i>			
Nitrogen Autotroph Taxa Percent	27.33%		
Eutraphentic Taxa Percent	38.00%		
Rhopalodiales Percent	0.00%		
<i>Metals</i>			
Disturbance Taxa Percent	0.00%		
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	0.17%		
Abnormal Cells Percent	0.00%	Excellent	

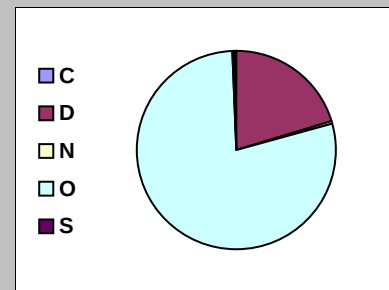
BiolIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Fair
MTP	Montana DEQ Plains (Bahls 1992)	Fair

Increaser/Decreaser Taxa (Teply and Bahls 2005)

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	15.67%	31.92%
Mountains Metals Increasers Taxa Percent	0.33%	3.14%
Mountains Nutrient Increasers Taxa Percent	0.33%	4.46%
Mountains Sediment Increasers Taxa Percent	15.67%	36.32%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	20.67%	46.81%
Plains General Increasers Taxa Percent	0.33%	0.89%



Dominant Taxa

Category	A	PRA
Tabularia fasciculata	124	20.67%
Navicula abunda	108	18.00%
Nitzschia inconspicua	63	10.50%
Cocconeis scutellum v. parva	53	8.83%
Navicula perminuta	50	8.33%
Gomphonema pumilum v. rigidum	47	7.83%
Navicula salinicola	46	7.67%
Amphora pediculus	29	4.83%
Planorhynchium delicatulum	25	4.17%
Achnanthes rivulare	14	2.33%

Metrics Report

Project ID: SW17CHP
Sample ID: SW17CHP002
Station Name: Lower Willow Creek
Client ID: WC-02
STORET ID: WC-02
Date Collected: 9/20/2017
Count Of Taxon: 19
Sum Of Count: 600

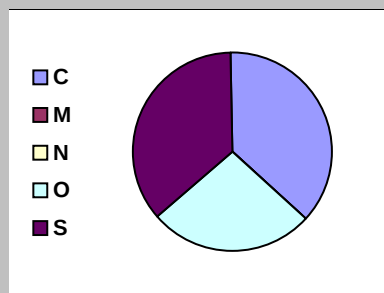
Metrics (Bahls 1993)

Metric	Value	MTM	MTP
<i>Community Structure</i>			
Shannon H (log2)	2.286	Good	Fair
Species Richness	19	Fair	Poor
Native Taxa Percent	0.00%		
Cosmopolitan Taxa Percent	71.17%		
Mountains Rare Taxa Percent	0.00%		
Plains Rare Taxa Percent	0.00%		
Dominant Taxon Percent	55.00%	Fair	Fair
<i>Sediment</i>			
Siltation Taxa Percent	90.00%	Poor	Poor
Motile Taxa Percent	72.67%		
Mountains Brackish Taxa Percent	0.17%		
Plains Brackish Taxa Percent	0.00%		
<i>Organic Nutrients</i>			
Pollution Index	1.956	Fair	Good
Nitrogen Heterotroph Taxa Percent	58.83%		
Polysaprobous Taxa Percent	61.50%		
Low DO Taxa Percent	2.67%		
<i>Inorganic Nutrients</i>			
Nitrogen Autotroph Taxa Percent	6.33%		
Eutraphentic Taxa Percent	65.00%		
Rhopalodiales Percent	0.00%		
<i>Metals</i>			
Disturbance Taxa Percent	0.00%		
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	0.33%		
Abnormal Cells Percent	0.00%	Excellent	

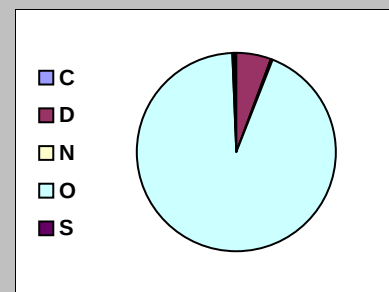
BiolIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Poor
MTP	Montana DEQ Plains (Bahls 1992)	Poor

Increaser/Decreaser Taxa (Teply and Bahls 2005)

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	57.67%	95.35%
Mountains Sediment Increasers Taxa Percent	57.67%	99.38%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	6.00%	80.51%
Plains General Increasers Taxa Percent	0.17%	0.87%



Dominant Taxa

Category	A	PRA
Nitzschia inconspicua	330	55.00%
Navicula abunda	118	19.67%
Navicula perminuta	36	6.00%
Nitzschia frustulum	21	3.50%
Amphora coffeaeformis	20	3.33%
Opephora mutabilis	17	2.83%
Navicula gregaria	14	2.33%
Planothidium delicatulum	11	1.83%
Nitzschia amplexans	10	1.67%
Navicula paul-schulzii	6	1.00%

Metrics Report

Project ID: SW17CHP
Sample ID: SW17CHP003
Station Name: Willow Creek Marsh
Client ID: WC-03
STORET ID: WC-03
Date Collected: 9/20/2017
Count Of Taxon: 46
Sum Of Count: 314

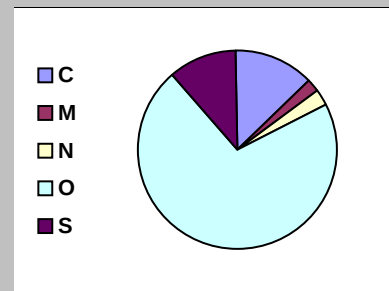
Metrics (Bahls 1993)

Metric	Value	MTM	MTP
<i>Community Structure</i>			
Shannon H (log2)	4.511	Excellent	Excellent
Species Richness	46	Excellent	Excellent
Native Taxa Percent	1.27%		
Cosmopolitan Taxa Percent	75.48%		
Mountains Rare Taxa Percent	0.00%		
Plains Rare Taxa Percent	0.64%		
Dominant Taxon Percent	16.88%	Excellent	Excellent
<i>Sediment</i>			
Siltation Taxa Percent	34.39%	Good	Excellent
Motile Taxa Percent	39.17%		
Mountains Brackish Taxa Percent	73.25%		
Plains Brackish Taxa Percent	2.23%		
<i>Organic Nutrients</i>			
Pollution Index	2.534	Excellent	Excellent
Nitrogen Heterotroph Taxa Percent	9.55%		
Polysaprobous Taxa Percent	33.12%		
Low DO Taxa Percent	3.50%		
<i>Inorganic Nutrients</i>			
Nitrogen Autotroph Taxa Percent	67.83%		
Eutraphentic Taxa Percent	49.04%		
Rhopalodiales Percent	0.32%		
<i>Metals</i>			
Disturbance Taxa Percent	6.69%	Excellent	Excellent
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	14.01%		
Abnormal Cells Percent	0.00%	Excellent	

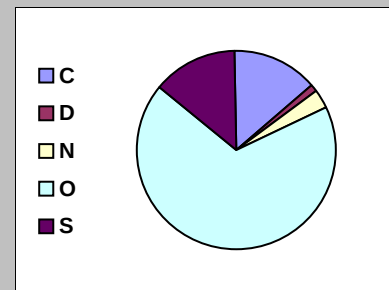
BiolIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Good
MTP	Montana DEQ Plains (Bahls 1992)	Excellent

Increaser/Decreaser Taxa (Teply and Bahls 2005)

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	15.92%	32.64%
Mountains Metals Increasers Taxa Percent	2.23%	4.18%
Mountains Nutrient Increasers Taxa Percent	3.18%	6.55%
Mountains Sediment Increasers Taxa Percent	13.69%	31.21%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	1.91%	86.86%
Plains General Increasers Taxa Percent	16.56%	11.31%



Dominant Taxa

Category	A	PRA
Cocconeis placentula sensu lato	53	16.88%
Planothidium lanceolatum	38	12.10%
Achnanthidium minutissimum	21	6.69%
Navicula cryptocephala	20	6.37%
Pinnularia saprophila	19	6.05%
Planothidium frequentissimum	16	5.10%
Sellaphora atomoides	15	4.78%
Nitzschia inconspicua	14	4.46%
Amphora pediculus	12	3.82%
Navicula tripunctata	10	3.18%

Metrics Report

Project ID: SW17CHP
Sample ID: SW17CHP004
Station Name: Willow Creek Marsh
Client ID: WC-04
STORET ID: WC-04
Date Collected: 9/20/2017
Count Of Taxon: 49
Sum Of Count: 600

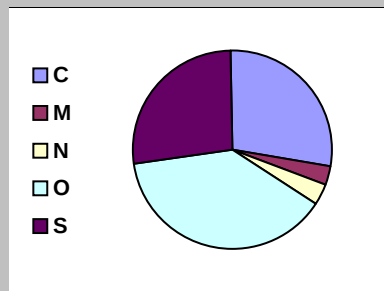
Metrics (Bahls 1993)

Metric	Value	MTM	MTP
<i>Community Structure</i>			
Shannon H (log2)	3.683	Excellent	Good
Species Richness	49	Excellent	Excellent
Native Taxa Percent	0.33%		
Cosmopolitan Taxa Percent	91.83%		
Mountains Rare Taxa Percent	0.33%		
Plains Rare Taxa Percent	0.33%		
Dominant Taxon Percent	34.00%	Good	Good
<i>Sediment</i>			
Siltation Taxa Percent	20.50%	Good	Excellent
Motile Taxa Percent	51.83%		
Mountains Brackish Taxa Percent	87.67%		
Plains Brackish Taxa Percent	0.67%		
<i>Organic Nutrients</i>			
Pollution Index	2.547	Excellent	Excellent
Nitrogen Heterotroph Taxa Percent	8.17%		
Polysaprobous Taxa Percent	33.67%		
Low DO Taxa Percent	5.33%		
<i>Inorganic Nutrients</i>			
Nitrogen Autotroph Taxa Percent	83.83%		
Eutraphentic Taxa Percent	71.00%		
Rhopalodiales Percent	0.17%		
<i>Metals</i>			
Disturbance Taxa Percent	9.17%	Excellent	Excellent
Acidophilous Taxa Percent	0.17%		
Metals Tolerant Taxa Percent	20.33%		
Abnormal Cells Percent	0.00%	Excellent	

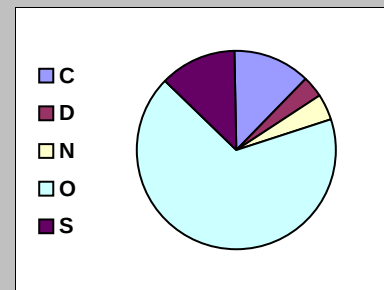
BiolIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Good
MTP	Montana DEQ Plains (Bahls 1992)	Good

Increaser/Decreaser Taxa (Teply and Bahls 2005)

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	42.33%	81.59%
Mountains Metals Increasers Taxa Percent	4.00%	5.37%
Mountains Nutrient Increasers Taxa Percent	5.33%	8.38%
Mountains Sediment Increasers Taxa Percent	41.50%	92.22%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	4.00%	83.65%
Plains General Increasers Taxa Percent	15.50%	10.03%



Dominant Taxa

Category	A	PRA
Amphora pediculus	204	34.00%
Planothidium lanceolatum	105	17.50%
Achnanthyidium minutissimum	55	9.17%
Planothidium frequentissimum	28	4.67%
Cocconeis placentula sensu lato	25	4.17%
Rhoicosphenia abbreviata	20	3.33%
Sellaphora atomoides	19	3.17%
Navicula cryptocephala	12	2.00%
Nitzschia frustulum	12	2.00%
Nitzschia dissipata	9	1.50%

Metrics Report

Project ID: SW17CHP
Sample ID: SW17CHP005
Station Name: Willow Creek Marsh
Client ID: WC-05
STORET ID: WC-05
Date Collected: 9/20/2017
Count Of Taxon: 49
Sum Of Count: 600

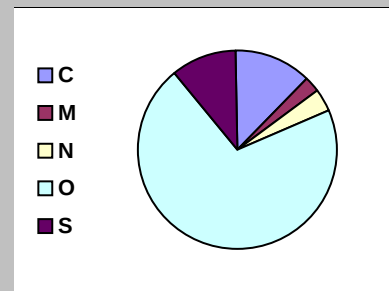
Metrics (Bahls 1993)

Metric	Value	MTM	MTP
<i>Community Structure</i>			
Shannon H (log2)	3.453	Excellent	Good
Species Richness	49	Excellent	Excellent
Native Taxa Percent	0.67%		
Cosmopolitan Taxa Percent	91.17%		
Mountains Rare Taxa Percent	0.50%		
Plains Rare Taxa Percent	0.00%		
Dominant Taxon Percent	37.17%	Good	Good
<i>Sediment</i>			
Siltation Taxa Percent	11.33%	Excellent	Excellent
Motile Taxa Percent	19.83%		
Mountains Brackish Taxa Percent	90.00%		
Plains Brackish Taxa Percent	0.83%		
<i>Organic Nutrients</i>			
Pollution Index	2.549	Excellent	Excellent
Nitrogen Heterotroph Taxa Percent	5.67%		
Polysaprobous Taxa Percent	34.67%		
Low DO Taxa Percent	4.33%		
<i>Inorganic Nutrients</i>			
Nitrogen Autotroph Taxa Percent	88.50%		
Eutraphentic Taxa Percent	76.83%		
Rhopalodiales Percent	0.50%		
<i>Metals</i>			
Disturbance Taxa Percent	5.83%	Excellent	Excellent
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	23.50%		
Abnormal Cells Percent	0.00%	Excellent	

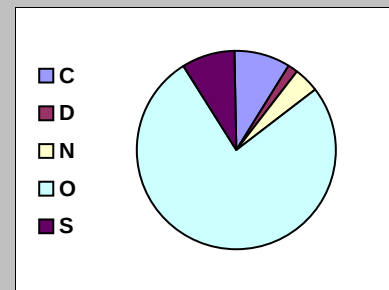
BiolIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Good
MTP	Montana DEQ Plains (Bahls 1992)	Good

Increaser/Decreaser Taxa (Tepley and Bahls 2005)

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	15.33%	31.56%
Mountains Metals Increasers Taxa Percent	3.17%	4.75%
Mountains Nutrient Increasers Taxa Percent	4.17%	7.35%
Mountains Sediment Increasers Taxa Percent	13.33%	30.50%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	2.17%	86.43%
Plains General Increasers Taxa Percent	10.50%	5.05%



Dominant Taxa

Category	A	PRA
Cocconeis placentula sensu lato	223	37.17%
Planothidium lanceolatum	121	20.17%
Amphora pediculus	42	7.00%
Achnanthidium minutissimum	35	5.83%
Planothidium frequentissimum	34	5.67%
Rhoicosphenia abbreviata	15	2.50%
Nitzschia inconspicua	9	1.50%
Nitzschia dissipata	8	1.33%
Sellaphora atomoides	8	1.33%
Melosira lineata	8	1.33%

Metrics Report

Project ID: SW17CHP
Sample ID: SW17CHP006
Station Name: Upper Willow Creek
Client ID: WC-06
STORET ID: WC-06
Date Collected: 9/20/2017
Count Of Taxon: 36
Sum Of Count: 600

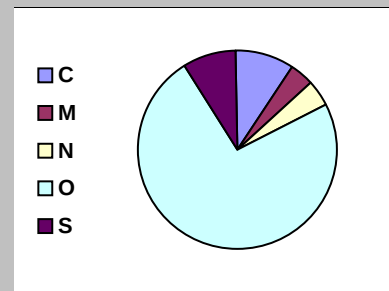
Metrics (Bahls 1993)

Metric	Value	MTM	MTP
<i>Community Structure</i>			
Shannon H (log2)	2.814	Good	Fair
Species Richness	36	Excellent	Good
Native Taxa Percent	0.17%		
Cosmopolitan Taxa Percent	93.83%		
Mountains Rare Taxa Percent	0.00%		
Plains Rare Taxa Percent	0.00%		
Dominant Taxon Percent	52.50%	Fair	Fair
<i>Sediment</i>			
Siltation Taxa Percent	11.00%	Excellent	Excellent
Motile Taxa Percent	13.83%		
Mountains Brackish Taxa Percent	94.00%		
Plains Brackish Taxa Percent	0.00%		
<i>Organic Nutrients</i>			
Pollution Index	2.697	Excellent	Excellent
Nitrogen Heterotroph Taxa Percent	5.17%		
Polysaprobous Taxa Percent	22.33%		
Low DO Taxa Percent	3.50%		
<i>Inorganic Nutrients</i>			
Nitrogen Autotroph Taxa Percent	88.83%		
Eutraphentic Taxa Percent	80.83%		
Rhopalodiales Percent	0.00%		
<i>Metals</i>			
Disturbance Taxa Percent	5.67%	Excellent	Excellent
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	15.33%		
Abnormal Cells Percent	0.00%	Excellent	

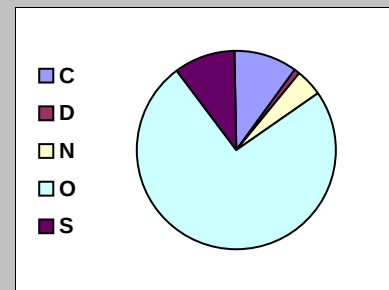
BiolIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Fair
MTP	Montana DEQ Plains (Bahls 1992)	Fair

Increaser/Decreaser Taxa (Teply and Bahls 2005)

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	11.83%	25.46%
Mountains Metals Increasers Taxa Percent	4.67%	5.82%
Mountains Nutrient Increasers Taxa Percent	5.00%	8.08%
Mountains Sediment Increasers Taxa Percent	10.83%	24.83%



Metric	Value	Prob.
Plains General Decreasers Taxa Percent	1.00%	88.10%
Plains General Increasers Taxa Percent	12.33%	6.55%



Dominant Taxa

Category	A	PRA
Cocconeis placentula sensu lato	315	52.50%
Planothidium lanceolatum	82	13.67%
Achnanthidium minutissimum	34	5.67%
Amphora pediculus	28	4.67%
Rhoicosphenia abbreviata	26	4.33%
Planothidium frequentissimum	16	2.67%
Sellaphora atomoides	14	2.33%
Navicula cryptotenella	10	1.67%
Sellaphora nigri	10	1.67%
Nitzschia inconspicua	7	1.17%

Metrics Report

Project ID: SW17CHP
Sample ID: SW17CHP007
Station Name: Upper Shellebarger Creek
Client ID: WC-07
STORET ID: WC-07
Date Collected: 9/20/2017
Count Of Taxon: 16
Sum Of Count: 600

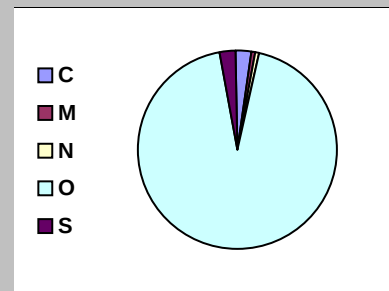
Metrics (Bahls 1993)

Metric	Value	MTM	MTP
<i>Community Structure</i>			
Shannon H (log2)	1.000	Poor	Poor
Species Richness	16	Fair	Poor
Native Taxa Percent	0.17%		
Cosmopolitan Taxa Percent	99.50%		
Mountains Rare Taxa Percent	0.17%		
Plains Rare Taxa Percent	0.00%		
Dominant Taxon Percent	84.17%	Poor	Poor
<i>Sediment</i>			
Siltation Taxa Percent	1.50%	Excellent	Excellent
Motile Taxa Percent	3.33%		
Mountains Brackish Taxa Percent	99.00%		
Plains Brackish Taxa Percent	0.00%		
<i>Organic Nutrients</i>			
Pollution Index	2.878	Excellent	Excellent
Nitrogen Heterotroph Taxa Percent	0.67%		
Polysaprobous Taxa Percent	11.67%		
Low DO Taxa Percent	0.17%		
<i>Inorganic Nutrients</i>			
Nitrogen Autotroph Taxa Percent	98.67%		
Eutraphentic Taxa Percent	96.33%		
Rhopalodiales Percent	0.00%		
<i>Metals</i>			
Disturbance Taxa Percent	0.33%	Excellent	Excellent
Acidophilous Taxa Percent	0.00%		
Metals Tolerant Taxa Percent	9.67%		
Abnormal Cells Percent	0.00%	Excellent	

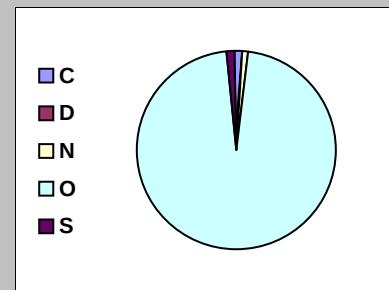
BiolIndex	Description	Rating
MTM	Montana DEQ Mountains (Bahls 1992)	Poor
MTP	Montana DEQ Plains (Bahls 1992)	Poor

Increaser/Decreaser Taxa (Teply and Bahls 2005)

Metric	Value	Prob.
Mountains General Increasers Taxa Percent	2.67%	12.92%
Mountains Metals Increasers Taxa Percent	0.67%	3.29%
Mountains Nutrient Increasers Taxa Percent	0.67%	4.65%
Mountains Sediment Increasers Taxa Percent	2.67%	10.75%



Metric	Value	Prob.
Plains General Increasers Taxa Percent	1.50%	1.10%



Dominant Taxa

Category	A	PRA
Cocconeis placentula sensu lato	505	84.17%
Planothidium lanceolatum	57	9.50%
Amphora pediculus	8	1.33%
Planothidium frequentissimum	7	1.17%
Rhoicosphenia abbreviata	4	0.67%
Nitzschia inconspicua	3	0.50%
Staurosira construens v. venter	3	0.50%
Reimeria sinuata	3	0.50%
Achnanthes minutissimum	2	0.33%
Navicula cryptotenella	2	0.33%

Appendix D

Important Information About Your Geotechnical/Environmental Report



Date:	June 20, 2019
To:	Mr. Zach Richardson, PE
	City of Edmonds Public Works Department

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ ENVIRONMENTAL REPORT

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland