MEMORANDUM

TO: Brad Phelps, Project Manager, CH2M Hill
FROM: Brad Gamble, Henry Hunt and Sam Stowe,
Layne Ranney Collector Wells
RE: Results: Test Borings and Hydraulic Interval Testing
Cowlitz River Alluvial Aquifer Collector Well Feasibility Study

DATE: March 3, 2016

INTRODUCTION

The City of Longview currently operates four deep (352-385 feet) water supply wells constructed in the alluvium associated with the Columbia River. These wells, constructed in the Mint Farm Industrial Park, are located in the western portion of the City. The City initiated an investigation to determine the feasibility of replacing their current water supply wells using collector well technology from the alluvium in the Cowlitz River valley, which generally forms the eastern boundary of the City.

In order to determine if the hydrogeologic conditions are sufficient to develop a collector well (or wells) along the Cowlitz River, Layne was authorized to undertake a phased drilling and testing program. The first phase involved drilling test borings in three locations north of the City and conducting hydraulic interval testing. The results of this recently completed work, the capacity estimates and water quality analyses are presented in this memorandum. The data collected were evaluated primarily to determine if additional detailed aquifer testing is warranted, and if so, the most favorable location to conduct the detailed aquifer testing, which constitutes the second phase of this investigation.

FIELD ACTIVITIES

In order to evaluate the hydraulic character of the alluvial deposits, a total of three (3) test borings were drilled by Cascade Drilling, L.P. using rotasonic drilling technology, under the supervision of an experienced Layne hydrogeologist. Test boring TH-1 was drilled in Riverside County Park (Site 1), test boring TH-2 was drilled along Solomon Road (Site 2), and test boring TH-3 was drilled adjacent to the (inactive) Fishers Lane Water Treatment Plant (FLWTP) (Site 3) as shown in Figures 1 and 2. Each boring was advanced until it was confirmed that the base of coarse-grained alluvial deposits was encountered. Lithologic samples were retained from

every five (5) feet of depth and at each change in formation materials. Selected samples from each boring were retained by Layne for grain size analysis. Lithologic samples not retained by Layne were submitted to the City at the end of the field activities.

Hydraulic interval pumping tests were conducted in borings at two of the three locations (Sites 1 and 3). At Site 1 a single test boring, TH-1, was drilled, and the interval test was conducted in this boring. At Site 3, boring TH-3 was drilled for the lithologic characterization and installation of an observation well; then a larger diameter boring, TH-3a, was drilled 8.5 feet away from TH-3 to conduct the hydraulic interval test. Some stratigraphic differences were noted between the two borings which may be the result of variability within the formation and/or differences in sampling between the two borings. No hydraulic interval test was conducted at Site 2 because the saturated thickness of sand and gravel aquifer encountered in TH-2 was so thin and the deposits above and below the aquifer deposits were of sufficiently low permeability that they would likely restrict recharge to the thin sand and gravel layer that was encountered at 55.5 to 58 feet below ground surface.

The vertical interval (depth) to be tested in borings TH-1 and TH-3a was selected by the hydrogeologist on the basis of the drilling and material sampling results. Upon reaching the total completion depth of the test boring, the casing was pulled back to the bottom of the interval to be tested, and a 15-foot length of well screen (6-inch diameter, wire-wrapped continuous slot) was installed in the selected interval using the pullback method. The screen slot size was 0.020-inch.

An electric submersible pump capable of pumping up to 125 gallons per minute (gpm) was used to develop the test wells and conduct the test pumping. Development of the interval tested was accomplished by surging and airlifting for up to two hours until the water produced was visibly clear and contained little or no sediment. For the tests, the selected interval was pumped for two (2) hours, with the pumping period divided into four (4) steps of thirty (30) minutes duration. During each step, the pumping was maintained at a constant rate.

During the hydraulic interval test pumping periods, depths to water in the test wells were measured to the nearest 0.01 foot. The elapsed time of pumping to the nearest minute and the pumping rate associated with the water level measurements were also recorded. The approximate elevation

of the Cowlitz River in this area was also monitored during this testing using a stage gage at the existing intake near the FLWTP and a nearby U.S. Army Corps of Engineers gaging station. An in-line electronic flowmeter (Great Plains Industries, Inc. Model TM200-N) was used to measure the pumping rates.

During each step of the pumping period, water level measurements in the test boring were made on at approximately the following schedule:

- Every 1 minute for 0 to 6 minutes from the start of the step;
- Every 2 minutes for 6 to 12 minutes from the start of the step;
- Every 5 minutes after 15 minutes from the start of the step.

During the hydraulic interval testing, water samples were field screened for pH, conductivity, iron and temperature by Layne. Additionally, water samples were collected by CH2M during the pumping period and submitted to the ALS Environmental Kelso Laboratory for laboratory analysis of water quality parameters selected by CH2M. Water samples were not collected at Site 2 because that location had been determined unfavorable due to the limited saturated thickness of sand and gravel. A water sample was also collected from the Cowlitz River by Layne for general background screening purposes.

Two of the borings, TH-1 and TH-3, were converted to 2-inch diameter PVC observation wells. Each observation well was installed with 10 feet of machine slotted PVC well screen. At TH-1 (in Riverside County Park), the top of the observation well was completed with a flush-grade cover. At TH-3 (FLWTP site), the top of the observation well was completed with an above-grade 4-inch square steel protective casing with a lockable lid. Water-tight plugs were installed in the tops of the PVC casings in both observation wells. The other borings, which were no longer needed for exploratory testing, TH-2 and TH-3a, were properly abandoned following completion of the drilling by filling with bentonite chips per WAC 173-160-381 and Department of Ecology requirements.

TEST DRILLING RESULTS

Detailed logs of the materials encountered in the boreholes are presented in Attachment 1, and a summary of information on the boreholes and observation wells is presented in Table 1. The sieve analysis results are presented in Attachment 2 and summarized in Table 2.

The borings were drilled to total depths of 60 to 80 feet. All of the borings were advanced until about 10 feet of low permeability materials were encountered. In all of the borings, alluvial deposits of unconsolidated sand with varying amounts of gravel were present from just below the ground surface to depths of 48 to 58 feet. The coarse-grained alluvial deposits were underlain by layers of comprised mainly of clay and/or silt, which will not yield usable quantities of water and would impede recharge to any more permeable deposits that might be present at greater depths. The grain size distribution of the coarse-grained alluvial deposits encountered in the borings varied from nearly all sand to more than 70% gravel (based on the Wentworth grain size classification). The greatest depth to the base of the coarse-grained sand and gravel deposits was at 58 feet in TH-2, which is the boring along Solomon Road. However, in this boring the sand and gravel was only 2.5 feet thick. The shallowest depth to the base of the coarse-grained sand and gravel deposits was at 48 feet in TH-3 at the FLWTP. The sand and gravel was 13 feet thick in TH-3. In TH-1 in Riverside County Park the depth to the base of the sand and gravel was at 50 feet, and this boring encountered the thickest layer of coarse-grained sand and gravel at 23 feet thick.

The uppermost sediments encountered at Riverside County Park could be the result of dredging operations in the area following the 1980 eruption of Mt. St. Helens and subsequent surge flows down the Cowlitz and Toutle Rivers. A local resident described the pumping of dredge spoil sediments into the park area at some time in the past, presumably to raise the grade elevation in this area.

The measured depths to water in the borings varied from about 12 to 19 feet below ground with the water table elevations estimated to be about 15 to 23 feet above sea level. The saturated thickness above the base of the coarse-grained sand and gravel deposits varied from about 35 to 39 feet, with the greatest saturated thickness occurring at TH-2 where the base of the sand and gravel was encountered at the lowest elevation. However, as indicated above, there is only about 2.5 feet of sand and gravel present at TH-2. The remainder of the saturated thickness above the sand and gravel in TH-2 is comprised of clayey silt and silty sand which will not yield usable quantities of water.

In addition to the three test borings completed as part of this phase, the results from drilling of a test boring during a 1977 investigation for the City of Kelso (T.H.2) on a property (referred to as the Ostrander Rock Property)

in the vicinity of the Solomon Road Site (the approximate location shown on Figure 2) was also considered. Attempts were made to gain access to this property for the purposes of installing a new test boring, however, an agreement could not be reached within the time frame of this study schedule. The previous boring conducted in 1977 showed a saturated sand and gravel aquifer thickness of approximately 32 feet. The previous boring was completed before the eruption of Mt. St. Helens, and the information in the 1977 report does not reflect the possible accumulation of dredge spoils or river surge flows that may have been deposited post-1980. These deposits could have raised the grade elevation from what was observed at in 1977.

HYDRAULIC INTERVAL TEST RESULTS

The hydraulic interval pumping test data are presented in Attachment 3, and a summary of the pumping test results is presented in Table 3. Time drawdown plots for the pumping tests are presented in Figures 3 and 4.

For the hydraulic interval pumping test conducted at TH-1 (Riverside County Park), the observed drawdown value (the difference between the static and the pumping water levels in the wells) at the end of the step at the maximum pumping rate of 121 gpm was 1.66 feet. The observed specific capacity (the ratio of the pumping rate to the drawdown) for this step is 73 gallons per minute per foot of drawdown (gpm/ft).

At TH-3a (FLWTP site), the maximum pumping rate that could be sustained was 91 gpm and the observed drawdown at the end of the step at this rate was 8.09 feet giving a specific capacity of only 11 gpm/ft.

Estimates of the aquifer transmissivity and hydraulic conductivity were made based on the observed specific capacity values. These transmissivity and hydraulic conductivity values should be considered as very approximate estimates given factors such as the short-term length of the pumping tests, potential boundary effects, possible recirculation of the discharge water, and pumping well efficiency.

Transmissivity of an unconfined aquifer can be estimated from specific capacity using the following equation (Driscoll, 1986):

$$T = 1500 * Q/s$$

Where: T = transmissivity, gpd/ft
Q/s = specific capacity, gpm/ft
Q = pumping rate, gpm
s = drawdown, feet

Hydraulic conductivity is related to transmissivity by the following equation:

$$K = T/b$$

Where: K = hydraulic conductivity, gpd/ft^2
b = aquifer thickness, feet

The specific capacity data from the tests were adjusted for well efficiency and partial penetration effects using an equation by Kozeny (Driscoll, 1986), such that:

$$T = \frac{1500 \cdot Q/s}{X \cdot E}$$

$$X = L \cdot \left[1 + 7 \cdot \sqrt{\frac{r}{2 \cdot b \cdot L}} \cdot \cos\left(\frac{\pi \cdot L}{2} \right) \right]$$

Where: T = aquifer transmissivity, gpd/ft
Q = pumping rate, gpm
s = drawdown, feet
r = well radius, in feet
b = saturated aquifer thickness, feet
L = well screen length as a fraction of aquifer thickness
r = well radius, feet
X = partial penetration adjustment
E = well efficiency

For the analysis, the well efficiency was estimated using the methods presented by Bruin and Hudson (1955).

The estimated transmissivity values from the hydraulic interval tests are included in Table 3. For the TH-1 site, the transmissivity values were calculated with and without the partial penetration correction. The Kozeny equation used to adjust for partial penetration assumes that the aquifer is homogeneous and isotropic. At the TH-1 site, the aquifer materials have a fining upward character, where grain-size becomes finer in the upward direction with finer-grained material lying over coarser sediments. Because of this, the partial penetration adjustment may result in an optimistic

estimate of the transmissivity and hydraulic conductivity values. In the temporary well installed in TH-3a for the interval test, the screened zone fully penetrated the sand and gravel layer and so a correction for partial penetration is not needed.

The results for the TH-1 test without the partial penetration correction are approximately 136,000 gallons per day per foot (gpd/ft) for the transmissivity and approximately 3,600 gallons per day per square foot (gpd/ft^2) for the hydraulic conductivity. With the partial penetration correction, the results for the TH-1 test are about 240,000 gpd/ft for the transmissivity and about 6,400 gpd/ft^2 for the hydraulic conductivity. It is likely that the actual aquifer properties are intermediate between the values obtained with and without the partial penetration correction.

The results for the TH-3a test are approximately 35,000 gpd/ft for the transmissivity and approximately 2,700 gallons gpd/ft^2 for the hydraulic conductivity. However, the drawdown data obtained from the observation well installed in boring TH-3 during the TH-3a interval test suggests that the hydraulic conductivity at the TH-3a site could be higher than was calculated based on the pumping well data and could be similar to the upper range of the values obtained for the TH-1 site. Hydraulic conductivity values between 3,000 and 5,000 gpd/ft^2 are in the expected range for an aquifer comprised mainly of sand and gravel of a character similar to that observed during the drilling.

WATER QUALITY

The results of the field water quality testing conducted during the hydraulic interval tests are presented in Table 4. The laboratory results from the TH-1 samples are summarized in Table 5, and the laboratory results from the TH-3a samples are summarized in Table 6. The laboratory reports are attached as Attachment 4. The field water quality measurements indicated that the ground water temperatures averaged between 53 degrees F (11.4 degrees C) at TH-1 and 50 degrees F (10.3 degrees C) at TH-3a. The specific conductance values averaged 240 micro Siemens per centimeter (µS/cm) at TH-1 and 230 µS/cm at TH-3a. Field sampling and testing for iron concentrations exceeded the limits of the field testing equipment, suggesting the iron concentrations were above the testing limit of 5 milligrams per liter (mg/l).

The laboratory iron concentrations for the samples from TH-1 and TH-3a were 11.1 and 12.5 mg/l, respectively, both of which are considerably

above the secondary drinking water standard for iron of 0.30 mg/l. The manganese results for TH-1 at 0.29 and for TH-3a 0.64 mg/l exceed the secondary drinking water standard for manganese of 0.050 mg/l. The aluminum result for TH-3a at 0.27 mg/l exceeds the secondary drinking water standard for aluminum of 0.2 mg/l, and the aluminum result for TH-1, at 0.04 mg/l is below the secondary standard. Secondary drinking water standards are generally established for aesthetic reasons to control issues of color, odor or the potential for staining, rather than for health effects.

A water sample from the Cowlitz River was collected by Layne at Riverside County Park for general background screening and comparison to the ground water quality. The results for the river water sample are summarized in Table 7 and the laboratory report is included as Attachment 5. The aluminum, iron and manganese concentrations in the river water sample also exceed the secondary drinking water standards, but the iron concentration in the river water at 0.43 mg/l is substantially lower than the iron concentrations in the sample from TH-1 and TH-3a. Silica levels in the Cowlitz River were reported at 18 mg/L, notably lower than the total silica levels reported in ground water samples collected from TH-1 and TH-3a at 58 mg/L and 49 mg/L, respectively. Arsenic was reported as non-detect in samples from all three sources.

AQUIFER CHARACTERIZATION

The unconsolidated sand and gravel deposits encountered in the test borings are part of the Cowlitz River Valley alluvial aquifer system. There are permeable sand and gravel deposits present at each of the test boring locations, to varying degrees of thickness, which are a source of ground water supply. Based on their fine-grained nature, the deposits observed just below the sand and gravel aquifer deposits likely have very low permeability and would yield negligible quantities of water to wells.

The limited saturated thickness of sand and gravel at borings TH-2 and TH-3 and the relatively low hydraulic conductivity values at TH-2 limit the potential yield of production wells at those test boring locations. Of the sites tested, the TH-1 location in Riverside County Park is the most favorable location for ground water supply development based on the higher transmissivity values for that location and the greater saturated thickness. The location of the test boring T.H.2 made in 1977 (Ostrander Rock Property) also appears potentially favorable due to the well log description and the reported saturated thickness, however, confirmation of

the depth, permeability and saturated thickness of those deposits is required to verify the aquifer conditions and potential well yield projections at this prospective location.

Based on the available information from a nearby City of Kelso radial collector well constructed in the alluvial deposits along the Cowlitz River, it appears the aquifer conditions and the potential productivity at the Riverside County Park site may be similar or more favorable than those for the existing collector well operated by the City of Kelso. The yield estimated for a collector well installed at TH-1 (Riverside County Park), up to 9 million gallons per day (MGD) under test conditions, is above the yield reported for the Kelso collector well on an average pumping basis.

The information from drilling and testing TH-1 and TH-3a, and from the existing radial collector well, suggests that the areas upstream from the Ostrander Rock Property to Riverside County Park along the Cowlitz River appear favorable for development of a horizontal collector well water supply. At both Riverside County Park and the Ostrander Rock property, there is a flood control levee that runs the length of each property following the Cowlitz River. It is understood that subsurface construction in either area will require discussions and compliance with levee-related regulations for locating and operating wells.

HORIZONTAL COLLECTOR WELL YIELD ESTIMATE

Using the recent testing results, estimates for the yield of horizontal collector well can be calculated. The theoretical drawdown under steady-state pumping conditions in a collector well can be calculated using the following equation developed by Hantush and Papadopulos (1962):

$$s_{cs} \geq \left(\frac{Q}{2\pi Kb}\right) \mathrm{Ln}\left[\frac{\Gamma^{\Gamma}}{\varepsilon^{\varepsilon}}\left(\frac{\left(\frac{b}{\pi r_w}\right)^2}{2\left(1 - \cos\frac{\pi}{b}\left(2z_i + r_w\right)\right)}\right)^{\frac{b}{4l}}\right]$$

where:
- s_{cs} = Drawdown in collector well, ft
- Q = Yield of collector, gpd
- K = Hydraulic Conductivity, gpd/ft2
- b = Saturated thickness of aquifer, ft

Γ = $(2 (a - r_c))/l$
a = Effective distance to a line of recharge, ft
l = Average length of laterals, ft
r_c = Radius of collector caisson, ft
ε = $(2a - r_c - l)/l$
r_w = Effective radius of each lateral, ft
z_i = Depth of lateral below top of the aquifer, ft

The test boring location with the most favorable aquifer conditions of the three sites tested in this investigative study is TH-1. Using a variation of the above equation, the potential collector well yield was estimated using values determined by the test results and the hydrogeologic setting of the TH-1 and TH-3a locations. To estimate yield, the design depth to centerline elevation of the laterals is assumed at seven (7) feet above the estimated base of the alluvial aquifer and the minimum pumping level at ten (10) feet above the centerline of the laterals. The effective distance to recharge was assumed to equal the distance from the test boring locations to the middle of the Cowlitz River. The assumed collector well design utilized five (5) laterals with an average lateral length of 200 feet. For comparability, the same number and length of laterals were used for the yield calculations for both sites. However, because of the proximity to structures and property lines for the TH-3a site, installation of five 200-foot laterals would require the demolition of existing structures and/or the acquisition of additional property. The calculated yields for the TH-3a site are too low to justify installation of five laterals (three would be sufficient). The collector well yield estimates for both sites assume no pumping interference from any adjacent wells.

For both sites, the collector well yields were calculated with a low and high estimate of the hydraulic conductivity. For the TH-1 site, the hydraulic conductivity values used for the yield estimates were those obtained from the interval test analysis with and without the partial penetration correction (3,600 and 6,400 gpd/ft^2). For the TH-3a site, the low hydraulic conductivity value was from the interval test analysis (2,700 gpd/ft^2) and the high hydraulic conductivity value (6,400 gpd/ft^2) was the same as the high value for the TH-1 site.

Based on the equation and the assumptions presented above, the yield of a collector well installed near the TH-1 location under the conditions present during testing is estimated to be in the range of 3,570 to 6,340 gpm or 5.1 to 9.1 MGD. The yield of a collector well installed near the TH-3a location

under the conditions present during the testing is estimated to be in the range of 1,150 to 2,730 gpm or 1.7 to 3.9 MGD. The actual collector well yields will depend on how well the actual conditions match the assumed conditions and will vary with changes in recharge conditions, river and ground water levels and river and ground water temperatures. It is estimated that during the interval testing the Cowlitz River levels were 3 to 4 feet above normal low river levels. Reducing the static water levels by 3 to 4 feet to adjust for normal river conditions could reduce the estimated yields by 20% or more from the values presented above.

Considering the estimated yield for a collector well at the Riverside County Park site, and assuming that a similar yield could also be developed at other sites within the park boundaries, it appears that two collector wells could be installed on this property to produce a combined capacity of 10 to 18 MGD, assuming minimal pumping interferences between the wells. Depending upon property line and levee set-backs/easements, it may be possible to locate three collector wells on the Riverside County Park site, although there would likely be hydraulic interference between the wells, possibly reducing their individual yields. Similarly, it appears that two collector wells could be installed within the estimated property boundaries for the Ostrander Rock site downstream where T.H.2 was installed in 1977, and could also produce in the range of 10 to 18 MGD, assuming aquifer conditions at this site are at least as favorable as the aquifer conditions tested at Riverside County Park. A collector well at the FLWTP might be capable of 1 to 4 MGD, at most. At all of the sites, criteria such as levee easements and restrictions, property line set-backs and property owner (e.g. Riverside County Park) preferences will direct the final well location selections.

SUMMARY / RECOMMENDATIONS

The City of Longview is considering the feasibility of installing collector wells along the Cowlitz River to supplement and/or replace some or all of the capacity produced from the existing vertical wells at the Mint Farm Regional Water Treatment Plant. In order to determine if the existing hydrogeologic conditions are sufficient to develop a collector well in one or more areas along the Cowlitz River, Layne has recommended a phased drilling and testing program. The first phase, involving test borings and hydraulic interval testing, was recently completed. In this phase, three test borings were drilled using rotasonic methods at locations within the Riverside County Park (Site 1), along Solomon Road near West Side Highway (Site 2), and within the inactive Fishers Lane Water Treatment

Plant (Site 3). Hydraulic interval pumping tests were conducted at Sites 1 and 3.

The three test borings conducted in the first phase of the investigation showed that the coarse-grained sand and gravel aquifer materials were present from just below the ground surface to depths of 48 to 58 feet, although the full depth of the borings was not water bearing. The alluvial deposits were underlain by layers comprised primarily of clay and/or silt, deposits which likely have very low permeability. The saturated thickness of the coarse-grained sand and gravel deposits at the test boring locations were 2.5 to 23 feet. The transmissivity results from the TH-1 site range from about 135,000 to 240,000 gpd/ft and the estimated hydraulic conductivity values vary from about 3,600 to 6,400 gpd/ft^2. The transmissivity result from the TH-3a site is about 35,000 gpd/ft and the estimated hydraulic conductivity value is about 2,700 gpd/ft^2. The limited saturated thickness values and/or relatively low hydraulic conductivity values limit the potential yield of production wells at Sites 2 and 3. Site 1 (Riverside County Park) is the most favorable location for ground water supply development based on the higher saturated thickness and transmissivity value at that location. Additionally, a test boring (T.H.2) made in 1977 on the Ostrander Rock Property near the test site along Solomon Road suggests favorable aquifer deposits may also exist at that location.

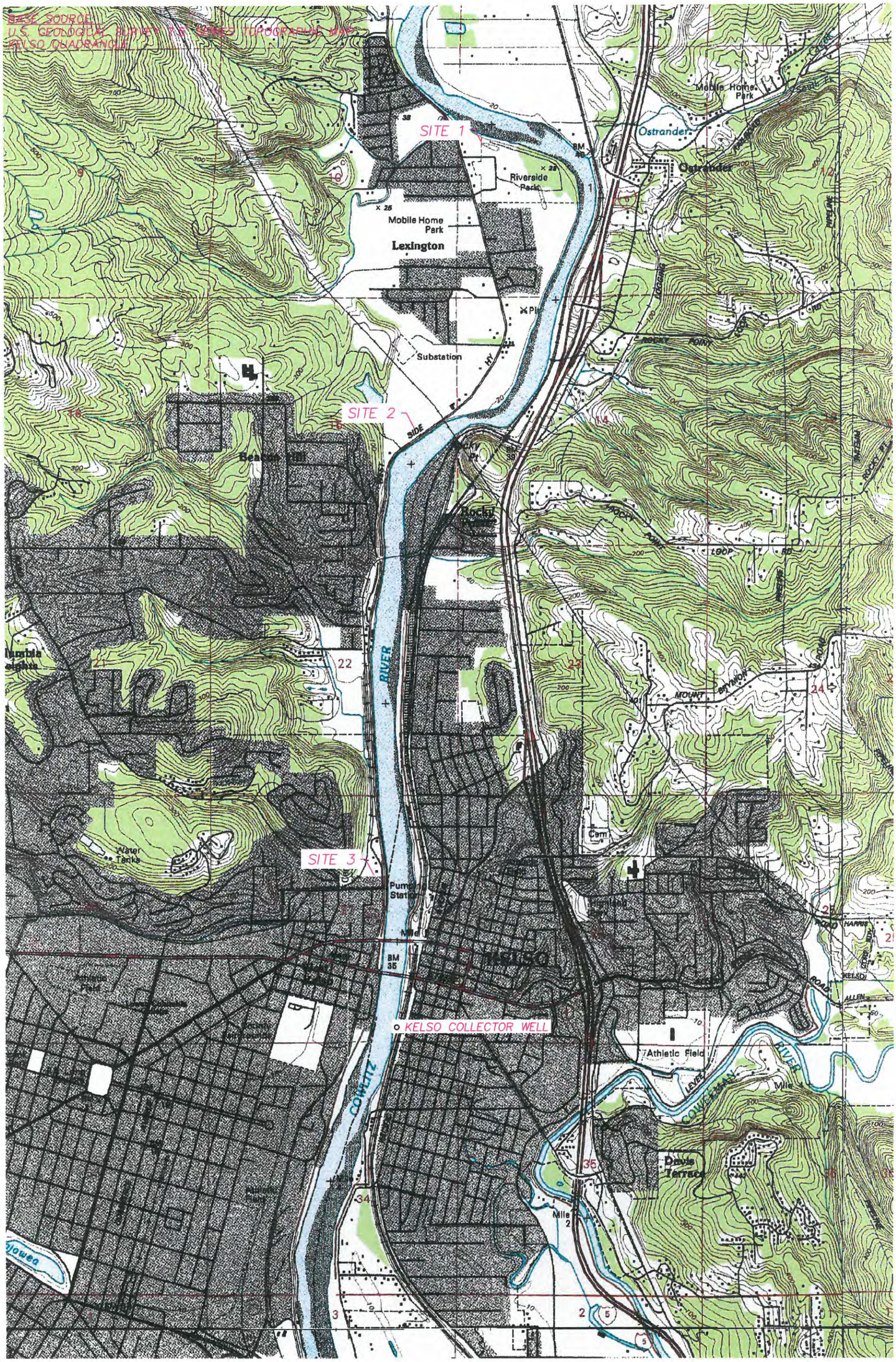
The estimated yield of a collector well installed at the Riverside County Park under the conditions present during the initial testing phase is estimated to be between 5 to 9 MGD.

If the City wishes to continue to investigate the feasibility of developing a water supply using collector well technology along the Cowlitz River, Layne recommends continuing with the phased testing approach, which would involve additional detailed aquifer testing. The transmissivity and hydraulic conductivity values from the short-term pumping tests conducted at TH-1 and TH-3a should be considered as very approximate values. Because the collector well yield estimates utilize these transmissivity and hydraulic conductivity values, they must also be considered very approximate. A longer term pumping test conducted with a higher pumping rate and with multiple observation wells is necessary to accurately determine the aquifer characteristics and allow for accurate estimates of collector well yields. Also, additional borings are required to evaluate the potential for variability in the aquifer properties. Layne recommends installing a larger temporary

production test well to be used for the detailed aquifer testing. To accurately determine the aquifer characteristics, we recommend installing up to three additional observation wells adjacent to the production test well and using the initial well TH-1 as an additional observation well. The detailed aquifer testing would then be conducted.

It is also recommended that if the City wishes to continue to investigate the feasibility of installing a collector well on the Ostrander Rock Property, access rights should be pursued for the purposes of drilling an exploratory test boring and conducting a hydraulic interval test there to compare with the results from the drilling and testing of the boring in the Riverside County Park. If this initial testing phase suggests that aquifer conditions here are favorable, the City may elect to conduct the next phase of testing (detailed aquifer testing) at that location in lieu of or in addition to the Riverside County Park site.

FIGURES

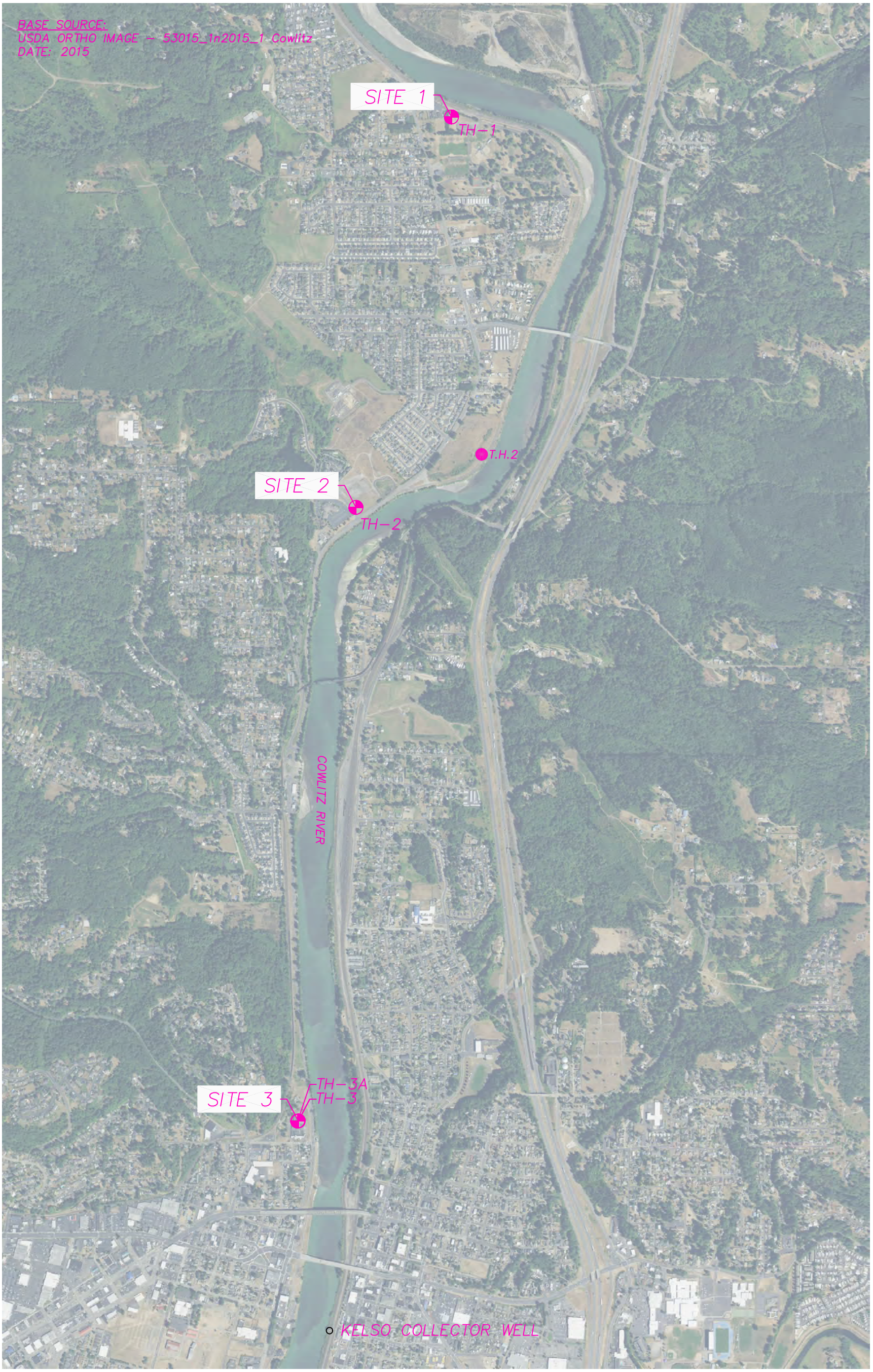


Layne
Ranney Collector Wells
6360 HUNTLEY ROAD
COLUMBUS, OHIO 43229
(614) 888-6263 / FAX (614) 888-9208

GENERAL LOCATION MAP

CITY OF LONGVIEW, WASHINGTON
COLLECTOR WELL FEASIBILITY INVESTIGATION

FILE NAME:	DATE:	FIGURE
38941-01	02/11/2016	1
PROJECT #: 38941	SCALE: 1" = 2000'	



NORTH

SCALE IN FEET

0 750 1500 3000 4500

Layne Ranney Collector Wells

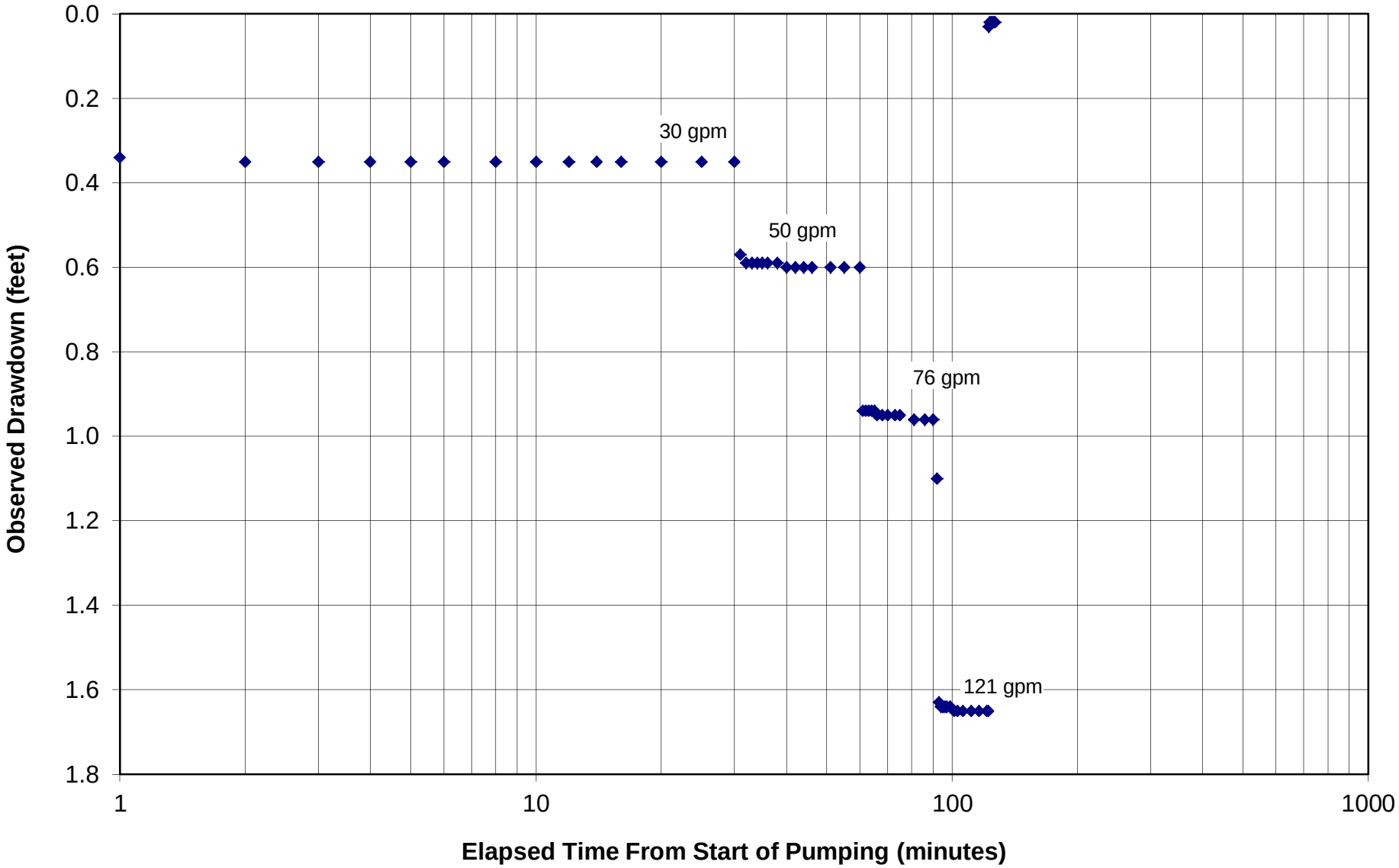
6360 HUNTLEY ROAD
COLUMBUS, OHIO 43229
(614) 888-6263 / FAX (614) 888-9208

BORING LOCATION MAP

CITY OF LONGVIEW, WASHINGTON
COLLECTOR WELL FEASIBILITY INVESTIGATION

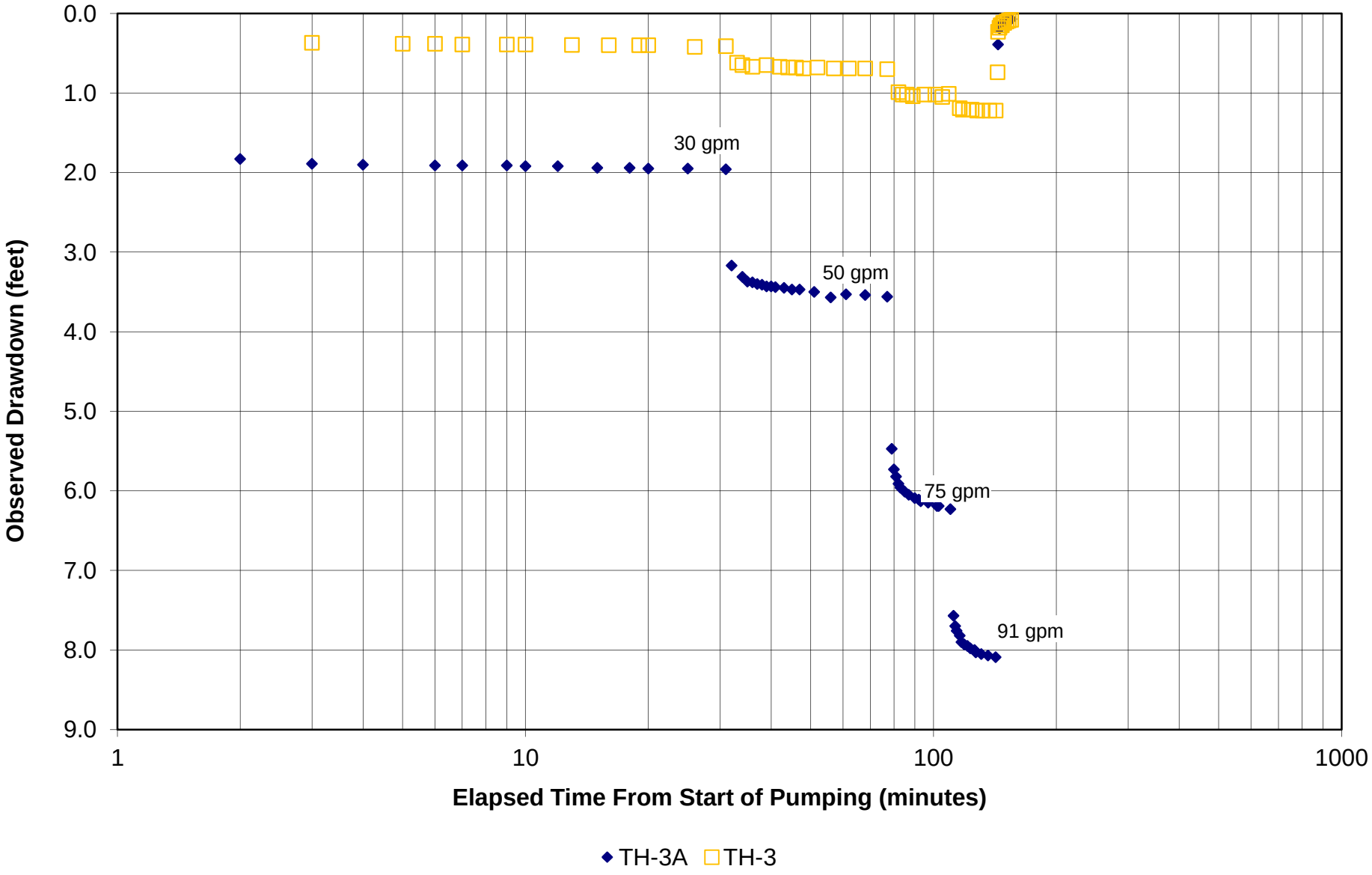
FILE NAME:	DATE:	FIGURE
38941-03	02/11/2016	2
PROJECT #: 38941	SCALE: 1" = 2000'	

FIGURE 3
Boring TH-1 Hydraulic Interval Test Time Versus Drawdown Plot
CH2M Hill - City of Longview, Washington



File: 38941 TB-1 Interval Test Analysis.xlsx Print Date: 2/18/2016

FIGURE 4
Boring TH-3A Hydraulic Interval Test Time Versus Drawdown Plots
CH2M Hill - City of Longview, Washington



File: 38941 TB-3A Interval Test Analysis.xlsx Print Date: 2/18/2016

TABLES

TABLE 1

Boring and Well Information Summary

CH2M Hill - City of Longview, Washington

Boring ID	Date Drilled	Total Depth Drilled (feet)	Depth to Base of Sand and Gravel (feet)	Approximate Location Coordinates [1] UTM Zone 10 - NAD83 Easting (meters)	Northing (meters)	Ground Surface Elevation [2] (feet)	Approximate Base of Aquifer Elevation (feet)	Interval Pumping Test Screened Depths (feet)	Monitoring Well Screened Interval Depths (feet)	Depth to Water from Ground Surface (feet date/time)		Approximate Water Elevation (feet)
TH-1	1/11/2016	60	50	507234	5115561	32.6	-17	35 - 50	40.0 - 50.0	12.4	1/12/16 8:56 AM	20.2
TH-2	1/9/2016	66	58	506785	5113728	42	-16	n/a	n/a	18.6	1/9/16 10:18 AM	23.4
TH-3	12/14/2015	80	48	506514	5110847	28.3	-20	30 - 45 [3]	35 - 45	13.1	1/11/16 12:07 PM	15.2

1) Location coordinates not surveyed. Estimated from handheld GPS receiver.

2) Ground surface elevations were surveyed at TH-1 and TH-3 and estimated from Google Earth at TH-2.

3) Interval pumping test conducted in the adjacent boring TH-3a.

TABLE 2
Grain Size Analysis Results
CH2M Hill - City of Longview, Washington

Test Hole ID	Depth Interval (feet)	Coefficient of Uniformity [2] (C_u)	Effective Grain Size [1]					Wentworth Size Fraction [3]		
			D_{10} (inch)	D_{40} (inch)	D_{50} (inch)	D_{60} (inch)	D_{90} (inch)	Gravel (percent)	Sand (percent)	Silt/Clay (percent)
TH-1	25 to 27	3.0	0.007	0.015	0.017	0.021	0.039	1.6%	96.7%	1.8%
	30 to 35	46.4	0.013	0.119	0.4 Est.	0.6 Est.	> 0.6	62.6%	36.1%	1.4%
	40 to 45	35.5	0.020	0.171	0.371	0.7 Est.	> 0.7	69.2%	29.6%	1.2%
	45 to 50	33.1	0.014	0.132	0.274	0.5 Est.	> 0.5	65.1%	33.0%	1.9%
TH-2	45 to 50	3.0	0.004	0.010	0.011	0.013	0.022	0.3%	95.6%	4.1%
	50 to 55	3.4	0.004	0.011	0.012	0.014	0.027	0.4%	94.3%	5.3%
	55.5 to 58	3.2	0.013	0.028	0.034	0.043	> 0.05	27.6%	70.1%	2.3%
TH-3	32.5 to 35	4.3	0.003	0.011	0.013	0.015	0.030	1.8%	91.3%	6.9%
	35 to 40	28.2	0.010	0.029	0.053	0.290	> 0.29	48.0%	49.2%	2.8%
	40 to 45	9.8	0.012	0.028	0.039	0.115	> 0.12	43.3%	54.7%	2.1%
	45 to 48	9.8	0.012	0.045	0.067	0.122	> 0.13	46.3%	51.4%	2.4%
TH-3a	35 to 40	4.7	0.010	0.025	0.031	0.049	> 0.05	36.3%	61.7%	2.0%
	40 to 45	4.1	0.010	0.023	0.029	0.042	> 0.05	32.1%	65.8%	2.1%

1) Effective grain size values represent diameter at percent passing fraction, e.g. D_{10} = grain diameter at 10% passing size.
Est. - effective grain size estimated when the percent passing the 3/8-inch sieve is less than the percent passing value

2) Coefficient of Uniformity = D_{60}/D_{40}. Estimated when percent passing the 3/8-inch sieve is <60%

3) Wentworth Grain Size Classification

Classification		(millimeters)	(approx. inches)
Fines	Clay	< 1/256	< 0.0002
	Silt	1/256 - 1/16	0.0002 - 0.002
Sand	Very Fine Sand	1/16 - 1/8	0.002 - 0.005
	Fine Sand	1/8 - 1/4	0.005 - 0.01
	Medium Sand	1/4 - 1/2	0.01 - 0.02
	Coarse Sand	1/2 - 1	0.02 - 0.04
	Very Coarse Sand	1 - 2	0.04 - 1/16
Gravel	Granules	2 - 4	1/16 - 3/16
	Fine Pebbles	4 - 8	3/16 - 5/16
	Medium Pebbles	8 - 16	5/16 - 5/8
	Coarse Pebbles	16 - 32	5/8 - 1-1/4
	Very Coarse Pebbles	32 - 64	1-1/4 - 2-1/2
	Cobbles	64 - 256	2-1/2 - 10
	Boulders	> 256	> 10

TABLE 3

Hydraulic Interval Pumping Test Results

CH2M Hill - City of Longview, Washington

												Without Partial Penetration Correction		With Partial Penetration Correction	
Boring	Screen Diameter	Screen Slot Size	Screen Setting Depth	Step	Observed Drawdown at End of Pumping Step	Pumping Rate at End of Step	Observed Specific Capacity at End of Step	Screen Length as Fraction of Aquifer Thickness	Partial Penetration Correction (1)	Estimated Well Efficiency (2)	Saturated Aquifer Thickness	Estimated Hydraulic Conductivity (3)	Estimated Transmissivity (4)	Estimated Hydraulic Conductivity (3)	Estimated Transmissivity (4)
	(inches)	(inches)	(feet)		(feet)	(gpm)	(gpm/ft)			(%)	(feet)	(gpd/ft^2)	(gpd/ft)	(gpd/ft^2)	(gpd/ft)
TH-1	6	0.020	35 - 50	1	0.35	30	85.7	0.40	0.57	94.4%	37.6	3,620	136,100	6,380	240,000
				2	0.6	50	83.3	0.40	0.57	91.1%	37.6	3,650	137,300	6,430	242,000
				3	0.96	76	79.2	0.40	0.57	87.0%	37.6	3,630	136,500	6,390	240,600
				4	1.66	121	72.9	0.40	0.57	80.8%	37.6	3,600	135,300	6,340	238,500
TH-3A	6	0.020	30 - 45	1	1.96	30	15.3	1.00	1	85.0%	13.0	2,770	36,000		
				2	3.56	50	14.0	1.00	1	77.3%	13.0	2,790	36,300		
				3	6.23	75	12.0	1.00	1	69.4%	13.0	2,670	34,700		
				4	8.09	91	11.2	1.00	1	65.2%	13.0	2,650	34,500		

1) Partial penetration correction:

$$X = L \cdot \left[1 + 7 \cdot \sqrt{\frac{r}{2 \cdot b \cdot L}} \cdot \cos\left(\frac{\pi \cdot L}{2} \right) \right]$$ (from Driscoll, 1986 based on Kozeny, 1933)

X = partial penetration correction; L = well screen length as a fraction of aquifer thickness; r = well radius; b = saturated aquifer thickness.

2) Well Efficiency estimated based on analysis using the methods of Bruin and Hudson, 1955

3) Hydraulic Conductivity = transmissivity divided by the saturated aquifer thickness, K=T/b

4) Transmissivity given by:

$$T = \frac{1500 \cdot Q/s}{X \cdot E}$$ for an unconfined aquifer $$T = \frac{2000 \cdot Q/s}{X \cdot E}$$ for a confined aquifer

(Driscoll, 1986)

T = aquifer transmissivity; Q = well pumping rate; s = observed drawdown; X = partial penetration correction; E = well efficiency

TABLE 4
Field Water Quality Summary
CH2M Hill - City of Longview, Washington

Sample Source	Date	Time	Temperature (degees F)	Temperature (degees C)	Specific Conductance (uS/cm)	pH (S.U.)	Iron (mg/l)	Comments
TH-1	01/12/16	10:00 AM	52.8	11.5	250	6.0	> 5	Step 1
		10:31 AM	52.6	11.4	240	6.3	> 5	Step 2
		11:01 AM	52.4	11.3	240	6.5		Step 3
		11:35 AM	52.2	11.2	240	6.5	> 5	Step 4
TH-3a	01/07/16	12:49 PM	50.4	10.2	240			During development
		1:38 PM	50.2	10.1	220			During development
		3:12 PM	50.9	10.5	230		> 5	Step 1
		3:50 PM	50.4	10.2	240	6.4		Step 2
		4:35 PM	50.7	10.4	230	6.2		Step 3
		5:10 PM	50.4	10.2	230	6.4		Step 4

TABLE 5
TH-1 (Riverside County Park site) Sample Laboratory Water Quality Analysis Results
CH2M Hill - City of Longview, Washington

Analyte	Analysis Method	Method Reporting Limit	Sample Result	Duplicate Result	Average of Sample and Duplicate Results	Unit
Ammonia as Nitrogen	SM 4500-NH3 G	0.05	0.366	0.373	0.37	mg/L
Nitrate as Nitrogen	300.0	0.10	ND	ND	NC	mg/L
Nitrite as Nitrogen	300.0	0.10	ND	ND	NC	mg/L
Hardness as $CaCO_3$	200.7/SM 2340B	0.07	82.1	80.6	81.4	mg/L
Chloride	300.0	0.2	7.66	7.66	7.66	mg/L
Fluoride	SM 4500-F- C Modified	0.2	ND	ND	NC	mg/L
Sulfate	300.0	0.2	ND	ND	NC	mg/L
Cyanide, Total	335.4	0.01	ND	ND	NC	mg/L
Turbidity	180.1	0.2	16.8	16.5	16.7	NTU
Carbon, Total Organic	SM 5310 C	0.5	2.3	2.02	2.16	mg/L
UV254	SM 5910 B		0.119	0.120	0.12	cm-1
Color	SM 2120 B	5	35	35	35	Color Units
Solids, Total Dissolved	SM 2540 C	10	143	144	144	mg/L
Conductivity at 25 Degrees Celsius	SM 2510 B	2	218	218	218	uMHOS/cm
Oxidation-Reduction Potential (ORP)	ASTM D1498-00		-79.7	-79.7	-79.7	mV
Oxygen, Dissolved	SM 4500-O G	1.0	1.2	1.0	1.09	mg/L
pH	SM 4500-H+ B		6.79	6.80	6.8	pH Units
Aluminum, Total	200.7	10	43.8	44.4	44.1	ug/L (ppb)
Antimony, Total	200.8	0.05	ND	ND	NC	ug/L (ppb)
Arsenic, Total	200.8	0.5	ND	ND	NC	ug/L (ppb)
Barium, Total	200.7	4	6.1	7.2	6.7	ug/L (ppb)
Beryllium, Total	200.8	0.02	ND	ND	NC	ug/L (ppb)
Cadmium, Total	200.8	0.02	ND	ND	NC	ug/L (ppb)
Calcium, Total	200.7	20	15900	15600	15800	ug/L (ppb)
Chromium, Total	200.8	0.2	ND	ND	NC	ug/L (ppb)
Copper, Total	200.7	4	ND	ND	NC	ug/L (ppb)
Iron, Total	200.7	20	11200	11000	11100	ug/L (ppb)
Lead, Total	200.8	0.02	0.12	0.11	0.11	ug/L (ppb)
Magnesium, Total	200.7	5	10300	10100	10200	ug/L (ppb)
Manganese, Total	200.7	1	293	289	291	ug/L (ppb)
Nickel, Total	200.8	0.2	0.8	0.6	0.7	ug/L (ppb)
Selenium, Total	200.8	1	ND	ND	NC	ug/L (ppb)
Silicon, as SiO_2, Total	200.7	500	58200	58250	58200	ug/L (ppb)
Silicon, as SiO_2, Dissolved	200.7	500	56100	54500	55300	ug/L (ppb)
Silver, Total	200.8	0.02	ND	ND	NC	ug/L (ppb)
Sodium, Total	200.7	200	10500	10700	10600	ug/L (ppb)
Thallium, Total	200.8	0.02	ND	ND	NC	ug/L (ppb)
Zinc, Total	200.7	4	18.7	20.1	19.4	ug/L (ppb)
Mercury, Total	1631E	0.5	ND		NC	ng/L
Orthophosphate as Phosphorus	SM 4500-P E	0.05	0.327	0.327	0.327	mg/L

ND - The contaminant was not detected at or above the stated detection limit.
NC - Not calculated

TABLE 6
TH-3a (FLWTP site) Sample Laboratory Water Quality Analysis Results
CH2M Hill - City of Longview, Washington

Analyte	Analysis Method	Method Reporting Limit	Sample Result	Duplicate Result	Average of Sample and Duplicate Results	Unit
Ammonia as Nitrogen	SM 4500-NH3 G	0.05	0.314	0.297	0.305	mg/L
Nitrate as Nitrogen	300.0	0.10	ND	ND	NC	mg/L
Nitrite as Nitrogen	300.0	0.10	ND	ND	NC	mg/L
Hardness as $CaCO_3$	200.7/SM 2340B	0.07	73.8	74.6	74.2	mg/L
Chloride	300.0	0.2	6.19	6.14	6.16	mg/L
Fluoride	SM 4500-F- C Modified	0.2	ND	ND	NC	mg/L
Sulfate	300.0	0.2	6.52	6.42	6.47	mg/L
Cyanide	335.4	0.01	ND	ND	NC	mg/L
Turbidity	180.1	0.2	5.11	5.06	5.09	NTU
Carbon, Total Organic	SM 5310 C	0.5	1.8	1.68	1.74	mg/L
UV254	SM 5910 B		0.097	0.100	0.0985	cm^{-1}
Color	SM 2120 B	5	20	20	20	Color Units
Solids, Total Dissolved	SM 2540 C	10	181			mg/L
Conductivity at 25 Degrees Celsius	SM 2510 B	2	243	242	243	uMHOS/cm
Oxidation-Reduction Potential (ORP)	D1498-00		-30.25	-30.25	-30.3	mV
Oxygen, Dissolved	SM 4500-O G	1.0	2.3			mg/L
pH	SM 4500-H+ B		6.94	6.95	6.95	pH Units
Aluminum, Total	200.7	10	270	247	258	ug/L (ppb)
Antimony, Total	200.8	0.05	ND	ND	NC	ug/L (ppb)
Arsenic, Total	200.8	0.5	ND	ND	NC	ug/L (ppb)
Barium, Total	200.7	4	7	7	7	ug/L (ppb)
Beryllium, Total	200.8	0.02	ND	ND	NC	ug/L (ppb)
Cadmium, Total	200.8	0.02	ND	ND	NC	ug/L (ppb)
Calcium, Total	200.7	20	15700	15800	15800	ug/L (ppb)
Chromium, Total	200.8	0.2	0.4	0.3	0.4	ug/L (ppb)
Copper, Total	200.7	4	4	ND	NC	ug/L (ppb)
Iron, Total	200.7	20	12500	12600	12500	ug/L (ppb)
Lead, Total	200.8	0.02	0.81	0.73	0.77	ug/L (ppb)
Magnesium, Total	200.7	5	8410	8510	8460	ug/L (ppb)
Manganese, Total	200.7	1	637	644	641	ug/L (ppb)
Nickel, Total	200.8	0.2	1.1	1.1	1.1	ug/L (ppb)
Selenium, Total	200.8	1	ND	ND	NC	ug/L (ppb)
Silicon, as SiO_2, Total	200.7	500	48400	49300	48800	ug/L (ppb)
Silicon, as SiO_2, Dissolved	200.7	500	46700	47400	47100	ug/L (ppb)
Silver, Total	200.8	0.02	ND	ND	NC	ug/L (ppb)
Sodium, Total	200.7	200	10500	10600	10500	ug/L (ppb)
Thallium, Total	200.8	0.02	ND	ND	NC	ug/L (ppb)
Zinc, Total	200.7	4	41.5	41.1	41.3	ug/L (ppb)
Mercury, Total	1631E	0.5	0.5		NC	ng/L
Orthophosphate as Phosphorus	SM 4500-P E	0.05	0.2	0.197	0.198	mg/L

ND - The contaminant was not detected at or above the stated detection limit.
NC - Not calculated

TABLE 7
Cowlitz River Sample Laboratory Water Quality Analysis Results
CH2M Hill - City of Longview, Washington

Constituent	Units	Minimum Detection Limits	MCL or SMCL	Drinking Water Standard	River Water Sample Results 1/12/16 3:19 PM
Aluminum	mg/l	0.1	0.2	EPA Secondary	**0.3**
Arsenic	mg/l	0.005	0.01	EPA Primary	ND
Barium	mg/l	0.3	2.0	EPA Primary	ND
Cadmium	mg/l	0.002	0.005	EPA Primary	ND
Calcium	mg/l	2.0	--		7.1
Chromium	mg/l	0.01	0.1	EPA Primary	ND
Copper	mg/l	0.004	1.3	EPA Action Level	ND
Iron	mg/l	0.02	0.3	EPA Secondary	**0.434**
Lead	mg/l	0.002	0.015	EPA Action Level	ND
Lithium	mg/l	0.001	--		0.001
Magnesium	mg/l	0.10	--		1.65
Manganese	mg/l	0.004	0.05	EPA Secondary	**0.051**
Mercury	mg/l	0.001	0.002	EPA Primary	ND
Nickel	mg/l	0.02	--		ND
Potassium	mg/l	1.0	--		ND
Selenium	mg/l	0.02	0.05	EPA Primary	ND
Silica	mg/l	0.1	--		18.0
Silver	mg/l	0.002	0.1	EPA Secondary	ND
Sodium	mg/l	1	--		4
Strontium		0.001	--		0.029
Uranium		0.001	0.03	EPA Primary	ND
Zinc	mg/l	0.004	5	EPA Secondary	ND
Alkalinity (Total as $CaCO_3$)	mg/l	20	--		28
Hardness	mg/l	10			24
pH	S.U.		6.5 to 8.5	EPA Secondary	7.4
Total Dissolved Solids	mg/l	20	500	EPA Secondary	53
Bromide		0.5	--		ND
Chloride	mg/l	5	250	EPA Secondary	ND
Fluoride	mg/l	0.5	4	EPA Primary	ND
Nitrate as N	mg/l	0.5	10	EPA Primary	ND
Nitrite as N	mg/l	0.5	1	EPA Primary	ND
Ortho Phosphate	mg/l	2.0	--		ND
Sulfate	mg/l	5	250	EPA Secondary	5.1
Trihalomethanes, VOCs and Other Organic Compounds See Laboratory Reports for list of parameters analyzed.					All ND

ND - The contaminant was not detected at or above the stated detection limit.
MCL - Maximum contaminant level, SMCL - Secondary maximum contaminant level

ATTACHMENT 1
BORING LOGS

Layne Ranney Collector Wells
RANNEY COLLECTOR WELLS
6360 HUNTLEY ROAD
COLUMBUS, OHIO 43229
614-888-6263

FIELD BOREHOLE LOG

BOREHOLE NO.: **TH-1**
TOTAL DEPTH: **60 feet**

CLIENT: City of Longview, Washington - CH2M Hill
SITE LOCATION: North Lexington site
Riverside County Park
COORDINATES: N 5,115,561 m E 507,234 m UTM Zone 10 NAD83
TOP OF CASING ELEVATION:
GRADE ELEVATION: 32.6 Feet

JOB NO.: 38941
DATE DRILLED: 1/11/2016
GEOLOGIST: Brad Gamble, Layne
DRILLER: Zane Huckins, Cascade
BORING DIAMETER: 8 inches
METHOD OF DRILLING: Rotasonic

NOTES: Coordinates Not Surveyed, approximately determined with handheld GPS receiver.

Water level 12.4 feet below ground surface at 08:56 on 01/12/16.

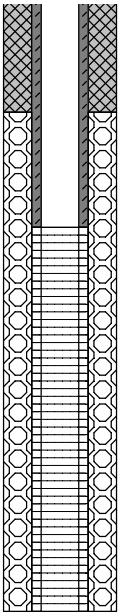
DEPTH (feet)	LITHOLOGY	RECOVERY	WELL CONSTRUCTION	WELL DESCRIPTION
0	Sand, brownish gray, very fine to medium sand, mostly fine, trace silt, loose, moist.	0 to 5 feet, 5 feet recovery		
5	Sand to Sand and Gravel, dark gray, 70-90% very fine to very coarse sand, mostly coarse, 10-30% granules and pebbles up to 2 inches, subrounded to rounded, loose, moist, 2 inch layer of brown fine sand and silt at 10 feet.	5 to 10 feet, 5 feet recovery		8" borehole
10	Sand, dark gray, very fine to very coarse sand, mostly coarse, loose, moist.	10 to 15 feet, 4 feet recovery		
15		15 to 20 feet, 2 feet recovery		
20		20 to 25 feet, 0 feet recovery		Bentonite seal placed in annulus
25		25 to 30 feet, 5 feet recovery		
30	Sand and Gravel, dark gray, 40-60% very fine to very coarse sand, mostly coarse, 40-60% granules, pebbles and cobbles up to 3 inches, subrounded to rounded, trace silt, loose, wet.	30 to 35 feet, 3 feet recovery		2" PVC Casing, threaded joints

Colors used in the graphic logs are solely to aid in distinguishing the graphic patterns.

RANNEY COLLECTOR WELLS
6360 HUNTLEY ROAD
COLUMBUS, OHIO 43229
614-888-6263

FIELD BOREHOLE LOG

BOREHOLE NO.: **TH-1**
TOTAL DEPTH: **60 feet**

DEPTH (feet)	LITHOLOGY	RECOVERY	WELL CONSTRUCTION	WELL DESCRIPTION
35		35 to 40 feet, 0 feet recovery		Sand pack set at 37-50 feet
40	Sand and Gravel, dark gray, 30-50% very fine to very coarse sand, mostly coarse, 50-70% granules, pebbles and numerous cobbles up to 4 inches, subrounded to rounded, trace silt, loose, wet.	40 to 45 feet, 5 feet recovery		
45		45 to 50 feet, 5 feet recovery		2" PVC screen, 0.010-inch slot set at 40-50 feet
50	Clay, gray, very soft, wet.	50 to 55 feet, 5 feet recovery		
55	Silty Sand to Sandy Silt, gray, very fine to fine sand and silt, trace clay, soft, wet.	55 to 60 feet, 5 feet recovery		
60	Silty Clay, dark gray, soft to firm, wet, with peaty material.			

Colors used in the graphic logs are solely to aid in distinguishing the graphic patterns.

RANNEY COLLECTOR WELLS
6360 HUNTLEY ROAD
COLUMBUS, OHIO 43229
614-888-6263

FIELD BOREHOLE LOG

BOREHOLE NO.: **TH-2**
TOTAL DEPTH: **66 feet**

CLIENT: City of Longview, Washington - CH2M Hill
SITE LOCATION: South Lexington site
Near the end of Solomon Road
COORDINATES: N 5,113,728 m E 506,785 m UTM Zone 10 NAD83
TOP OF CASING ELEVATION:
GRADE ELEVATION: 42 Feet, estimated

JOB NO.: 38941
DATE DRILLED: 1/9/2016
GEOLOGIST: Brad Gamble, Layne
DRILLER: Zane Huckins, Cascade
BORING DIAMETER: 8 inches
METHOD OF DRILLING: Rotasonic

NOTES: Coordinates and Elevations Not Surveyed, approximately determined with handheld GPS receiver.

Water level 18.6 feet below ground surface at 10:18 on 01/09/16.

DEPTH (feet)	LITHOLOGY	RECOVERY	WELL CONSTRUCTION	WELL DESCRIPTION
0	Sand and Gravel, dark gray, 60-80% very fine to very coarse sand, mostly coarse, 20-40% granules, pebbles and cobbles up to 4 inches, trace silt, loose, moist, cemented zone at 4 to 5 feet and partially cemented zone at 12 feet.	0 to 5 feet, 5 feet recovery		
5		5 to 10 feet, 5 feet recovery		Borehole abandoned with bentonite chips after drilling.
10		10 to 15 feet, 3 feet recovery		
15	Sand and Gravel, dark gray, 40-60% very fine to very coarse sand, mostly coarse, 40-60% granules, pebbles and numerous cobbles up to 4 inches, trace silt, loose, moist.	15 to 20 feet, 5 feet recovery	▽	
	Sand, dark gray, very fine to coarse sand, mostly coarse, trace granules and pebbles, trace silt, loose, moist.			
20	Clayey Silt, dark gray to black, very soft, moist, with roots and plant matter.	20 to 25 feet, 4 feet recovery		
	Silty Sand, dark gray, mostly very fine to fine sand with silt, trace clay, very soft, wet.			
25	Silty Sand to Sandy Silt, dark gray and brown, very fine to fine sand with silt, trace clay, soft to very soft, wet, fragments of decayed wood.	25 to 30 feet, 5 feet recovery		
30		30 to 35 feet, 4 feet recovery		

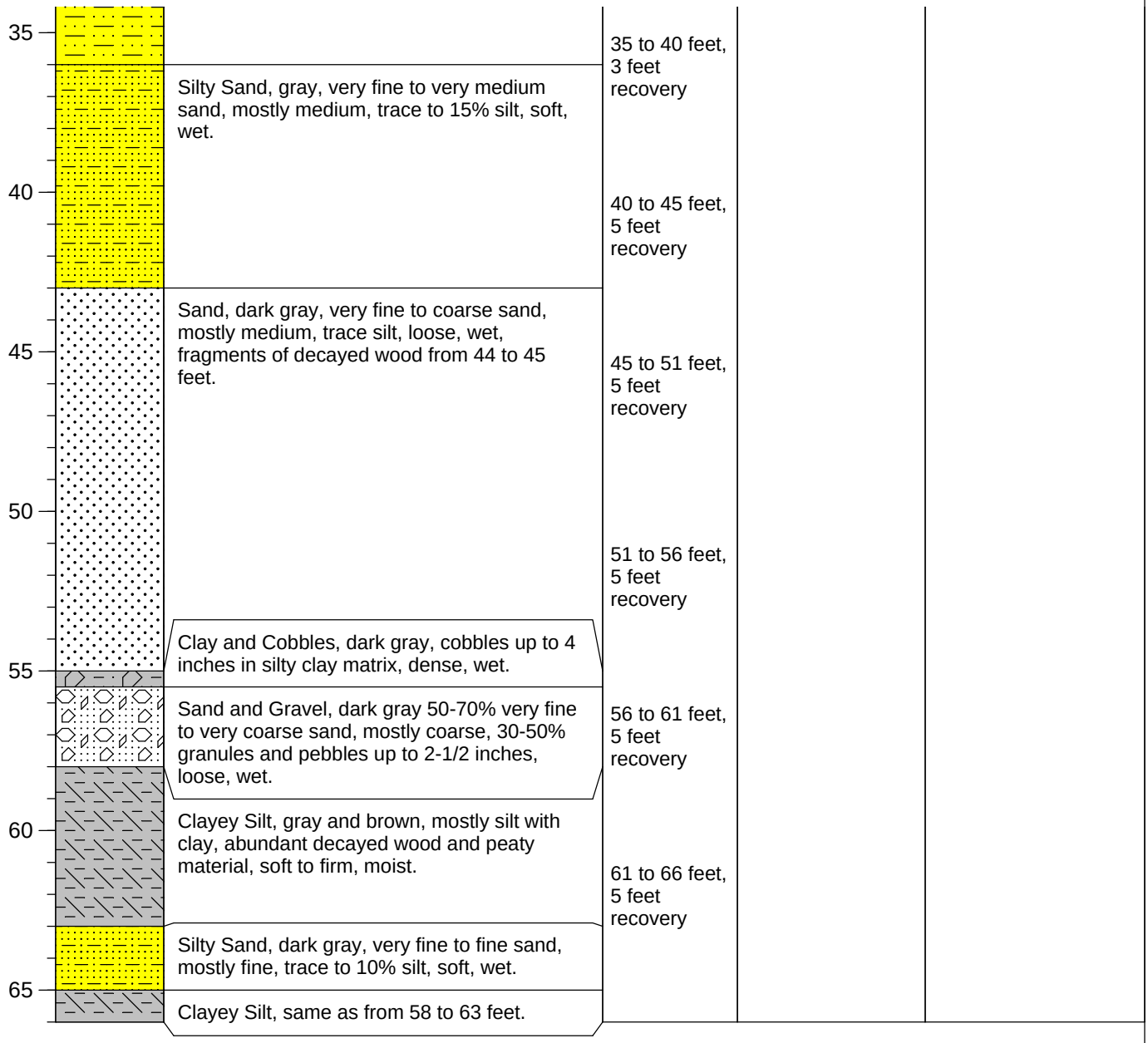
Colors used in the graphic logs are solely to aid in distinguishing the graphic patterns.

RANNEY COLLECTOR WELLS
6360 HUNTLEY ROAD
COLUMBUS, OHIO 43229
614-888-6263

FIELD BOREHOLE LOG

BOREHOLE NO.: **TH-2**
TOTAL DEPTH: **66 feet**

DEPTH (feet)	LITHOLOGY	RECOVERY	WELL CONSTRUCTION	WELL DESCRIPTION



Colors used in the graphic logs are solely to aid in distinguishing the graphic patterns.

RANNEY COLLECTOR WELLS
6360 HUNTLEY ROAD
COLUMBUS, OHIO 43229
614-888-6263

FIELD BOREHOLE LOG

BOREHOLE NO.: **TH-3**
TOTAL DEPTH: **80 feet**

CLIENT: City of Longview, Washington - CH2M Hill
SITE LOCATION: Longview, WA
On north side of Fishers Lane Water Treatment Plant
COORDINATES: N 5,110,847 m E 506,514 m UTM Zone 10 NAD83
TOP OF CASING ELEVATION:
GRADE ELEVATION: 28.28 Feet

JOB NO.: 38941
DATE DRILLED: 12/14/2015
GEOLOGIST: Brad Gamble, Layne
DRILLER: Zane Shadrick, Cascade
BORING DIAMETER: 6 inches
METHOD OF DRILLING: Rotasonic

NOTES: Coordinates Not Surveyed, approximately determined with handheld GPS receiver.

Water level 8.6 feet below ground surface at 14:42 on 12/15/15.

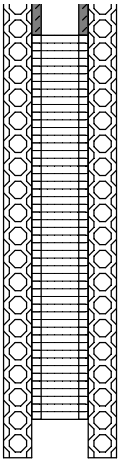
DEPTH (feet)	LITHOLOGY	RECOVERY	WELL CONSTRUCTION	WELL DESCRIPTION
0	Fill, dark gray, crushed stone and/or slag, 2 to 4 inch material, loose, moist.	0 to 5 feet, 5 feet recovery		
	Sand, gray, very fine to medium sand, mostly fine, loose, moist.			
5	Sand, brown, very fine to coarse sand, mostly medium, trace silt, loose, moist.	5 to 10 feet, 4 feet recovery		6" borehole
	Sand and Gravel, dark gray, 70-90% very fine to very coarse sand, mostly coarse, 10-30% granules and pebbles up to 1 inch, loose, moist.			
10		10 to 15 feet, 4.5 feet recovery		
	Silty Sand, brown becoming dark gray at about 14 feet, very fine to coarse sand, mostly medium, trace to 10% silt, slightly cohesive, wet.			
15	Silty Clay, gray, mostly clay with silt, trace very fine sand, very soft, wet.	15 to 20 feet, 5 feet recovery		
20		20 to 25 feet, 5 feet recovery		Bentonite seal placed in annulus
	Silty Sand to Sandy Silt, gray, silt with very fine to fine sand, trace clay, slightly cohesive, wet.			
25	Silty Sand, gray, very fine to very medium sand, mostly fine, trace to 10% silt, slightly cohesive, wet.	25 to 35 feet, 8 feet recovery		
30				2" PVC Casing, threaded joints
	Silty Sand, gray, very fine to very coarse sand, mostly medium, trace silt, loose, wet.			

Colors used in the graphic logs are solely to aid in distinguishing the graphic patterns.

RANNEY COLLECTOR WELLS
6360 HUNTLEY ROAD
COLUMBUS, OHIO 43229
614-888-6263

FIELD BOREHOLE LOG

BOREHOLE NO.: **TH-3**
TOTAL DEPTH: **80 feet**

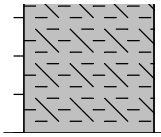
DEPTH (feet)	LITHOLOGY	RECOVERY	WELL CONSTRUCTION	WELL DESCRIPTION
35	Sand and Gravel, gray 50-70% very fine to very coarse sand, mostly coarse, 30-50% granules and pebbles up to 2 inches and occasional cobble up to 4 inches, subangular to rounded, loose, wet.	35 to 45 feet, 10 feet recovery		Sand pack set at 33.5-46 feet 2" PVC screen, 0.010-inch slot set at 35-45 feet
40				
45		45 to 55 feet, 10 feet recovery		
50	Silty Clay, brown, firm, moist, with fragments of decayed wood. Clayey Silt with Decayed Wood, dark brown, soft to very soft, moist.			
55	Clayey Silt, gray, mostly silt with clay, trace very fine to fine sand, soft, wet, traces of decayed wood, occasional 2 to 4 inch layers that are mostly sand.	55 to 60 feet, 5 feet recovery		
60		60 to 65 feet, 5 feet recovery		
65		65 to 80 feet, 6 feet recovery		
70				
75				

Colors used in the graphic logs are solely to aid in distinguishing the graphic patterns.

RANNEY COLLECTOR WELLS
6360 HUNTLEY ROAD
COLUMBUS, OHIO 43229
614-888-6263

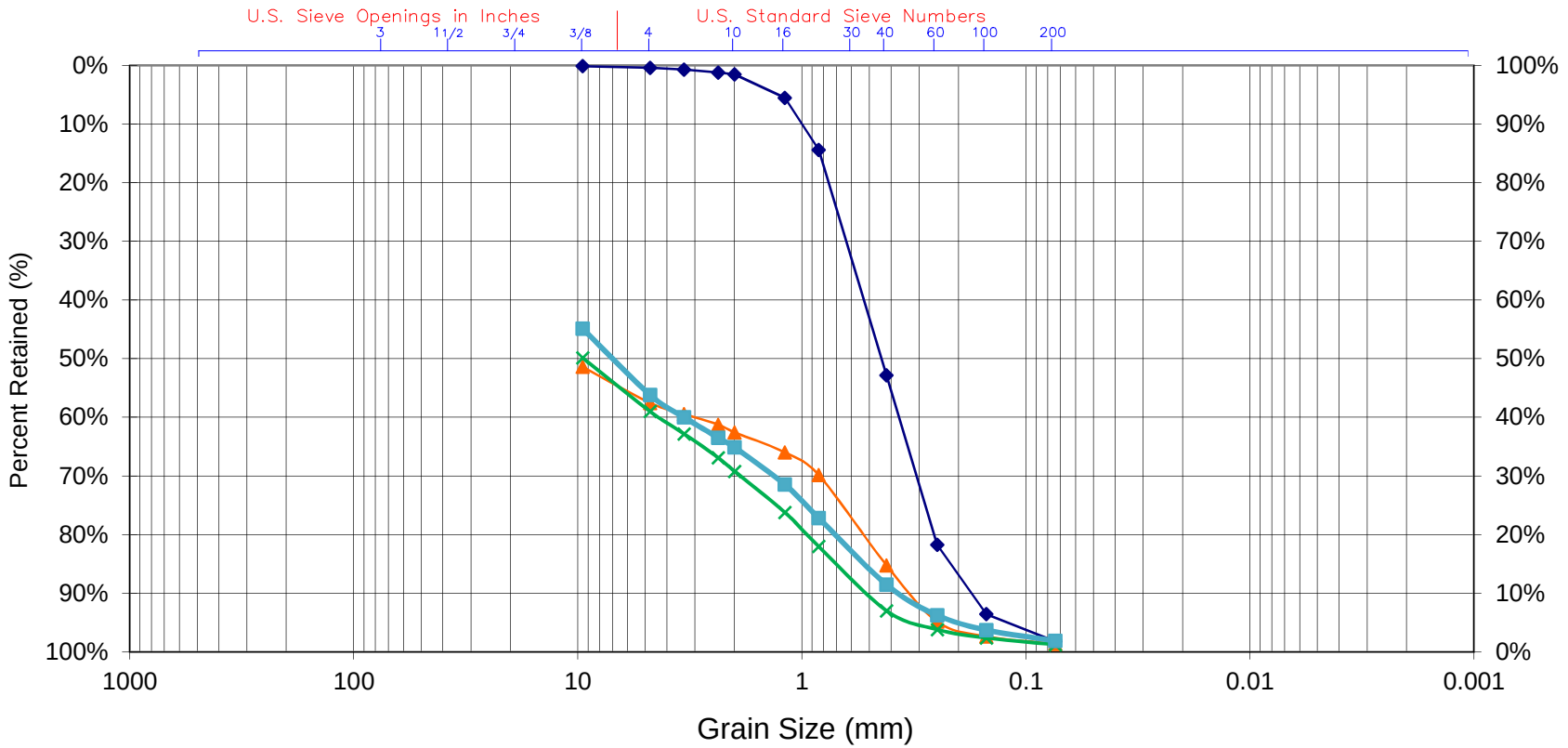
FIELD BOREHOLE LOG

BOREHOLE NO.: **TH-3**
TOTAL DEPTH: **80 feet**

DEPTH (feet)	LITHOLOGY	RECOVERY	WELL CONSTRUCTION	WELL DESCRIPTION
80				

Colors used in the graphic logs are solely to aid in distinguishing the graphic patterns.

ATTACHMENT 2
SIEVE ANALYSIS RESULTS



Wentworth Classification	Boulders	Cobbles	Very Coarse Pebbles	Coarse Pebbles	Medium Pebbles	Fine Pebbles	Granules	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay
	Boulders	Cobbles	Pebbles and Gravel					Sand					Silt	Clay

USCS Classification	Boulders	Cobbles	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
		Cobbles	Gravel		Sand			Silt or Clay

Layne Ranney Collector Wells

- TH-1 25 to 27 feet
- TH-1 30 to 35 feet
- TH-1 40 to 45 feet
- TH-1 45 to 50 feet

GRAIN SIZE ANALYSIS

Layne - Ranney Collector Wells

Project: City of Longview, Washington
Test Boring: TH-1

Job Number: 38941

SIEVE ANALYSIS RESULTS

Client: City of Longview, Washington
Job No. 38941

Boring ID: TH-1
Depth Interval: 25 to 27 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	2	2	0.1%	99.9%
4	4.760	0.187	4	6	0.4%	99.6%
6	3.353	0.132	4	10	0.7%	99.3%
8	2.360	0.094	7	17	1.3%	98.7%
10	1.999	0.079	4	21	1.6%	98.4%
16	1.191	0.047	54	75	5.5%	94.5%
20	0.841	0.033	120	195	14.4%	85.6%
40	0.419	0.017	520	715	52.9%	47.1%
60	0.249	0.010	390	1105	81.7%	18.3%
100	0.150	0.006	160	1265	93.6%	6.4%
200	0.074	0.003	63	1328	98.2%	1.8%
Pan			24	1352	100.0%	0.0%

Total	1352			
Initial Weight	1361	Gravel	Sand	Silt or Clay
Difference	0.7%	1.6%	96.7%	1.8%

	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.17	0.37	0.44	0.53	1.00	3.03
(inches)	0.007	0.015	0.017	0.021	0.039	

Boring ID: TH-1
Depth Interval: 30 to 35 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	1055	1055	51.4%	48.6%
4	4.760	0.187	126	1181	57.6%	42.4%
6	3.353	0.132	39	1220	59.5%	40.5%
8	2.360	0.094	37	1257	61.3%	38.7%
10	1.999	0.079	27	1284	62.6%	37.4%
16	1.191	0.047	70	1354	66.0%	34.0%
20	0.841	0.033	79	1433	69.8%	30.2%
40	0.419	0.017	316	1749	85.2%	14.8%
60	0.249	0.010	197	1946	94.8%	5.2%
100	0.150	0.006	52	1998	97.4%	2.6%
200	0.074	0.003	26	2024	98.6%	1.4%
Pan			28	2052	100.0%	0.0%

Total	2052			
Initial Weight	2060	Gravel	Sand	Silt or Clay
Difference	0.4%	62.6%	36.1%	1.4%

	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.32	3.01	10	15		46
(inches)	0.013	0.119	0.40	0.6		

SIEVE ANALYSIS RESULTS

Client: City of Longview, Washington
Job No. 38941

Boring ID: TH-1
Depth Interval: 40 to 45 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	1046	1046	49.9%	50.1%
4	4.760	0.187	192	1238	59.0%	41.0%
6	3.353	0.132	80	1318	62.8%	37.2%
8	2.360	0.094	86	1404	66.9%	33.1%
10	1.999	0.079	48	1452	69.2%	30.8%
16	1.191	0.047	147	1599	76.2%	23.8%
20	0.841	0.033	122	1721	82.0%	18.0%
40	0.419	0.017	230	1951	93.0%	7.0%
60	0.249	0.010	67	2018	96.2%	3.8%
100	0.150	0.006	30	2048	97.6%	2.4%
200	0.074	0.003	24	2072	98.8%	1.2%
Pan			26	2098	100.0%	0.0%

Total	2098			
Initial Weight	2105	Gravel	Sand	Silt or Clay
Difference	0.3%	69.2%	29.6%	1.2%

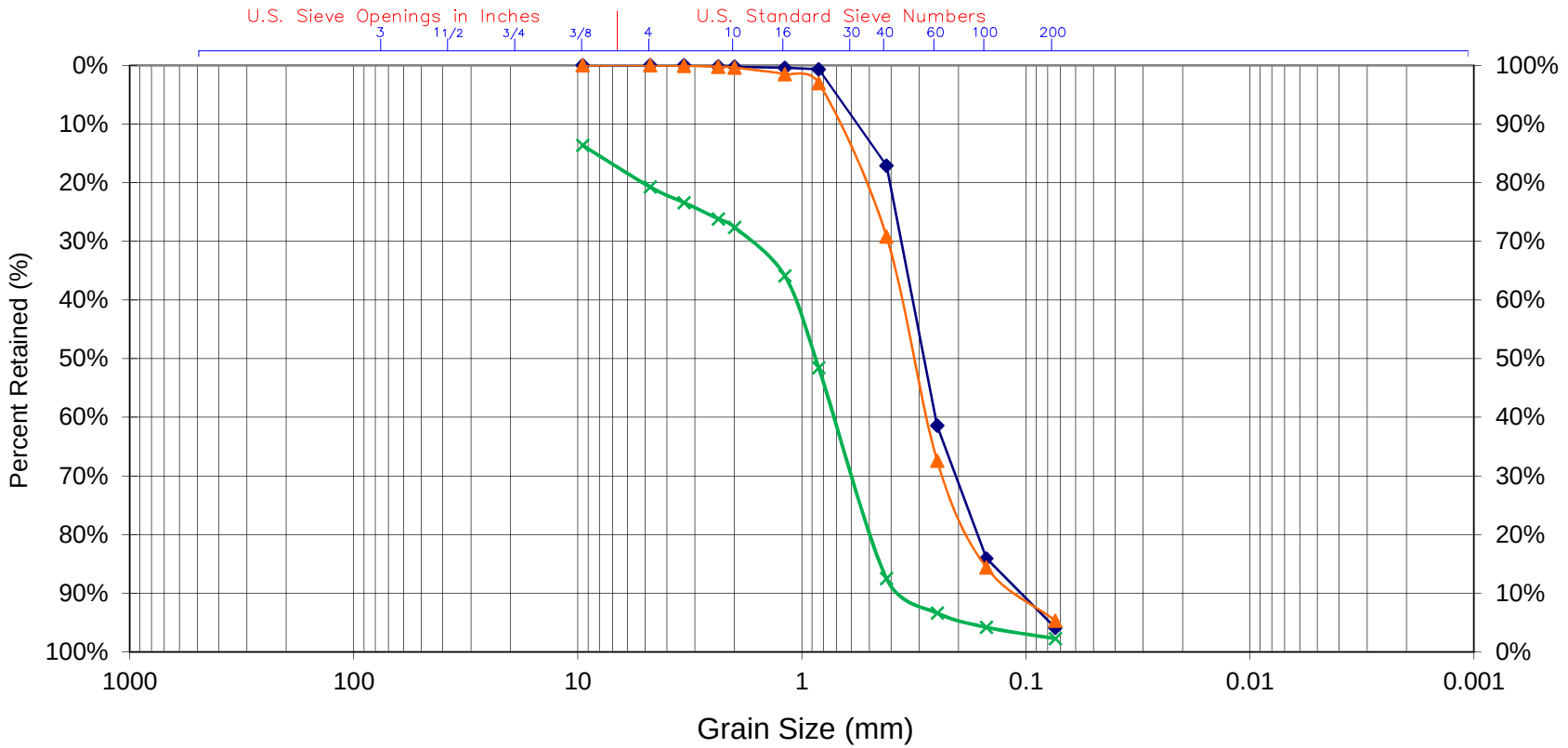
	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.51	4.35	9.42	18		36
(inches)	0.020	0.171	0.371	0.7		

Boring ID: TH-1
Depth Interval: 45 to 50 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	834	834	44.9%	55.1%
4	4.760	0.187	210	1044	56.2%	43.8%
6	3.353	0.132	71	1115	60.0%	40.0%
8	2.360	0.094	65	1180	63.5%	36.5%
10	1.999	0.079	30	1210	65.1%	34.9%
16	1.191	0.047	118	1328	71.5%	28.5%
20	0.841	0.033	106	1434	77.2%	22.8%
40	0.419	0.017	211	1645	88.5%	11.5%
60	0.249	0.010	97	1742	93.8%	6.2%
100	0.150	0.006	47	1789	96.3%	3.7%
200	0.074	0.003	34	1823	98.1%	1.9%
Pan			35	1858	100.0%	0.0%

Total	1858			
Initial Weight	1868	Gravel	Sand	Silt or Clay
Difference	0.5%	65.1%	33.0%	1.9%

	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.36	3.36	6.96	12		33
(inches)	0.014	0.132	0.274	0.5		



Wentworth Classification	Boulders	Cobbles	Very Coarse Pebbles	Coarse Pebbles	Medium Pebbles	Fine Pebbles	Granules	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay
	Boulders	Cobbles	Pebbles and Gravel					Sand					Silt	Clay

USCS Classification	Boulders	Cobbles	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
		Cobbles	Gravel		Sand			Silt or Clay

Layne Ranney Collector Wells

TH-2 45 to 50 feet
TH-2 50 to 55 feet
TH-2 55.5 to 58 feet

GRAIN SIZE ANALYSIS

Layne - Ranney Collector Wells

Project: City of Longview, Washington
Test Boring: TH-2

Job Number: 38941

SIEVE ANALYSIS RESULTS

Client: City of Longview, Washington
Job No. 38941

Boring ID: TH-2
Depth Interval: 45 to 50 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	0	0	0.0%	100.0%
4	4.760	0.187	0	0	0.0%	100.0%
6	3.353	0.132	0	0	0.0%	100.0%
8	2.360	0.094	2	2	0.2%	99.8%
10	1.999	0.079	1	3	0.3%	99.7%
16	1.191	0.047	2	5	0.4%	99.6%
20	0.841	0.033	3	8	0.7%	99.3%
40	0.419	0.017	191	199	17.1%	82.9%
60	0.249	0.010	515	714	61.4%	38.6%
100	0.150	0.006	263	977	84.1%	15.9%
200	0.074	0.003	137	1114	95.9%	4.1%
Pan			48	1162	100.0%	0.0%

Total	1162			
Initial Weight	1168	Gravel	Sand	Silt or Clay
Difference	0.5%	0.3%	95.6%	4.1%

	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.11	0.25	0.28	0.32	0.57	3.04
(inches)	0.004	0.010	0.011	0.013	0.022	

Boring ID: TH-2
Depth Interval: 50 to 55 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	0	0	0.0%	100.0%
4	4.760	0.187	0	0	0.0%	100.0%
6	3.353	0.132	1	1	0.1%	99.9%
8	2.360	0.094	2	3	0.2%	99.8%
10	1.999	0.079	2	5	0.4%	99.6%
16	1.191	0.047	14	19	1.5%	98.5%
20	0.841	0.033	19	38	3.0%	97.0%
40	0.419	0.017	329	367	29.2%	70.8%
60	0.249	0.010	481	848	67.4%	32.6%
100	0.150	0.006	229	1077	85.6%	14.4%
200	0.074	0.003	114	1191	94.7%	5.3%
Pan			67	1258	100.0%	0.0%

Total	1258			
Initial Weight	1263	Gravel	Sand	Silt or Clay
Difference	0.4%	0.4%	94.3%	5.3%

	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.11	0.28	0.32	0.36	0.70	3.39
(inches)	0.004	0.011	0.012	0.014	0.027	

SIEVE ANALYSIS RESULTS

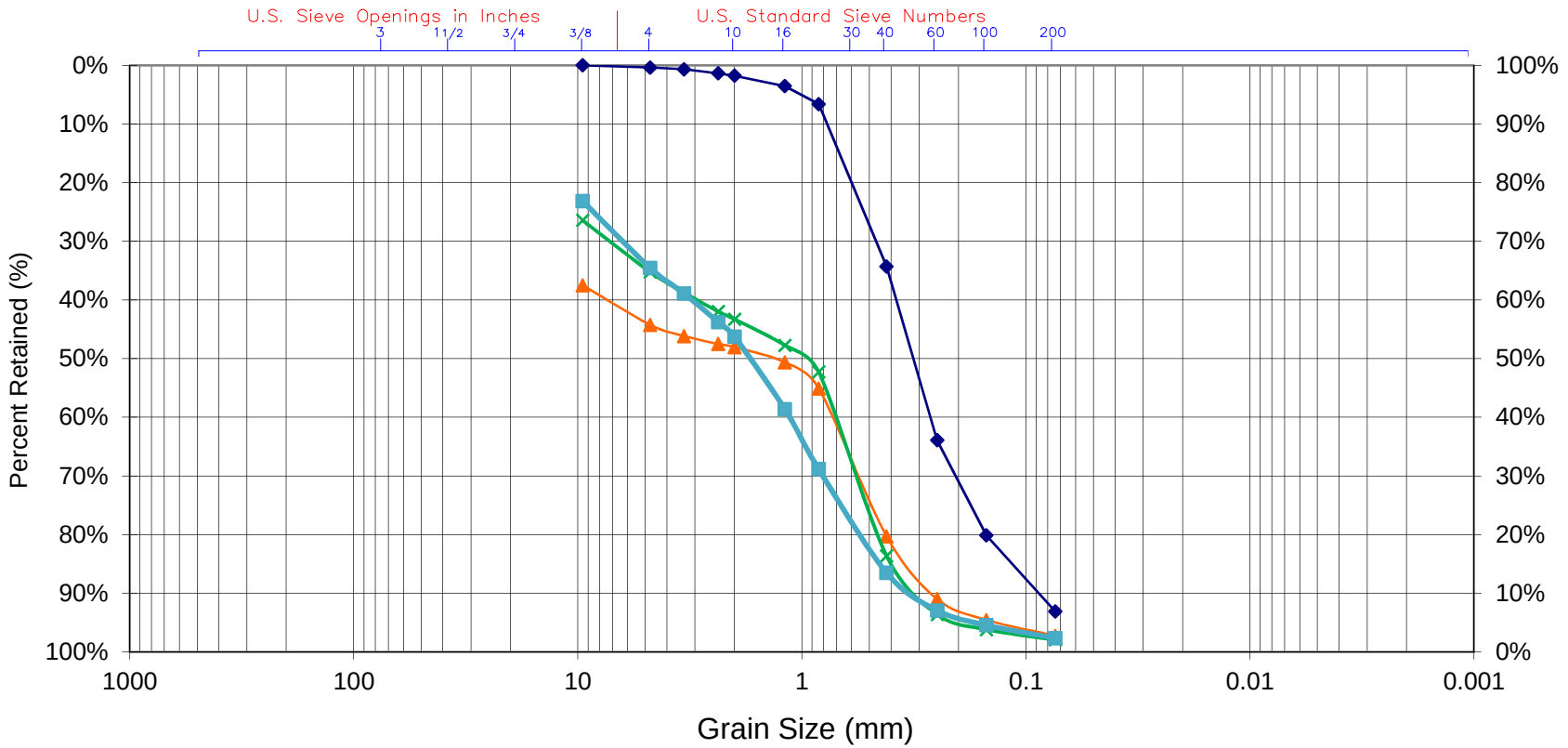
Client: City of Longview, Washington
Job No. 38941

Boring ID: TH-2
Depth Interval: 55.5 to 58 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	205	205	13.6%	86.4%
4	4.760	0.187	107	312	20.7%	79.3%
6	3.353	0.132	40	352	23.4%	76.6%
8	2.360	0.094	42	394	26.2%	73.8%
10	1.999	0.079	21	415	27.6%	72.4%
16	1.191	0.047	125	540	35.9%	64.1%
20	0.841	0.033	235	775	51.5%	48.5%
40	0.419	0.017	541	1316	87.5%	12.5%
60	0.249	0.010	88	1404	93.4%	6.6%
100	0.150	0.006	37	1441	95.8%	4.2%
200	0.074	0.003	29	1470	97.7%	2.3%
Pan			34	1504	100.0%	0.0%

Total	1504			
Initial Weight	1504	Gravel	Sand	Silt or Clay
Difference	0.0%	27.6%	70.1%	2.3%

	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.34	0.71	0.87	1.09	> 2	3.24
(inches)	0.013	0.028	0.034	0.043	> 0.05	



Wentworth Classification	Boulders	Cobbles	Very Coarse Pebbles	Coarse Pebbles	Medium Pebbles	Fine Pebbles	Granules	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay
	Boulders	Cobbles	Pebbles and Gravel					Sand					Silt	Clay

USCS Classification	Boulders	Cobbles	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
		Cobbles	Gravel		Sand			Silt or Clay

Layne Ranney Collector Wells

TH-3 32.5 to 35 feet
TH-3 35 to 40 feet
TH-3 40 to 45 feet
TH-3 45 to 48 feet

GRAIN SIZE ANALYSIS

Layne - Ranney Collector Wells

Project: City of Longview, Washington
Test Boring: TH-3

Job Number: 38941

SIEVE ANALYSIS RESULTS

Client: City of Longview, Washington
Job No. 38941

Boring ID: TH-3
Depth Interval: 32.5 to 35 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	0	0	0.0%	100.0%
4	4.760	0.187	4	4	0.4%	99.6%
6	3.353	0.132	3	7	0.7%	99.3%
8	2.360	0.094	7	14	1.4%	98.6%
10	1.999	0.079	4	18	1.8%	98.2%
16	1.191	0.047	18	36	3.6%	96.4%
20	0.841	0.033	31	67	6.6%	93.4%
40	0.419	0.017	280	347	34.3%	65.7%
60	0.249	0.010	300	647	63.9%	36.1%
100	0.150	0.006	164	811	80.1%	19.9%
200	0.074	0.003	131	942	93.1%	6.9%
Pan			70	1012	100.0%	0.0%

Total	1012			
Initial Weight	1013	Gravel	Sand	Silt or Clay
Difference	0.1%	1.8%	91.3%	6.9%

	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.09	0.27	0.32	0.38	0.77	4.33
(inches)	0.003	0.011	0.013	0.015	0.030	

Boring ID: TH-3
Depth Interval: 35 to 40 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	640	640	37.5%	62.5%
4	4.760	0.187	115	755	44.2%	55.8%
6	3.353	0.132	33	788	46.2%	53.8%
8	2.360	0.094	23	811	47.5%	52.5%
10	1.999	0.079	9	820	48.0%	52.0%
16	1.191	0.047	44	864	50.6%	49.4%
20	0.841	0.033	76	940	55.1%	44.9%
40	0.419	0.017	430	1370	80.3%	19.7%
60	0.249	0.010	183	1553	91.0%	9.0%
100	0.150	0.006	61	1614	94.6%	5.4%
200	0.074	0.003	46	1660	97.2%	2.8%
Pan			47	1707	100.0%	0.0%

Total	1707			
Initial Weight	1708	Gravel	Sand	Silt or Clay
Difference	0.1%	48.0%	49.2%	2.8%

	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.26	0.73	1.35	7.36	> 8	28.18
(inches)	0.010	0.029	0.053	0.290	> 0.29	

SIEVE ANALYSIS RESULTS

Client: City of Longview, Washington
Job No. 38941

Boring ID: TH-3
Depth Interval: 40 to 45 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	450	450	26.4%	73.6%
4	4.760	0.187	150	600	35.2%	64.8%
6	3.353	0.132	60	660	38.8%	61.2%
8	2.360	0.094	55	715	42.0%	58.0%
10	1.999	0.079	22	737	43.3%	56.7%
16	1.191	0.047	76	813	47.7%	52.3%
20	0.841	0.033	77	890	52.3%	47.7%
40	0.419	0.017	534	1424	83.6%	16.4%
60	0.249	0.010	170	1594	93.6%	6.4%
100	0.150	0.006	44	1638	96.2%	3.8%
200	0.074	0.003	30	1668	97.9%	2.1%
Pan			35	1703	100.0%	0.0%

Total	1703			
Initial Weight	1703	Gravel	Sand	Silt or Clay
Difference	0.0%	43.3%	54.7%	2.1%

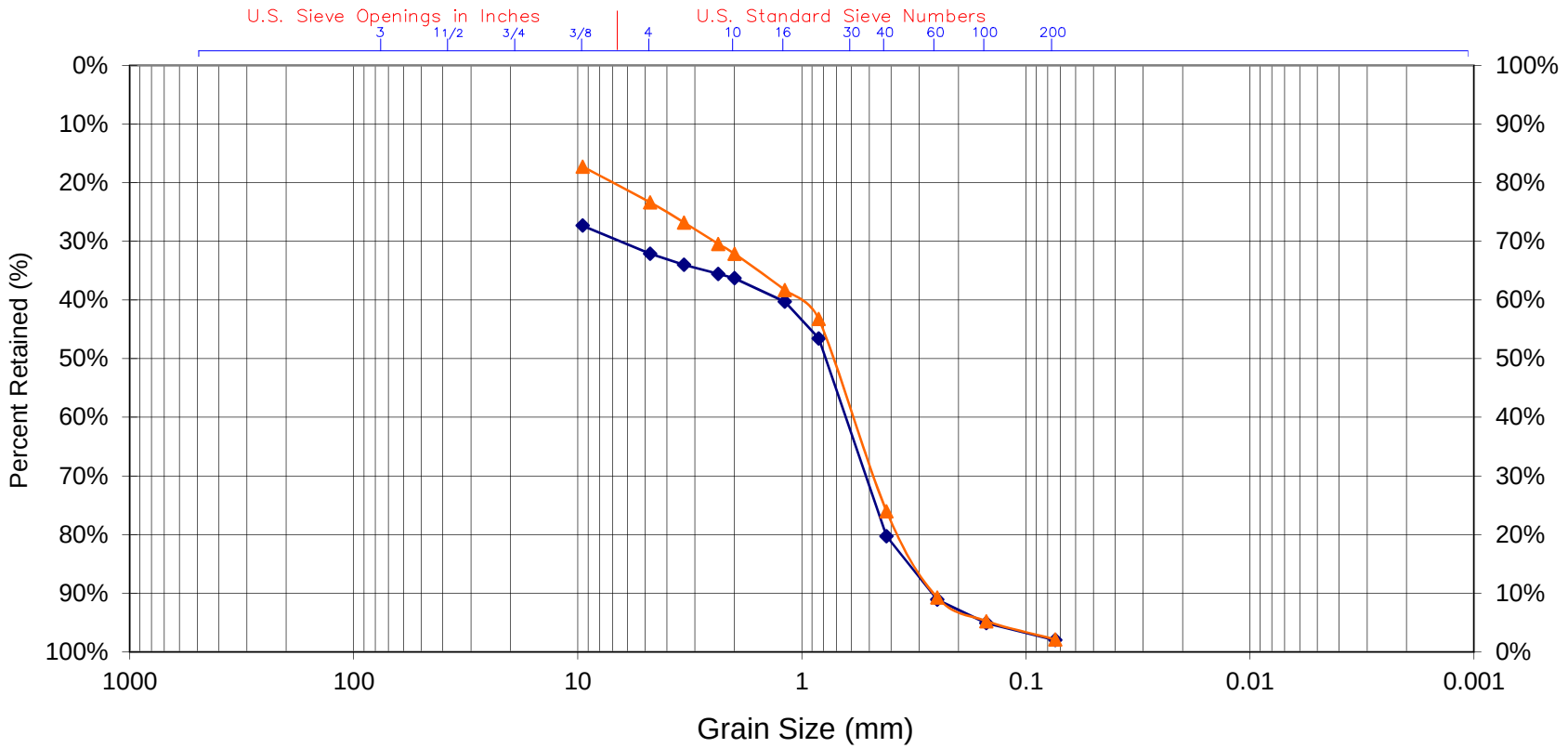
	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.30	0.71	1.00	2.93	> 3	9.75
(inches)	0.012	0.028	0.039	0.115	> 0.12	

Boring ID: TH-3
Depth Interval: 45 to 48 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	403	403	23.2%	76.8%
4	4.760	0.187	198	601	34.5%	65.5%
6	3.353	0.132	76	677	38.9%	61.1%
8	2.360	0.094	85	762	43.8%	56.2%
10	1.999	0.079	43	805	46.3%	53.7%
16	1.191	0.047	215	1020	58.6%	41.4%
20	0.841	0.033	178	1198	68.9%	31.1%
40	0.419	0.017	307	1505	86.5%	13.5%
60	0.249	0.010	112	1617	92.9%	7.1%
100	0.150	0.006	44	1661	95.5%	4.5%
200	0.074	0.003	38	1699	97.6%	2.4%
Pan			41	1740	100.0%	0.0%

Total	1740			
Initial Weight	1746	Gravel	Sand	Silt or Clay
Difference	0.3%	46.3%	51.4%	2.4%

	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.32	1.14	1.71	3.10	> 4	9.82
(inches)	0.012	0.045	0.067	0.122	> 0.13	



Wentworth Classification	Boulders	Cobbles	Very Coarse Pebbles	Coarse Pebbles	Medium Pebbles	Fine Pebbles	Granules	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay
	Boulders	Cobbles	Pebbles and Gravel					Sand					Silt	Clay

USCS Classification	Boulders	Cobbles	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
		Cobbles	Gravel		Sand			Silt or Clay

Layne Ranney Collector Wells

TH-3a 35 to 40 feet
TH-3a 40 to 45 feet

GRAIN SIZE ANALYSIS

Layne - Ranney Collector Wells

Project: City of Longview, Washington
Test Boring: TH-3a

Job Number: 38941

SIEVE ANALYSIS RESULTS

Client: City of Longview, Washington
Job No. 38941

Boring ID: TH-3a
Depth Interval: 35 to 40 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	445	445	27.3%	72.7%
4	4.760	0.187	78	523	32.1%	67.9%
6	3.353	0.132	31	554	34.0%	66.0%
8	2.360	0.094	25	579	35.6%	64.4%
10	1.999	0.079	12	591	36.3%	63.7%
16	1.191	0.047	65	656	40.3%	59.7%
20	0.841	0.033	102	758	46.6%	53.4%
40	0.419	0.017	549	1307	80.3%	19.7%
60	0.249	0.010	176	1483	91.1%	8.9%
100	0.150	0.006	65	1548	95.1%	4.9%
200	0.074	0.003	47	1595	98.0%	2.0%
Pan			33	1628	100.0%	0.0%

Total	1628			
Initial Weight	1629	Gravel	Sand	Silt or Clay
Difference	0.1%	36.3%	61.7%	2.0%

	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.26	0.64	0.78	1.24	> 2	4.71
(inches)	0.010	0.025	0.031	0.049	> 0.05	

Boring ID: TH-3a
Depth Interval: 40 to 45 feet

Sieve Size or Sieve No.	Sieve Size (mm)	Sieve Size (inches)	Weight Retained (grams)	Cumulative Weight (grams)	Cumulative % Retained	Cumulative % Passing
3/8	9.525	0.375	270	270	17.3%	82.7%
4	4.760	0.187	95	365	23.4%	76.6%
6	3.353	0.132	54	419	26.8%	73.2%
8	2.360	0.094	57	476	30.5%	69.5%
10	1.999	0.079	26	502	32.1%	67.9%
16	1.191	0.047	97	599	38.3%	61.7%
20	0.841	0.033	77	676	43.3%	56.7%
40	0.419	0.017	512	1188	76.0%	24.0%
60	0.249	0.010	230	1418	90.7%	9.3%
100	0.150	0.006	63	1481	94.8%	5.2%
200	0.074	0.003	49	1530	97.9%	2.1%
Pan			33	1563	100.0%	0.0%

Total	1563			
Initial Weight	1565	Gravel	Sand	Silt or Clay
Difference	0.1%	32.1%	65.8%	2.1%

	D_{10}	D_{40}	D_{50}	D_{60}	D_{90}	C_u
(mm)	0.26	0.59	0.73	1.06	> 2	4.14
(inches)	0.010	0.023	0.029	0.042	> 0.05	

ATTACHMENT 3
HYDRAULIC INTERVAL TEST DATA

Well ID: TH-1 **Job No.:** 38941

Client: CH2M Hill / City of Longview, Washington
Location: Riverside County Park
Well Information: Temporary 0.020-inch slot wire-wrapped screen set from 35 to 50 feet below ground surface
Test Information: Multiple-rate Hydraulic Interval Step Test with 30 minute steps
Measuring Point: Top of temporary 6-inch casing, approximately 0.6 feet above ground surface.

Date/Time	Elapsed Time from Start of Test	Elapsed Time from Start of Step	Depth to Water	Observed Drawdown	Totalizer Reading	Meter Pumping Rate	Comments
(mo/day/yr hr:min)	(minutes)	(minutes)	(feet)	(feet)	(gallons)	(gpm)	
1/12/16 8:56			12.94				
1/12/16 9:17			12.95				
1/12/16 9:37			12.95				
1/12/16 9:39	0	0			0	47.0	Start Step 1
1/12/16 9:40	1	1	13.29	0.34	49	30.4	
1/12/16 9:41	2	2	13.30	0.35	84	30.4	
1/12/16 9:42	3	3	13.30	0.35	94	30.3	
1/12/16 9:43	4	4	13.30	0.35	124	30.3	
1/12/16 9:44	5	5	13.30	0.35	155	30.1	
1/12/16 9:45	6	6	13.30	0.35	185	30.1	
1/12/16 9:47	8	8	13.30	0.35	244	30.3	
1/12/16 9:49	10	10	13.30	0.35	305	30.3	
1/12/16 9:51	12	12	13.30	0.35	365	30.2	
1/12/16 9:53	14	14	13.30	0.35	425	30.3	
1/12/16 9:55	16	16	13.30	0.35	486	30.2	
1/12/16 9:59	20	20	13.30	0.35	615	30.3	
1/12/16 10:04	25	25	13.30	0.35	764	30.3	
1/12/16 10:09	30	30 / 0	13.30	0.35	909	30.1	Start Step 2
1/12/16 10:10	31	1	13.52	0.57		50.2	
1/12/16 10:11	32	2	13.54	0.59		50.1	
1/12/16 10:12	33	3	13.54	0.59		50.1	
1/12/16 10:13	34	4	13.54	0.59	1101	50.1	
1/12/16 10:14	35	5	13.54	0.59	1156	50.1	
1/12/16 10:15	36	6	13.54	0.59		50.1	
1/12/16 10:17	38	8	13.54	0.59	1301	50.1	
1/12/16 10:19	40	10	13.55	0.60	1400	50.1	
1/12/16 10:21	42	12	13.55	0.60	1501	50.1	
1/12/16 10:23	44	14	13.55	0.60	1603	50.1	
1/12/16 10:25	46	16	13.55	0.60	1701	50.1	
1/12/16 10:30	51	21	13.55	0.60	1957	50.1	
1/12/16 10:34	55	25	13.55	0.60	2152	50.1	
1/12/16 10:39	60	30 / 0	13.55	0.60	2410	50.1	Start Step 3
1/12/16 10:40	61	1	13.89	0.94		75.5	
1/12/16 10:41	62	2	13.89	0.94		75.4	
1/12/16 10:42	63	3	13.89	0.94	2614	75.5	
1/12/16 10:43	64	4	13.89	0.94		75	
1/12/16 10:44	65	5	13.89	0.94	2768	75.4	
1/12/16 10:45	66	6	13.90	0.95	2842	75.5	
1/12/16 10:47	68	8	13.90	0.95	2993	75.5	
1/12/16 10:49	70	10	13.90	0.95		75.5	
1/12/16 10:52	73	13	13.90	0.95	3370	75.5	
1/12/16 10:54	75	15	13.90	0.95	3533	75.5	
1/12/16 11:00	81	21	13.91	0.96	3974	75.4	
1/12/16 11:05	86	26	13.91	0.96		75.5	
1/12/16 11:09	90	30	13.91	0.96	4654	75.5	
1/12/16 11:10	91	31 / 0					Start Step 4
1/12/16 11:11	92	1	14.05	1.10		120.9	
1/12/16 11:12	93	2	14.58	1.63		121.0	
1/12/16 11:13	94	3	14.59	1.64		121.0	
1/12/16 11:14	95	4	14.59	1.64	5182	121.0	
1/12/16 11:15	96	5	14.59	1.64	5303	121.0	

Well ID: TH-1 **Job No.:** 38941

Client: CH2M Hill / City of Longview, Washington
Location: Riverside County Park
Well Information: Temporary 0.020-inch slot wire-wrapped screen set from 35 to 50 feet below ground surface
Test Information: Multiple-rate Hydraulic Interval Step Test with 30 minute steps
Measuring Point: Top of temporary 6-inch casing, approximately 0.6 feet above ground surface.

Date/Time	Elapsed Time from Start of Test	Elapsed Time from Start of Step	Depth to Water	Observed Drawdown	Totalizer Reading	Meter Pumping Rate	Comments
(mo/day/yr hr:min)	(minutes)	(minutes)	(feet)	(feet)	(gallons)	(gpm)	
1/12/16 11:16	97	6	14.59	1.64	5424	121.0	
1/12/16 11:18	99	8	14.59	1.64	5666		
1/12/16 11:20	101	10	14.60	1.65	5908		
1/12/16 11:22	103	12	14.60	1.65	6150	121.1	
1/12/16 11:25	106	15	14.60	1.65	6518	121.0	
1/12/16 11:30	111	20	14.60	1.65	7118	121.0	
1/12/16 11:35	116	25	14.60	1.65	7734	121.1	
1/12/16 11:40	121	30	14.60	1.65	8329	120.9	
1/12/16 11:41	122	31 / 0	14.60	1.65	8459		Pump off, start recovery
1/12/16 11:41	122.5	0.5	12.98	0.03			
1/12/16 11:42	123	1	12.97	0.02			
1/12/16 11:43	124	2	12.97	0.02			
1/12/16 11:44	125	3	12.97	0.02			
1/12/16 11:45	126	4	12.97	0.02			
1/12/16 11:46	127	5	12.97	0.02			

Well ID: TH-3 38941

Client: CH2M Hill / City of Longview, Washington
Location: Fishers Lane WTP, 8.5 feet east of TH-3A
Well Information: 2-inch ID PVC with 0.010-inch slot screen set from 35 to 45 feet below ground surface
Test Information: Multiple-rate Hydraulic Interval Step Test with 30 minute steps
Measuring Point: Top of 2-inch PVC casing, approximately 2.6 feet above ground surface.

Date/Time	Elapsed Time from Start of Test	Elapsed Time from Start of Step	Depth to Water	Observed Drawdown	Comments
(mo/day/yr hr:min)	(minutes)	(minutes)	(feet)	(feet)	
1/7/16 8:57			15.45		
1/7/16 14:07			15.43		
1/7/16 14:38			15.43		
1/7/16 14:56	0	0			Start Step 1
1/7/16 14:59	3	3	15.80	0.37	
1/7/16 15:01	5	5	15.81	0.38	
1/7/16 15:02	6	6	15.81	0.38	
1/7/16 15:03	7	7	15.82	0.39	
1/7/16 15:05	9	9	15.82	0.39	
1/7/16 15:06	10	10	15.82	0.39	
1/7/16 15:09	13	13	15.83	0.40	
1/7/16 15:12	16	16	15.83	0.40	
1/7/16 15:15	19	19	15.83	0.40	
1/7/16 15:16	20	20	15.83	0.40	
1/7/16 15:22	26	26	15.85	0.42	
1/7/16 15:27	31	31 / 0	15.84	0.41	Start Step 2
1/7/16 15:29	33	2	16.05	0.62	
1/7/16 15:30	34	3	16.08	0.65	
1/7/16 15:32	36	5	16.10	0.67	
1/7/16 15:35	39	8	16.08	0.65	
1/7/16 15:38	42	11	16.10	0.67	
1/7/16 15:40	44	13	16.11	0.68	
1/7/16 15:42	46	15	16.11	0.68	
1/7/16 15:44	48	17	16.12	0.69	
1/7/16 15:48	52	21	16.11	0.68	
1/7/16 15:53	57	26	16.12	0.69	
1/7/16 15:58	62	31	16.12	0.69	
1/7/16 16:04	68	37	16.12	0.69	
1/7/16 16:13	77	46	16.13	0.70	
1/7/16 16:14	78	47 / 0			Start Step 3
1/7/16 16:18	82	4	16.42	0.99	
1/7/16 16:20	84	6	16.45	1.02	
1/7/16 16:22	86	8	16.45	1.02	
1/7/16 16:25	89	11	16.47	1.04	
1/7/16 16:31	95	17	16.45	1.02	
1/7/16 16:37	101	23	16.45	1.02	
1/7/16 16:41	105	27	16.48	1.05	
1/7/16 16:45	109	31	16.44	1.01	
1/7/16 16:47	111	33 / 0			Start Step 4
1/7/16 16:52	116	5	16.62	1.19	
1/7/16 16:54	118	7	16.64	1.21	
1/7/16 16:58	122	11	16.64	1.21	
1/7/16 17:00	124	13	16.64	1.21	

Well ID: TH-3 38941

Client: CH2M Hill / City of Longview, Washington
Location: Fishers Lane WTP, 8.5 feet east of TH-3A
Well Information: 2-inch ID PVC with 0.010-inch slot screen set from 35 to 45 feet below ground surface
Test Information: Multiple-rate Hydraulic Interval Step Test with 30 minute steps
Measuring Point: Top of 2-inch PVC casing, approximately 2.6 feet above ground surface.

Date/Time	Elapsed Time from Start of Test	Elapsed Time from Start of Step	Depth to Water	Observed Drawdown	Comments
(mo/day/yr hr:min)	(minutes)	(minutes)	(feet)	(feet)	
1/7/16 17:04	128	17	16.65	1.22	
1/7/16 17:08	132	21	16.65	1.22	
1/7/16 17:13	137	26	16.65	1.22	
1/7/16 17:18	142	31	16.65	1.22	
1/7/16 17:19	143	32 / 0			Pump off, start recovery
1/7/16 17:19	143.5	0.5	16.17	0.74	
1/7/16 17:20	144	1	15.66	0.23	
1/7/16 17:21	145	2	15.61	0.18	
1/7/16 17:22	146	3	15.58	0.15	
1/7/16 17:23	147	4	15.58	0.15	
1/7/16 17:24	148	5	15.55	0.12	
1/7/16 17:25	149	6	15.55	0.12	
1/7/16 17:27	151	8	15.53	0.10	
1/7/16 17:29	153	10	15.52	0.09	
1/7/16 17:31	155	12	15.51	0.08	

Well ID: TH-3A **Job No.:** 38941

Client: CH2M Hill / City of Longview, Washington
Location: Fishers Lane WTP, 8.5 feet west of TH-3
Well Information: Temporary 0.020-inch slot wire-wrapped screen set from 30 to 45 feet below ground surface
Test Information: Multiple-rate Hydraulic Interval Step Test with 30 minute steps
Measuring Point: Top of temporary 6-inch casing, approximately 0.65 feet above ground surface.

Date/Time	Elapsed Time from Start of Test	Elapsed Time from Start of Step	Depth to Water	Observed Drawdown	Totalizer Reading	Meter Pumping Rate	Comments
(mo/day/yr hr:min)	(minutes)	(minutes)	(feet)	(feet)	(gallons)	(gpm)	
1/7/16 14:04			13.53				
1/7/16 14:29			13.53				
1/7/16 14:48			13.53				
1/7/16 14:56	0	0			0	63.0	Start Step 1
1/7/16 14:58	2	2	15.36	1.83		30.0	
1/7/16 14:59	3	3	15.42	1.89			
1/7/16 15:00	4	4	15.43	1.90			
1/7/16 15:02	6	6	15.44	1.91			
1/7/16 15:03	7	7	15.44	1.91		30.1	
1/7/16 15:05	9	9	15.44	1.91	245	30.3	
1/7/16 15:06	10	10	15.45	1.92	290	30.1	
1/7/16 15:08	12	12	15.45	1.92	352	30.0	
1/7/16 15:11	15	15	15.47	1.94	441	30.0	
1/7/16 15:14	18	18	15.47	1.94	531	30.3	
1/7/16 15:16	20	20	15.48	1.95	594		
1/7/16 15:21	25	25	15.48	1.95	742	30.1	
1/7/16 15:27	31	31 / 0	15.49	1.96	923	30.2	Start Step 2
1/7/16 15:28	32	1	16.70	3.17			
1/7/16 15:30	34	3	16.84	3.31		50.1	
1/7/16 15:31	35	4	16.90	3.37		50.1	
1/7/16 15:32	36	5	16.91	3.38		50.2	
1/7/16 15:33	37	6	16.93	3.40		50.1	
1/7/16 15:34	38	7	16.94	3.41	1260	50.1	
1/7/16 15:35	39	8	16.96	3.43		50.0	
1/7/16 15:36	40	9	16.96	3.43	1367	50.1	
1/7/16 15:37	41	10	16.97	3.44	1405	50.1	
1/7/16 15:39	43	12	16.98	3.45	1506	50.2	
1/7/16 15:41	45	14	17.00	3.47	1615	50.2	
1/7/16 15:43	47	16	17.00	3.47	1711	50.1	
1/7/16 15:47	51	20	17.03	3.50	1907	50.2	
1/7/16 15:52	56	25	17.10	3.57	2168	50.1	
1/7/16 15:57	61	30	17.06	3.53	2411	50.2	
1/7/16 16:04	68	37	17.07	3.54	2761	50.2	
1/7/16 16:13	77	46	17.09	3.56		50.2	
1/7/16 16:14	78	47 / 0					Start Step 3
1/7/16 16:15	79	1	19.00	5.47		75	
1/7/16 16:16	80	2	19.26	5.73			
1/7/16 16:17	81	3	19.35	5.82		75.4	
1/7/16 16:18	82	4	19.44	5.91		75.1	
1/7/16 16:19	83	5	19.49	5.96		75.2	
1/7/16 16:21	85	7	19.54	6.01	3788	75.3	
1/7/16 16:23	87	9	19.58	6.05	3925	75.3	
1/7/16 16:26	90	12	19.62	6.09	4150	75.3	
1/7/16 16:28	92	14	19.64	6.11		75.3	
1/7/16 16:29	93	15	19.66	6.13	4401	75.3	
1/7/16 16:33	97	19	19.68	6.15	4679	75.2	
1/7/16 16:38	102	24	19.72	6.19		75.3	
1/7/16 16:39	103	25	19.72	6.19	5129	75.3	
1/7/16 16:46	110	32	19.76	6.23	5656	75.3	
1/7/16 16:47	111	33 / 0					Start Step 4
1/7/16 16:48	112	1	21.10	7.57		90.0	

Well ID: TH-3A **Job No.:** 38941

Client: CH2M Hill / City of Longview, Washington
Location: Fishers Lane WTP, 8.5 feet west of TH-3
Well Information: Temporary 0.020-inch slot wire-wrapped screen set from 30 to 45 feet below ground surface
Test Information: Multiple-rate Hydraulic Interval Step Test with 30 minute steps
Measuring Point: Top of temporary 6-inch casing, approximately 0.65 feet above ground surface.

Date/Time	Elapsed Time from Start of Test	Elapsed Time from Start of Step	Depth to Water	Observed Drawdown	Totalizer Reading	Meter Pumping Rate	Comments
(mo/day/yr hr:min)	(minutes)	(minutes)	(feet)	(feet)	(gallons)	(gpm)	
1/7/16 16:49	113	2	21.23	7.70		90.3	
1/7/16 16:50	114	3	21.29	7.76	6000	90.3	
1/7/16 16:52	116	5	21.35	7.82		90.8	
1/7/16 16:53	117	6	21.43	7.90	6277	90.9	
1/7/16 16:55	119	8	21.46	7.93		90.7	
1/7/16 16:57	121	10	21.48	7.95	6648	90.9	
1/7/16 16:59	123	12	21.51	7.98		90.8	
1/7/16 17:02	126	15	21.53	8.00		90.9	
1/7/16 17:03	127	16	21.56	8.03	7176	90.8	
1/7/16 17:07	131	20	21.58	8.05	7549	90.7	
1/7/16 17:12	136	25	21.60	8.07	7994	90.7	
1/7/16 17:18	142	31	21.62	8.09	8542	90.6	
1/7/16 17:19	143	32 / 0					Pump off, start recovery
1/7/16 17:20	144	1	13.92	0.39			
1/7/16 17:21	145	2	13.72	0.19			
1/7/16 17:22	146	3	13.68	0.15			
1/7/16 17:23	147	4	13.67	0.14			
1/7/16 17:24	148	5	13.64	0.11			
1/7/16 17:25	149	6	13.63	0.10			
1/7/16 17:27	151	8	13.63	0.10			
1/7/16 17:29	153	10	13.62	0.09			
1/7/16 17:31	155	12	13.60	0.07			

ATTACHMENT 4
TH-1 AND TH-3a SAMPLES
LABORATORY ANALYSIS RESULTS

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

January 29, 2016

Analytical Report for Service Request No: K1600294

Brad Phelps
CH2M Hill
2020 SW 4th Ave.
Suite 300
Portland, OR 97201

RE: Riverside Park

Dear Brad,

Enclosed are the results of the sample(s) submitted to our laboratory January 12, 2016
For your reference, these analyses have been assigned our service request number **K1600294.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Chris Leaf
Project Manager

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

Table of Contents

Acronyms
Qualifiers
State Certifications, Accreditations, And Licenses
Case Narrative
Chain of Custody
General Chemistry
Metals
Diesel and Residual Range Organics
Gasoline Range Organics
Subcontract Lab Results

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
Idaho DHW	http://www.healthandwelfare.idaho.gov/Health/Labs/CertificationDrinkingWaterLabs/tabid/1833/Default.aspx	-
ISO 17025	http://www.pjlabs.com/	L14-50
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Michigan DEQ	http://www.michigan.gov/deq/0,1607,7-135-3307_4131_4156---,00.html	9949
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wisconsin DNR	http://dnr.wi.gov/	998386840
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS ENVIRONMENTAL

Client:	CH2M Hill	**Service Request No.:**	K1600294
Project:	Riverside Park	**Date Received:**	01/12/16
Sample Matrix:	Water		

Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), Matrix/Duplicate Matrix Spike (MS/DMS), Laboratory Control Sample (LCS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

Sample Receipt

One water sample was received for analysis at ALS Environmental on 01/12/16. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4ºC upon receipt at the laboratory.

General Chemistry Parameters

Total Organic Carbon by Standard Method 5310C:
The Relative Percent Difference (RPD) criterion for the replicate analysis in sample Riverside PK was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

No other anomalies associated with the analysis of this sample were observed.

Total Metals

No anomalies associated with the analysis of this sample were observed.

Diesel Range Organics by Method NWTPH-Dx

No anomalies associated with the analysis of this sample were observed.

Gasoline Range Organics by Method NWTPH-Gx

No anomalies associated with the analysis of this sample were observed.

Sulfur

This analysis was performed at ALS Environmental, Simi Valley, CA. The data for this analysis is included in the corresponding section of this report.

Approved by_____

Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Environmental

CHAIN OF CUSTODY
66260

001

SR# K16 00 294

COC Set____of____

COC#_____

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

Project Name: Riverside Park | Project Number:

Project Manager: Brad Phelps

Company: CH2M

Address: 2020 SW 4th Ave, Portland, OR

Phone #: 503 360 7413 | email: bphelps@ch2m.com

Sampler Signature: B | Sampler Printed Name: Brad Phelps

CLIENT SAMPLE ID	LABID	SAMPLING Date	Time	Matrix	NUMBER OF CONTAINERS	0H: ASTM D1498-00 / Redox Pot	SM 4500-H+ B / pH	SM 4500-O G / Oxygen	48H: 180.1 / Turbidity	300.0 / NO2	300.0 / NO3	SM 2120 B / Color	SM 4500-P E / O Phos	SM 5910 B / UV 254	7D: SM 2540 C / TDS	14D: 335.4 / CN T	NWTPH-Dx / NW_TPH	NWTPH-Gx / NW_GAS	Sulfur Liq / Sulfur	28D: 245.1 / Hg T	300.0 / Chloride	300.0 / SO4	SM 2510 B / Conductivity	SM 4500-F- C Modified / F	SM 4500-NH3 G / Ammonia	SM 5310 C / TOC T	90D: 1631E / Hg LL T	180D: 200.7 / Metals T	Remarks
1. Riverside PK		1/12/16	10:48			X																							
2.																													
3.																													
4.																													
5.																													
6.																													
7.																													
8.																													
9.																													
10.																													

Report Requirements

___ I. Routine Report: Method Blank, Surrogate, as required

___ II. Report Dup., MS, MSD as required

___ III. CLP Like Summary (no raw data)

___ IV. Data Validation Report

___ V. EDD

Invoice Information

P.O.#_____

Bill To:_____

Turnaround Requirements

___ 24 hr. ___ 48 hr.

___ 5 Day

~~7~~ Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: (Al) (As) (Sb) (Ba) (Be) B (Ca) (Cd) Co (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) Mo (Ni) (K) (Ag) (Na) (Se) Sr (Tl) Sn V (Zn) (Hg)

Special Instructions/Comments: Cyanide - Dissolved (HCN) Silica Total & Dissolved Fluoride Dissolved Hydrogen Sulfide H_2S

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other____(Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature: B	Signature:	Signature	Signature	Signature	Signature
Printed Name: BRAD Phelps	Printed Name:	Printed Name	Printed Name	Printed Name	Printed Name
Firm: CH2M	Firm: ALS	Firm	Firm	Firm	Firm
Date/Time: 1/12/16 14:26	Date/Time: 1/12/16 1430	Date/Time	Date/Time	Date/Time	Date/Time

ALS Environmental

CHAIN OF CUSTODY
66260

001

SR# K1600299

COC Set____of____

COC#_____

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

Project Name	Project Number:
Project Manager	
Company	
Address	
Phone #	email
Sampler Signature	Sampler Printed Name

CLIENT SAMPLE ID	LABID	SAMPLING Date Time	Matrix	NUMBER OF CONTAINERS	180D 200.7 / Metals D ✓	180D 200.8 / Metals T ✓	999D Calculation / NO2 NO3 Calc ✓	999D Filter Met / Filter Met ✓	999D SM 2340 B / Hardness Calc ✓	1	2	3	4	5	Remarks
1. Riverside Park					X				A						
2.															
3.															
4.															
5.															
6.															
7.															
8.															
9.															
10.															

Report Requirements

___ I. Routine Report: Method Blank, Surrogate, as required

___ II. Report Dup., MS, MSD as required

___ III. CLP Like Summary (no raw data)

___ IV. Data Validation Report

___ V. EDD

Invoice Information

P.O.#_____

Bill To:_____

Turnaround Requirements

____ 24 hr. ____48 hr.

____ 5 Day

____ Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Special Instructions/Comments:

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other____(Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name	Printed Name	Printed Name	Printed Name	Printed Name	Printed Name
Firm	Firm	Firm	Firm	Firm	Firm
Date/Time	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

PC CL

Cooler Receipt and Preservation Form

Client CH2M Hill Service Request *K16* 00294

Received: 1/12/16 Opened: 1/12/16 By: [signature] Unloaded: 1/12/16 By: [signature]

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? one, front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID (NA)	Tracking Number (NA)	Filed
11.5	11.5	12.7	12.7	0	366			

4. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
5. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
6. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA (Y) N
11. Were VOA vials received without headspace? *Indicate in the table below.* NA (Y) N
12. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

SHORT HOLD TIME

Notes, Discrepancies, & Resolutions:

Page ____ *of* ____

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	180.1	**Units:**	NTU
Prep Method:	None	**Basis:**	NA

Turbidity

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Riverside PK	K1600294-001	**16.8**	0.20	1	01/13/16 07:00	
Method Blank	K1600294-MB2	ND U	0.20	1	01/13/16 07:00	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	180.1	**Units:**	NTU
Prep Method:	None	**Basis:**	NA

Replicate Sample Summary
Turbidity

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Riverside PK	K1600294-001DUP	0.20	16.8	16.5	16.7	2	20	01/13/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: CH2M Hill
Project: Riverside Park
Sample Matrix: Water

Service Request: K1600294
Date Analyzed: 1/13/16

Lab Control Sample Summary
General Chemistry Parameters

Units: NTU
Basis: NA

		Lab Control Sample K1600294-LCS2			
Analyte Name	**Method**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**
Turbidity	180.1	4.50	4.23	106	90 - 110

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Chloride

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Riverside PK	K1600294-001	**7.66**	0.20	2	01/13/16 09:54	1/13/16	
Method Blank	K1600294-MB1	ND U	0.10	1	01/13/16 09:40	1/13/16	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
Chloride	300.0	0.20	7.66	7.66	7.66	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16
		Date Extracted:	01/13/16

Duplicate Matrix Spike Summary
Chloride

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA
Analysis Method:	300.0		
Prep Method:	Method		

		Matrix Spike K1600294-001MS			**Duplicate Matrix Spike** K1600294-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Chloride	7.66	16.9	10.0	92	16.8	10.0	91	90-110	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/13/16
Sample Matrix:	Water	**Date Extracted:**	01/13/16

Lab Control Sample Summary
Chloride

Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	479966

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	4.74	5.00	95	90-110

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Nitrite as Nitrogen

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Riverside PK	K1600294-001	ND U	0.10	2	01/13/16 09:54	1/13/16	
Method Blank	K1600294-MB1	ND U	0.050	1	01/13/16 09:40	1/13/16	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
Nitrite as Nitrogen	300.0	0.10	ND U	ND U	NC	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16
		Date Extracted:	01/13/16

Duplicate Matrix Spike Summary
Nitrite as Nitrogen

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA
Analysis Method:	300.0		
Prep Method:	Method		

		Matrix Spike			**Duplicate Matrix Spike**					
		K1600294-001MS			K1600294-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Nitrite as Nitrogen	ND U	10.3	10.0	103	10.3	10.0	103	90-110	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/13/16
Sample Matrix:	Water	**Date Extracted:**	01/13/16

Lab Control Sample Summary
Nitrite as Nitrogen

Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	479966

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	2.54	2.50	102	90-110

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Nitrate as Nitrogen

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Riverside PK	K1600294-001	ND U	0.10	2	01/13/16 09:54	1/13/16	
Method Blank	K1600294-MB1	ND U	0.050	1	01/13/16 09:40	1/13/16	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
Nitrate as Nitrogen	300.0	0.10	ND U	ND U	NC	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16
		Date Extracted:	01/13/16

Duplicate Matrix Spike Summary
Nitrate as Nitrogen

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA
Analysis Method:	300.0		
Prep Method:	Method		

		Matrix Spike			Duplicate Matrix Spike					
		K1600294-001MS			K1600294-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Nitrate as Nitrogen	ND U	9.41	10.0	94	9.44	10.0	94	90-110	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/13/16
Sample Matrix:	Water	**Date Extracted:**	01/13/16

Lab Control Sample Summary
Nitrate as Nitrogen

Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	479966

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	2.35	2.50	94	90-110

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Sulfate

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Riverside PK	K1600294-001	ND U	0.20	2	01/13/16 09:54	1/13/16	
Method Blank	K1600294-MB1	ND U	0.10	1	01/13/16 09:40	1/13/16	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
Sulfate	300.0	0.20	ND U	ND U	NC	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16
		Date Extracted:	01/13/16

Duplicate Matrix Spike Summary
Sulfate

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA
Analysis Method:	300.0		
Prep Method:	Method		

		Matrix Spike			Duplicate Matrix Spike					
		K1600294-001MS			K1600294-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Sulfate	ND U	9.34	10.0	93	9.36	10.0	94	90-110	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/13/16
Sample Matrix:	Water	**Date Extracted:**	01/13/16

Lab Control Sample Summary
Sulfate

Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	479966

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	4.83	5.00	97	90-110

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	335.4	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Cyanide, Total

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Riverside PK	K1600294-001	ND U	0.010	1	01/20/16 09:18	1/19/16	
Method Blank	K1600294-MB1	ND U	0.010	1	01/20/16 09:18	1/19/16	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/20/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
Cyanide, Total	335.4	0.010	ND U	ND U	NC	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/20/16
		Date Extracted:	NA

Duplicate Matrix Spike Summary
Cyanide, Total

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA
Analysis Method:	335.4		
Prep Method:	None		

		Matrix Spike			Duplicate Matrix Spike					
		K1600294-001MS			K1600294-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Cyanide, Total	ND U	0.105	0.100	104	0.107	0.100	107	90-110	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/20/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Cyanide, Total

Analysis Method:	335.4	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	480624

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	0.138	0.150	92	90-110

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	ASTM D1498-00	**Units:**	mV
Prep Method:	None	**Basis:**	NA

Oxidation-Reduction Potential (ORP)

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Riverside PK	K1600294-001	**-79.65**	-	1	01/12/16 16:30	H

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/12/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	mV
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
Oxidation-Reduction Potential (ORP)	ASTM D1498-00	-	-79.7	-79.7	-79.7	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/12/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Oxidation-Reduction Potential (ORP)

Analysis Method:	ASTM D1498-00	**Units:**	mV
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479738

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	457	480	95	85-115
Lab Control Sample	K1600294-LCS2	456	480	95	85-115

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	Calculation	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Nitrate+Nitrite as Nitrogen

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Riverside PK	K1600294-001	ND U	0.20	1	01/13/16 09:54	

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 2120 B	**Units:**	ColorUnits
Prep Method:	None	**Basis:**	NA

Color

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Riverside PK	K1600294-001	**35.0**	5.0	1	01/13/16 09:56	
Method Blank	K1600294-MB1	ND U	5.0	1	01/13/16 09:46	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	ColorUnits
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
Color	SM 2120 B	5.0	35.0	35.0	35.0	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/13/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Color

Analysis Method:	SM 2120 B	**Units:**	ColorUnits
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479803

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	50.0	50.0	100	85-115

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 2510 B	**Units:**	uMHOS/cm
Prep Method:	None	**Basis:**	NA

Conductivity at 25 Degrees Celsius

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Riverside PK	K1600294-001	**218**	2.0	1	01/18/16 11:03	
Method Blank	K1600294-MB1	ND U	2.0	1	01/18/16 11:03	
Method Blank	K1600294-MB2	ND U	2.0	1	01/18/16 11:03	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/18/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	uMHOS/cm
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
Conductivity at 25 Degrees Celsius	SM 2510 B	2.0	218	218	218	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/18/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Conductivity at 25 Degrees Celsius

Analysis Method:	SM 2510 B	**Units:**	uMHOS/cm
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	480375

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	284	289	98	86-113

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 2540 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Solids, Total Dissolved

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Riverside PK	K1600294-001	**143**	10	1	01/16/16 14:00	
Method Blank	K1600294-MB1	ND U	10	1	01/16/16 14:00	
Method Blank	K1600294-MB2	ND U	10	1	01/16/16 14:00	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 2540 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Replicate Sample Summary
Solids, Total Dissolved

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Riverside PK	K1600294-001DUP	10	143	144	144	<1	10	01/16/16
Batch QC	K1600389-001DUP	10	126	117	122	7	10	01/16/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/16/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Solids, Total Dissolved

Analysis Method:	SM 2540 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	480051

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	650	714	91	85-115

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 4500-F- C Modified	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Fluoride

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Riverside PK	K1600294-001	ND U	0.20	1	01/19/16 10:00	
Method Blank	K1600294-MB1	ND U	0.20	1	01/19/16 10:00	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/19/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
Fluoride	SM 4500-F- C Modified	0.20	ND U	ND U	NC	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/19/16
		Date Extracted:	NA

Matrix Spike Summary
Fluoride

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA
Analysis Method:	SM 4500-F- C Modified		
Prep Method:	None		

Matrix Spike
K1600294-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Fluoride	ND U	26.5	25.0	106	74-128

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/19/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Fluoride

Analysis Method:	SM 4500-F- C Modified	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	480535

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	9.20	8.52	108	87-117

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 4500-H+ B	**Units:**	pH Units
Prep Method:	None	**Basis:**	NA

pH

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Riverside PK	K1600294-001	**6.79**	-	1	01/13/16 10:23	H

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	pH Units
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
pH	SM 4500-H+ B	-	6.79	6.80	6.80	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/13/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
pH

Analysis Method:	SM 4500-H+ B	**Units:**	pH Units
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479839

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	8.28	8.32	100	85-115

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 4500-NH3 G	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Ammonia as Nitrogen

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Riverside PK	K1600294-001	**0.366**	0.050	1	01/13/16 14:54	1/13/16	
Method Blank	K1600294-MB1	ND U	0.050	1	01/13/16 14:54	1/13/16	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 4500-NH3 G	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Replicate Sample Summary
Ammonia as Nitrogen

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Riverside PK	K1600294-001DUP	0.050	0.366	0.373	0.370	2	20	01/13/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16
		Date Extracted:	01/13/16

Duplicate Matrix Spike Summary
Ammonia as Nitrogen

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA
Analysis Method:	SM 4500-NH3 G		
Prep Method:	Method		

		Matrix Spike K1600294-001MS			Duplicate Matrix Spike K1600294-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Ammonia as Nitrogen	0.366	2.42	2.00	103	2.49	2.00	106	90-110	3	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/13/16
Sample Matrix:	Water	**Date Extracted:**	01/13/16

Lab Control Sample Summary
Ammonia as Nitrogen

Analysis Method:	SM 4500-NH3 G	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	479836

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	1.61	1.62	99	90-110

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 4500-O G	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Oxygen, Dissolved

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Riverside PK	K1600294-001	**1.2**	1.0	1	01/12/16 16:38	H

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/12/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
Oxygen, Dissolved	SM 4500-O G	1.0	1.2	1.0	1.09	13	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 4500-P E	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Orthophosphate as Phosphorus

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Riverside PK	K1600294-001	**0.327**	0.050	1	01/13/16 07:55	
Method Blank	K1600294-MB1	ND U	0.050	1	01/13/16 07:55	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
Orthophosphate as Phosphorus	SM 4500-P E	0.050	0.327	0.327	0.327	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16
		Date Extracted:	NA

Duplicate Matrix Spike Summary
Orthophosphate as Phosphorus

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA
Analysis Method:	SM 4500-P E		
Prep Method:	None		

		Matrix Spike K1600294-001MS			Duplicate Matrix Spike K1600294-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Orthophosphate as Phosphorus	0.327	0.76	0.40	109	0.75	0.40	105	75-125	4	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/13/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Orthophosphate as Phosphorus

Analysis Method:	SM 4500-P E	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479940

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	2.54	2.54	100	85-115

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Carbon, Total Organic

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Riverside PK	K1600294-001	**2.30**	0.50	1	01/14/16 11:19	
Method Blank	K1600294-MB1	ND U	0.50	1	01/14/16 11:19	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Replicate Sample Summary
Carbon, Total Organic

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Riverside PK	K1600294-001DUP	0.50	2.30	2.02	2.16	13 *	10	01/14/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/14/16
		Date Extracted:	NA

Matrix Spike Summary
Carbon, Total Organic

Sample Name:	Riverside PK	**Units:**	mg/L
Lab Code:	K1600294-001	**Basis:**	NA
Analysis Method:	SM 5310 C		
Prep Method:	None		

Matrix Spike
K1600294-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Total Organic	2.30	26.8	25.0	98	83-117

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Analyzed:**	01/14/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Carbon, Total Organic

Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479960

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600294-LCS1	18.5	19.8	94	83-117

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
Analysis Method:	SM 5910 B	**Units:**	cm-1
Prep Method:	None	**Basis:**	NA

UV254

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
Riverside PK	K1600294-001	**0.119**	-	1	01/13/16 09:41	
Method Blank	K1600294-MB1	ND U	-	1	01/13/16 09:41	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Analyzed:	01/13/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Riverside PK	**Units:**	cm-1
Lab Code:	K1600294-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600294-001DUP Result	Average	RPD	RPD Limit
UV254	SM 5910 B	-	0.119	0.120	0.120	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16

Hardness as CaCO3

Prep Method:	CLAA	Units:	mg/L (ppm)
Analysis Method:	200.7/SM 2340B	Basis:	NA
Test Notes:			

Sample Name	Lab Code	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Riverside PK	K1600294-001	0.07	1	01/13/16	01/19/16	82.1	
Method Blank	K1600294-MB	0.07	1	01/13/16	01/19/16	ND	

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client: CH2M Hill
Project: Riverside Park
Sample Matrix: Water

Service Request: K1600294
Date Collected: 01/12/16
Date Received: 01/12/16
Date Extracted: 01/13/16
Date Analyzed: 01/19/16

Duplicate Summary
Metals

Sample Name: Riverside PK
Lab Code: K1600294-001D
Test Notes:

Units: mg/L (ppm)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Hardness as CaCO3	CLAA	200.7/SM 2340B	0.07	82.1	80.6	81.4	2	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16

Mercury, Total

Prep Method:	METHOD	Units:	ng/L
Analysis Method:	1631E	Basis:	NA
Test Notes:			

Sample Name	Lab Code	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Riverside PK	K1600294-001	0.5	1	01/19/16	01/20/16	ND	
Method Blank 1	K1600294-MB1	0.5	1	01/19/16	01/20/16	ND	
Method Blank 2	K1600294-MB2	0.5	1	01/19/16	01/20/16	ND	
Method Blank 3	K1600294-MB3	0.5	1	01/19/16	01/20/16	ND	

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/16
Sample Matrix:	Water	**Date Received:**	01/12/16
		Date Extracted:	01/19/16
		Date Analyzed:	01/20/16

Matrix Spike/Duplicate Matrix Spike Summary
Total Metals

Sample Name:	Riverside PK	Units:	ng/L
Lab Code:	K1600294-001MS, K1600294-001MSD	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	ALS Acceptance Limits	Relative Percent Difference	Result Notes
Mercury	METHOD	1631E	0.5	50	50	ND	48.7	50.6	97	101	71-125	4	

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	01/20/16

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Initial)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	ALS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.13	103	77-123	

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	01/20/16

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	ALS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.24	105	77-123	

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	01/20/16

Quality Control Sample (QCS) Summary
Total Metals

Sample Name: Quality Control Sample

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	ALS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.35	107	77-123	

ALS Group USA, Corp.
dba ALS Enviromental

Analytical Report

Client :	CH2M Hill	**Service Request :**	K1600294
Project Name :	Riverside Park	**Date Collected :**	01/12/16
Project No. :	NA	**Date Received :**	01/12/16
Matrix :	Water	**Date Extracted :**	01/13/16

Total Metals

Sample Name :	Riverside PK	**Units :**	ug/L (ppb)
Lab Code :	K1600294-001	**Basis :**	NA

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Aluminum	200.7	10	01/19/16	43.8	
Antimony	200.8	0.05	01/14/16	ND	
Arsenic	200.8	0.5	01/14/16	ND	
Barium	200.7	4.0	01/19/16	6.1	
Beryllium	200.8	0.02	01/14/16	ND	
Cadmium	200.8	0.02	01/14/16	ND	
Calcium	200.7	20	01/19/16	15900	
Chromium	200.8	0.2	01/14/16	ND	
Copper	200.7	4.0	01/19/16	ND	
Iron	200.7	20	01/19/16	11200	
Lead	200.8	0.02	01/14/16	0.12	
Magnesium	200.7	5.0	01/19/16	10300	
Manganese	200.7	1.0	01/19/16	293	
Nickel	200.8	0.2	01/14/16	0.8	
Selenium	200.8	1.0	01/14/16	ND	
Silicon, as SiO2	200.7	500	01/19/16	58200	
Silver	200.8	0.02	01/14/16	ND	
Sodium	200.7	200	01/19/16	10500	
Thallium	200.8	0.02	01/14/16	ND	
Zinc	200.7	4.0	01/19/16	18.7	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

Analytical Report

Client :	CH2M Hill	**Service Request :**	K1600294
Project Name :	Riverside Park	**Date Collected :**	01/12/16
Project No. :	NA	**Date Received :**	01/12/16
Matrix :	Water	**Date Extracted :**	01/13/16

Dissolved Metals

Sample Name :	Riverside PK	**Units :**	ug/L (ppb)
Lab Code :	K1600294-001	**Basis :**	NA

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Silicon, as SiO2	200.7	500	01/19/16	56100	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

Analytical Report

Client :	CH2M Hill	**Service Request :**	K1600294
Project Name :	Riverside Park	**Date Collected :**	NA
Project No. :	NA	**Date Received :**	NA
Matrix :	Water	**Date Extracted :**	01/13/16

Total Metals

Sample Name :	Method Blank	**Units :**	ug/L (ppb)
Lab Code :	K1600294-MB	**Basis :**	NA

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Aluminum	200.7	10	01/19/16	ND	
Antimony	200.8	0.05	01/14/16	ND	
Arsenic	200.8	0.5	01/14/16	ND	
Barium	200.7	4.0	01/19/16	ND	
Beryllium	200.8	0.02	01/14/16	ND	
Cadmium	200.8	0.02	01/14/16	ND	
Calcium	200.7	20	01/19/16	ND	
Chromium	200.8	0.2	01/14/16	ND	
Copper	200.7	4.0	01/19/16	ND	
Iron	200.7	20	01/19/16	ND	
Lead	200.8	0.02	01/14/16	ND	
Magnesium	200.7	5.0	01/19/16	ND	
Manganese	200.7	1.0	01/19/16	ND	
Nickel	200.8	0.2	01/14/16	ND	
Selenium	200.8	1.0	01/14/16	ND	
Silicon, as SiO2	200.7	500	01/19/16	ND	
Silver	200.8	0.02	01/14/16	ND	
Sodium	200.7	200	01/19/16	ND	
Thallium	200.8	0.02	01/14/16	ND	
Zinc	200.7	4.0	01/19/16	ND	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

QA/QC Report

Client :	CH2M Hill	**Service Request :**	K1600294
Project Name :	Riverside Park	**Date Collected :**	01/12/16
Project No. :	NA	**Date Received :**	01/12/16
Matrix :	Water	**Date Extracted :**	01/13/16
		Date Analyzed :	01/19/16

Duplicate Summary
Dissolved Metals

Sample Name :	Riverside PK	**Units :**	ug/L (ppb)
Lab Code :	K1600294-001D	**Basis :**	NA

Analyte	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Silicon, as SiO2	200.7	500	56100	54500	55300	3	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

QA/QC Report

Client :	CH2M Hill	**Service Request :**	K1600294
Project Name :	Riverside Park	**Date Collected :**	01/12/16
Project No. :	NA	**Date Received :**	01/12/16
Matrix :	Water	**Date Extracted :**	01/13/16
		Date Analyzed :	01/19/16

Matrix Spike Summary
Dissolved Metals

Sample Name :	Riverside PK	**Units :**	ug/L (ppb)
Lab Code :	K1600294-001S	**Basis :**	NA

Analyte	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	ALS Percent Recovery Acceptance Limits	Result Notes
Silicon, as SiO2	500	21400	56100	76400	95	70-130	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

QA/QC Report

Client :	CH2M Hill	**Service Request :**	K1600294
Project Name :	Riverside Park	**Date Collected :**	01/12/16
Project No. :	NA	**Date Received :**	01/12/16
Matrix :	Water	**Date Extracted :**	01/13/16
		Date Analyzed :	01/14-19/16

Duplicate Summary
Total Metals

Sample Name :	Riverside PK	**Units :**	ug/L (ppb)
Lab Code :	K1600294-001D	**Basis :**	NA

Analyte	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Aluminum	200.7	10	43.8	44.4	44.1	1	
Antimony	200.8	0.05	ND	ND	ND	-	
Arsenic	200.8	0.5	ND	ND	ND	-	
Barium	200.7	4.0	6.1	7.2	6.7	17	
Beryllium	200.8	0.02	ND	ND	ND	-	
Cadmium	200.8	0.02	ND	ND	ND	-	
Calcium	200.7	20	15900	15600	15800	2	
Chromium	200.8	0.2	ND	ND	ND	-	
Copper	200.7	4.0	ND	ND	ND	-	
Iron	200.7	20	11200	11000	11100	2	
Lead	200.8	0.02	0.12	0.11	0.11	9	
Magnesium	200.7	5.0	10300	10100	10200	2	
Manganese	200.7	1.0	293	289	291	1	
Nickel	200.8	0.2	0.8	0.6	0.7	29	
Selenium	200.8	1.0	ND	ND	ND	-	
Silicon, as SiO2	200.7	500	58200	58300	58200	<1	
Silver	200.8	0.02	ND	ND	ND	-	
Sodium	200.7	200	10500	10700	10600	2	
Thallium	200.8	0.02	ND	ND	ND	-	
Zinc	200.7	4.0	18.7	20.1	19.4	7	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

QA/QC Report

Client :	CH2M Hill	**Service Request :**	K1600294
Project Name :	Riverside Park	**Date Collected :**	01/12/16
Project No. :	NA	**Date Received :**	01/12/16
Matrix :	Water	**Date Extracted :**	01/13/16
		Date Analyzed :	01/14-19/16

Matrix Spike Summary
Total Metals

Sample Name :	Riverside PK	**Units :**	ug/L (ppb)
Lab Code :	K1600294-001S	**Basis :**	NA

Analyte	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	ALS Percent Recovery Acceptance Limits	Result Notes
Aluminum	10	2000	43.8	2110	103	70-130	
Antimony	0.05	50.0	ND	50.2	100	70-130	
Arsenic	0.5	50.0	ND	49.8	100	70-130	
Barium	4.0	1000	6.1	1120	111	70-130	
Beryllium	0.02	2.50	ND	2.4	96	70-130	
Cadmium	0.02	25.0	ND	24.7	99	70-130	
Calcium	20	10000	15900	26400	105	70-130	
Chromium	0.2	10.0	ND	8.7	87	70-130	
Copper	4.0	250	ND	251	100	70-130	
Iron	20	1000	11200	12100	90	70-130	
Lead	0.02	50.0	0.12	49.9	100	70-130	
Magnesium	5.0	10000	10300	20500	102	70-130	
Manganese	1.0	500	293	819	105	70-130	
Nickel	0.2	25.0	0.8	23.1	89	70-130	
Selenium	1.0	50.0	ND	49.6	99	70-130	
Silicon, as SiO2	500	21400	58200	78500	95	70-130	
Silver	0.02	12.5	ND	12.1	97	70-130	
Sodium	200	10000	10500	21300	108	70-130	
Thallium	0.02	50.0	ND	50.3	101	70-130	
Zinc	4.0	500	18.7	514	99	70-130	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

QA/QC Report

Client :	CH2M Hill	**Service Request :**	K1600294
Project Name :	Riverside Park	**Date Collected :**	NA
Project No. :	NA	**Date Received :**	NA
Matrix :	Water	**Date Extracted :**	01/13/16
		Date Analyzed :	01/14-19/16

Laboratory Control Sample Summary
Total Metals

Sample Name :	Laboratory Control Sample	**Units :**	ug/L (ppb)
Lab Code :	K1600294-LCS	**Basis :**	NA

Analyte	Analysis Method	True Value	Result	Percent	ALS Percent Recovery Acceptance Limits	Result Notes
Aluminum	200.7	5000	5090	102	85-115	
Antimony	200.8	50.0	48.3	97	85-115	
Arsenic	200.8	50.0	47.7	95	85-115	
Barium	200.7	5000	5230	105	85-115	
Beryllium	200.8	2.50	2.4	95	85-115	
Cadmium	200.8	25.0	23.9	96	85-115	
Calcium	200.7	12500	12700	101	85-115	
Chromium	200.8	10.0	9.6	96	85-115	
Copper	200.7	625	595	95	85-115	
Iron	200.7	2500	2530	101	85-115	
Lead	200.8	50.0	48.0	96	85-115	
Magnesium	200.7	12500	12600	100	85-115	
Manganese	200.7	1250	1280	103	85-115	
Nickel	200.8	25.0	24.0	96	85-115	
Selenium	200.8	50.0	47.8	96	85-115	
Silicon, as SiO2	200.7	21400	21600	101	85-115	
Silver	200.8	12.5	11.8	95	85-115	
Sodium	200.7	12500	12500	100	85-115	
Thallium	200.8	50.0	48.7	97	85-115	
Zinc	200.7	1250	1180	94	85-115	

Comments:

Diesel and Residual Range Organics

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Results

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/2016
Sample Matrix:	Water	**Date Received:**	01/12/2016

Diesel and Residual Range Organics

Sample Name:	Riverside PK	**Units:**	ug/L
Lab Code:	K1600294-001	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	260	1	01/13/16	01/14/16	KWG1600353	
Residual Range Organics (RRO)	ND	U	520	1	01/13/16	01/14/16	KWG1600353	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	78	50-150	01/14/16	Acceptable
n-Triacontane	78	50-150	01/14/16	Acceptable

Comments:

Analytical Results

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1600353-4	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	01/13/16	01/14/16	KWG1600353	
Residual Range Organics (RRO)	ND	U	500	1	01/13/16	01/14/16	KWG1600353	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	77	50-150	01/14/16	Acceptable
n-Triacontane	77	50-150	01/14/16	Acceptable

Comments:

Client: CH2M Hill **Service Request:** K1600294
Project: Riverside Park
Sample Matrix: Water

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: METHOD **Units:** Percent
Analysis Method: NWTPH-Dx **Level:** Low

Sample Name	Lab Code	Sur1	Sur2
Riverside PK	K1600294-001	78	78
Riverside PKDUP	KWG1600353-2	80	76
Method Blank	KWG1600353-4	77	77
Lab Control Sample	KWG1600353-3	85	86

Surrogate Recovery Control Limits (%)

Sur1	o-Terphenyl	50-150
Sur2	n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Extracted:**	01/13/2016
Sample Matrix:	Water	**Date Analyzed:**	01/14/2016

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	Riverside PK	**Units:**	ug/L
Lab Code:	K1600294-001	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1600353

Analyte Name	MRL	Sample Result	Riverside PKDUP KWG1600353-2 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	260	ND	ND	ND	-	30
Residual Range Organics (RRO)	520	ND	ND	ND	-	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Extracted:**	01/13/2016
Sample Matrix:	Water	**Date Analyzed:**	01/14/2016

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	METHOD	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1600353

	Lab Control Sample KWG1600353-3 Lab Control Spike			
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	2540	3200	79	46-140
Residual Range Organics (RRO)	1380	1600	86	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Gasoline Range Organics

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Results

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	01/12/2016
Sample Matrix:	Water	**Date Received:**	01/12/2016

Gasoline Range Organics

Sample Name:	Riverside PK	**Units:**	ug/L
Lab Code:	K1600294-001	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	NWTPH-Gx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Gasoline Range Organics-NWTPH	ND	U	250	1	01/13/16	01/13/16	KWG1600352	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
1,4-Difluorobenzene	95	50-150	01/13/16	Acceptable

Comments:

Analytical Results

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Gasoline Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1600352-3	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	NWTPH-Gx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Gasoline Range Organics-NWTPH	ND	U	250	1	01/13/16	01/13/16	KWG1600352	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
1,4-Difluorobenzene	96	50-150	01/13/16	Acceptable

Comments:

QA/QC Report

Client: CH2M Hill **Service Request:** K1600294
Project: Riverside Park
Sample Matrix: Water

Surrogate Recovery Summary
Gasoline Range Organics

Extraction Method: EPA 5030B **Units:** Percent
Analysis Method: NWTPH-Gx **Level:** Low

Sample Name	Lab Code	Sur1
Riverside PK	K1600294-001	95
Riverside PKDUP	KWG1600352-1	98
Method Blank	KWG1600352-3	96
Lab Control Sample	KWG1600352-2	99

Surrogate Recovery Control Limits (%)

Sur1 = 1,4-Difluorobenzene 50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Extracted:**	01/13/2016
Sample Matrix:	Water	**Date Analyzed:**	01/13/2016

Duplicate Sample Summary
Gasoline Range Organics

Sample Name:	Riverside PK	**Units:**	ug/L
Lab Code:	K1600294-001	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	NWTPH-Gx	**Extraction Lot:**	KWG1600352

Analyte Name	MRL	Sample Result	Riverside PKDUP KWG1600352-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Gasoline Range Organics-NWTPH	250	ND	ND	ND	-	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	CH2M Hill	**Service Request:**	K1600294
Project:	Riverside Park	**Date Extracted:**	01/13/2016
Sample Matrix:	Water	**Date Analyzed:**	01/13/2016

Lab Control Spike Summary
Gasoline Range Organics

Extraction Method:	EPA 5030B	**Units:**	ug/L
Analysis Method:	NWTPH-Gx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1600352

	Lab Control Sample KWG1600352-2 Lab Control Spike			
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**
Gasoline Range Organics-NWTPH	515	500	103	80-119

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Subcontract Lab Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

LABORATORY REPORT

January 20, 2016

Brad Phelps
CH2M Hill
2020 SW 4th Ave. Suite 300
Portland, OR 97201

RE: Riverside Park

Dear Brad:

Enclosed are the results of the sample submitted to our laboratory on January 12, 2016. For your reference, this analysis has been assigned our service request number K1600294.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

Kate Aguilera

By Kate Aguilera at 12:34 pm, Jan 20, 2016

Kate Aguilera
Project Manager

Client: CH2M Hill Service Request No: K1600294
Project: Riverside Park

CASE NARRATIVE

The sample was received intact under chain of custody at the Simi Valley facility on January 14, 2016 and was stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the sample at the time of sample receipt.

Hydrogen Sulfide Analysis

The sample was analyzed for hydrogen sulfide using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). This method is not included on the laboratory's NELAP, DoD-ELAP, or AIHA-LAP scope of accreditation.

ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
DoD ELAP	http://www.pjlabs.com/search-accredited-labs	L15-398
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	977273
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-001
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413-15-6
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA016272015-5
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

Intra-Network Chain of Custody

1317 South 13th Avenue • Kelso, WA 98626 • 1-360-577-7222 • FAX 1-360-636-1068

ALS Contact: Chris Leaf

Project Name: Riverside Park
Project Number:
Project Manager: Brad Phelps
Company: CH2M Hill
QAP: LAB QAP

Lab Code	Client Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Date Received	Send To	Sulfur Sulfur Liq
K1600294-001	Riverside PK	3	Water	1/12/16	1048	1/12/16	SIMIVALLEY	II

Test Comments
Sulfur - Sulfur Liq K1600294-001 H2S only. Must run DUP. ✓

Folder Comments:
Must run QC on this sample.
1631E LL Hg required only.

Special Instructions/Comments
Please provide the electronic (PDF and EDD) report to the following e-mail address: ALKLS.Data@alsglobal.com.

1/13/16

pH Checked _____

Turnaround Requirements
_____ **RUSH** (Surcharges Apply)
PLEASE CIRCLE WORK DAYS
1 2 3 4 5
✓ **STANDARD**
Requested FAX Date: _____
Requested Report Date: 01/22/16

Report Requirements
___ I. Results Only
✓ II. Results + QC Summaries
___ III. Results + QC and Calibration Summaries
___ IV. Data Validation Report with Raw Data
PQL/MDL/J N
EDD Y

Invoice Information
PO# 51K1600294
Bill to

Relinquished By: [signature] 1/13/16 1040 Received By: [signature] 1/14/16 0930 Airbill Number: _____

TEMP BLANK: 0°C

ALS Environmental
Sample Acceptance Check Form

Client: CH2M Hill Work order: K1600294

Project: Riverside Park

Sample(s) received on: 1/14/16 Date opened: 1/14/16 by: ADAVID

Note: This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Did **sample containers** arrive in good condition?	☒	☐	☐
3	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
4	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
5	Was **sample volume** received adequate for analysis?	☒	☐	☐
6	Are samples within specified holding times?	☒	☐	☐
7	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature: ° C Blank Temperature: 0° C **Gel Packs**			
8	Were **custody seals** on outside of cooler/Box/Container?	☒	☐	☐
	Location of seal(s)? Cooler lid. Sealing Lid?	☒	☐	☐
	Were signature and date included?	☒	☐	☐
	Were seals intact?	☒	☐	☐
9	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☒	☐	☐
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☒	☐	☐
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☒	☐	☐
10	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
11	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
K1600294-001.19	40mL VOA NP		7	1	A	MC 01/15/2016
K1600294-001.20	40mL VOA NP		7	1	A	MC 01/15/2016
K1600294-001.21	40mL VOA NP				A	

Explain any discrepancies: (include lab sample ID numbers):

Samples received at ALS-Kelso on 1/12/16

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **CH2M Hill**
Client Project ID: **Riverside Park** ALS Project ID: K1600294

Hydrogen Sulfide

Test Code: GC/SCD Reduced Sulfur Analysis
Instrument ID: Agilent 6890A/GC13/SCD Date(s) Collected: 1/12/16
Analyst: Mike Conejo Date Received: 1/12/16
Sample Type: Water Date Analyzed: 1/15/16
Test Notes:

Client Sample ID	ALS Sample ID	Liquid Amount: Amount ml(s)	Purge Volume Liter(s)	Injection Volume ml(s)	**Result µg/L**	MRL µg/L	Data Qualifier
Riverside PK	K1600294-001	10.0	0.30	1.0	ND	0.84	
Method Blank	P160115-MB	10.0	0.30	1.0	ND	0.84	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Client: **CH2M Hill**
Client Sample ID: **Duplicate Lab Control Sample**
Client Project ID: **Riverside Park**

ALS Project ID: K1600294
ALS Sample ID: P160115-DLCS

Test Code: GC/SCD Reduced Sulfur Analysis
Instrument ID: Agilent 6890A/GC13/SCD
Analyst: Mike Conejo
Sample Type: Water
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 1/15/16
Liquid Amount: 10.0 ml(s)
Purge Volume: 0.30 Liter(s)
Injection Volume: 0.20 ml(s)

CAS #	Compound	Spike Amount LCS / DLCS ug/L	Result LCS ug/L	Result DLCS ug/L	% Recovery LCS	% Recovery DLCS	ALS Acceptance Limits	RPD	RPD Limit	Data Qualifier
7783-06-4	Hydrogen Sulfide	418	419	436	**100**	**104**	45-151	4	28	

ALS ENVIRONMENTAL

LABORATORY DUPLICATE SUMMARY RESULTS

Client: **CH2M Hill**
Client Sample ID: **Riverside PK**
Client Project ID: **Riverside Park**

ALS Project ID: K1600294
ALS Sample ID: K1600294-001DUP

Test Code: GC/SCD Reduced Sulfur Analysis
Instrument ID: Agilent 6890A/GC13/SCD
Analyst: Mike Conejo
Sample Type: Water
Test Notes:

Date Collected: 1/12/16
Date Received: 1/12/16
Date Analyzed: 1/15/16
Liquid Amount: 1.0 ml(s)
Purge Volume: 0.30 Liter(s)
Injection Volume(s): 1.0 ml(s)

CAS #	Compound	Sample Result µg/L	Duplicate Sample Result µg/L	Average	% RPD	RPD Limit	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	ND	-	-	28	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

February 4, 2016

Analytical Report for Service Request No: K1600170

Brad Phelps
CH2M Hill
2020 SW 4th Ave.
Suite 300
Portland, OR 97201

RE: City of Longview Ranney

Dear Brad,

Enclosed are the results of the sample(s) submitted to our laboratory January 08, 2016
For your reference, these analyses have been assigned our service request number **K1600170.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Chris Leaf
Project Manager

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

Table of Contents

Acronyms
Qualifiers
State Certifications, Accreditations, And Licenses
Case Narrative
Chain of Custody
General Chemistry
Metals
Diesel and Residual Range Organics
Gasoline Range Organics
Subcontract Lab Results

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
Idaho DHW	http://www.healthandwelfare.idaho.gov/Health/Labs/CertificationDrinkingWaterLabs/tabid/1833/Default.aspx	-
ISO 17025	http://www.pjlabs.com/	L14-50
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Michigan DEQ	http://www.michigan.gov/deq/0,1607,7-135-3307_4131_4156---,00.html	9949
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wisconsin DNR	http://dnr.wi.gov/	998386840
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS ENVIRONMENTAL

Client:	CH2M Hill	**Service Request No.:**	K1600170
Project:	City of Longview Ranney	**Date Received:**	01/07/15-01/08/15
Sample Matrix:	Water		

Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), Matrix/Duplicate Matrix Spike (MS/DMS), Laboratory Control Sample (LCS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

Sample Receipt

Two water samples were received for analysis at ALS Environmental between 01/07/15 and 01/08/15. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

General Chemistry Parameters

Sulfate by EPA Method 300.0:
The matrix spike recoveries for sample WTP TEST WELL were outside control criteria because of suspected matrix interference. As a result of the interference, the results for this analyte contained a potential high bias. No further corrective action was taken.

No other anomalies associated with the analysis of this sample were observed.

Total Metals

No anomalies associated with the analysis of this sample were observed.

Diesel Range Organics by Method NWTPH-Dx

No anomalies associated with the analysis of this sample were observed.

Gasoline Range Organics by Method NWTPH-Gx

No anomalies associated with the analysis of this sample were observed.

Sulfur

This analysis was performed at ALS Environmental, Simi Valley, CA. The data for this analysis is included in the corresponding section of this report.

Approved by_____

Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Environmental

CHAIN OF CUSTODY
66252

001

SR# 1160070

COC Set ____ of ____

COC# 1 of 3

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

Project Name	City of Longview RAMEY
Project Number	
Project Manager	Brad Phelps
Company	CH2M Hill
Address	2020 SW 4th Ave, Portland OR 97201
Phone #	503-872-4794
email	Brad.Phelps@CH2M.com
Sampler Signature	BPhelps
Sampler Printed Name	Brad Phelps

CLIENT SAMPLE ID	LABID	SAMPLING Date	SAMPLING Time	Matrix	NUMBER OF CONTAINERS	0H: ASTM D1498-00 / Redox Pot.	0H: SM 4500-H+ B / pH	0H: SM 4500-O G / Oxygen	48H: 180.1 / Turbidity	48H: 300.0 / NO2	48H: 300.0 / NO3	48H: SM 2120 B / Color	48H: SM 4500-P E / O Phos	48H: SM 5910 B / UV 254	7D: SM 2540 C / TDS	14D: 335.4 / CN T	14D: Sulfur Liq / Sulfur	28D: 245.1 / Hg T	28D: 300.0 / Chloride	28D: 300.0 / SO4	28D: SM 2510 B / Conductivity	28D: SM 4500-F- C Modified / F	28D: SM 4500-NH3 G / Ammonia	28D: SM 5310 C / TOC T	180D: 200.7 / Metals D	180D: 200.7 / Metals T	180D: 200.8 / Metals T	999D: SM 2340 B / Hardness Calc	Remarks
1. WTP TEST WELL		1/7/16	3:45																										
2. " " "		1/7/16	3:56																										
3. " " "		1/7/16	3:54																										
4. " " "		1/7/16	4:03																										
5. " " "		1/7/16	3:50																										
6. " " "		1/7/16	3:50																										
7. " " "		1/7/16	3:58																										
8. " " "		1/7/16	3:45																										
9. " " "		1/7/16	3:45																										
10. " " "		1/7/16	3:45																										

Report Requirements

___ I. Routine Report: Method Blank, Surrogate, as required

___ II. Report Dup., MS, MSD as required

___ III. CLP Like Summary (no raw data)

___ IV. Data Validation Report

___ V. EDD

Invoice Information

P.O.#

Bill To: City of Longview

Turnaround Requirements

___ 24 hr. ___ 48 hr.

___ 5 Day

X Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: (Al) (As) (Sb) (Ba) (Be) B (Ca) (Cd) Co (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) Mo (Ni) (K) (Ag) (Na) (Se) Sr (Tl) Sn V (Zn) (Hg)

Special Instructions/Comments:

Cyanide - Dissolved (HCN)

Silica - Total and Dissolved

Fluoride - Dissolved (F)

*Indicate State Hydrocarbon Procedure: AK CA WI (Northwest) Other____(Circle One)

Hydrogen Sulfide (H_2S)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature: BPhelps	Signature: KSmith	Signature	Signature	Signature	Signature
Printed Name: Brad Phelps	Printed Name: ALS	Printed Name	Printed Name	Printed Name	Printed Name
Firm: CH2M	Firm: ALS	Firm	Firm	Firm	Firm
Date/Time: 1/7/16 4:23	Date/Time: 1/7/16 1623	Date/Time	Date/Time	Date/Time	Date/Time

ALS Environmental

CHAIN OF CUSTODY
66254

005

SR# 611600170

COC Set____of____

COC# 3 of 3

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

Project Name: City of Longview RANNEY	Project Number:
Project Manager: Brad Phelps	
Company: CH2M Hill	
Address: 2020 SW 4th Ave, Portland OR 97201	
Phone #: 503-872-4794	email: brad.phelps@ch2m.com
Sampler Signature:	Sampler Printed Name: Brad Phelps

CLIENT SAMPLE ID	LABID	SAMPLING Date	SAMPLING Time	Matrix	NUMBER OF CONTAINERS	14D NWTPH-Dx / NW TPH SGT	14D NWTPH-Dx / NW_TPH	14D NWTPH-Gx / NW_GAS	90D 1631E / Hg LL T	1	2	3	4	5	Remarks
1. WTP TEST WELL		1/7/16	4:05												
2.															
3.															
4.															
5.															
6.															
7.															
8.															
9.															
10.															

Report Requirements

___ I. Routine Report: Method Blank, Surrogate, as required

___ II. Report Dup., MS, MSD as required

___ III. CLP Like Summary (no raw data)

___ IV. Data Validation Report

___ V. EDD

Invoice Information

P.O.#_____

Bill To: City of Longview

Turnaround Requirements

____ 24 hr. ____ 48 hr.

____ 5 Day

____ Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Special Instructions/Comments:

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other____(Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	Signature: KSmith	Signature	Signature	Signature	Signature
Printed Name: Brad Phelps	Printed Name: KSmith	Printed Name	Printed Name	Printed Name	Printed Name
Firm: CH2M	Firm: ALS	Firm	Firm	Firm	Firm
Date/Time	Date/Time: 1/7/16 1445	Date/Time	Date/Time	Date/Time	Date/Time

4:23 1/7/16

ALS Environmental

CHAIN OF CUSTODY
66252

001

SR# 611000170

COC Set____of____

COC# 2 of 3

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

Project Name	Project Number:
Project Manager	
Company	
Address	
Phone #	email
Sampler Signature	Sampler Printed Name

CLIENT SAMPLE ID	LABID	SAMPLING Date Time	Matrix	NUMBER OF CONTAINERS	999D Calculation / NO2 NO3 Calc	999D Filter Met / Filter Met	1	2	3	4	5	Remarks
1.												
2.												
3.												
4.												
5.												
6.												
7.												
8.												
9.												
10.												

Report Requirements

___ I. Routine Report: Method Blank, Surrogate, as required

___ II. Report Dup., MS, MSD as required

___ III. CLP Like Summary (no raw data)

___ IV. Data Validation Report

___ V. EDD

Invoice Information

P.O.#_____

Bill To:_____

_____

_____

Turnaround Requirements

____ 24 hr. ____48 hr.

____ 5 Day

____ Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Special Instructions/Comments:

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other_____(Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name	Printed Name	Printed Name	Printed Name	Printed Name	Printed Name
Firm	Firm	Firm	Firm	Firm	Firm
Date/Time	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

PC CL

Cooler Receipt and Preservation Form

Client CH2M Hill Service Request K16 00170

Received: 1/7/16 Opened: 1/7/16 By: KD Unloaded: 1/7/16 By: KD

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 1, Front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID (NA)	Tracking Number (NA)	Filed
12.5	12.8	12.3	12.6	+.3	351			
12.7	12.9	—	—	+.2	355			

4. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
5. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
6. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA (Y) N
11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y (N)
12. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
WTP Test Well	All 40ml		X							

Notes, Discrepancies, & Resolutions: SHORT HOLD TIME

Page _____ *of* _____

ALS Environmental

CHAIN OF CUSTODY
66851

006

SR# K1600170

COC Set 1 of 1

COC#

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

Project Name	City of Longview WTP Test Well
Project Number:	
Project Manager	Brad Phelps
Company	CH2M
Address	2020 SW 4th Ave, Portland, OR 97201
Phone #	503 360 7413
email	Brad.Phelps@CH2M.com
Sampler Signature	
Sampler Printed Name	Brad Phelps

CLIENT SAMPLE ID	LABID	SAMPLING Date	Time	Matrix	NUMBER OF CONTAINERS	14D NWTPH-Gx / NW_GAS	14D Sulfur Liq / Sulfur	1	2	3	4	5	Remarks
1. WTP Test Well		1/8/16	8:30		9								
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													

Report Requirements

___ I. Routine Report: Method Blank, Surrogate, as required

___ II. Report Dup., MS, MSD as required

___ III. CLP Like Summary (no raw data)

___ IV. Data Validation Report

___ V. EDD

Invoice Information

P.O.#

Bill To: City of Longview

c/o Amy Blain

Turnaround Requirements

___ 24 hr. ___ 48 hr.

___ 5 Day

X Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Special Instructions/Comments:

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other_____(Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name: Brad Phelps	Printed Name: A Ramirez	Printed Name	Printed Name	Printed Name	Printed Name
Firm: CH2M	Firm: AMS	Firm	Firm	Firm	Firm
Date/Time: 1/8/16 9:45 Am	Date/Time: 1/8/16 0945	Date/Time	Date/Time	Date/Time	Date/Time

PC CL

Cooler Receipt and Preservation Form

Client CH2M Hill Service Request K16 00170

Received: 1/8/16 Opened: 1/8/16 By: L Unloaded: 1/8/16 By: L

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 1F

   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID (NA)	Tracking Number (NA)	Filed
3.6	3.9	2.8	3.1	0.3	323			

4. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
5. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
6. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* NA (Y) N
12. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: REC'D 8 VIALS (5 HCl), NOT 9 AS INDICATED ON COC.

Page ____ *of* ____

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	180.1	**Units:**	NTU
Prep Method:	None	**Basis:**	NA

Turbidity

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
WTP TEST WELL	K1600170-001	**5.11**	0.20	1	01/08/16 08:56	
Method Blank	K1600170-MB1	ND U	0.20	1	01/07/16 15:00	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
Analysis Method:	180.1	**Units:**	NTU
Prep Method:	None	**Basis:**	NA

Replicate Sample Summary
Turbidity

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1600148-005DUP	0.20	0.46	0.47	0.465	1	20	01/07/16
WTP TEST WELL	K1600170-001DUP	0.20	5.11	5.06	5.09	<1	20	01/08/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/07/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Turbidity

Analysis Method:	180.1	**Units:**	NTU
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479379

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	4.29	4.23	101	90-110

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Chloride

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
WTP TEST WELL	K1600170-001	**6.19**	0.20	2	01/08/16 11:07	1/7/16	
Method Blank	K1600170-MB1	ND U	0.10	1	01/08/16 10:53	1/7/16	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Replicate Sample Summary
Chloride

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
WTP TEST WELL	K1600170-001DUP1	0.20	6.19	6.14	6.16	<1	20	01/08/16
Batch QC	K1600179-001DUP	0.10	ND U	0.46	NC	NC	20	01/09/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/8/16
		Date Extracted:	01/7/16

Duplicate Matrix Spike Summary
Chloride

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA
Analysis Method:	300.0		
Prep Method:	Method		

		Matrix Spike K1600170-001MS1			**Duplicate Matrix Spike** K1600170-001DMS1					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Chloride	6.19	10.7	4.00	112 *	10.6	4.00	110	90-110	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	01/9/16
		Date Extracted:	01/7/16

Duplicate Matrix Spike Summary
Chloride

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1600179-001	**Basis:**	NA
Analysis Method:	300.0		
Prep Method:	Method		

		Matrix Spike			Duplicate Matrix Spike					
		K1600179-001MS			K1600179-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Chloride	ND U	4.14	4.00	103	4.13	4.00	103	90-110	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/08/16
Sample Matrix:	Water	**Date Extracted:**	01/07/16

Lab Control Sample Summary
Chloride

Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	479376

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	4.82	5.00	96	90-110

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Nitrite as Nitrogen

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
WTP TEST WELL	K1600170-001	ND U	0.10	2	01/08/16 11:07	1/7/16	
Method Blank	K1600170-MB1	ND U	0.050	1	01/08/16 10:53	1/7/16	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/08/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600170-001DUP1 Result	Average	RPD	RPD Limit
Nitrite as Nitrogen	300.0	0.10	ND U	ND U	NC	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/8/16
		Date Extracted:	01/7/16

Duplicate Matrix Spike Summary
Nitrite as Nitrogen

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA
Analysis Method:	300.0		
Prep Method:	Method		

		Matrix Spike K1600170-001MS1			**Duplicate Matrix Spike** K1600170-001DMS1					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Nitrite as Nitrogen	ND U	4.28	4.00	107	4.21	4.00	105	90-110	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/08/16
Sample Matrix:	Water	**Date Extracted:**	01/07/16

Lab Control Sample Summary
Nitrite as Nitrogen

Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	479376

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	2.63	2.50	105	90-110

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Nitrate as Nitrogen

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
WTP TEST WELL	K1600170-001	ND U	0.10	2	01/08/16 11:07	1/7/16	
Method Blank	K1600170-MB1	ND U	0.050	1	01/08/16 10:53	1/7/16	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Replicate Sample Summary

Nitrate as Nitrogen

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
WTP TEST WELL	K1600170-001DUP1	0.10	ND U	ND U	NC	NC	20	01/08/16
Batch QC	K1600179-001DUP	0.050	0.219	0.216	0.217	2	20	01/09/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/8/16
		Date Extracted:	01/7/16

Duplicate Matrix Spike Summary
Nitrate as Nitrogen

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA
Analysis Method:	300.0		
Prep Method:	Method		

		Matrix Spike			Duplicate Matrix Spike					
		K1600170-001MS1			K1600170-001DMS1					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Nitrate as Nitrogen	ND U	3.72	4.00	93	3.69	4.00	92	90-110	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	01/9/16
		Date Extracted:	01/7/16

Duplicate Matrix Spike Summary
Nitrate as Nitrogen

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1600179-001	**Basis:**	NA
Analysis Method:	300.0		
Prep Method:	Method		

		Matrix Spike K1600179-001MS			**Duplicate Matrix Spike** K1600179-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Nitrate as Nitrogen	0.219	4.13	4.00	98	4.17	4.00	99	90-110	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/08/16
Sample Matrix:	Water	**Date Extracted:**	01/07/16

Lab Control Sample Summary
Nitrate as Nitrogen

Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	479376

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	2.38	2.50	95	90-110

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Sulfate

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
WTP TEST WELL	K1600170-001	**6.52**	0.20	2	01/08/16 11:07	1/7/16	
Method Blank	K1600170-MB1	ND U	0.10	1	01/08/16 10:53	1/7/16	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Replicate Sample Summary
Sulfate

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
WTP TEST WELL	K1600170-001DUP	0.20	6.52	6.42	6.47	2	20	01/08/16
Batch QC	K1600179-001DUP	0.10	1.80	1.76	1.78	2	20	01/09/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/8/16
		Date Extracted:	01/7/16

Duplicate Matrix Spike Summary
Sulfate

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA
Analysis Method:	300.0		
Prep Method:	Method		

		Matrix Spike			**Duplicate Matrix Spike**					
		K1600170-001MS			K1600170-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Sulfate	6.52	11.0	4.00	113 *	11.0	4.00	113 *	90-110	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	01/9/16
		Date Extracted:	01/7/16

Duplicate Matrix Spike Summary
Sulfate

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1600179-001	**Basis:**	NA
Analysis Method:	300.0		
Prep Method:	Method		

		Matrix Spike			Duplicate Matrix Spike					
		K1600179-001MS			K1600179-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Sulfate	1.80	5.73	4.00	98	5.84	4.00	101	90-110	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/08/16
Sample Matrix:	Water	**Date Extracted:**	01/07/16

Lab Control Sample Summary
Sulfate

Analysis Method:	300.0	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	479376

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	4.76	5.00	95	90-110

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	335.4	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Cyanide, Total

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
WTP TEST WELL	K1600170-001	ND U	0.010	1	01/12/16 15:57	1/12/16	
Method Blank	K1600170-MB1	ND U	0.010	1	01/12/16 15:57	1/12/16	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/12/16

Replicate Sample Summary

General Chemistry Parameters

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600170-001DUP Result	Average	RPD	RPD Limit
Cyanide, Total	335.4	0.010	ND U	ND U	NC	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/12/16
		Date Extracted:	01/12/16

Duplicate Matrix Spike Summary
Cyanide, Total

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA
Analysis Method:	335.4		
Prep Method:	Method		

		Matrix Spike			**Duplicate Matrix Spike**					
		K1600170-001MS			K1600170-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Cyanide, Total	ND U	0.104	0.100	104	0.103	0.100	103	90-110	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/12/16
Sample Matrix:	Water	**Date Extracted:**	01/12/16

Lab Control Sample Summary
Cyanide, Total

Analysis Method:	335.4	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	479691

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	0.138	0.150	92	90-110

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	ASTM D1498-00	**Units:**	mV
Prep Method:	None	**Basis:**	NA

Oxidation-Reduction Potential (ORP)

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
WTP TEST WELL	K1600170-001	**-30.25**	-	1	01/08/16 09:00	H

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/08/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	WTP TEST WELL	**Units:**	mV
Lab Code:	K1600170-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600170-001DUP Result	Average	RPD	RPD Limit
Oxidation-Reduction Potential (ORP)	ASTM D1498-00	-	-30.25	-30.25	-30.3	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/08/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Oxidation-Reduction Potential (ORP)

Analysis Method:	ASTM D1498-00	**Units:**	mV
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479333

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	452	480	94	85-115
Lab Control Sample	K1600170-LCS2	452	480	94	85-115

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	Calculation	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Nitrate+Nitrite as Nitrogen

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
WTP TEST WELL	K1600170-001	ND U	0.20	1	01/07/16 23:10	

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	SM 2120 B	**Units:**	ColorUnits
Prep Method:	None	**Basis:**	NA

Color

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
WTP TEST WELL	K1600170-001	**20.0**	5.0	1	01/08/16 09:32	
Method Blank	K1600170-MB1	ND U	5.0	1	01/07/16 16:19	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/08/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	WTP TEST WELL	**Units:**	ColorUnits
Lab Code:	K1600170-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600170-001DUP Result	Average	RPD	RPD Limit
Color	SM 2120 B	5.0	20.0	20.0	20.0	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/07/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Color

Analysis Method:	SM 2120 B	**Units:**	ColorUnits
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479268

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	50.0	50.0	100	85-115

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	SM 2510 B	**Units:**	uMHOS/cm
Prep Method:	None	**Basis:**	NA

Conductivity at 25 Degrees Celsius

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
WTP TEST WELL	K1600170-001	**243**	2.0	1	01/08/16 09:35	
Method Blank	K1600170-MB1	ND U	2.0	1	01/08/16 09:35	
Method Blank	K1600170-MB2	ND U	2.0	1	01/08/16 09:35	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/08/16

Replicate Sample Summary

General Chemistry Parameters

Sample Name:	WTP TEST WELL	**Units:**	uMHOS/cm
Lab Code:	K1600170-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600170-001DUP Result	Average	RPD	RPD Limit
Conductivity at 25 Degrees Celsius	SM 2510 B	2.0	243	242	243	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/08/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Conductivity at 25 Degrees Celsius

Analysis Method:	SM 2510 B	**Units:**	uMHOS/cm
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479294

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	283	289	98	86-113

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	SM 2540 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Solids, Total Dissolved

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
WTP TEST WELL	K1600170-001	**181**	10	1	01/08/16 16:12	
Method Blank	K1600170-MB1	ND U	10	1	01/08/16 16:12	
Method Blank	K1600170-MB2	ND U	10	1	01/08/16 16:12	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Analysis Method:	SM 2540 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Replicate Sample Summary
Solids, Total Dissolved

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1600142-001DUP	10	203	190	197	7	10	01/08/16
Batch QC	K1600146-001DUP	10	508	500	504	2	10	01/08/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/08/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Solids, Total Dissolved

Analysis Method:	SM 2540 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479357

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	724	714	101	85-115

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	SM 4500-F- C Modified	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Fluoride

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
WTP TEST WELL	K1600170-001	ND U	0.20	1	01/18/16 03:15	
Method Blank	K1600170-MB1	ND U	0.20	1	01/18/16 03:15	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/18/16

Replicate Sample Summary

General Chemistry Parameters

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600170-001DUP Result	Average	RPD	RPD Limit
Fluoride	SM 4500-F- C Modified	0.20	ND U	ND U	NC	NC	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/18/16
		Date Extracted:	NA

Matrix Spike Summary
Fluoride

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA
Analysis Method:	SM 4500-F- C Modified		
Prep Method:	None		

Matrix Spike
K1600170-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Fluoride	ND U	24.5	25.0	98	74-128

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/18/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Fluoride

Analysis Method:	SM 4500-F- C Modified	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	478805

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	8.16	8.52	96	87-117

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	SM 4500-H+ B	**Units:**	pH Units
Prep Method:	None	**Basis:**	NA

pH

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
WTP TEST WELL	K1600170-001	**6.94**	-	1	01/08/16 15:05	H

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/08/16

Replicate Sample Summary

General Chemistry Parameters

Sample Name:	WTP TEST WELL	**Units:**	pH Units
Lab Code:	K1600170-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600170-001DUP Result	Average	RPD	RPD Limit
pH	SM 4500-H+ B	-	6.94	6.95	6.95	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/08/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
pH

Analysis Method:	SM 4500-H+ B	**Units:**	pH Units
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479344

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	8.27	8.32	99	85-115

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	SM 4500-NH3 G	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA

Ammonia as Nitrogen

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
WTP TEST WELL	K1600170-001	**0.314**	0.050	1	01/08/16 11:09	1/8/16	
Method Blank	K1600170-MB1	ND U	0.050	1	01/08/16 11:09	1/8/16	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/08/16

Replicate Sample Summary

General Chemistry Parameters

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600170-001DUP Result	Average	RPD	RPD Limit
Ammonia as Nitrogen	SM 4500-NH3 G	0.050	0.314	0.297	0.305	6	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/8/16
		Date Extracted:	01/8/16

Duplicate Matrix Spike Summary
Ammonia as Nitrogen

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA
Analysis Method:	SM 4500-NH3 G		
Prep Method:	Method		

		Matrix Spike			**Duplicate Matrix Spike**					
		K1600170-001MS			K1600170-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Ammonia as Nitrogen	0.314	2.31	2.00	100	2.29	2.00	99	90-110	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/08/16
Sample Matrix:	Water	**Date Extracted:**	01/08/16

Lab Control Sample Summary
Ammonia as Nitrogen

Analysis Method:	SM 4500-NH3 G	**Units:**	mg/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	479308

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	15.4	16.2	95	90-110

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	SM 4500-O G	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Oxygen, Dissolved

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
WTP TEST WELL	K1600170-001	**2.3**	1.0	1	01/08/16 10:35	

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	SM 4500-P E	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Orthophosphate as Phosphorus

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
WTP TEST WELL	K1600170-001	**0.200**	0.050	1	01/08/16 12:39	
Method Blank	K1600170-MB1	ND U	0.050	1	01/08/16 12:39	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/08/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600170-001DUP Result	Average	RPD	RPD Limit
Orthophosphate as Phosphorus	SM 4500-P E	0.050	0.200	0.197	0.198	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/8/16
		Date Extracted:	NA

Duplicate Matrix Spike Summary
Orthophosphate as Phosphorus

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA
Analysis Method:	SM 4500-P E		
Prep Method:	None		

		Matrix Spike K1600170-001MS			**Duplicate Matrix Spike** K1600170-001DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Orthophosphate as Phosphorus	0.200	0.53	0.40	82	0.57	0.40	92	75-125	11	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/08/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Orthophosphate as Phosphorus

Analysis Method:	SM 4500-P E	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479388

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	2.53	2.54	99	85-115

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Carbon, Total Organic

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
WTP TEST WELL	K1600170-001	**1.80**	0.50	1	01/14/16 11:19	
Method Blank	K1600170-MB1	ND U	0.50	1	01/14/16 11:19	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA

Replicate Sample Summary
Carbon, Total Organic

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
WTP TEST WELL	K1600170-001DUP	0.50	1.80	1.68	1.74	7	10	01/14/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/14/16
		Date Extracted:	NA

Matrix Spike Summary
Carbon, Total Organic

Sample Name:	WTP TEST WELL	**Units:**	mg/L
Lab Code:	K1600170-001	**Basis:**	NA
Analysis Method:	SM 5310 C		
Prep Method:	None		

Matrix Spike
K1600170-001MS

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Total Organic	1.80	26.6	25.0	99	83-117

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Analyzed:**	01/14/16
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Carbon, Total Organic

Analysis Method:	SM 5310 C	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	479960

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1600170-LCS1	18.5	19.8	94	83-117

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/7/16
Sample Matrix:	Water	**Date Received:**	01/7/16
Analysis Method:	SM 5910 B	**Units:**	cm-1
Prep Method:	None	**Basis:**	NA

UV254

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Q
WTP TEST WELL	K1600170-001	**0.097**	-	1	01/08/16 11:32	
Method Blank	K1600170-MB1	ND U	-	1	01/08/16 11:32	
Method Blank	K1600170-MB2	ND U	-	1	01/08/16 11:32	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Analyzed:	01/08/16

Replicate Sample Summary

General Chemistry Parameters

Sample Name:	WTP TEST WELL	**Units:**	cm-1
Lab Code:	K1600170-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K1600170-001DUP Result	Average	RPD	RPD Limit
UV254	SM 5910 B	-	0.097	0.100	0.0985	3	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16

Hardness as CaCO3

Prep Method:	CLAA	Units:	mg/L (ppm)
Analysis Method:	200.7/SM 2340B	Basis:	NA
Test Notes:			

Sample Name	Lab Code	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
WTP TEST WELL	K1600170-001	0.07	1	01/13/16	01/19/16	73.8	
Method Blank	K1600170-MB	0.07	1	01/13/16	01/19/16	ND	

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Extracted:	01/13/16
		Date Analyzed:	01/19/16

Duplicate Summary
Metals

Sample Name:	WTP TEST WELL	Units:	mg/L (ppm)
Lab Code:	K1600170-001D	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Hardness as CaCO3	CLAA	200.7/SM 2340B	0.07	73.8	74.6	74.2	1	

ALS Group USA, Corp.
dba ALS Environmental
Analytical Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16

Mercury, Total

Prep Method:	METHOD	Units:	ng/L
Analysis Method:	1631E	Basis:	NA
Test Notes:			

Sample Name	Lab Code	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
WTP TEST WELL	K1600170-001	0.5	1	01/07/16	01/08/16	0.5	
Method Blank 1	K1600170-MB1	0.5	1	01/07/16	01/08/16	ND	
Method Blank 2	K1600170-MB2	0.5	1	01/07/16	01/08/16	ND	
Method Blank 3	K1600170-MB3	0.5	1	01/07/16	01/08/16	ND	

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/16
Sample Matrix:	Water	**Date Received:**	01/07/16
		Date Extracted:	01/07/16
		Date Analyzed:	01/08/16

Matrix Spike/Duplicate Matrix Spike Summary
Total Metals

Sample Name:	WTP TEST WELL	Units:	ng/L
Lab Code:	K1600170-001MS, K1600170-001MSD	Basis:	NA
Test Notes:			

				Spike Level		Sample	Spike Result		Percent Recovery				
Analyte	**Prep Method**	**Analysis Method**	**MRL**	**MS**	**DMS**	**Result**	**MS**	**DMS**	**MS**	**DMS**	**ALS Acceptance Limits**	**Relative Percent Difference**	**Result Notes**
Mercury	METHOD	1631E	0.5	50	50	0.5	47.5	49.8	94	99	71-125	5	

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	01/08/16

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Initial)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	ALS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.97	99	77-123	

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	01/08/16

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	ALS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.73	95	77-123	

ALS Group USA, Corp.
dba ALS Environmental
QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	01/08/16

Quality Control Sample (QCS) Summary
Total Metals

Sample Name: Quality Control Sample

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	ALS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.23	105	77-123	

ALS Group USA, Corp.
dba ALS Enviromental

Analytical Report

Client :	CH2M Hill	**Service Request :**	K1600170
Project Name :	City of Longview Ranney	**Date Collected :**	01/07/16
Project No. :	NA	**Date Received :**	01/07/16
Matrix :	Water	**Date Extracted :**	01/13/16

Total Metals

Sample Name :	WTP TEST WELL	**Units :**	ug/L (ppb)
Lab Code :	K1600170-001	**Basis :**	NA

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Aluminum	200.7	10	01/19/16	270	
Antimony	200.8	0.05	01/14/16	ND	
Arsenic	200.8	0.5	01/14/16	ND	
Barium	200.7	4.0	01/19/16	7.0	
Beryllium	200.8	0.02	01/14/16	ND	
Cadmium	200.8	0.02	01/14/16	ND	
Calcium	200.7	20	01/19/16	15700	
Chromium	200.8	0.2	01/14/16	0.4	
Copper	200.7	4.0	01/19/16	4.0	
Iron	200.7	20	01/19/16	12500	
Lead	200.8	0.02	01/14/16	0.81	
Magnesium	200.7	5.0	01/19/16	8410	
Manganese	200.7	1.0	01/19/16	637	
Nickel	200.8	0.2	01/14/16	1.1	
Selenium	200.8	1.0	01/14/16	ND	
Silicon, as SiO2	200.7	500	01/19/16	48400	
Silver	200.8	0.02	01/14/16	ND	
Sodium	200.7	200	01/19/16	10500	
Thallium	200.8	0.02	01/14/16	ND	
Zinc	200.7	4.0	01/19/16	41.5	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

Analytical Report

Client :	CH2M Hill	**Service Request :**	K1600170
Project Name :	City of Longview Ranney	**Date Collected :**	01/07/16
Project No. :	NA	**Date Received :**	01/07/16
Matrix :	Water	**Date Extracted :**	01/13/16

Dissolved Metals

Sample Name :	WTP TEST WELL	**Units :**	ug/L (ppb)
Lab Code :	K1600170-001	**Basis :**	NA

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Silicon, as SiO2	200.7	500	01/19/16	46700	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

Analytical Report

Client :	CH2M Hill	**Service Request :**	K1600170
Project Name :	City of Longview Ranney	**Date Collected :**	NA
Project No. :	NA	**Date Received :**	NA
Matrix :	Water	**Date Extracted :**	01/13/16

Total Metals

Sample Name :	Method Blank	**Units :**	ug/L (ppb)
Lab Code :	K1600170-MB	**Basis :**	NA

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Aluminum	200.7	10	01/19/16	ND	
Antimony	200.8	0.05	01/14/16	ND	
Arsenic	200.8	0.5	01/14/16	ND	
Barium	200.7	4.0	01/19/16	ND	
Beryllium	200.8	0.02	01/14/16	ND	
Cadmium	200.8	0.02	01/14/16	ND	
Calcium	200.7	20	01/19/16	ND	
Chromium	200.8	0.2	01/14/16	ND	
Copper	200.7	4.0	01/19/16	ND	
Iron	200.7	20	01/19/16	ND	
Lead	200.8	0.02	01/14/16	ND	
Magnesium	200.7	5.0	01/19/16	ND	
Manganese	200.7	1.0	01/19/16	ND	
Nickel	200.8	0.2	01/14/16	ND	
Selenium	200.8	1.0	01/14/16	ND	
Silicon, as SiO2	200.7	500	01/19/16	ND	
Silver	200.8	0.02	01/14/16	ND	
Sodium	200.7	200	01/19/16	ND	
Thallium	200.8	0.02	01/14/16	ND	
Zinc	200.7	4.0	01/19/16	ND	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

QA/QC Report

Client :	CH2M Hill	**Service Request :**	K1600170
Project Name :	City of Longview Ranney	**Date Collected :**	01/07/16
Project No. :	NA	**Date Received :**	01/07/16
Matrix :	Water	**Date Extracted :**	01/13/16
		Date Analyzed :	01/14-19/16

Duplicate Summary
Total Metals

Sample Name :	WTP TEST WELL	**Units :**	ug/L (ppb)
Lab Code :	K1600170-001D	**Basis :**	NA

Analyte	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Aluminum	200.7	10	270	247	258	9	
Antimony	200.8	0.05	ND	ND	ND	-	
Arsenic	200.8	0.5	ND	ND	ND	-	
Barium	200.7	4.0	7.0	7.0	7.0	<1	
Beryllium	200.8	0.02	ND	ND	ND	-	
Cadmium	200.8	0.02	ND	ND	ND	-	
Calcium	200.7	20	15700	15800	15800	<1	
Chromium	200.8	0.2	0.4	0.3	0.4	29	
Copper	200.7	4.0	4.0	ND	NC	NC	
Iron	200.7	20	12500	12600	12500	<1	
Lead	200.8	0.02	0.81	0.73	0.77	10	
Magnesium	200.7	5.0	8410	8510	8460	1	
Manganese	200.7	1.0	637	644	641	1	
Nickel	200.8	0.2	1.1	1.1	1.1	<1	
Selenium	200.8	1.0	ND	ND	ND	-	
Silicon, as SiO2	200.7	500	48400	49300	48800	2	
Silver	200.8	0.02	ND	ND	ND	-	
Sodium	200.7	200	10500	10600	10500	<1	
Thallium	200.8	0.02	ND	ND	ND	-	
Zinc	200.7	4.0	41.5	41.1	41.3	<1	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

QA/QC Report

Client :	CH2M Hill	**Service Request :**	K1600170
Project Name :	City of Longview Ranney	**Date Collected :**	01/07/16
Project No. :	NA	**Date Received :**	01/07/16
Matrix :	Water	**Date Extracted :**	01/13/16
		Date Analyzed :	01/19/16

Duplicate Summary
Dissolved Metals

Sample Name :	WTP TEST WELL	**Units :**	ug/L (ppb)
Lab Code :	K1600170-001D	**Basis :**	NA

Analyte	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Silicon, as SiO2	200.7	500	46700	47400	47100	1	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

QA/QC Report

Client :	CH2M Hill	**Service Request :**	K1600170
Project Name :	City of Longview Ranney	**Date Collected :**	01/07/16
Project No. :	NA	**Date Received :**	01/07/16
Matrix :	Water	**Date Extracted :**	01/13/16
		Date Analyzed :	01/14-19/16

Matrix Spike Summary
Total Metals

Sample Name :	WTP TEST WELL	**Units :**	ug/L (ppb)
Lab Code :	K1600170-001S	**Basis :**	NA

Analyte	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	ALS Percent Recovery Acceptance Limits	Result Notes
Aluminum	10	2000	270	2240	99	70-130	
Antimony	0.05	50.0	ND	48.9	98	70-130	
Arsenic	0.5	50.0	ND	49.3	99	70-130	
Barium	4.0	1000	7.0	1090	108	70-130	
Beryllium	0.02	2.50	ND	2.43	97	70-130	
Cadmium	0.02	25.0	ND	24.6	98	70-130	
Calcium	20	10000	15700	25800	101	70-130	
Chromium	0.2	10.0	0.4	9.2	88	70-130	
Copper	4.0	250	4.0	246	97	70-130	
Iron	20	1000	12500	13400	90	70-130	
Lead	0.02	50.0	0.81	50.2	99	70-130	
Magnesium	5.0	10000	8410	18600	102	70-130	
Manganese	1.0	500	637	1160	105	70-130	
Nickel	0.2	25.0	1.1	23.6	90	70-130	
Selenium	1.0	50.0	ND	49.3	99	70-130	
Silicon, as SiO2	500	21400	48400	70600	104	70-130	
Silver	0.02	12.5	ND	12.0	96	70-130	
Sodium	200	10000	10500	20900	104	70-130	
Thallium	0.02	50.0	ND	49.9	100	70-130	
Zinc	4.0	500	41.5	527	97	70-130	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

QA/QC Report

Client :	CH2M Hill	**Service Request :**	K1600170
Project Name :	City of Longview Ranney	**Date Collected :**	01/07/16
Project No. :	NA	**Date Received :**	01/07/16
Matrix :	Water	**Date Extracted :**	01/13/16
		Date Analyzed :	01/19/16

Matrix Spike Summary
Dissolved Metals

Sample Name :	WTP TEST WELL	**Units :**	ug/L (ppb)
Lab Code :	K1600170-001S	**Basis :**	NA

Analyte	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	ALS Percent Recovery Acceptance Limits	Result Notes
Silicon, as SiO2	500	21400	46700	67600	98	70-130	

Comments:

ALS Group USA, Corp.
dba ALS Enviromental

QA/QC Report

Client :	CH2M Hill	**Service Request :**	K1600170
Project Name :	City of Longview Ranney	**Date Collected :**	NA
Project No. :	NA	**Date Received :**	NA
Matrix :	Water	**Date Extracted :**	01/13/16
		Date Analyzed :	01/14-19/16

Laboratory Control Sample Summary
Total Metals

Sample Name :	Laboratory Control Sample	**Units :**	ug/L (ppb)
Lab Code :	K1600170-LCS	**Basis :**	NA

Analyte	Analysis Method	True Value	Result	Percent	ALS Percent Recovery Acceptance Limits	Result Notes
Aluminum	200.7	5000	5090	102	85-115	
Antimony	200.8	50.0	48.3	97	85-115	
Arsenic	200.8	50.0	47.7	95	85-115	
Barium	200.7	5000	5230	105	85-115	
Beryllium	200.8	2.50	2.38	95	85-115	
Cadmium	200.8	25.0	23.9	96	85-115	
Calcium	200.7	12500	12700	101	85-115	
Chromium	200.8	10.0	9.6	96	85-115	
Copper	200.7	625	595	95	85-115	
Iron	200.7	2500	2530	101	85-115	
Lead	200.8	50.0	48.0	96	85-115	
Magnesium	200.7	12500	12600	100	85-115	
Manganese	200.7	1250	1280	103	85-115	
Nickel	200.8	25.0	24.0	96	85-115	
Selenium	200.8	50.0	47.8	96	85-115	
Silicon, as SiO2	200.7	21400	21500	101	85-115	
Silver	200.8	12.5	11.8	95	85-115	
Sodium	200.7	12500	12500	100	85-115	
Thallium	200.8	50.0	48.7	97	85-115	
Zinc	200.7	1250	1180	94	85-115	

Comments:

Diesel and Residual Range Organics

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Results

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/07/2016
Sample Matrix:	Water	**Date Received:**	01/07/2016

Diesel and Residual Range Organics

Sample Name:	WTP TEST WELL	**Units:**	ug/L
Lab Code:	K1600170-001	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	260	1	01/13/16	01/14/16	KWG1600353	
Residual Range Organics (RRO)	ND	U	520	1	01/13/16	01/14/16	KWG1600353	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	72	50-150	01/14/16	Acceptable
n-Triacontane	80	50-150	01/14/16	Acceptable

Comments:

Analytical Results

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1600353-4	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	01/13/16	01/14/16	KWG1600353	
Residual Range Organics (RRO)	ND	U	500	1	01/13/16	01/14/16	KWG1600353	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	77	50-150	01/14/16	Acceptable
n-Triacontane	77	50-150	01/14/16	Acceptable

Comments:

Client: CH2M Hill **Service Request:** K1600170
Project: City of Longview Ranney
Sample Matrix: Water

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: METHOD **Units:** Percent
Analysis Method: NWTPH-Dx **Level:** Low

Sample Name	Lab Code	Sur1	Sur2
WTP TEST WELL	K1600170-001	72	80
WTP TEST WELLDUP	KWG1600353-1	70	66
Method Blank	KWG1600353-4	77	77
Lab Control Sample	KWG1600353-3	85	86

Surrogate Recovery Control Limits (%)

Sur1	=	o-Terphenyl	50-150
Sur2	=	n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Extracted:**	01/13/2016
Sample Matrix:	Water	**Date Analyzed:**	01/14/2016

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	WTP TEST WELL	**Units:**	ug/L
Lab Code:	K1600170-001	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1600353

Analyte Name	MRL	Sample Result	WTP TEST WELLDUP KWG1600353-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	260	ND	ND	ND	-	30
Residual Range Organics (RRO)	520	ND	ND	ND	-	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Extracted:**	01/13/2016
Sample Matrix:	Water	**Date Analyzed:**	01/14/2016

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	METHOD	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1600353

Lab Control Sample
KWG1600353-3
Lab Control Spike

Analyte Name	Result	Spike Amount	%Rec	%Rec Limits
Diesel Range Organics (DRO)	2540	3200	79	46-140
Residual Range Organics (RRO)	1380	1600	86	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Gasoline Range Organics

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Results

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	01/08/2016
Sample Matrix:	Water	**Date Received:**	01/08/2016

Gasoline Range Organics

Sample Name:	WTP TEST WELL 1/8/16	**Units:**	ug/L
Lab Code:	K1600170-002	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	NWTPH-Gx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Gasoline Range Organics-NWTPH	ND	U	250	1	01/11/16	01/11/16	KWG1600315	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
1,4-Difluorobenzene	97	50-150	01/11/16	Acceptable

Comments:

ALS Group USA, Corp. dba ALS Environmental

Analytical Results

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Gasoline Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1600315-3	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	NWTPH-Gx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Gasoline Range Organics-NWTPH	ND	U	250	1	01/11/16	01/11/16	KWG1600315	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
1,4-Difluorobenzene	97	50-150	01/11/16	Acceptable

Comments:

QA/QC Report

Client: CH2M Hill
Project: City of Longview Ranney
Sample Matrix: Water

Service Request: K1600170

Surrogate Recovery Summary
Gasoline Range Organics

Extraction Method: EPA 5030B
Analysis Method: NWTPH-Gx

Units: Percent
Level: Low

Sample Name	Lab Code	Sur1
WTP TEST WELL 1/8/16	K1600170-002	97
WTP TEST WELL 1/8/16DUP	KWG1600315-1	96
Method Blank	KWG1600315-3	97
Lab Control Sample	KWG1600315-2	100

Surrogate Recovery Control Limits (%)

Sur1 =	1,4-Difluorobenzene	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

ALS Group USA, Corp. dba ALS Environmental

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Extracted:**	01/11/2016
Sample Matrix:	Water	**Date Analyzed:**	01/11/2016

Duplicate Sample Summary
Gasoline Range Organics

Sample Name:	WTP TEST WELL 1/8/16	**Units:**	ug/L
Lab Code:	K1600170-002	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	NWTPH-Gx	**Extraction Lot:**	KWG1600315

			WTP TEST WELL 1/8/16DUP KWG1600315-1 Duplicate Sample			
Analyte Name	**MRL**	**Sample Result**	**Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Gasoline Range Organics-NWTPH	250	ND	ND	ND	-	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K1600170
Project:	City of Longview Ranney	**Date Extracted:**	01/11/2016
Sample Matrix:	Water	**Date Analyzed:**	01/11/2016

Lab Control Spike Summary
Gasoline Range Organics

Extraction Method:	EPA 5030B	**Units:**	ug/L
Analysis Method:	NWTPH-Gx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1600315

Lab Control Sample
KWG1600315-2
Lab Control Spike

Analyte Name	Result	Spike Amount	%Rec	%Rec Limits
Gasoline Range Organics-NWTPH	492	500	98	80-119

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Subcontract Lab Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

LABORATORY REPORT

January 18, 2016

Brad Phelps
CH2M Hill
2020 SW 4th Ave. Suite 300
Portland, OR 97201

RE: City of Longview Ranney

Dear Brad:

Enclosed are the results of the sample submitted to our laboratory on January 12, 2016. For your reference, this analysis has been assigned our service request number K1600170.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

Kate Aguilera

By Kate Aguilera at 10:45 am, Jan 18, 2016

Kate Aguilera
Project Manager

Client: CH2M Hill Service Request No: K1600170
Project: City of Longview Ranney

CASE NARRATIVE

The sample was received intact under chain of custody at the Simi Valley facility on January 12, 2016 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the sample(s) at the time of sample receipt.

Hydrogen Sulfide Analysis

The sample was analyzed for hydrogen sulfide using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). This method is not included on the laboratory's NELAP, DoD-ELAP, or AIHA-LAP scope of accreditation.

ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
DoD ELAP	http://www.pjlabs.com/search-accredited-labs	L15-398
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	977273
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-001
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413-15-6
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA016272015-5
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

Intra-Network Chain of Custody

1317 South 13th Avenue • Kelso, WA 98626 • 1-360-577-7222 • FAX 1-360-636-1068

ALS Contact: Chris Leaf

Project Name: City of Longview Ranney
Project Number:
Project Manager: Brad Phelps
Company: CH2M Hill
QAP: LAB QAP

Lab Code	Client Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Date Received	Send To	Sulfur Sulfur Liq
K1600170-002	WTP TEST WELL 1/8/16	3	Water	1/8/16	0830	1/8/16	SIMIVALLEY	II

Folder Comments:
Must run QC on this sample. ✓
1631E LL Hg required only.

Special Instructions/Comments
Please provide the electronic (PDF and EDD) report to the following e-mail address: ALKLS.Data@alsglobal.com.

1/11/16

pH Checked _____

Turnaround Requirements
____ **RUSH** (Surcharges Apply)
PLEASE CIRCLE WORK DAYS
1 2 3 4 5
✓ **STANDARD**
Requested FAX Date: _____
Requested Report Date: 01/18/16

Report Requirements
___ I. Results Only
✓ II. Results + QC Summaries
___ III. Results + QC and Calibration Summaries
___ IV. Data Validation Report with Raw Data
PQL/MDL/J N
EDD Y Kelso Superset or Basic w/ QC

Invoice Information
PO# 51K1600170 ✓
Bill to

Relinquished By: 1/11/16
Received By: 1/12/16 0930
Airbill Number: hand

ALS Environmental
Sample Acceptance Check Form

Client: CH2M Hill Work order: K1600170

Project: City of Longview Ranney

Sample(s) received on: 1/12/16 Date opened: 1/12/16 by: KKELPE

Note: This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Did **sample containers** arrive in good condition?	☒	☐	☐
3	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
4	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
5	Was **sample volume** received adequate for analysis?	☒	☐	☐
6	Are samples within specified holding times?	☒	☐	☐
7	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☒	☐	☐
	Cooler Temperature: ° C Blank Temperature: 1° C **Gel Packs**			
8	Were **custody seals** on outside of cooler/Box/Container?	☒	☐	☐
	Location of seal(s)? SEALING COOLER Sealing Lid?	☒	☐	☐
	Were signature and date included?	☒	☐	☐
	Were seals intact?	☒	☐	☐
9	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☒	☐	☐
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☒	☐	☐
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☒	☐	☐
10	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
11	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☐

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
K1600170-002.19	40mL VOA NP		7	1	A	MC 01/15/2016
K1600170-002.20	40mL VOA NP		7	1	A	MC 01/15/2016
K1600170-002.21	40mL VOA NP				A	

Explain any discrepancies: (include lab sample ID numbers):

The samples were received at ALS-Kelso on 1/8/16

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **CH2M Hill**
Client Project ID: **City of Longview Ranney** ALS Project ID: K1600170

Hydrogen Sulfide

Test Code: GC/SCD Reduced Sulfur Analysis
Instrument ID: Agilent 6890A/GC13/SCD Date(s) Collected: 1/8/16
Analyst: Mike Conejo Date Received: 1/8/16
Sample Type: Water Date Analyzed: 1/15/16
Test Notes:

Client Sample ID	ALS Sample ID	Liquid Amount: Amount ml(s)	Purge Volume Liter(s)	Injection Volume ml(s)	**Result µg/L**	MRL µg/L	Data Qualifier
WTP TEST WELL 1/8/16	K1600170-002	10.0	0.30	1.00	ND	0.84	
Method Blank	P160115-MB	10.0	0.30	1.00	ND	0.84	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE / DUPLICATE LABORATORY CONTROL SAMPLE SUMMARY

Client: **CH2M Hill**
Client Sample ID: **Duplicate Lab Control Sample**
Client Project ID: **City of Longview Ranney**

ALS Project ID: K1600170
ALS Sample ID: P160115-DLCS

Test Code: GC/SCD Reduced Sulfur Analysis
Instrument ID: Agilent 6890A/GC13/SCD
Analyst: Mike Conejo
Sample Type: Water
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 1/15/16
Liquid Amount: 10.0 ml(s)
Purge Volume: 0.30 Liter(s)
Injection Volume: 0.20 ml(s)

CAS #	Compound	Spike Amount LCS / DLCS ug/L	Result LCS ug/L	Result DLCS ug/L	% Recovery LCS	% Recovery DLCS	ALS Acceptance Limits	RPD	RPD Limit	Data Qualifier
7783-06-4	Hydrogen Sulfide	418	419	436	**100**	**104**	45-151	4	28	

ALS ENVIRONMENTAL

LABORATORY DUPLICATE SUMMARY RESULTS

Client: **CH2M Hill**
Client Sample ID: **WTP TEST WELL 1/8/16**
Client Project ID: **City of Longview Ranney**

ALS Project ID: K1600170
ALS Sample ID: K1600170-002DUP

Test Code: GC/SCD Reduced Sulfur Analysis
Instrument ID: Agilent 6890A/GC13/SCD
Analyst: Mike Conejo
Sample Type: Water
Test Notes:

Date Collected: 1/8/16
Date Received: 1/8/16
Date Analyzed: 1/15/16
Liquid Amount: 1.00 ml(s)
Purge Volume: 0.30 Liter(s)
Injection Volume(s): 1.00 ml(s)

CAS #	Compound	Sample Result µg/L	Duplicate Sample Result µg/L	Average	% RPD	RPD Limit	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	ND	-	-	28	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

ATTACHMENT 5
COWLITZ RIVER SAMPLE
LABORATORY ANALYSIS RESULTS

Informational Water Quality Report

Watercheck w/PO

National Testing Laboratories, Ltd.
Quality Water Analysis
6571 Wilson Mills Rd
Cleveland, Ohio 44143
1-800-458-3330

Client:
Longview, WA

Ordered By:
Collector Wells Intl. 6360 Huntley Rd Columbus, OH 43229 ATTN: James Bell

Sample Number: 859997

Location:	Cowlitz River
Type of Water:	Other
Collection Date and Time:	1/12/2016 15:20
Received Date and Time:	1/14/2016 10:40
Date Completed:	1/28/2016

Definition and Legend

This informational water quality report compares the actual test result to national standards as defined in the EPA's Primary and Secondary Drinking Water Regulations.

Primary Standards:	Are expressed as the maximum contaminant level (MCL) which is the highest level of contaminant that is allowed in drinking water. MCLs are enforceable standards.
Secondary standards:	Are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor,or color) in drinking water. Individual states may choose to adopt them as enforceable standards.
Action levels:	Are defined in treatment techniques which are required processes intended to reduce the level of a contaminant in drinking water.
mg/L (ppm):	Unless otherwise indicated, results and standards are expressed as an amount in milligrams per liter or parts per million.
Minimum Detection Level (MDL):	The lowest level that the laboratory can detect a contaminant.
ND:	The contaminant was not detected above the minimum detection level.
NA:	The contaminant was not analyzed.


The contaminant was not detected in the sample above the minimum detection level.


The contaminant was detected at or above the minimum detection level, but not above the referenced standard.


The contaminant was detected above the standard, which is not an EPA enforceable MCL.


The contaminant was detected above the EPA enforceable MCL.


These results may be invalid.

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
			Microbiologicals			
	Total Coliform by P/A	No bacteria sample was required.				
			Inorganic Analytes - Metals			
▲	Aluminum	0.3	mg/L	0.2	EPA Secondary	0.1
✓	Arsenic	ND	mg/L	0.010	EPA Primary	0.005
✓	Barium	ND	mg/L	2	EPA Primary	0.30
✓	Cadmium	ND	mg/L	0.005	EPA Primary	0.002
●	Calcium	7.1	mg/L	--		2.0
✓	Chromium	ND	mg/L	0.1	EPA Primary	0.010
✓	Copper	ND	mg/L	1.3	EPA Action Level	0.004
▲	Iron	0.434	mg/L	0.3	EPA Secondary	0.020
✓	Lead	ND	mg/L	0.015	EPA Action Level	0.002
●	Lithium	0.001	mg/L	--		0.001
●	Magnesium	1.65	mg/L	--		0.10
▲	Manganese	0.051	mg/L	0.05	EPA Secondary	0.004
✓	Mercury	ND	mg/L	0.002	EPA Primary	0.001
✓	Nickel	ND	mg/L	--		0.020
✓	Potassium	ND	mg/L	--		1.0
✓	Selenium	ND	mg/L	0.05	EPA Primary	0.020
●	Silica	18.0	mg/L	--		0.1
✓	Silver	ND	mg/L	0.100	EPA Secondary	0.002
●	Sodium	4	mg/L	--		1
●	Strontium	0.029	mg/L	--		0.001
✓	Uranium	ND	mg/L	0.030	EPA Primary	0.001
✓	Zinc	ND	mg/L	5	EPA Secondary	0.004
			Physical Factors			
●	Alkalinity (Total as CaCO3)	28	mg/L	--		20
●	Hardness	24	mg/L	100	NTL Internal	10

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	pH	7.4	pH Units	6.5 to 8.5	EPA Secondary	
●	Total Dissolved Solids	53	mg/L	500	EPA Secondary	20
▲	Turbidity	6.4	NTU	1.0	EPA Action Level	0.1
			Inorganic Analytes - Other			
✓	Bromide	ND	mg/L	--		0.5
✓	Chloride	ND	mg/L	250	EPA Secondary	5.0
✓	Fluoride	ND	mg/L	4.0	EPA Primary	0.5
✓	Nitrate as N	ND	mg/L	10	EPA Primary	0.5
✓	Nitrite as N	ND	mg/L	1	EPA Primary	0.5
✓	Ortho Phosphate	ND	mg/L	--		2.0
●	Sulfate	5.1	mg/L	250	EPA Secondary	5.0
			Organic Analytes - Trihalomethanes			
✓	Bromodichloromethane	ND	mg/L	--		0.002
✓	Bromoform	ND	mg/L	--		0.004
✓	Chloroform	ND	mg/L	--		0.002
✓	Dibromochloromethane	ND	mg/L	--		0.004
✓	Total THMs	ND	mg/L	0.080	EPA Primary	0.002
			Organic Analytes - Volatiles			
✓	1,1,1,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,1-Trichloroethane	ND	mg/L	0.2	EPA Primary	0.001
✓	1,1,2,2-Tetrachloroethane	ND	mg/L	--		0.002
✓	1,1,2-Trichloroethane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,1-Dichloroethane	ND	mg/L	--		0.002
✓	1,1-Dichloroethene	ND	mg/L	0.007	EPA Primary	0.001
✓	1,1-Dichloropropene	ND	mg/L	--		0.002
✓	1,2,3-Trichlorobenzene	ND	mg/L	--		0.002
✓	1,2,3-Trichloropropane	ND	mg/L	--		0.002
✓	1,2,4-Trichlorobenzene	ND	mg/L	0.07	EPA Primary	0.002

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	1,2-Dichlorobenzene	ND	mg/L	0.6	EPA Primary	0.001
✓	1,2-Dichloroethane	ND	mg/L	0.005	EPA Primary	0.001
✓	1,2-Dichloropropane	ND	mg/L	0.005	EPA Primary	0.002
✓	1,3-Dichlorobenzene	ND	mg/L	--		0.001
✓	1,3-Dichloropropane	ND	mg/L	--		0.002
✓	1,4-Dichlorobenzene	ND	mg/L	0.075	EPA Primary	0.001
✓	2,2-Dichloropropane	ND	mg/L	--		0.002
✓	2-Chlorotoluene	ND	mg/L	--		0.001
✓	4-Chlorotoluene	ND	mg/L	--		0.001
✓	Acetone	ND	mg/L	--		0.01
✓	Benzene	ND	mg/L	0.005	EPA Primary	0.001
✓	Bromobenzene	ND	mg/L	--		0.002
✓	Bromomethane	ND	mg/L	--		0.002
✓	Carbon Tetrachloride	ND	mg/L	0.005	EPA Primary	0.001
✓	Chlorobenzene	ND	mg/L	0.1	EPA Primary	0.001
✓	Chloroethane	ND	mg/L	--		0.002
✓	Chloromethane	ND	mg/L	--		0.002
✓	cis-1,2-Dichloroethene	ND	mg/L	0.07	EPA Primary	0.002
✓	cis-1,3-Dichloropropene	ND	mg/L	--		0.002
✓	DBCP	ND	mg/L	--		0.001
✓	Dibromomethane	ND	mg/L	--		0.002
✓	Dichlorodifluoromethane	ND	mg/L	--		0.002
✓	Dichloromethane	ND	mg/L	0.005	EPA Primary	0.002
✓	EDB	ND	mg/L	--		0.001
✓	Ethylbenzene	ND	mg/L	0.7	EPA Primary	0.001
✓	Methyl Tert Butyl Ether	ND	mg/L	--		0.004
✓	Methyl-Ethyl Ketone	ND	mg/L	--		0.01
✓	Styrene	ND	mg/L	0.1	EPA Primary	0.001

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	Tetrachloroethene	ND	mg/L	0.005	EPA Primary	0.002
✓	Tetrahydrofuran	ND	mg/L	--		0.01
✓	Toluene	ND	mg/L	1	EPA Primary	0.001
✓	trans-1,2-Dichloroethene	ND	mg/L	0.1	EPA Primary	0.002
✓	trans-1,3-Dichloropropene	ND	mg/L	--		0.002
✓	Trichloroethene	ND	mg/L	0.005	EPA Primary	0.001
✓	Trichlorofluoromethane	ND	mg/L	--		0.002
✓	Vinyl Chloride	ND	mg/L	0.002	EPA Primary	0.001
✓	Xylenes (Total)	ND	mg/L	10	EPA Primary	0.001
	Organic Analytes - Others					
✓	2,4-D	ND	mg/L	0.07	EPA Primary	0.010
✓	Alachlor	ND	mg/L	0.002	EPA Primary	0.001
✓	Aldrin	ND	mg/L	--		0.002
✓	Atrazine	ND	mg/L	0.003	EPA Primary	0.002
✓	Chlordane	ND	mg/L	0.002	EPA Primary	0.001
✓	Dichloran	ND	mg/L	--		0.002
✓	Dieldrin	ND	mg/L	--		0.001
✓	Endrin	ND	mg/L	0.002	EPA Primary	0.0001
✓	Heptachlor	ND	mg/L	0.0004	EPA Primary	0.0004
✓	Heptachlor Epoxide	ND	mg/L	0.0002	EPA Primary	0.0001
✓	Hexachlorobenzene	ND	mg/L	0.001	EPA Primary	0.0005
✓	Hexachlorocyclopentadiene	ND	mg/L	0.05	EPA Primary	0.001
✓	Lindane	ND	mg/L	0.0002	EPA Primary	0.0002
✓	Methoxychlor	ND	mg/L	0.04	EPA Primary	0.002
✓	Pentachloronitrobenzene	ND	mg/L	--		0.002
✓	Silvex 2,4,5-TP	ND	mg/L	0.05	EPA Primary	0.005
✓	Simazine	ND	mg/L	0.004	EPA Primary	0.002
✓	Total PCBs	ND	mg/L	0.0005	EPA Primary	0.0005

Status	Contaminant	Results	Units	National Standards		Min. Detection Level
✓	Toxaphene	ND	mg/L	0.003	EPA Primary	0.001
✓	Trifluralin	ND	mg/L	--		0.002

We certify that the analyses performed for this report are accurate, and that the laboratory tests were conducted by methods approved by the U.S. Environmental Protection Agency or variations of these EPA methods.

These test results are intended to be used for informational purposes only and may not be used for regulatory compliance.

National Testing Laboratories, Ltd.

NATIONAL TESTING LABORATORIES, LTD