COWLITZ COUNTY HEADQUARTERS LANDFILL

GROUNDWATER AND SURFACE WATER MONITORING

FOURTH QUARTER AND ANNUAL REPORT FOR 2023

Prepared for

Cowlitz County Solid Waste

December 30, 2023

prepared by

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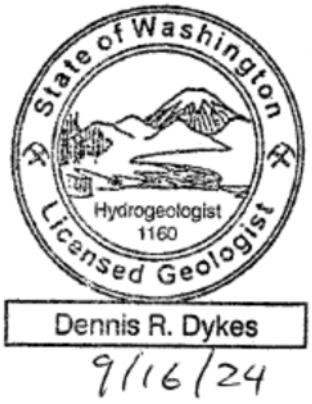
The material and data in this report were prepared by or under the supervision and direction of the undersigned.

Cowlitz County Headquarters Landfill, Groundwater and Surface Water Monitoring, Fourth Quarter and Annual Report for 2023



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CHECKLIST FOR GROUNDWATER REPORTING
Municipal Solid Waste Landfills
WAC 173-351-415

Include a signed, completed copy of this checklist with each quarterly and annual report.

Quarterly groundwater reports shall be submitted to the jurisdictional health department and Ecology within 60 days of receipt of analytical data. Annual groundwater reports shall be submitted to the jurisdictional health department and Ecology by April 1 of each year.

1st _____ 2nd _____ 3rd _____ 4th ___X___ YEAR __2023__	**Reference** (section, subsection)	**Included in this report**	**Location – page # or appendix #**
Quarterly Groundwater Reports: *173-351-415 (2) plus the referenced section*			
Statistical calculations and summaries			
Descriptive statistics	420, (1)	X	
Statistical tests	420, (2)	X	
Notification of statistical increase (if applicable)	420, (4)	☐	
Notification of concentrations above Chapter 173-200 WAC criteria (if any)	430, (4)	X	
Static water level readings	415, (2)	X	
Potentiometric surface elevation maps depicting flow direction	415, (2)	X	
Flow rate – calculated	415, (2)	X	
Cation-anion balances	430, (5a)	X	
Explanation of greater than 5% (or 10%) difference if needed	430, (5a)	X	
Trilinear diagrams	430, (5b)	X	
Leachate analyses (if sampled and tested)	415, (2)	X	
Data entered into EIM database (date entered: December 29, 2023)	415, (3)		
Complete copy of the lab report with chain of custody record.		X	
Annual Groundwater Reports: *173-351-415 (1)* **YEAR__2023_____**			
Summary of statistical results and trends	415, (1)	X	
Summary of groundwater flow rate and direction for the year	415, (1)	X	
Copy of all potentiometric maps for the year	415, (1)	X	
Summary geochemical evaluation	415, (1)	X	
For Quarterly and Annual Reports			
Stamped by a licensed professional	RCW 18.220	X	

Signature of Report Author | December 30, 2023 Date | Headquarters Landfill Landfill

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1 INTRODUCTION

This is the combined Fourth Quarter and Annual 2023 report for the groundwater, surface water and leachate monitoring program at the Cowlitz County Headquarters Landfill (CCHQL). The CCHQL is located at 3434 Silver Lake Road, Castle Rock, Washington (Figure 1). The landfill is being monitored as one area (Figure 2). Monitoring was completed in January (first quarter), April (second quarter), July (third quarter), and October (fourth quarter) of 2023. The first, second, and third quarter monitoring results were previously reported.

This report is submitted in compliance with the Criteria for Municipal Solid Waste Landfills (CMSWL) which are specified in Washington Administrative Code (WAC) Chapter 173-351. The groundwater monitoring requirements are specified in WAC 173-351-430. Revisions to WAC173-351 were adopted December 7, 2012. These revisions have been integrated in this report with slight modifications as agreed with the Cowlitz County Environmental Health Unit (EHU) and the Washington Department of Ecology (Ecology).

The sampling procedures and program are described in the *Sampling and Analysis Plan Cowlitz County Headquarters Landfill Project* (SAP) (Tuppan, June, 2013b). The SAP was originally presented as Appendix G of the Hydrogeologic Report (Tuppan, 2013a). The quarterly monitoring program described in the SAP includes groundwater, surface water, and leachate sampling. The groundwater flow rate and direction, statistical analyses of the analytical data, and a geochemical evaluation of the groundwater chemistry are specified for inclusion in each quarterly report. A summary of the 2023 data and analysis as well as a description of trends if apparent are integrated in each section forming the annual report. A revised SAP is currently in review and is expected to be implemented in 2024. The draft revised SAP continues currently used procedures and most monitoring wells and revises the analytical program for the HGCS and surface so they are more consistent with the regulations. A leachate sample is also included.

Ownership of the landfill was transferred to Cowlitz County from the Weyerhaeuser Company early in 2014 when the landfill was permitted for municipal solid waste. Fill was initially placed in Cell 6. Construction of Cell 7 began in 2014 and Cell 8 in 2017. Cells 7 and 8 have been filled to a working level and covered with temporary tarps while the fill settles. Preparation for construction of Cells 9 and 10, located east of Cell 8, began in 2018 with clear cutting of the forest and monitoring of groundwater levels for engineering purposes in 10 temporary piezometers. The temporary piezometers were abandoned in September 2019 and the area grubbed out and graded in 2020. A liner was installed in the Cell 9 area in 2021. The initial lift in this cell has been completed and temporary tarps installed on portions to reduce leachate generation. Fill is currently being placed in the northern area of Cell 9 and progressing west to bring Cells 7 and 8 to final grade.

Water levels are measured each quarter in monitoring wells and piezometers located at the landfill. The monitoring points are screened in shallow groundwater in weathered tuff and basalt (Tuppan, 2013a). Two piezometers (P-3 and P-20) were abandoned in the summer of 2014 to allow construction of Cell 7. Piezometer P-19 was abandoned in the summer of 2017 to allow for construction of Cell 8. The water level data were plotted, the hydraulic gradient estimated, and the horizontal linear groundwater velocity estimated as described in Section 2.

Groundwater samples representing each quarter were collected in 2023 from five monitoring wells completed in the shallow aquifer and the main outlet of the hydraulic gradient control system (HGCS). The fourth quarter and annual groundwater analytical results and a summary of the annual data are described in Section 3.

One surface water sample was also collected quarterly. Leachate samples are collected monthly as required by the Discharge Permit. The surface water and leachate analytical results are described in Section 4.

Water level measurements and elevations are included in Appendix A, with the groundwater level contour maps, hydrograph and flow calculations. The groundwater quality data, statistical calculations, cation-anion balance calculations and trilinear diagrams are included in Appendix B. The surface water and leachate quality data are included in Appendix C. Technical memoranda describing the fourth quarter sampling procedures and analytical data validation are included in Appendix D. The fourth quarter laboratory analytical data reports for the groundwater and leachate samples are included on a DVD in this appendix.

2 GROUNDWATER LEVELS AND FLOW DIRECTIONS

Groundwater level measurements and a hydrograph are included in Appendix A. Groundwater level contour maps for each quarter for the shallow aquifer are also provided in Appendix A. Two piezometers (P-3 and P-20) were abandoned after the third quarter 2014 measurements because of Cell 7 construction and P-19 was abandoned after the second quarter 2017 measurement because of Cell 8 construction. These piezometers are therefore no longer included in the water level monitoring system.

2.1 Groundwater Levels

2.1.1 Fourth Quarter

Water levels were measured in five monitoring wells and 10 piezometers during the monitoring round as specified in the SAP except for P-3, -19 and -20 for the reasons mentioned above, and in P-12. Measurement of the water level in P-12 was suspended to prevent fouling of the well probe. Conditions at P-12 are unusual including an almost constant level for more than 20 years and a foul odor that suggest the measured water is stagnant in the well. The constant level is used to estimate the groundwater level at this piezometer.

Water levels were measured on October 30 and 31, 2023. The water levels at most wells and piezometers were above and below the average measured levels for this time of year during the permitted period. C-1, P-10, P-13R and P-14 were above the average. The rest of the piezometers were significantly below average except P-15 that was near average and C-2, P-12, and P-18 which show very little fluctuation.

The data describe flow as generally to the northwest and north that discharges groundwater to the drainages that cross the site and in turn flow to south Sucker Creek. This overall flow pattern is consistent with the previously observed flow pattern across the site.

2.1.2 Annual Summary

Groundwater levels were measured during each sampling event in the shallow part of the uppermost aquifer as specified in the SAP. Resulting groundwater level contour maps were included in each quarterly report and are included in Appendix A. Three hydrographs representing the lower, middle and upper groundwater elevations at the site are also included in Appendix A. The hydrographs include data collected before the permitted period which includes measurements made during different calendar months than under the permit. Data collected this year is compared only to data collected under the permit.

In 2023 the annual fluctuation range of groundwater levels appeared to generally be somewhat lower than the average of the ten year permit period in most wells except in the second quarter when the levels in many wells were above the average for that time of year. Groundwater levels were higher than in 2022 when the lowest measured under the permit were measured. The annual high water level was measured in January and April at various wells. The annual low water levels were measured in the third or fourth quarter in 2023. Groundwater levels reflect the interplay of the aquifer character and aquifer recharge on the groundwater levels. Recharge was affected in 2023 by an above average early to middle of the wet season, followed by an early and sudden beginning of the dry season. The quite dry summer began in early May and extended to September.

Recharge occurs north, east and south of the landfill cells and is expected to fluctuate seasonally increasing in the fall and winter and decreasing in the spring and summer. Groundwater levels typically rise after the third or fourth quarter measurements and peak in the winter at the first or second quarter measurements at various wells. The peak occasionally occurs in the fourth quarter or second quarter at some locations.

2.2 Hydraulic Gradients

The horizontal hydraulic gradient was estimated for two areas using the contour plots generated from the water level data. These areas are in the hydrologic basin where landfilling has occurred. They are under the older landfill area and upgradient of this area where the next phases of landfill expansion are taking place. The gradient is measured under the filled area between the vicinity of the now abandoned piezometer P-19 and the C-2/HGCS outlet area and upgradient between U-1 and the vicinity of P-19. Cells 7, 8 and 9 are located over the upgradient area. Cells 7 and 8 have been filled to a working grade and the first lift placed across Cell 9. The flow path from U-1 to the P-19 vicinity crosses the southern part of Cell 9 and northern part of Cell 8. In the spring of 2020 construction of Cells 9 and 10 began and a liner installed in Cell 9 during the summer of 2021. The HGCS was extended under Cell 9 liner and is expected to control higher groundwater levels and therefore the gradient under the cells. The only variable that affects the estimation of the hydraulic gradient under this area is therefore the water level in U-1.

2.2.1 Fourth Quarter

The gradient under the older filled area was estimated for the fourth quarter 2023 to be 0.0530. The gradient in the upgradient expansion area was estimated to be 0.0496. The estimated gradients are shown on a table included in Appendix A. These values are below and similar to fourth quarter averages, respectively.

2.2.2 Annual Summary

The gradient under the older filled area was estimated to range from 0.053 to 0.058. The gradient in the upgradient area was estimated to range from 0.047 to 0.050.

This is the tenth year that the hydraulic gradients have been estimated in this manner for these areas and a historic record for comparison is being developed. The groundwater level hydrographs, which include a longer historical record, indicate that these ranges for the gradients are likely to be typical for each area. However the landfill expansion to the Cells 7 and 8 area and the lining of Cell 9 is rerouting any high groundwater to an extended HGCS which may change groundwater levels in this area. The HGCS is expected to moderate fluctuations in the apparent gradient in the developed area of the landfill primarily under the lower areas of the liner topography. Groundwater levels at U-1 are the variable affecting the estimation of the hydraulic gradient under the upgradient area and are likely to reflect changes in the gradient under the southern part of area where the HGCS is unlikely to have an affect on groundwater levels.

2.3 Groundwater Flow

Groundwater flow direction and linear velocity were evaluated using the groundwater level maps generated using the quarterly groundwater level measurements. The linear velocity of groundwater was estimated using the hydraulic parameters defined in the Hydrogeologic Report (Tuppan, 2013a). The hydraulic conductivity used was 0.15 feet per day which is the geometric mean of the slug tests completed at the site as interpreted using the Bouwer-Rice and Hvorslav methods. This included both rising head and falling head tests. An effective porosity between 6 and 32 per cent was determined from the literature. The range of the values of the parameters used to estimate the linear groundwater velocity indicate that actual flow may vary from the calculated estimates described here.

2.3.1 Fourth Quarter

On October 31, 2023, overall groundwater flow was to the northwest in the hydrologic basin where landfilling has occurred. Flow on the northern side of this drainage was to the west and on the southern side to the north and northwest in a pattern that describes discharge to the HGCS and the southern tributary of Sucker Creek. (Appendix A). Flow under the northeastern forested part of the site property was generally to the north.

The linear velocity of groundwater was estimated to be between 0.025 and 0.133 feet per day under the older filled area and between 0.023 and 0.124 feet per day in the southern expansion area. This is an average annual velocity of 28.7 feet per year under the older filled area and 26.9 feet per year under the expansion area.

These velocities are slightly lower than the average for this time of year during the permit period. However, they are substantially higher than reported before 2014 because the slug tests completed in October 2012 and reported in the revised Hydrogeologic Report (Tuppan, 2013a), when combined with the previous slug tests, resulted in a geometric mean of the hydraulic conductivity about an order of magnitude higher than historically reported.

2.3.2 Annual Summary

During each quarter of 2023 overall groundwater flow was to the northwest in the drainage basin where landfilling has occurred. Flow on the northern side of this drainage was to the west and on the southern side to the north and northwest in a pattern that describes discharge to the HGCS and the southern tributary of Sucker Creek. (Appendix A). Flow under the northeastern forested part of the site property was generally to the north. The flow pattern appears to be controlled by site topography and the HGCS.

The linear velocity of groundwater under the filled area was estimated to range from an average of 28.7 in the fourth quarters to 31.3 feet per year in the first and second quarters. The groundwater gradient in the upgradient area was estimated to range from an average of 25.6 ft/yr in the third quarter to 26.9 ft/yr in the fourth quarters.

This is the ten year that the linear velocity of groundwater has been estimated in this manner for these areas and a historic record for comparison is being developed. The groundwater level hydrographs indicate that these ranges for the gradients are likely to be typical for each area although some variability caused by recharge conditions and cell construction is expected.

3 GROUNDWATER QUALITY

Groundwater samples were collected and analyzed during each of the 2023 quarterly sampling rounds from five monitoring wells completed in the shallow aquifer and one location at the discharge from the HGCS. Three compliance wells and two upgradient wells were sampled. Results for the earlier quarters of 2023 have been previously reported. Groundwater samples representing the fourth quarter were collected on October 30, 2023. The sampling procedures for the fourth quarter are described in a memorandum included in Appendix D.

The groundwater samples from the monitoring wells were analyzed for:

- Chapter 173-351 WAC Appendix I parameters
- Chapter 173-351 WAC Appendix II parameters
- Field parameters (pH, specific conductance, temperature, dissolved oxygen, oxidation reduction potential, turbidity, static water level)
- Geochemical Indicator Parameters (Ca, Mg, Na, K, Fe, Mn, SO4, Cl, TSS, Bicarbonate, Alkalinity as CaCO3)
- Leachate Indicators (NH_3-N, TOC, TDS)

The 2023 samples were analyzed by ALS Environmental Laboratories located in Kelso, Washington. The HQLF changed laboratories in the third quarter 2018 back to ALS after having samples analyzed by BSK Associates for one year. ALS is accredited by Ecology for each type of analysis performed. Documentation of this is included in the laboratory reports in Appendix D of each quarterly report. The validation of the data is described in a memorandum also included in Appendix D of each report. The data are qualified on the data tables where appropriate.

Metals were analyzed using EPA Methods 200.7 and 200.8. The geochemistry metals (Fe, Mn, Ca, Mg, Na and K) are analyzed using Method 200.7. All other metals are analyzed using Method 200.8.

The samples were collected and analyzed as specified in the SAP. All six geochemical metals were analyzed as dissolved by agreement with the EHU and Ecology although WAC 173-351 only specifies iron and manganese be analyzed as dissolved. The samples were filtered in the laboratory. The water quality data summary tables and statistical calculations are included in Appendix B. The cation-anion balance calculations and trilinear diagrams for the fourth quarter sampling event are also included in Appendix B.

The groundwater chemistry data for the shallow aquifer were evaluated to determine whether downgradient groundwater quality differs from upgradient groundwater quality. This was

accomplished by application of the prediction limit method, comparison of site data with promulgated maximum contaminant levels (MCL), statistical analysis of the data, and geochemical evaluation of the data. The prediction limit evaluations are discussed in Section 3.1. Detections of analyte concentrations above the MCLs are discussed in Section 3.2. Statistical analyses of the quarterly groundwater data are discussed in Section 3.3. Geochemical evaluation of the analytical results is discussed in Section 3.4.

Monitoring wells U-1 and P-9 represent background. Monitoring wells C-1, C-2 and MW-1 are the downgradient. MW-1 is a substantial distance from the compliance boundary and cross gradient from the landfill and therefore the analytical data from this location are not evaluated through comparison with the background data.

3.1 Prediction Limit Determination and Data Evaluation

A parametric and non-parametric prediction limit method was selected as the statistical procedure used to evaluate the groundwater quality results. Prediction limits were determined from the background data developed for the site (Tuppan, 2014a). Parametric prediction limits were determined for parameters normally distributed. Non-parametric prediction limits were determined for parameters that were not normally distributed (Tuppan, 2014a).

Downgradient data are compared point by point to the prediction limit and are therefore adequate for use with the statistical method. False positives or negatives are evaluated by the inherent retest scheme and review of trends in the data to determine if a data point is representative (i.e., within the normal range of values or part of a trend). Background will be periodically reviewed (approximately every two years) to make sure the prediction level is valid based on the updated data set. If a data point is determined to not be representative (i.e., an outlier) it is not used in the evaluation. The prediction limit data evaluation and statistical summaries calculation were completed for the groundwater quality database.

Inorganic parameters and metals were evaluated. VOCs were not evaluated because they were detected infrequently and do not appear to define a pattern. Geochemical parameters are evaluated using cation-anion balance calculations and trilinear diagrams. The following constituents were evaluated relative to prediction limits:

- Metals (Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Ni, Se, Ag, Tl, V and Zn)
- Nitrate

Background data development as specified in WAC Chapter 173-351 was completed in October 2013. The January 2014 data is included in the background data because the landfill had not begun receiving municipal solid waste (MSW).

Data points are reviewed to determine if they are apparent outliers and not representative of background conditions. An outlier for a particular background data set was considered a data point less than 1.5 (low) or greater than 3 interquartile ranges (high) as shown on box plots.

3.1.1 Fourth Quarter Data Evaluation

The water quality prediction limits for the shallow aquifer are shown on Table 1. One of the parameter prediction limits was exceeded in the fourth quarter 2023. This includes only one of the 30 concentrations evaluated at the downgradient wells. Silver was detected at C-1 above the prediction limit.

No VOC was detected in an upgradient or downgradient well sample in the fourth quarter.

3.1.2 Annual Summary

Four parameters were detected at concentrations above a prediction limit in downgradient wells in 2023. This includes only 8 of the 120 concentrations evaluated at the downgradient wells. Beryllium, lead, zinc and silver at C-1 were detected above a prediction limit in 2023, most were in the first and second quarters. Zinc was also detected at an estimated concentration below the MRL but above the prediction limit in the first quarter sample from C-2. Concentrations higher than the prediction limits for several parameters were detected at the background wells suggesting the prediction limit should be updated.

No VOCs were detected in groundwater or the HGCS in 2023.

3.2 Detections Above Standards

Parameter concentrations were compared to Washington and federal water quality standards. Washington groundwater quality criteria specified in WAC 173-200 and the federal drinking water Maximum Contaminant Levels (MCLs) were used.

3.2.1 4th Quarter

One parameter was detected at concentrations above a standard in upgradient samples and the HGCS sample. Arsenic was detected at concentrations above the Washington criterion (0.05 µg/L) at background wells P-9 and U-1. The arsenic concentration at B1-P was below the MRL (therefore estimated) and above the MRL (0.5 µg/L) at P-9 and U-1. No arsenic concentrations were above the federal MCL of 10 µg/L. Arsenic is commonly detected in the site vicinity at these concentrations.

Manganese was detected above the secondary standard at the HGCS (B1-P) and one background well (U-1). The concentration at U-1 was more than twelve times the concentration at C-2, the next highest concentration. Iron was also detected above the secondary standard in the U-1 and HGCS samples.

3.2.2 Annual Summary

Arsenic was detected above the Washington MCL in both downgradient and upgradient wells in 2023. It was detected downgradient well C-1 only in the third quarter at a concentration below

the MRL near the MDL. Arsenic was detected at substantially higher concentrations in both upgradient wells each quarter (Table 2 and Appendix B). Arsenic was also detected at concentrations above the standard in the HGCS samples in the third and fourth quarters. No arsenic concentrations were above the federal MCL of 10 µg/L. Arsenic is commonly detected in the site vicinity at these concentrations.

Manganese was not detected above the secondary standard at a downgradient well. It was above the standard at one background well (U-1) and in the HGCS in each quarter in 2023. The concentrations at U-1 were up to twenty times the concentration at C-2 which were the next highest concentrations. The manganese concentration in the HGCS samples generally increased from April 2017 into 2020 and varied in the upper part of the range of concentrations in 2021 to 2023 but with substantial fluctuation from quarter to quarter. This increase is coincident with extension of the system under Cells 7, 8 and 9. Iron was also detected above the secondary standard at U-1 each quarter, and at the HGCS in the first three quarters. The detected concentrations of these two metals are common in the site area.

3.3 Statistical Analysis

Groundwater quality data were evaluated using statistical procedures specified in WAC Chapter 173-351-420. Statistics calculated for each parameter at each well are as follows:

- mean
- sample standard deviation
- variance
- coefficient of variation
- standard error

A statistical summary of each data set for each well are presented in the water quality data tables in Appendix B. The statistics were calculated using the available data for each inorganic parameter at each well excluding identified outliers. Statistics were not calculated for VOCs because of the lack of compound detections.

3.4 Geochemical Evaluation

Geochemical evaluation of the 2023 analytical data included calculations of cation-anion balances and preparation of trilinear diagrams (Appendix B). Alkalinity is used to calculate the bicarbonate concentrations which are used by both geochemical evaluation methods.

3.4.1 Fourth Quarter

The cation-anion balance calculations were below the 10 percent criterion defined in WAC Chapter 173-351-430 at each well in the fourth quarter. The 10 percent criterion was applied because total milliequivalents at each well were less than five.

Piper trilinear diagrams were prepared for each shallow monitoring well and the HGCS. The data points generally appear to fall in relatively the same general area on each respective diagram creating clusters of the data that define the chemical character of the water at each well. The plotted locations for the fourth quarter data fall roughly within the cluster of data points collected for the background and detection monitoring programs although C-1 plotted to the right side and MW-1 plotted at the upper left edge of the cluster.

3.4.2 Annual Summary

The cation-anion balance calculations did not exceed the criteria in 2023. The balance calculations were poor in the winter 2013/2014 but have been in better balance since. The reason for the poor balances that winter is not known but appears to have primarily resulted from higher bicarbonate concentrations.

Bicarbonate is the dominant anion and is present in each sample at much higher equivalent concentrations than the other anions. Total cation and anion equivalents were relatively stable across the site through 2023. Individual anion equivalents are typically lower than the bicarbonate concentration and the total cation equivalents are distributed primarily among calcium, magnesium and sodium.

Piper trilinear diagrams were prepared for each shallow monitoring well using data from each quarter from 2014 through 2023 as well as the quarterly 2013 data generated during background data development. The groundwater at the site generally plots in the left part of the diagram indicating a calcium/magnesium bicarbonate water with sodium pulling the plotted location down the diagram. This is typical of groundwater in a basaltic volcanic environment where the lower plotted data suggest a more feldspathic aquifer matrix.

As described in Tuppan (2014a), the cluster at C-2 is somewhat lower than was plotted for historic data generated prior to 2013. This may be the result of the change to low flow sampling and filtering of the sample analyzed for geochemical metals. The slight difference from other wells at the site is most likely the result of a variation in the composition of the aquifer matrix in the vicinity of this location. Also groundwater flow around this well appears to be quite slow and the groundwater is likely to be older.

In 2023 the data generally plot within the cluster of data points for each location and are defining what can be expected to be the variability. At C-1 the plotted data moved randomly left and right this year which appears to be defining variability at this well. C-2 data points also showed variability.

3.5 Groundwater Quality Trends

Groundwater quality trend plots were generated although the available comparable data is limited to ten years. The short data record constrains the evaluation of normal variability and seasonal or other trends. The trend plots were used primarily to inform the geochemical

analysis. Plots for calcium, iron, magnesium, manganese, potassium, sodium, bicarbonate, chloride and sulfate are included in Appendix B.

Additionally, plots for arsenic, cobalt, copper, lead, silver, thallium, vanadium, and zinc were generated and are also included in Appendix B. As for the geochemistry plots, the short data record constrains the evaluation of normal variability and seasonal or other trends.

Groundwater quality in general appears to be typical of this environment showing some variability from location to location. The background location U-1 typically has the highest concentrations of these parameters. Other parameters are highest at the other background well (P-9), the HGCS and a few at C-2. Although detailed evaluation of trends is limited by the short data record, a slight seasonal trend of increasing concentrations in the summer may be apparent for several parameters at some locations.

The concentrations of several metals at the background well U-1 have typically been significantly higher than at other wells (including arsenic, cobalt, zinc, iron, magnesium, manganese and sodium). Concentrations of copper, lead and vanadium, which had also been higher at U-1, have fallen since 2018 and this trend continued in 2023. It is possible that the concentration changes of copper, lead and vanadium as well as the variability in a few other parameters are related to conditions in the well that have affected sampling. A precipitate accumulated on and in the pump dedicated to this well between sampling events causing the valves in the pump to become stuck. The precipitate was cleaned from the pump after the third quarter 2015 event, unfortunately this did not prevent the valve from becoming stuck during the fourth quarter sampling. Sampling procedures were changed in 2016 to remove the pump between events and the valves did not stick this year. The concentrations of copper, lead, vanadium, silver and zinc that rose in 2015 were generally lower and/or more stable in 2017 and 2018 although elevated from stable levels measured in 2013 and 2014 suggesting these variations may result from sampling conditions. Iron, vanadium and silver show variability that may also be affected by sampling conditions.

Cobalt and manganese concentrations at C-2 steadily increased in 2014 and the first three quarters of 2015 before falling to near 2013 levels in the fourth quarter of 2015. In 2016 the concentrations of these metals at this well rose slowly with cobalt peaking in early 2018 at a lower concentration than the earlier peak and manganese peaking in 2019 at the highest concentration in the record. The concentration of cobalt began to fall in 2019 reaching a low similar to the concentration at other well in late 2020 and has since fluctuated with low concentrations in the middle of each year since. The concentration of manganese has fallen since mid-2019 to a low that fluctuates slightly above other wells. These concentrations are a small fraction of the concentrations at the background well U-1 when sampled under the permit. The concentration of sodium rose at C-2 in 2017 and 2018 to levels higher than at P-9 and U-1 but fell in 2019 and was at levels similar to the background wells in 2021 through 2023. Sulfate at C-2 rose in 2018 and 2019 and began to fall in 2020. This falling trend appears to have stabilized since 2021 at concentrations slightly above pre-2018 levels. The

unusually high January 2021 sulfate concentrations has not been reproduced and appears to be an outlier data point.

Plots of additional parameters will be generated with additional data or to investigate apparent changes in concentrations identified through comparison with prediction limits or other review of the data.

4 SURFACE WATER AND LEACHATE QUALITY

Surface water samples were collected each quarter at the SS-1 location. Leachate samples were collected each month at the outfall to the leachate pond as specified in the SAP (location LP-B1). The leachate samples were collected by HQLF personnel. Summary tables of the analytical results for the surface water and leachate samples are included in Appendix C. Sample collection procedures for the surface water sample were documented for the fourth quarter sampling event in a memorandum included in Appendix D.

4.1 Surface Water

Surface water samples were collected from the southern tributary of Sucker Creek a short distance upstream of the 1310 Road. This location is identified as SS-1 on Figure 2. Chloride, sulfate, ammonia, TOC, and total phosphorus were analyzed in the laboratory. pH, specific conductance, temperature, dissolved oxygen and turbidity were measured in the field. A qualitative observation of flow was also made. 2023 is the tenth year samples have been collected at this location under the permit and trends in the data cannot be evaluated.

The results for the fourth quarter surface water sample were generally somewhat lower than the previous fourth quarter samples. Turbidity and dissolved oxygen were however somewhat higher than typical for the fourth quarter likely because of precipitation during the weeks before sampling. Surface water quality appears to meet primary and secondary standards where promulgated for the parameters tested when evaluated as allowed by the available data. Flow has been observed to fluctuate seasonally with the channel roughly bank to bank in the winter and well within the banks during the drier parts of the year. Flow was observed to be typical in 2023.

4.2 Leachate

Leachate samples were collected at the discharge to the leachate pond (see Figure 2) by Cowlitz County personnel. This location is identified as LP-B1. Leachate monitoring for the detection monitoring program was defined to be consistent with the requirements of the separate interim Discharge Permit. In August 2019 the final permit was issued and the monitoring program modified to be consistent with the final permit.

Leachate monitoring as summarized on Table 9-2 of the SAP includes overlapping monthly, semiannual and annual analytical requirements consistent with the interim Discharge Permit. The final Discharge Permit requires that ammonia, TSS and BOD are analyzed monthly. pH must be measured weekly. In August each year the following analyses are added:

- Cyanide
- Total Phenolic Compounds
- Priority Pollutant Metals (Total)
- Volatile Organic Compounds
- Acid Extractable Compounds
- Base-Neutral Compounds

The analytical results for September through December were available for validation, management and inclusion in this report. The validation memoranda and laboratory reports for these months are included in Appendix D. Previous months validation memoranda and laboratory reports are included in previous quarterly reports. The analytical data are compiled in tables included in Appendix C. Validation memoranda and laboratory reports for the other months of 2023 were included in previous quarterly reports.

This is the tenth year samples have been collected for the detection monitoring program and Discharge Permit therefore evaluation of trends or variations in the data is limited. Changes in landfill management in 2017 and 2018 that included a transition through an interim manager and two changes in the laboratory used during this time led to some communication lapses causing partial transmittal of the leachate data for the second half of 2017 and early 2018. However, the data record is complete enough to confirm consistency with the past data. Most parameters were detected at moderate concentrations for leachate. Concentrations of several of the monthly parameters varied significantly during the year although some of this variation may have resulted from heterogeneity of the sample or matrix interference with the analytical method. Seasonality of these variations are not clearly defined although lower concentrations of several parameters were typically detected in the winter. Most metals, which are analyzed only in August, were detected with concentrations generally lower than in recent years. . Pesticides and PCBs were not analyzed in 2023. VOCs were not detected in the August sample. One SVOC, phenol, was detected although the detection limits were elevated because the sample was diluted for analysis.

The SAP requires a qualitative observation of the leachate flow rate to the pond each month. In 2023 the flow was not reported at the time of sampling but generally varies depending on precipitation. Flow tends to be moderate and high in the wet season but low in the dry season.

5 DISCUSSION

In January, April, July and October 2023 Cowlitz County Solid Waste completed the quarterly monitoring events of 2023 at the Headquarters Landfill. The sampling events were guided by the SAP dated June 2013 (Tuppan, 2013b) and the analytical program was as shown on updated Table 9-2 of the SAP dated January 2014. Exceptions include a necessary sampling procedural change at the background well U-1 and the analytical program for the leachate which conforms with the final Discharge Permit. Neither change significantly deviates from the intent of the detection monitoring program.

Groundwater flow was determined to be generally to the northwest in the shallow aquifer under the active area of the site. The primary controls of the flow direction appear to be the topography and HGCS under the landfill. The linear groundwater velocity was estimated for the drainage basin under the older filled area of the site and the expansion area upgradient in the same drainage. The groundwater flow rate under the older filled area was estimated to be between 0.025 and 0.144 feet per day. The groundwater flow rate in the upgradient expansion area was estimated to be between 0.022 and 0.124 feet per day. The average flow rate each quarter was estimated to range from 28.7 to 31.3 ft/year under the older fill area and from 25.6 to 26.9 ft/year under the upgradient expansion area. These rates are similar to previous estimates although are significantly higher than historically reported because the slug tests completed in October 2012 raised the geometric mean of test results about an order of magnitude.

Groundwater quality data from the site monitoring wells were evaluated in this report. The data indicate that the landfill does not appear to have affected groundwater quality. This was the tenth year of detection monitoring under the MSW permit and the available data is not sufficient to evaluate long term trends. .

Groundwater quality in general appears to be typical of this environment showing some variability from location to location. The background location U-1 typically has the highest concentrations of several parameters most notably iron, magnesium, manganese, arsenic, cobalt, lead, zinc and bicarbonate. Other parameters are highest at the other background well P-9, the HGCS and a few at C-2 (silver and beryllium). Although detailed evaluation of trends is limited by the short data record, a slight seasonal fluctuation of increasing concentrations in the summer may be apparent for several parameters at some locations.

The valves in the pump dedicated in U-1 became stuck in 2015 due to a precipitate necessitating removing the pump to free the valves before sampling. In 2016 procedures were changed to include removing the pump after sampling and storing it in clean plastic between sampling

events. The concentrations of copper, lead, vanadium, silver and zinc that rose in 2015 were generally lower and/or more stable in 2017 and 2018 although elevated from stable levels measured in 2013 and 2014 suggesting these variations may result from sampling conditions.

The concentrations of cobalt and manganese previously noted at C-2 that appeared relatively stable in 2018, have fallen since then and are fluctuating near the levels at other wells.

REFERENCES

Culhane et al, 2012, *Guidance For Groundwater Monitoring at Landfills and Other Facilities Regulated Under Chapters 173-304, 173-306, 173-350, and 173-351 WAC.* Washington Department of Ecology (Publication No. 12-07-072). December 2012.

Tuppan, 2013a. Hydrogeologic Report for the Proposed Cowlitz County Headquarters Landfill. Revised June 14.

Tuppan, 2013b. Sampling and Analysis Plan, Cowlitz County Headquarters Landfill Project. (Appendix G of Hydrogeologic Report) June 14.

Tuppan, 2014a. Preliminary Statistics for Baseline Data: Headquarters Road Landfill. Memorandum to Tom Culhane and Chris Bischoff from Eric Tuppan. February 10.

Tuppan, 2014b. Recommendations for Prediction Limits at Headquarters Road Landfill, Cowlitz County, Washington. Memorandum to Tom Culhane and Chris Bischoff from Eric Tuppan. April 25.

Washington, State of, 1990. Chapter 173–200 WAC Water Quality Standards For Ground Waters Of The State Of Washington. October 31.

Washington, State of, 2012. Chapter 173-351 WAC Criteria For Municipal Solid Waste Landfills. December 8.

LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

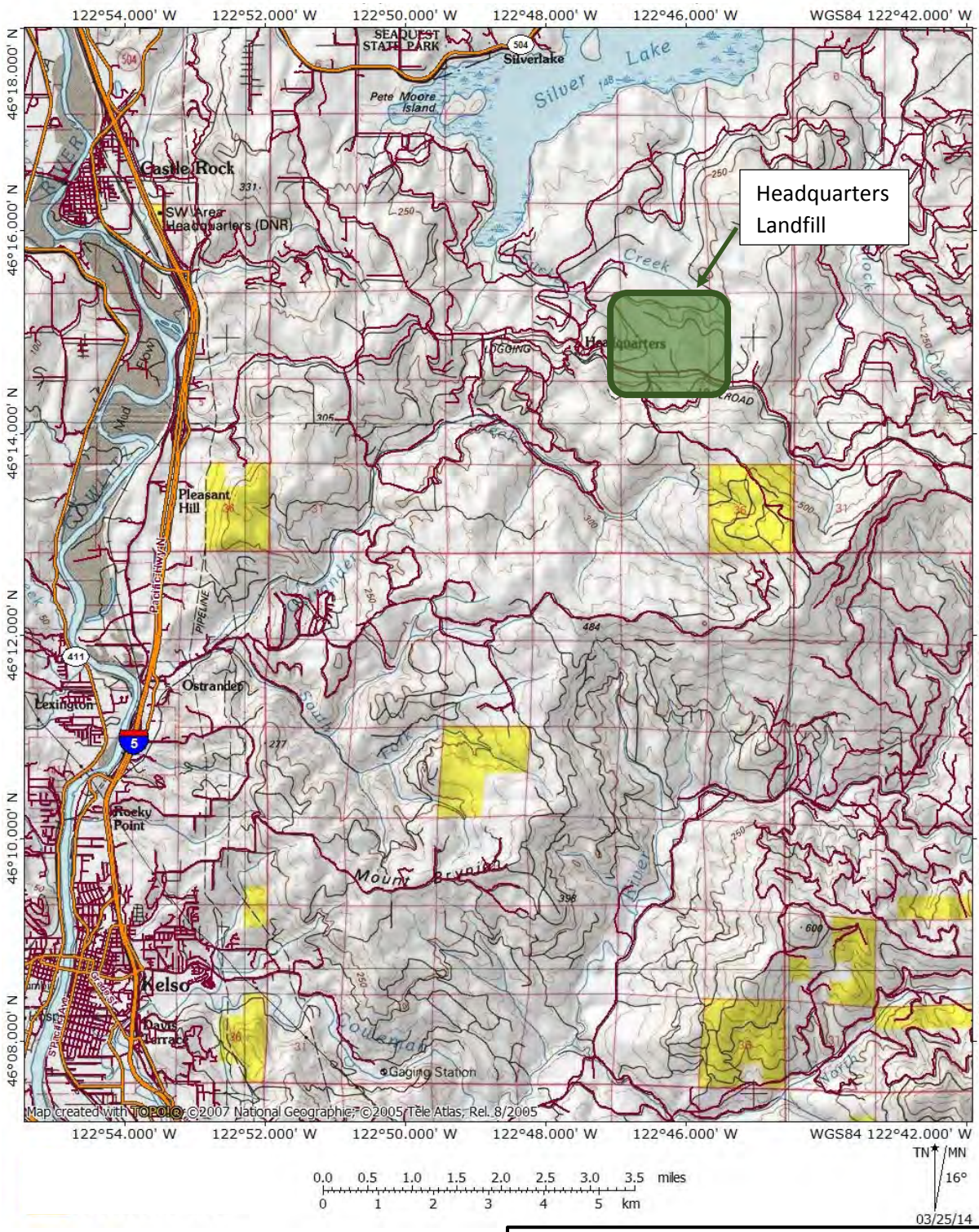


Figure 1
Cowlitz County Headquarter Landfill
Castle Rock, Washington
Site Location Map

Bright Fields Groundwater, Inc.

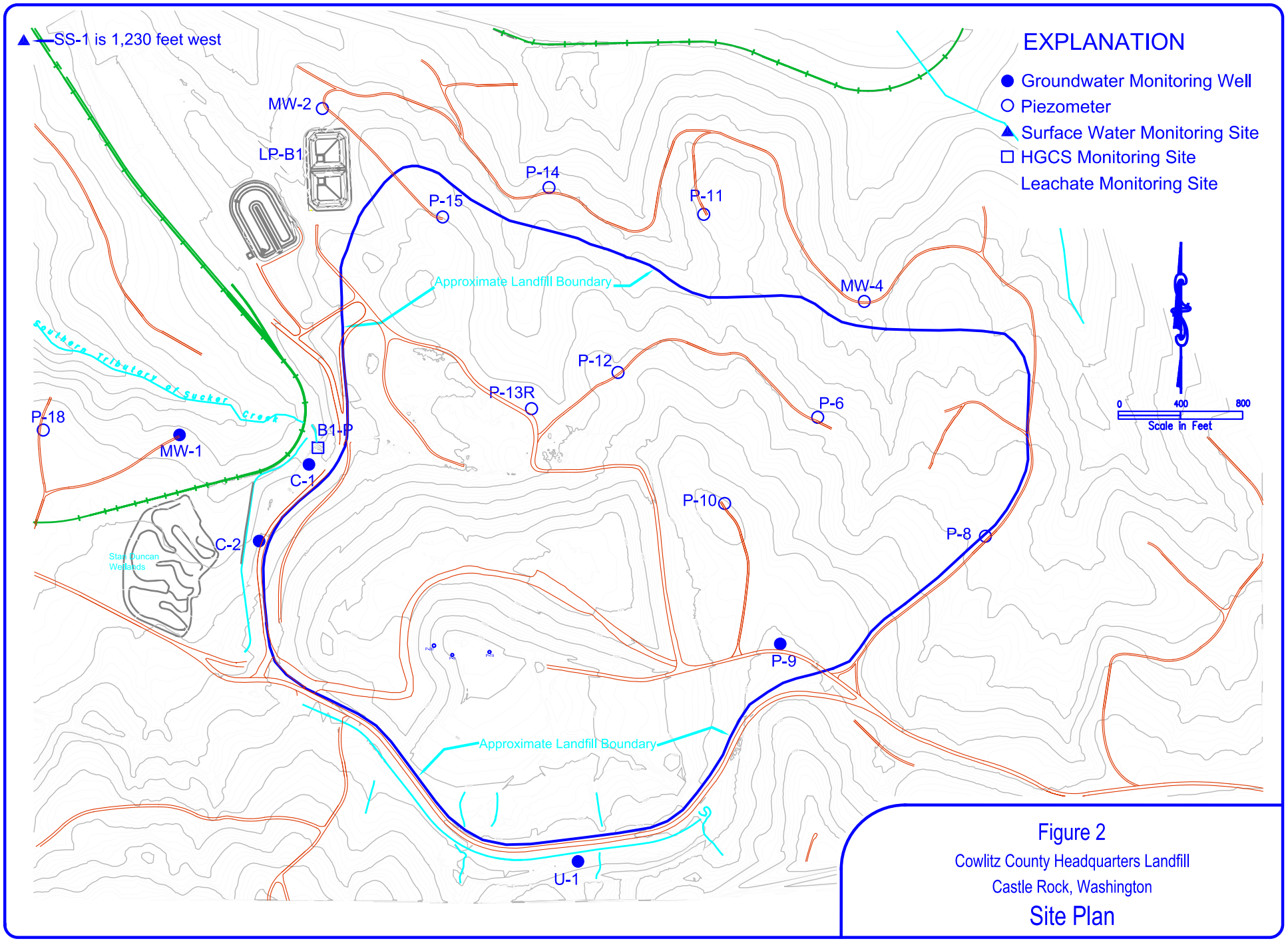


Figure 2

Cowlitz County Headquarters Landfill

Castle Rock, Washington

Site Plan

Table 1
Cowlitz County Headquarters Landfill
Parameters Exceeding Prediction Limit in 2023

Parameter Units	Antimony ug/l	Arsenic ug/l	Barium ug/l	Beryllium ug/l	Cadmium ug/l	Chromium ug/l	Cobalt ug/l	Copper ug/l	Lead ug/l	Nickel ug/l	Selenium ug/l	Silver ug/l
C-1												
Prediction Limit	0.081	8.2	53.5	0.06	0.057	0.48	5.72	0.45	0.067	1.17	1.0 U	0.4
1st Quarter				0.07					0.13			
2nd Quarter				0.07					0.13			
3rd Quarter									0.09			
4th Quarter												0.99
C-2												
Prediction Limit	0.081	8.2	53.5	0.034	0.057	1.8	5.72	0.45	0.067	1.17	1.0 U	0.4
1st Quarter												
2nd Quarter												
3rd Quarter												
4th Quarter												

Note: Prediction limits are the maximun values detected in the background data set for each well (includes U-1 and P-9 data).
U = Less than the method reporting limit shown.
J = Data qualifier assigned. The associated value is an estimate.
T = Detected below reporting limit. Value is an estimate.

Table 1
Cowlitz County Headquarters Landfill
Parameters Exceeding Prediction Limit in 2023

Parameter Units	Thallium ug/l	Vanadium ug/l	Zinc ug/l	Nitrate mg/l
C-1				
Prediction Limit	0.02 U	3.67	2.42	0.64
1st Quarter			3 J	
2nd Quarter				
3rd Quarter				
4th Quarter				
C-2				
Prediction Limit	0.02 U	3.67	2.42	0.15
1st Quarter			5 J	
2nd Quarter				
3rd Quarter				
4th Quarter				

Note: Prediction limits as determined in Tuppan, 2014.
U = Less than the method reporting limit shown.
J = Data qualifier assigned. The value is an estimate.
T = Detected below reporting limit. Value is an estimat

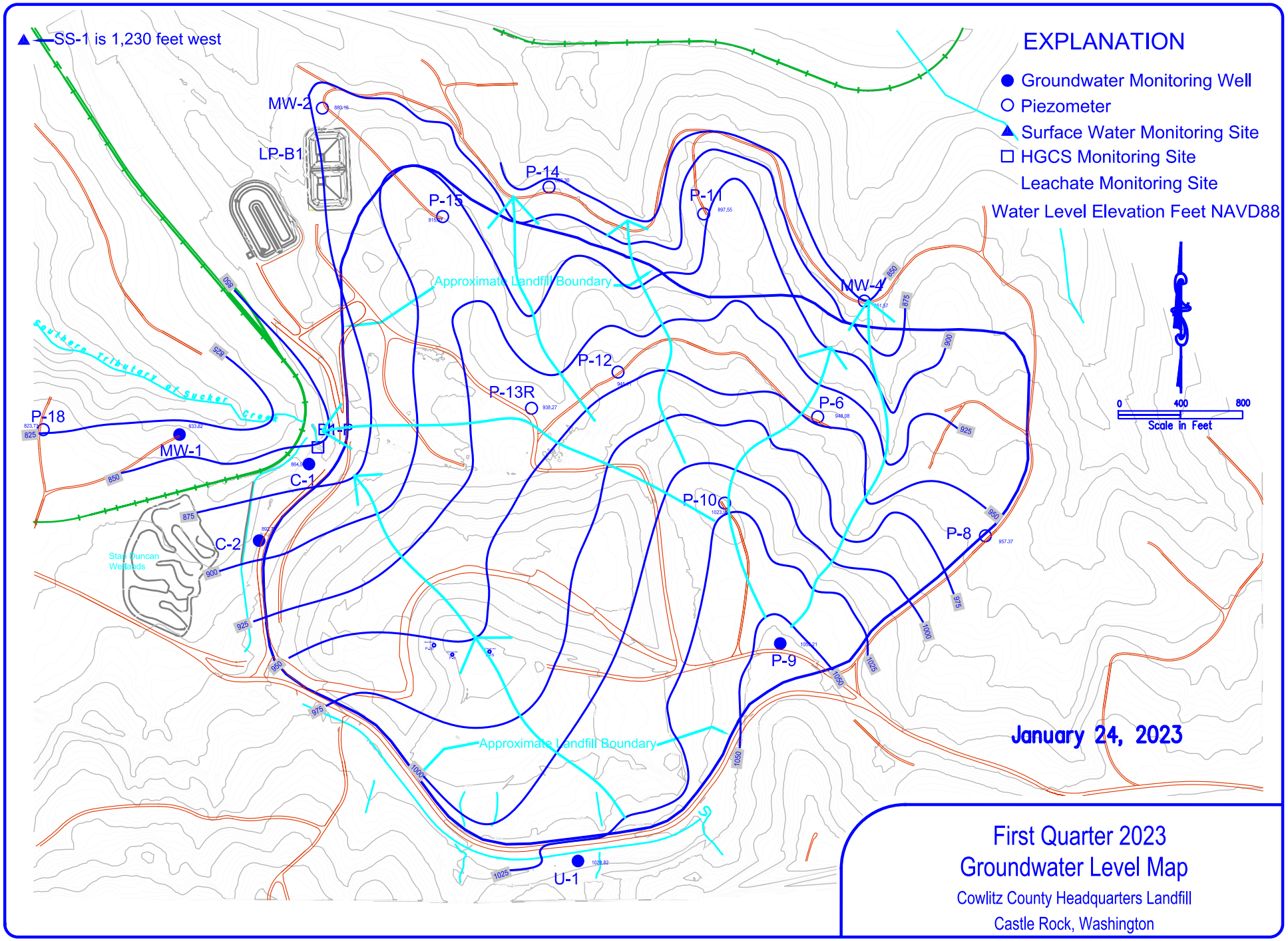
Table 2
Cowlitz County Headquarters Landfill
Concentrations Above Primary Standards
2018 to 2023

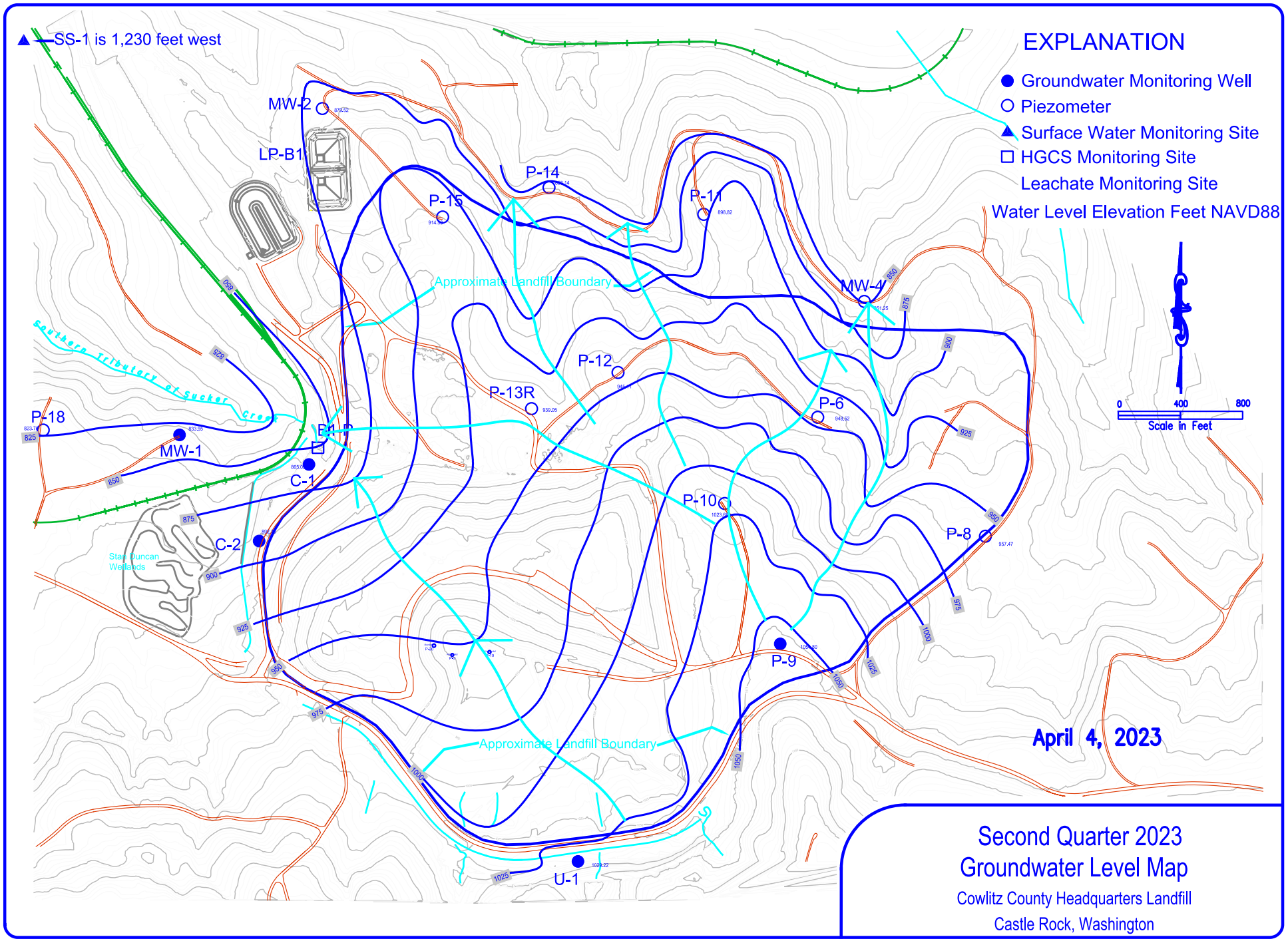
Location	Quarter	Parameter	Standards (ug/l) Washington	Standards (ug/l) Federal	Reporting Limit (ug/l)	Parameter Concentration (ug/l)
C-1	1st	Arsenic	0.05	10	0.5	0.06T
C-2	1st	Arsenic	0.05	10	0.5	0.04T
MW-1	1st	Arsenic	0.05	10	0.5	0.07T
P-9	1st	Arsenic	0.05	10	0.5	0.65
U-1	1st	Arsenic	0.05	10	0.5	5.2
C-1	2nd	Arsenic	0.05	10	0.5	0.05T
MW-1	2nd	Arsenic	0.05	10	0.5	0.07T
P-9	2nd	Arsenic	0.05	10	0.5	0.56
U-1	2nd	Arsenic	0.05	10	0.5	5.4
C-1	3rd	Arsenic	0.05	10	0.5	0.12T
P-9	3rd	Arsenic	0.05	10	0.5	0.63
U-1	3rd	Arsenic	0.05	10	0.5	4.0
C-1	4th	Arsenic	0.05	10	0.5	0.10T
P-9	4th	Arsenic	0.05	10	0.5	0.59
U-1	4th	Arsenic	0.05	10	0.5	4.8
C-1	1st	Arsenic	0.05	10	0.5	0.15T
P-9	1st	Arsenic	0.05	10	0.5	0.55
U-1	1st	Arsenic	0.05	10	0.5	3.7
C-1	2nd	Arsenic	0.05	10	0.5	0.12T
P-9	2nd	Arsenic	0.05	10	0.5	0.56
U-1	2nd	Arsenic	0.05	10	0.5	3.8
C-1	3rd	Arsenic	0.05	10	0.5	0.15T
C-2	3rd	Arsenic	0.05	10	0.5	0.09T
MW-1	3rd	Arsenic	0.05	10	0.5	0.12T
P-9	3rd	Arsenic	0.05	10	0.5	0.66
U-1	3rd	Arsenic	0.05	10	0.5	2.3
B1-P	3rd	Arsenic	0.05	10	0.5	0.13T
C-1	4th	Arsenic	0.05	10	0.5	0.11T
P-9	4th	Arsenic	0.05	10	0.5	1.01
U-1	4th	Arsenic	0.05	10	0.5	5.3
C-1	1st	Arsenic	0.05	10	0.5	0.09T
P-9	1st	Arsenic	0.05	10	0.5	0.60
U-1	1st	Arsenic	0.05	10	0.5	4.3
C-1	2nd	Arsenic	0.05	10	0.5	0.09T
P-9	2nd	Arsenic	0.05	10	0.5	0.49T
U-1	2nd	Arsenic	0.05	10	0.5	3.6
B1-P	3rd	Arsenic	0.05	10	0.5	0.27T
C-1	3rd	Arsenic	0.05	10	0.5	0.13T
P-9	3rd	Arsenic	0.05	10	0.5	0.57
U-1	3rd	Arsenic	0.05	10	0.5	3.8
C-1	4th	Arsenic	0.05	10	0.5	0.13T
P-9	4th	Arsenic	0.05	10	0.5	0.53
U-1	4th	Arsenic	0.05	10	0.5	5.1
C-1	1st	Arsenic	0.05	10	0.5	0.10T
P-9	1st	Arsenic	0.05	10	0.5	0.58
U-1	1st	Arsenic	0.05	10	0.5	4.5
C-1	2nd	Arsenic	0.05	10	0.5	0.10T
P-9	2nd	Arsenic	0.05	10	0.5	0.50
U-1	2nd	Arsenic	0.05	10	0.5	4.7
B1-P	3rd	Arsenic	0.05	10	0.5	0.14T
C-1	3rd	Arsenic	0.05	10	0.5	0.12T
P-9	3rd	Arsenic	0.05	10	0.5	0.62
U-1	3rd	Arsenic	0.05	10	0.5	4.4
P-9	4th	Arsenic	0.05	10	0.5	0.46T
U-1	4th	Arsenic	0.05	10	0.5	5.7
P-9	1st	Arsenic	0.05	10	0.5	0.60
U-1	1st	Arsenic	0.05	10	0.5	4.4
P-9	2nd	Arsenic	0.05	10	0.5	0.44T
U-1	2nd	Arsenic	0.05	10	0.5	4.4
B1-P	3rd	Arsenic	0.05	10	0.5	0.25T
C-1	3rd	Arsenic	0.05	10	0.5	0.09T
P-9	3rd	Arsenic	0.05	10	0.5	0.50
U-1	3rd	Arsenic	0.05	10	0.5	5.1
B1-P	4th	Arsenic	0.05	10	0.5	0.25T
P-9	4th	Arsenic	0.05	10	0.5	0.56
U-1	4th	Arsenic	0.05	10	0.5	5.6
P-9	1st	Arsenic	0.05	10	0.5	0.57
U-1	1st	Arsenic	0.05	10	0.5	5.8
P-9	2nd	Arsenic	0.05	10	0.5	0.51
U-1	2nd	Arsenic	0.05	10	0.5	5.4
C-1	3rd	Arsenic	0.05	10	0.5	0.12T
P-9	3rd	Arsenic	0.05	10	0.5	0.58
U-1	3rd	Arsenic	0.05	10	0.5	5.9
B1-P	3rd	Arsenic	0.05	10	0.5	0.69
P-9	4th	Arsenic	0.05	10	0.5	0.50
U-1	4th	Arsenic	0.05	10	0.5	6.0
B1-P	4th	Arsenic	0.05	10	0.5	0.45T

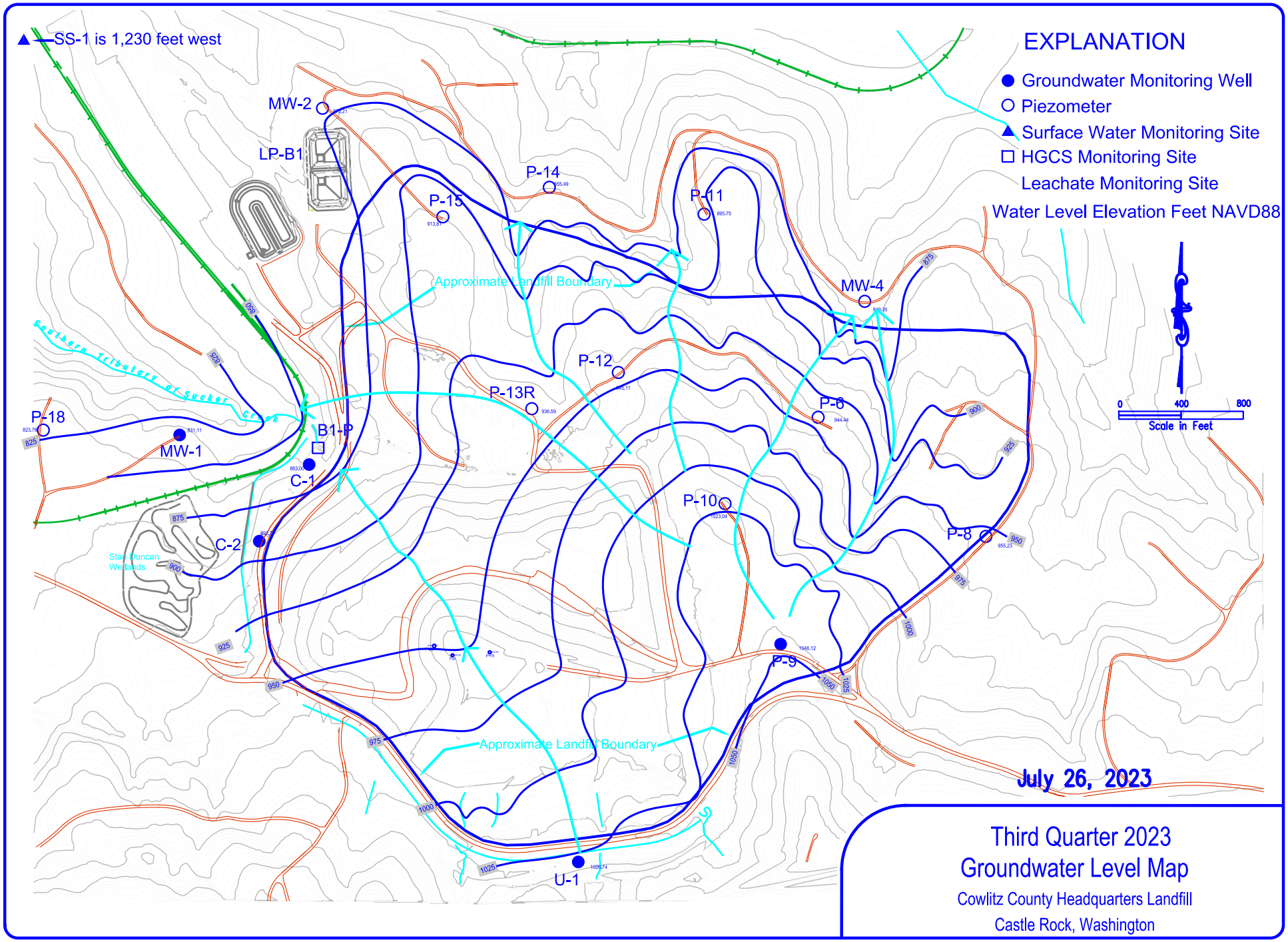
Notes:
T = detected above criterion and below reporting limit. Concentration is an estimate.
J = estimated concentration.
Washington standard is the Groundwater criteria in WAC173-200.
Federal standard is the MCL for drinking water.

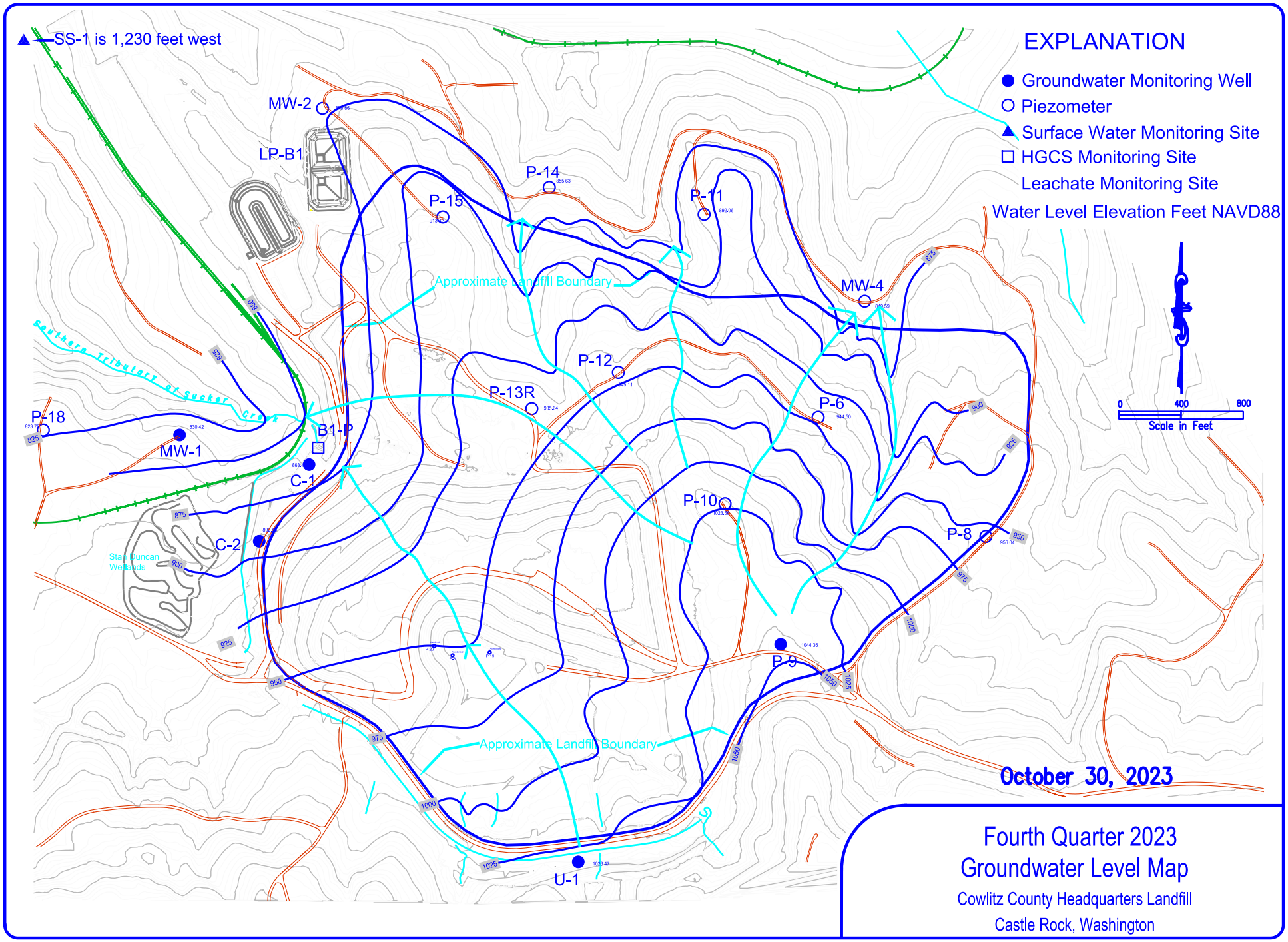
APPENDIX A

WATER LEVEL CONTOUR PLOTS, LINEAR VELOCITY SUMMARY, HYDROGRAPH AND DATA


SS-1 is 1,230 feet west
EXPLANATION
Groundwater Monitoring Well
Piezometer
Surface Water Monitoring Site
HGCS Monitoring Site
Leachate Monitoring Site
Water Level Elevation Feet NAVD88
MW-2
LP-B1
P-14
P-15
P-11
MW-4
Approximate Landfill Boundary
P-12
P-13R
P-6
P-18
MW-1
C-1
E-1
C-2
P-10
P-8
P-9
U-1
Southern Tributary of Sucker Creek
Stan Duncan Wetlands
0
400
800
Scale in Feet
January 24, 2023
First Quarter 2023
Groundwater Level Map
Cowlitz County Headquarters Landfill
Castle Rock, Washington


SS-1 is 1,230 feet west
EXPLANATION
Groundwater Monitoring Well
Piezometer
Surface Water Monitoring Site
HGCS Monitoring Site
Leachate Monitoring Site
Water Level Elevation Feet NAVD88
MW-2
LP-B1
P-14
P-15
P-11
Approximate Landfill Boundary
MW-4
P-12
P-13R
P-6
P-18
MW-1
C-1
B-1
P-10
P-8
C-2
Stan Duncan Wetlands
P-9
Approximate Landfill Boundary
U-1
Southern Tributary of Sucker Creek
0
400
800
Scale in Feet
April 4, 2023
Second Quarter 2023
Groundwater Level Map
Cowlitz County Headquarters Landfill
Castle Rock, Washington


SS-1 is 1,230 feet west
EXPLANATION
Groundwater Monitoring Well
Piezometer
Surface Water Monitoring Site
HGCS Monitoring Site
Leachate Monitoring Site
Water Level Elevation Feet NAVD88
MW-2
LP-B1
P-14
P-15
P-11
MW-4
Approximate Landfill Boundary
P-12
P-13R
P-6
P-18
MW-1
B1-P
C-1
C-2
P-10
P-8
P-9
U-1
Approximate Landfill Boundary
Southern Tributary of Sucker Creek
Stan Duncan Wetlands
0
400
800
Scale in Feet
July 26, 2023
Third Quarter 2023
Groundwater Level Map
Cowlitz County Headquarters Landfill
Castle Rock, Washington


SS-1 is 1,230 feet west
EXPLANATION
Groundwater Monitoring Well
Piezometer
Surface Water Monitoring Site
HGCS Monitoring Site
Leachate Monitoring Site
Water Level Elevation Feet NAVD88
MW-2
LP-B1
P-14
P-15
P-11
Approximate Landfill Boundary
MW-4
P-12
P-13R
P-6
P-18
MW-1
B1-P
C-1
C-2
P-10
P-8
P-9
U-1
Approximate Landfill Boundary
Southern Tributary of Sucker Creek
Stan Duncan Wetlands
0
400
800
Scale in Feet
October 30, 2023
Fourth Quarter 2023
Groundwater Level Map
Cowlitz County Headquarters Landfill
Castle Rock, Washington

Cowlitz County Headquarter Landfill
Hydraulic Characteristics Summary
Area Under Old Cells of Landfill

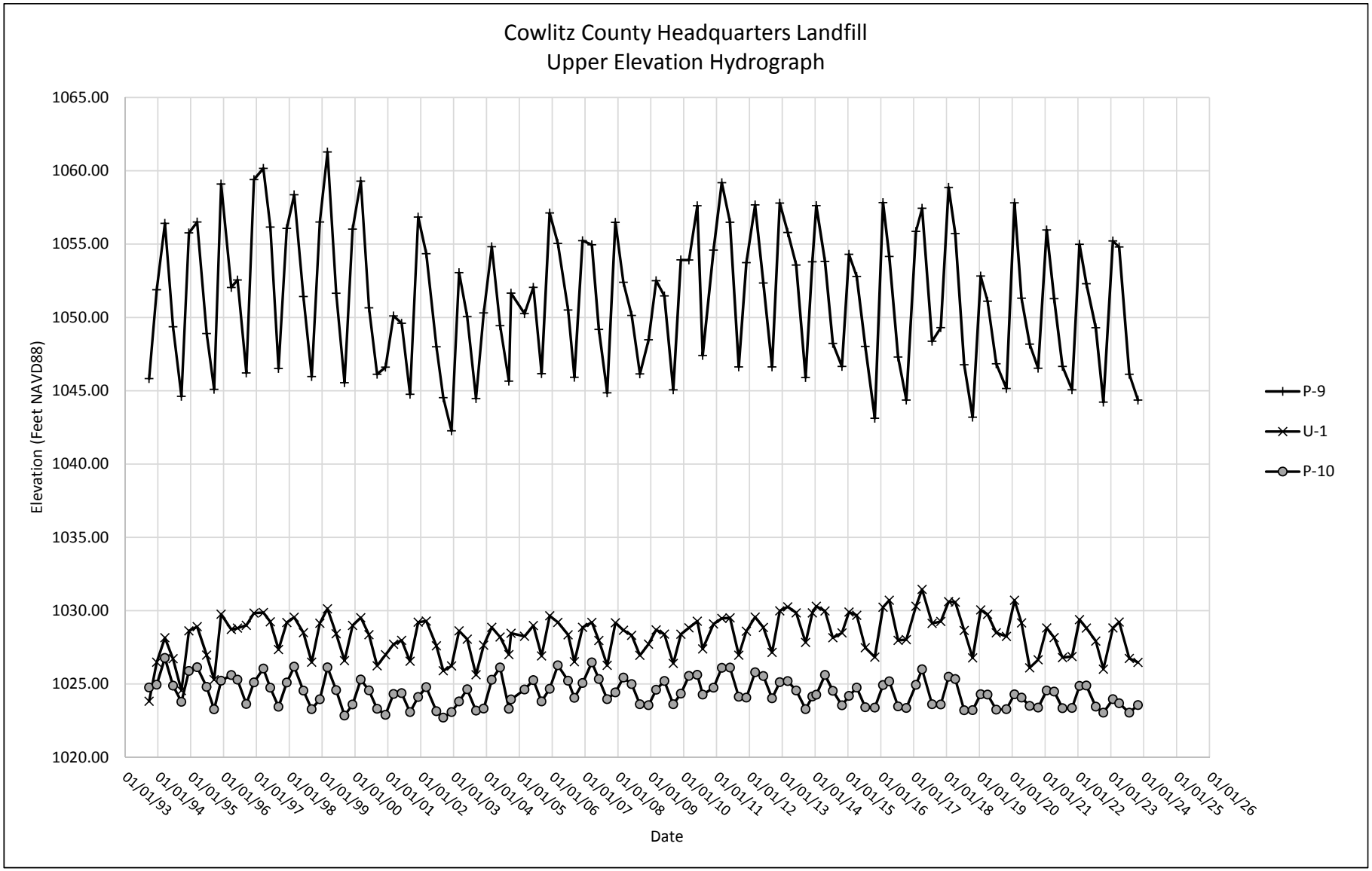
Date	Hydraulic Conductivity K (feet/day)	Effective Porosity n Low	Effective Porosity n High	Hydraulic Gradient I (feet/feet)	Low Linear Groundwater Velocity (feet/day)	High Linear Groundwater Velocity (feet/day)	Average Annual Groundwater Velocity (feet/year)	Apparent Groundwater Flow Direction
1/14/2015	0.15	0.06	0.32	0.0609	0.029	0.152	33.0	Northwest
4/9/2015	0.15	0.06	0.32	0.0498	0.023	0.125	27.0	Northwest
7/14/2015	0.15	0.06	0.32	0.0421	0.020	0.105	22.8	Northwest
10/27/2015	0.15	0.06	0.32	0.0647	0.030	0.162	35.0	Northwest
1/27/2016	0.15	0.06	0.32	0.0634	0.030	0.158	34.3	Northwest
4/5/2016	0.15	0.06	0.32	0.0521	0.024	0.130	28.2	Northwest
7/12/2016	0.15	0.06	0.32	0.0600	0.028	0.150	32.5	Northwest
10/11/2016	0.15	0.06	0.32	0.0613	0.029	0.153	33.2	Northwest
1/26/2017	0.15	0.06	0.32	0.0641	0.030	0.160	34.7	Northwest
4/5/2017	0.15	0.06	0.32	0.0646	0.030	0.162	35.0	Northwest
7/25/2017	0.15	0.06	0.32	0.0626	0.029	0.156	33.9	Northwest
10/30/2017	0.15	0.06	0.32	0.0626	0.029	0.156	33.9	Northwest
1/25/2018	0.15	0.06	0.32	0.0551	0.026	0.138	29.9	Northwest
4/9/2018	0.15	0.06	0.32	0.0589	0.028	0.147	31.9	Northwest
7/17/2018	0.15	0.06	0.32	0.0610	0.029	0.152	33.0	Northwest
10/19/2018	0.15	0.06	0.32	0.0647	0.030	0.162	35.0	Northwest
1/16/2019	0.15	0.06	0.32	0.0609	0.029	0.152	33.0	Northwest
4/3/2019	0.15	0.06	0.32	0.0592	0.028	0.148	32.1	Northwest
7/8/2019	0.15	0.06	0.32	0.0610	0.029	0.152	33.0	Northwest
10/29/2019	0.15	0.06	0.32	0.0610	0.029	0.152	33.0	Northwest
1/26/2020	0.15	0.06	0.32	0.0602	0.028	0.150	32.6	Northwest
4/14/2020	0.15	0.06	0.32	0.0592	0.028	0.148	32.1	Northwest
7/13/2020	0.15	0.06	0.32	0.0626	0.029	0.156	33.9	Northwest
10/15/2020	0.15	0.06	0.32	0.0626	0.029	0.156	33.9	Northwest
1/19/2021	0.15	0.06	0.32	0.0592	0.028	0.148	32.1	Northwest
4/12/2021	0.15	0.06	0.32	0.0592	0.028	0.148	32.1	Northwest
7/13/2021	0.15	0.06	0.32	0.0533	0.025	0.133	28.9	Northwest
10/27/2021	0.15	0.06	0.32	0.0604	0.028	0.151	32.7	Northwest
1/18/2022	0.15	0.06	0.32	0.0592	0.028	0.148	32.1	Northwest
4/5/2022	0.15	0.06	0.32	0.0592	0.028	0.148	32.1	Northwest
7/18/2022	0.15	0.06	0.32	0.0573	0.027	0.143	31.1	Northwest
10/11/2022	0.15	0.06	0.32	0.0573	0.027	0.143	31.1	Northwest
1/24/2023	0.15	0.06	0.32	0.0578	0.027	0.144	31.3	Northwest
4/4/2023	0.15	0.06	0.32	0.0578	0.027	0.144	31.3	Northwest
7/26/2023	0.15	0.06	0.32	0.0533	0.025	0.133	28.9	Northwest
10/30/2023	0.15	0.06	0.32	0.0530	0.025	0.133	28.7	Northwest
		Maximum		0.0758	0.0355	0.189		
		Minimum		0.0421	0.0197	0.105		
		Std Dev		0.0062	0.0029	0.016		
		Average		0.0607	0.0284	0.152		

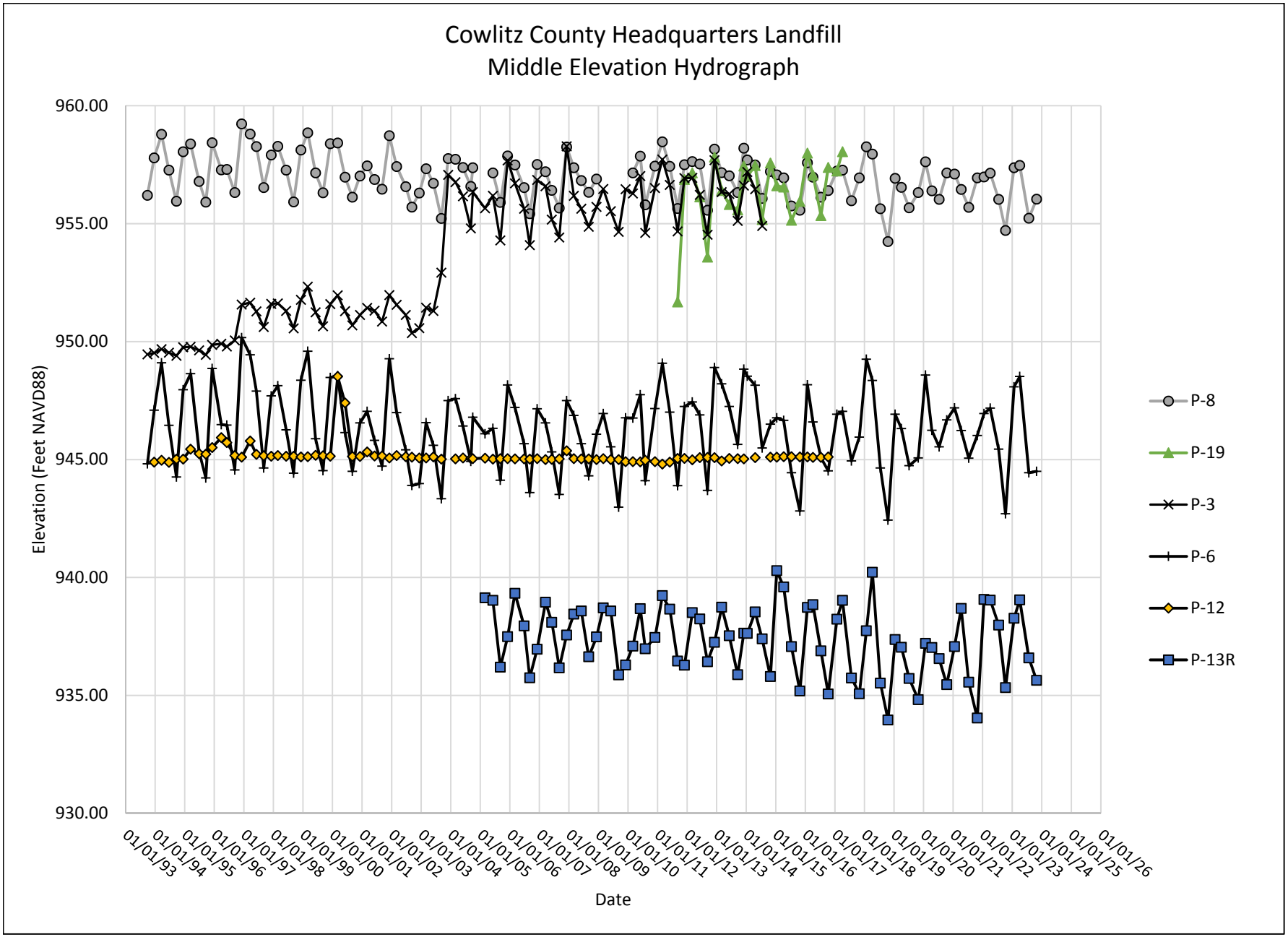
Notes: Hydraulic conductivity and effective porosity taken from Tuppan, 2013a.
Hydraulic gradient estimated using contour plots.
Linear groundwater velocity calculated as KI/n.
Apparent groundwater flow direction estimated as downgradient direction on the contour plots.

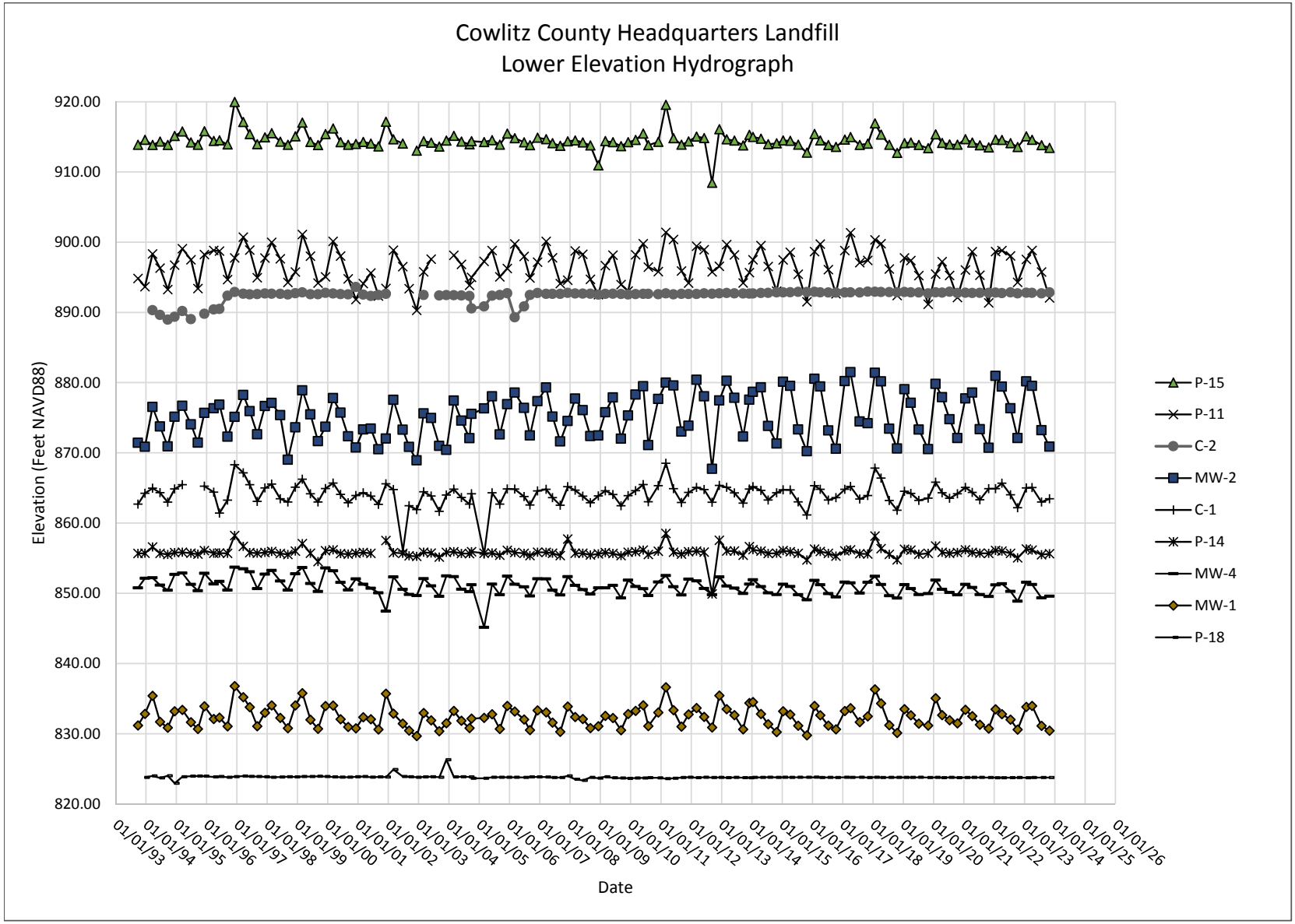
Cowlitz County Headquarter Landfill
Hydraulic Characteristics Summary
Southern Expansion Area of Landfill

Date	Hydraulic Conductivity K (feet/day)	Effective Porosity n		Hydraulic Gradient I (feet/feet)	Low Linear Groundwater Velocity (feet/day)	High Linear Groundwater Velocity (feet/day)	Average Annual Groundwater Velocity (feet/year)	Apparent Groundwater Flow Direction
		Low	High					
1/14/2015	0.15	0.06	0.32	0.0452	0.021	0.113	24.5	Northwest
4/9/2015	0.15	0.06	0.32	0.0522	0.024	0.130	28.3	Northwest
7/14/2015	0.15	0.06	0.32	0.0497	0.023	0.124	26.9	Northwest
10/27/2015	0.15	0.06	0.32	0.0509	0.024	0.127	27.6	Northwest
1/27/2016	0.15	0.06	0.32	0.0506	0.024	0.127	27.4	Northwest
4/5/2016	0.15	0.06	0.32	0.0500	0.023	0.125	27.1	Northwest
7/12/2016	0.15	0.06	0.32	0.0497	0.023	0.124	26.9	Northwest
10/11/2016	0.15	0.06	0.32	0.0495	0.023	0.124	26.8	Northwest
1/26/2017	0.15	0.06	0.32	0.0502	0.024	0.125	27.2	Northwest
4/5/2017	0.15	0.06	0.32	0.0510	0.024	0.127	27.6	Northwest
7/25/2017	0.15	0.06	0.32	0.0466	0.022	0.116	25.2	Northwest
10/30/2017	0.15	0.06	0.32	0.0466	0.022	0.116	25.2	Northwest
1/25/2018	0.15	0.06	0.32	0.0512	0.024	0.128	27.8	Northwest
4/9/2018	0.15	0.06	0.32	0.0531	0.025	0.133	28.8	Northwest
7/17/2018	0.15	0.06	0.32	0.0496	0.023	0.124	26.9	Northwest
10/19/2018	0.15	0.06	0.32	0.0510	0.024	0.127	27.6	Northwest
1/16/2019	0.15	0.06	0.32	0.0434	0.020	0.108	23.5	Northwest
4/3/2019	0.15	0.06	0.32	0.0493	0.023	0.123	26.7	Northwest
7/8/2019	0.15	0.06	0.32	0.0496	0.023	0.124	26.9	Northwest
10/29/2019	0.15	0.06	0.32	0.0496	0.023	0.124	26.9	Northwest
1/26/2020	0.15	0.06	0.32	0.0496	0.023	0.124	26.9	Northwest
4/14/2020	0.15	0.06	0.32	0.0493	0.023	0.123	26.7	Northwest
7/13/2020	0.15	0.06	0.32	0.0444	0.021	0.111	24.1	Northwest
10/15/2020	0.15	0.06	0.32	0.0437	0.020	0.109	23.7	Northwest
1/19/2021	0.15	0.06	0.32	0.0493	0.023	0.123	26.7	Northwest
4/12/2021	0.15	0.06	0.32	0.0493	0.023	0.123	26.7	Northwest
7/13/2021	0.15	0.06	0.32	0.0473	0.022	0.118	25.6	Northwest
10/27/2021	0.15	0.06	0.32	0.0444	0.021	0.111	24.1	Northwest
1/18/2022	0.15	0.06	0.32	0.0493	0.023	0.123	26.7	Northwest
4/5/2022	0.15	0.06	0.32	0.0486	0.023	0.121	26.3	Northwest
7/18/2022	0.15	0.06	0.32	0.0495	0.023	0.124	26.8	Northwest
10/11/2022	0.15	0.06	0.32	0.0495	0.023	0.124	26.8	Northwest
1/24/2023	0.15	0.06	0.32	0.0491	0.023	0.123	26.6	Northwest
4/4/2023	0.15	0.06	0.32	0.0491	0.023	0.123	26.6	Northwest
7/26/2023	0.15	0.06	0.32	0.0473	0.022	0.118	25.6	Northwest
10/30/2023	0.15	0.06	0.32	0.0496	0.023	0.124	26.9	Northwest
		Maximum		0.0531	0.025	0.133		
		Minimum		0.0395	0.019	0.099		
		Std Dev		0.0030	0.001	0.007		
		Average		0.0489	0.023	0.122		

Notes: Hydraulic conductivity and effective porosity taken from Tuppan, 2013a.
Hydraulic gradient estimated using contour plots.
Linear groundwater velocity calculated as KI/n.
Apparent groundwater flow direction estimated as downgradient direction on the contour plots.


Cowlitz County Headquarters Landfill
Upper Elevation Hydrograph
Elevation (Feet NAVD88)
1065.00
1060.00
1055.00
1050.00
1045.00
1040.00
1035.00
1030.00
1025.00
1020.00
01/01/93
01/01/94
01/01/95
01/01/96
01/01/97
01/01/98
01/01/99
01/01/00
01/01/01
01/01/02
01/01/03
01/01/04
01/01/05
01/01/06
01/01/07
01/01/08
01/01/09
01/01/10
01/01/11
01/01/12
01/01/13
01/01/14
01/01/15
01/01/16
01/01/17
01/01/18
01/01/19
01/01/20
01/01/21
01/01/22
01/01/23
01/01/24
01/01/25
01/01/26
Date
P-9
U-1
P-10


Cowlitz County Headquarters Landfill
Middle Elevation Hydrograph
960.00
955.00
950.00
945.00
940.00
935.00
930.00
Elevation (Feet NAVD88)
01/01/93
01/01/94
01/01/95
01/01/96
01/01/97
01/01/98
01/01/99
01/01/00
01/01/01
01/01/02
01/01/03
01/01/04
01/01/05
01/01/06
01/01/07
01/01/08
01/01/09
01/01/10
01/01/11
01/01/12
01/01/13
01/01/14
01/01/15
01/01/16
01/01/17
01/01/18
01/01/19
01/01/20
01/01/21
01/01/22
01/01/23
01/01/24
01/01/25
01/01/26
Date
P-8
P-19
P-3
P-6
P-12
P-13R


Cowlitz County Headquarters Landfill
Lower Elevation Hydrograph
Elevation (Feet NAVD88)
920.00
910.00
900.00
890.00
880.00
870.00
860.00
850.00
840.00
830.00
820.00
01/01/93
01/01/94
01/01/95
01/01/96
01/01/97
01/01/98
01/01/99
01/01/00
01/01/01
01/01/02
01/01/03
01/01/04
01/01/05
01/01/06
01/01/07
01/01/08
01/01/09
01/01/10
01/01/11
01/01/12
01/01/13
01/01/14
01/01/15
01/01/16
01/01/17
01/01/18
01/01/19
01/01/20
01/01/21
01/01/22
01/01/23
01/01/24
01/01/25
01/01/26
Date
P-15
P-11
C-2
MW-2
C-1
P-14
MW-4
MW-1
P-18

Cowlitz County Headquarters Landfill
Groundwater Level Monitoring Data
Depth to Water Measurements
(feet below measuring point)

Date Measured	U-1	C-1	C-2	MW-1	MW-2	MW-4	P-6	P-8	P-9
7/14/2015	23.93	17.45	35.13	29.67	19.95	9.29	12.88	6.10	31.63
10/27/2015	24.57	19.32	35.15	31.03	23.05	10.01	14.50	6.28	36.53
1/27/2016	21.17	15.15	35.13	26.84	12.72	7.24	9.15	4.27	21.82
4/5/2016	20.69	15.65	35.20	28.18	13.82	7.87	10.73	4.88	25.50
7/12/2016	23.43	17.19	35.22	29.65	20.08	9.12	12.24	5.73	32.36
10/11/2016	23.38	16.84	35.24	30.17	22.70	9.60	12.80	5.45	35.29
1/26/2017	21.10	15.65	35.23	27.57	13.06	7.50	10.40	4.62	23.79
4/5/2017	19.95	15.25	35.20	27.17	11.79	7.59	10.28	4.58	22.21
7/25/2017	22.27	17.05	35.22	29.15	18.80	9.06	12.38	5.88	31.28
10/30/2017	22.14	16.55	35.10	28.34	19.06	7.51	11.37	4.91	30.35
1/25/2018	20.79	12.64	35.11	24.48	11.87	6.65	8.07	3.59	20.79
4/9/2018	20.82	14.06	35.15	26.49	13.09	7.83	8.97	3.90	23.94
7/17/2018	22.75	17.26	35.17	29.60	19.84	9.43	12.88	6.22	32.88
10/19/2018	24.62	18.63	35.19	30.69	22.66	9.77	15.09	7.61	36.46
1/16/2019	21.35	15.95	35.15	27.30	14.21	7.84	10.60	4.93	26.83
4/3/2019	21.65	16.25	35.21	28.18	16.15	8.41	11.21	5.31	28.55
7/8/2019	22.91	17.23	35.22	29.36	19.96	9.26	12.78	6.18	32.82
10/29/2019	23.16	16.92	35.35	29.64	22.74	9.13	12.45	5.53	34.50
1/26/2020	20.69	14.64	35.20	25.74	13.46	7.20	8.94	4.23	21.84
4/14/2020	22.24	16.15	35.24	28.16	15.35	8.52	11.28	5.46	28.34
7/13/2020	25.30	16.94	35.12	28.88	18.49	8.97	11.98	5.82	31.48
10/15/2020	24.75	16.30	35.30	29.33	21.16	9.31	10.84	4.70	33.12
1/19/2021	22.58	15.39	35.26	27.40	15.53	7.81	10.33	4.75	23.69
4/12/2021	23.24	16.10	35.30	28.29	14.69	8.26	11.29	5.40	28.38
7/13/2021	24.60	17.15	35.27	29.53	19.90	9.26	12.46	6.16	33.00
10/27/2021	24.53	15.57	35.27	30.08	22.55	9.54	11.50	4.91	34.59
1/18/2022	22.01	15.57	35.24	27.33	12.31	7.89	10.57	4.87	24.67
4/5/2022	22.59	14.78	35.31	28.01	13.85	7.72	10.34	4.71	27.36
7/18/2022	23.48	16.43	35.21	28.79	16.92	8.81	12.08	5.82	30.36
10/11/2022	25.39	18.28	35.35	30.21	21.16	10.21	15.13	7.14	35.43
1/24/2023	22.58	15.47	35.25	26.98	13.10	7.51	9.75	4.48	24.44
4/4/2023	22.18	15.41	35.27	26.85	13.74	7.83	9.31	4.38	24.85
7/26/2023	24.66	17.46	35.34	29.69	20.05	9.73	13.39	6.62	33.53
10/30/2023	24.93	17.00	35.20	30.38	22.40	9.49	13.33	5.81	35.29

NOTES: NM = Not Measured

Cowlitz County Headquarters Landfill
Groundwater Level Monitoring Data
Depth to Water Measurements
(feet below measuring point)

Date Measured	P-10	P-11	P-12	P-13R	P-14	P-15	P-18
7/14/2015	55.89	34.64	43.00	24.51	22.02	32.25	65.06
10/27/2015	55.92	38.55	43.01	26.39	22.95	33.39	65.06
1/27/2016	54.38	31.41	43.01	22.85	21.42	30.72	65.04
4/5/2016	54.12	30.34	43.03	22.73	21.75	31.64	65.10
7/12/2016	55.83	33.97	43.03	24.69	22.01	32.30	65.07
10/11/2016	55.94	37.42	43.01	26.52	22.41	32.57	65.09
1/26/2017	54.36	31.26	NM	23.35	21.66	31.52	65.06
4/5/2017	53.30	28.73	NM	22.55	21.52	31.16	65.07
7/25/2017	55.69	32.99	NM	25.84	22.07	32.28	65.05
10/30/2017	55.70	32.66	NM	26.51	22.10	32.11	65.10
1/25/2018	53.81	29.74	NM	23.84	19.55	29.21	65.05
4/9/2018	53.97	30.28	NM	21.36	21.34	30.81	65.09
7/17/2018	56.10	33.89	NM	26.06	22.15	32.26	65.08
10/19/2018	56.09	37.66	NM	27.62	22.93	33.41	65.08
1/16/2019	55.00	32.31	NM	24.21	21.43	32.03	65.07
4/3/2019	55.03	32.69	NM	24.54	21.56	31.94	65.07
7/8/2019	56.06	34.83	NM	25.86	22.14	32.29	65.06
10/29/2019	56.02	38.91	NM	26.76	22.01	32.75	65.10
1/26/2020	55.01	34.62	NM	24.37	20.96	30.77	65.08
4/14/2020	55.23	32.84	NM	24.55	21.88	31.99	65.11
7/13/2020	55.80	34.82	NM	25.02	22.01	32.22	65.07
10/15/2020	55.92	37.95	NM	26.12	21.89	32.25	65.11
1/19/2021	54.75	34.03	NM	24.51	21.52	31.46	65.09
4/12/2021	54.82	31.42	NM	22.89	21.88	31.94	65.08
7/13/2021	55.96	34.77	NM	26.02	21.99	32.33	65.08
10/27/2021	55.94	38.71	NM	27.54	22.01	32.63	65.10
1/18/2022	54.44	31.41	NM	22.51	21.60	31.53	65.12
4/5/2022	54.41	31.26	NM	22.54	21.70	31.58	65.12
7/18/2022	55.85	32.02	NM	23.60	22.01	32.03	65.11
10/11/2022	56.26	35.79	NM	26.25	22.65	32.58	65.10
1/24/2023	55.34	32.52	NM	23.31	21.40	31.06	65.12
4/4/2023	55.62	31.25	NM	22.53	21.56	31.55	65.09
7/26/2023	56.26	34.32	NM	24.99	22.21	32.32	65.09
10/30/2023	55.74	38.01	NM	25.94	22.07	32.71	65.10

NOTES: NM = Not Measured

Cowlitz County Headquarters Landfill
Groundwater Level Monitoring Data
Groundwater Level Elevations
(feet NAVD88)

Date Measured	MP Elev.	U-1 1051.4	C-1 880.46	C-2 928.05	MW-1 860.80	MW-2 893.26	MW-4 859.08	P-6 957.32	P-8 961.85	P-9 1079.65
7/14/2015		1027.47	863.01	892.92	831.13	873.31	849.79	944.44	955.75	1048.02
10/27/2015		1026.83	861.14	892.90	829.77	870.21	849.07	942.82	955.57	1043.12
1/27/2016		1030.23	865.31	892.92	833.96	880.54	851.84	948.17	957.58	1057.83
4/5/2016		1030.71	864.81	892.85	832.62	879.44	851.21	946.59	956.97	1054.15
7/12/2016		1027.97	863.27	892.83	831.15	873.18	849.96	945.08	956.12	1047.29
10/11/2016		1028.02	863.62	892.81	830.63	870.56	849.48	944.52	956.40	1044.36
1/26/2017		1030.30	864.81	892.82	833.23	880.20	851.58	946.92	957.23	1055.86
4/5/2017		1031.45	865.21	892.85	833.63	881.47	851.49	947.04	957.27	1057.44
7/25/2017		1029.13	863.41	892.83	831.65	874.46	850.02	944.94	955.97	1048.37
10/30/2017		1029.26	863.91	892.95	832.46	874.20	851.57	945.95	956.94	1049.30
1/25/2018		1030.61	867.82	892.94	836.32	881.39	852.43	949.25	958.26	1058.86
4/9/2018		1030.58	866.40	892.90	834.31	880.17	851.25	948.35	957.95	1055.71
7/17/2018		1028.65	863.20	892.88	831.20	873.42	849.65	944.64	955.63	1046.77
10/19/2018		1026.78	861.83	892.86	830.11	870.60	849.31	942.43	954.24	1043.19
1/16/2019		1030.05	864.51	892.90	833.50	879.05	851.24	946.92	956.92	1052.82
4/3/2019		1029.75	864.21	892.84	832.62	877.11	850.67	946.31	956.54	1051.10
7/8/2019		1028.49	863.23	892.83	831.44	873.30	849.82	944.74	955.67	1046.83
10/29/2019		1028.24	863.54	892.70	831.16	870.52	849.95	945.07	956.32	1045.15
1/26/2020		1030.71	865.82	892.85	835.06	879.80	851.88	948.58	957.62	1057.81
4/14/2020		1029.16	864.31	892.81	832.64	877.91	850.56	946.24	956.39	1051.31
7/13/2020		1026.10	863.52	892.93	831.92	874.77	850.11	945.54	956.03	1048.17
10/15/2020		1026.65	864.16	892.75	831.47	872.10	849.77	946.68	957.15	1046.53
1/19/2021		1028.82	865.07	892.79	833.40	877.73	851.27	947.19	957.10	1055.96
4/12/2021		1028.16	864.36	892.75	832.51	878.57	850.82	946.23	956.45	1051.27
7/13/2021		1026.80	863.31	892.78	831.27	873.36	849.82	945.06	955.69	1046.65
10/27/2021		1026.87	864.89	892.78	830.72	870.71	849.54	946.02	956.94	1045.06
1/18/2022		1029.39	864.89	892.81	833.47	880.95	851.19	946.95	956.98	1054.98
4/5/2022		1028.81	865.68	892.74	832.79	879.41	851.36	947.18	957.14	1052.29
7/18/2022		1027.92	864.03	892.84	832.01	876.34	850.27	945.44	956.03	1049.29
10/11/2022		1026.01	862.18	892.70	830.59	872.10	848.87	942.70	954.71	1044.22
1/24/2023		1028.82	864.99	892.80	833.82	880.16	851.57	948.08	957.37	1055.21
4/4/2023		1029.22	865.05	892.78	833.95	879.52	851.25	948.52	957.47	1054.80
7/26/2023		1026.74	863.00	892.71	831.11	873.21	849.35	944.44	955.23	1046.12
10/30/2023		1026.47	863.46	892.85	830.42	870.86	849.59	944.50	956.04	1044.36

NOTES: NM = Not Measured

Cowlitz County Headquarters Landfill
Groundwater Level Monitoring Data
Groundwater Level Elevations
(feet NAVD88)

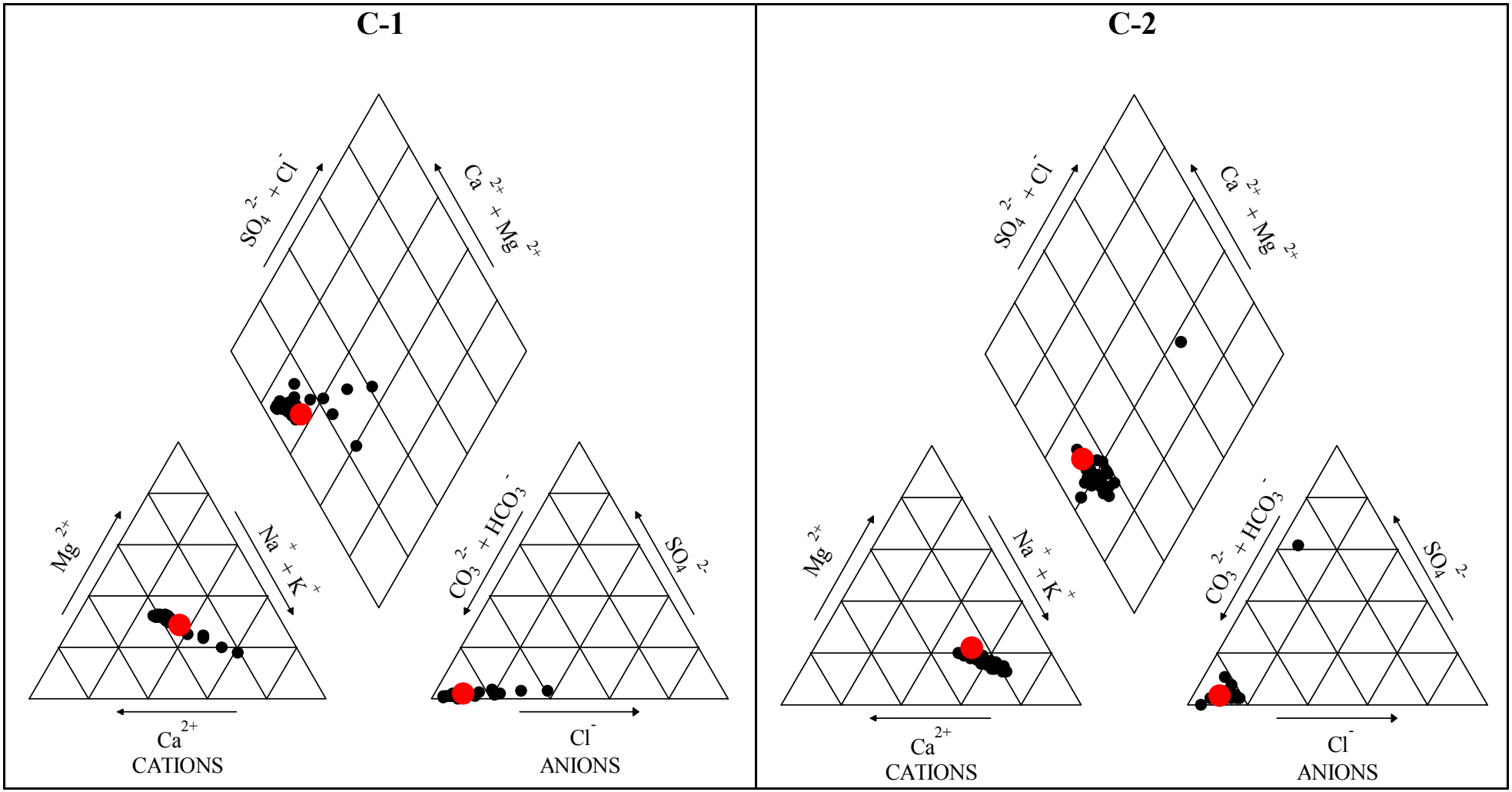
Date Measured	MP Elev.	P-10 1079.3	P-11 930.07	P-12 988.12	P-13R 961.58	P-14 877.7	P-15 946.13	P-18 888.85
7/14/2015		1023.41	895.43	945.12	937.07	855.68	913.88	823.79
10/27/2015		1023.38	891.52	945.11	935.19	854.75	912.74	823.79
1/27/2016		1024.92	898.66	945.11	938.73	856.28	915.41	823.81
4/5/2016		1025.18	899.73	945.09	938.85	855.95	914.49	823.75
7/12/2016		1023.47	896.10	945.09	936.89	855.69	913.83	823.78
10/11/2016		1023.36	892.65	945.11	935.06	855.29	913.56	823.76
1/26/2017		1024.94	898.81	NM	938.23	856.04	914.61	823.79
4/5/2017		1026.00	901.34	NM	939.03	856.18	914.97	823.78
7/25/2017		1023.61	897.08	NM	935.74	855.63	913.85	823.80
10/30/2017		1023.60	897.41	NM	935.07	855.60	914.02	823.75
1/25/2018		1025.49	900.33	NM	937.74	858.15	916.92	823.80
4/9/2018		1025.33	899.79	NM	940.22	856.36	915.32	823.76
7/17/2018		1023.20	896.18	NM	935.52	855.55	913.87	823.77
10/19/2018		1023.21	892.41	NM	933.96	854.77	912.72	823.77
1/16/2019		1024.30	897.76	NM	937.37	856.27	914.10	823.78
4/3/2019		1024.27	897.38	NM	937.04	856.14	914.19	823.78
7/8/2019		1023.24	895.24	NM	935.72	855.56	913.84	823.79
10/29/2019		1023.28	891.16	NM	934.82	855.69	913.38	823.75
1/26/2020		1024.29	895.45	NM	937.21	856.74	915.36	823.77
4/14/2020		1024.07	897.23	NM	937.03	855.82	914.14	823.74
7/13/2020		1023.50	895.25	NM	936.56	855.69	913.91	823.78
10/15/2020		1023.38	892.12	NM	935.46	855.81	913.88	823.74
1/19/2021		1024.55	896.04	NM	937.07	856.18	914.67	823.76
4/12/2021		1024.48	898.65	NM	938.69	855.82	914.19	823.77
7/13/2021		1023.34	895.30	NM	935.56	855.71	913.80	823.77
10/27/2021		1023.36	891.36	NM	934.04	855.69	913.50	823.75
1/18/2022		1024.86	898.66	NM	939.07	856.10	914.60	823.73
4/5/2022		1024.89	898.81	NM	939.04	856.00	914.55	823.73
7/18/2022		1023.45	898.05	NM	937.98	855.69	914.10	823.74
10/11/2022		1023.04	894.28	NM	935.33	855.05	913.55	823.75
1/24/2023		1023.96	897.55	NM	938.27	856.30	915.07	823.73
4/4/2023		1023.68	898.82	NM	939.05	856.14	914.58	823.76
7/26/2023		1023.04	895.75	NM	936.59	855.49	913.81	823.76
10/30/2023		1023.56	892.06	NM	935.64	855.63	913.42	823.75

NOTES: NM = Not Measured

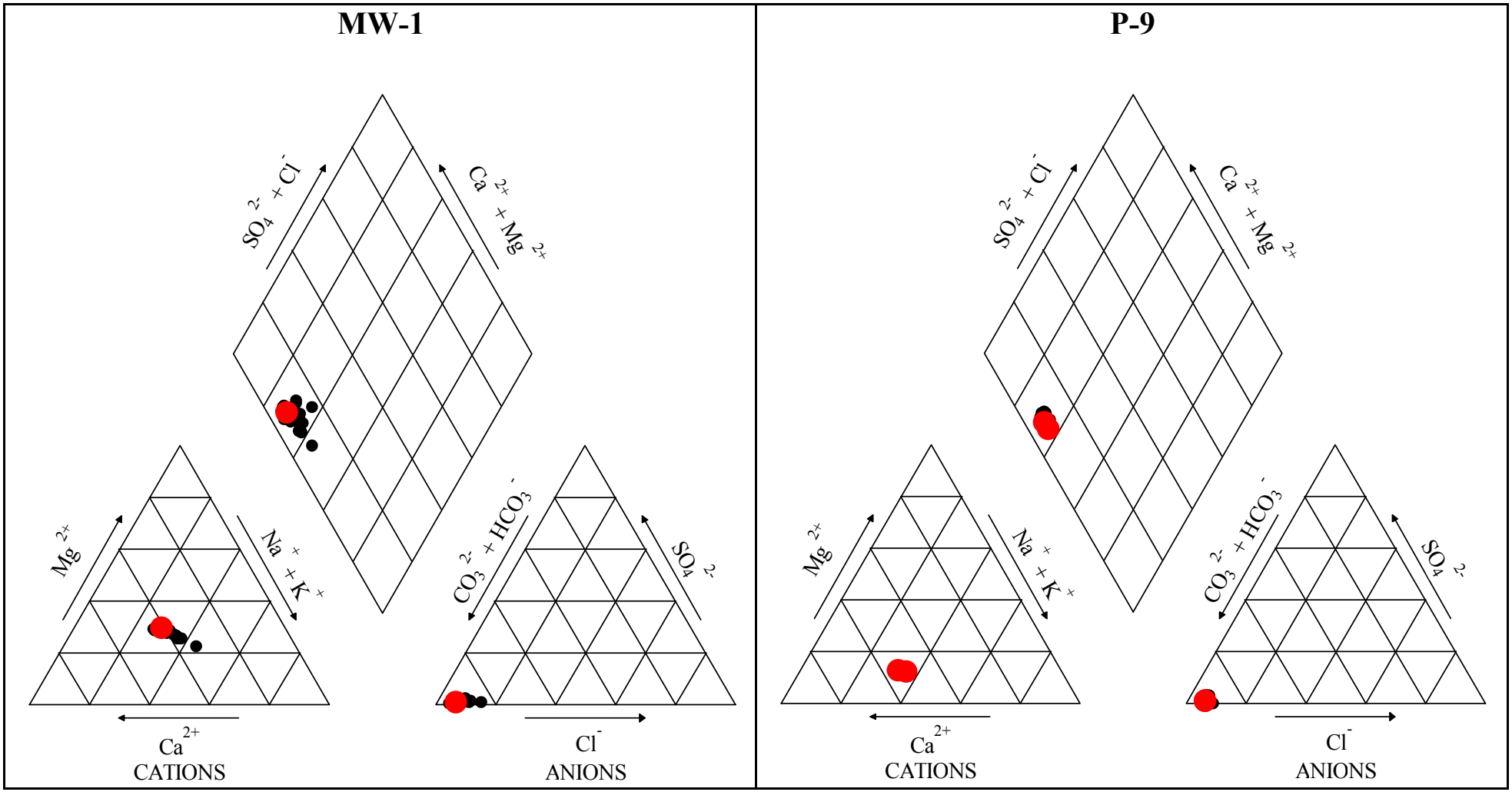
APPENDIX B

FOURTH QUARTER TRILINEAR DIAGRAMS, CATION-ANION BALANCE TABLE, TREND PLOTS, GROUNDWATER QUALITY DATA, AND STATISTICAL CALCULATIONS

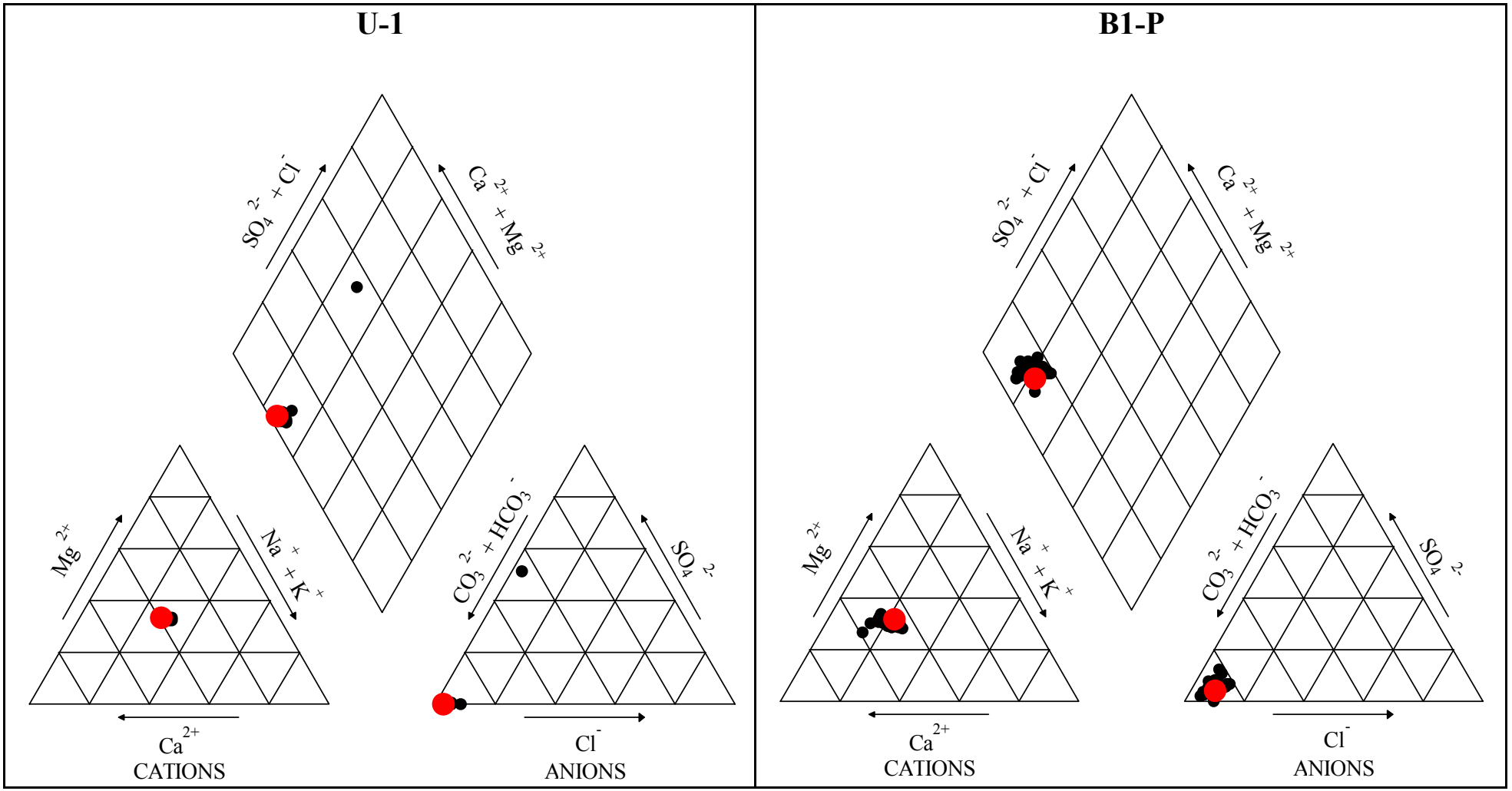
Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
January 2023 Data Point is Larger



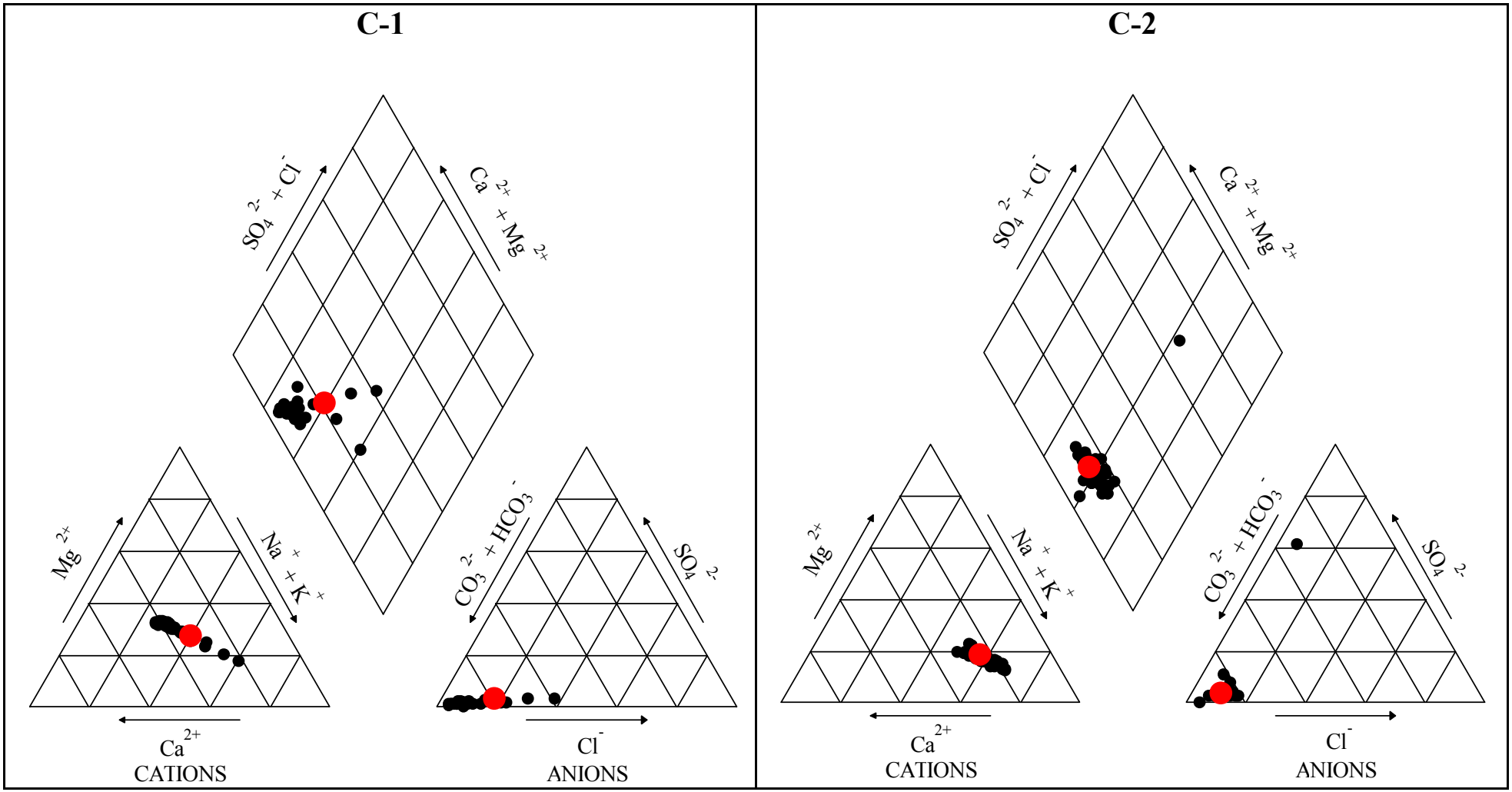
Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
January 2023 Data Point is Larger



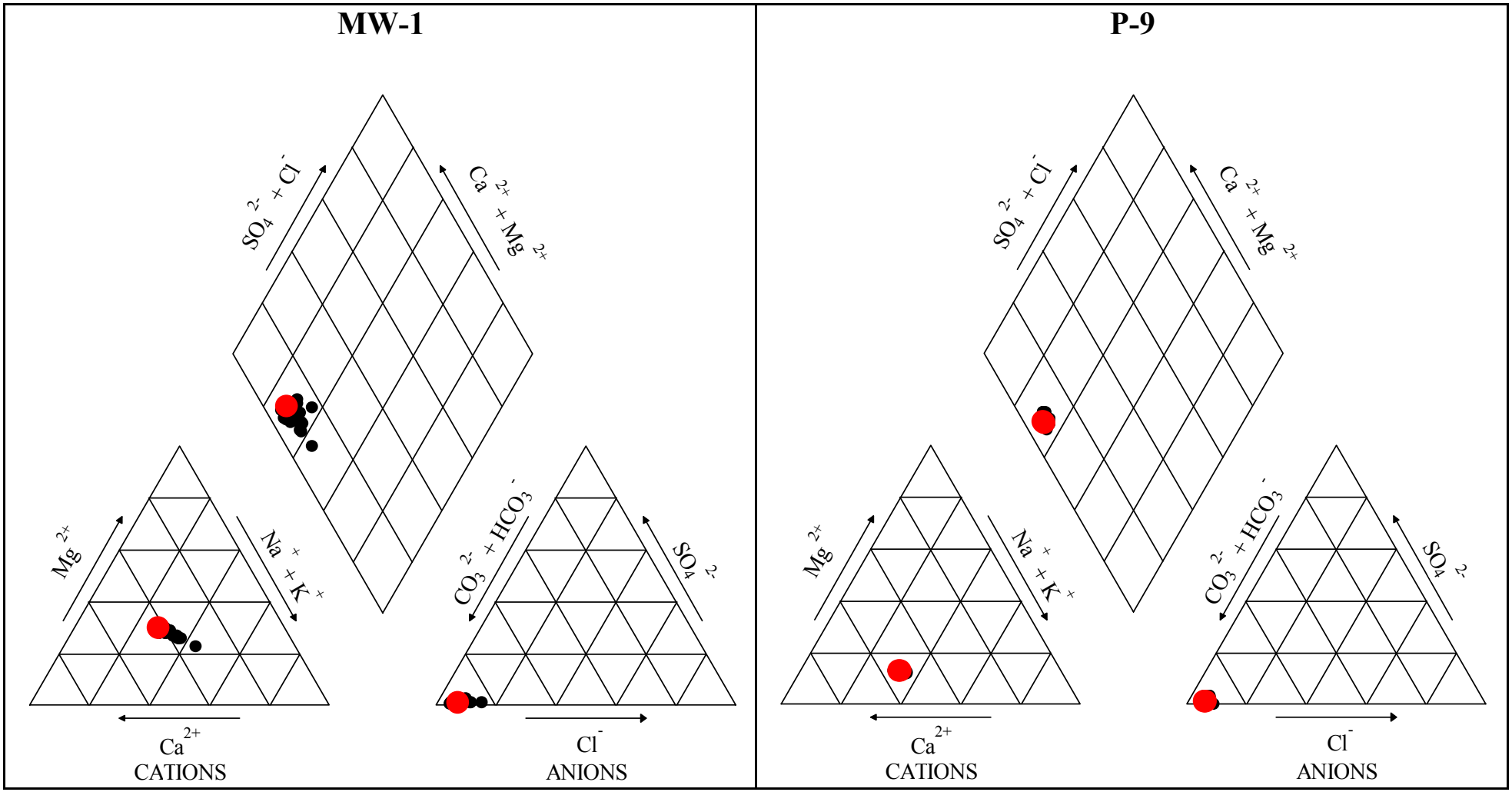
Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
January 2023 Data Point is Larger



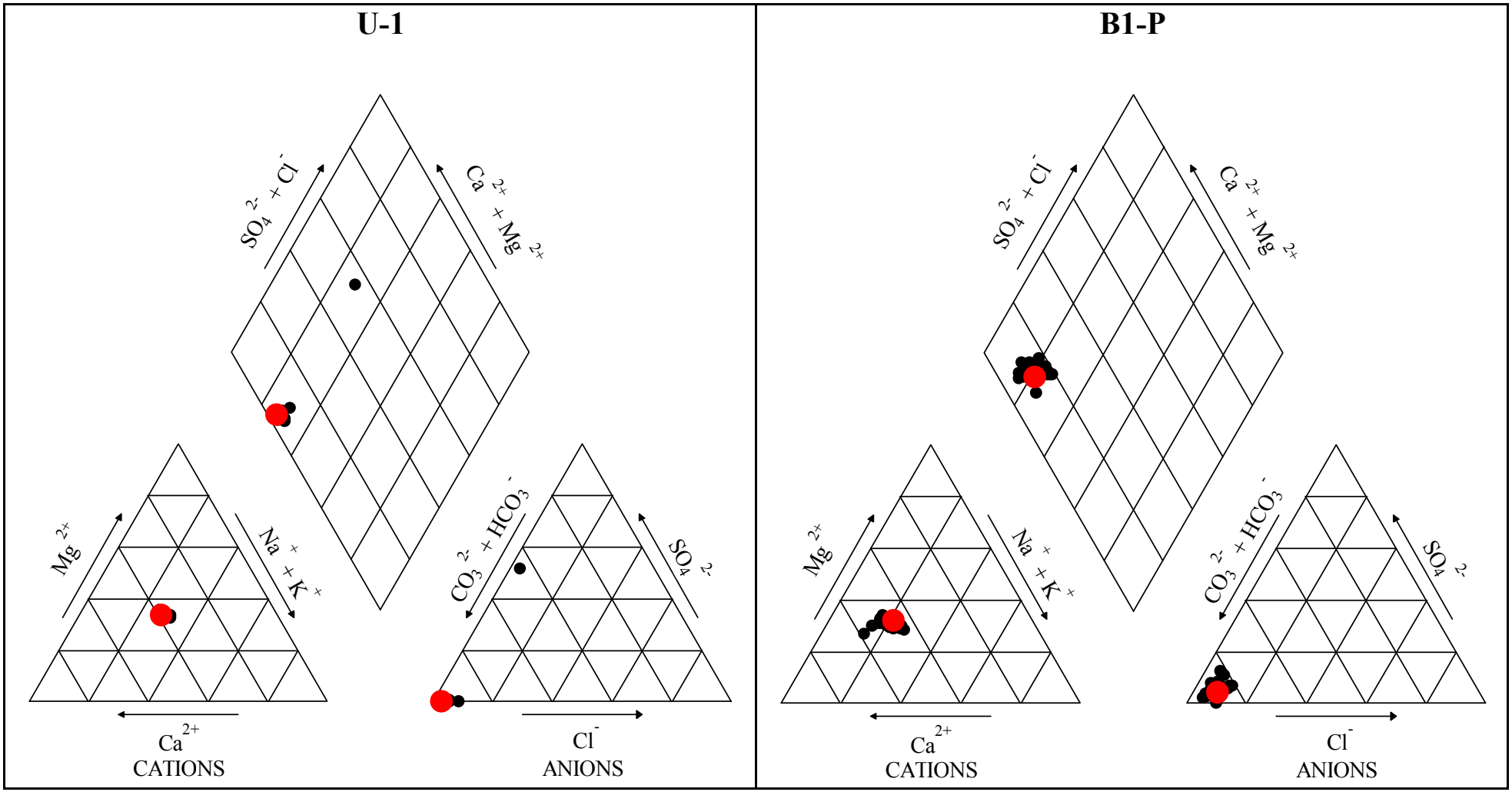
Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
April 2023 Data Point is Larger



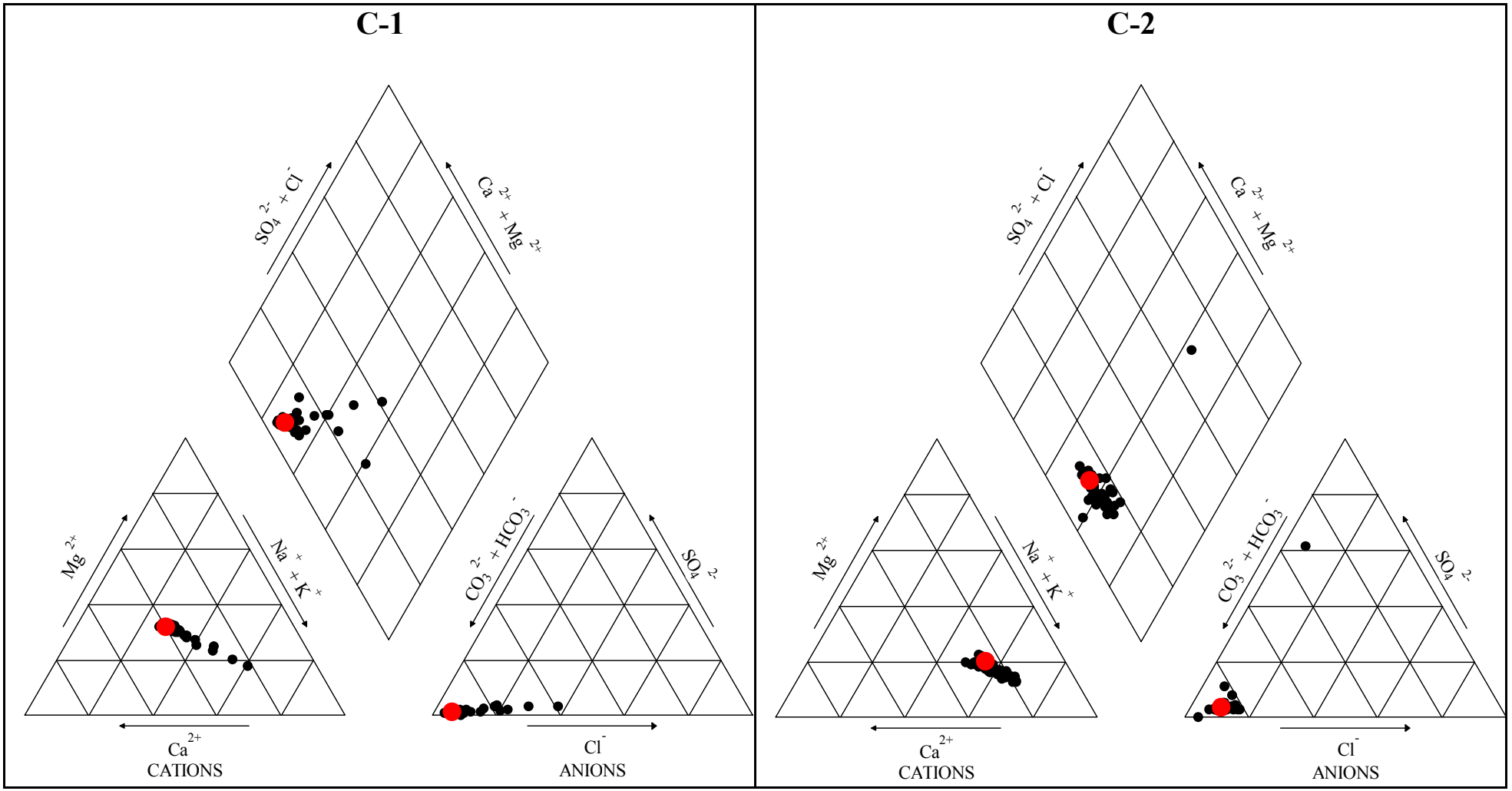
Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
April 2023 Data Point is Larger



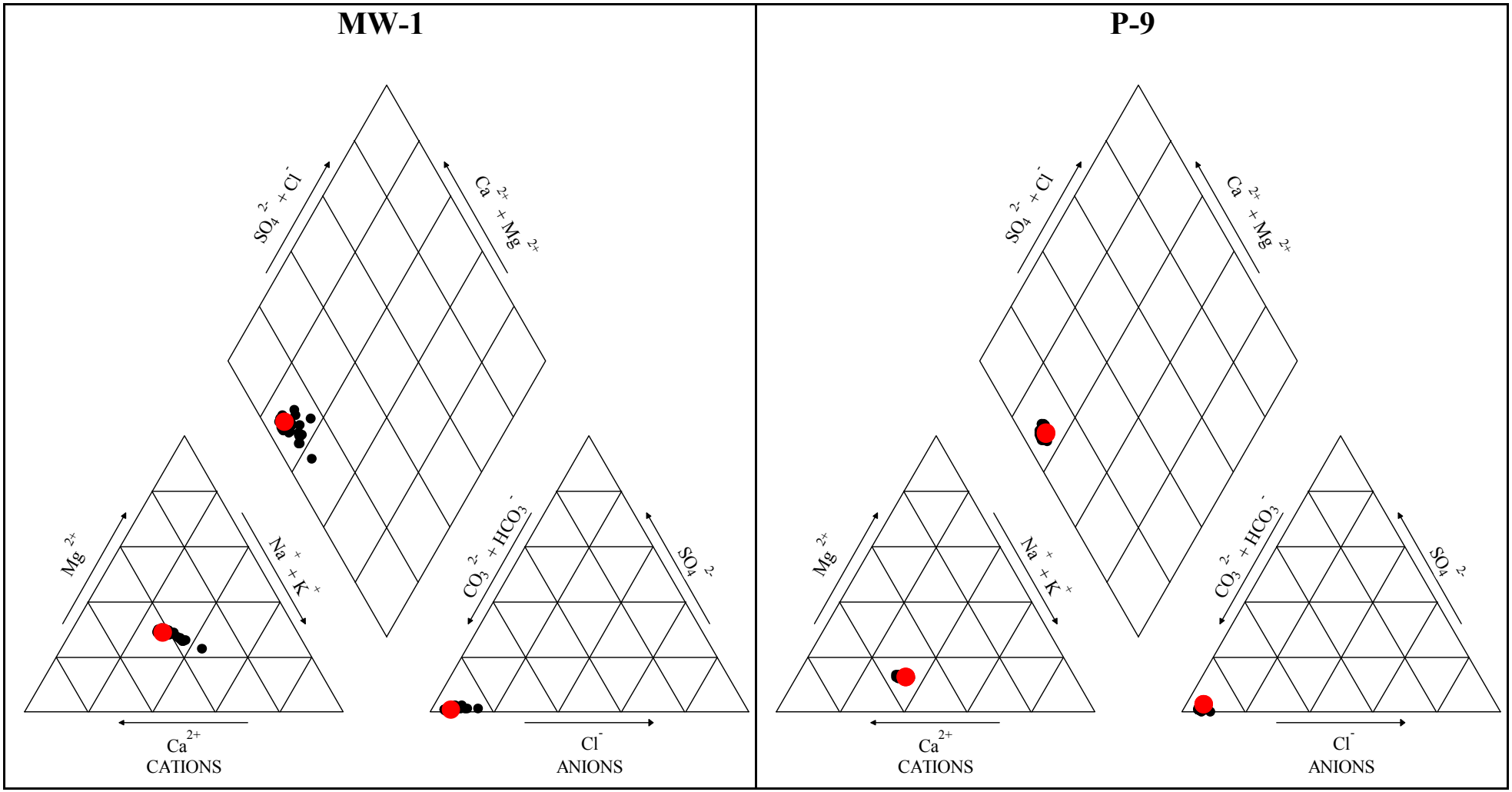
Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
April 2023 Data Point is Larger



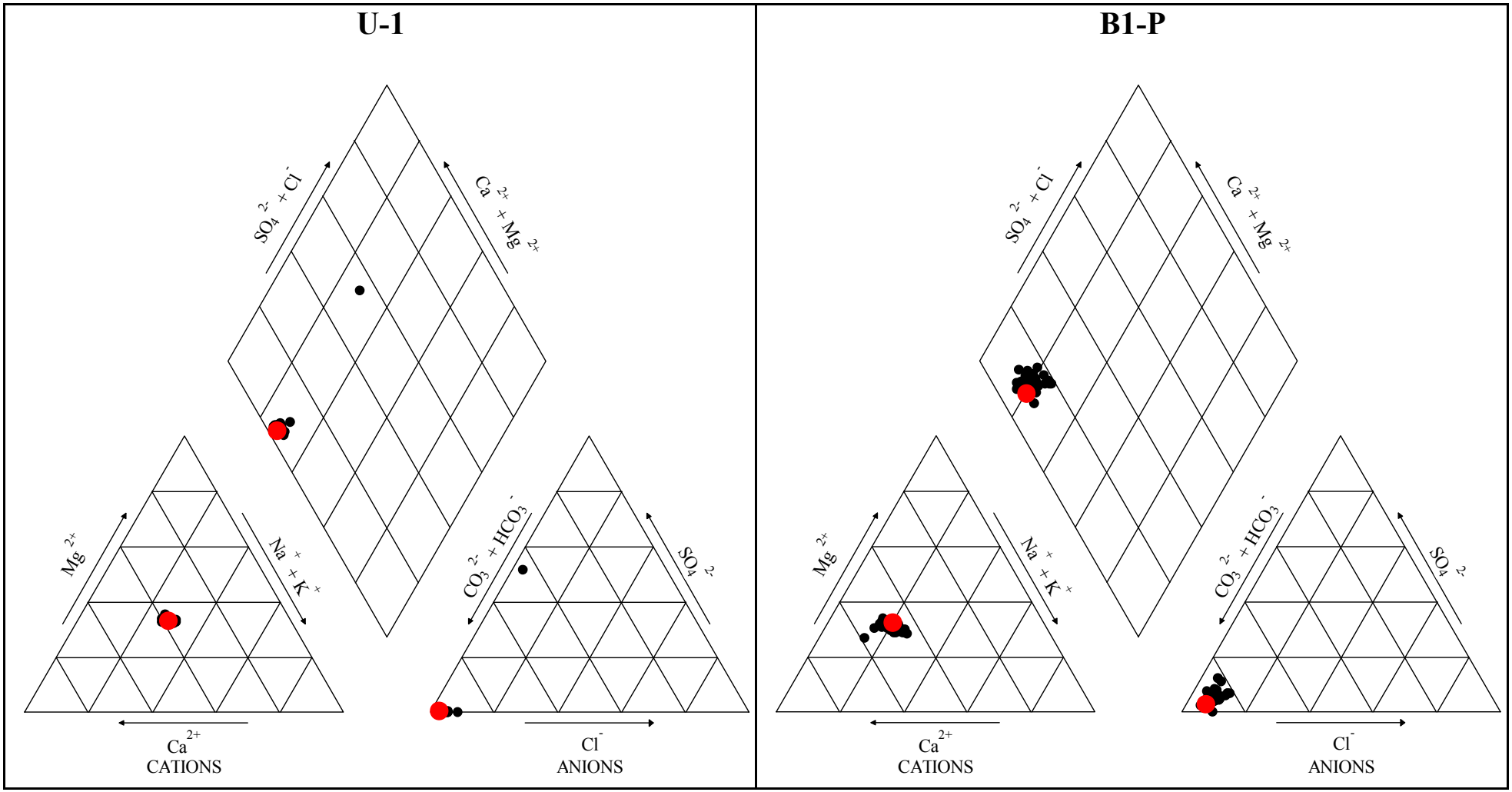
Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
July 2023 Data Point is Larger



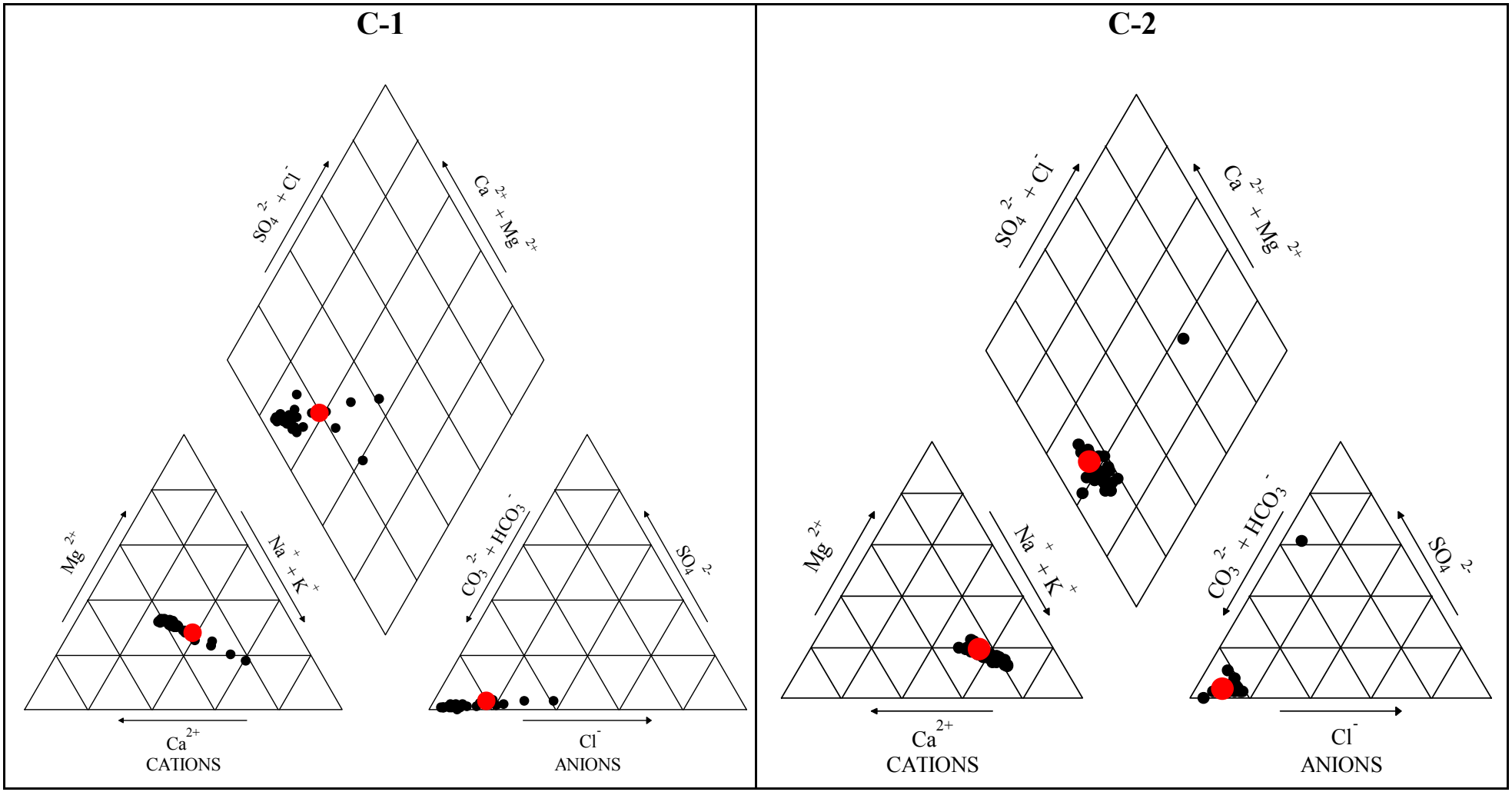
Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
July 2023 Data Point is Larger



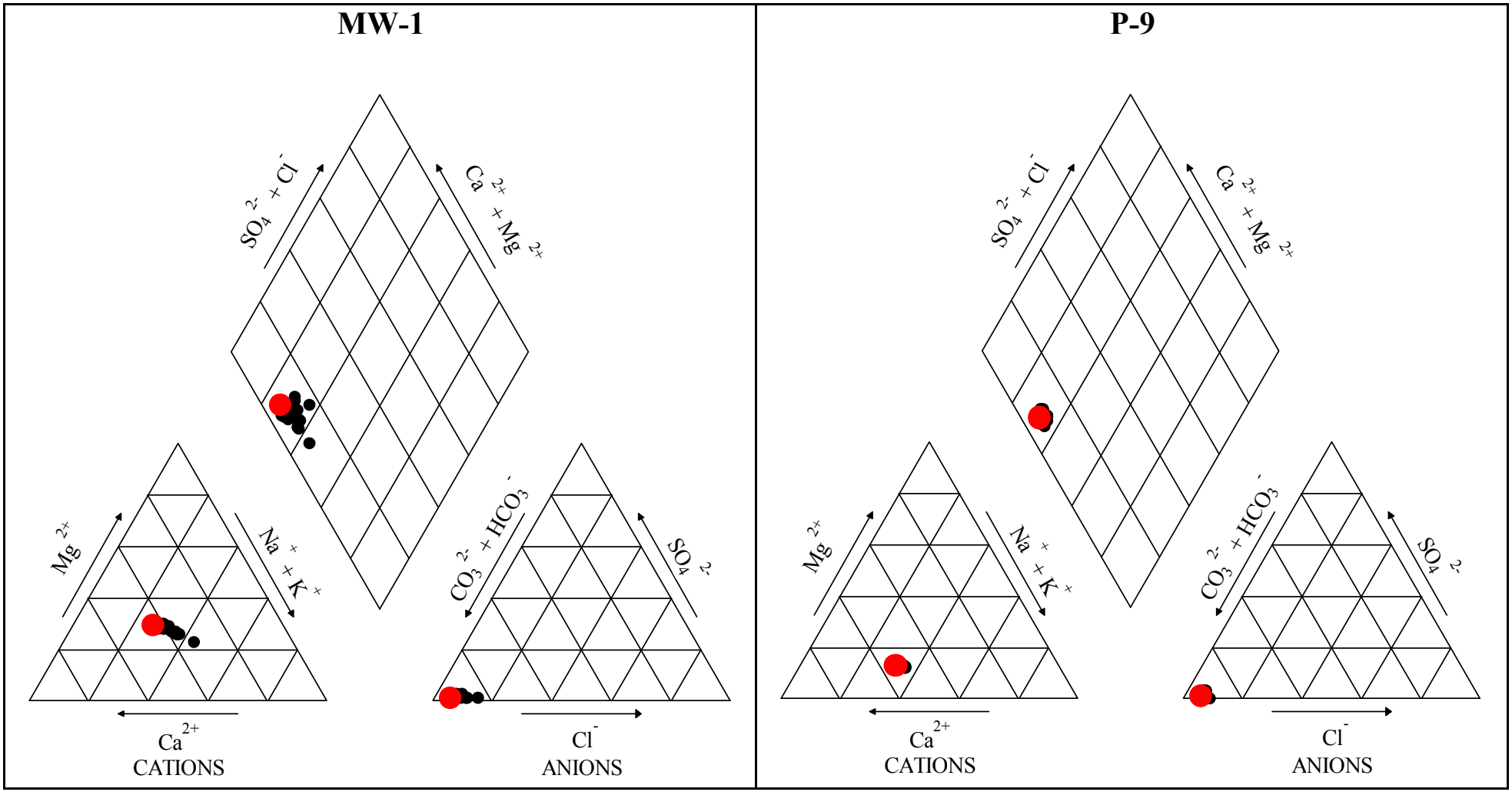
Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
July 2023 Data Point is Larger



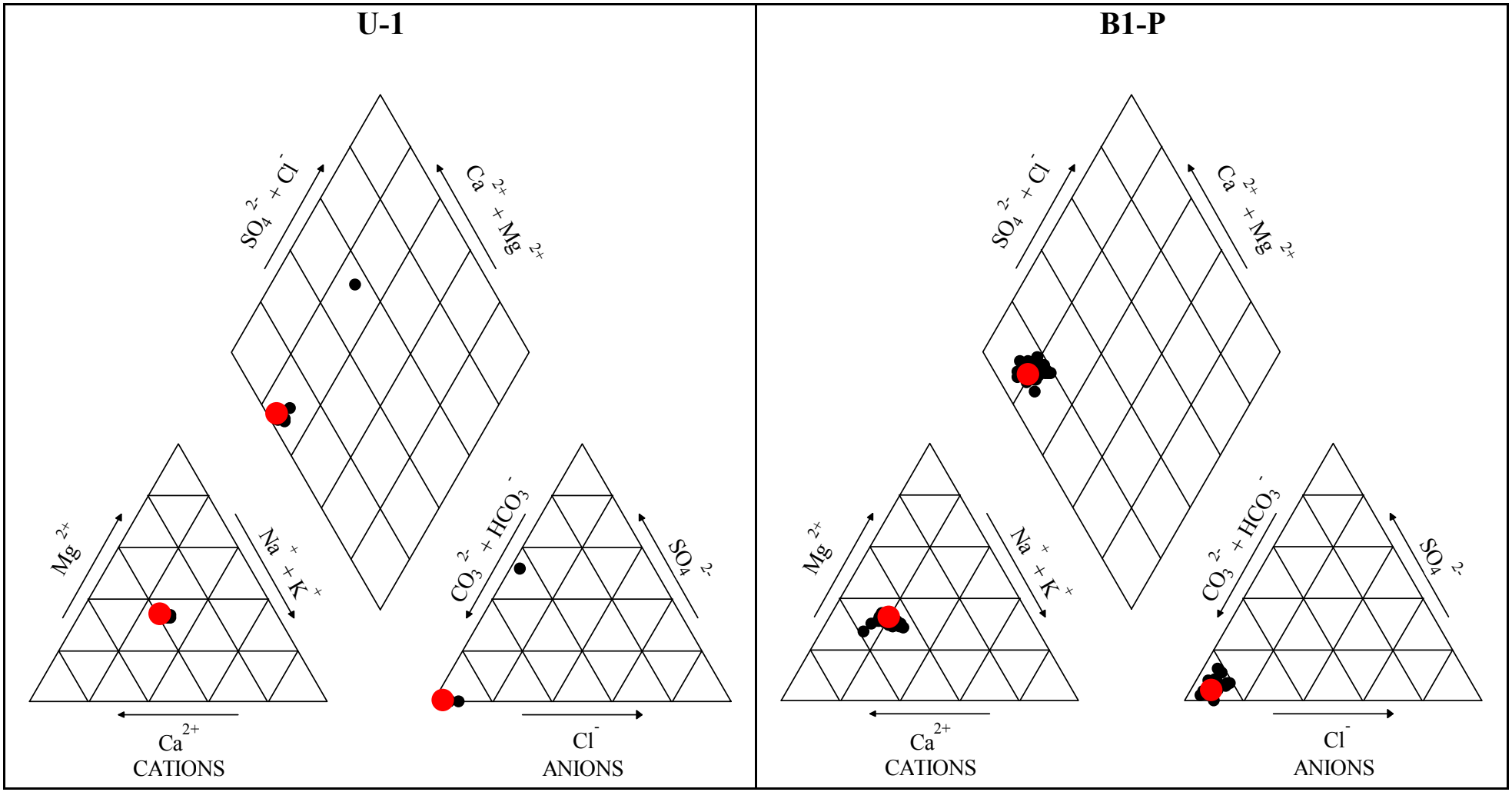
Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
October 2023 Data Point is Larger



Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
October 2023 Data Point is Larger



Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
October 2023 Data Point is Larger



Cowlitz County Headquarters Landfill
Cation-Anion Balance Calculations
January 2023

Well	Ion	Equivalent Weight	Concentration (mg/L)	Equivalents per million Cations	Equivalents per million Anions	Difference (meq/L)	Difference (%)
C-1	Calcium	20.04	3.4	0.17			
	Magnesium	12.16	1.7	0.14			
	Potassium	39.10	0.3	0.01			
	Sodium	22.99	3.8	0.17			
	Iron	55.85	0.02	0.0003			
	Bicarbonate	61.02	28.2		0.46		
	Chloride	35.45	1.8		0.05		
	Sulfate	48.03	0.5		0.01		
			Total	**0.48**	**0.52**	**-0.04**	**-4.30**
C-2	Calcium	20.04	3.3	0.17			
	Magnesium	12.16	1.8	0.14			
	Potassium	39.10	0.5	0.01			
	Sodium	22.99	7.7	0.34			
	Iron	55.85	0.01	0.00			
	Bicarbonate	61.02	37.6		0.62		
	Chloride	35.45	2.3		0.06		
	Sulfate	48.03	1.2		0.02		
			Total	**0.66**	**0.70**	**-0.05**	**-3.31**
MW-1	Calcium	20.04	7.9	0.40			
	Magnesium	12.16	3.5	0.28			
	Potassium	39.10	0.5	0.01			
	Sodium	22.99	6.1	0.26			
	Iron	55.85	0.02	0.00			
	Bicarbonate	61.02	54.3		0.89		
	Chloride	35.45	2.0		0.06		
	Sulfate	48.03	0.5		0.01		
			Total	**0.96**	**0.95**	**0.00**	**0.18**
P-9	Calcium	20.04	13.3	0.66			
	Magnesium	12.16	1.9	0.16			
	Potassium	39.10	0.7	0.02			
	Sodium	22.99	8.1	0.35			
	Iron	55.85	0.01	0.00			
	Bicarbonate	61.02	67.4		1.10		
	Chloride	35.45	2.4		0.07		
	Sulfate	48.03	1.4		0.03		
			Total	**1.19**	**1.20**	**-0.01**	**-0.35**
U-1	Calcium	20.04	10.6	0.53			
	Magnesium	12.16	5.5	0.45			
	Potassium	39.10	0.8	0.02			
	Sodium	22.99	8.0	0.35			
	Iron	55.85	8.73	0.16			
	Bicarbonate	61.02	85.1		1.39		
	Chloride	35.45	1.5		0.04		
	Sulfate	48.03	0.1		0.00		
			Total	**1.50**	**1.44**	**0.06**	**2.13**

mg/L = milligrams per litre (parts per million)
meq/L = milliequivalents per litre

Cowlitz County Headquarters Landfill
Cation-Anion Balance Calculations
April 2023

Well	Ion	Equivalent Weight	Concentration (mg/L)	Equivalents per million Cations	Equivalents per million Anions	Difference (meq/L)	Difference (%)
C-1	Calcium	20.04	2.4	0.12			
	Magnesium	12.16	1.2	0.10			
	Potassium	39.10	0.3	0.01			
	Sodium	22.99	3.2	0.14			
	Iron	55.85	0.03	0.0005			
	Bicarbonate	61.02	14.5		0.24		
	Chloride	35.45	1.9		0.05		
	Sulfate	48.03	0.5		0.01		
			Total	**0.36**	**0.30**	**0.06**	**9.19**
C-2	Calcium	20.04	3.1	0.15			
	Magnesium	12.16	1.4	0.12			
	Potassium	39.10	0.5	0.01			
	Sodium	22.99	8.2	0.36			
	Iron	55.85	0.02	0.00			
	Bicarbonate	61.02	36.2		0.59		
	Chloride	35.45	2.3		0.06		
	Sulfate	48.03	1.3		0.03		
			Total	**0.64**	**0.68**	**-0.04**	**-3.21**
MW-1	Calcium	20.04	7.8	0.39			
	Magnesium	12.16	3.4	0.28			
	Potassium	39.10	0.5	0.01			
	Sodium	22.99	5.6	0.24			
	Iron	55.85	0.02	0.00			
	Bicarbonate	61.02	48.2		0.79		
	Chloride	35.45	2.0		0.06		
	Sulfate	48.03	0.4		0.01		
			Total	**0.92**	**0.86**	**0.06**	**3.65**
P-9	Calcium	20.04	13.3	0.66			
	Magnesium	12.16	1.9	0.16			
	Potassium	39.10	0.7	0.02			
	Sodium	22.99	8.1	0.35			
	Iron	55.85	0.01	0.00			
	Bicarbonate	61.02	67.3		1.10		
	Chloride	35.45	2.5		0.07		
	Sulfate	48.03	1.3		0.03		
			Total	**1.19**	**1.20**	**-0.01**	**-0.43**
U-1	Calcium	20.04	11.1	0.55			
	Magnesium	12.16	5.8	0.48			
	Potassium	39.10	0.9	0.02			
	Sodium	22.99	8.5	0.37			
	Iron	55.85	17.40	0.31			
	Bicarbonate	61.02	90.2		1.48		
	Chloride	35.45	1.5		0.04		
	Sulfate	48.03	0.2		0.00		
			Total	**1.73**	**1.52**	**0.21**	**6.41**

mg/L = milligrams per litre (parts per million)
meq/L = milliequivalents per litre

Cowlitz County Headquarters Landfill
Cation-Anion Balance Calculations
July 2023

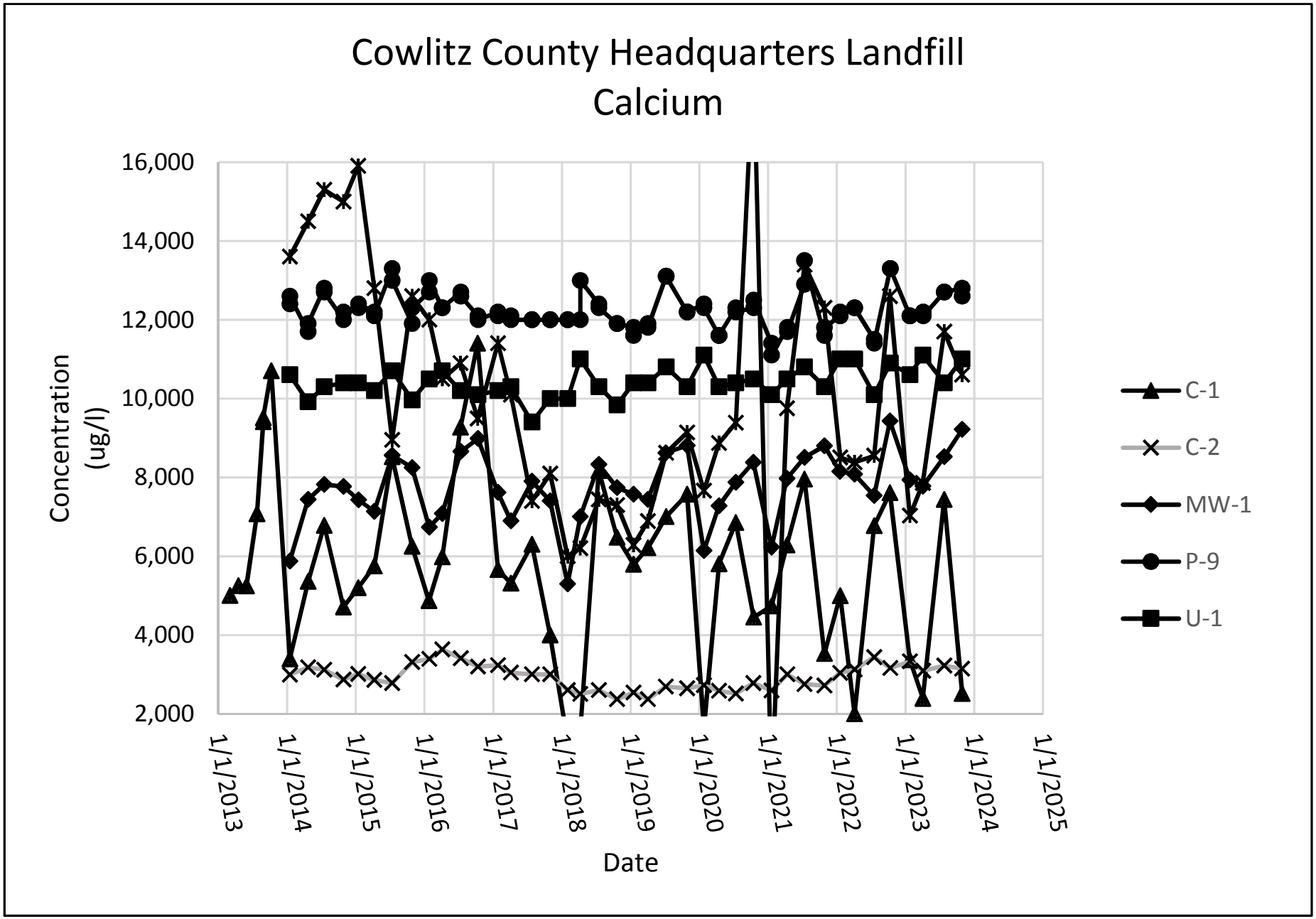
Well	Ion	Equivalent Weight	Concentration (mg/L)	Equivalents per million Cations	Equivalents per million Anions	Difference (meq/L)	Difference (%)
C-1	Calcium	20.04	7.4	0.37			
	Magnesium	12.16	3.6	0.30			
	Potassium	39.10	0.6	0.02			
	Sodium	22.99	5.7	0.25			
	Iron	55.85	0.02	0.0004			
	Bicarbonate	61.02	54.0		0.89		
	Chloride	35.45	1.8		0.05		
	Sulfate	48.03	0.5		0.01		
			Total	**0.93**	**0.95**	**-0.01**	**-0.71**
C-2	Calcium	20.04	3.2	0.16			
	Magnesium	12.16	1.6	0.13			
	Potassium	39.10	0.5	0.01			
	Sodium	22.99	7.9	0.35			
	Iron	55.85	0.01	0.00			
	Bicarbonate	61.02	35.2		0.58		
	Chloride	35.45	2.3		0.06		
	Sulfate	48.03	1.1		0.02		
			Total	**0.65**	**0.66**	**-0.01**	**-1.01**
MW-1	Calcium	20.04	8.5	0.43			
	Magnesium	12.16	3.5	0.29			
	Potassium	39.10	0.8	0.02			
	Sodium	22.99	6.2	0.27			
	Iron	55.85	0.02	0.00			
	Bicarbonate	61.02	56.1		0.92		
	Chloride	35.45	2.1		0.06		
	Sulfate	48.03	0.4		0.01		
			Total	**1.01**	**0.99**	**0.02**	**0.97**
P-9	Calcium	20.04	12.1	0.60			
	Magnesium	12.16	1.7	0.14			
	Potassium	39.10	0.7	0.02			
	Sodium	22.99	9.2	0.40			
	Iron	55.85	0.02	0.00			
	Bicarbonate	61.02	66.1		1.08		
	Chloride	35.45	2.3		0.06		
	Sulfate	48.03	0.6		0.01		
			Total	**1.16**	**1.16**	**0.00**	**0.08**
U-1	Calcium	20.04	10.4	0.52			
	Magnesium	12.16	5.5	0.45			
	Potassium	39.10	0.9	0.02			
	Sodium	22.99	8.3	0.36			
	Iron	55.85	8.03	0.14			
	Bicarbonate	61.02	84.0		1.38		
	Chloride	35.45	1.4		0.04		
	Sulfate	48.03	0.1		0.00		
			Total	**1.50**	**1.42**	**0.08**	**2.66**

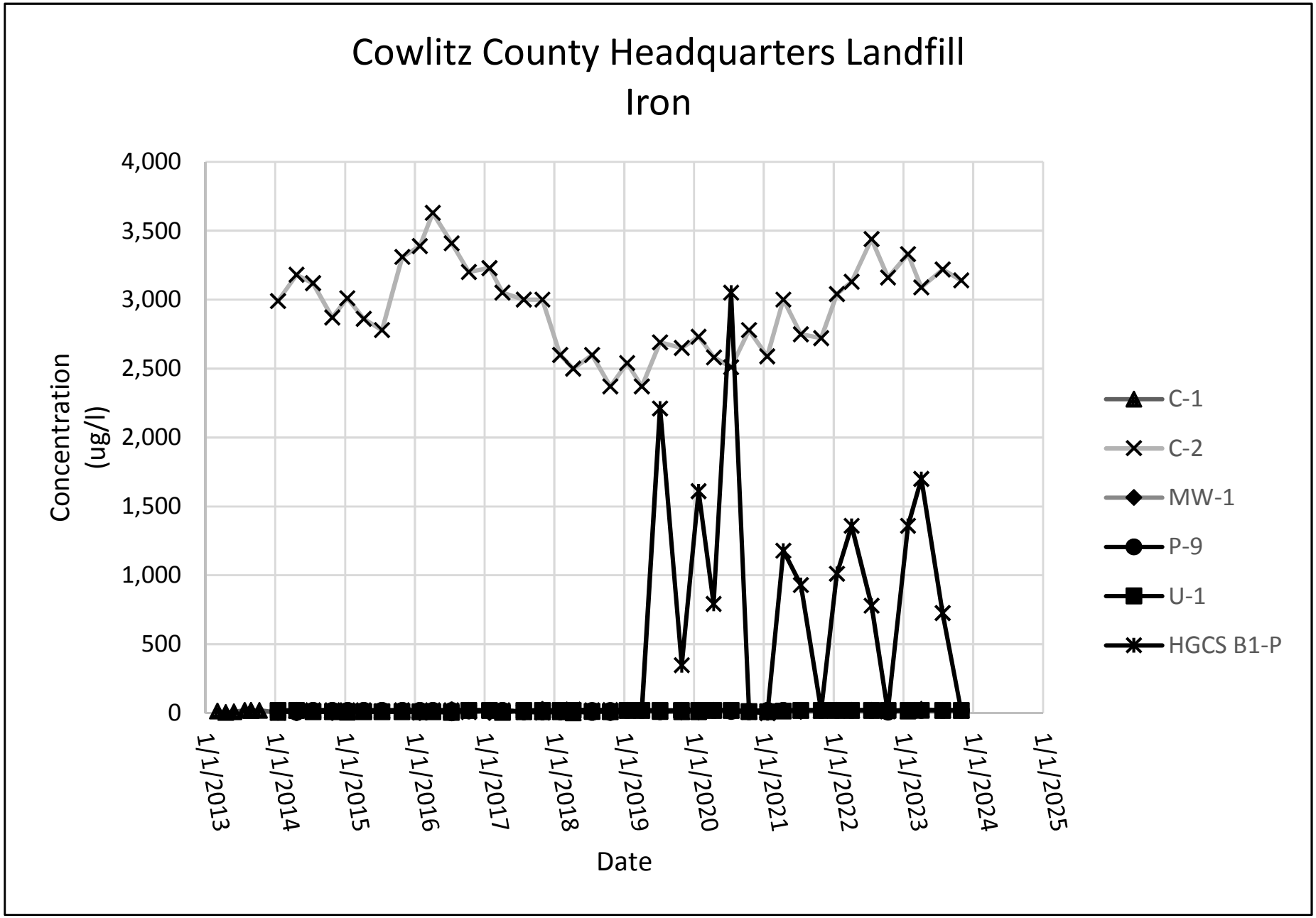
mg/L = milligrams per litre (parts per million)
meq/L = milliequivalents per litre

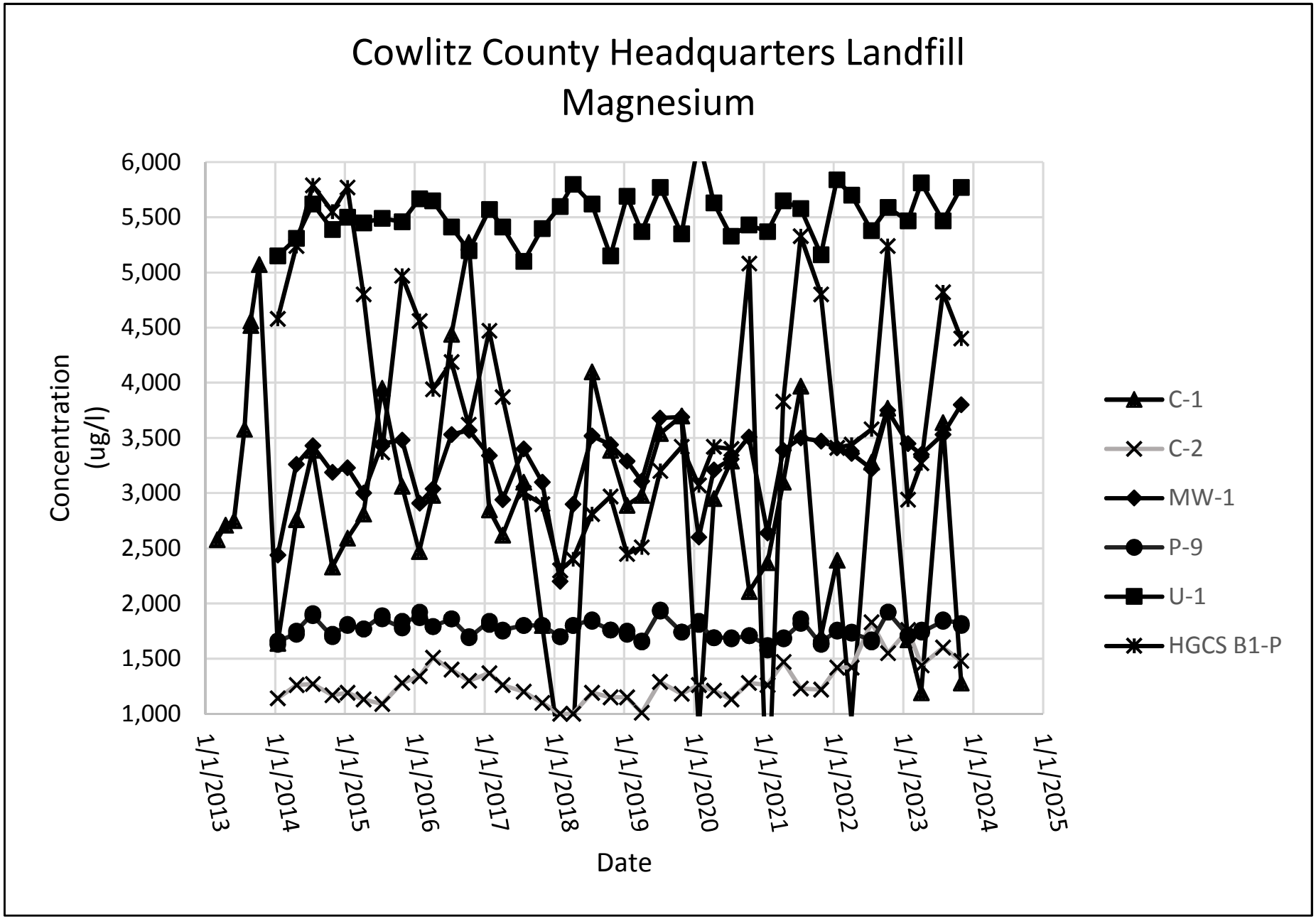
Cowlitz County Headquarters Landfill
Cation-Anion Balance Calculations
October 2023

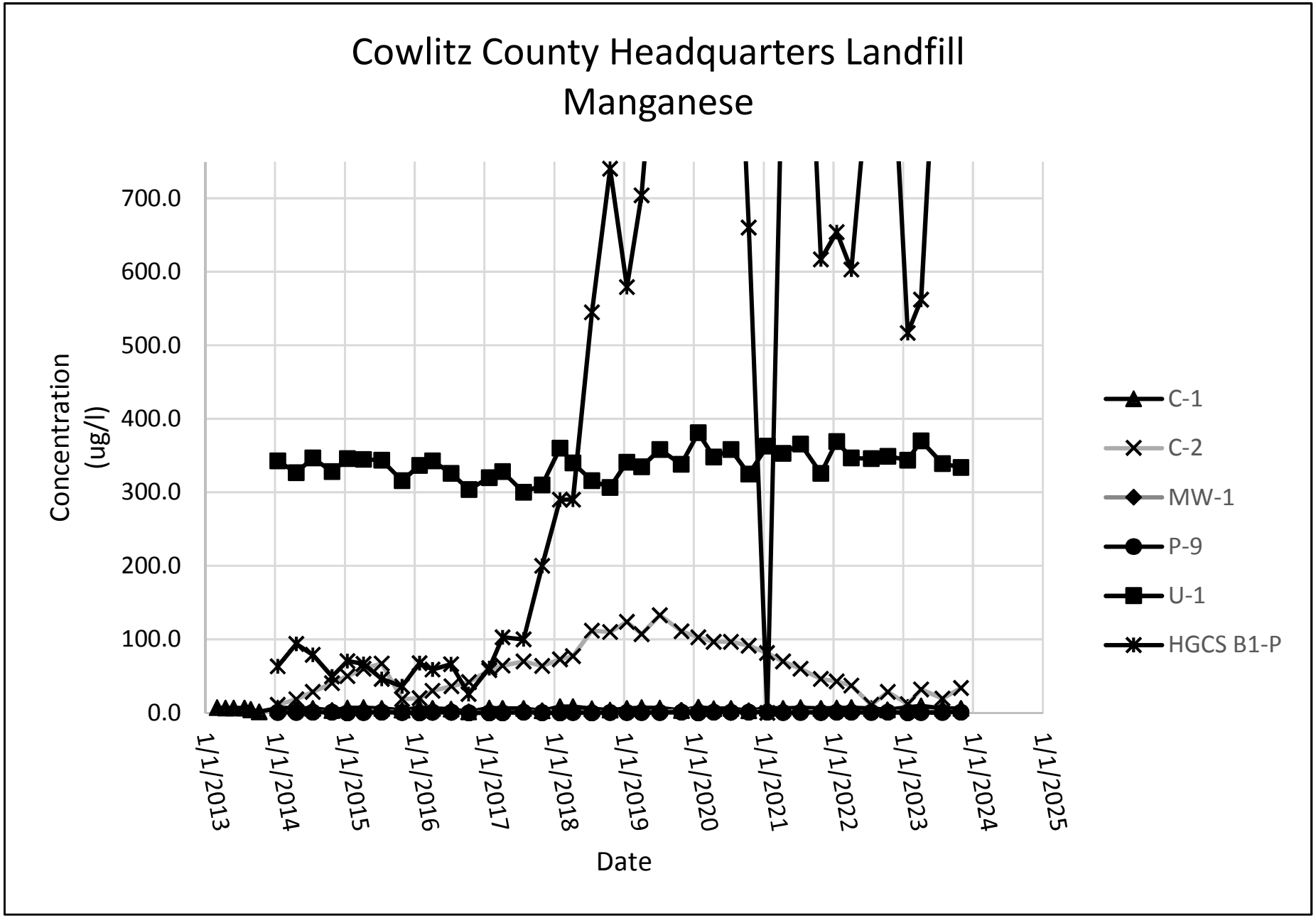
Well	Ion	Equivalent Weight	Concentration (mg/L)	Equivalents per million Cations	Equivalents per million Anions	Difference (meq/L)	Difference (%)
C-1	Calcium	20.04	2.5	0.13			
	Magnesium	12.16	1.3	0.11			
	Potassium	39.10	0.3	0.01			
	Sodium	22.99	3.2	0.14			
	Iron	55.85	0.02	0.0004			
	Bicarbonate	61.02	16.3		0.27		
	Chloride	35.45	1.9		0.05		
	Sulfate	48.03	0.5		0.01		
			Total	**0.38**	**0.33**	**0.04**	**6.21**
C-2	Calcium	20.04	3.1	0.16			
	Magnesium	12.16	1.5	0.12			
	Potassium	39.10	0.5	0.01			
	Sodium	22.99	7.9	0.34			
	Iron	55.85	0.02	0.00			
	Bicarbonate	61.02	36.7		0.60		
	Chloride	35.45	2.3		0.06		
	Sulfate	48.03	1.1		0.02		
			Total	**0.64**	**0.69**	**-0.05**	**-4.04**
MW-1	Calcium	20.04	9.2	0.46			
	Magnesium	12.16	3.8	0.31			
	Potassium	39.10	0.6	0.02			
	Sodium	22.99	6.2	0.27			
	Iron	55.85	0.02	0.00			
	Bicarbonate	61.02	58.6		0.96		
	Chloride	35.45	2.0		0.06		
	Sulfate	48.03	0.4		0.01		
			Total	**1.06**	**1.03**	**0.03**	**1.47**
P-9	Calcium	20.04	12.1	0.60			
	Magnesium	12.16	1.7	0.14			
	Potassium	39.10	0.7	0.02			
	Sodium	22.99	8.1	0.35			
	Iron	55.85	0.02	0.00			
	Bicarbonate	61.02	66.0		1.08		
	Chloride	35.45	2.3		0.06		
	Sulfate	48.03	0.6		0.01		
			Total	**1.11**	**1.16**	**-0.05**	**-2.00**
U-1	Calcium	20.04	11.0	0.55			
	Magnesium	12.16	5.8	0.47			
	Potassium	39.10	0.9	0.02			
	Sodium	22.99	8.3	0.36			
	Iron	55.85	6.67	0.12			
	Bicarbonate	61.02	84.1		1.38		
	Chloride	35.45	1.4		0.04		
	Sulfate	48.03	0.4		0.01		
			Total	**1.52**	**1.43**	**0.10**	**3.26**

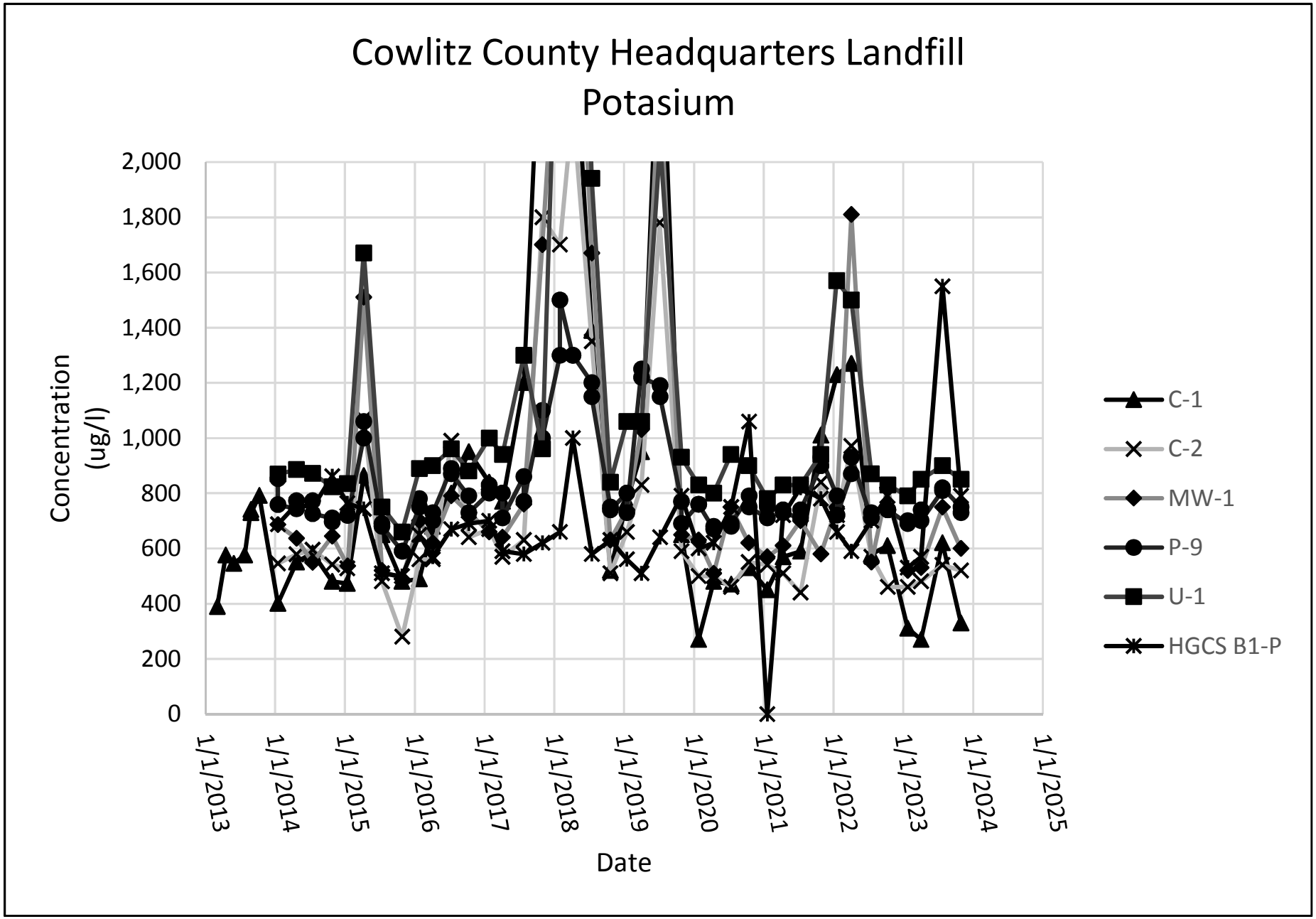
mg/L = milligrams per litre (parts per million)
meq/L = milliequivalents per litre

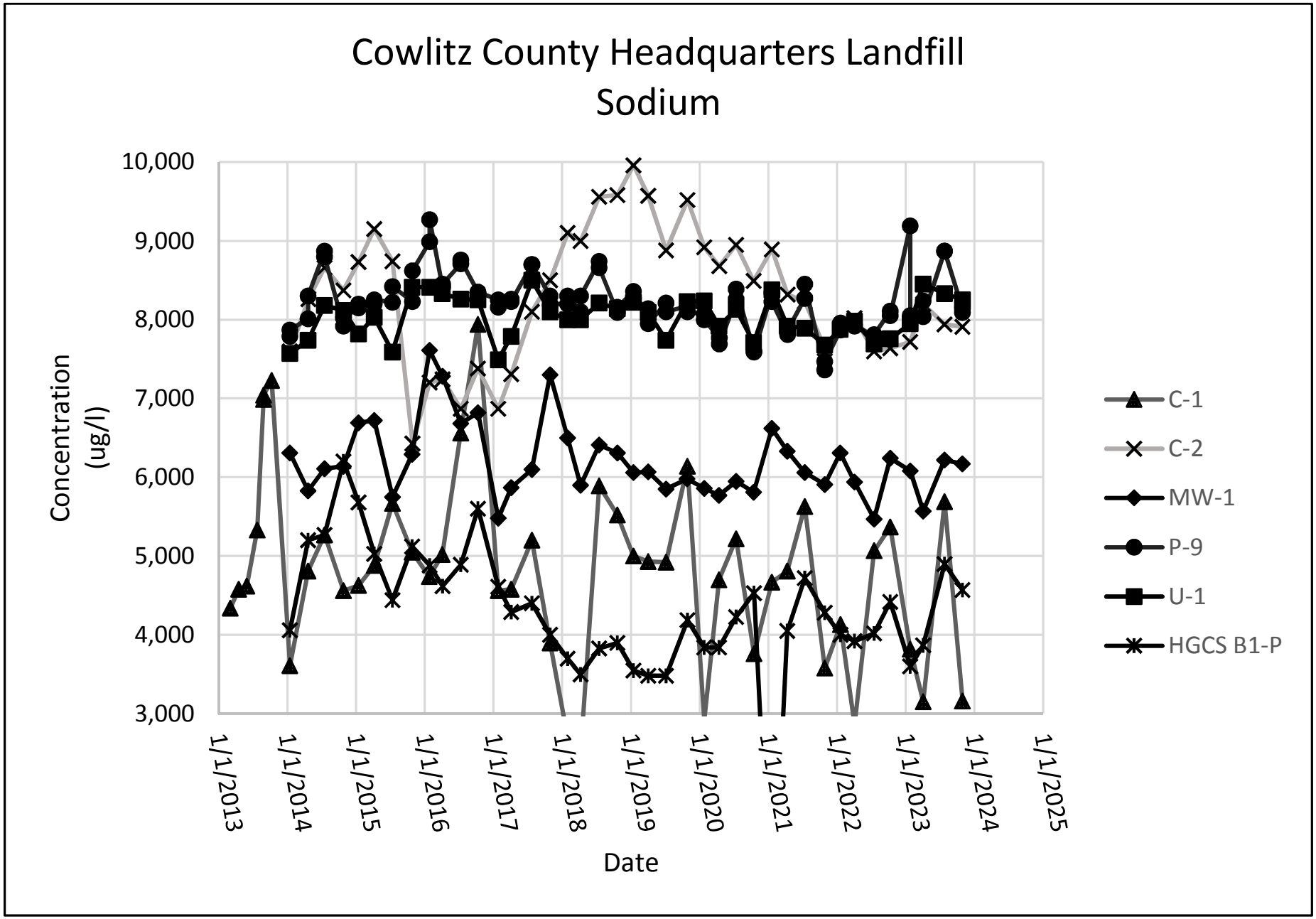

Cowlitz County Headquarters Landfill
Calcium
Concentration (ug/l)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1

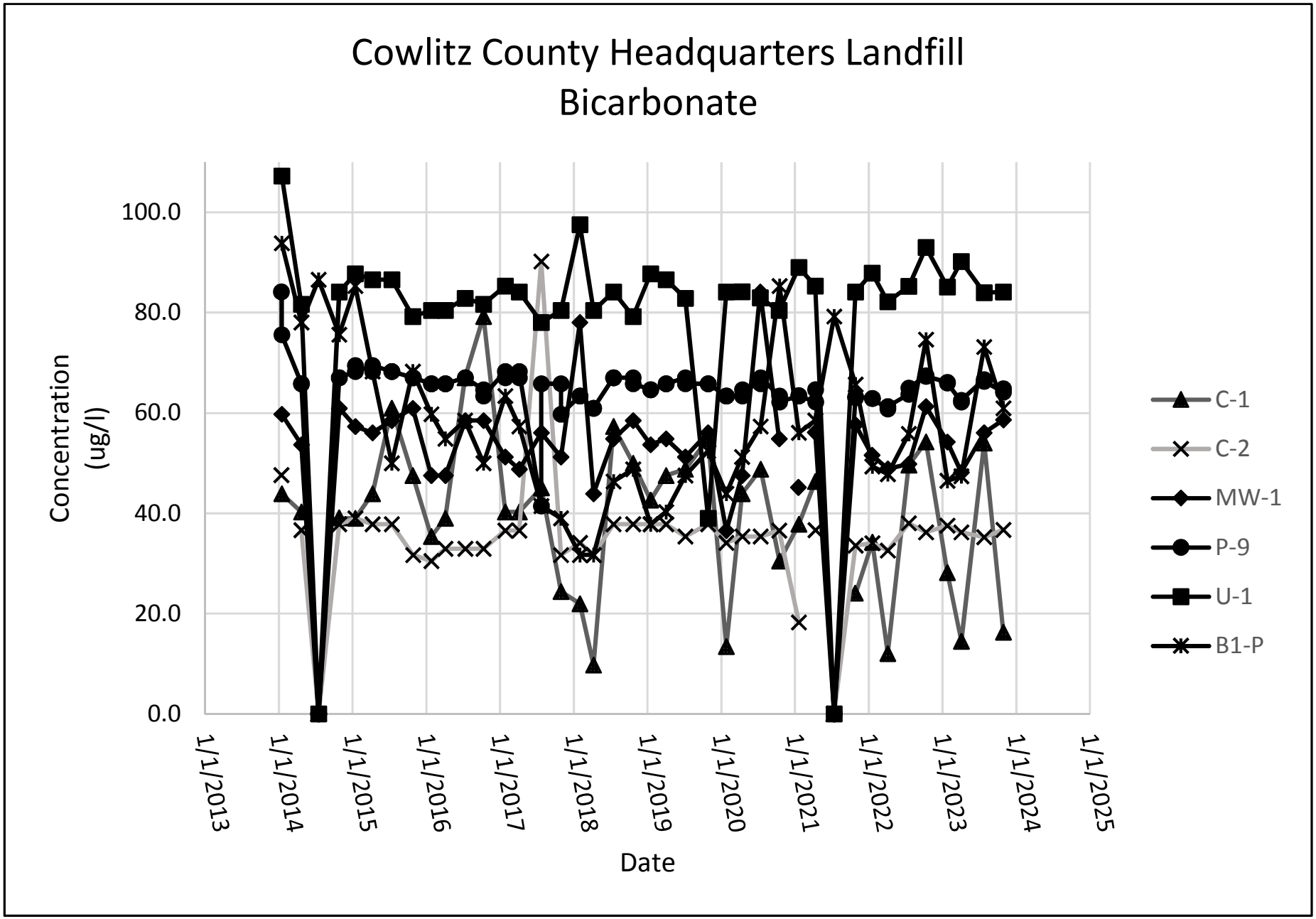

Cowlitz County Headquarters Landfill
Iron
Concentration (ug/l)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P

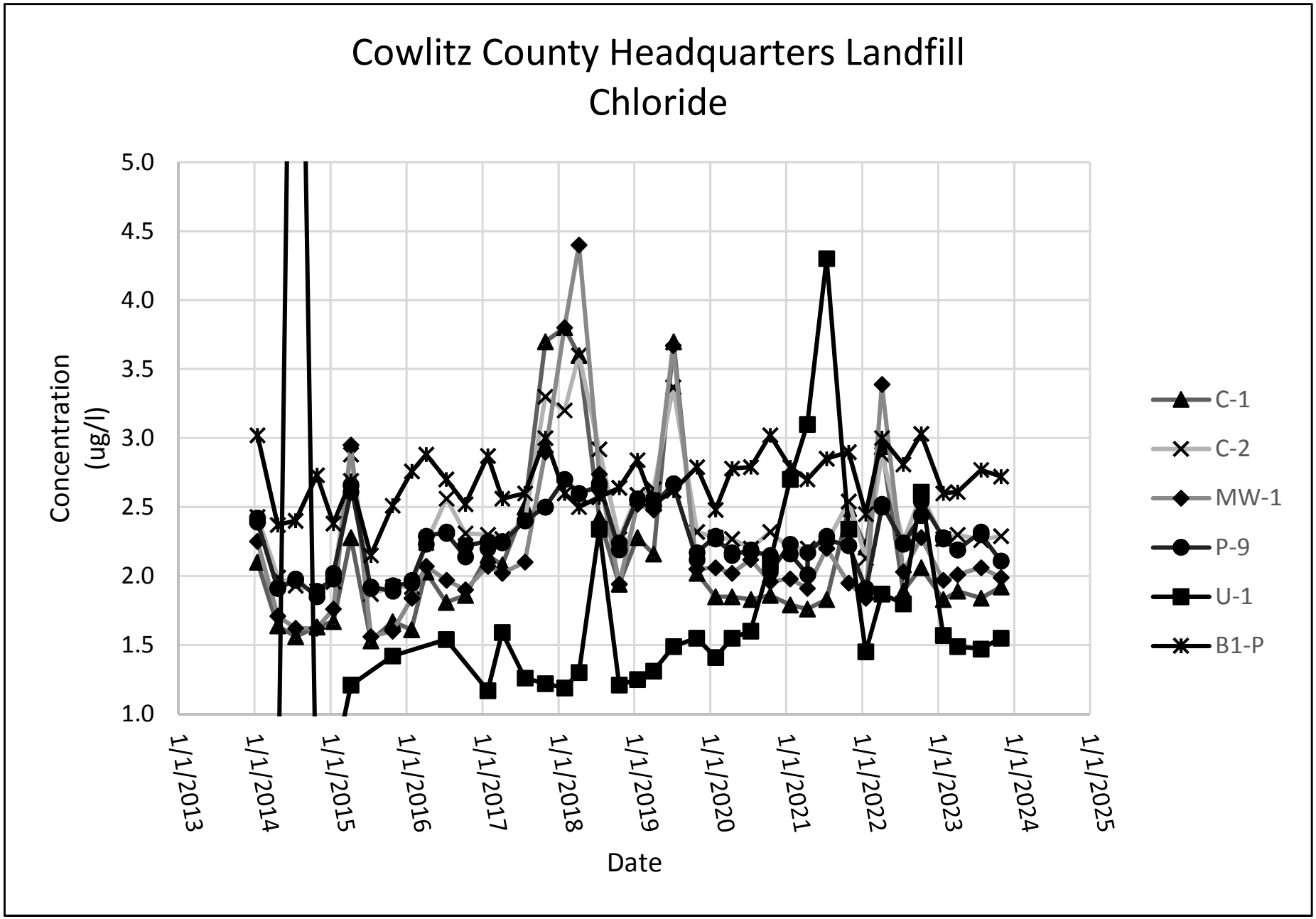

Cowlitz County Headquarters Landfill
Magnesium
Concentration (ug/l)
6,000
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P

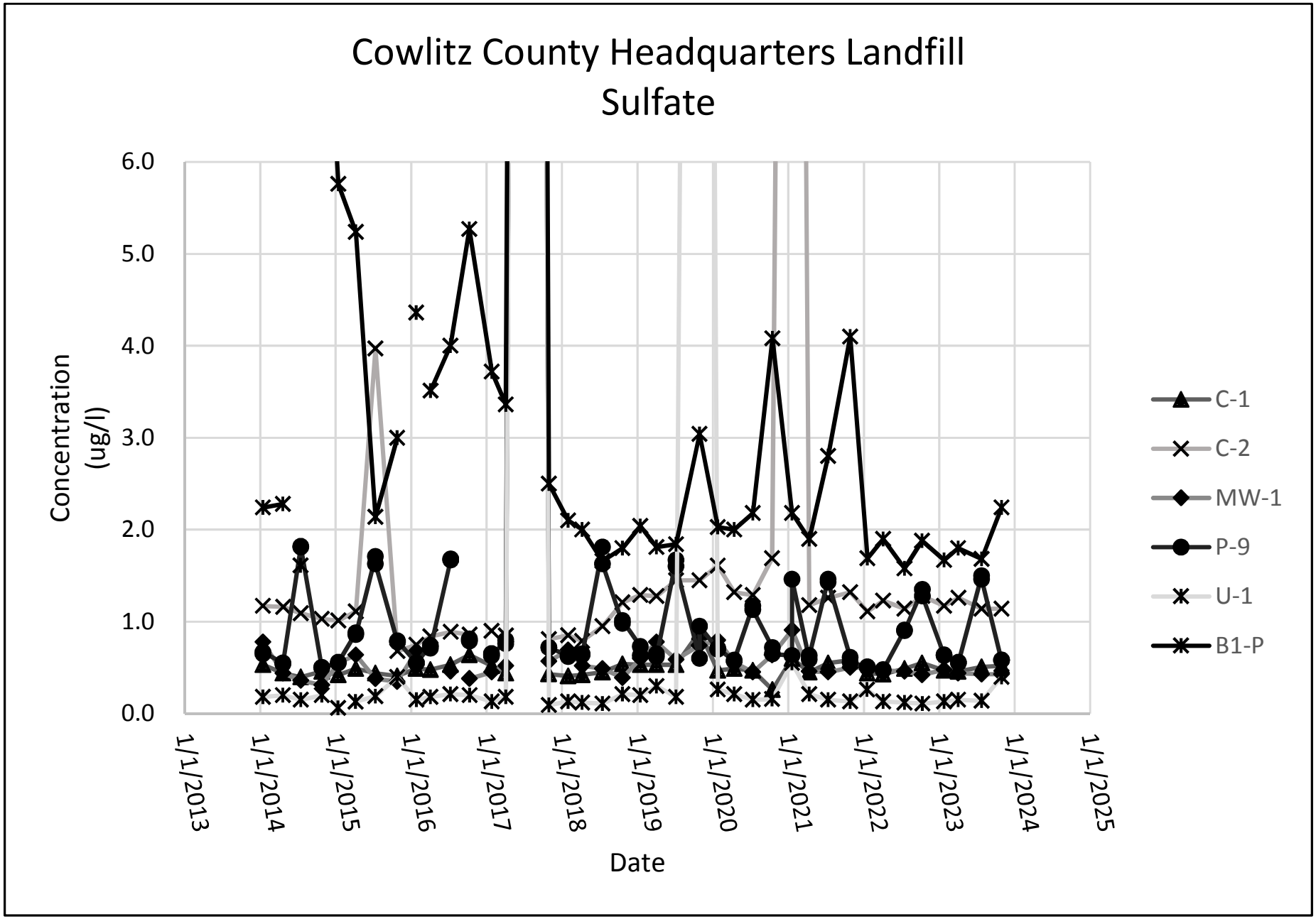

Cowlitz County Headquarters Landfill
Manganese
Concentration (ug/l)
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P

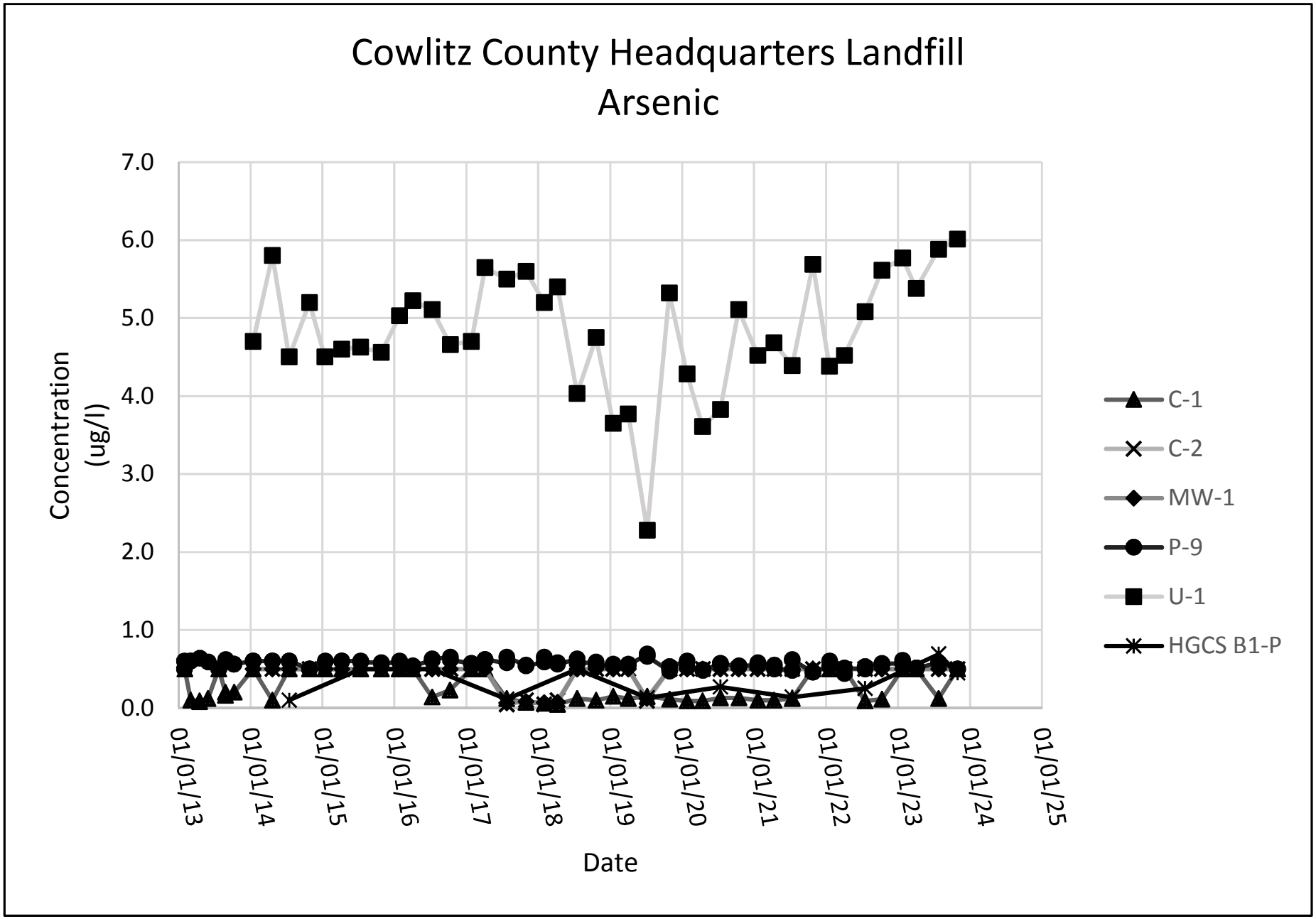

Cowlitz County Headquarters Landfill
Potasium
Concentration (ug/l)
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P

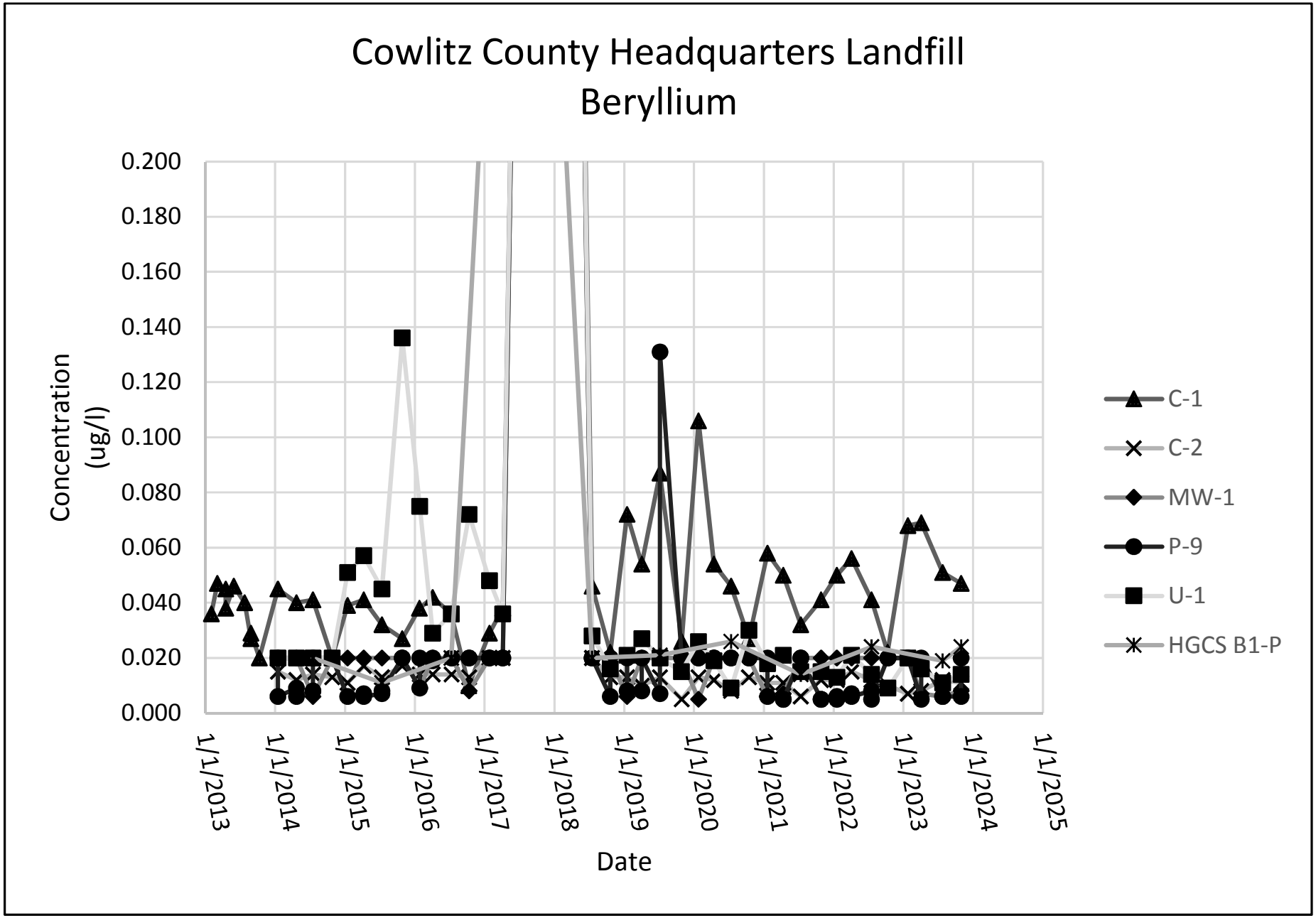

Cowlitz County Headquarters Landfill
Sodium
Concentration (ug/l)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P

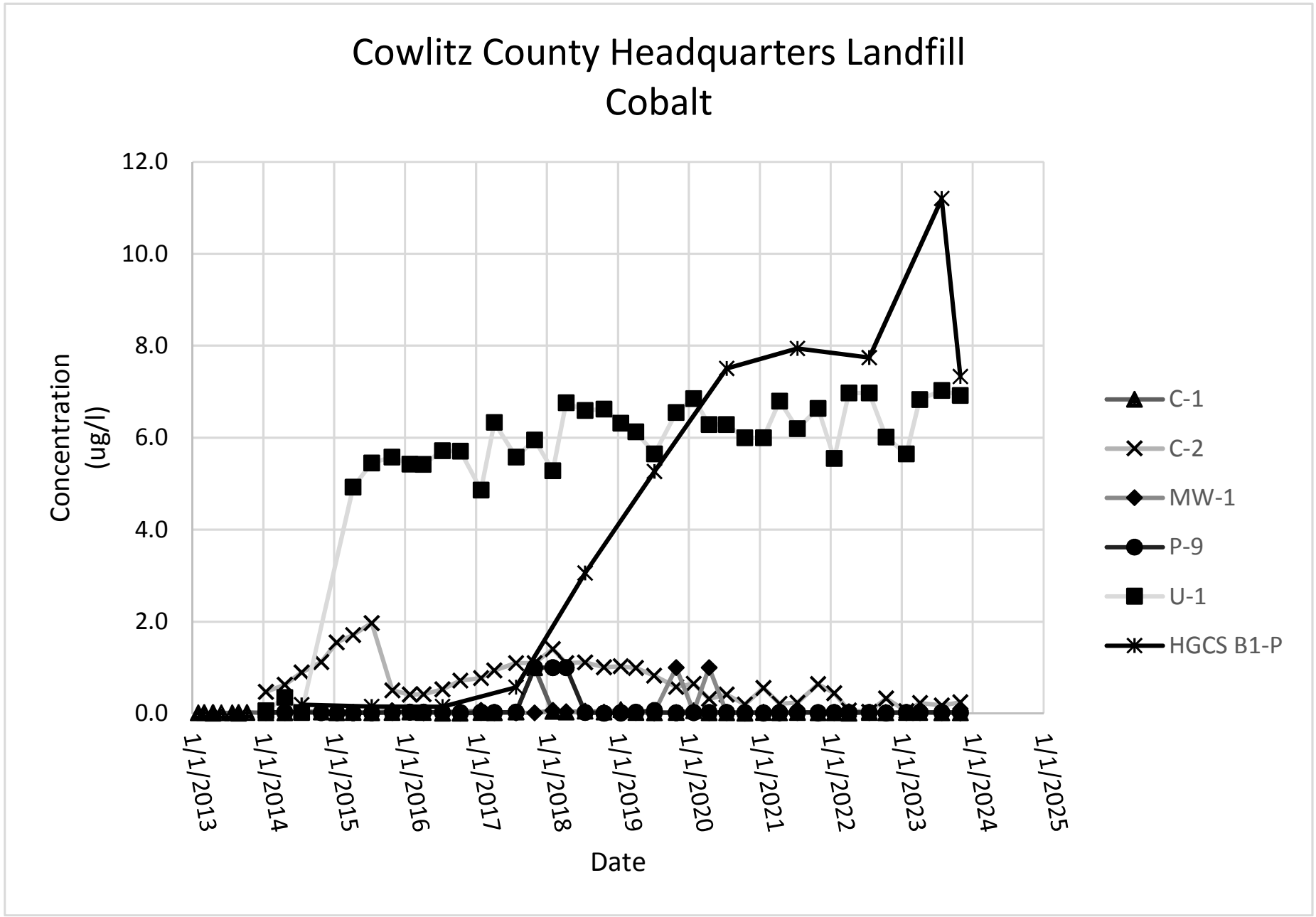

Cowlitz County Headquarters Landfill
Bicarbonate
Concentration (ug/l)
100.0
80.0
60.0
40.0
20.0
0.0
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
B1-P


Cowlitz County Headquarters Landfill
Chloride
Concentration (ug/l)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
B1-P

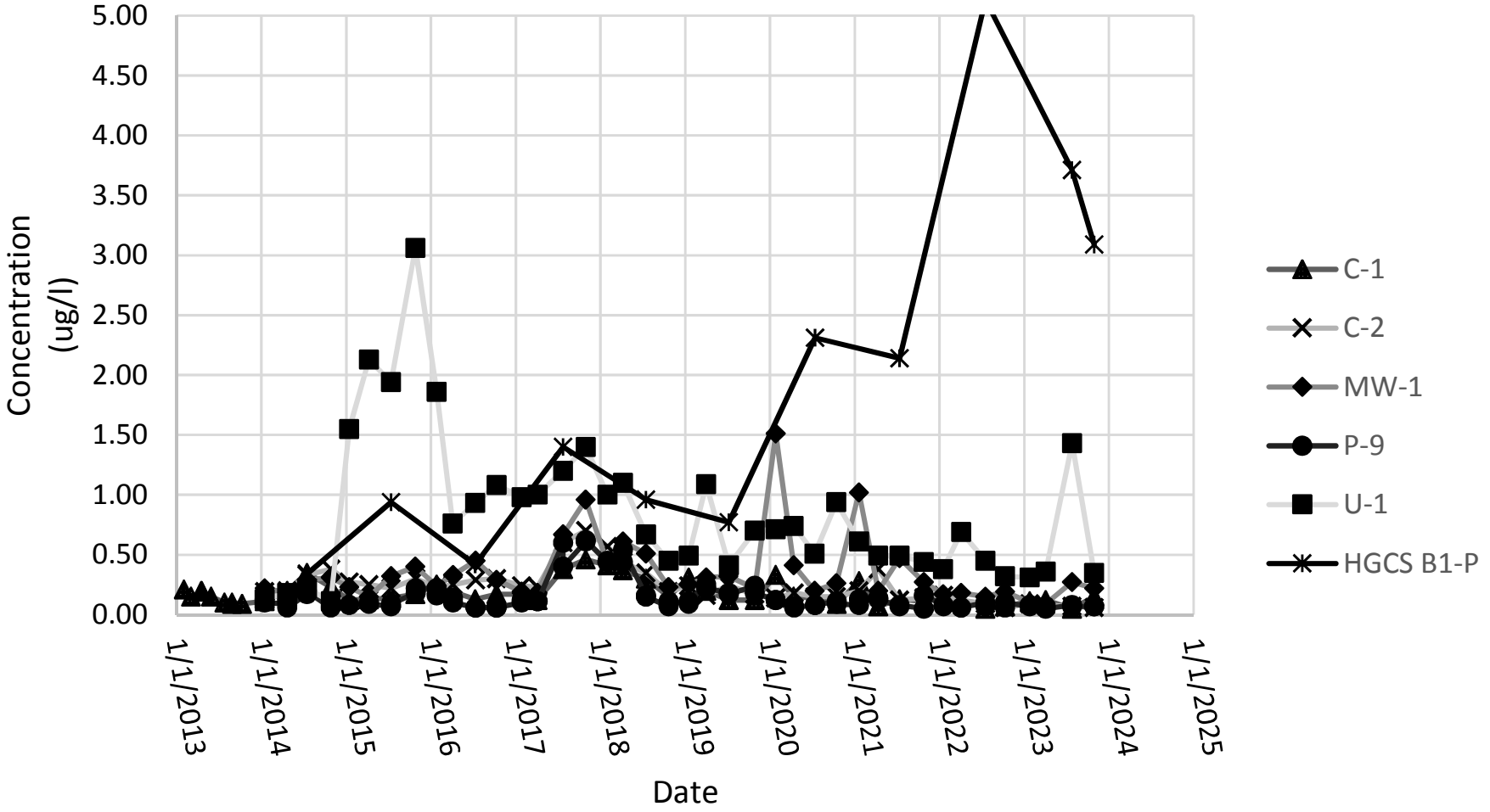

Cowlitz County Headquarters Landfill
Sulfate
Concentration (ug/l)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
B1-P

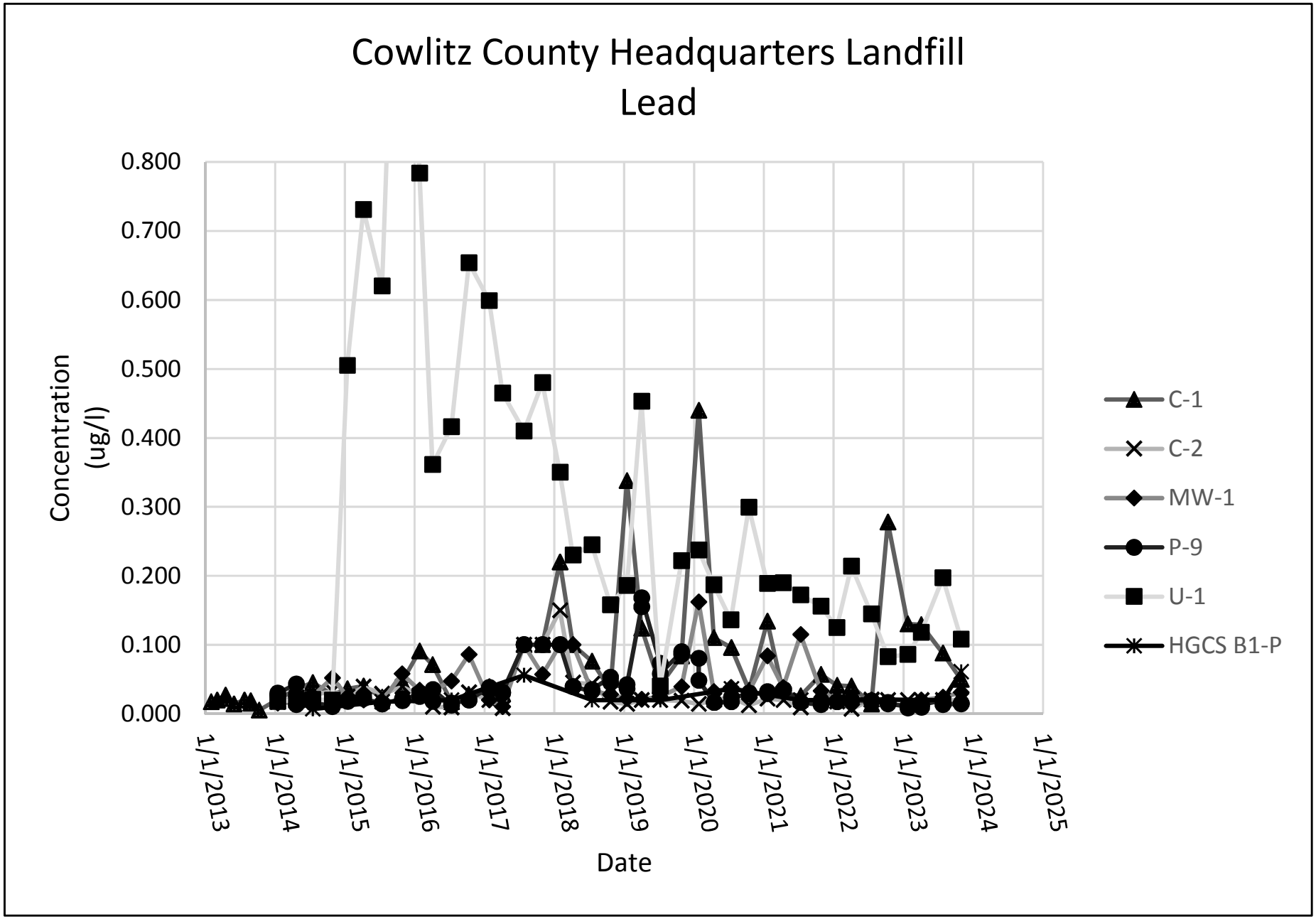

Cowlitz County Headquarters Landfill
Arsenic
Concentration (ug/l)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
01/01/13
01/01/14
01/01/15
01/01/16
01/01/17
01/01/18
01/01/19
01/01/20
01/01/21
01/01/22
01/01/23
01/01/24
01/01/25
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P

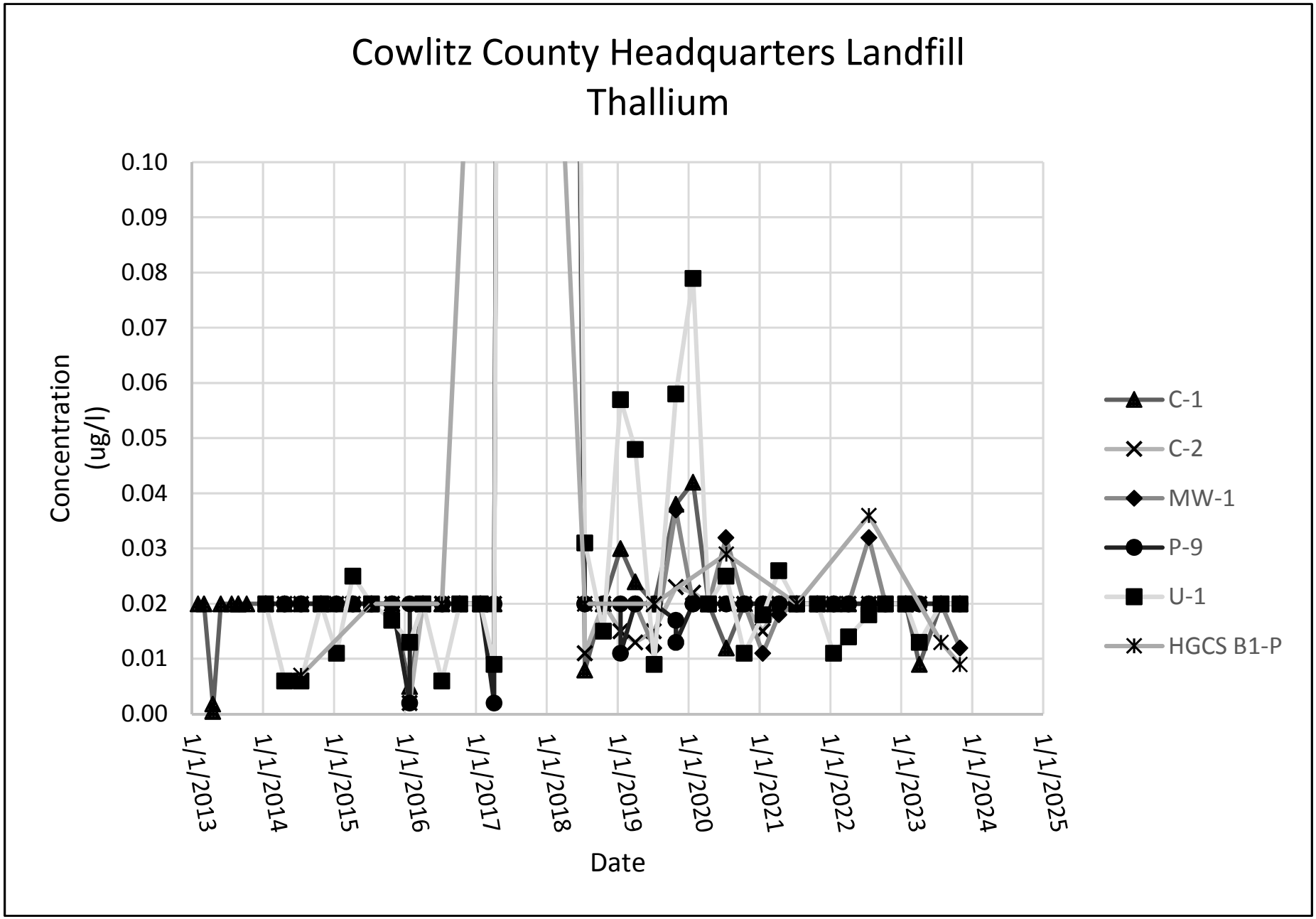

Cowlitz County Headquarters Landfill
Beryllium
Concentration (ug/l)
0.200
0.180
0.160
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P

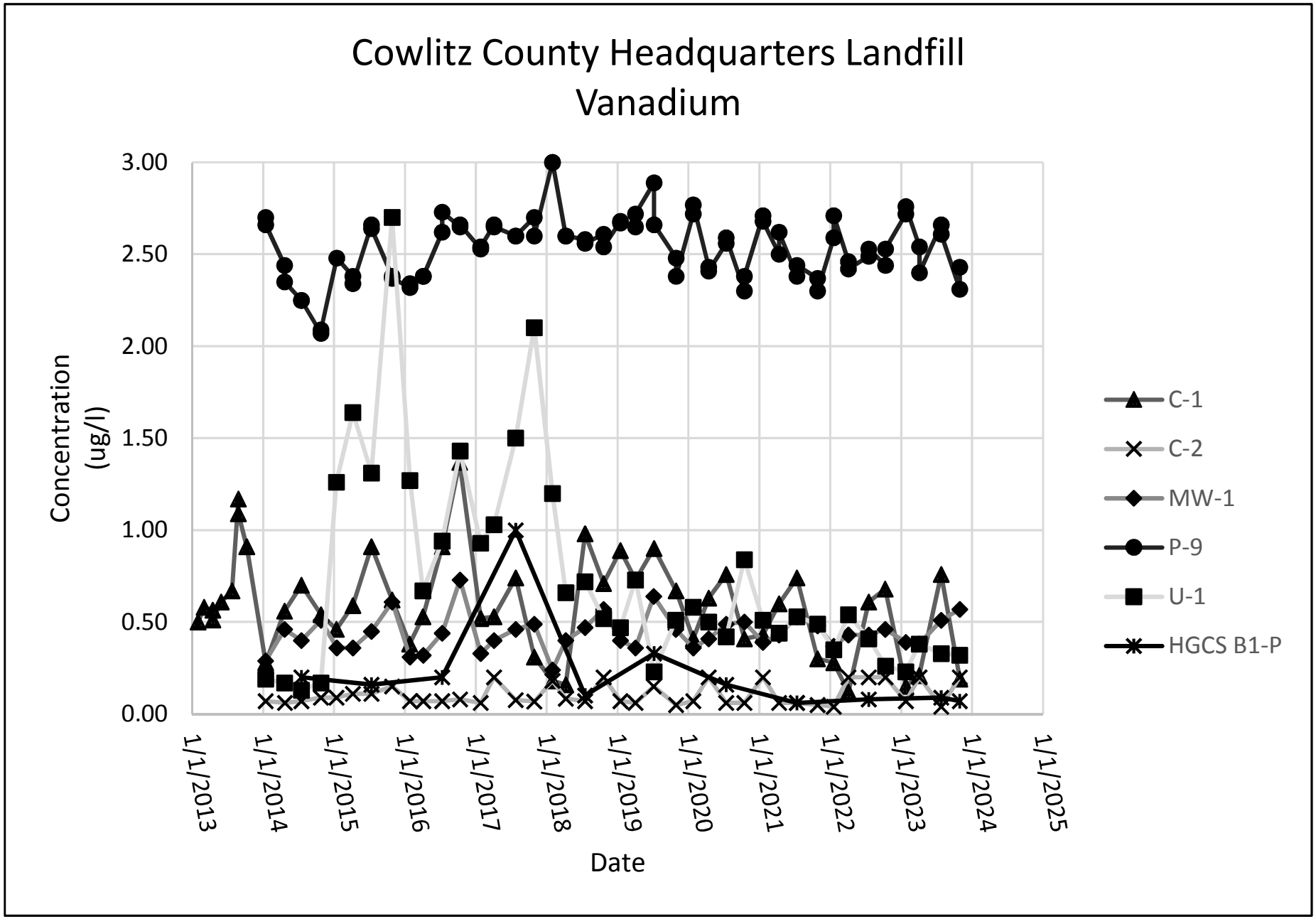

Cowlitz County Headquarters Landfill
Cobalt
Concentration (ug/l)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P

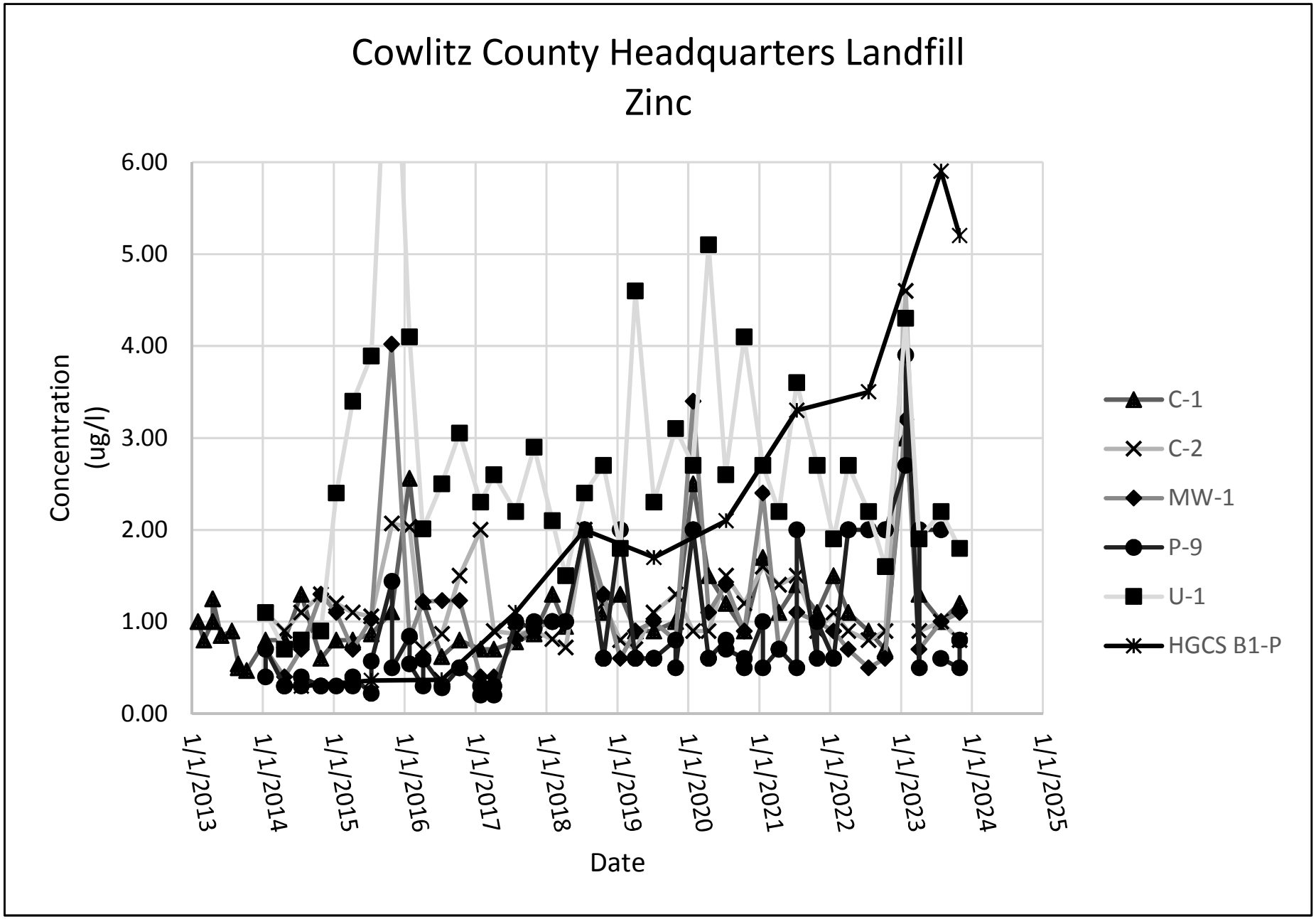
Cowlitz County Headquarters Landfill
Copper

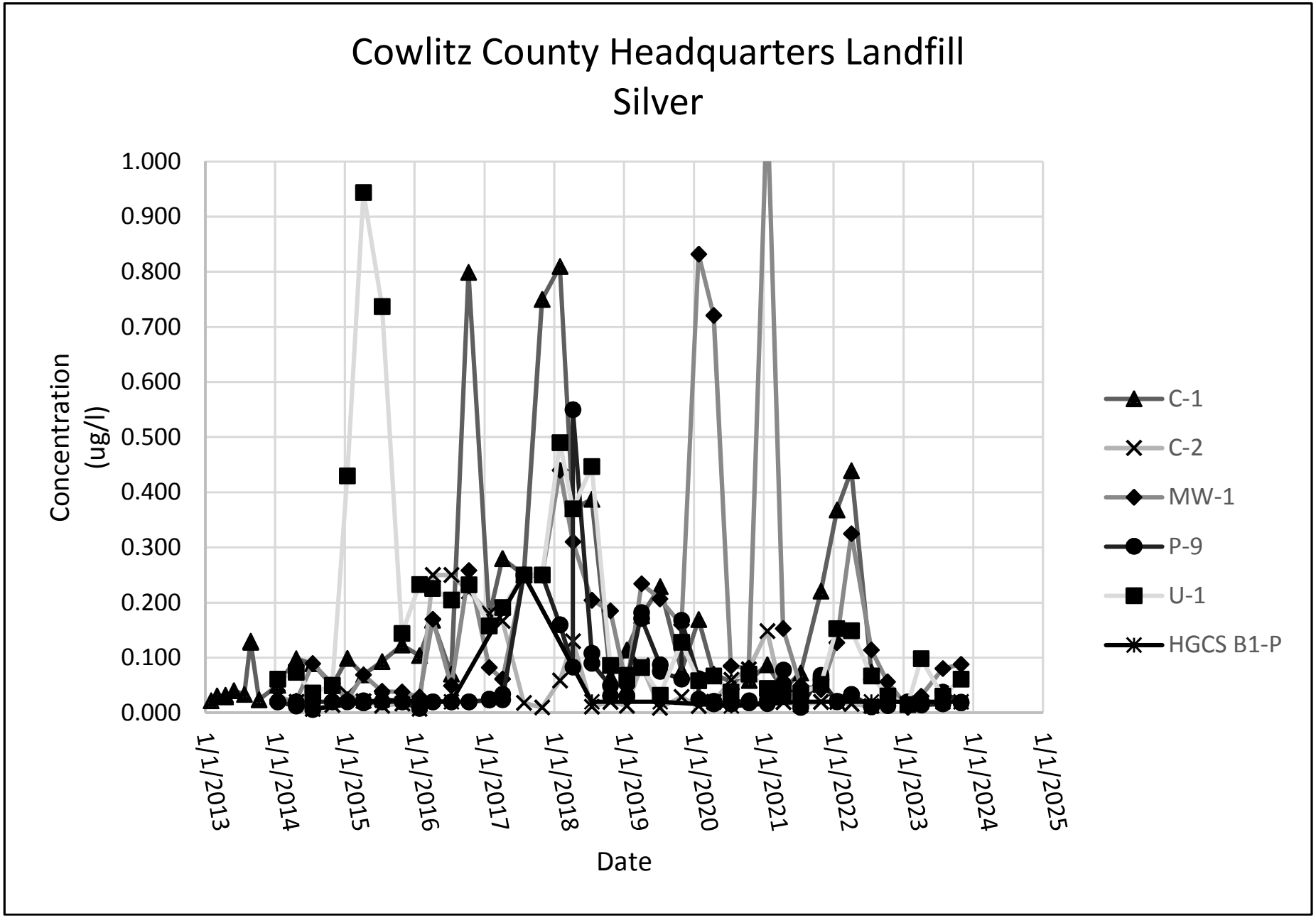



Cowlitz County Headquarters Landfill
Lead
Concentration (ug/l)
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P


Cowlitz County Headquarters Landfill
Thallium
Concentration (ug/l)
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P


Cowlitz County Headquarters Landfill
Vanadium
Concentration (ug/l)
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P


Cowlitz County Headquarters Landfill
Zinc
Concentration (ug/l)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P


Cowlitz County Headquarters Landfill
Silver
Concentration (ug/l)
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
1/1/2013
1/1/2014
1/1/2015
1/1/2016
1/1/2017
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
1/1/2023
1/1/2024
1/1/2025
Date
C-1
C-2
MW-1
P-9
U-1
HGCS B1-P

Cowlitz County Headquarters Landfill
Inorganic Groundwater Quality Data and Statistics

Location	Date	mg/L									Field Measurements					
		Bicarbonate	Alkalinity (as CaCO3)	Chloride	Ammonia	Nitrate	Sulfate	TOC	Total Suspended Solids	Total Dissolved Solids	pH	Specific Conduct.	Temp.	Turbidity	Dissolved Oxygen	Eh
		MCL>		250 (2ndary)		10.0	250 (2ndary)			500 (2ndary)		(umhos/cm)	(C)	(NTU)	(mg/l)	(mV)
C-1	01/14/15	39.0	32	1.7	0.05 U	0.41	0.4	0.26 T	5 U	54	5.5	67	8.7	NM	5.6	148
	04/09/15	43.9	36	2.3	0.125	0.52	0.5	0.13 T	5 U	49	5.4	75	9.6	1.2	6.5	176
	07/14/15	61.0	50	1.5	0.05 U	0.35	0.4	0.08 T	5 U	83	5.8	91	11.0	12.9	6.0	149
	10/27/15	47.5	39	1.7	0.05 B1	0.34	0.4	0.5 U	5 U	24	5.6	80	9.5	4.1	5.9	180
	01/26/16	35.4	29	1.6	0.05 B1	0.40	0.5	0.5 U	5 U	38	5.6	63	9.4	2.8	7.1	158
	04/04/16	39.0	32	2.0	0.05 B1	0.45	0.5	0.5 B1	5 U	43	5.8	75	9.4	NM	8.1	53
	07/11/16	67.1	55	1.8	0.05 B1	0.37	0.5	0.5 B1	5 U	84	6.3	107	10.9	NM	7.4	37
	10/10/16	79.2	65	1.9	0.05 B1	0.28	0.6	0.1 T	5 U	76	6.4	128	10.0	NM	6.4	33
	01/26/17	40.2	33	2.2	0.05 B1	0.48	0.5	0.4 T	5 U	118 J	6.1	71	9.5	NM	7.3	50
	04/05/17	40.2	33	2.1	0.05 B1	0.45	0.4	0.3 T	5 U	48	5.9	72	9.8	NM	8.1	55
	07/25/17	45.1	37	2.5 T	0.10 U	0.50	50 U	0.7	5 U	100 U	6.1	80	11.3	NM	4.4	56
	10/30/17	24.4	20	3.7 T	0.10 U	0.45 T	0.4 T	1.6	5 T	100 T	5.9	57	10.0	NM	6.5	53
	01/31/18	21.9	18	3.8 T	0.10 U	0.46 T	0.4 T	1.9	19	100	5.5	35	9.4	NM	7.5	75
	04/09/18	9.8	8	3.6 T	0.10 U	0.45 T	0.4 T	2.2	5 U	100 U	5.8	33	10.0	NM	8.2	56
	07/17/18	57.3	47	2.4	0.13	0.39	0.5	0.5 T	5 U	63	6.0	102	13.0	NM	5.8	13
	10/21/18	50.0	41	1.9	0.05 U	0.39	0.5	0.1 U	5 U	61	5.6	86	9.7	NM	6.0	32
	01/16/19	42.7	35	2.3	0.05 U	0.45	0.5	0.5 U	18	42	5.1	76	9.4	NM	6.5	63
	04/03/19	47.5	39	2.2	0.05 U	0.39	0.5	0.3 T	9	61	5.8	81	10.2	NM	6.8	23
	07/08/19	48.8	40	3.7	0.05 B1	0.41	0.5	0.6	5 U	81	6.1	89	10.3	NM	6.7	16
	10/29/19	54.9	45	2.0	0.05 U	0.37	0.9 J	0.5 U	5 U	60	5.7	87	9.3	NM	5.5	37
	01/26/20	13.4 T	11 T	1.9	0.05 U	0.43	0.5	0.5 U	28	51	4.6	30	9.7	NM	NM	92
	04/14/20	43.9	36	1.9	0.03 T	0.39	0.5	0.5 U	6	63	6.5	76	10.3	NM	6.2	48
	07/14/20	48.8	40	1.8	0.43	0.35	0.5	0.5 U	6	60	5.6	83	10.5	NM	6.5	42
	10/16/20	30.5	25	1.9	0.04 T	0.41	0.3 T	0.5 U	5 U	43	5.2	56	10.5	NM	6.4	60
	01/20/21	37.8	31	1.8	0.05 B1	0.38	0.6 J	0.1 T	9	74 J	5.2	67	9.6	NM	7.8	63
	04/12/21	46.3	38	1.8	0.03 B1	0.40	0.5	0.5 U	5 U	65	5.3	73	10.3	NM	6.8	55
	07/13/21			1.8	0.05 B1	0.36	0.6	0.5 U	5 U	64	5.9	88	12.3	NM	6.4	48
	10/27/21	24.0	20	2.5	0.66	0.42	0.6	0.2 T	5 U	49	5.6	51	10.1	NM	6.6	54
	01/19/22	34.3	28	2.2 J	0.01 T	0.31 J	0.4 J	0.2 T	5 U	36 J	5.8	60	9.8	NM	6.7	48
	04/05/22	12.1	9.9	2.9	0.05 B1	0.43	0.4	0.1 T	5 U	24	5.8	60	9.8	NM	6.7	48
	07/18/22	49.6	41	1.9	0.05 B1	0.34	0.5	0.2 T	5 U	54	6.0	84	11.3	NM	5.2	33
	10/11/22	54.3	45	2.1	0.05 B1	0.36	0.6	0.1 T	5 U	66	6.2	88	10.7	NM	5.9	21
	01/25/23	28.2	23	1.8	0.05 U	0.32	0.5	0.5 U	15	45	5.4	47	9.6	NM	6.5	67
	04/04/23	14.5	12	1.9	0.05 U	0.40	0.5	0.5 U	7	28	5.1	33	9.2	NM	6.1	83
	07/26/23	54.0	44	1.8	0.05 B1	0.30	0.5	0.5 U	5 U	73	6.1	88	11.5	NM	6.1	31
	10/30/23	16.3	13	1.9	0.05 B1	0.41	0.5	0.1 T	6	26	5.2	37	9.8	1.2	6.5	78
	count	44	44	45	45	46	45	45	45	45						
	max	82.1	67.3	3.8	0.660	0.59	50.0	2.2 U	28 U	118						
	min			1.5	0.010 T	0.28	0.3	0.1 T	5 U	24						
	non-detects				33		1	21	34	2						
	average	40.3	33.0	2.1	0.1	0.4	1.6	0.5	6.5	61.9						
	sample stdev	17	14	1	0	0	7	0	5	24						
	variance	288.5	194.1	0.3	0.0	0.0	54.5	0.2	20.3	578.1						
	coeff. of variation	2.4	2.4	3.6	0.7	6.7	0.2	1.1	1	2.6						
	standard error	2.6	2.1	0.1	0.0	0.0	1.1	0.1	1	3.6						

Cowlitz County Headquarters Landfill
Inorganic Groundwater Quality Data and Statistics

Location	Date	mg/L									Field Measurements					
		Bicarbonate	Alkalinity (as CaCO3)	Chloride	Ammonia	Nitrate	Sulfate	TOC	Total Suspended Solids	Total Dissolved Solids	pH	Specific Conduct.	Temp.	Turbidity	Dissolved Oxygen	Eh
		MCL>		250 (2ndary)		10.0	250 (2ndary)			500 (2ndary)		(umhos/cm)	(C)	(NTU)	(mg/l)	(mV)
C-2	01/14/15	39.0	32.0	2.0	0.05 B1	0.1 U	1.0	0.15 T	5 U	61	5.3	65	8.7	NM	0.0	160
	04/09/15	37.8	31.0	2.9	0.05 B1	0.1 U	1.1	0.27 T	5 U	44	5.2	65	16.6	0.7	0.1	116
	07/14/15	37.8	31.0	1.9	0.019 T	0.1 U	4.0	0.10 T	5 U	63	4.8	64	18.7	1.5	0.3	131
	10/28/15	31.7	26.0	1.9	0.050 B1	0.02 T	0.7	0.5 U	5 U	29	4.9	56	11.1	1.9	0.8	196
	01/27/16	30.5	25.0	1.9	0.05 B1	0.1 U	0.8	0.5 U	5 U	29	5.1	56	11.6	0.8	3.3	162
	04/05/16	32.9	27.0	2.2	0.05 B1	0.1 U	0.8	0.5 B1	5 U	42	5.6	61	14.2	NM	3.2	74
	07/12/16	32.9	27.0	2.6	0.05 B1	0.1 U	0.9	0.5 B1	5 U	47	5.7	60	14.9	NM	2.2	72
	10/11/16	32.9	27.0	2.3	0.05 B1	0.1 U	0.9	0.2 T	5 U	5	5.6	61	12.1	NM	0.3	74
	01/26/17	36.6	30.0	2.3	0.05 B1	0.1 U	0.9	0.2 T	5 U	58	5.7	62	9.5	NM	0.4	70
	04/05/17	36.6	30.0	2.3	0.05 B1	0.1 U	0.9	0.2 T	5 U	54	6.6	62	9.7	NM	0.1	74
	07/25/17	90.2	74.0	2.4 T	0.10 U	0.03 T	50 U	0.3	5 U	100	5.7	63	21.1	NM	0.7	75
	10/30/17	31.7	26.0	3.3 T	0.10 U	0.03 T	0.8 T	1.1 B	5 U	100	5.9	66	12.5	NM	0.6	64
	01/31/18	34.1	28.0	3.2 T	0.10 U	0.50 U	0.9 T	1.1	5 T	100	5.9	68	9.4	NM		56
	04/09/18	31.7	26.0	3.6 T	0.10 U	0.50 U	0.8 T	1.6	5 U	100	6.2	71	13.9	NM	0.4	40
	07/17/18	37.8	31.0	2.9	0.05 B1	0.10 U	1.0	0.7	5 U	51	5.5	69	22.8	NM	0.6	44
	10/21/18	37.8	31.0	2.3	0.05 U	0.10 U	1.2	0.7 J	5 U	50	5.2	67	14.6	NM	0.2	57
	01/16/19	37.8	31.0	2.6	0.01 T	0.10 U	1.3	0.5 U	5 U	37	5.0	68	9.9	NM	0.2	69
	04/03/19	37.8	31.0	2.6	0.05 U	0.10 U	1.3	0.2 T	5 U	54	5.5	66	12.2	NM	0.3	47
	07/07/19	35.4	29.0	3.4	0.05 B1	0.10 U	1.5	0.2 T	5 U	66	5.5	70	15.5	NM	0.5	48
	10/29/19	37.8	31.0	2.3	0.02 T	0.10 U	1.5 J	0.5 U	5 U	54	5.4	64	12.1	NM	0.4	52
	01/26/20	34.1	28.0	2.3	0.05 U	0.10 U	1.6	0.5 U	5 U	63	5.0	63	10.4	NM	NM	70
	04/15/20	35.4	29.0	2.3	0.02 T	0.10 U	1.3	0.5 U	5 U	51	5.2	59	12.4	NM	0.4	63
	07/14/20	35.4	29.0	2.2	0.05 U	0.10 U	1.3	0.5 U	5 U	45	5.0	65	18.8	NM	0.7	74
	10/15/20	36.6	30.0	2.3	0.05 U	0.10 U	1.7	0.5 U	5 U	56	5.1	64	11.9	NM	0.8	65
	01/19/21	18.3 B1	15.0 B1	2.2	0.05 B1	0.05 U	27.6 J	0.2 T	5 U	75	5.1	63	8.6	NM	0.5	65
	04/13/21	36.6	30.0	2.2	0.03 B1	0.10 U	1.2	0.1 T	5 U	69	5.2	59	14.8	NM	0.9	65
	07/13/21			2.2	0.05 B1	0.10 U	1.3	0.5 U	5 U	47	5.0	66	19.8	NM	1.0	79
	10/27/21	33.5	27.5	2.5	0.06	0.10 U	1.3	0.2 T	5 U	59	5.6	66	11.7	NM	0.7	59
	01/19/22	34.0	27.9	2.1 J	0.02 T	0.10 U	1.1 J	0.3 T	5 U	48	5.6	66	10.6	NM	0.7	54
	04/05/22	32.6	26.7	2.9	0.05 B1	0.10 U	1.2	0.1 T	5 UJ	45	5.6	66	10.6	NM	0.7	54
	07/18/22	38.0	31.2	2.3	0.07	0.10 U	1.1	0.2 T	5 U	47	5.7	69	15.9	NM	1.0	53
	10/12/22	36.2	29.7	2.6	0.05 U	0.10 U	1.3	0.1 T	5 U	52	5.6	64	14.7	NM	1.0	55
	01/25/23	37.6	30.8	2.3	0.05 U	0.10 U	1.2	0.5 U	5 U	51	5.6	67	9.9	NM	0.7	56
	04/05/23	36.2	29.7	2.3	0.05 U	0.10 U	1.3	0.5 U	5 U	45	5.3	64	10.3	NM	0.4	73
	07/26/23	35.2	28.9	2.3	0.05 B1	0.10 U	1.1	0.5 U	5 U	55	5.4	63	18.1	NM	1.1	67
	10/30/23	36.7	30.1	2.3	0.05 B1	0.10 U	1.1	0.1 T	5 U	46	5.6	63	11.5	0.1	0.8	56
	count	43	43	44	44	47	44	44	44	44						
	max	90.2	74.0	3.6	0.100 J	0.5 U	50.0	1.6 U	5 U	100						
	min			1.8	0.009 T	0.02 T	0.7	0.1 T	5 U	5						
	non-detects	1	1		32	41	1	16	43							
	average	35.9	29.4	2.4	0.1	0.1	2.9	0.4	5.0	55.2						
	sample stdev	10.9	8.9	0.4	0.0	0.1	8.3	0.3		18.4						
	variance	119.0	80.0	0.2	0.0	0.0	68.9	0.1		338.5						
	coeff. of variation	3.3	3.3	5.7	2.3	1.2	0.3	1.3	#DIV/0!	3.0						
	standard error	1.7	1.4	0.1	0.0	0.0	1.3	0.0		2.8						

Cowlitz County Headquarters Landfill
Inorganic Groundwater Quality Data and Statistics

Location	Date	mg/L									Field Measurements					
		Bicarbonate	Alkalinity (as CaCO3)	Chloride	Ammonia	Nitrate	Sulfate	TOC	Total Suspended Solids	Total Dissolved Solids	pH	Specific Conduct.	Temp.	Turbidity	Dissolved Oxygen	Eh
		MCL>		250 (2ndary)		10.0	250 (2ndary)			500 (2ndary)		(umhos/cm)	(C)	(NTU)	(mg/l)	(mV)
MW-1	01/15/15	57.3	47	1.8	0.05 U	0.54	0.6	0.12 T	5 U	82	5.7	91	6.9	NM	6.9	167
	04/09/15	56.1	46	3.0	0.05 U	0.67	0.6	0.11 T	5 U	76	6.0	84	7.4	0.9	5.3	151
	07/14/15	58.5	48	1.6	0.015 T	0.30	0.4	0.09 T	5 U	96	6.2	92	10.9	1.3	5.7	120
	10/27/15	61.0	50	1.6	0.05 B1	0.14	0.4	0.11 T	5 U	57	6.2	99	9.6	2.5	6.2	150
	01/27/16	47.5	39	1.8	0.05 B1	0.77	0.7	0.15 T	5 U	54	5.8	87	9.6	1.9	8.0	150
	04/05/16	47.5	39	2.1	0.05 B1	0.93	0.7	0.50 B1	5 U	65	6.2	91	9.0	NM	6.5	43
	07/12/16	58.5	48	2.0	0.05 B1	0.32	0.5	0.50 B1	5 U	93	6.4	98	11.4	NM	6.9	31
	10/11/16	58.5	48	1.9	0.05 B1	0.27	0.4	0.11 T	7	78	6.4	96	8.6	NM	6.4	30
	01/26/17	51.2	42	2.1	0.05 U	0.83	0.5	0.09 T	5 U	63 J	6.2	78	6.6	NM	6.8	38
	04/05/17	48.8	40	2.0	0.05 B1	0.79	0.5	0.23 T	5 U	70	6.3	87	8.8	NM	7.3	36
	07/25/17	56.1	46	2.1 T	0.10 U	1.00	50 U	0.15 T	5 U	100 U	6.4	94	12.2	NM	7.9	30
	10/30/17	51.2	42	2.9 T	0.10 U	0.61	0.6 T	0.77 B	5 U	100 T	6.5	96	8.9	NM	5.6	26
	01/31/18	78.0	64	3.8 T	0.10 U	1.20	0.7 T	1.80	5 U	110	6.2	84	8.3	NM	5.9	37
	04/09/18	43.9	36	4.4 T	0.10 U	1.10	0.5 T	2.50	5 U	100 U	6.8	104	8.9	NM	6.2	4
	07/17/18	54.9	45	2.7	0.05 U	0.66	0.5	0.72	5 U	75	6.3	103	12.3	NM	5.6	-3
	10/21/18	58.5	48	1.9	0.05 U	0.35	0.4	0.07 U	5 U	93	6.0	92	9.1	NM	5.3	12
	01/16/19	53.6	44	2.5	0.05 U	0.84	0.6	0.50 U	5 U	59	5.5	96	8.2	NM	5.5	41
	04/03/19	54.9	45	2.5	0.05 B1	0.85	0.8	0.54	5 U	84	6.1	97	9.6	NM	5.6	13
	07/07/19	51.2	42	3.7	0.05 B1	0.91	0.6	0.23 T	5 U	106	6.2	97	11.1	NM	5.8	9
	10/28/19	56.1	46	2.1	0.05 U	0.70	0.7 J	0.50 U	5 U	90	5.9	95	9.2	NM	5.7	27
	01/26/20	36.6	30	2.1	0.05 B1	1.30	0.8	0.50 U	5 U	78	5.5	65	8.9	NM	NM	46
	04/14/20	47.5	39	2.0	0.02 T	0.94	0.6	0.50 U	5 U	80	5.8	91	10.8	NM	5.1	28
	07/13/20	84.1	69	2.1	0.05 B1	0.78	0.5	0.50 U	5 U	83	5.6	94	12.3	NM	6.1	23
	10/15/20	54.9	45	2.0	0.05 U	0.70	0.6	0.50 U	5 U	90	6.0	92	10.1	NM	NM	19
	01/19/21	45.1	37	2.0	15.60	0.99	0.9 J	0.15 T	5 U	90 J	6.0	85	8.4	NM	NM	20
	04/12/21	56.1	46	1.9	0.02 B1	0.61	0.5	0.50 U	5 U	98	6.1	95	10.5	NM	5.6	13
	07/13/21			2.2	0.05 B1	0.66	0.5	0.50 U	5 U	85	5.9	92	12.0	NM	5.9	27
	10/27/21	57.7	47.3	2.0	0.66	0.55	0.5	0.50 U	5 U	93	6.4	99	9.7	NM	5.6	11
	01/18/22	51.6	42.3	1.8 J	0.03 T	0.75 J	0.5 J	0.12 T	5 U	66 J	6.4	93	9.0	NM	5.8	14
	04/05/22	48.9	40.1	3.4	0.05 B1	1.00	0.5	0.22 T	5 U	89	6.4	93	9.0	NM	5.8	14
	07/18/22	49.9	40.9	2.0	0.05 B1	1.00	0.5	0.18 T	5 U	71	6.6	92	11.4	NM	4.8	5
	10/11/22	61.3	50.3	2.3	0.05 U	0.47	0.4	0.08 T	5 U	90	6.8	100	10.6	NM	5.5	-13
	01/25/23	54.3	44.5	2.0	0.05 B1	0.92	0.5	0.50 U	5 U	77	6.3	93	7.8	NM	5.5	19
	04/04/23	48.2	39.5	2.0	0.05 B1	1.48	0.4	0.50 U	5 U	73	6.1	88	8.9	NM	5.3	30
	07/26/23	56.1	46	2.1	0.05 B1	0.91	0.4	0.32 T	5 U	88	6.7	92	12.0	NM	4.7	-4
	10/30/23	58.6	48.1	2.0	0.05 B1	0.74	0.4	0.50 U	5 U	87	6.2	93	8.5	1.1	6.0	25
	count	43	43	44	44	47	44	44	44	44						
	max	84.1	69.0	4.4	15.600	1.48	50.0	2.5	7 U	110						
	min			1.6	0.014 T	0.12	0.3	0.1 T	5 U	10						
	non-detects				34		1	17	43	3						
	average	53.5	43.9	2.2	0.4	0.7	1.6	0.4	5.0	80.1						
	sample stdev	11.8	9.7	0.6	2.3	0.3	7.5	0.4	0.3	17.1						
	variance	138.7	93.3	0.4	5.5	0.1	55.7	0.2	0.1	294.1						
	coeff. of variation	4.5	4.5	3.6	0.18	2.1	0.2	1.0	17	4.7						
	standard error	1.8	1.5	0.1	0.4	0.0	1.1	0.1	0	2.6						

Cowlitz County Headquarters Landfill
Inorganic Groundwater Quality Data and Statistics

Location	Date	mg/L									Field Measurements					
		Bicarbonate	Alkalinity (as CaCO3)	Chloride	Ammonia	Nitrate	Sulfate	TOC	Total Suspended Solids	Total Dissolved Solids	pH	Specific Conduct.	Temp.	Turbidity	Dissolved Oxygen	Eh
		MCL>		250 (2ndary)		10.0	250 (2ndary)			500 (2ndary)		(umhos/cm)	(C)	(NTU)	(mg/l)	(mV)
P-9	07/08/19	67.1	55	2.7	0.05 B1	0.14	1.7	0.5 U	5 U	141	6.3	113	10.4	NM	6.0	4
	07/08/19	65.8	54	2.7	0.05 B1	0.13	1.6	0.5 U	5 U	135						
	10/29/19	65.8	54	2.1	0.05 U	0.04 T	0.6 J	0.5 U	5 U	104	5.9	102	9.7	NM	6.2	23
	10/29/19	65.8	54	2.2	0.05 U	0.04 T	1.0 J	0.5 U	5 U	105						
	01/26/20	63.4	52	2.3	0.05 U	0.05 T	0.7	0.5 U	5 U	130	5.7	103	9.6	NM	NM	36
	01/26/20	63.4	52	2.3	0.05 U	0.07 T	0.7	0.5 U	5 U	121						
	04/15/20	63.4	52	2.2	0.03 T	0.04 T	0.6	0.5 U	5 U	111	5.8	100	9.9	NM	6.2	28
	04/15/20	64.6	53	2.2	0.02 T	0.04 T	0.6	0.5 U	5 U	111						
	07/14/20	65.8	54	2.2	0.05 B1	0.10 T	1.2	0.5 U	5 U	109	5.8	107	10.4	NM	6.5	30
	07/14/20	67.1	55	2.2	0.05 B1	0.09 T	1.1	0.5 U	5 U	112						
	10/16/20	63.4	52	2.2	0.05 U	0.05 T	0.7	0.5 U	5 U	104	5.8	100	10.2	NM	5.8	31
	10/16/20	62.2	51	2.0	0.03 T	0.05 T	0.7	0.5 U	5 U	109						
	01/20/21	63.4	52	2.2	0.05 B1	0.08	0.6 J	0.1 T	5 U	66 J	5.7	102	9.9	NM	6.7	35
	01/20/21	63.4	52	2.2	0.05 B1	0.05 T	1.5 J	0.2 T	5 U	129 J						
	04/13/21	62.2	51	2.0	0.03 B1	0.06 B1	0.6	0.1 T	5 U	124	6.8	100	10.0	NM	6.2	33
	04/13/21	64.6	53	2.2	0.02 B1	0.06 B1	0.6	0.5 U	5 U	121						
	07/13/21			2.3	0.05 B1	0.12	1.5	0.5 U	5 U	111	5.6	105	10.7	NM	NM	39
	07/13/21			2.3	0.05 B1	0.12	1.4	0.5 U	5 U	116						
	10/27/21	63.0	51.7	2.2	0.09	0.04 T	0.6	0.5 U	5 U	118	6.0	103	9.9	NM	6.1	30
	10/27/21	63.3	51.9	2.2	0.11	0.04 T	0.6	0.5 U	5 U	106						
	01/19/22	62.9	51.6	1.9 J	0.01 T	0.04 JT	0.5 J	0.1 T	5 U	112 J	6.1	103	9.8	NM	6.6	30
	01/19/22	62.9	51.6	1.9 J	0.01 T	0.04 JT	0.5 J	0.1 T	5 U	109 J						
	04/05/22	60.8	49.9	2.5	0.05 B1	0.04 T	0.5	0.5 U	5 U	104	6.1	103	9.8	NM	6.6	30
	04/05/22	61.3	50.3	2.5	0.05 B1	0.04 T	0.5	0.5 U	5 U	103						
	07/18/22	63.8	52.3	2.2	0.05 B1	0.08 T	0.9	0.2 T	5 U	113	6.0	104	10.4	NM	6.7	33
	07/18/22	65.0	53.3	2.2	0.05 B1	0.07 T	0.9	0.1 T	5 U	115						
	10/12/22	67.4	55.3	2.4	0.05 U	0.13	1.4	0.5 U	5 U	116	6.1	109	10.2	NM	6.2	29
	10/12/22	67.3	55.2	2.5	0.05 U	0.13	1.3	0.5 U	5 U	114						
	01/25/23	66.1	54.2	2.3	0.05 U	0.05 T	0.6	0.5 U	5 U	111	5.9	103	9.8	NM	6.0	39
	01/25/23	66.0	54.1	2.3	0.05 U	0.05 T	0.6	0.5 U	5 U	109						
	04/05/23	62.2	51	2.2	0.05 U	0.05 T	0.6	0.5 U	5 U	105	5.8	98	9.7	NM	5.6	44
	04/05/23	62.5	51.3	2.2	0.05 U	0.05 T	0.6	0.5 U	5 U	108						
	07/26/23	66.7	54.7	2.3	0.05 B1	0.14	1.5	0.1 T	5 U	128	6.0	108	10.8	NM	5.9	33
	07/26/23	66.3	54.4	2.3	0.05 B1	0.14	1.5	0.5 U	5 U	122						
	10/30/23	64.1	52.6	2.1	0.05 B1	0.05 T	0.6	0.5 U	5 U	110	5.8	98	10.1	0.2	6.0	42
	10/30/23	64.9	53.2	2.1	0.05 B1	0.05 T	0.6	0.5 U	5 U	107						
	count	85	85	87	87	91	91	91	91	91						
	max	84.1	69.0	2.7	0.118 J	0.15	50.0	0.6 U	5 U	141						
	min			1.9	0.009 T	0.04 T		T	U	U						
	non-detects				66	4	2	55	86	2						
	average	64.2	52.6	2.2	0.1	0.1	1.9	0.4	4.8	104.3						
	sample stdev	10.9	9.0	0.2	0.0	0.0	7.3	0.2	1.0	29.8						
	variance	119.7	80.5	0.1	0.0	0.0	52.7	0.0	1.1	890.5						
	coeff. of variation	5.9	5.9	9.6	2.0	2.1	0.3	2.1	5	3.5						
	standard error	1.2	1.0	0.0	0.0	0.0	0.8	0.0	0	3.1						

Cowlitz County Headquarters Landfill
Inorganic Groundwater Quality Data and Statistics

Location	Date	mg/L									Field Measurements					
		Bicarbonate	Alkalinity (as CaCO3)	Chloride	Ammonia	Nitrate	Sulfate	TOC	Total Suspended Solids	Total Dissolved Solids	pH	Specific Conduct.	Temp.	Turbidity	Dissolved Oxygen	Eh
		MCL>		250 (2ndary)		10.0	250 (2ndary)			500 (2ndary)		(umhos/cm)	(C)	(NTU)	(mg/l)	(mV)
U-1	01/14/15	87.8	72	1.3	4.28	0.10 U	0.06 T	2.7	48.0	125	6.4	165	7.4	NM	0.0	56
	04/09/15	86.6	71	2.3	0.41	0.02 T	0.13 T	3.0	86.0	85	6.2	167	7.8	68.1	0.0	105
	07/14/15	86.6	71	1.2	0.47	0.10 U	0.19 T	2.7	63.0	98	6.3	159	10.6	50.4	0.0	111
	10/27/15	79.2	65	1.3	0.45	0.02 T	0.40	2.8	131.0	40	6.3	158	9.2	152.0	0.0	137
	01/27/16	80.5	66	1.3	0.42	0.02 T	0.15 T	2.5	72.0	86	6.5	166	9.0	88.7	3.5	19
	04/04/16	80.5	66	1.5	0.39	0.10 U	0.18 T	2.8	49.5	90	6.8	172	9.0	41.0	0.9	10
	07/11/16	82.9	68	1.6	0.38	0.10 U	0.21	2.9	54.5	100	6.8	171	10.6	NM	0.5	9
	10/11/16	81.7	67	1.4	0.47	0.10 U	0.20 U	2.8	48.5	82	6.7	169	9.4	NM	0.0	18
	01/26/17	85.3	70	1.6	0.42	0.10 U	0.13 T	3.0	64.8	106 J	6.7	168	8.6	NM	0.0	19
	04/05/17	84.1	69	1.6	0.39	0.10 U	0.18 T	3.2	54.0	88	6.7	166	8.6	NM	0.0	14
	07/25/17	78.0	64	2.1 T	0.40 T	0.04 T	50 U	3.5	43.0	110	6.8	165	11.5	NM	0.6	10
	10/30/17	80.5	66	2.7 T	0.32	0.03 T	0.09 T	4.4	36.0	110	6.9	164	9.1	NM	0.0	9
	01/31/18	97.5	80	3.1 T	0.51	0.03 T	0.13 T	4.3	48.0	100	6.8	199	8.4	NM	0.0	7
	04/09/18	80.5	66	4.3 T	0.39	0.03 T	0.12 B1	5.8	33.0	100	7.1	194	9.0	NM	0.0	-13
	07/17/18	84.1	69	2.3	0.59	0.10 U	0.11 T	3.2	29.0	106	6.5	182	11.8	NM	0.0	-18
	10/21/18	79.2	65	1.5	0.22	0.10 U	0.21	2.5 J	19.5	114	6.3	165	9.0	NM	0.0	-6
	01/16/19	87.8	72	1.9	0.28	0.10 U	0.20 U	2.2	26.5	86	5.9	186	8.5	NM	0.0	15
	04/03/19	86.6	71	1.8	0.47	0.08 T	0.30 T	3.1	40.0	107	6.5	183	9.3	NM	0.0	-13
	07/08/19	82.9	68	2.6	0.44	0.10 U	0.18 T	3.0	22.5	129	6.5	180	10.2	NM	0.0	-12
	10/28/19	39.0	32	1.6	0.37	0.10 U	34.7 J	2.8	14.5	149	6.2	163	9.0	NM	0.0	7
	01/26/20	84.1	69	1.5	0.46	0.10 U	0.3 T	2.6	30.0	115	6.2	176	8.8	NM	NM	9
	04/14/20	84.1	69	1.5	0.52	0.10 U	0.2 T	2.6	17.0	125	6.3	174	10.1	NM	0.0	5
	07/13/20	82.9	68	1.6	0.05 B1	0.10 U	0.2 T	2.6	13.0	116	6.3	176	10.9	NM	0.0	5
	10/15/20	80.5	66	1.4	0.47	0.10 U	0.2 T	2.6	31.5	122	6.3	166	9.7	NM	0.2	2
	01/20/21	89.0	73	1.4	0.40	0.05 U	0.6 J	2.7	29.0	115 J	6.3	164	8.8	NM	0.1	4
	04/12/21	85.3	70	1.4	0.06	0.10 U	0.2 T	2.7	19.5	124	6.2	173	9.9	NM	0.2	6
	07/13/21			1.5	0.41	0.10 U	0.2 T	2.4	24.5	106	6.1	169	11.7	NM	0.4	11
	10/27/21	84.1	69	1.5	2.03	0.10 U	0.1 T	3.1	25.0	136	6.7	169	9.5	NM	0.2	-2
	01/18/22	87.9	72.1	1.8 J	0.53	0.10 U	0.3 JT	2.6	10.5	91 J	6.7	183	8.5	NM	0.1	-2
	04/05/22	82.2	67.4	2.2	0.54	0.10 U	0.1 T	2.6	20.0	141	6.7	183	8.5	NM	0.1	-2
	07/18/22	85.2	69.9	1.5	0.46	0.10 U	0.1 T	2.7	19.5	107	6.8	174	10.7	NM	0.0	-8
	10/12/22	93.0	76.3	1.6	0.45	0.10 U	0.1 T	2.7	11.5	115	7.2	171	9.4	NM	0.2	-29
	01/25/23	85.1	69.8	1.5	0.59	0.10 U	0.1 T	2.7	23.5	108	6.4	175	8.5	NM	0.0	12
	04/04/23	90.2	74	1.5	0.46	0.10 U	0.2 T	2.6	17.0	108	6.4	175	8.0	NM	0.0	13
	07/26/23	84.0	68.9	1.4	0.38	0.10 U	0.1 T	2.6	11.0	122	6.6	169	11.2	NM	0.5	4
	10/30/23	84.1	69	1.4	0.33	0.10 U	0.4 U	2.7	16.5	116	6.4	161	8.7	10.6	0.6	10
	count	43	43	44	44	48	44	44	44	44						
	max	107.3	88.0	4.3	4.28	0.1 U	50.0	5.8	131.0	149						
	min			1.2	0.05 B1	0.02 U	0.06 U	1.8	5	40						
	non-detects				2	40	7		3							
	average	81.9	67.2	1.7	0.5	0.1	2.1	2.8	31.4	107.1						
	sample stdev	15.6	12.8	0.6	0.6	0.0	9.0	0.6	24.7	18.5						
	variance	242.2	162.9	0.3	0.4	0.0	81.6	0.4	611.4	344.0						
	coeff. of variation	5.3	5.3	2.9	0.8	3.3	0.2	4.4	1	5.8						
	standard error	2.4	1.9	0.1	0.1	0.0	1.4	0.1	4	2.8						

Cowlitz County Headquarters Landfill
Inorganic Groundwater Quality Data and Statistics

Location	Date	mg/L									Field Measurements					
		Bicarbonate	Alkalinity (as CaCO3)	Chloride	Ammonia	Nitrate	Sulfate	TOC	Total Suspended Solids	Total Dissolved Solids	pH	Specific Conduct.	Temp.	Turbidity	Dissolved Oxygen	Eh
		MCL>		250 (2ndary)		10.0	250 (2ndary)			500 (2ndary)		(umhos/cm)	(C)	(NTU)	(mg/l)	(mV)
HGCS	01/27/16	59.7	49.0	2.8	0.06		4.4	0.7	5 U	78	5.5	118	17.7	NM	NM	158
B1-P	04/05/16	54.9	45.0	2.9	0.05 B1		3.5	0.7	5 U	63	5.6	89	18.1	NM	NM	158
	07/11/16	58.5	48.0	2.7	0.05 B1	0.27	4.0	0.7	5 U	81	5.8	112	19.5	NM	NM	63
	10/10/16	50.0	41.0	2.5	0.05 B1		5.3	0.8 J	5 U	99	6.0	103	17.2	NM	NM	51
	01/26/17	63.4	52.0	2.9	0.05 B1		3.7	0.6 J	5 U	60 J	6.1	113	18.2	NM	NM	56
	04/05/17	57.3	47.0	2.6	0.05 B1		3.4	0.9 J	5 U	67	5.7	101	17.1	NM	NM	56
	07/25/17	41.5	34.0	2.6 T	0.10 B1	0.29 T	50.0 U	0.6	5 U	100 U	5.8	83	18.8	NM	NM	68
	10/30/17	39.0	32.0	3.0 T	0.10 U		2.5 T	0.9 B	5 U	100 T	6.2	86	15.3	NM	NM	48
	01/31/18	31.7	26.0	2.6 T,B	0.10 U		2.1 T	0.6	5 T	100 T	6.0	74	11.6	NM	NM	44
	04/09/18	31.7	26.0	2.5 T	0.10 U		2.0 T	0.6	5 U	100 U	6.1	74	11.5	NM	NM	41
	07/17/18	46.3	38.0	2.6	0.05 U		1.7	0.9	5 U	52	5.0	85	14.3	NM	NM	78
	10/21/18	48.8	40.0	2.6	0.05 U		1.8	1.0 J	5 U	61	5.0	90	15.8	NM	NM	NM
	01/16/19	37.8	31.0	2.8	0.05 U		2.0	0.6	5 U	31	4.9	79	12.1	NM	NM	NM
	04/03/19	40.2	33.0	2.5	0.05 U		1.8	0.8	5 U	61	5.7	83	14.0	NM	NM	48.0
	07/08/19	47.5	39.0	2.6	0.06		1.8	0.9	5 U	81	5.3	94	15.6	NM	NM	NM
	10/29/19	52.4	43.0	2.8	0.05 U		3.0 J	0.3 T	5 U	89	5.2	97	17.0	NM	NM	NM
	01/26/20	43.9	36.0	2.5	0.05 U		2.0	0.4 T	5 U	67	4.7	87	14.5	NM	NM	91
	04/14/20	51.2	42.0	2.8	0.03 T		2.0	0.8	5 U	65	5.1	101	16.9	NM	NM	67
	07/14/20	57.3	47.0	2.8	0.05 B1		2.2	0.9	5 U	84	5.2	113	19.3	NM	NM	66
	10/16/20	85.3	70.0	3.0	0.05 U		4.1	0.9	5 U	114	5.6	148	17.3	NM	NM	44
	01/20/21	56.1	46.0	2.8	0.05 U		2.2 J	0.7	5	109 J	5.0	103	15.1	NM	NM	73
	04/12/21	58.5	48.0	2.7	0.05 B1		1.9	0.8	5 U	116	5.2	104	15.6	NM	NM	59
	07/13/21	79.2	65.0	2.9	0.05 B1		2.8	0.5 T	5 U	93	5.2	128	18.1	NM	NM	63
	10/27/21	65.7	53.9	2.9	0.17		4.1	0.8	5 U	90	6.0	126	15.8	NM	NM	37
	01/19/22	49.4	40.5	2.5 J	0.03 T		1.7 J	1.4	5 U	51 J	5.7	94	15.0	NM	NM	62
	04/05/22	47.8	39.2	3.0	0.05 B1		1.9	0.5	5 U	59	5.7	94	15.0	NM	NM	62
	07/18/22	55.8	45.8	2.8	0.07		1.6	1.0	5 U	58	5.7	104	18.5	NM	NM	54
	10/11/22	74.6	61.2	3.0	0.05 B1		1.9	0.7	5 U	84	6.1	126	19.1	NM	NM	35
	01/25/23	46.5	38.1	2.6	0.05 B1		1.7	0.5 U	5 U	52	5.6	85	14.9	NM	NM	59
	04/04/23	47.4	38.9	2.6	0.05 U		1.8	0.3 T	5 U	52	5.2	86	14.3	NM	NM	NM
	07/26/23	73.2	60.0	2.8	0.05 B1		1.7	0.7	14	89	6.0	138	19.7	NM	NM	33
	10/30/23	61.0	50.0	2.7	0.05		2.2	0.7	5 U	66	5.9	107	18.8	NM	NM	38
	count	40	40	40	40		40	40	39	40						
	max	93.9	77.0	3.0	1.6 J		50.0	1.4 J	14 U	116						
	min	31.7	26.0	2.2	0.0 J		1.6	0.3 J	5 U	31						
	non-detects				29		1	1	36	2						
	average	58.0	47.6	2.7	0.1		4.0	0.7	5.2	78.2						
	sample stdev	15.6	12.8	0.2	0.2		7.6	0.2	1.4	19.5						
	variance	243.5	163.8	0.0	0.1		57.9	0.0	1.9	380.7						
	coeff. of variation	3.7	3.7	13.2	0.4		0.5	3.5	4	4.0						
	standard error	2.5	2.0	0.0	0.0		1.2	0.0	0	3.1						

Note:
U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B1 = blank corrected, if reported concentration below MRL corrected to MRL.
B = detected in blank, not corrected.
J = concentration estimated because of QA/QC.
UJ = MRL estimated because of QA/QC.
JT = detected below MRL, concentration estimated because of QA/QC.
NM = not measured

Cowlitz County Headquarters Landfill
Metals Groundwater Quality Data and Statistics (ug/l)

Site	Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Nickel	Selenium
	MCL>	6	0.05	1000	4	5	50 (total)		1000 (2ndary)	15	100	10
C-1							Total					
	07/17/14	0.103	0.5 U	4.5	0.041	0.020	0.09 T	0.028	0.35	0.045	0.24	1 U
	10/27/14	0.018 T	0.5 U	2.6	0.020	0.010 T	0.22	0.033	0.23	0.028	0.20	1 U
	01/14/15	0.05 U	0.5 U	5.0	0.039	0.010 T	0.24	0.017 T	0.12	0.036	0.22	1 U
	04/09/15	0.05 U	0.5 U	5.2	0.041	0.011 T	0.2 B1	0.026	0.13	0.040	0.16 T	1 U
	07/14/15	0.010 T	0.5 U	4.7	0.032	0.009 T	0.17 JT	0.019 T	0.14	0.024	0.52 J	1 U
	10/27/15	0.05 U	0.5 U	4.0	0.027	0.008 JT	0.2 B1	0.021	0.17	0.046	0.48	1 U
	01/26/16	0.012 T	0.5 U	5.4	0.038	0.019 T	0.2 B1	0.028	0.25 J	0.091	0.22	1 U
	04/04/16	0.05 B1	0.5 U	4.9	0.042	0.015 T	0.2 B1	0.027	0.19	0.071	0.19 T	1 U
	07/11/16	0.05 U	0.14 T	4.5	0.036	0.013 T	0.1 T	0.009 T	0.13	0.017 T	0.11 T	0.4 U
	10/10/16	0.05 U	0.23 T	2.7	0.010 T	0.006 T	0.1 T	0.006 T	0.17	0.028	0.12 T	1 U
	01/26/17	0.02 T	0.5 U	4.7	0.029	0.015 T	0.1 T	0.021	0.17	0.039	0.05 T	1 U
	04/05/17	0.05 U	0.5 U	5.1	0.038	0.017 T	0.2 B1	0.016 T	0.12	0.029	0.17 T	0.4 T
	07/25/17	0.50 U	0.12	5.6	0.500 U	0.250 U	0.5 U	0.032 T	0.38 T	0.100	0.24 T	1 U
	10/30/17	0.50 U	0.07 T	3.5	0.500 U	0.250 U	0.5 U	1.000 U	0.46 T	0.100 U	0.24 T	1 U
	01/31/18	1.00 U	0.06 T	7.9	0.500 U	0.250 U	0.5 U	0.046 T	0.41 T	0.220 B	0.12 T	1 U
	04/09/18	1.00 U	0.05 T	6.6	0.500 U	0.250 U	0.2 T	0.033 T	0.37 T	0.100	0.24 T	1 U
	07/17/18	0.05 U	0.12 T	5.1	0.046	0.013 T	0.1 T	0.051	0.30	0.076	0.20 B1	1 U
	10/21/18	0.05 U	0.10 T	3.9	0.022	0.013 T	0.3	0.028	0.15 J	0.034	0.31	1 U
	01/16/19	0.05 U	0.15 T	6.8	0.072	0.012 T	0.2 U	0.084	0.31	0.338	0.16 T	1 U
	04/03/19	0.05 U	0.12 T	6.1	0.054	0.013 T	0.1 T	0.023	0.20	0.124	0.17 T	1 U
	07/08/19	0.05 U	0.15 T	5.6	0.087	0.016 T	0.1 T	0.015 JT	0.12	0.041 J	0.08 T	0.2 JT
	10/29/19	0.05 U	0.11 T	4.3	0.026	0.012 T	0.2 T	0.025	0.12 J	0.084	0.05 T	1 U
	01/26/20	0.05 U	0.09 T	8.4	0.106	0.038	0.2	0.058	0.33	0.440 J	0.13 T	1 U
	04/14/20	0.05 U	0.09 T	5.3	0.054	0.012 T	0.1 T	0.016 T	0.15	0.110	0.08 T	1 U
	07/14/20	0.05 U	0.13 T	5.2	0.046	0.014 JT	0.1 T	0.018 T	0.14	0.096 J	0.06 T	1 U
	10/16/20	0.05 U	0.13 T	3.0	0.027	0.014 T	0.1 T	0.010 T	0.09 T	0.034	0.05 T	1 U
	01/20/21	0.05 U	0.10 T	6.0	0.058	0.016 T	0.1 T	0.025	0.28 J	0.134	0.11 T	1 U
	04/12/21	0.05 U	0.10 T	5.0	0.050	0.012 T	0.1 T	0.013 T	0.07 JT	0.030 J	0.20 U	1 U
	07/13/21	0.05 U	0.12 T	4.7	0.032	0.009 T	0.2 T	0.020 U	0.13	0.026	0.17 T	1 U
	10/27/21	0.05 U	0.50 U	4.5	0.041	0.013 T	0.2 T	0.012 T	0.11 J	0.057	0.07 T	1 U
	01/19/22	0.05 U	0.50 U	5.9	0.050	0.015 T	0.1 T	0.014 T	0.14	0.041	0.12 T	1 U
	04/05/22	0.05 U	0.50 U	5.6	0.056	0.018 T	0.2 T	0.009 T	0.13	0.040	0.06 T	1 U
	07/18/22	0.05 U	0.09 T	5.0	0.041	0.010 T	0.2 T	0.020 U	0.05 T	0.014 T	0.05 T	1 U
	10/11/22	0.05 U	0.11 T	3.7	0.022	0.009 T	0.3 J	0.012 T	0.07 T	0.278	0.06 T	1 U
	01/25/23	0.05 U	0.50 U	7.8	0.068	0.009 T	0.1 T	0.020 U	0.11	0.130	0.07 T	1 U
	04/04/23	0.05 U	0.50 U	6.6	0.069	0.015 T	0.1 T	0.022	0.12	0.129	0.05 T	1 U
	07/26/23	0.05 U	0.12 T	5.2	0.051	0.009 T	0.2 T	0.013 T	0.05 T	0.088	0.05 T	1 U
	10/30/23	0.05 U	0.50 U	4.5	0.047	0.011 T	0.1 T	0.014 T	0.15	0.050 J	0.24	1 U
	count	49	49	49	49	49	49	49	49	49	49	49
	max	1.000	0.5 U	8.4	0.50	0.250	0.50	1.000	0.46	0.440	0.52 J	1 U
	min	0.006 T	0.05 T	2.6	0.01 B1	0.004 T	0.04 T	0.006 T	0.05 T	0.005 T	0.05 T	0.2 T
	non-detects	38	19		5	4	10	7	1	2	2	46
	average	0.10	0.27	4.9	0.08	0.03	0.16	0.042	0.18	0.074	0.15	0.9
	sample stdev	0.21	0.19	1.2	0.13	0.07	0.11	0.140	0.10	0.085	0.10	0.2
	variance	0.04	0.04	1.5	0.02	0.00	0.01	0.020	0.01	0.007	0.01	0.0
	coeff. of variation	0.5	1.4	4.0	0.6	0.5	1.5	0.3	1.8	0.9	1.5	4.8
	standard error	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cowlitz County Headquarters Landfill
Metals Groundwater Quality Data and Statistics (ug/l)

Site	Date	Silver 50	Thallium 2	Vanadium	Zinc 5000 (2ndary)	Geochecmical Metals: Calcium	Iron 300 (2ndary)	Magnesium	Manganese 50 (2ndary)	Potassium	Sodium
C-1		Total				Dissolved					
	07/17/14	0.089	0.02 U	0.70	1.30	6,780	20 U	3,390	6.3	583	5,270
	10/27/14	0.049	0.02 U	0.54	0.60	4,710	20 U	2,330	3.2	481	4,560
	01/14/15	0.099	0.02 U	0.46	0.80	5,200	7 T	2,590	6.6	473	4,630
	04/09/15	0.069	0.02 B1	0.59	0.80	5,750	20 B1	2,810	7.1	864	4,880
	07/14/15	0.093	0.02 U	0.91	0.87 J	8,520	21 U	3,950	6.4	650	5,670
	10/27/15	0.123	0.02 U	0.62	1.11 J	6,250	20 U	3,060	3.9	480	5,050
	01/26/16	0.104	0.005 T	0.38	2.56 J	4,870	20 U	2,470	7.1	490	4,740
	04/04/16	0.168	0.02 B1	0.53	1.22	5,980	20 U	2,980	6.3	680	5,020
	07/11/16	0.070	0.02 U	0.91	0.62	9,270	20 U	4,440	5.3	800	6,560
	10/10/16	0.799	0.02 U	1.37	0.80	11,400	20 U	5,270	1.3	950	7,940
	01/26/17	0.175	0.02 B1	0.52	0.70 T	5,660	21 U	2,850	6.9	840	4,560
	04/05/17	0.280	0.02 U	0.53	0.70 T	5,310	21 U	2,620	6.1	770	4,580
	07/25/17	0.250	1.00 U	0.74 T	0.78 T	6,300	10 U	3,100	6.4	1,200	5,200
	10/30/17	0.750	1.00 U	0.31 T	0.87 T	4,000	10 U	1,800	3.1	2,700	3,900
	01/31/18	0.810	0.36 U	0.18 T	1.30	1,300	10 U	660	8.7	2,700	2,700
	04/09/18	0.370 J	0.36 U	0.16 T	0.95 T	1,600	3 T	780	8.7	2,600	2,500
	07/17/18	0.387	0.01 U	0.98	2.00 B1	8,170	21 U	4,100	5.9	1,390	5,890
	10/21/18	0.065 J	0.02 U	0.71	1.10 T	6,480	21 U	3,390	3.9	520	5,520
	01/16/19	0.114 J	0.03	0.89	1.30 T	5,790	21 U	2,890	6.0	770	5,000
	04/03/19	0.176 J	0.02	0.73	0.90 T	6,210	21 U	2,980	7.0	950	4,930
	07/08/19	0.229	0.02 U	0.90	0.90 T	7,000	13 T	3,540	6.8	2,660	4,920
	10/29/19	0.076 J	0.04	0.67	1.00 T	7,570	10 T	3,700	3.4	650	6,140
	01/26/20	0.169 J	0.04	0.41	2.50	1,640	11 T	859	7.6	270	2,910
	04/14/20	0.070	0.02 U	0.63	1.50 T	5,800	21 U	2,950	5.7	480	4,700
	07/14/20	0.056	0.01 JT	0.76	1.20 JT	6,850	21 U	3,290	6.0	470	5,220
	10/16/20	0.059	0.02 U	0.41	0.90 T	4,450	12 T	2,110	3.0	530	3,760
	01/20/21	0.087	0.02 U	0.43	1.70 T	4,740	21 U	2,370	6.9	450	4,670
	04/12/21	0.042 J	0.02 U	0.60	1.10 T	6,280	21 U	3,100	6.4	570	4,810
	07/13/21	0.072	0.02 U	0.74	1.40 T	7,950	21 U	3,970	7.1	590	5,630
	10/27/21	0.221	0.02 U	0.30	1.10 T	3,530	21 B1	1,700	6.0	1,010	3,580
	01/19/22	0.368	0.02 U	0.28	1.50 T	4,990	21 U	2,390	6.9	1,230	4,130
	04/05/22	0.439	0.02 U	0.12 T	1.10 T	2,000	21 U	953	7.4	1,270	2,860
	07/18/22	0.074	0.02 U	0.61	0.90 T	6,770	21 U	3,280	6.4	580	5,070
	10/11/22	0.069	0.02 U	0.68	0.70 T	7,610	21 U	3,770	4.2	610	5,370
	01/25/23	0.055	0.02 U	0.15 T	3.00 J	3,370	15 T	1,670	7.8	310	3,820
	04/04/23	0.094	0.01 T	0.21	1.30 T	2,390	28	1,190	9.6	270	3,150
	07/26/23	0.043 J	0.02 U	0.76	1.00 T	7,440	21 U	3,640	6.0	620	5,690
	10/30/23	0.989	0.02 U	0.19 T	1.20 T	2,510	21 U	1,280	6.4	330	3,160
	count	49	49	49	49	47	47	47	47	47	47
	max	0.989	1.00 U	1.37	3.00	11,400	28 T	5,270	9.6	2,700	7,940
	min	0.022	0.001 T	0.12	0.47 B	1,300	3 U	660	1.3	270 T	2,500
	non-detects		40		2		35				
	average	0.181	0.07	0.59	1.11	5,816.4	17.5	2,859.4	6.0	831.7	4,834.9
	sample stdev	0.223	0.20	0.27	0.51	2,323.1	5.6	1,105.4	1.7	620.0	1,188.3
	variance	0.050	0.04	0.08	0.26	5,396,832.3	31.3	1,221,948.6	3.0	384,399.2	1,411,999.4
	coeff. of variation	0.8	0.4	2.2	2.2	2.5	3.1	2.6	3.4	1.3	4.1
	standard error	0.0	0.0	0.0	0.1	338.9	0.8	161.2	0.3	90.4	173.3

Cowlitz County Headquarters Landfill
Metals Groundwater Quality Data and Statistics (ug/l)

Site	Date	MCL>	Antimony 6	Arsenic 0.05	Barium 1000	Beryllium 4	Cadmium 5	Chromium 50 (total)	Cobalt	Copper 1000 (2ndary)	Lead 15	Nickel 100	Selenium 10
C-2								Total					
	07/17/14		0.05 U	0.5 U	8.4	0.014 T	0.019 T	0.04 T	0.894	0.33	0.027	0.20 T	1 U
	10/27/14		0.027 T	0.5 U	8.6	0.013 T	0.022	0.08 T	1.12	0.38	0.033	0.20 T	1 U
	01/14/15		0.05 U	0.5 U	9.1	0.011 T	0.019 T	0.2 B1	1.55	0.27	0.025	0.26	1 U
	04/09/15		0.05 B1	0.5 U	8.9	0.017 T	0.018 T	0.2 B1	1.71	0.25	0.039	0.25	0.3 T
	07/14/15		0.05 U	0.5 U	8.8	0.013 T	0.010 T	0.14 JT	1.97	0.22	0.029	0.23 JT	1 U
	10/28/15		0.05 U	0.5 U	8.5	0.017 T	0.02 UJ	0.2 B1	0.506	0.30	0.039	0.43	1 U
	01/27/16		0.007 T	0.5 U	8.5	0.014 T	0.011 T	0.2 B1	0.410	0.23 J	0.027	0.25	1 U
	04/05/16		0.05 B1	0.5 U	7.9	0.014 T	0.016 T	0.2 B1	0.419	0.25	0.010 T	0.25	1 U
	07/12/16		0.05 U	0.5 U	9.0	0.014 T	0.010 T	0.03 T	0.526	0.29	0.009 T	0.35	1 U
	10/11/16		0.05 U	0.5 U	8.7	0.013 T	0.015 T	0.03 T	0.720	0.30	0.031	0.36	1 U
	01/26/17		0.05 U	0.5 U	8.2	0.020 U	0.016 T	0.20 U	0.769	0.24	0.020	0.54	1 U
	04/05/17		0.05 U	0.5 U	8.8	0.020 U	0.018 T	0.27	0.938	0.23	0.008 T	0.29	0.3 T
	07/25/17		0.50 U	0.04 T	9.4	0.500 U	0.250 U	0.50 U	1.100	0.60	0.100 U	0.34 T	1 U
	10/30/17		0.50 U	0.10 U	8.0	0.500 U	0.250 U	0.50 U	1.100	0.70	0.100 U	0.33 T	1 U
	01/31/18		1.00 U	0.04 T	8.2	0.500 U	0.250 U	0.50 U	1.400	0.57	0.150 B	0.32 T	0 T
	04/09/18		1.00 U	0.10 U	8.4	0.500 U	0.250 U	0.50 U	1.100	0.44 T	0.045 T	0.27 T	1 U
	07/17/18		0.05 U	0.5 U	8.2	0.020 B1	0.017 T	0.03 T	1.110	0.35	0.043	0.32	1 U
	10/21/18		0.05 U	0.5 U	7.9	0.013 T	0.018 T	0.09 T	1.010	0.19 J	0.017 T	0.31	1 U
	01/16/19		0.05 U	0.5 U	7.7	0.013 T	0.013 T	0.20 U	1.030	0.24	0.014 T	0.20 T	1 U
	04/03/19		0.05 U	0.5 U	8.3	0.010 T	0.011 T	0.05 T	0.989	0.16	0.020 U	0.18 T	1 U
	07/07/19		0.05 U	0.09 T	8.6	0.013 T	0.018 T	0.20 U	0.823 J	0.24	0.020 J	0.27	1 U
	10/29/19		0.05 U	0.5 U	8.5	0.005 T	0.024	0.10 T	0.580	0.17 J	0.019 T	0.29	1 U
	01/26/20		0.05 U	0.5 U	8.1	0.013 T	0.011 T	0.07 T	0.646	0.14	0.014 T	0.19 T	1 U
	04/15/20		0.05 U	0.5 U	7.8	0.012 T	0.014 T	0.10 T	0.318	0.18	0.020 U	0.27	1 U
	07/14/20		0.05 U	0.5 U	8.0	0.008 T	0.016 JT	0.10 T	0.411	0.15	0.024 J	0.35	1 U
	10/15/20		0.05 U	0.5 U	8.2	0.013 T	0.018 T	0.07 T	0.199	0.15	0.012 T	0.29	1 U
	01/19/21		0.05 U	0.5 U	7.2	0.011 T	0.012 T	0.11 T	0.560	0.20 J	0.022	0.29	1 U
	04/13/21		0.05 U	0.5 U	7.9	0.011 T	0.013 T	0.08 T	0.215	0.38 J	0.020 U	0.25	1 U
	07/13/21		0.05 U	0.5 U	7.6	0.006 T	0.020 U	0.12 T	0.239	0.12	0.009 T	0.16 T	1 U
	10/27/21		0.05 U	0.5 U	7.7	0.012 T	0.020 U	0.12 T	0.638	0.14 J	0.024	0.26	1 U
	01/19/22		0.05 U	0.5 U	8.1	0.012 T	0.013 T	0.17 T	0.442	0.16	0.018 T	0.24	1 U
	04/05/22		0.05 U	0.5 U	7.7	0.015 T	0.020 U	0.19 T	0.071	0.12	0.007 T	0.19 T	1 U
	07/18/22		0.05 U	0.5 U	7.5	0.012 T	0.020 U	0.14 T	0.042	0.09 T	0.020 U	0.19 T	1 U
	10/12/22		0.05 U	0.5 U	7.4	0.010 T	0.020 U	0.19 JT	0.327	0.06 T	0.020 U	0.17 T	1 U
	01/25/23		0.05 U	0.5 U	7.4	0.007 T	0.020 U	0.21	0.056	0.09 T	0.020 U	0.16 T	1 U
	04/05/23		0.05 U	0.5 U	7.1	0.008 T	0.010 T	0.10 T	0.229	0.08 T	0.020 U	0.14 T	1 U
	07/26/23		0.05 U	0.5 U	7.5	0.012 T	0.020 U	0.17 T	0.174	0.07 T	0.020 U	0.16 T	1 U
	10/30/23		0.05 U	0.5 U	7.0	0.011 T	0.008 T	0.09 T	0.245	0.06 T	0.020 U	0.14 T	1 U
	count		47	47	47	47	47	47	47	47	47	47	47
	max		1.00 U	0.5 U	9.4	0.50 U	0.25 U	0.55	1.970 J	0.70	0.150	0.54	1 U
	min		0.005 T	0.0 U	7.0	0.005 T	0.006 T	0.02 U	0.042	0.06	0.007 T	0.12 T	0.3 U
	non-detects		40	44		9	13	13			11		43
	average		0.1	0.5	8.1	0.05	0.03	0.18	0.632	0.25	0.029	0.24	0.9
	sample stdev		0.2	0.1	0.5	0.14	0.07	0.13	0.455	0.14	0.026	0.09	0.2
	variance		0.0	0.0	0.3	0.02	0.00	0.02	0.207	0.02	0.001	0.01	0.0
	coeff. of variation		0.5	3.4	15.4	0.4	0.5	1.3	1.4	1.8	1.1	2.8	5.2
	standard error		0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0

Cowlitz County Headquarters Landfill
Metals Groundwater Quality Data and Statistics (ug/l)

Site	Date	Silver 50	Thallium 2	Vanadium	Zinc 5000 (2ndary)	Geochecmical Metals: Calcium	Iron 300 (2ndary)	Magnesium	Manganese 50 (2ndary)	Potassium	Sodium
C-2		Total				Dissolved					
	07/17/14	0.018 T	0.02 U	0.07 T	1.10	3,120	20 B1	1,270	28.6	595	8,660
	10/27/14	0.019 T	0.02 U	0.09 T	1.30	2,870	9 T	1,170	40.4	542	8,370
	01/14/15	0.008 T	0.02 U	0.09 T	1.20	3,010	4 T	1,190	50.2	528	8,730
	04/09/15	0.029	0.02 B1	0.11 T	1.10	2,860	20 B1	1,130	59.9	1,070	9,150
	07/14/15	0.02 B1	0.02 B1	0.11 T	1.06 J	2,780	6 T	1,090	67.4	480	8,740
	10/28/15	0.007 T	0.02 U	0.15 T	2.07 J	3,310	4 T	1,280	18.8	280 T	6,430
	01/27/16	0.014 T	0.002 T	0.07 T	2.03 J	3,390	20 U	1,340	19.9	560	7,200
	04/05/16	0.034	0.02 B1	0.07 T	0.70	3,630	20 B1	1,510	30.1	560	7,240
	07/12/16	0.021	0.02 U	0.07 T	0.87	3,410	3 T	1,400	36.4	990	6,870
	10/11/16	0.013 T	0.02 B1	0.08 T	1.50	3,200	20 U	1,300	41.9	640	7,380
	01/26/17	0.017 T	0.02 B1	0.06 T	2.00	3,230	21 U	1,370	57.9	670	6,870
	04/05/17	0.007 T	0.02 U	0.20 B1	0.90 T	3,050	21 U	1,260	64.4	570	7,310
	07/25/17	0.250 U	1.00 U	0.08 T	0.87 T	3,000	12	1,200	70.0	630 T	8,100
	10/30/17	0.250 U	1.00 U	0.07 T	0.90 T	3,000	4 T	1,100	64.0	1,800	8,500
	01/31/18	0.220	0.36 U	0.18 T	0.81 T	2,600	10 U	1,000	73.0	1,700	9,100
	04/09/18	0.180 JT	0.36 U	0.08 T	0.72 T	2,500	5 T	1,000	77.0	2,200	9,000
	07/17/18	0.167	0.011 T	0.07 T	2.00 B1	2,600	14 T	1,190	112.0	1,350	9,560
	10/21/18	0.018 JT	0.02 U	0.20 B1	1.20 T	2,370	12 T	1,150	110.0	510	9,580
	01/16/19	0.010 JT	0.015 T	0.07 T	0.80 T	2,540	21 U	1,150	124.0	660	9,960
	04/03/19	0.059 J	0.013 T	0.06 T	0.70 T	2,370	21 U	1,010	107.0	830	9,570
	07/07/19	0.130	0.015 T	0.15 T	1.10 T	2,690	15 T	1,290	133.0	1,780	8,880
	10/29/19	0.011 JT	0.023	0.05 T	1.30 T	2,650	21 U	1,180	111.0	590	9,520
	01/26/20	0.020 U	0.022	0.07 T	0.90 T	2,730	21 U	1,260	103.0	500	8,920
	04/15/20	0.013 T	0.020 U	0.20 U	0.90 T	2,580	21 U	1,210	96.7	500	8,680
	07/14/20	0.086	0.020 U	0.06 T	1.50 JT	2,510	14 T	1,130	96.8	460	8,950
	10/15/20	0.009 T	0.020 U	0.06 T	1.20 T	2,780	9 T	1,280	91.5	550	8,490
	01/19/21	0.029	0.015 T	0.20 U	1.60 T	2,590	21 U	1,260	81.6	540	8,890
	04/13/21	0.012 T	0.020 U	0.06 T	1.40 T	3,000	21 U	1,470	70.2	510	8,320
	07/13/21	0.020 U	0.020 U	0.06 T	1.50 T	2,750	12 T	1,230	59.9	440	8,230
	10/27/21	0.060	0.020 U	0.05 T	0.90 T	2,720	21 B1	1,220	46.4	840	7,640
	01/19/22	0.079	0.020 U	0.04 T	1.10 T	3,040	21 U	1,420	42.7	720	7,900
	04/05/22	0.148	0.020 U	0.20 U	0.90 T	3,130	21 U	1,420	37.1	970	8,020
	07/18/22	0.019 T	0.020 U	0.20 U	0.80 T	3,440	21 U	1,830	10.8	570	7,600
	10/12/22	0.014 T	0.020 U	0.20 U	0.90 T	3,160	21 T	1,550	28.6	460	7,640
	01/25/23	0.020 U	0.020 U	0.07 T	4.60 J	3,330	11 T	1,760	11.9	460	7,720
	04/05/23	0.020 U	0.020 U	0.20 U	0.90 T	3,090	21 U	1,440	32.1	480	8,200
	07/26/23	0.016 JT	0.020 U	0.04 T	1.00 T	3,220	11 T	1,600	19.6	540	7,940
	10/30/23	0.012 T	0.020 U	0.20 U	0.80 T	3,140	21 U	1,480	33.9	520	7,910
	count	47	47	47	47	45	45	45	45	45	45
	max	0.250	1.00 U	0.21	4.6	3,630	21 U	1,830	133.0	2,200	9,960
	min	0.006 T	0.002 T	0.04 T	0.70	2,370	3 U	1,000	3.8 T	280	6,040
	non-detects	8	36	9	1		25				
	average	0.048	0.07	0.11	1.21	2,976.9	15.4	1,289.8	53.7	726.2	8,176.9
	sample stdev	0.066	0.21	0.06	0.62	323.0	6.5	178.6	36.9	412.2	887.5
	variance	0.004	0.04	0.00	0.38	104,326.5	41.9	31,911.3	1,359.4	169,874.2	787,571.9
	coeff. of variation	0.7	0.4	1.8	2.0	9.2	2.4	7.2	1.5	1.8	9.2
	standard error	0.0	0.0	0.0	0.1	48.1	1.0	26.6	5.5	61.4	132.3

Cowlitz County Headquarters Landfill
Metals Groundwater Quality Data and Statistics (ug/l)

Site	Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Nickel	Selenium
	MCL>	6	0.05	1000	4	5	50 (total)		1000 (2ndary)	15	100	10
MW-1							Total					
	07/17/14	0.014 T	0.5 U	2.7	0.006 T	0.008 T	0.04 T	0.035	0.29	0.026	0.28	1 U
	10/27/14	0.020 T	0.5 U	2.4	0.02 U	0.015 T	0.09 T	0.066	0.31	0.052	0.17 T	1 U
	01/15/15	0.05 U	0.5 U	3.6	0.02 U	0.02 U	0.2 B1	0.027	0.23	0.025	0.14 T	1 U
	04/09/15	0.05 U	0.5 U	3.0	0.02 U	0.02 U	0.2 B1	0.014 T	0.15	0.02 B1	0.19 T	0.4 T
	07/14/15	0.022 T	0.5 U	2.8	0.02 U	0.02 U	0.17 JT	0.017 T	0.32	0.018 T	0.31 J	1 U
	10/27/15	0.030 T	0.5 U	2.4	0.02 U	0.03 J	0.2 B1	0.070	0.40	0.058	0.31	1 U
	01/27/16	0.008 T	0.5 U	3.9	0.009 T	0.008 T	0.2 B1	0.036	0.24 J	0.034	0.14 T	1 U
	04/05/16	0.050 B1	0.5 U	3.3	0.020 U	0.011 T	0.2 B1	0.033	0.33	0.034	0.34	1 U
	07/12/16	0.020 T	0.5 U	3.0	0.020 U	0.013 T	0.1 T	0.016 T	0.45	0.047	0.29	1 U
	10/11/16	0.050 U	0.5 U	2.7	0.008 T	0.028	0.1 T	0.060	0.29	0.086	0.76	1 U
	01/26/17	0.012 T	0.5 U	2.9	0.020 U	0.020 U	0.2 U	0.021	0.19	0.020 B1	0.13 T	1 U
	04/05/17	0.050 U	0.5 U	3.2	0.020 U	0.009 T	0.2 B1	0.016 T	0.18	0.010 T	0.11 T	1 U
	07/25/17	0.500 U	0.06 T	2.9	0.500 U	0.250 U	0.3 T	1.000 U	0.67	0.100 U	0.55 T	1 U
	10/30/17	0.500 U	0.08 T	3.0	0.500 U	0.250 U	0.2 T	0.038 T	0.96	0.057 T	0.36 T	1 U
	01/31/18	1.000 U	0.07 T	3.0	0.500 U	0.250 U	0.5 U	1.000 U	0.43 T	0.100 B1	0.17 T	1 U
	04/09/18	1.000 U	0.07 T	4.0	0.500 U	0.250 U	0.5 U	0.032 T	0.61	0.100 U	0.27 T	1 U
	07/17/18	0.050 U	0.5 U	2.7	0.020 B1	0.017 T	0.1 T	0.020 B1	0.51	0.033	0.25	1 U
	10/21/18	0.050 U	0.5 U	2.2	0.020 U	0.020 U	0.2 T	0.030	0.23 J	0.028	0.20 B1	1 U
	01/16/19	0.050 U	0.5 U	3.0	0.006 T	0.014 T	0.2 U	0.010 T	0.25	0.022	0.06 T	1 U
	04/03/19	0.050 U	0.5 U	3.3	0.020 U	0.020 U	0.1 T	0.020 U	0.31	0.021	0.16 T	1 U
	07/07/19	0.050 U	0.12 T	3.6	0.020 U	0.020 U	0.1 T	0.020 U	0.32	0.025 J	0.24	1 U
	10/28/19	0.050 U	0.5 U	3.1	0.020 U	0.013 T	0.1 T	0.025	0.22 J	0.039	0.07 T	1 U
	01/26/20	0.023 T	0.5 U	3.1	0.005 T	0.037	0.2	0.036	1.51	0.162 J	3.78	1 U
	04/14/20	0.050 U	0.5 U	3.0	0.020 U	0.013 T	0.2 T	0.021	0.41	0.032	0.23	1 U
	07/13/20	0.050 U	0.5 U	2.9	0.020 U	0.016 JT	0.2 T	0.025	0.20	0.038 J	0.13 T	1 U
	10/15/20	0.050 U	0.5 U	3.1	0.020 U	0.019 T	0.1 T	0.027	0.26	0.032	0.12 T	1 U
	01/19/21	0.050 U	0.5 U	2.9	0.006 T	0.021	0.1 T	0.026	1.02	0.084	1.96	1 U
	04/12/21	0.050 U	0.5 U	2.9	0.007 T	0.010 T	0.1 T	0.020 U	0.20 J	0.038 J	0.10 T	1 U
	07/13/21	0.050 U	0.5 U	3.0	0.020 U	0.020 U	0.1 T	0.017 T	0.47	0.115	0.15 T	1 U
	10/27/21	0.050 U	0.5 U	3.1	0.020 U	0.008 T	0.2 T	0.018 T	0.27 J	0.033	0.11 T	1 U
	01/18/22	0.050 U	0.5 U	3.5	0.020 U	0.020 U	0.2 T	0.009 T	0.17	0.021	0.21	1 U
	04/05/22	0.050 U	0.5 U	3.3	0.020 U	0.008 T	0.3	0.020 U	0.18	0.013 T	0.28	1 U
	07/18/22	0.050 U	0.5 U	3.1	0.020 U	0.020 U	0.1 T	0.021	0.15	0.020	0.15 T	1 U
	10/11/22	0.050 U	0.5 U	2.9	0.020 U	0.020 U	0.3 J	0.010 T	0.19	0.016 T	0.19 T	1 U
	01/25/23	0.050 U	0.5 U	3.3	0.020 U	0.020 U	0.3	0.020 U	0.10 T	0.009 T	0.04 T	1 U
	04/04/23	0.050 U	0.5 U	2.8	0.007 T	0.020 U	0.1 T	0.020 U	0.09 T	0.020 U	0.08 T	1 U
	07/26/23	0.050 U	0.5 U	3.4	0.006 T	0.008 T	0.2 T	0.018 T	0.27	0.024	0.27	1 U
	10/30/23	0.050 U	0.5 U	2.4	0.008 T	0.020 U	0.1 T	0.023	0.22	0.031 J	0.55	1 U
	count	47	47	47	47	47	47	47	47	47	47	47
	max	1.000	0.5 U	4.0	0.50 U	0.25 U	0.50	1.000	1.51	0.162	3.78	1 U
	min	0.01 T	0.04 T	1.7	0.005 T	0.007 T	0.04 T	0.009 T	0.09	0.007 T	0.04 T	0.16 T
	non-detects	34	40		36	21	11	9		6	1	44
	average	0.1	0.4	2.9	0.06	0.04	0.18	0.069	0.35	0.039	0.33	1.0
	sample stdev	0.2	0.2	0.4	0.14	0.07	0.10	0.199	0.26	0.033	0.59	0.2
	variance	0.0	0.0	0.2	0.02	0.00	0.01	0.040	0.07	0.001	0.35	0.0
	coeff. of variation	0.5	2.8	6.9	0.4	0.5	1.8	0.3	1.3	1.2	0.6	5.4
	standard error	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0

Cowlitz County Headquarters Landfill
Metals Groundwater Quality Data and Statistics (ug/l)

Site	Date	Silver 50	Thallium 2	Vanadium	Zinc 5000 (2ndary)	Geochecmical Metals: Calcium	Iron 300 (2ndary)	Magnesium	Manganese 50 (2ndary)	Potassium	Sodium
MW-1		Total				Dissolved					
	07/17/14	0.089	0.02 U	0.40	0.70	7,820	20 U	3,430	1.4	549	6,110
	10/27/14	0.053	0.02 U	0.51	1.30	7,770	6 T	3,190	1.4	645	6,140
	01/15/15	0.024	0.02 U	0.36	1.10	7,430	20 U	3,230	0.8 T	537	6,690
	04/09/15	0.069	0.02 U	0.36	0.70	7,140	20 B1	3,000	3.5	1,510	6,720
	07/14/15	0.039	0.02 U	0.45	1.03 J	8,560	21 U	3,450	1.8	520	5,750
	10/27/15	0.038	0.02 U	0.61	4.02 J	8,250	20 U	3,480	1.9	490	6,290
	01/27/16	0.029	0.02 U	0.31	0.82 J	6,740	6 T	2,910	1.4	700	7,610
	04/05/16	0.170	0.02 U	0.32	1.22	7,080	20 U	3,040	0.5 T	620	7,280
	07/12/16	0.049	0.02 U	0.44	1.23	8,660	25	3,530	0.7 T	790	6,680
	10/11/16	0.258	0.02 U	0.73	1.23	8,990	20 U	3,570	1.1	730	6,820
	01/26/17	0.082	0.02 B1	0.33	0.40 T	7,620	4 T	3,340	0.7 T	660	5,480
	04/05/17	0.061	0.02 U	0.40	0.40 T	6,900	21 U	2,940	0.6 T	640	5,870
	07/25/17	0.250 U	1.00 U	0.46 T	0.82 T	7,900	10 U	3,400	1.0 B1	760 T	6,100
	10/30/17	0.250 U	1.00 U	0.49 T	0.93 T	7,400	29	3,100	2.3	1,700	7,300
	01/31/18	0.440	0.13 T	0.24 T	1.00 U	5,300	10 U	2,200	1.3	2,700	6,500
	04/09/18	0.310 J	0.36 U	0.40 T	1.00 U	7,000	10 U	2,900	2.3	3,200	5,900
	07/17/18	0.204	0.02 T	0.47	2.00 B1	8,330	21 U	3,520	0.5 T	1,670	6,410
	10/21/18	0.185 J	0.02 U	0.57	1.30 T	7,740	6 T	3,440	1.4	630	6,310
	01/16/19	0.048 J	0.02 U	0.40	0.60 T	7,570	21 U	3,290	1.6	740	6,060
	04/03/19	0.234 J	0.02 U	0.36	0.90 T	7,440	21 U	3,110	1.9	1,030	6,070
	07/07/19	0.207	0.01 T	0.64	1.00 T	8,620	21 U	3,680	1.3 T	2,310	5,850
	10/28/19	0.160 J	0.04	0.46	0.80 T	8,810	10 T	3,690	3.4	650	5,980
	01/26/20	0.832 J	0.02 U	0.36	3.40	6,140	11 T	2,600	4.7	630	5,860
	04/14/20	0.721	0.02 U	0.41	1.10 T	7,280	21 U	3,210	1.9	510	5,770
	07/13/20	0.085	0.03 J	0.49	1.40 JT	7,870	21 U	3,310	0.7 T	750	5,950
	10/15/20	0.081	0.02 U	0.50	0.90 T	8,380	21 U	3,510	2.2	620	5,810
	01/19/21	1.110	0.01 T	0.39	2.40	6,230	21 U	2,640	2.0	570	6,620
	04/12/21	0.153 J	0.02 T	0.43	0.70 T	7,970	21 U	3,390	1.6	610	6,330
	07/13/21	0.049	0.02 U	0.53	1.10 T	8,510	13 T	3,500	2.4	700	6,060
	10/27/21	0.042	0.02 U	0.48	1.00 T	8,800	21 B1	3,470	2.0	580	5,910
	01/18/22	0.127	0.02 U	0.37	0.90 T	8,150	21 U	3,410	1.2	750	6,310
	04/05/22	0.325	0.02 U	0.43	0.70 T	8,080	21 U	3,360	1.1 U	1,810	5,940
	07/18/22	0.114	0.03	0.43	0.50 T	7,540	21 U	3,220	1.4	550	5,470
	10/11/22	0.056	0.02 U	0.46	0.60 T	9,430	10 T	3,750	1.8	820	6,240
	01/25/23	0.010 T	0.02 U	0.39	3.20 J	7,940	21 U	3,450	1.7	520	6,080
	04/04/23	0.030	0.02 U	0.38	0.70 T	7,780	21 U	3,350	1.4	530	5,570
	07/26/23	0.080 J	0.02 U	0.51	1.00 T	8,520	21 U	3,530	2.1	750	6,220
	10/30/23	0.088	0.01 T	0.57	1.10 T	9,220	21 U	3,800	1.4	600	6,170
	count	47	47	47	47	45	45	45	45	45	45
	max	1.110	1.00 U	0.75	4.02	9,430	29 U	3,800	4.7	3,200	7,610
	min	0.010 T	0.008 T	0.24	0.40 T	5,300	3 T	2,200	0.5 T	481	4,620
	non-detects	2	36		3		30		2		
	average	0.162	0.07	0.44	1.13	7,696.0	16.3	3,253.1	1.6	884.2	6,165.1
	sample stdev	0.220	0.20	0.10	0.76	890.1	7.0	346.5	0.8	598.3	508.3
	variance	0.048	0.04	0.01	0.57	792,265.5	48.6	120,035.6	0.7	357,955.2	258,361.9
	coeff. of variation	0.7	0.3	4.3	1.5	8.6	2.3	9.4	1.9	1.5	12.1
	standard error	0.0	0.0	0.0	0.1	132.7	1.0	51.6	0.1	89.2	75.8

Cowlitz County Headquarters Landfill
Metals Groundwater Quality Data and Statistics (ug/l)

Site	Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Nickel	Selenium
	MCL>	6	0.05	1000	4	5	50 (total)		1000 (2ndary)	15	100	10
P-9							Total					
	04/03/19	0.1 U	0.56	1.3	0.01 T	0.02 U	0.2	0.025	0.25	0.155	0.47	1 U
	04/03/19	0.1 U	0.55	1.3	0.02 U	0.02 U	0.2	0.030	0.22	0.168	0.35	1 U
	07/08/19	0.1 U	0.69	1.6	0.007 T	0.02 U	0.2 T	0.068 J	0.18	0.073 J	0.14 T	0 JT
	07/08/19	0.1 U	0.66	1.6	0.13	0.02 U	0.1 T	0.022 J	0.17	0.058 J	0.18 T	1 JT
	10/29/19	0.1 U	0.47 T	1.0	0.02 U	0.02 U	0.2 T	0.019 T	0.24 J	0.090	0.10 T	1 U
	10/29/19	0.1 U	0.53	1.0	0.02 U	0.02 U	0.2 T	0.016 T	0.18 J	0.086	0.06 T	1 U
	01/26/20	0.1 U	0.60	1.0	0.02 U	0.02 U	0.2	0.012 T	0.12	0.080 J	0.08 T	1 U
	01/26/20	0.1 U	0.52	1.1	0.02 U	0.02 U	0.2 T	0.024	0.12	0.048 J	0.07 T	1 U
	04/15/20	0.1 U	0.49 T	0.8	0.02 U	0.02 U	0.2 T	0.020 U	0.07 T	0.016 T	0.06 T	1 U
	04/15/20	0.1 U	0.48 T	0.8	0.02 U	0.02 U	0.2	0.020 U	0.06 T	0.016 T	0.08 T	1 U
	07/14/20	0.1 U	0.57	0.9	0.02 U	0.02 U	0.2	0.020 U	0.08 T	0.017 JT	0.07 T	1 U
	07/14/20	0.1 U	0.57	0.9	0.02 U	0.02 U	0.2 T	0.020 U	0.08 T	0.024 J	0.10 T	1 U
	10/16/20	0.1 U	0.53	0.9	0.02 U	0.02 U	0.1 T	0.009 T	0.11	0.028	0.05 T	1 U
	10/16/20	0.1 U	0.54	0.9	0.02 U	0.02 U	0.2 T	0.020 U	0.09 T	0.030	0.08 T	1 U
	01/20/21	0.1 U	0.55	1.1	0.02 U	0.02 U	0.2 T	0.011 T	0.08 JT	0.029	0.07 T	1 U
	01/20/21	0.1 U	0.58	1.1	0.01 T	0.02 U	0.2 T	0.012 T	0.13 J	0.032	0.07 T	1 U
	04/13/21	0.1 U	0.55	1.1	0.01 T	0.02 U	0.2 T	0.020 U	0.14 J	0.035 J	0.08 T	1 U
	04/13/21	0.1 U	0.50	1.1	0.01 T	0.02 U	0.2 T	0.013 T	0.13 J	0.035 J	0.16 T	1 U
	07/13/21	0.1 U	0.48 T	1.0	0.02 U	0.02 U	0.2	0.020 U	0.07 T	0.016 T	0.08 T	1 U
	07/13/21	0.1 U	0.62	1.1	0.02 U	0.02 U	0.3	0.020 U	0.08 T	0.016 T	0.06 T	1 U
	10/27/21	0.1 U	0.46 T	0.9	0.01 T	0.02 U	0.2	0.020 U	0.05 JT	0.013 T	0.07 T	1 U
	10/27/21	0.1 U	0.46 T	0.9	0.01 T	0.02 U	0.2 T	0.010 T	0.16 J	0.019 T	0.09 T	1 U
	01/19/22	0.1 U	0.54	1.1	0.01 T	0.02 U	0.3	0.020 U	0.08 T	0.018 T	0.09 T	1 U
	01/19/22	0.1 U	0.60	1.2	0.01 T	0.02 U	0.3	0.020 U	0.07 T	0.017 T	0.06 T	1 U
	04/05/22	0.1 U	0.44 T	1.3	0.01 T	0.02 U	0.2	0.020 U	0.06 T	0.019 T	0.08 T	1 U
	04/05/22	0.1 U	0.51	1.3	0.01 T	0.02 U	0.2	0.020 U	0.06 T	0.020	0.05 T	1 U
	07/18/22	0.1 U	0.50	1.4	0.01 T	0.02 U	0.2	0.020 U	0.10 U	0.019 T	0.07 T	1 U
	07/18/22	0.1 U	0.53	1.2	0.01 T	0.02 U	0.2	0.020 U	0.07 T	0.017 T	0.07 T	1 U
	10/12/22	0.1 U	0.56	1.4	0.02 U	0.02 U	0.4 J	0.013 T	0.06 T	0.016 T	0.11 T	1 U
	10/12/22	0.1 U	0.57	1.4	0.02 U	0.02 U	0.2 J	0.009 T	0.10 U	0.014 T	0.09 T	1 U
	01/25/23	0.1 U	0.57	1.2	0.02 U	0.02 U	0.3	0.020 U	0.07 T	0.011 T	0.05 T	1 U
	01/25/23	0.1 U	0.61	1.3	0.02 U	0.02 U	0.3	0.020 U	0.08 T	0.008 T	0.07 T	1 U
	04/05/23	0.1 U	0.51	1.3	0.01 T	0.02 U	0.2	0.020 U	0.07 T	0.009 T	0.07 T	1 U
	04/05/23	0.1 U	0.51	1.2	0.02 U	0.02 U	0.2	0.020 U	0.05 T	0.013 T	0.05 T	1 U
	07/26/23	0.1 U	0.58	1.3	0.01 T	0.02 U	0.2	0.020 U	0.08 T	0.020	0.11 T	1 U
	07/26/23	0.1 U	0.58	1.3	0.01 T	0.02 U	0.2	0.020 U	0.07 T	0.013 T	0.09 T	1 U
	10/30/23	0.1 U	0.50 T	0.9	0.01 T	0.02 U	0.1 T	0.020 U	0.07 T	0.015 JT	0.09 T	1 U
	10/30/23	0.1 U	0.50	0.9	0.02 U	0.02 U	0.2 T	0.020 U	0.07 T	0.014 JT	0.13 T	1 U
	count	90	90	90	90	90	90	90	90	90	90	90
	max	1.00 U	0.69	1.6	0.50 U	0.25 U	0.50	1.000	0.62	0.168	0.48	1 U
	min	0.005 T	0.44	0.8	0.005 T	0.003 T	0.04 T	0.007 T	0.05 T	0.008 TJ	0.05 T	0.14 T
	non-detects	77			53	81	15	37	2	8	4	78
	average	0.1	0.6	1.2	0.06	0.04	0.19	0.086	0.15	0.035	0.16	0.9
	sample stdev	0.2	0.1	0.2	0.14	0.07	0.08	0.246	0.13	0.031	0.11	0.2
	variance	0.0	0.0	0.0	0.02	0.00	0.01	0.060	0.02	0.001	0.01	0.1
	coeff. of variation	0.5	11.1	6.8	0.4	0.6	2.4	0.4	1.1	1.1	1.5	3.6
	standard error	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Cowlitz County Headquarters Landfill
Metals Groundwater Quality Data and Statistics (ug/l)

Site	Date	Silver 50	Thallium 2	Vanadium	Zinc 5000 (2ndary)	Geochecmical Metals					
						Calcium	Iron 300 (2ndary)	Magnesium	Manganese 50 (2ndary)	Potassium	Sodium
P-9		Total				Dissolved					
	04/03/19	0.18 J	0.02 U	2.65	0.60 T	11,900	21 U	1,660	0.4 T	1,250	8,140
	04/03/19	0.17 J	0.02 U	2.72	0.60 T	11,800	21 U	1,650	0.4 T	1,220	7,950
	07/08/19	0.09	0.02 U	2.89	0.60 T	13,100	12 T	1,940	0.4 T	1,190	8,210
	07/08/19	0.08	0.02 U	2.66	0.60 T	13,100	10 T	1,930	0.4 T	1,150	8,100
	10/29/19	0.06 J	0.017 T	2.48	0.80 T	12,200	21 U	1,740	1.1 U	770	8,170
	10/29/19	0.17 J	0.013 T	2.38	0.50 T	12,200	21 U	1,740	1.1 U	690	8,100
	01/26/20	0.06 J	0.020 U	2.72	2.00 U	12,400	21 U	1,840	0.2 T	760	8,070
	01/26/20	0.03 J	0.020 U	2.77	2.00 U	12,300	21 U	1,810	0.2 T	760	8,000
	04/15/20	0.02 T	0.020 U	2.43	0.60 T	11,600	21 U	1,690	1.1 U	670	7,770
	04/15/20	0.02	0.020 U	2.41	0.60 T	11,600	21 U	1,690	1.1 U	680	7,690
	07/14/20	0.02 T	0.020 U	2.56	0.80 JT	12,300	21 U	1,690	1.1 U	680	8,260
	07/14/20	0.02 T	0.020 U	2.59	0.70 JT	12,200	12 T	1,680	1.1 U	690	8,390
	10/16/20	0.02	0.020 U	2.30	0.60 T	12,300	11 T	1,710	1.1 U	790	7,600
	10/16/20	0.02 T	0.020 U	2.38	0.50 T	12,500	16 T	1,710	1.1 U	750	7,590
	01/20/21	0.02 T	0.020 U	2.71	1.00 T	11,400	21 U	1,620	1.1 U	710	8,340
	01/20/21	0.02	0.020 U	2.68	0.50 T	11,100	21 U	1,580	1.1 U	750	8,230
	04/13/21	0.08 J	0.020 U	2.50	0.70 T	11,800	21 U	1,690	0.3 T	740	7,810
	04/13/21	0.05 J	0.020 U	2.62	0.70 T	11,700	21 U	1,680	0.3 T	730	7,870
	07/13/21	0.02	0.020 U	2.38	0.50 T	12,900	21 U	1,820	0.5 T	710	8,270
	07/13/21	0.01 T	0.020 U	2.44	2.00 U	13,500	21 U	1,860	0.8 T	740	8,450
	10/27/21	0.07	0.020 U	2.37	0.60 T	11,600	21 U	1,630	0.4 T	900	7,360
	10/27/21	0.06	0.020 U	2.30	1.00 T	11,800	21 U	1,650	0.3 T	930	7,470
	01/19/22	0.02 T	0.020 U	2.59	0.60 T	12,100	21 U	1,750	1.1 U	790	7,870
	01/19/22	0.02	0.020 U	2.71	0.60 T	12,200	21 U	1,760	1.1 U	720	7,960
	04/05/22	0.03	0.020 U	2.46	2.00 U	12,300	21 U	1,740	1.1 U	870	7,920
	04/05/22	0.03	0.020 U	2.42	2.00 U	12,300	21 U	1,730	1.1 U	930	7,940
	07/18/22	0.01 T	0.020 U	2.49	2.00 U	11,500	21 U	1,670	0.3 T	710	7,780
	07/18/22	0.01 T	0.020 U	2.53	2.00 U	11,400	21 U	1,650	1.1 U	730	7,810
	10/12/22	0.01 T	0.020 U	2.44	2.00 U	13,300	9 T	1,920	1.1 U	740	8,110
	10/12/22	0.02 U	0.020 U	2.53	2.00 U	13,300	13 T	1,920	1.1 U	740	8,050
	01/25/23	0.02 U	0.020 U	2.72	2.70 J	12,100	21 U	1,710	0.2 T	690	9,190
	01/25/23	0.02 U	0.020 U	2.76	3.90 J	12,100	21 U	1,710	1.1 U	700	8,050
	04/05/23	0.02 T	0.020 U	2.54	0.50 T	12,200	21 U	1,760	0.3 T	740	8,240
	04/05/23	0.01 T	0.020 U	2.40	2.00 U	12,100	21 U	1,740	0.7 T	700	8,040
	07/26/23	0.02 JT	0.020 U	2.66	2.00 U	12,700	21 U	1,840	0.3 T	810	8,870
	07/26/23	0.04 J	0.020 U	2.61	0.60 T	12,700	21 U	1,850	1.1 U	820	8,870
	10/30/23	0.02 T	0.020 U	2.31	0.50 T	12,800	21 U	1,820	1.1 U	750	8,140
	10/30/23	0.02 T	0.020 U	2.43	0.80 T	12,600	21 U	1,800	1.1 U	730	8,090
	count	90	90	90	90	88	88	88	88	88	88
	max	0.550	1.00 U	3.00	3.9	13,500	21 U	1,940	1.3 T	1,500	9,270
	min	0.004 T	0.002 T	2.07	0.20 T	11,100	3 T	1,580	0.1 T	590	7,360
	non-detects	31	84		24		76		38		
	average	0.052	0.07	2.52	0.91	12,265	18	1,770	0.64	819	8,229
	sample stdev	0.079	0.19	0.18	0.68	480	5	83	0.41	184	370
	variance	0.006	0.04	0.03	0.47	230,124	25	6,917	0.17	33,675	136,798
	coeff. of variation	0.7	0.4	13.9	1.3	25.6	3.6	21.3	1.6	4.5	22.2
	standard error	0.0	0.0	0.0	0.1	51.1	0.5	8.9	0.0	19.6	39.4

Cowlitz County Headquarters Landfill
Metals Groundwater Quality Data and Statistics (ug/l)

Site	Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Nickel	Selenium
	MCL>	6	0.05	1000	4	5	50 (total)		1000 (2ndary)	15	100	10
U-1							Total					
	07/17/14	0.05 U	4.5	48	0.02 U	0.02 U	0.06 T	5.95	0.22	0.021	0.91	1 U
	10/27/14	0.017 T	5.2	48	0.02 U	0.006 T	0.10 T	5.28	0.11	0.020	0.77	1 U
	01/14/15	0.012 T	4.5	59	0.05	0.007 T	0.44	6.76	1.55	0.505	1.19	1 U
	04/09/15	0.05 B1	4.6	59	0.06	0.019 T	1.63	6.59	2.13	0.731	1.46	0.3 T
	07/14/15	0.047 T	4.6	56	0.05	0.016 T	2.79	6.62	1.94	0.620	1.98	1 U
	10/27/15	0.024 T	4.6	64	0.14	0.022 J	1.78	6.32	3.06	1.430	2.34	1 U
	01/27/16	0.020 T	5.0	58	0.08	0.012 T	2.37	6.13	1.86 J	0.784	1.30	1 U
	04/04/16	0.050 B1	5.2	51	0.03	0.012 T	1.30	5.65	0.76	0.361	1.26	1 U
	07/11/16	0.015 T	5.1	56	0.04	0.020 U	1.79	6.55	0.93	0.416	2.14	1 U
	10/11/16	0.050 U	4.7	66	0.07	0.009 T	1.20	6.85	1.08	0.654	5.15	1 U
	01/26/17	0.050 U	4.7	54	0.05	0.020 U	0.67	6.29	0.98	0.599	3.46	1 U
	04/05/17	0.009 T	5.7	55	0.04	0.013 T	0.65	6.29	1.00	0.465	3.36	1 U
	07/25/17	0.500 U	5.5	55	0.50 U	0.250 U	0.57	6.00	1.20	0.410	2.50	1 U
	10/30/17	0.500 U	5.6	51	0.50 U	0.250 U	0.62	6.00	1.40	0.480	2.00	1 U
	01/31/18	1.000 U	5.2	51	0.50 U	0.250 U	0.84	6.80	1.00	0.350	2.70	1 U
	04/09/18	1.000 U	5.4	51	0.50 U	0.250 U	0.21 T	6.20	1.10	0.230	1.70	1 U
	07/17/18	0.026 T	4.0	48	0.03	0.015 T	0.20	6.64	0.67	0.245	1.86	1 U
	10/21/18	0.050 U	4.8	45	0.02 T	0.009 T	0.17 T	5.55	0.45 J	0.158	1.45	1 U
	01/16/19	0.050 U	3.7	49	0.02	0.016 T	0.06 T	6.97	0.49	0.186	1.46	1 U
	04/03/19	0.050 U	3.8	50	0.03	0.020 U	0.32	6.97	1.09	0.453	1.51	1 U
	07/08/19	0.050 U	2.3	38	0.02 U	0.020 U	0.04 T	6.01 J	0.41	0.040 J	1.17	1 U
	10/28/19	0.050 U	5.3	48	0.02 T	0.014 T	0.23	5.65	0.70 J	0.222	1.12	1 U
	01/26/20	0.050 U	4.3	53	0.03	0.010 T	0.22	6.83	0.71	0.237 J	1.40	1 U
	04/14/20	0.050 U	3.6	49	0.02 T	0.020 U	0.20 T	7.03	0.74	0.187	1.23	1 U
	07/13/20	0.021 T	3.8	49	0.01 T	0.011 JT	1.36	6.92	0.51	0.136 J	2.12	1 U
	10/15/20	0.050 U	5.1	50	0.03	0.018 T	0.25	5.80	0.94	0.299	1.77	1 U
	01/20/21	0.050 U	4.5	48	0.02 T	0.020 U	0.20 T	6.75	0.61	0.189	1.49	1 U
	04/12/21	0.050 U	4.7	49	0.02	0.009 T	0.17 T	6.39	0.49 J	0.190 J	1.50	1 U
	07/13/21	0.050 U	4.4	49	0.02 T	0.020 U	0.24	6.28	0.49	0.172	1.34	1 U
	10/27/21	0.050 U	5.7	47	0.02 T	0.020 U	0.48	5.48	0.44 J	0.156	1.34	1 U
	01/18/22	0.050 U	4.4	52	0.01 T	0.020 U	0.22	7.17	0.38	0.125	1.64	1 U
	04/05/22	0.050 U	4.5	49	0.02	0.011 T	0.28	6.82	0.69	0.214	1.70	1 U
	07/18/22	0.050 U	5.1	48	0.01 T	0.020 U	0.17 T	6.31	0.45	0.145	1.13	1 U
	10/12/22	0.050 U	5.6	45	0.01 T	0.020 U	0.23 J	5.76	0.32	0.083	0.94	1 U
	01/25/23	0.050 U	5.8	49	0.02 U	0.020 U	0.23	6.34	0.31	0.086	1.00	1 U
	04/04/23	0.051	5.4	48	0.02 T	0.009 T	0.22	6.53	0.36	0.118	1.02	1 U
	07/26/23	0.050 U	5.9	47	0.01 T	0.020 U	0.18 T	6.23	1.43	0.197	1.12	1 U
	10/30/23	0.050 U	6.0	46	0.01 T	0.020 U	0.13 T	5.45	0.35	0.108 J	0.89	1 U
	count	48	48	48	48	48	48	48	48	48	48	48
	max	1.00 U	8.2	66	0.50 U	0.25	2.79	7.17	3.06	1.430	5.15	1 U
	min	0.009 T	2.3	38	0.006 T	0.005 T	0.04 T	4.86	0.10	0.009 T	0.72	0.3 T
	non-detects	33			16	22	1					44
	average	0.1	5.0	50.9	0.07	0.04	0.52	6.149	0.74	0.256	1.52	1.0
	sample stdev	0.2	1.0	4.8	0.13	0.07	0.63	0.587	0.61	0.271	0.83	0.2
	variance	0.0	0.9	23.0	0.02	0.00	0.40	0.345	0.37	0.073	0.69	0.0
	coeff. of variation	0.5	5.2	10.6	0.5	0.5	0.8	10.5	1.2	0.9	1.8	5.9
	standard error	0.0	0.1	0.7	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0

Cowlitz County Headquarters Landfill
Metals Groundwater Quality Data and Statistics (ug/l)

Site	Date	Silver 50	Thallium 2	Vanadium	Zinc 5000 (2ndary)	Geochecmical Metals: Calcium	Iron 300 (2ndary)	Magnesium	Manganese 50 (2ndary)	Potassium	Sodium
U-1		Total				Dissolved					
	07/17/14	0.036	0.006 T	0.13 T	0.80	10,300	272	5,620	347	872	8,180
	10/27/14	0.050	0.02 U	0.17 T	0.90	10,400	511	5,390	328	824	8,120
	01/14/15	0.430	0.011 T	1.26	2.40	10,400	758	5,500	346	835	7,820
	04/09/15	0.944	0.03	1.64	3.40	10,200	3,370	5,450	345	1,670	8,030
	07/14/15	0.737	0.02 B1	1.31	3.89	10,700	15 T	5,490	344	750	7,590
	10/27/15	0.144	0.017 T	2.70	8.60 J	9,960	52	5,460	316	660	8,410
	01/27/16	0.233	0.013 T	1.27	4.10 J	10,500	578	5,670	337	890	8,410
	04/04/16	0.226	0.02 B1	0.67	2.01	10,700	645	5,650	343	900	8,330
	07/11/16	0.205	0.01 T	0.94	2.50	10,200	20	5,410	326	960	8,260
	10/11/16	0.232	0.02 B1	1.43	3.05	10,100	27	5,200	304	880	8,250
	01/26/17	0.158	0.02 B1	0.93	2.30	10,200	105	5,570	320	1,000	7,490
	04/05/17	0.191	0.01 T	1.03	2.60	10,300	1,050	5,410	328	940	7,790
	07/25/17	0.250 U	1.00 U	1.50	2.20	9,400	640	5,100	300	1,300	8,500
	10/30/17	0.250 U	1.00 U	2.10	2.90	10,000	630	5,400	310	960 T	8,100
	01/31/18	0.490	0.36 U	1.20	2.10	10,000	3,100	5,600	360	3,000	8,000
	04/09/18	0.370 J	0.36 U	0.66 T	1.50	11,000	3,600	5,800	340	4,100	8,000
	07/17/18	0.447	0.03	0.72	2.40	10,300	5 T	5,620	316	1,940	8,210
	10/21/18	0.086 J	0.02 T	0.52	2.70	9,840	3,480	5,150	307	840	8,140
	01/16/19	0.068 J	0.06	0.47	1.80 T	10,400	1,220	5,690	341	1,060	8,220
	04/03/19	0.082 J	0.05	0.73	4.60	10,400	219	5,370	335	1,060	8,090
	07/08/19	0.032	0.01 T	0.23 T	2.30	10,800	16,800	5,770	358	2,070	7,740
	10/28/19	0.128 J	0.06	0.51	3.10	10,300	10,400	5,350	338	930	8,230
	01/26/20	0.058 J	0.08	0.58	2.70	11,100	9,190	6,200	381	830	8,240
	04/14/20	0.067	0.02 U	0.50	5.10	10,300	8,170	5,630	348	800	7,920
	07/13/20	0.038	0.03 J	0.42	2.60 JT	10,400	6,450	5,330	358	940	8,130
	10/15/20	0.070	0.01 T	0.84	4.10	10,500	2,830	5,430	325	900	7,710
	01/20/21	0.044	0.02 T	0.51	2.70	10,100	1,620	5,370	363	780	8,380
	04/12/21	0.033 J	0.03	0.44	2.20	10,500	3,690	5,650	353	830	7,920
	07/13/21	0.034	0.02 U	0.53	3.60	10,800	17,000	5,580	366	830	7,890
	10/27/21	0.052	0.02 U	0.49	2.70	10,300	5,250	5,160	326	940	7,680
	01/18/22	0.153	0.01 T	0.35	1.90 T	11,000	5,690	5,840	369	1,570	7,880
	04/05/22	0.149	0.01 T	0.54	2.70	11,000	9,080	5,700	347	1,500	7,980
	07/18/22	0.067	0.02 T	0.41	2.20	10,100	9,120	5,380	346	870	7,690
	10/12/22	0.031	0.02 U	0.26	1.60 T	10,900	11,300	5,590	349	830	7,760
	01/25/23	0.015 T	0.02 U	0.23	4.30 J	10,600	8,730	5,470	344	790	7,950
	04/04/23	0.098	0.01 T	0.38	1.90 T	11,100	17,400	5,810	370	850	8,450
	07/26/23	0.030 J	0.02 U	0.33	2.20	10,400	8,030	5,470	339	900	8,330
	10/30/23	0.061	0.02 U	0.32	1.80 T	11,000	6,670	5,770	334	850	8,250
	count	48	48	48	48	45	45	45	45	45	45
	max	0.944	1.00	2.70	8.6	11,100	17,400	6,200	381	4,100	8,500
	min	0.015 T	0.005 T	0.12 T	0.70	9,400	5	5,100	285	660	7,460
	non-detects	3	17								
	average	0.152	0.08	0.65	2.42	10,390	4,486	5,491	337	1,097	8,005
	sample stdev	0.188	0.21	0.55	1.42	389	4,800	225	20	625	272
	variance	0.035	0.04	0.30	2.01	151,473	23,037,159	50,513	386	390,623	74,066
	coeff. of variation	0.8	0.4	1.2	1.7	26.7	0.9	24.4	17.2	1.8	29.4
	standard error	0.0	0.0	0.1	0.2	58.0	715.5	33.5	2.9	93.2	40.6

Cowlitz County Headquarters Landfill
Metals Groundwater Quality Data and Statistics (ug/l)

Site	Date	MCL>	Antimony 6	Arsenic 0.05	Barium 1000	Beryllium 4	Cadmium 5	Chromium 50 (total)	Cobalt	Copper 1000 (2ndary)	Lead 15	Nickel 100	Selenium 10
HGCS B1-P								Total					
	01/14/15												
	04/09/15												
	07/14/15		0.02 T	0.50 U	7	0.01 T	0.02 U	0.23 J	0.15	0.94	0.017 T	0.34 J	1 U
	10/27/15												
	01/27/16												
	04/05/16												
	07/11/16		0.05 U	0.50 U	9	0.02 U	0.02 U	0.03 T	0.15	0.42	0.020 U	0.22	1 U
	10/10/16												
	01/26/17												
	04/05/17												
	07/25/17		0.50 U	0.11	12	0.50 U	0.25 U	0.53	0.57 T	1.40	0.056 T	0.64 T	1 B1
	10/30/17												
	01/31/18												
	04/09/18												
	07/17/18		0.05 U	0.50 U	13	0.02 B1	0.02 U	0.20 U	3.06	0.96	0.020 B1	1.00	1 U
	10/21/18												
	01/16/19												
	04/03/19												
	07/08/19		0.05 U	0.13 T	16	0.02	0.02 U	0.20 U	5.27	0.77	0.020 U	0.86	1 U
	10/29/19												
	01/26/20												
	04/14/20												
	07/14/20		0.02 T	0.27 T	24	0.03	0.02 J	0.12 T	7.51	2.31	0.036 J	1.07	1 U
	10/16/20												
	01/20/21												
	04/12/21												
	07/13/21		0.03 T	0.14 T	23	0.01 T	0.02	0.09 T	7.94	2.14	0.020 U	4.08	1 U
	10/27/21												
	01/19/22												
	04/05/22												
	07/18/22		0.05 U	0.25 T	22	0.02	0.01 T	0.14 T	7.74	5.13	0.021	2.86	1 U
	10/11/22												
	01/25/23												
	04/04/23												
	07/26/23		0.05 U	0.69	27	0.02 T	0.01 T	0.11 T	11.20	3.71	0.020 U	4.84	1 U
	10/30/23		0.05 U	0.45 T	21	0.02	0.01 T	0.11 T	7.33	3.09	0.061 J	3.40	1 U
	count												
	max												
	min												
	non-detects												
	average												
	sample stdev												
	variance												
	coeff. of variation												
	standard error												

Note: U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B1 = blank corrected, if reported concentration below MRL corrected to MRL.
B = detected in blank, not corrected.
J = concentration estimated because of QA/QC.
UJ = MRL estimated because of QA/QC.
JT = detected below MRL, concentration estimated because of QA/QC.

Cowlitz County Headquarters Landfill
Metals Groundwater Quality Data and Statistics (ug/l)

Site	Date	Silver 50	Thallium 2	Vanadium	Zinc 5000 (2ndary)	Geochecmical Metals: Calcium	Iron 300 (2ndary)	Magnesium	Manganese 50 (2ndary)	Potassium	Sodium
HGCS B1-P		Total				Dissolved					
	01/14/15					15,900	20 U	5,770	70	764	5,680
	04/09/15					12,800	20 B1	4,800	67	743	5,030
	07/14/15	0.023	0.02 B1	0.16 T	0.36 JT	8,950	14 T	3,370	46	510	4,440
	10/27/15					12,600	20 U	4,970	36	500	5,120
	01/27/16					12,000	4 T	4,560	68	650	4,880
	04/05/16					10,500	20 B1	3,940	59	570	4,620
	07/11/16	0.020 U	0.02 U	0.20 U	0.37 T	10,900	20 U	4,190	66	670	4,890
	10/10/16					9,490	7 T	3,620	26	690	5,600
	01/26/17					11,400	21 U	4,470	61	700	4,610
	04/05/17					10,100	21 U	3,870	103	590	4,290
	07/25/17	0.250 U	0.30 T	1.00	1.10	7,400	9 T	3,000	100 T	580 T	4,400
	10/30/17					8,100	5 T	2,900	200	620 T	4,000
	01/31/18					6,000	10 U	2,300	290	660 T	3,700
	04/09/18					6,200	25	2,400	290	1,000 U	3,500
	07/17/18	0.020 B1	0.02 U	0.10 T	2.00 B1	7,440	21 U	2,810	545	580	3,830
	10/21/18					7,300	23	2,970	740	630	3,900
	01/16/19					6,280	21 U	2,450	579	560	3,550
	04/03/19					6,890	21 U	2,510	704	510	3,480
	07/08/19	0.020 U	0.02 U	0.33 T	1.70 T	8,620	2,210	3,200	1,000	640	3,480
	10/29/19					9,140	348	3,420	1,010	790	4,190
	01/26/20					7,660	1,610	3,070	768	600	3,840
	04/14/20					8,870	792	3,420	1,060	620	3,840
	07/14/20	0.012 T	0.03 J	0.16 T	2.10 J	9,390	3,050	3,400	1,200	750	4,230
	10/16/20					18,600	10 T	5,080	660	1,060	4,530
	01/20/21										
	04/12/21					9,750	1,180	3,830	942	720	4,050
	07/13/21	0.020 U	0.02 U	0.06 T	3.30	13,400	929	5,330	1,210	820	4,720
	10/27/21					12,300	21 B1	4,800	617	780	4,280
	01/19/22					8,510	1,010	3,410	654	660	4,000
	04/05/22					8,380	1,360	3,440	603	590	3,920
	07/18/22	0.020 U	0.04	0.08 T	3.50	8,550	781	3,580	908	700	4,020
	10/11/22					12,600	14 T	5,240	1,040	790	4,420
	01/25/23					7,030	1,360	2,940	517	530	3,600
	04/04/23					7,860	1,700	3,270	562	570	3,870
	07/26/23	0.020 U	0.01 T	0.09 T	5.90	11,700	726	4,820	1,090	1,550	4,900
	10/30/23	0.020 U	0.01 T	0.07 T	5.20	10,600	21 U	4,400	906	790	4,570
	count					40	40	40	40	40	40
	max					18,600	3,050	5,790	1,210	1,550	6,200
	min										
	non-detects						16			1	
	average					10,040.3	437.2	3,817.8	477.1	688.6	4,267.8
	sample stdev					3,408.9	731.9	1,174.1	407.7	214.8	949.0
	variance					11,620,525.6	535,668.0	1,378,571.7	166,211.0	46,119.6	900,638.4
	coeff. of variation					2.9	0.6	3.3	1.2	3.2	4.5
	standard error					539.0	115.7	185.6	64.5	34.0	150.1

Note: U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B1 = blank corrected, if reported concentration below MRL corrected to MRL.
B = detected in blank, not corrected.
J = concentration estimated because of QA/QC.
UJ = MRL estimated because of QA/QC.
JT = detected below MRL, concentration estimated because of QA/QC.

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichloropropane	1,2-Dibromo-3-Chloropropan	1,2-Dibromoethane (EDB)	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,4-Dichlorobenzene	2-Butanone (MEK)	2-Hexanone	4-Methyl-2-Pentanone (MIBK	Acrylonitrile
C-1	01/15/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/22/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/17/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/27/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/14/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/09/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/14/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/27/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/26/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.1 T	0.5 U	0.5 U	20 U	20 U	20 U	
	04/04/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/11/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/10/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/26/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/05/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/25/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/30/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/31/18		0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1				0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	2 U
	04/09/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/17/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/21/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/16/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/03/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/08/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/29/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/26/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/14/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/14/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/16/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/20/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/12/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/13/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/27/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/19/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/05/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/18/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/11/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/25/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/04/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/26/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/30/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	CFC-11	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cis-1,2-Dichloroethene	Cis-1,3-Dichloropropene	Chlorodibromomethane	Dibromomethane
C-1	01/15/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/22/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/17/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/27/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/14/15	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/09/15	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/14/15	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/27/15	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/26/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/04/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/11/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/10/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/26/17	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/17	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/25/17	20 B1	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	10/30/17	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.1 T**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/31/18	20 U	0.5 U		0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
	04/09/18	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/17/18	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/21/18	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/16/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/03/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/08/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/29/19	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/26/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/14/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/14/20	**22 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	10/16/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/20/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/12/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/13/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/27/21	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	01/19/22	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/18/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/11/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/25/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/04/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/26/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/30/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	Ethylbenzene	Iodomethane	m, p-Xylene	Methylene Chloride	o-Xylene	Styrene	Tetrachloroethene	Toluene	Trans-1,2-Dichloroethene	Trans-1,3-Dichloropropene	Trichloroethene	Vinyl Acetate	Vinyl Chloride
C-1	01/15/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/22/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	07/17/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	10/27/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	01/14/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/09/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	07/14/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	10/27/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	01/26/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/04/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	07/11/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	10/10/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	01/26/17	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/05/17	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	07/25/17	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U		0.5 U
	10/30/17	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	01/31/18	0.5 U		0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/09/18	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U,		0.5 U
	07/17/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.1 JT**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/21/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/16/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/03/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/08/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.1 T**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/29/19	0.5 U	5.0 B1	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/26/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/14/20	0.5 U	5.0 B1	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/14/20	0.5 U	5.0 B1	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/16/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/20/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/12/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/13/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/27/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/19/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/05/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/18/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/11/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/25/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/04/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/26/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/30/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichloropropane	1,2-Dibromo-3-Chloropropan	1,2-Dibromoethane (EDB)	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,4-Dichlorobenzene	2-Butanone (MEK)	2-Hexanone	4-Methyl-2-Pentanone (MIBK	Acrylonitrile
C-2	01/15/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/23/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/17/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/27/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/14/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/09/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/14/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/28/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/27/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/05/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/12/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/11/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/26/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/05/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/25/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/30/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/31/18		0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1				0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	2 U
	04/09/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/17/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/21/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/16/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/03/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/07/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/29/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/26/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/15/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/14/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/15/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/19/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/13/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/13/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/27/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/19/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/05/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/18/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/12/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/25/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/05/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/26/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/30/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	CFC-11	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cis-1,2-Dichloroethene	Cis-1,3-Dichloropropene	Chlorodibromomethane	Dibromomethane
C-2	01/15/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/23/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/17/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/27/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.1 T**	0.5 U	0.5 U	0.5 U	0.5 U
	01/14/15	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/09/15	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/14/15	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/28/15	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	01/27/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/12/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/11/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/26/17	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/17	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/25/17	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	10/30/17	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/31/18	20 U	0.5 U		0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
	04/09/18	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/17/18	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/21/18	20 T	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/16/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/03/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/07/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/29/19	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/26/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/15/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/14/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/15/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/19/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/13/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/13/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/27/21	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	01/19/22	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/18/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/12/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/25/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/26/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/30/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	Ethylbenzene	Iodomethane	m, p-Xylene	Methylene Chloride	o-Xylene	Styrene	Tetrachloroethene	Toluene	Trans-1,2-Dichloroethene	Trans-1,3-Dichloropropene	Trichloroethene	Vinyl Acetate	Vinyl Chloride
C-2	01/15/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/23/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	07/17/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	10/27/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	01/14/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/09/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	07/14/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U		0.5 U
	10/28/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	01/27/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/05/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	07/12/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	10/11/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	01/26/17	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/05/17	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	07/25/17	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	10/30/17	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	01/31/18	0.5 U		0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/09/18	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U,		0.5 U
	07/17/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/21/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/16/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/03/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/07/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.2 T**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/29/19	0.5 U	5.0 B1	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/26/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/15/20	0.5 U	5.0 B1	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/14/20	0.5 U	5.0 B1	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/15/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/19/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/13/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/13/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/27/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/19/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/05/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/18/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/12/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/25/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/05/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/26/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/30/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichloropropane	1,2-Dibromo-3-Chloropropan	1,2-Dibromoethane (EDB)	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,4-Dichlorobenzene	2-Butanone (MEK)	2-Hexanone	4-Methyl-2-Pentanone (MIBK	Acrylonitrile
MW-1	01/15/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/22/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/17/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/27/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/15/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/09/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/14/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/27/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/27/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/05/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/12/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/11/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/26/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/05/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/25/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/30/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/31/18		0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1				0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	2 U
	04/09/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/17/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/21/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/16/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/03/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/07/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/28/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/26/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/14/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/13/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/15/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/19/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/12/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/13/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/27/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/18/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/05/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/18/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/11/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/25/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/04/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/26/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/30/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	CFC-11	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cis-1,2-Dichloroethene	Cis-1,3-Dichloropropene	Chlorodibromomethane	Dibromomethane
MW-1	01/15/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/22/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/17/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/27/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.2 T**	**0.1 T**	0.5 U	0.5 U	0.5 U
	01/15/15	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/09/15	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/14/15	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/27/15	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/27/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/12/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/11/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/26/17	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/17	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/25/17	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	10/30/17	**2 T**	0.5 T	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.2 T**	0.5 U	0.5 U	0.5 U	0.5 U
	01/31/18	20 U	0.5 U		0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
	04/09/18	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/17/18	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/21/18	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/16/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/03/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/07/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/28/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/26/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/14/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/13/20	**4 JT**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/15/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/19/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/12/21	10 T	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/13/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/27/21	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	01/18/22	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/22	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/18/22	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/11/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/25/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/04/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/26/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/30/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	Ethylbenzene	Iodomethane	m, p-Xylene	Methylene Chloride	o-Xylene	Styrene	Tetrachloroethene	Toluene	Trans-1,2-Dichloroethene	Trans-1,3-Dichloropropene	Trichloroethene	Vinyl Acetate	Vinyl Chloride
MW-1	01/15/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/22/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	07/17/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	10/27/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	01/15/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/09/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	07/14/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	10/27/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	01/27/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/05/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	07/12/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	10/11/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	01/26/17	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/05/17	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	07/25/17	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	10/30/17	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	01/31/18	0.5 U		0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/09/18	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U,		0.5 U
	07/17/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.1 JT**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/21/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/16/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/03/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/07/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.3 T**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/28/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/26/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/14/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/13/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/15/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/19/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/12/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.1 T	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/13/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/27/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/18/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/05/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/18/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/11/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/25/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/04/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/26/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/30/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichloropropane	1,2-Dibromo-3-Chloropropan	1,2-Dibromoethane (EDB)	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,4-Dichlorobenzene	2-Butanone (MEK)	2-Hexanone	4-Methyl-2-Pentanone (MIBK	Acrylonitrile
P-9	01/31/18		0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1				0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	2 U
	01/31/18		0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1				0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	2 U
	04/09/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/09/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/17/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/17/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/21/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/21/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/16/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/16/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/03/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/03/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/08/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/08/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/29/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/29/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/26/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/26/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/15/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/15/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/14/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/14/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/16/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/16/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/20/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/20/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/13/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/13/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/13/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/13/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/27/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/27/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/19/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/19/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/05/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/05/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/18/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/18/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/12/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/12/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/25/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/25/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/05/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/05/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/26/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/26/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/30/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/30/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	CFC-11	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cis-1,2-Dichloroethene	Cis-1,3-Dichloropropene	Chlorodibromomethane	Dibromomethane
P-9	01/31/18	20 U	0.5 U		0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
	01/31/18	20 U	0.5 U		0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
	04/09/18	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/09/18	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/17/18	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/17/18	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/21/18	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/21/18	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/16/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/16/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/03/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	04/03/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	07/08/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/08/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/29/19	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/29/19	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/26/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/26/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/15/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/15/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/14/20	**11 JT**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	07/14/20	**5 JT**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	10/16/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/16/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/20/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/20/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/13/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/13/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/13/21	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/13/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/27/21	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	10/27/21	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	01/19/22	1 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/19/22	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/18/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/18/22	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/12/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/12/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/25/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/25/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/26/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/26/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/30/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/30/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	Ethylbenzene	Iodomethane	m, p-Xylene	Methylene Chloride	o-Xylene	Styrene	Tetrachloroethene	Toluene	Trans-1,2-Dichloroethene	Trans-1,3-Dichloropropene	Trichloroethene	Vinyl Acetate	Vinyl Chloride
P-9	01/31/18	0.5 U		0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	01/31/18	0.5 U		0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/09/18	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U,		0.5 U
	04/09/18	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U,		0.5 U
	07/17/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.1 JT**	0.5 U	0.5 U	0.5 U		0.5 U
	07/17/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	10/21/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	10/21/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	01/16/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/16/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/03/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/03/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/08/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.3 T**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/08/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.3 T**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/29/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/29/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/26/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/26/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/15/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/15/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/14/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/14/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/16/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.1 T**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/16/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.1 T**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/20/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/20/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.1 JT**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/13/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/13/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/13/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/13/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/27/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/27/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/19/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/19/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/05/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/05/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/18/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/18/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/12/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/12/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/25/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/25/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/05/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/05/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/26/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/26/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/30/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/30/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichloropropane	1,2-Dibromo-3-Chloropropan	1,2-Dibromoethane (EDB)	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,4-Dichlorobenzene	2-Butanone (MEK)	2-Hexanone	4-Methyl-2-Pentanone (MIBK	Acrylonitrile
U-1	01/27/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/04/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/11/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/11/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/26/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	04/05/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/25/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	10/30/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	01/31/18		0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1				0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	2 U
	04/09/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/17/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/21/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/16/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/03/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/08/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/28/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/26/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/14/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/13/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/15/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/20/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/12/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/13/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/27/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/18/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/05/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/18/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/12/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	01/25/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	04/04/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/26/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/30/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
B1-P	07/17/14	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/14/15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/11/16	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/25/17	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	
	07/17/18	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/08/19	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/14/20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/13/21	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/18/22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	07/26/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U
	10/30/23	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.0 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	20 U	20 U	20 U	5.0 U

Note: U = not detected, MRL shown.
J = concentration estimated because of QA/QC.
T = detected below the MRL, concentration estimated.
UJ = MRL estimated because of QA/QC.
B1 = blank corrected, if reported concentration below MRL corrected to JT = detected below MRL, concentration estimated because of QA/QC.
B = detected in blank, not corrected.

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	Acetone	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide	Carbon Tetrachloride	CFC-11	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cis-1,2-Dichloroethene	Cis-1,3-Dichloropropene	Chlorodibromomethane	Dibromomethane
U-1	01/27/16	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/04/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/11/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/11/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/26/17	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/17	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/25/17	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/30/17	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/31/18	20 U	0.5 U		0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
	04/09/18	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/17/18	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/21/18	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/16/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/03/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/08/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/28/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/26/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/14/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/13/20	**5 JT**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/15/20	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/20/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/12/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/13/21	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/27/21	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	01/18/22	1 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/05/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/18/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/12/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	01/25/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	04/04/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/26/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/30/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
B1-P	07/17/14	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/14/15	20 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/11/16	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/25/17	20 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	50.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U
	07/17/18	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/08/19	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/14/20	**5 JT**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.1 B1	0.5 U	0.5 U	0.5 U	0.5 U
	07/13/21	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/18/22	20 B1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	07/26/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	10/30/23	20 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Note: U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B1 = blank corrected, if reported concentration below MRL corrected to MRL.
B = detected in blank, not corrected.

J = co Note: U = not detected, MRL shown.
UJ = MRL es T = detected below the MRL, concentration estimated.
JT = detected B1 = blank corrected, if reported concentration below MRL corrected to MRL.
B = detected in blank, not corrected.

Cowlitz County Headquarters Landfill
Groundwater Quality Data
Volatile Organic Compounds ug/l (ppb)

Sample Location	Date Sampled	Ethylbenzene	Iodomethane	m, p-Xylene	Methylene Chloride	o-Xylene	Styrene	Tetrachloroethene	Toluene	Trans-1,2-Dichloroethene	Trans-1,3-Dichloropropene	Trichloroethene	Vinyl Acetate	Vinyl Chloride
U-1	01/27/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/04/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	07/11/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	10/11/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	01/26/17	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/05/17	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	07/25/17	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	10/30/17	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	01/31/18	0.5 U		0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	04/09/18	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U,		0.5 U
	07/17/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/21/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/16/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/03/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/08/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.3 T**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/28/19	0.5 U	5.0 B1	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/26/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/14/20	0.5 U	5.0 B1	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/13/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/15/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/20/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/12/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/13/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/27/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/18/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/05/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/18/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/12/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	01/25/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	04/04/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/26/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/30/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
B1-P	07/17/14	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 B1	0.5 U	0.5 U	0.5 U		0.5 U
	07/14/15	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U		0.5 U
	07/11/16	0.5 U		0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	07/25/17	0.5 U	50 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U
	07/17/18	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/08/19	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.1 T**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/14/20	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	**0.1 T**	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/13/21	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/18/22	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	07/26/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U
	10/30/23	0.5 U	5.0 U	0.5 U	2.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U

Note: U = not detected, MRL shown.
J = concentration estimated because of QA/QC.
T = detected below the MRL, concentration estimated.
UJ = MRL estimated because of QA/QC.
B1 = blank corrected, if reported concentration below MRL corrected to
JT = detected below MRL, concentration estimated because of QA/QC.
B = detected in blank, not corrected.
because of QA/QC.

Cowlitz County Headquarters Landfill
Hydraulic Gradient Control System
Annual Petroleum Hydrocarbons
and Cyanide Data

Location	Date	ug/L			
		Diesel Range Organics	Gasoline Range Organics	Residual Range Organics	Cyanide
HGCS B1-P	07/17/14	16 T	250 U	520 B1	0.01 U
	07/14/15	260 B1	250 U	520 B1	0.01 U
	07/11/16	270 B1	250 U	530 B1	0.005 U
	07/25/17	100 U	50 U	34 T	0.005 U
	07/17/18	320 B1	250 B1	40 T	0.003 U
	07/08/19	270 B1	250 U	530 B1	0.020 U
	07/13/20	29 T	250 U	500 B1	0.020 U
	07/13/21	260 B1	250 U	520 B1	0.020 U
	07/18/22	280 B1	14 T	560 B1	0.020 U
	07/26/23	260 B1	250 B1	520 B1	0.020 U

Note: U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B1 = blank corrected, reported concentration below MRL corrected to MRL.
B = detected in blank, not corrected.

APPENDIX C

SURFACE WATER AND LEACHATE QUALITY DATA

Cowlitz County Headquarters Landfill
Surface Water Quality Data

Location	Date	mg/L					Field Measurements						
		Chloride	Ammonia	Sulfate	TOC	Total Phosphorus	pH	Specific Conductance (umhos/cm)	Temperature (C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)	Flow
SS-1	01/27/16	2.3	0.05 B1	0.8	0.9	0.01 U	6.0	45	8.2	6.7	10.3	129	Moderate
	04/04/16	2.2	0.05 B1	1.3	1.3	0.02	7.8	53	10.1	13.9	10.5	-42	Moderate
	07/11/16	2.2	0.05 B1	0.9	1.6	0.01 T	7.9	62	13.4	5.7	12.3	-51	Low
	10/10/16	4.6	0.05 B1	2.6	2.6	0.04	7.9	67	11.3	12.2	11.4	-57	Moderate
	01/26/17	2.3	0.05 B1	0.9	0.7	0.02	9.4	45	6.2	7.4	12.2	-125	Moderate
	04/05/17	2.0	0.05 B1	0.9	1.1 J	0.03	8.1	44	8.3	15.3	11.9	-60	Moderate
	07/25/17	2.3 T	0.10 B1	50.0 U	1.9	0.05 J	7.4	66	14.0	14.0	9.0	-24	Low
	10/30/17	2.4 T	0.10 U	1.1 T	1.6 B	0.01	7.4	66	14.0	14.0	9.0	-24	Low
	01/31/18	2.1 T,B	0.10 U	0.9 T	0.8	0.01 B	8.3	44	7.2	11.8	11.2	-81	Moderate
	04/09/18	1.9 T	0.10 U	0.9 T	1.0	0.01 B1	9.1	44	7.3	18.6	11.3	-118	Moderate
	07/17/18	2.4	0.05 U	1.0	1.0	0.02	6.3	72	15.3	2.1	8.1	NM	Low
	10/22/18	2.7	0.05 U	1.2	1.6 J	0.01	6.5	80	7.6	1.1	9.3	-18	Low
	01/16/19	2.5	0.05 U	1.0	1.5	0.03	7.6	47	4.9	4.2	11.5	-79	Moderate
	04/03/19	2.1	0.05 B1	0.9	1.6	0.01 T	7.9	47	9.7	5.3	10.5	-114	Moderate
	07/08/19	2.4	0.05 B1	1.0	1.2	0.01	6.4	68	13.3	2.1	9.2	NM	Low
	10/28/19	2.6	0.05 U	0.9 J	1.2	0.01 U	7.0	57	6.2	3.7	10.8	NM	Moderate
	01/27/20	2.0	0.05 U	1.0	0.5 T	0.02 T	7.6	43	7.9	6.2	10.7	-69	Moderate
	04/14/20	2.2	0.01 T	1.0	1.6	0.02 T	7.3	50	9.5	8.1	9.6	-51	Moderate
	07/13/20	2.8	0.05 U	2.2	1.5	0.03	8.4	61	13.6	3.1	9.3	-106	Low
	10/15/20	2.5	0.05 U	1.3	1.4	0.01 T	7.4	59	10.7	2.7	8.1	-57	Moderate
	01/19/21	2.2	0.05 U	1.0 J	0.8	0.01 T	7.4	49	7.0	4.8	11.1	-56	Moderate
	04/12/21	2.3	0.03 B1	0.9	1.0	0.01 T	7.1	53	8.0	5.1	9.7	NM	Moderate
	07/13/21	2.5	0.05 B1	1.3	2.2	0.02	7.1	82	13.9	1.8	8.4	-40	Low
	10/27/21	2.7	0.05 B1	2.0	3.3	0.02	6.1	59	10.4	11.5	9.6		Moderate
	01/18/22	2.2 J	0.01 T	0.9 J	1.2	0.04	8.2	46	8.3	4.6	10.4	-85	Moderate
	04/05/22	2.9	0.05 B1	1.0 T	1.5	0.03	8.0	51	7.4	10.0	10.1	-87	Moderate
	07/18/22	2.3	0.05 B1	1.1	1.7	0.01 T	7.3	62	13.3	3.9	5.6		Low
	10/11/22	3.2	0.05 U	2.9	1.4	0.01 T	7.9	97	11.9	1.0	7.5	-63	V. Low
	01/25/23	2.3	0.05 U	0.9	1.0	0.01 T	6.9	45	7.2	4.0	9.0	-4	Moderate
	04/04/23	2.5	0.05 B1	0.9	1.0	0.02 T	7.2	50	7.0	6.4	9.6	-33	Moderate
	07/26/23	2.7	0.05 B1	1.0	1.6	0.02 B1	7.2	85	13.8	1.7	7.6	-23	Low
	10/30/23	2.7	0.05	1.4	1.4	0.02	6.7	65	5.0	2.1	10.2	-4	Moderate

Note: U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B1 = blank corrected, if reported concentration below MRL corrected to MRL.
B = detected in blank, not corrected.
J = concentration estimated because of QA/QC.
UJ = MRL estimated because of QA/QC.
JT = detected below MRL, concentration estimated because of QA/QC.
NM = not measured

Cowlitz County Headquarters Landfill
Leachate Quality Data
Miscellaneous Parameters

Site	Date	pH	Spec. Conduc. (umhos/cm)	Temp. (°C)	Total Suspended Solids (mg/L)	Total Dissolved Solids (mg/L)	Biochemical Oxygen Demand (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Total Cyanide (mg/L)	Weak Acid Dissociable Cyanide (mg/L)	Oil and Grease (mg/L)	Total Phenolics (mg/L)	Phenol (ug/L)	Dioxin (2,3,7,8-TCDD) (pg/L)	Flow
LP-B1	6/7/2021	7.9			42.0		810	108								
	7/9/2021			4.7	41.0		800	255								
	8/11/2021			3.8	28.0		930	186		0.058			1.54	440 J		
	9/13/2021			21.2	29.5		1210	88.8								
	10/8/2021			17.4	27.0		440	132								
	11/4/2021			19.8	29.5		246	73.1								
	12/28/2021				20 U		460	99.2								
	2/3/2022	7.8		12.8	34.0 J		740	124								
	3/7/2022	7.8		14.0	20 U		610 J	114								
	4/4/2022				10.0		1180	128								
	5/5/2022				84.0		>714 J	288								
	5/19/2022				20 U		610	84.7								
	6/9/2022	7.8		21.1	34		550	132								
	7/12/2022	8.1		23.6	25		760	116								
	8/11/2022	8.4		19.7	35		660	202		0.040			0.805			
	9/14/2022	7.8		19.4	20		370	148								
	10/6/2022			8.9	26		540	125								
	11/11/2022			24.9	9		200	63.3								
	12/2/2022	7.6		7.7	6		260	62.3								
	1/3/2023	7.3		9.2	8		270	50.8								
	2/1/2023	7.3		7.1	5		1860	63.3								
	2/14/2023	7.5		10.6	7		340	108								
	3/1/2023	7.2		6.9	8		360	61.2								
	4/5/2023	7.5		7.8	7		158	49.2								
	5/3/2023	7.4		10.1	9		440	49.6								
	6/6/2023	7.4		8.9	14		380	92.6								
	7/11/2023	7.7		12.2	20		590	80.5								
	8/3/2023	7.8		11.9	18		880	98.9		0.041			0.438			
	9/7/2023	7.6		12.2	13		690	136								
	10/10/2023	7.4		10.6	11		570	104								
	11/9/2023	7.0		11.8	21		207	64.5								

Note: U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B1 = blank corrected, if reported conc. below MRL corrected to MRL.
B = detected in blank, not corrected.
J = concentration estimated because of QA/QC.
UJ = MRL estimated because of QA/QC.
JT = detected below MRL, concentration estimated because of QA/QC.

Cowlitz County Headquarters Landfill
Leachate Quality Data
Metals Data
(ug/L)

Site	Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium Total	Chromium Hexavalent	Cobalt	Copper	Lead
LP-B1	1/16/2014		18.8	115		0.1	26.9	500 U		28.4	0.3
	8/5/2014	46.4	119	147	0.2	0.3	151	50 U	11.2	8.5	1.6
	1/6/2015		33.7	125		0.25	38.4	500 U		67.0	5.7
	2/3/2015		17.3	110		0.07	20.5			15.8	0.66
	8/11/2015	8.70	74.7	225	0.05 U	0.08	148	50 UJ	15.3	24.1	0.89
	1/7/2016		25.2	152		0.37	42.5	50 U		39.4	6.7
	8/2/2016	4.13	39.0	246	0.1 U	0.1 U	160	0.5 UJ	16.7	25.2	3.5
	9/12/2016		47.6	248		0.29	111	50 UJ		14.8	2.6
	1/5/2017		22.9	393		0.28	67.2	0.05 UJ		29.2	10.6
	8/8/2017	2.80	25.0	410	2.5 U	0.38 T	120	4.7	13	52.0	7.5
	1/17/2018		35.0	580		0.83	190	0.25 U		130	45.0
	8/9/2018	4.12	32.1	501	0.2 U	0.76	209	0.05 U	22.5	186	52.6
	2/5/2019		30.0	479		0.52	151			74.3	32.8
	8/6/2019	6.52	33.4	489	0.1 U	0.42	198	0.05 U	17.7	33.0	22.6
	8/11/2020	8.40	39.6	339	0.1 U	0.26	249		22.5	29.0	11.7
	8/11/2021	11.00	45.4	450	0.16 U	0.19	248		20.2	33.5	8.4
	8/15/2022	7.04	32.2	575	0.1 U	0.34	182		17.5	16.3	9.3
	8/3/2023	4.02	35.5	404	0.1 U	0.18	171		17.1	41.1	7.3

Note:
U = not detected, MRL shown.
T = detected below the MRL, conc. estimated.
B = detected in blank, not corrected.
B1 = blank corrected, if reported concentration < MRL corrected to MRL.
J = concentration estimated because of QA/QC.
UJ = MRL estimated because of QA/QC.
JT = detected < MRL, conc. estimated because of QA/QC.

Cowlitz County Headquarters Landfill
Leachate Quality Data
Metals Data
(ug/L)

Site	Date	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
LP-B1	1/16/2014	0.2 U	2.8	21.9	6.9	0.10			5.1
	8/5/2014	0.8 U	17.9	85.6	6.1	0.60	0.1 U	178	13.2
	1/6/2015	0.2 U	9.7	36.9	2 U	0.14			39.8
	2/3/2015	0.2 U	1.5	21.2	4 U	0.07			7.9
	8/11/2015	0.2 U	14.2	90.2	13	0.11	0.05 U	241	16.7
	1/7/2016	0.2 U	5.3	40.9	5 U	0.18			337
	8/2/2016	0.8 U	13.9	97.4	27.2	0.12	0.1 U	191	51.6
	9/12/2016	0.2 U	7.0	87.9	10 U	0.38			38.2
	1/5/2017	0.2 U	10.6	68.7	5 U	0.12			71.8
	8/8/2017	1.4	34.0	88.0	1.8 T	1.20	5 U	110	45
	1/17/2018	0.39	77.0	190	3.7	2.5 U			150
	8/9/2018	0.142	32.9	132	10 U	0.36	0.2 U	88.6	337
	2/5/2019	0.2 U	81.0	163	4 U	0.08 U			260
	8/6/2019	0.2 U	80.4	190	5 U	0.10 U	0.11	129	99
	8/11/2020	0.4 U	67.4	212	21.5	0.25 U	0.1 U	139	68
	8/11/2021	0.8 U	104.0	219	8.0 U	0.16 U	0.16 U	120	82
	8/15/2022	0.2 U	44.8	162	5 U	0.12	0.1 U	91.6	62
	8/3/2023	0.2 U	22.4	174	5 U	0.10 U	0.1 U	84.4	49

Note: U = not detected, MRL shown.
T = detected below the MRL, conc est.
B = detected in blank, not corrected.
B1 = blank corrected, if reported concentration < MRL corrected to MRL.
J = conc. estimated because of QA/QC.
UJ = MRL estimated because of QA/QC.
JT = conc< MRL, conc est because of QA/QC.

Cowlitz County Headquarters Landfill
Leachate Quality Data
Volatile Organic Compounds
(ug/L)

Sample Location	Date Sampled	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Chloroethyl Vinyl Ether	2-Butanone	2-Hexanone	4-Methyl-2-Pentanone	Acetone	Acrolein	Acrylonitrile
LP-B1	8/5/2014	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	20 U	20 U	20 U	20 U		
	8/11/2015	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	20 U	20 U	20 U	20 U		
	8/2/2016	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	20 U	20 U	20 U	20 U		
	8/8/2017	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.3 T**	0.5 U	0.5 U	0.5 U	1 U	10 U	20 U	**3 T**	20 U		
	8/9/2018	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	50 U						
	8/6/2019	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U					50 U	10 U
	8/11/2020	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U					50 U	10 U
	8/11/2021	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	100 U					500 U	1000 U
	11/11/2022	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	50 U					250 U	500 U
	8/3/2023	130 U	130 U	130 U	130 U	130 U	130 U	130 U	130 U	130 U	130 U	250 U					1300 U	2500 U

Note:
U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B = detected in blank, not corrected.
B1 = blank corrected, if reported conc. below MRL corrected to MRL.
J = concentration estimated because of QA/QC.
UJ = MRL estimated because of QA/QC.
JT = detected below MRL, concentration estimated because of QA/QC.

Cowlitz County Headquarters Landfill
Leachate Quality Data
Volatile Organic Compounds
(ug/L)

Sample Location	Date Sampled	Benzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Tetrachloride	Trichlorofluoromethane (F	Dichlorodifluoromethane	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cis-1,2-Dichloroethene	Cis-1,3-Dichloropropene	Chlorodibromomethane	Ethylbenzene	Methylene Chloride	o-Xylene
LP-B1	8/5/2014	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U
	8/11/2015	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U
	8/2/2016	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U
	8/8/2017	0.5 U	0.5 U	0.5 U	1.0 U	0.5 U	0.5 U	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.3** T
	8/9/2018	25 U	25 U	25 U	25 U	25 U	25 U		25 U	25 U	25 U	25 U		25 U		25 U	25 U	
	8/6/2019	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U	5.0 U	
	8/11/2020	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U	5.0 U	
	8/11/2021	50 U	50 U	50 U	50 U	50 U	50 U		50 U	50 U	50 U	50 U		50 U	50 U	50 U	50 U	
	11/11/2022	25 U	25 U	25 U	25 U	25 U	25 U		25 U	25 U	25 U	25 U		25 U	25 U	25 U	25 U	
	8/3/2023	130 U	130 U	130 U	130 U	130 U	130 U		130 U	130 U	130 U	130 U		130 U	130	130 U	130 U	

Note:
U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B = detected in blank, not corrected.
B1 = blank corrected, if reported conc. below MRL corrected to MRL.

Cowlitz County Headquarters Landfill
Leachate Quality Data
Volatile Organic Compounds
(ug/L)

Sample Location	Date Sampled	Styrene	Tetrachloroethene	Toluene	Trans-1,2-Dichloroethene	Trans-1,3-Dichloropropen	Trichloroethene	Vinyl Chloride
LP-B1	8/5/2014	0.5 U	5.0 U	0.04 T	5.0 U	5.0 U	5.0 U	5.0 U
	8/11/2015	0.5 U	5.0 U	0.04 T	5.0 U	5.0 U	5.0 U	5.0 U
	8/2/2016	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	8/8/2017	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8/9/2018		25 U	25 U	25 U	25 U	25 U	25 U
	8/6/2019		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	8/11/2020		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	8/11/2021		50 U	50 U	50 U	50 U	50 U	50 U
	11/11/2022		25 U	25 U	25 U	25 U	25 U	25 U
	8/3/2023		130 U	130 U	130 U	130 U	130 U	130 U

Note: J = concentration estimated because of QA/QC.
UJ = MRL estimated because of QA/QC.
JT = detected below MRL, concentration estimated because of QA
U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B1 = blank corrected, if reported conc. below MRL corrected to MRL.
B = detected in blank, not corrected.

Cowlitz County Headquarters Landfill
Leachate Quality Data
Volatile Organic Compounds
(ug/L)

Sample Location	Date Sampled	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Chloroethyl Vinyl Ether	2-Butanone	2-Hexanone	4-Methyl-2-Pentanone	Acetone	Acrolein	Acrylonitrile
LP-B1	8/5/2014	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	20 U	20 U	20 U	20 U		
	8/11/2015	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	20 U	20 U	20 U	20 U		
	8/2/2016	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	20 U	20 U	20 U	20 U		
	8/8/2017	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.3 T**	0.5 U	0.5 U	0.5 U	1 U	10 U	20 U	**3 T**	20 U		
	8/9/2018	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	50 U						
	8/6/2019	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U					50 U	10 U
	8/11/2020	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U					50 U	10 U
	8/11/2021	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	100 U					500 U	1000 U
	11/11/2022	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	50 U					250 U	500 U
	8/3/2023	130 U	130 U	130 U	130 U	130 U	130 U	130 U	130 U	130 U	130 U	250 U					1300 U	2500 U

Note:
U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B = detected in blank, not corrected.
B1 = blank corrected, if reported conc. below MRL corrected to MRL.
J = concentration estimated because of QA/QC.
UJ = MRL estimated because of QA/QC.
JT = detected below MRL, concentration estimated because of QA/QC.

Cowlitz County Headquarters Landfill
Leachate Quality Data
Volatile Organic Compounds
(ug/L)

Sample Location	Date Sampled	Benzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Tetrachloride	Trichlorofluoromethane (F	Dichlorodifluoromethane	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Cis-1,2-Dichloroethene	Cis-1,3-Dichloropropene	Chlorodibromomethane	Ethylbenzene	Methylene Chloride	o-Xylene
LP-B1	8/5/2014	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U
	8/11/2015	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U
	8/2/2016	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	0.5 U
	8/8/2017	0.5 U	0.5 U	0.5 U	1.0 U	0.5 U	0.5 U	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.3** T
	8/9/2018	25 U	25 U	25 U	25 U	25 U	25 U		25 U	25 U	25 U	25 U		25 U		25 U	25 U	
	8/6/2019	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U	5.0 U	
	8/11/2020	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U	5.0 U	
	8/11/2021	50 U	50 U	50 U	50 U	50 U	50 U		50 U	50 U	50 U	50 U		50 U	50 U	50 U	50 U	
	11/11/2022	25 U	25 U	25 U	25 U	25 U	25 U		25 U	25 U	25 U	25 U		25 U	25 U	25 U	25 U	
	8/3/2023	130 U	130 U	130 U	130 U	130 U	130 U		130 U	130 U	130 U	130 U		130 U	130	130 U	130 U	

Note:
U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B = detected in blank, not corrected.
B1 = blank corrected, if reported conc. below MRL corrected to MRL.

Cowlitz County Headquarters Landfill
Leachate Quality Data
Volatile Organic Compounds
(ug/L)

Sample Location	Date Sampled	Styrene	Tetrachloroethene	Toluene	Trans-1,2-Dichloroethene	Trans-1,3-Dichloropropen	Trichloroethene	Vinyl Chloride
LP-B1	8/5/2014	0.5 U	5.0 U	0.04 T	5.0 U	5.0 U	5.0 U	5.0 U
	8/11/2015	0.5 U	5.0 U	0.04 T	5.0 U	5.0 U	5.0 U	5.0 U
	8/2/2016	0.5 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	8/8/2017	5.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8/9/2018		25 U	25 U	25 U	25 U	25 U	25 U
	8/6/2019		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	8/11/2020		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	8/11/2021		50 U	50 U	50 U	50 U	50 U	50 U
	11/11/2022		25 U	25 U	25 U	25 U	25 U	25 U
	8/3/2023		130 U	130 U	130 U	130 U	130 U	130 U

Note: J = concentration estimated because of QA/QC.
UJ = MRL estimated because of QA/QC.
JT = detected below MRL, concentration estimated because of QA
U = not detected, MRL shown.
T = detected below the MRL, concentration estimated.
B1 = blank corrected, if reported conc. below MRL corrected to MRL.
B = detected in blank, not corrected.

APPENDIX D

FOURTH QUARTER TECHNICAL MEMORANDA AND ANALYTICAL DATA REPORTS

MEMORANDUM

November 2, 2023

TO: Cowlitz County Headquarters Landfill Project File

FROM: Dennis R. Dykes, Bright Fields Groundwater, Inc.

SUBJECT: 4th Quarter 2023 Field Sampling Procedures

The 4th quarter 2023 sampling event at the Cowlitz County Headquarters Landfill was conducted on October 30 and 31, 2023. Five monitoring wells, one surface water site, one leachate site and one hydraulic gradient control system (HGCS) site were sampled. One duplicate sample was also prepared. The sample locations, sample identifiers, and purging parameters are summarized on the attached table. Additionally, the depth to water was measured in 10 piezometers.

The sampling and sample handling procedures used were consistent with those described in the draft Sampling and Analysis Plan as revised in June 2023. The procedures were consistent with the previous SAP and supplemented by those in the revised plan. Cowlitz County decided to implement both the currently permitted and the proposed revised procedures this quarter due to the delayed approval of the revised SAP and desire to begin collection of the proposed additional data. The proposed additional samples and analytical were agreed to in a letter from the EHU dated April 13, 2023.

The monitoring wells were purged and sampled using Geotech GEO1.66SS18 bladder pumps dedicated to each well. At U-1 the valves in the pump have in the past become stuck during the interval between sampling events by mineral precipitation. Sampling procedures were modified to remove the pump after sampling and store it in clean plastic between events. The pump was returned to the well immediately prior to sampling and removed after sampling.

The depth to water in each well was measured immediately before purging. At each well, the pump was started and the flow adjusted to rates ranging from approximately 62 ml/minute to approximately 555 ml per minute based on previous sampling of each well. The depth to water was checked periodically during purging to determine the approximate amount and stability of drawdown. The variables that affected the pumping rate were the aquifer and well characteristics, the depth of submergence of the pump (which affects the fill rate of the bladder), and the depth to water (which determines the pressure that must be applied to the pump to push water to the surface). An additional consideration is that the pressure applied during the discharge cycle must be below the level that blows out a flow through cell. The flow through cells are where field parameters are measured and include stoppers that hold the meter probes.

The wells were generally pumped until two liters had flowed through the apparatus before the measurement of field parameters (temperature, pH, specific conductance, dissolved oxygen, and redox potential) was initiated. Field parameters were measured and recorded at intervals that allowed at least three times the volume of the apparatus to flow through between measurements (at least 360 ml). This took from 3 to 9 minutes at different wells. Purging continued until field parameters had stabilized within SAP criteria with particular attention typically paid to specific conductance and dissolved oxygen. It should be noted that the sample temperature was likely affected by the ambient temperature because of the low flow rates. The ambient temperature was typically somewhat lower or higher than the sample temperature depending on the location and time of day. The recorded temperature is likely to vary slightly from the groundwater temperature.

The depth to water was checked and recorded occasionally during purging. Sample collection was initiated at each well when field parameters had stabilized and the water level appeared to be

relatively stable (less than 0.01 to 0.02 feet per minute change). Purge water was disposed to vegetated ground away from surface water at each well. The final flow rate and depth to water were measured and recorded after sample collection just before the pump was turned off.

Eight sample bottles were filled directly from the flow through cell for each groundwater sample. This included one unpreserved bottle for dissolved metals analysis that was identified for lab filtering before preservation.

A duplicate sample was collected at P-9 by alternately filling sample bottles. The bottle labels were marked with the project site, blind sample numbers and the date and time. The sampling time for the duplicates were marked as one half hour different with both times before the actual sample collection time.

One surface water sample was collected by submerging the bottles under the water surface at the designated location. Five sample bottles were filled at this location. This included bottles for additional analyses from the permit specified so the analytical is similar to groundwater. Flow was observed to be bank to bank in a 3 to 4 foot wide main channel within the stream bed and therefore characterized as moderate. The culvert a short distance downstream of the sampling location was replaced a few years ago. The sample was collected upstream of the stream bed that had been disturbed by construction. It appears that high wet season flow rates move and reorganize the bed load which reconfigures the streambed. Stream bed conditions affected by the culvert construction are becoming less distinct.

The HGCS sample was collected directly from the flow stream from the 8-inch diameter primary discharge pipe (designated B1-P). Eight sample bottles were filled at this. This included bottles for additional analyses from the permit specified so the analytical is similar to groundwater. The screen that had covered the discharge pipe was removed several years ago. Flow from the pipe was more than an inch deep and was characterized as moderate although direct comparison to earlier observations was not possible because the screen had been removed. The HGCS was extended several years ago under landfill Cells 7 and 8 and in the summer of 2021 under Cell 9. From the 3-inch diameter secondary pipes (designated B1-S2 and B1-S3) and directly from the gravel could not be determined. The portion of the HGCS sample for dissolved metals analysis was identified for lab filtering.

A leachate sample was collected from the flow at the outfall pipe to the leachate pond. The location is identified as LPN-B1. This sample is not required by the permit but has been approved for the proposed permit modification. The analyses specified for this sample was the same as for groundwater except that all the metals are analyzed as total.

The sample bottles were placed in a cooler immediately after collection. Samples were delivered to ALS in Longview, Washington on October 31st under chain of custody documentation.

The depth to water was measured in 15 monitoring wells and piezometers on 30 and 31, 2023. The measurements in sampled wells were made prior to sampling and in piezometers on October 31st or at a convenient time during the day samples were collected. The water level at P-12 was not measured because an odor was noticed on the probe in the past which required more vigorous rinsing and wiping. The water level at P-12 had not varied over at least 15 years and the data not considered worth the risk of cross contamination. It appears that the measurement is likely to be of stagnant water in the tail pipe of the well. The monument at P-6 has settled over time and the well casing was cut down 0.31 feet a few years ago so the monument could be closed and locked. The calculation to water level elevation using the depth to water measurement has been adjusted in the data table.

Sampling procedures are documented on the attached Field Sampling Data Sheets. The hydrology field sheet and the sample Chain of Custody sheets are also attached.

Dedicated or disposable sampling equipment was used therefore decontamination was not necessary. The well probe and field meters were rinsed with distilled water after use. The field meters were calibrated before use.

Attachments: Sampling Summary
Hydrology Field Sheet
Field Sampling Data Sheets
Chain of Custody Document

Cowlitz County Headquarters Landfill
Sampling Summary for
4th Quarter 2023

Sample Location	Sample Identifier	Depth to Water		Total Draw-down	Approx. Flow Rate	Approx. Total Liters Removed *	Field Measure-ments Intervals **
		Initial (feet)	Final (feet)	(feet)	(milliliters/ minute)		
C-1	W5-1030	17.00	19.05	2.05	234.4	7.3	3
C-2	W6-1030	35.20	36.55	1.35	62.0	4.5	3
MW-1	W2-1030	30.38	31.77	1.39	76.3	8.05	4
P-9	W7-1030	35.29	35.38	0.09	555.6	13.9	3
U-1	W3-1030	24.93	26.39	1.46	103.3	5.2	4
HGCS B1-P	W4-1030	---	---	---	---	---	---
SS-1	W1-1030	---	---	---	---	---	---
LPN-B1	W9-1030	---	---	---	---	---	---
P-9 Duplicate	W8-1030	---	---	---	---	---	---

Notes: * total volume includes purged and sampled water.
** field measurements interval is typically two to nine minutes of pumping.
--- not applicable.
\+ measured next day
NM not measured

Cowlitz County Headquarters Landfill
Hydrology Field Sheet

Sampling Event: 4th Qtr 2023
Measured by: DAD
Weather: Ptly Cldy Cool Calm

Location	Date	Time	Measurement	Comments
U-1	10/30	1215	24.93	
C-1	"	1350	17.00	
C-2	"	1435	35.20	
MW-1	"	1040	30.38	
MW-2	10/31	1144	22.40	
MW-4	"	1132	9.49	
P-6	"	1056	13.33	
P-8	"	1118	5.81	
P-9	10/30	1604	35.29	
P-10	10/31	1104	65.74	
P-11	"	1130	38.01	
P-12				
P-13R	10/31	1052	25.94	
P-14	"	1140	22.07	
P-15	"	1147	33.71	
P-18	10/30	1035	65.10	

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location:	**Cowlitz Co- Headquarters Rd Landfill**	Sample Location:	SS-1
Sampling Event:	**4th Qtr 2023**	Sample Field Identifier:	W1-1030
Sampler:	Dennis R. Dykes	Start Date/Time:	10/30/23 950
		Weather:	Clear Cold Calm

Well Pumping Data

		Measurement	Date	Time	Method
Depth to Water:	Prepumping				Well Probe
	Final pumping		"		

Pumping Time	Rate	Fill Time	Discharge	DTW	Liters Pumped	Rate

Not Applicable

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Flow	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)
Moderate	6.72	65.1	5.0	2.13	10.23	-4

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
10 30 1000	1	500ml	poly	None	Surface	no	Dipped
" "	1	125ml	poly	H2SO4	"	"	"
" "	1	40ml	glass	H2SO4	"	"	"
" "	1	125ml	poly	HNO3	"	"	"
" "	1	250ml	poly	H2SO4	"	"	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled

Sample Appearance: Clear Sample Handling: Cooler, deliver to lab same day

Comments: Flow fills main flow channel

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: HGCS B1-P
Sampling Event: **4th Qtr 2023** Sample Field Identifier: W4-1030
Sampler: Dennis R. Dykes Start Date/Time: 10/30/23 1330
Weather: Sunny/cool/Calm

Well Pumping Data

Depth to Water:	Measurement	Date	Time	Method
Prepumping				Well Probe
Final pumping				

Pumping Time	Rate	Fill Time	Discharge	DTW	Liters Pumped	Rate

Not Applicable

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Flow	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)
Moderate	5.91	107	18.8			38

Sampling

Date/Time	Containers (number/volume/type/preservative)	Depth Taken (ft)	Field Filtration	Sampling Method
10/30 1330	1 500ml poly none	Surface	no	Flow stream
"	1 125ml poly HNO3	"	"	from pipe
"	3 40ml glass HCl	"	"	"
"	1 40ml amber glass HCl	"	"	"
"	1 125ml poly H2SO4	"	"	"
"	1 125ml poly none	"	"	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled
Sample Appearance: Clear Sample Handling: Cooler, deliver to lab same day

Comments: Flow 1-2" deep

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: MW-1
Sampling Event: **4th Qtr 2023** Sample Field Identifier: [redacted] W2-1023
Sampler: Dennis R. Dykes Start Date/Time: 10/30/23 1040
Weather: Clear Cold Calm windy

Well Pumping Data

		Measurement	Date	Time	Method
Depth to Water:	Prepumping	30.38	10/30	1040	Well Probe
	Final pumping	31.77	"	1158	

Pumping Time	Rate	Discharge	Fill Time	DTW	Liters Pumped	Rate (ml/min)
6	155/1185	4	60	30.59	0.97	78.8
29				30.94		
28				31.16		
45				31.30		
53				31.44		
111	150/1145	4	60	31.77	3.0 / 4.5	76.3

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Pumping Time	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)
27	6.37	97.4	8.4	0.68	5.46	14
35	6.31	97.0	8.4	0.68	5.44	17
43	6.21	94.4	8.6	1.10	5.78	21
51	6.15	93.2	8.5	1.09	6.01	25
					5.41	

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
10/30 1100	1	500ml	poly	none	37.5	no	Bladder
" "	1	125ml	poly	HNO3	"	no	Pump
" "	3	40ml	glass	HCl	"	no	"
" "	1	40ml	amber glass	HCl	"	no	"
" "	1	125ml	poly	H2SO4	"	no	"
" "	1	125ml	poly	none	"	no	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled
Sample Appearance: Clear Sample Handling: Cooler, deliver to lab same day

Comments:

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: U-1
Sampling Event: **4th Qtr 2023** Sample Field Identifier: WB-4030
Sampler: Dennis R. Dykes Start Date/Time: 10/30/23
Weather: Clear Cold Rainy

Well Pumping Data

		Measurement	Date	Time	Method
Depth to Water:	Prepumping	24.93	10/30	12.15	Well Probe
	Final pumping	26.34	"	1314	

Pumping Time	Rate	Discharge	Fill Time	DTW	Liters Pumped	Rate (ml/min)
7	150/90s	4	40	~~29.85~~		100
10				25.53		
22				25.92		
27				26.13		
32	41			26.13	26.27	
50	155/90s	"	"	26.34	5.2	103.3

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Pumping Time	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)
20	6.30	161	8.7	13.4	1.21	18
25	6.36	162	8.7	12.6	0.47	14
30	6.42	161	8.7	11.5	0.39	12
35	6.43	161	8.7	10.6	0.66	10

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
10/30 1320	1	500ml	poly	none	35.0	no	Bladder
" "	1	125ml	poly	HNO3	"	no	Pump
" "	3	40ml	glass	HCl	"	no	"
" "	1	40ml	amber glass	HCl	"	no	"
" "	1	125ml	poly	H2SO4	"	no	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled
Sample Appearance: Clear Sample Handling: Cooler, deliver to lab same day

Comments:

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location:	**Cowlitz Co- Headquarters Rd Landfill**	Sample Location:	C-1
Sampling Event:	**4th Qtr 2023**	Sample Field Identifier:	WS-1032
Sampler:	Dennis R. Dykes	Start Date/Time:	10/30/23 1330
		Weather:	Sunny Cool Calm

Well Pumping Data

		Measurement	Date	Time	Method
Depth to Water:	Prepumping	17.00	10/30	1350	Well Probe
	Final pumping	19.05	"	1427	

Pumping Time	Rate	Discharge	Fill Time	DTW	Liters Pumped	Rate (ml/min)
7	250/64	4	30	18.62		
19				19.02		
23				19.06		
31	250/64s	"	"	19.05	7.3	234.4

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Pumping Time	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)
10 14	5.26	37.9	9.8	1.67	6.41	75
14 18	5.24	37.8	9.8	1.22	6.39	78
18 22	5.19	37.2	9.8	1.22	6.47	78

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
10/30 1400	1	500ml	poly	none	27.0	no	Bladder
" "	1	125ml	poly	HNO3	"	no	Pump
" "	3	40ml	glass	HCl	"	no	"
" "	1	40ml	amber glass	HCl	"	no	"
" "	1	125ml	poly	H2SO4	"	no	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled

Sample Appearance: Clear

Sample Handling: Cooler, deliver to lab same day

Comments:

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: C-2
Sampling Event: **4th Qtr 2023** Sample Field Identifier: WC-1052
Sampler: Dennis R. Dykes Start Date/Time: 10/30/23 1435
Weather: Sunny 60s/Calm

Well Pumping Data

		Measurement	Date	Time	Method
Depth to Water:	Prepumping	35.20	10/30	1435	Well Probe
	Final pumping	36.55	"	1532	

Pumping Time	Rate	Discharge	Fill Time	DTW	Liters Pumped	Rate (ml/min)
8	125/125	4+	60	35.81		
30				36.22		
42				36.37		
52				36.44		
73	125/125			36.55	4.5	62

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Pumping Time	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)
33	5.63	67.2	11.5	0.04	0.94	54
41	5.62	65.4	11.6	0.06	0.86	55
50	5.59	62.8	11.5	0.09	0.82	56

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
10/30 1530	1	500ml	poly	none	52.5	no	Bladder
" "	1	125ml	poly	HNO3	"	no	Pump
" "	3	40ml	glass	HCl	"	no	"
" "	1	40ml	amber glass	HCl	"	no	"
" "	1	125ml	poly	H2SO4	"	no	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled
Sample Appearance: Clear Sample Handling: Cooler, deliver to lab same day

Comments:

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: P-9
Sampling Event: **4th Qtr 2023** Sample Field Identifier: GW7-1030
Sampler: Dennis R. Dykes Start Date/Time: 10/30/23 1600
Weather: Sunny Cool Calm

Well Pumping Data

		Measurement	Date	Time	Method
Depth to Water:	Prepumping	35.29	10/30	1604	Well Probe
	Final pumping	35.38	"	1631	

Pumping Time	Rate	Discharge	Fill Time	DTW	Liters Pumped	Rate (ml/min)
2	253.1/285	5th	5	35.32		
25	250/275	"	"	35.38	13.9	555.6

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Pumping Time	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)
10	5.81	98.2	10.1	0.20	6.09	43
13	5.82	98.3	10.1	0.22	6.06	43
16	5.83	98.4	10.1		6.03	42

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
10/30 1600	1	500ml	poly	none	46.5	no	Bladder
" "	1	125ml	poly	HNO3	"	no	Pump
" "	3	40ml	glass	HCl	"	no	"
" "	1	40ml	amber glass	HCl	"	no	"
" "	1	125ml	poly	H2SO4	"	no	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled
Sample Appearance: clear Sample Handling: Cooler, deliver to lab same day

Comments: Bottles filled alternating w/ P-9 duplicate

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: f-9 Duplicate
Sampling Event: **4th Qtr 2023** Sample Field Identifier: WS-1030
Sampler: Dennis R. Dykes Start Date/Time: 10/30/23
Weather: Sunny cool Calm

Well Pumping Data

	Measurement	Date	Time	Method
Depth to Water:	Prepumping			Well Probe
	Final pumping	"		

Pumping Time	Rate	Discharge	Fill Time	DTW	Liters Pumped	Rate (ml/min)
~~4~~	~~125/125~~	~~24+~~	~~60~~	f-9		
			ll			

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Pumping Time	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)
		f-9	f-9			
		ll				

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
10/30 1630	1	500ml	poly	none		no	Bladder
" "	1	125ml	poly	HNO3	"	no	Pump
" "	3	40ml	glass	HCl	"	no	"
" "	1	40ml	amber glass	HCl	"	no	"
" "	1	125ml	poly	H2SO4	"	no	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled
Sample Appearance: Clear Sample Handling: Cooler, deliver to lab same day

Comments: Bottles filled alternating w/ f-9

Bright Fields Groundwater, Inc.

Field Sampling Data LONB1

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: Leachate Outfall
Sampling Event: **4th Qtr 2023** Sample Field Identifier: W9-1030
Sampler: Dennis R. Dykes Start Date/Time: 10/30/23 1645
Weather: Sunny cool Calm

Well Pumping Data

Depth to Water:	Measurement	Date	Time	Method
	Prepumping			Well Probe
	Final pumping	"		

Pumping Time	Rate	Discharge	Fill Time	DTW	Liters Pumped	Rate (ml/min)

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Pumping Time	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)
	8.04	10270	26.2			

Sampling

Date/Time	Containers (number/volume/type/preservative)	~~Depth Taken (ft)~~	Field Filtration	Sampling Method
10/30 1700	1 500ml poly none	Pipe	no	Bladder
" "	1 125ml poly HNO3	"	no	Pump
" "	3 40ml glass HCl	"	no	"
" "	1 40ml amber glass HCl	"	no	"
" "	1 125ml poly H2SO4	"	no	"

Equipment Decontamination: None, dedicated equip used. Well probe rinsed with distilled
Sample Appearance: Dark brown stain Sample Handling: Cooler, deliver to lab same day
Comments: Flow 1-2" deep out 12" pipe

CHAIN OF CUSTODY
133847

008, 009

SR#_____

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: Conlitz Co Headquarters Landfill Detection Monitoring
Project Number:
Project Manager: Dennis Dykes
Company: BEGW Inc
Address, City, State:
Phone #: 5602636307
email: ddykes@tds.net
Sampler Signature:
Sampler Printed Name: Dennis Dykes

CLIENT SAMPLE ID	LABID	SAMPLING Date Time State	Matrix	NUMBER OF CONTAINERS	48H: 300.0 / NO3	7D: SM 2540 C / TDS	7D: SM 2540 D / TSS	14D: 8260C / VOC FP	14D: SM 2320 B / Alkalinity T	28D: 300.0 / Chloride	28D: 300.0 / SO4	28D: 365.3 / Phos T	28D: SM 4500-NH3 E / Ammonia	28D: SM 5310 B / TOC T	180D: 200.7 / Metals D	180D: 200.7 / Metals T	180D: 200.8 / Metals T	999D: Filter Met / Filter Mat	1	2	3	4	5	Remarks
1. W1-1030		10/30 1000 WA	W	5								X				+		NP						
2. W2-1030		1100		8																				
3. W3-1030		1300		8																				
4. W4-1030		1330		8																				
5. W5-1030		1400		8																				
6. W6-1030		1530		8																				
7. W7-1030		1600		8																				
8. W8-1030		1630		8																				
9. W9-1030		1700		7												++								
10.																								

Report Requirements

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

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

___ III. CLP Like Summary (no raw data)

___ IV. Data Validation Report

___ V. EDD

Invoice Information

P.O.# Conlitz Co
Bill To: Public Works

Turnaround Requirements

___ 24 hr ___ 48 hr
X 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: Dennis Dykes	Signature:	Signature	Signature	Signature	Signature
Printed Name: BEGW	Printed Name: Marilyn Mithio	Printed Name	Printed Name	Printed Name	Printed Name
Firm: 10/31/23 9:20	Firm: ALS	Firm	Firm	Firm	Firm
Date/Time	Date/Time: 10/31/23 0920	Date/Time	Date/Time	Date/Time	Date/Time

Cowlitz County Headquarters Landfill
Quarterly Detection Monitoring Data Validation
Fourth Quarter 2023

This memorandum presents a summary of the validation review completed for the **INORGANIC** analytical data generated for the identified project using the identified analytical method, laboratory, and guidance.

1. General Information

Project: **Cowlitz County Headquarters Road Landfill: Detection Monitoring Program**
Laboratory: **ALS Evironmental Kelso**
Lab Package Identifier: **Service Request Number K2312341**
Date(s) Sampled: October 30, 2023
Data Reviewer: Dennis R. Dykes, Bright Fields Groundwater, Inc.
Date Reviewed: December 15, 2023
See attached table for sample numbers, laboratory-assigned identifiers, and sample dates.
Laboratory report which includes QC and Chain of Custody documentation is attached.

2. Validation Review Guidance

Sampling and Analysis Plan, Cowlitz Co. Headquarters Landfill Project (Tuppan Consultants, 2011)
National Functional Guidelines for Inorganic Data Review (USEPA, 2010)
Criteria for Municipal Solid Waste Landfills (Chapter 173-351 WAC)

3. Overall Assessment of Data

The data are judged to be acceptable for use in the detection monitoring program as qualified:
T data qualifier assigned to detections below MRL without other qualifiers.
J data qualifier assigned to lead because of poor lab duplication
B1 data qualifier assigned to low ammonia and phosphorus because Meth Blank det.

Precision:	Analytical precision acceptable; field duplication not evaluated
Accuracy:	Spike, surrogate, and method blank results acceptable except as noted.
Representativeness:	Sampling completeness confirms representativeness as specified in SAP.
Completeness:	All locations sampled, results valid with above qualifiers, if assigned.
Comparability:	Sampling and analyses performed per the SAP and method requirements. Results should be comparable with previous similar sample results.

4.Data Validation Summary

Holding Times:		NO3 1and 2 days, Cl 1 and 14 days, SO4 1 day, TDS 3 days, TSS 3 days, P 2 days and Alk 11 and 14 days Ammonia 2 days, TOC 7 days Total metals 4 days to extraction, 7 to 8 days to analysis. Diss metals 4 days to extraction, 7 days to analysis.
Blanks:	Method:	Non detect except NH3 (.030T), and P (.010T) Dissolved metals: Ca (3T), Total metals: none det.

Cowlitz County Headquarters Landfill
Quarterly Detection Monitoring Data Validation
Fourth Quarter 2023

Duplicates: Lab: OK for Cl, NO3, SO4, alk. Others not reported.
None for Diss. Metals, Total OK except Pb
None reported for P, TOC and NH3

Field: OK except Ni, Zn and NH3 <MRL invalid

MS/MSD: OK Metals: dissolved not reported, total MS only OK
Not reported for NH3, P, Alk, TDS, TSS, TOC
Ok for Cl, NO3 and SO4. Others not reported.

Laboratory Control Samples: OK except

Method Reporting Limits: Acceptable.

Other:

Cowlitz County Headquarters Landfill
Quarterly Detection Monitoring Data Validation
Fourth Quarter 2023

This memorandum presents a summary of the validation review completed for the **VOLATILE ORGANIC COMPOUND** data generated for the identified project using the specified analytical method, laboratory, and guidance.

1. General Information

Project: **Cowlitz County Headquarters Road Landfill: Detection Monitoring Program**
Laboratory: **ALS in Kelso, WA**
Lab Package Identifier: **Service Request Number K2312341**
Date(s) Sampled: October 30, 2023
Data Reviewer: Dennis R. Dykes, Bright Fields Groundwater, Inc.
Date Reviewed: December 15, 2023
See attached table for sample numbers, laboratory-assigned identifiers, and sample dates.
Laboratory report which includes QC data and Chain of Custody documentation is attached.

2. Validation Review Guidance

Sampling and Analysis Plan, Cowlitz Co. Headquarters Landfill Project (Tuppan Consultants, 2011)
National Functional Guidelines for Organic Data Review (USEPA, 2008)
Criteria for Municipal Solid Waste Landfills (Chapter 173-351 WAC)

3. Overall Assessment of Data

The data are judged to be acceptable for use in the detection monitoring program as qualified:
No qualifiers required.

Precision:	Analytical precision acceptable; field duplication not evaluated
Accuracy:	Spike, surrogate, and method blank results acceptable.
Representativeness:	Sampling completeness confirms representativeness as specified in SAP.
Completeness:	All locations sampled, greater than specified percentage of results valid.
Comparability:	Sampling and analyses performed per the SAP and method requirements. Results should be comparable with previous similar sample results.

4. Data Validation Summary (EPA Method 8260A)

Holding Times: VOC analyzed 3 days after sampling,

Blanks: Method - VOCs: Methylene Chloride (.31T)

Trip- Chloromethane (.23T) and Methylene Chloride (.11T)

Field Duplicate: None detected (VOCs only)
Detection limits: Acceptable, W9 leachate dilute 10X
Surrogate Recovery: OK
Matrix Spike/Matrix Spike Duplicates: Not reported

LCS/DLCS: OK

Method Reporting Limits: Acceptable. W9 leachate dilute 10X due to color and particulates.

Initial Calibration Exceptions: No probems reported in case narative.

Cont Calib Verif Exceptions: Case narative reported several analytes outside criteria. Ok by other criteria or not above MRL in samples.

Cowlitz County Headquarters Landfill
Quarterly Detection Monitoring Data Validation
Fourth Quarter 2023

Sample Identification Summary

Sample Location	Field Identifier	Laboratory Identifie	Date	Sample Type
C-1	W5-1030	K2312341-005	10/30/2023	Groundwater
C-2	W6-1030	K2312341-006	10/30/2023	Groundwater
MW-1	W2-1030	K2312341-002	10/30/2023	Groundwater
P-9	W7-1030	K2312341-007	10/30/2023	Groundwater
U-1	W3-1030	K2312341-003	10/30/2023	Groundwater
HGCS B1-P	W4-1030	K2312341-004	10/30/2023	Groundwater
SS-1	W1-1030	K2312341-001	10/30/2023	Surface Water
Leachate Outfall	W9-1030	K2312341-009	10/30/2023	Leachate
P-9 Duplicate	W8-1030	K2312341-008	10/30/2023	Groundwater
Trip Blank	Trip Blank	K2312341-010		Lab Prepared

CC HQ Landfill Leachate
September 2023

This memorandum presents a summary of the validation review completed for the INORGANIC analytical data generated for the identified project using the identified analytical method, laboratory, and guidance.

1. General Information

Project: **Cowlitz County Headquarters Landfill: Discharge Permit Leachate Monitoring**
Laboratory: **ALS Environmental in Kelso, WA**
Lab Package Identifiers: **Service Request Numbers**
Date(s) Sampled: September 7, 2023
Data Reviewer: Dennis R. Dykes, Bright Fields Groundwater, Inc.
Date Reviewed: December 30, 2023
See attached table for sample numbers, laboratory-assigned identifiers, and sample dates.
Laboratory report which includes QC and Chain of Custody documentation is attached.

2. Validation Review Guidance

Sampling and Analysis Plan, Cowlitz Co. Headquarters Landfill Project	(Tuppan Consultants, 2013)
National Functional Guidelines for Inorganic Data Review	(USEPA, 2010)
Criteria for Municipal Solid Waste Landfills	(Chapter 173-351 WAC)

3. Overall Assessment of Data

The data are judged to be acceptable for use in the detection monitoring program.
No data qualifier assigned

Precision:	Analytical precision acceptable; field duplication not evaluated
Accuracy:	Spike, surrogate, and method blank results acceptable except as noted.
Representativeness:	Sampling completeness confirms representativeness as specified in SAP.
Completeness:	All locations sampled, results valid with above qualifiers, if assigned.
Comparability:	Sampling and analyses performed per the SAP and method requirements. Results should be comparable with previous similar sample results.

4.Data Validation Summary

Holding Times: TSS 6 days, BOD <1 days, Ammonia 4 days

Blanks:	Method:	Ok, BOD not reported
	Field:	not submitted
Duplicates:	Lab:	None reported
	Field:	not submitted
Spike Sample Analysis:		None reported
		None reported

Laboratory Control Samples: Ok
Method Reporting Limits: Ok BOD diluted 100x
Other

Cowlitz County Headquarters Landfill
Sample Identification Summary
September Monthly Sample

Sample Location	Field Identifier	Laboratory Identifier	Date	Sample Type
LP-B1	HQLF Leachate	K2309946-001	September 7,	Leachate

CC HQ Landfill Leachate
October 2023

This memorandum presents a summary of the validation review completed for the INORGANIC analytical data generated for the identified project using the identified analytical method, laboratory, and guidance.

1. General Information

Project: **Cowlitz County Headquarters Landfill: Discharge Permit Leachate Monitoring**
Laboratory: **ALS Environmental in Kelso, WA**
Lab Package Identifiers: **Service Request Numbers**
Date(s) Sampled: October 10, 2023
Data Reviewer: Dennis R. Dykes, Bright Fields Groundwater, Inc.
Date Reviewed: December 30, 2023
See attached table for sample numbers, laboratory-assigned identifiers, and sample dates.
Laboratory report which includes QC and Chain of Custody documentation is attached.

2. Validation Review Guidance

Sampling and Analysis Plan, Cowlitz Co. Headquarters Landfill Project	(Tuppan Consultants, 2013)
National Functional Guidelines for Inorganic Data Review	(USEPA, 2010)
Criteria for Municipal Solid Waste Landfills	(Chapter 173-351 WAC)

3. Overall Assessment of Data

The data are judged to be acceptable for use in the detection monitoring program.
No data qualifier assigned

Precision:	Analytical precision acceptable; field duplication not evaluated
Accuracy:	Spike, surrogate, and method blank results acceptable except as noted.
Representativeness:	Sampling completeness confirms representativeness as specified in SAP.
Completeness:	All locations sampled, results valid with above qualifiers, if assigned.
Comparability:	Sampling and analyses performed per the SAP and method requirements. Results should be comparable with previous similar sample results.

4.Data Validation Summary

Holding Times: TSS 2 days, BOD <1 days, Ammonia 7 days

Blanks:	Method:	Ok, BOD not reported
	Field:	not submitted
Duplicates:	Lab:	None reported
	Field:	not submitted
Spike Sample Analysis:		None reported
		None reported

Laboratory Control Samples:	Ok	
Method Reporting Limits:	Ok	BOD diluted 100x

Other

Cowlitz County Headquarters Landfill
Sample Identification Summary
October Monthly Sample

Sample Location	Field Identifier	Laboratory Identifier	Date	Sample Type
LP-B1	HQLF Leachate	K2311452-001	October 10,	Leachate

CC HQ Landfill Leachate
November 2023

This memorandum presents a summary of the validation review completed for the INORGANIC analytical data generated for the identified project using the identified analytical method, laboratory, and guidance.

1. General Information

Project: **Cowlitz County Headquarters Landfill: Discharge Permit Leachate Monitoring**
Laboratory: **ALS Environmental in Kelso, WA**
Lab Package Identifiers: **Service Request Numbers**
Date(s) Sampled: November 9, 2023
Data Reviewer: Dennis R. Dykes, Bright Fields Groundwater, Inc.
Date Reviewed: December 30, 2023
See attached table for sample numbers, laboratory-assigned identifiers, and sample dates.
Laboratory report which includes QC and Chain of Custody documentation is attached.

2. Validation Review Guidance

Sampling and Analysis Plan, Cowlitz Co. Headquarters Landfill Project	(Tuppan Consultants, 2013)
National Functional Guidelines for Inorganic Data Review	(USEPA, 2010)
Criteria for Municipal Solid Waste Landfills	(Chapter 173-351 WAC)

3. Overall Assessment of Data

The data are judged to be acceptable for use in the detection monitoring program.
No data qualifier assigned

Precision:	Analytical precision acceptable; field duplication not evaluated
Accuracy:	Spike, surrogate, and method blank results acceptable except as noted.
Representativeness:	Sampling completeness confirms representativeness as specified in SAP.
Completeness:	All locations sampled, results valid with above qualifiers, if assigned.
Comparability:	Sampling and analyses performed per the SAP and method requirements. Results should be comparable with previous similar sample results.

4.Data Validation Summary

Holding Times: TSS 7 days, BOD <1 days, Ammonia <1 days

Blanks:	Method:	Ok, BOD not reported
	Field:	not submitted
Duplicates:	Lab:	None reported
	Field:	not submitted
Spike Sample Analysis:		None reported
		None reported

Laboratory Control Samples: Ok
Method Reporting Limits: Ok BOD diluted 43x
Other

Cowlitz County Headquarters Landfill
Sample Identification Summary
November Monthly Sample

Sample Location	Field Identifier	Laboratory Identifier	Date	Sample Type
LP-B1	HQLF Leachate	K2312717-001	November 9,	Leachate

CC HQ Landfill Leachate
December 2023

This memorandum presents a summary of the validation review completed for the INORGANIC analytical data generated for the identified project using the identified analytical method, laboratory, and guidance.

1. General Information

Project: **Cowlitz County Headquarters Landfill: Discharge Permit Leachate Monitoring**
Laboratory: **ALS Environmental in Kelso, WA**
Lab Package Identifiers: **Service Request Numbers**
Date(s) Sampled: December 8, 2023
Data Reviewer: Dennis R. Dykes, Bright Fields Groundwater, Inc.
Date Reviewed: December 30, 2023
See attached table for sample numbers, laboratory-assigned identifiers, and sample dates.
Laboratory report which includes QC and Chain of Custody documentation is attached.

2. Validation Review Guidance

Sampling and Analysis Plan, Cowlitz Co. Headquarters Landfill Project	(Tuppan Consultants, 2013)
National Functional Guidelines for Inorganic Data Review	(USEPA, 2010)
Criteria for Municipal Solid Waste Landfills	(Chapter 173-351 WAC)

3. Overall Assessment of Data

The data are judged to be acceptable for use in the detection monitoring program.
No data qualifier assigned

Precision:	Analytical precision acceptable; field duplication not evaluated
Accuracy:	Spike, surrogate, and method blank results acceptable except as noted.
Representativeness:	Sampling completeness confirms representativeness as specified in SAP.
Completeness:	All locations sampled, results valid with above qualifiers, if assigned.
Comparability:	Sampling and analyses performed per the SAP and method requirements. Results should be comparable with previous similar sample results.

4.Data Validation Summary

Holding Times: TSS 7 days, BOD <1 days, Ammonia 4 days

Blanks:	Method:	Ok, BOD not reported
	Field:	not submitted
Duplicates:	Lab:	None reported
	Field:	not submitted
Spike Sample Analysis:		None reported
		None reported

Laboratory Control Samples: Ok
Method Reporting Limits: Ok BOD diluted 43x
Other

Cowlitz County Headquarters Landfill
Sample Identification Summary
December Monthly Sample

Sample Location	Field Identifier	Laboratory Identifier	Date	Sample Type
LP-B1	HQLF Leachate	K2313792-001	December 8,	Leachate

November 17, 2023 Service Request No:K2312341

Dan Bales
Cowlitz County Public Works
1600 13th Avenue South
Kelso, WA 98626

Laboratory Results for: Cowlitz Co Headquarters Landfill Detection Monitor

Dear Dan,

Enclosed are the results of the sample(s) submitted to our laboratory October 31, 2023
For your reference, these analyses have been assigned our service request number **K2312341.**

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 3377. You may also contact me via email at Sydney.Wolf@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Sydney A. Wolf
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Cowlitz County Public Works
Project: Cowlitz Co Headquarters Landfill Detection Monitor
Sample Matrix: Water

Service Request: K2312341
Date Received: 10/31/2023

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Ten water samples were received for analysis at ALS Environmental on 10/31/2023. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

No significant anomalies were noted with this analysis.

Volatiles by GC/MS:

Method 8260C, 11/02/2023:Bromomethane and 1,2-Dibromo-3-chloropropane were flagged as outside the control criterion for Continuing Calibration Verification (CCV). In accordance with the EPA Method, 80% or more of the CCV analytes must pass within 20% of the true value. The ALS SOP allows for 40% difference for the remaining analytes. The CCV met these criteria. The quality of the sample data was not significantly affected. No further corrective action was required.
Method 8260C, 11/02/2023:The detection limits were elevated for all analytes in sample W9-1030. The sample was diluted due to color and particulates. The chromatogram indicated the presence of non-target background components.

Approved by Sydney A Wolfe Date 11/17/2023

SAMPLE DETECTION SUMMARY

This form includes only detections above the reporting levels. For a full listing of sample results, continue to the Sample Results section of this Report.

CLIENT ID: W9-1030			Lab ID: K2312341-009			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
2-Butanone (MEK)	150	J	19	200	ug/L	8260C
Acetone	410		33	200	ug/L	8260C
Alkalinity as CaCO3, Total	5140		1.2	4.0	mg/L	SM 2320 B
Ammonia as Nitrogen	141		0.02	0.10	mg/L	SM 4500-NH3 E
Antimony	9.95		0.020	0.050	ug/L	200.8
Arsenic	36.3		0.09	0.50	ug/L	200.8
Barium	494		0.020	0.050	ug/L	200.8
Beryllium	0.05	J	0.03	0.10	ug/L	200.8
Cadmium	0.094		0.008	0.020	ug/L	200.8
Calcium	77300		20	110	ug/L	200.7
Carbon Disulfide	4.0	J	0.69	5.0	ug/L	8260C
Carbon, Total Organic (TOC)	850		30	130	mg/L	SM 5310 B
Chloride	790		3	50	mg/L	300.0
Chromium	148		0.03	0.20	ug/L	200.8
Cobalt	12.2		0.009	0.020	ug/L	200.8
Copper	22.2		0.05	0.10	ug/L	200.8
Iron	1260		40	110	ug/L	200.7
Lead	4.54		0.006	0.020	ug/L	200.8
Magnesium	80100		2	26	ug/L	200.7
Manganese	847		1.1	5.3	ug/L	200.7
Methylene Chloride	3.8	J	1.0	20	ug/L	8260C
Nickel	127		0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.89		0.13	0.50	mg/L	300.0
Potassium	333000		300	1100	ug/L	200.7
Selenium	0.8	J	0.2	1.0	ug/L	200.8
Silver	0.040		0.009	0.020	ug/L	200.8
Sodium	2280000		200	1100	ug/L	200.7
Solids, Total Dissolved	8180			200	mg/L	SM 2540 C
Solids, Total Suspended (TSS)	10.5			5.0	mg/L	SM 2540 D
Sulfate	16.2		0.3	1.0	mg/L	300.0
Toluene	1.2	J	0.54	5.0	ug/L	8260C
Vanadium	71.8		0.04	0.20	ug/L	200.8
Zinc	37.8		0.5	2.0	ug/L	200.8

CLIENT ID: W2-1030			Lab ID: K2312341-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	48.1		0.6	2.0	mg/L	SM 2320 B
Ammonia as Nitrogen	0.040	J	0.009	0.050	mg/L	SM 4500-NH3 E
Barium	2.42		0.020	0.050	ug/L	200.8
Beryllium	0.008	J	0.005	0.020	ug/L	200.8
Calcium, Dissolved	9220		3	21	ug/L	200.7

SAMPLE DETECTION SUMMARY

This form includes only detections above the reporting levels. For a full listing of sample results, continue to the Sample Results section of this Report.

CLIENT ID: W2-1030			Lab ID: K2312341-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Chloride	1.99		0.010	0.20	mg/L	300.0
Chromium	0.13	J	0.03	0.20	ug/L	200.8
Cobalt	0.023		0.009	0.020	ug/L	200.8
Copper	0.22		0.05	0.10	ug/L	200.8
Lead	0.031		0.006	0.020	ug/L	200.8
Magnesium, Dissolved	3800		0.4	5.3	ug/L	200.7
Manganese, Dissolved	1.4		0.2	1.1	ug/L	200.7
Nickel	0.55		0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.74		0.03	0.10	mg/L	300.0
Potassium, Dissolved	600		60	210	ug/L	200.7
Silver	0.088		0.009	0.020	ug/L	200.8
Sodium, Dissolved	6170		30	210	ug/L	200.7
Solids, Total Dissolved	87			10	mg/L	SM 2540 C
Sulfate	0.43		0.12	0.40	mg/L	300.0
Thallium	0.012	J	0.009	0.020	ug/L	200.8
Vanadium	0.57		0.04	0.20	ug/L	200.8
Zinc	1.1	J	0.5	2.0	ug/L	200.8

CLIENT ID: W3-1030			Lab ID: K2312341-003			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	69.0		0.6	2.0	mg/L	SM 2320 B
Ammonia as Nitrogen	0.330		0.009	0.050	mg/L	SM 4500-NH3 E
Arsenic	6.01		0.09	0.50	ug/L	200.8
Barium	45.6		0.020	0.050	ug/L	200.8
Beryllium	0.014	J	0.005	0.020	ug/L	200.8
Calcium, Dissolved	11000		3	21	ug/L	200.7
Carbon, Total Organic (TOC)	2.70		0.10	0.50	mg/L	SM 5310 B
Chloride	1.43		0.010	0.20	mg/L	300.0
Chromium	0.13	J	0.03	0.20	ug/L	200.8
Cobalt	5.45		0.009	0.020	ug/L	200.8
Copper	0.35		0.05	0.10	ug/L	200.8
Iron, Dissolved	6670		8	21	ug/L	200.7
Lead	0.108		0.006	0.020	ug/L	200.8
Magnesium, Dissolved	5770		0.4	5.3	ug/L	200.7
Manganese, Dissolved	334		0.2	1.1	ug/L	200.7
Nickel	0.89		0.04	0.20	ug/L	200.8
Potassium, Dissolved	850		60	210	ug/L	200.7
Silver	0.061		0.009	0.020	ug/L	200.8
Sodium, Dissolved	8250		30	210	ug/L	200.7
Solids, Total Dissolved	116			10	mg/L	SM 2540 C
Solids, Total Suspended (TSS)	16.5			5.0	mg/L	SM 2540 D

SAMPLE DETECTION SUMMARY

This form includes only detections above the reporting levels. For a full listing of sample results, continue to the Sample Results section of this Report.

CLIENT ID: W3-1030			Lab ID: K2312341-003			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Vanadium	0.32		0.04	0.20	ug/L	200.8
Zinc	1.8	J	0.5	2.0	ug/L	200.8

CLIENT ID: W4-1030			Lab ID: K2312341-004			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	50.0		0.6	2.0	mg/L	SM 2320 B
Ammonia as Nitrogen	0.050		0.009	0.050	mg/L	SM 4500-NH3 E
Arsenic	0.45	J	0.09	0.50	ug/L	200.8
Barium	21.2		0.020	0.050	ug/L	200.8
Beryllium	0.024		0.005	0.020	ug/L	200.8
Cadmium	0.013	J	0.008	0.020	ug/L	200.8
Calcium, Dissolved	10600		3	21	ug/L	200.7
Carbon, Total Organic (TOC)	0.70		0.10	0.50	mg/L	SM 5310 B
Chloride	2.72		0.010	0.20	mg/L	300.0
Chromium	0.11	J	0.03	0.20	ug/L	200.8
Cobalt	7.33		0.009	0.020	ug/L	200.8
Copper	3.09		0.05	0.10	ug/L	200.8
Lead	0.061		0.006	0.020	ug/L	200.8
Magnesium, Dissolved	4400		0.4	5.3	ug/L	200.7
Manganese, Dissolved	906		0.2	1.1	ug/L	200.7
Nickel	3.40		0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.09	J	0.03	0.10	mg/L	300.0
Potassium, Dissolved	790		60	210	ug/L	200.7
Sodium, Dissolved	4570		30	210	ug/L	200.7
Solids, Total Dissolved	66			10	mg/L	SM 2540 C
Sulfate	2.24		0.12	0.40	mg/L	300.0
Thallium	0.009	J	0.009	0.020	ug/L	200.8
Vanadium	0.07	J	0.04	0.20	ug/L	200.8
Zinc	5.2		0.5	2.0	ug/L	200.8

CLIENT ID: W5-1030			Lab ID: K2312341-005			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	13.4		0.6	2.0	mg/L	SM 2320 B
Ammonia as Nitrogen	0.030	J	0.009	0.050	mg/L	SM 4500-NH3 E
Barium	4.48		0.020	0.050	ug/L	200.8
Beryllium	0.047		0.005	0.020	ug/L	200.8
Cadmium	0.011	J	0.008	0.020	ug/L	200.8
Calcium, Dissolved	2510		3	21	ug/L	200.7
Carbon, Total Organic (TOC)	0.13	J	0.10	0.50	mg/L	SM 5310 B
Chloride	1.92		0.010	0.20	mg/L	300.0
Chromium	0.13	J	0.03	0.20	ug/L	200.8

SAMPLE DETECTION SUMMARY

This form includes only detections above the reporting levels. For a full listing of sample results, continue to the Sample Results section of this Report.

CLIENT ID: W5-1030	Lab ID: K2312341-005					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Cobalt	0.014	J	0.009	0.020	ug/L	200.8
Copper	0.15		0.05	0.10	ug/L	200.8
Lead	0.050		0.006	0.020	ug/L	200.8
Magnesium, Dissolved	1280		0.4	5.3	ug/L	200.7
Manganese, Dissolved	6.4		0.2	1.1	ug/L	200.7
Nickel	0.24		0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.41		0.03	0.10	mg/L	300.0
Potassium, Dissolved	330		60	210	ug/L	200.7
Silver	0.989		0.009	0.020	ug/L	200.8
Sodium, Dissolved	3160		30	210	ug/L	200.7
Solids, Total Dissolved	26			10	mg/L	SM 2540 C
Solids, Total Suspended (TSS)	5.5			5.0	mg/L	SM 2540 D
Sulfate	0.52		0.12	0.40	mg/L	300.0
Vanadium	0.19	J	0.04	0.20	ug/L	200.8
Zinc	1.2	J	0.5	2.0	ug/L	200.8

CLIENT ID: W6-1030	Lab ID: K2312341-006					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	30.1		0.6	2.0	mg/L	SM 2320 B
Ammonia as Nitrogen	0.020	J	0.009	0.050	mg/L	SM 4500-NH3 E
Barium	7.03		0.020	0.050	ug/L	200.8
Beryllium	0.011	J	0.005	0.020	ug/L	200.8
Cadmium	0.008	J	0.008	0.020	ug/L	200.8
Calcium, Dissolved	3140		3	21	ug/L	200.7
Carbon, Total Organic (TOC)	0.12	J	0.10	0.50	mg/L	SM 5310 B
Chloride	2.29		0.010	0.20	mg/L	300.0
Chromium	0.09	J	0.03	0.20	ug/L	200.8
Cobalt	0.245		0.009	0.020	ug/L	200.8
Copper	0.06	J	0.05	0.10	ug/L	200.8
Magnesium, Dissolved	1480		0.4	5.3	ug/L	200.7
Manganese, Dissolved	33.9		0.2	1.1	ug/L	200.7
Nickel	0.14	J	0.04	0.20	ug/L	200.8
Potassium, Dissolved	520		60	210	ug/L	200.7
Silver	0.012	J	0.009	0.020	ug/L	200.8
Sodium, Dissolved	7910		30	210	ug/L	200.7
Solids, Total Dissolved	46			10	mg/L	SM 2540 C
Sulfate	1.14		0.12	0.40	mg/L	300.0
Zinc	0.8	J	0.5	2.0	ug/L	200.8

SAMPLE DETECTION SUMMARY

This form includes only detections above the reporting levels. For a full listing of sample results, continue to the Sample Results section of this Report.

CLIENT ID: W7-1030			Lab ID: K2312341-007			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	52.6		0.6	2.0	mg/L	SM 2320 B
Ammonia as Nitrogen	0.040	J	0.009	0.050	mg/L	SM 4500-NH3 E
Arsenic	0.50	J	0.09	0.50	ug/L	200.8
Barium	0.917		0.020	0.050	ug/L	200.8
Beryllium	0.006	J	0.005	0.020	ug/L	200.8
Calcium, Dissolved	12800		3	21	ug/L	200.7
Chloride	2.11		0.010	0.20	mg/L	300.0
Chromium	0.14	J	0.03	0.20	ug/L	200.8
Copper	0.07	J	0.05	0.10	ug/L	200.8
Lead	0.015	J	0.006	0.020	ug/L	200.8
Magnesium, Dissolved	1820		0.4	5.3	ug/L	200.7
Nickel	0.09	J	0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.05	J	0.03	0.10	mg/L	300.0
Potassium, Dissolved	750		60	210	ug/L	200.7
Silver	0.019	J	0.009	0.020	ug/L	200.8
Sodium, Dissolved	8140		30	210	ug/L	200.7
Solids, Total Dissolved	110			10	mg/L	SM 2540 C
Sulfate	0.58		0.12	0.40	mg/L	300.0
Vanadium	2.31		0.04	0.20	ug/L	200.8
Zinc	0.5	J	0.5	2.0	ug/L	200.8

CLIENT ID: W8-1030			Lab ID: K2312341-008			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	53.2		0.6	2.0	mg/L	SM 2320 B
Ammonia as Nitrogen	0.030	J	0.009	0.050	mg/L	SM 4500-NH3 E
Arsenic	0.50		0.09	0.50	ug/L	200.8
Barium	0.891		0.020	0.050	ug/L	200.8
Calcium, Dissolved	12600		3	21	ug/L	200.7
Chloride	2.11		0.010	0.20	mg/L	300.0
Chromium	0.15	J	0.03	0.20	ug/L	200.8
Copper	0.07	J	0.05	0.10	ug/L	200.8
Lead	0.014	J	0.006	0.020	ug/L	200.8
Magnesium, Dissolved	1800		0.4	5.3	ug/L	200.7
Nickel	0.13	J	0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.05	J	0.03	0.10	mg/L	300.0
Potassium, Dissolved	730		60	210	ug/L	200.7
Silver	0.018	J	0.009	0.020	ug/L	200.8
Sodium, Dissolved	8090		30	210	ug/L	200.7
Solids, Total Dissolved	107			10	mg/L	SM 2540 C
Sulfate	0.58		0.12	0.40	mg/L	300.0
Vanadium	2.43		0.04	0.20	ug/L	200.8

SAMPLE DETECTION SUMMARY

This form includes only detections above the reporting levels. For a full listing of sample results, continue to the Sample Results section of this Report.

CLIENT ID: W8-1030			Lab ID: K2312341-008			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Zinc	0.8	J	0.5	2.0	ug/L	200.8

CLIENT ID: W1-1030			Lab ID: K2312341-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Ammonia as Nitrogen	0.050		0.009	0.050	mg/L	SM 4500-NH3 E
Arsenic	0.09	J	0.09	0.50	ug/L	200.8
Barium	8.46		0.020	0.050	ug/L	200.8
Beryllium	0.006	J	0.005	0.020	ug/L	200.8
Cadmium	0.008	J	0.008	0.020	ug/L	200.8
Calcium	5840		3	21	ug/L	200.7
Carbon, Total Organic (TOC)	1.40		0.10	0.50	mg/L	SM 5310 B
Chloride	2.68		0.010	0.20	mg/L	300.0
Chromium	0.22		0.03	0.20	ug/L	200.8
Cobalt	0.069		0.009	0.020	ug/L	200.8
Copper	0.85		0.05	0.10	ug/L	200.8
Iron	198		8	21	ug/L	200.7
Lead	0.036		0.006	0.020	ug/L	200.8
Magnesium	2510		0.4	5.3	ug/L	200.7
Manganese	3.5		0.2	1.1	ug/L	200.7
Nickel	0.17	J	0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.47		0.03	0.10	mg/L	300.0
Phosphorus, Total	0.022		0.005	0.020	mg/L	365.3
Potassium	660		60	210	ug/L	200.7
Sodium	4760		30	210	ug/L	200.7
Solids, Total Dissolved	49			10	mg/L	SM 2540 C
Sulfate	1.37		0.12	0.40	mg/L	300.0
Thallium	0.019	J	0.009	0.020	ug/L	200.8
Vanadium	0.56		0.04	0.20	ug/L	200.8
Zinc	0.9	J	0.5	2.0	ug/L	200.8

CLIENT ID: Trip Blanks			Lab ID: K2312341-010			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Chloromethane	0.23	J	0.068	0.50	ug/L	8260C
Methylene Chloride	0.11	J	0.10	2.0	ug/L	8260C

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Cowlitz County Public Works **Service Request:**K2312341

Project: Cowlitz Co Headquarters Landfill Detection Monitor

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2312341-001	W1-1030	10/30/2023	1000
K2312341-002	W2-1030	10/30/2023	1100
K2312341-003	W3-1030	10/30/2023	1300
K2312341-004	W4-1030	10/30/2023	1330
K2312341-005	W5-1030	10/30/2023	1400
K2312341-006	W6-1030	10/30/2023	1530
K2312341-007	W7-1030	10/30/2023	1600
K2312341-008	W8-1030	10/30/2023	1630
K2312341-009	W9-1030	10/30/2023	1700
K2312341-010	Trip Blanks	10/30/2023	

ALS Environmental

CHAIN OF CUSTODY
133847

008, 009

SR# K231241

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: Cowlitz Co Headquarters Landfill Detection Monitoring
Project Number:
Project Manager: Darrin Dykes
Company: BFGW Inc
Address, City, State:
Phone #: 3602636307
email: ddykes@tds.net
Sampler Signature:
Sampler Printed Name: Dennis Dykes

CLIENT SAMPLE ID	LABID	SAMPLING Date Time State	Matrix	NUMBER OF CONTAINERS	48H: 300.0 / NO3	7D: SM 2540 C / TDS	7D: SM 2540 D / TSS	14D: 8260C / VOC FP	14D: SM 2320 B / Alkalinity Titr	28D: 300.0 / Chloride	28D: 300.0 / SO4	28D: 365.3 / Phos T	28D: SM 4500-NH3 E / Ammonia	28D: SM 5310 B / TOC T	180D: 200.7 / Metals D	180D: 200.7 / Metals T	180D: 200.8 / Metals T	999D: Filter Met / Filter Met	1	2	3	4	5	Remarks
1. W1-1030		10/30 1000 WA	W	5								X				+		F						
2. W2-1030		1100		8																				
3. W3-1030		1300		8																				
4. W4-1030		1330		8																				
5. W5-1030		1400		8																				
6. W6-1030		1530		8																				
7. W7-1030		1600		8																				
8. W8-1030		1630		8																				
9. W9-1030		1700		7												++								
10.																								

Report Requirements

- ___ I. Routine Report: Method Blank, Surrogate, as required
- X II. Report Dup., MS, MSD as required
- ___ III. CLP Like Summary (no raw data)
- ___ IV. Data Validation Report
- ___ V. EDD

Invoice Information

P.O.# Cowlitz Co
Bill To: Public Works

Turnaround Requirements

___ 24 hr. ___ 48 hr.
X 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: Dennis Dykes	Signature:	Signature	Signature	Signature	Signature
Printed Name: BFGW	Printed Name: Marilyn Mitolo	Printed Name	Printed Name	Printed Name	Printed Name
Firm: 10/31/23 9:20	Firm: ALS	Firm	Firm	Firm	Firm
Date/Time	Date/Time: 10/31/23 0920	Date/Time	Date/Time	Date/Time	Date/Time

PM SW

Cooler Receipt and Preservation Form

Client BTGW Service Request K23 12341

Received: 10/31/23 Opened: 10/31/23 By: VM Unloaded: 10/31/23 By: VM

1. Samples were received via? *USPS* *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? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified if out of temp	Tracking Number NA	Filed
0.9		IR02					

4. Was a Temperature Blank present in cooler? NA Y N If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y N
   If no, were they received on ice and same day as collected? If not, notate the cooler # above and notify the PM. NA Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
8. Were samples received in good condition (unbroken) NA Y N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA Y N
10. Did all sample labels and tags agree with custody papers? NA Y N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
14. Was C12/Res negative? NA Y N
15. Were samples received within the method specified time limit? If not, notate the error below and notify the PM NA Y N
16. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? NA Y N Underfilled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:

SHORT HOLD

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
WQ-1030	125mL			X	HNO3	.5mL	23EI-66-G	VM	1000
↓	↓			X	H2SO4	↓	19-GEW-07-	↓	↓
							86-J		

Notes, Discrepancies, Resolutions: Received 4 trip blanks not on COC. Lab to Reserve WQ-1030 40mL

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
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.
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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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.

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.

Client: Cowlitz County Public Works **Service Request:** K2312341
Project: Cowlitz Co Headquarters Landfill Detection Monitor/

Sample Name: W1-1030 **Date Collected:** 10/30/23
Lab Code: K2312341-001 **Date Received:** 10/31/23
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.7	ABOYER	AMCKORNEY
200.8	ABOYER	EMCALLISTER
300.0		NFOTH
365.3	JSANCHEZ	JSANCHEZ
SM 2540 C		JBYMAN
SM 4500-NH3 E		ACHEATLEY
SM 5310 B		MSPECHT

Sample Name: W2-1030 **Date Collected:** 10/30/23
Lab Code: K2312341-002 **Date Received:** 10/31/23
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.7	ABOYER	AMCKORNEY
200.8	ABOYER	EMCALLISTER
300.0		NFOTH
8260C		EWANOUS
SM 2320 B		DBRADBURY
SM 2540 C		JBYMAN
SM 2540 D		AWILSON
SM 4500-NH3 E		ACHEATLEY
SM 5310 B		MSPECHT

Sample Name: W3-1030 **Date Collected:** 10/30/23
Lab Code: K2312341-003 **Date Received:** 10/31/23
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.7	ABOYER	AMCKORNEY
200.8	ABOYER	EMCALLISTER
300.0		NFOTH
8260C		EWANOUS

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor/		

Sample Name:	W3-1030	**Date Collected:**	10/30/23
Lab Code:	K2312341-003	**Date Received:**	10/31/23
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
SM 2320 B		DBRADBURY
SM 2540 C		JBYMAN
SM 2540 D		AWILSON
SM 4500-NH3 E		ACHEATLEY
SM 5310 B		MSPECHT

Sample Name:	W4-1030	**Date Collected:**	10/30/23
Lab Code:	K2312341-004	**Date Received:**	10/31/23
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.7	ABOYER	AMCKORNEY
200.8	ABOYER	EMCALLISTER
300.0		NFOTH
8260C		EWANOUS
SM 2320 B		DBRADBURY
SM 2540 C		JBYMAN
SM 2540 D		AWILSON
SM 4500-NH3 E		ACHEATLEY
SM 5310 B		MSPECHT

Sample Name:	W4-1030	**Date Collected:**	10/30/23
Lab Code:	K2312341-004.R01	**Date Received:**	10/31/23
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Client: Cowlitz County Public Works **Service Request:** K2312341
Project: Cowlitz Co Headquarters Landfill Detection Monitor/

Sample Name: W5-1030 **Date Collected:** 10/30/23
Lab Code: K2312341-005 **Date Received:** 10/31/23
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.7	ABOYER	AMCKORNEY
200.8	ABOYER	EMCALLISTER
300.0		NFOTH
8260C		EWANOUS
SM 2320 B		DBRADBURY
SM 2540 C		JBYMAN
SM 2540 D		AWILSON
SM 4500-NH3 E		ACHEATLEY
SM 5310 B		MSPECHT

Sample Name: W5-1030 **Date Collected:** 10/30/23
Lab Code: K2312341-005.R01 **Date Received:** 10/31/23
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: W6-1030 **Date Collected:** 10/30/23
Lab Code: K2312341-006 **Date Received:** 10/31/23
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.7	ABOYER	AMCKORNEY
200.8	ABOYER	EMCALLISTER
300.0		NFOTH
8260C		EWANOUS
SM 2320 B		DBRADBURY
SM 2540 C		JBYMAN
SM 2540 D		AWILSON
SM 4500-NH3 E		ACHEATLEY
SM 5310 B		MSPECHT

Client: Cowlitz County Public Works **Service Request:** K2312341
Project: Cowlitz Co Headquarters Landfill Detection Monitor/

Sample Name: W6-1030 **Date Collected:** 10/30/23
Lab Code: K2312341-006.R01 **Date Received:** 10/31/23
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: W7-1030 **Date Collected:** 10/30/23
Lab Code: K2312341-007 **Date Received:** 10/31/23
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.7	ABOYER	AMCKORNEY
200.8	ABOYER	EMCALLISTER
300.0		NFOTH
8260C		EWANOUS
SM 2320 B		DBRADBURY
SM 2540 C		JBYMAN
SM 2540 D		AWILSON
SM 4500-NH3 E		ACHEATLEY
SM 5310 B		MSPECHT

Sample Name: W7-1030 **Date Collected:** 10/30/23
Lab Code: K2312341-007.R01 **Date Received:** 10/31/23
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name: W8-1030 **Date Collected:** 10/30/23
Lab Code: K2312341-008 **Date Received:** 10/31/23
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
200.7	ABOYER	AMCKORNEY
200.8	ABOYER	EMCALLISTER

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor/		

Sample Name:	W8-1030	**Date Collected:**	10/30/23
Lab Code:	K2312341-008	**Date Received:**	10/31/23
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
300.0		NFOTH
8260C		EWANOUS
SM 2320 B		DBRADBURY
SM 2540 C		JBYMAN
SM 2540 D		AWILSON
SM 4500-NH3 E		ACHEATLEY
SM 5310 B		MSPECHT

Sample Name:	W8-1030	**Date Collected:**	10/30/23
Lab Code:	K2312341-008.R01	**Date Received:**	10/31/23
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER

Sample Name:	W9-1030	**Date Collected:**	10/30/23
Lab Code:	K2312341-009	**Date Received:**	10/31/23
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.7	ABOYER	AMCKORNEY
200.8	ABOYER	EMCALLISTER
300.0		NFOTH
8260C		EWANOUS
SM 2320 B		DBRADBURY
SM 2540 C		JBYMAN
SM 2540 D		AWILSON
SM 4500-NH3 E		ACHEATLEY
SM 5310 B		MSPECHT

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor/		

Sample Name:	W9-1030	**Date Collected:**	10/30/23
Lab Code:	K2312341-009.R01	**Date Received:**	10/31/23
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ABOYER	EMCALLISTER
300.0		NFOTH
SM 2320 B		DBRADBURY

Sample Name:	Trip Blanks	**Date Collected:**	10/30/23
Lab Code:	K2312341-010	**Date Received:**	10/31/23
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
8260C		EWANOUS

Sample Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Volatile Organic Compounds by GC/MS

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 11:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W2-1030	**Units:**	ug/L
Lab Code:	K2312341-002	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Acetone	ND U	20	3.3	1	11/02/23 16:18	
Acrylonitrile	ND U	5.0	0.53	1	11/02/23 16:18	
Benzene	ND U	0.50	0.062	1	11/02/23 16:18	
Bromochloromethane	ND U	0.50	0.16	1	11/02/23 16:18	
Bromodichloromethane	ND U	0.50	0.091	1	11/02/23 16:18	
Bromoform	ND U	0.50	0.16	1	11/02/23 16:18	
Bromomethane	ND U	0.50	0.16	1	11/02/23 16:18	*
2-Butanone (MEK)	ND U	20	1.9	1	11/02/23 16:18	
Carbon Disulfide	ND U	0.50	0.069	1	11/02/23 16:18	
Carbon Tetrachloride	ND U	0.50	0.096	1	11/02/23 16:18	
Chlorobenzene	ND U	0.50	0.11	1	11/02/23 16:18	
Chloroethane	ND U	0.50	0.16	1	11/02/23 16:18	
Chloroform	ND U	0.50	0.072	1	11/02/23 16:18	
Chloromethane	ND U	0.50	0.068	1	11/02/23 16:18	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	11/02/23 16:18	*
Dibromochloromethane	ND U	0.50	0.14	1	11/02/23 16:18	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	11/02/23 16:18	
Dibromomethane	ND U	0.50	0.15	1	11/02/23 16:18	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	11/02/23 16:18	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 16:18	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 16:18	
1,1-Dichloroethane	ND U	0.50	0.077	1	11/02/23 16:18	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	11/02/23 16:18	
1,1-Dichloroethene	ND U	0.50	0.080	1	11/02/23 16:18	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	11/02/23 16:18	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	11/02/23 16:18	
1,2-Dichloropropane	ND U	0.50	0.095	1	11/02/23 16:18	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	11/02/23 16:18	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	11/02/23 16:18	
Ethylbenzene	ND U	0.50	0.050	1	11/02/23 16:18	
2-Hexanone	ND U	20	2.7	1	11/02/23 16:18	
Iodomethane	ND U	5.0	0.12	1	11/02/23 16:18	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	11/02/23 16:18	
Methylene Chloride	ND U	2.0	0.10	1	11/02/23 16:18	
Styrene	ND U	0.50	0.089	1	11/02/23 16:18	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	11/02/23 16:18	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	11/02/23 16:18	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	11/02/23 16:18	
Toluene	ND U	0.50	0.054	1	11/02/23 16:18	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	11/02/23 16:18	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	11/02/23 16:18	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 11:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W2-1030	**Units:**	ug/L
Lab Code:	K2312341-002	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Trichloroethene (TCE)	ND U	0.50	0.10	1	11/02/23 16:18	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	11/02/23 16:18	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	11/02/23 16:18	
Vinyl Acetate	ND U	5.0	0.43	1	11/02/23 16:18	
Vinyl Chloride	ND U	0.50	0.075	1	11/02/23 16:18	
o-Xylene	ND U	0.50	0.074	1	11/02/23 16:18	
m,p-Xylenes	ND U	0.50	0.11	1	11/02/23 16:18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	91	68 - 117	11/02/23 16:18	
Dibromofluoromethane	107	73 - 122	11/02/23 16:18	
Toluene-d8	100	65 - 144	11/02/23 16:18	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 13:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W3-1030	**Units:**	ug/L
Lab Code:	K2312341-003	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Acetone	ND U	20	3.3	1	11/02/23 16:42	
Acrylonitrile	ND U	5.0	0.53	1	11/02/23 16:42	
Benzene	ND U	0.50	0.062	1	11/02/23 16:42	
Bromochloromethane	ND U	0.50	0.16	1	11/02/23 16:42	
Bromodichloromethane	ND U	0.50	0.091	1	11/02/23 16:42	
Bromoform	ND U	0.50	0.16	1	11/02/23 16:42	
Bromomethane	ND U	0.50	0.16	1	11/02/23 16:42	*
2-Butanone (MEK)	ND U	20	1.9	1	11/02/23 16:42	
Carbon Disulfide	ND U	0.50	0.069	1	11/02/23 16:42	
Carbon Tetrachloride	ND U	0.50	0.096	1	11/02/23 16:42	
Chlorobenzene	ND U	0.50	0.11	1	11/02/23 16:42	
Chloroethane	ND U	0.50	0.16	1	11/02/23 16:42	
Chloroform	ND U	0.50	0.072	1	11/02/23 16:42	
Chloromethane	ND U	0.50	0.068	1	11/02/23 16:42	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	11/02/23 16:42	*
Dibromochloromethane	ND U	0.50	0.14	1	11/02/23 16:42	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	11/02/23 16:42	
Dibromomethane	ND U	0.50	0.15	1	11/02/23 16:42	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	11/02/23 16:42	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 16:42	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 16:42	
1,1-Dichloroethane	ND U	0.50	0.077	1	11/02/23 16:42	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	11/02/23 16:42	
1,1-Dichloroethene	ND U	0.50	0.080	1	11/02/23 16:42	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	11/02/23 16:42	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	11/02/23 16:42	
1,2-Dichloropropane	ND U	0.50	0.095	1	11/02/23 16:42	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	11/02/23 16:42	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	11/02/23 16:42	
Ethylbenzene	ND U	0.50	0.050	1	11/02/23 16:42	
2-Hexanone	ND U	20	2.7	1	11/02/23 16:42	
Iodomethane	ND U	5.0	0.12	1	11/02/23 16:42	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	11/02/23 16:42	
Methylene Chloride	ND U	2.0	0.10	1	11/02/23 16:42	
Styrene	ND U	0.50	0.089	1	11/02/23 16:42	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	11/02/23 16:42	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	11/02/23 16:42	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	11/02/23 16:42	
Toluene	ND U	0.50	0.054	1	11/02/23 16:42	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	11/02/23 16:42	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	11/02/23 16:42	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 13:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W3-1030	**Units:**	ug/L
Lab Code:	K2312341-003	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Trichloroethene (TCE)	ND U	0.50	0.10	1	11/02/23 16:42	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	11/02/23 16:42	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	11/02/23 16:42	
Vinyl Acetate	ND U	5.0	0.43	1	11/02/23 16:42	
Vinyl Chloride	ND U	0.50	0.075	1	11/02/23 16:42	
o-Xylene	ND U	0.50	0.074	1	11/02/23 16:42	
m,p-Xylenes	ND U	0.50	0.11	1	11/02/23 16:42	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	92	68 - 117	11/02/23 16:42	
Dibromofluoromethane	106	73 - 122	11/02/23 16:42	
Toluene-d8	98	65 - 144	11/02/23 16:42	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 13:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W4-1030	**Units:**	ug/L
Lab Code:	K2312341-004	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Acetone	ND U	20	3.3	1	11/02/23 17:07	
Acrylonitrile	ND U	5.0	0.53	1	11/02/23 17:07	
Benzene	ND U	0.50	0.062	1	11/02/23 17:07	
Bromochloromethane	ND U	0.50	0.16	1	11/02/23 17:07	
Bromodichloromethane	ND U	0.50	0.091	1	11/02/23 17:07	
Bromoform	ND U	0.50	0.16	1	11/02/23 17:07	
Bromomethane	ND U	0.50	0.16	1	11/02/23 17:07	*
2-Butanone (MEK)	ND U	20	1.9	1	11/02/23 17:07	
Carbon Disulfide	ND U	0.50	0.069	1	11/02/23 17:07	
Carbon Tetrachloride	ND U	0.50	0.096	1	11/02/23 17:07	
Chlorobenzene	ND U	0.50	0.11	1	11/02/23 17:07	
Chloroethane	ND U	0.50	0.16	1	11/02/23 17:07	
Chloroform	ND U	0.50	0.072	1	11/02/23 17:07	
Chloromethane	ND U	0.50	0.068	1	11/02/23 17:07	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	11/02/23 17:07	*
Dibromochloromethane	ND U	0.50	0.14	1	11/02/23 17:07	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	11/02/23 17:07	
Dibromomethane	ND U	0.50	0.15	1	11/02/23 17:07	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	11/02/23 17:07	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 17:07	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 17:07	
1,1-Dichloroethane	ND U	0.50	0.077	1	11/02/23 17:07	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	11/02/23 17:07	
1,1-Dichloroethene	ND U	0.50	0.080	1	11/02/23 17:07	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	11/02/23 17:07	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	11/02/23 17:07	
1,2-Dichloropropane	ND U	0.50	0.095	1	11/02/23 17:07	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	11/02/23 17:07	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	11/02/23 17:07	
Ethylbenzene	ND U	0.50	0.050	1	11/02/23 17:07	
2-Hexanone	ND U	20	2.7	1	11/02/23 17:07	
Iodomethane	ND U	5.0	0.12	1	11/02/23 17:07	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	11/02/23 17:07	
Methylene Chloride	ND U	2.0	0.10	1	11/02/23 17:07	
Styrene	ND U	0.50	0.089	1	11/02/23 17:07	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	11/02/23 17:07	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	11/02/23 17:07	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	11/02/23 17:07	
Toluene	ND U	0.50	0.054	1	11/02/23 17:07	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	11/02/23 17:07	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	11/02/23 17:07	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 13:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W4-1030	**Units:**	ug/L
Lab Code:	K2312341-004	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Trichloroethene (TCE)	ND U	0.50	0.10	1	11/02/23 17:07	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	11/02/23 17:07	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	11/02/23 17:07	
Vinyl Acetate	ND U	5.0	0.43	1	11/02/23 17:07	
Vinyl Chloride	ND U	0.50	0.075	1	11/02/23 17:07	
o-Xylene	ND U	0.50	0.074	1	11/02/23 17:07	
m,p-Xylenes	ND U	0.50	0.11	1	11/02/23 17:07	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	92	68 - 117	11/02/23 17:07	
Dibromofluoromethane	108	73 - 122	11/02/23 17:07	
Toluene-d8	99	65 - 144	11/02/23 17:07	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 14:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W5-1030	**Units:**	ug/L
Lab Code:	K2312341-005	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Acetone	ND U	20	3.3	1	11/02/23 17:31	
Acrylonitrile	ND U	5.0	0.53	1	11/02/23 17:31	
Benzene	ND U	0.50	0.062	1	11/02/23 17:31	
Bromochloromethane	ND U	0.50	0.16	1	11/02/23 17:31	
Bromodichloromethane	ND U	0.50	0.091	1	11/02/23 17:31	
Bromoform	ND U	0.50	0.16	1	11/02/23 17:31	
Bromomethane	ND U	0.50	0.16	1	11/02/23 17:31	*
2-Butanone (MEK)	ND U	20	1.9	1	11/02/23 17:31	
Carbon Disulfide	ND U	0.50	0.069	1	11/02/23 17:31	
Carbon Tetrachloride	ND U	0.50	0.096	1	11/02/23 17:31	
Chlorobenzene	ND U	0.50	0.11	1	11/02/23 17:31	
Chloroethane	ND U	0.50	0.16	1	11/02/23 17:31	
Chloroform	ND U	0.50	0.072	1	11/02/23 17:31	
Chloromethane	ND U	0.50	0.068	1	11/02/23 17:31	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	11/02/23 17:31	*
Dibromochloromethane	ND U	0.50	0.14	1	11/02/23 17:31	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	11/02/23 17:31	
Dibromomethane	ND U	0.50	0.15	1	11/02/23 17:31	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	11/02/23 17:31	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 17:31	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 17:31	
1,1-Dichloroethane	ND U	0.50	0.077	1	11/02/23 17:31	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	11/02/23 17:31	
1,1-Dichloroethene	ND U	0.50	0.080	1	11/02/23 17:31	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	11/02/23 17:31	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	11/02/23 17:31	
1,2-Dichloropropane	ND U	0.50	0.095	1	11/02/23 17:31	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	11/02/23 17:31	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	11/02/23 17:31	
Ethylbenzene	ND U	0.50	0.050	1	11/02/23 17:31	
2-Hexanone	ND U	20	2.7	1	11/02/23 17:31	
Iodomethane	ND U	5.0	0.12	1	11/02/23 17:31	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	11/02/23 17:31	
Methylene Chloride	ND U	2.0	0.10	1	11/02/23 17:31	
Styrene	ND U	0.50	0.089	1	11/02/23 17:31	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	11/02/23 17:31	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	11/02/23 17:31	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	11/02/23 17:31	
Toluene	ND U	0.50	0.054	1	11/02/23 17:31	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	11/02/23 17:31	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	11/02/23 17:31	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 14:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W5-1030	**Units:**	ug/L
Lab Code:	K2312341-005	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Trichloroethene (TCE)	ND U	0.50	0.10	1	11/02/23 17:31	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	11/02/23 17:31	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	11/02/23 17:31	
Vinyl Acetate	ND U	5.0	0.43	1	11/02/23 17:31	
Vinyl Chloride	ND U	0.50	0.075	1	11/02/23 17:31	
o-Xylene	ND U	0.50	0.074	1	11/02/23 17:31	
m,p-Xylenes	ND U	0.50	0.11	1	11/02/23 17:31	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	93	68 - 117	11/02/23 17:31	
Dibromofluoromethane	108	73 - 122	11/02/23 17:31	
Toluene-d8	100	65 - 144	11/02/23 17:31	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 15:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W6-1030	**Units:**	ug/L
Lab Code:	K2312341-006	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Acetone	ND U	20	3.3	1	11/02/23 17:56	
Acrylonitrile	ND U	5.0	0.53	1	11/02/23 17:56	
Benzene	ND U	0.50	0.062	1	11/02/23 17:56	
Bromochloromethane	ND U	0.50	0.16	1	11/02/23 17:56	
Bromodichloromethane	ND U	0.50	0.091	1	11/02/23 17:56	
Bromoform	ND U	0.50	0.16	1	11/02/23 17:56	
Bromomethane	ND U	0.50	0.16	1	11/02/23 17:56	*
2-Butanone (MEK)	ND U	20	1.9	1	11/02/23 17:56	
Carbon Disulfide	ND U	0.50	0.069	1	11/02/23 17:56	
Carbon Tetrachloride	ND U	0.50	0.096	1	11/02/23 17:56	
Chlorobenzene	ND U	0.50	0.11	1	11/02/23 17:56	
Chloroethane	ND U	0.50	0.16	1	11/02/23 17:56	
Chloroform	ND U	0.50	0.072	1	11/02/23 17:56	
Chloromethane	ND U	0.50	0.068	1	11/02/23 17:56	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	11/02/23 17:56	*
Dibromochloromethane	ND U	0.50	0.14	1	11/02/23 17:56	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	11/02/23 17:56	
Dibromomethane	ND U	0.50	0.15	1	11/02/23 17:56	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	11/02/23 17:56	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 17:56	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 17:56	
1,1-Dichloroethane	ND U	0.50	0.077	1	11/02/23 17:56	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	11/02/23 17:56	
1,1-Dichloroethene	ND U	0.50	0.080	1	11/02/23 17:56	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	11/02/23 17:56	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	11/02/23 17:56	
1,2-Dichloropropane	ND U	0.50	0.095	1	11/02/23 17:56	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	11/02/23 17:56	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	11/02/23 17:56	
Ethylbenzene	ND U	0.50	0.050	1	11/02/23 17:56	
2-Hexanone	ND U	20	2.7	1	11/02/23 17:56	
Iodomethane	ND U	5.0	0.12	1	11/02/23 17:56	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	11/02/23 17:56	
Methylene Chloride	ND U	2.0	0.10	1	11/02/23 17:56	
Styrene	ND U	0.50	0.089	1	11/02/23 17:56	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	11/02/23 17:56	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	11/02/23 17:56	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	11/02/23 17:56	
Toluene	ND U	0.50	0.054	1	11/02/23 17:56	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	11/02/23 17:56	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	11/02/23 17:56	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 15:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W6-1030	**Units:**	ug/L
Lab Code:	K2312341-006	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Trichloroethene (TCE)	ND U	0.50	0.10	1	11/02/23 17:56	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	11/02/23 17:56	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	11/02/23 17:56	
Vinyl Acetate	ND U	5.0	0.43	1	11/02/23 17:56	
Vinyl Chloride	ND U	0.50	0.075	1	11/02/23 17:56	
o-Xylene	ND U	0.50	0.074	1	11/02/23 17:56	
m,p-Xylenes	ND U	0.50	0.11	1	11/02/23 17:56	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	92	68 - 117	11/02/23 17:56	
Dibromofluoromethane	106	73 - 122	11/02/23 17:56	
Toluene-d8	99	65 - 144	11/02/23 17:56	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 16:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W7-1030	**Units:**	ug/L
Lab Code:	K2312341-007	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Acetone	ND U	20	3.3	1	11/02/23 18:20	
Acrylonitrile	ND U	5.0	0.53	1	11/02/23 18:20	
Benzene	ND U	0.50	0.062	1	11/02/23 18:20	
Bromochloromethane	ND U	0.50	0.16	1	11/02/23 18:20	
Bromodichloromethane	ND U	0.50	0.091	1	11/02/23 18:20	
Bromoform	ND U	0.50	0.16	1	11/02/23 18:20	
Bromomethane	ND U	0.50	0.16	1	11/02/23 18:20	*
2-Butanone (MEK)	ND U	20	1.9	1	11/02/23 18:20	
Carbon Disulfide	ND U	0.50	0.069	1	11/02/23 18:20	
Carbon Tetrachloride	ND U	0.50	0.096	1	11/02/23 18:20	
Chlorobenzene	ND U	0.50	0.11	1	11/02/23 18:20	
Chloroethane	ND U	0.50	0.16	1	11/02/23 18:20	
Chloroform	ND U	0.50	0.072	1	11/02/23 18:20	
Chloromethane	ND U	0.50	0.068	1	11/02/23 18:20	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	11/02/23 18:20	*
Dibromochloromethane	ND U	0.50	0.14	1	11/02/23 18:20	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	11/02/23 18:20	
Dibromomethane	ND U	0.50	0.15	1	11/02/23 18:20	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	11/02/23 18:20	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 18:20	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 18:20	
1,1-Dichloroethane	ND U	0.50	0.077	1	11/02/23 18:20	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	11/02/23 18:20	
1,1-Dichloroethene	ND U	0.50	0.080	1	11/02/23 18:20	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	11/02/23 18:20	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	11/02/23 18:20	
1,2-Dichloropropane	ND U	0.50	0.095	1	11/02/23 18:20	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	11/02/23 18:20	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	11/02/23 18:20	
Ethylbenzene	ND U	0.50	0.050	1	11/02/23 18:20	
2-Hexanone	ND U	20	2.7	1	11/02/23 18:20	
Iodomethane	ND U	5.0	0.12	1	11/02/23 18:20	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	11/02/23 18:20	
Methylene Chloride	ND U	2.0	0.10	1	11/02/23 18:20	
Styrene	ND U	0.50	0.089	1	11/02/23 18:20	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	11/02/23 18:20	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	11/02/23 18:20	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	11/02/23 18:20	
Toluene	ND U	0.50	0.054	1	11/02/23 18:20	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	11/02/23 18:20	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	11/02/23 18:20	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 16:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W7-1030	**Units:**	ug/L
Lab Code:	K2312341-007	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Trichloroethene (TCE)	ND U	0.50	0.10	1	11/02/23 18:20	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	11/02/23 18:20	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	11/02/23 18:20	
Vinyl Acetate	ND U	5.0	0.43	1	11/02/23 18:20	
Vinyl Chloride	ND U	0.50	0.075	1	11/02/23 18:20	
o-Xylene	ND U	0.50	0.074	1	11/02/23 18:20	
m,p-Xylenes	ND U	0.50	0.11	1	11/02/23 18:20	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	93	68 - 117	11/02/23 18:20	
Dibromofluoromethane	106	73 - 122	11/02/23 18:20	
Toluene-d8	99	65 - 144	11/02/23 18:20	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 16:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W8-1030	**Units:**	ug/L
Lab Code:	K2312341-008	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Acetone	ND U	20	3.3	1	11/02/23 18:44	
Acrylonitrile	ND U	5.0	0.53	1	11/02/23 18:44	
Benzene	ND U	0.50	0.062	1	11/02/23 18:44	
Bromochloromethane	ND U	0.50	0.16	1	11/02/23 18:44	
Bromodichloromethane	ND U	0.50	0.091	1	11/02/23 18:44	
Bromoform	ND U	0.50	0.16	1	11/02/23 18:44	
Bromomethane	ND U	0.50	0.16	1	11/02/23 18:44	*
2-Butanone (MEK)	ND U	20	1.9	1	11/02/23 18:44	
Carbon Disulfide	ND U	0.50	0.069	1	11/02/23 18:44	
Carbon Tetrachloride	ND U	0.50	0.096	1	11/02/23 18:44	
Chlorobenzene	ND U	0.50	0.11	1	11/02/23 18:44	
Chloroethane	ND U	0.50	0.16	1	11/02/23 18:44	
Chloroform	ND U	0.50	0.072	1	11/02/23 18:44	
Chloromethane	ND U	0.50	0.068	1	11/02/23 18:44	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	11/02/23 18:44	*
Dibromochloromethane	ND U	0.50	0.14	1	11/02/23 18:44	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	11/02/23 18:44	
Dibromomethane	ND U	0.50	0.15	1	11/02/23 18:44	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	11/02/23 18:44	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 18:44	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	11/02/23 18:44	
1,1-Dichloroethane	ND U	0.50	0.077	1	11/02/23 18:44	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	11/02/23 18:44	
1,1-Dichloroethene	ND U	0.50	0.080	1	11/02/23 18:44	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	11/02/23 18:44	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	11/02/23 18:44	
1,2-Dichloropropane	ND U	0.50	0.095	1	11/02/23 18:44	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	11/02/23 18:44	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	11/02/23 18:44	
Ethylbenzene	ND U	0.50	0.050	1	11/02/23 18:44	
2-Hexanone	ND U	20	2.7	1	11/02/23 18:44	
Iodomethane	ND U	5.0	0.12	1	11/02/23 18:44	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	11/02/23 18:44	
Methylene Chloride	ND U	2.0	0.10	1	11/02/23 18:44	
Styrene	ND U	0.50	0.089	1	11/02/23 18:44	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	11/02/23 18:44	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	11/02/23 18:44	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	11/02/23 18:44	
Toluene	ND U	0.50	0.054	1	11/02/23 18:44	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	11/02/23 18:44	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	11/02/23 18:44	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 16:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W8-1030	**Units:**	ug/L
Lab Code:	K2312341-008	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Trichloroethene (TCE)	ND U	0.50	0.10	1	11/02/23 18:44	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	11/02/23 18:44	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	11/02/23 18:44	
Vinyl Acetate	ND U	5.0	0.43	1	11/02/23 18:44	
Vinyl Chloride	ND U	0.50	0.075	1	11/02/23 18:44	
o-Xylene	ND U	0.50	0.074	1	11/02/23 18:44	
m,p-Xylenes	ND U	0.50	0.11	1	11/02/23 18:44	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	91	68 - 117	11/02/23 18:44	
Dibromofluoromethane	108	73 - 122	11/02/23 18:44	
Toluene-d8	100	65 - 144	11/02/23 18:44	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 17:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W9-1030	**Units:**	ug/L
Lab Code:	K2312341-009	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Acetone	**410**	200	33	10	11/02/23 20:46	
Acrylonitrile	ND U	50	5.3	10	11/02/23 20:46	
Benzene	ND U	5.0	0.62	10	11/02/23 20:46	
Bromochloromethane	ND U	5.0	1.6	10	11/02/23 20:46	
Bromodichloromethane	ND U	5.0	0.91	10	11/02/23 20:46	
Bromoform	ND U	5.0	1.6	10	11/02/23 20:46	
Bromomethane	ND U	5.0	1.6	10	11/02/23 20:46	*
2-Butanone (MEK)	**150 J**	200	19	10	11/02/23 20:46	
Carbon Disulfide	**4.0 J**	5.0	0.69	10	11/02/23 20:46	
Carbon Tetrachloride	ND U	5.0	0.96	10	11/02/23 20:46	
Chlorobenzene	ND U	5.0	1.1	10	11/02/23 20:46	
Chloroethane	ND U	5.0	1.6	10	11/02/23 20:46	
Chloroform	ND U	5.0	0.72	10	11/02/23 20:46	
Chloromethane	ND U	5.0	0.68	10	11/02/23 20:46	
1,2-Dibromo-3-chloropropane	ND U	20	2.2	10	11/02/23 20:46	*
Dibromochloromethane	ND U	5.0	1.4	10	11/02/23 20:46	
1,2-Dibromoethane (EDB)	ND U	20	1.0	10	11/02/23 20:46	
Dibromomethane	ND U	5.0	1.5	10	11/02/23 20:46	
trans-1,4-Dichloro-2-butene	ND U	100	3.5	10	11/02/23 20:46	
1,2-Dichlorobenzene	ND U	5.0	1.2	10	11/02/23 20:46	
1,4-Dichlorobenzene	ND U	5.0	1.2	10	11/02/23 20:46	
1,1-Dichloroethane	ND U	5.0	0.77	10	11/02/23 20:46	
1,2-Dichloroethane (EDC)	ND U	5.0	0.80	10	11/02/23 20:46	
1,1-Dichloroethene	ND U	5.0	0.80	10	11/02/23 20:46	
cis-1,2-Dichloroethene	ND U	5.0	0.67	10	11/02/23 20:46	
trans-1,2-Dichloroethene	ND U	5.0	0.72	10	11/02/23 20:46	
1,2-Dichloropropane	ND U	5.0	0.95	10	11/02/23 20:46	
cis-1,3-Dichloropropene	ND U	5.0	1.8	10	11/02/23 20:46	
trans-1,3-Dichloropropene	ND U	5.0	0.68	10	11/02/23 20:46	
Ethylbenzene	ND U	5.0	0.50	10	11/02/23 20:46	
2-Hexanone	ND U	200	27	10	11/02/23 20:46	
Iodomethane	ND U	50	1.2	10	11/02/23 20:46	
4-Methyl-2-pentanone (MIBK)	ND U	200	26	10	11/02/23 20:46	
Methylene Chloride	**3.8 J**	20	1.0	10	11/02/23 20:46	
Styrene	ND U	5.0	0.89	10	11/02/23 20:46	
1,1,1,2-Tetrachloroethane	ND U	5.0	1.1	10	11/02/23 20:46	
1,1,2,2-Tetrachloroethane	ND U	5.0	1.6	10	11/02/23 20:46	
Tetrachloroethene (PCE)	ND U	5.0	0.99	10	11/02/23 20:46	
Toluene	**1.2 J**	5.0	0.54	10	11/02/23 20:46	
1,1,2-Trichloroethane	ND U	5.0	1.4	10	11/02/23 20:46	
1,1,1-Trichloroethane (TCA)	ND U	5.0	0.75	10	11/02/23 20:46	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 17:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W9-1030	**Units:**	ug/L
Lab Code:	K2312341-009	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Trichloroethene (TCE)	ND U	5.0	1.0	10	11/02/23 20:46	
Trichlorofluoromethane (CFC 11)	ND U	5.0	1.2	10	11/02/23 20:46	
1,2,3-Trichloropropane	ND U	5.0	2.0	10	11/02/23 20:46	
Vinyl Acetate	ND U	50	4.3	10	11/02/23 20:46	
Vinyl Chloride	ND U	5.0	0.75	10	11/02/23 20:46	
o-Xylene	ND U	5.0	0.74	10	11/02/23 20:46	
m,p-Xylenes	ND U	5.0	1.1	10	11/02/23 20:46	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	93	68 - 117	11/02/23 20:46	
Dibromofluoromethane	109	73 - 122	11/02/23 20:46	
Toluene-d8	100	65 - 144	11/02/23 20:46	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	Trip Blanks	**Units:**	ug/L
Lab Code:	K2312341-010	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Q
Acetone	ND	U	20	3.3	1	11/02/23 13:03	
Acrylonitrile	ND	U	5.0	0.53	1	11/02/23 13:03	
Benzene	ND	U	0.50	0.062	1	11/02/23 13:03	
Bromochloromethane	ND	U	0.50	0.16	1	11/02/23 13:03	
Bromodichloromethane	ND	U	0.50	0.091	1	11/02/23 13:03	
Bromoform	ND	U	0.50	0.16	1	11/02/23 13:03	
Bromomethane	ND	U	0.50	0.16	1	11/02/23 13:03	*
2-Butanone (MEK)	ND	U	20	1.9	1	11/02/23 13:03	
Carbon Disulfide	ND	U	0.50	0.069	1	11/02/23 13:03	
Carbon Tetrachloride	ND	U	0.50	0.096	1	11/02/23 13:03	
Chlorobenzene	ND	U	0.50	0.11	1	11/02/23 13:03	
Chloroethane	ND	U	0.50	0.16	1	11/02/23 13:03	
Chloroform	ND	U	0.50	0.072	1	11/02/23 13:03	
Chloromethane	**0.23**	**J**	0.50	0.068	1	11/02/23 13:03	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.22	1	11/02/23 13:03	*
Dibromochloromethane	ND	U	0.50	0.14	1	11/02/23 13:03	
1,2-Dibromoethane (EDB)	ND	U	2.0	0.10	1	11/02/23 13:03	
Dibromomethane	ND	U	0.50	0.15	1	11/02/23 13:03	
trans-1,4-Dichloro-2-butene	ND	U	10	0.35	1	11/02/23 13:03	
1,2-Dichlorobenzene	ND	U	0.50	0.12	1	11/02/23 13:03	
1,4-Dichlorobenzene	ND	U	0.50	0.12	1	11/02/23 13:03	
1,1-Dichloroethane	ND	U	0.50	0.077	1	11/02/23 13:03	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.080	1	11/02/23 13:03	
1,1-Dichloroethene	ND	U	0.50	0.080	1	11/02/23 13:03	
cis-1,2-Dichloroethene	ND	U	0.50	0.067	1	11/02/23 13:03	
trans-1,2-Dichloroethene	ND	U	0.50	0.072	1	11/02/23 13:03	
1,2-Dichloropropane	ND	U	0.50	0.095	1	11/02/23 13:03	
cis-1,3-Dichloropropene	ND	U	0.50	0.18	1	11/02/23 13:03	
trans-1,3-Dichloropropene	ND	U	0.50	0.068	1	11/02/23 13:03	
Ethylbenzene	ND	U	0.50	0.050	1	11/02/23 13:03	
2-Hexanone	ND	U	20	2.7	1	11/02/23 13:03	
Iodomethane	ND	U	5.0	0.12	1	11/02/23 13:03	
4-Methyl-2-pentanone (MIBK)	ND	U	20	2.6	1	11/02/23 13:03	
Methylene Chloride	**0.11**	**J**	2.0	0.10	1	11/02/23 13:03	
Styrene	ND	U	0.50	0.089	1	11/02/23 13:03	
1,1,1,2-Tetrachloroethane	ND	U	0.50	0.11	1	11/02/23 13:03	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.16	1	11/02/23 13:03	
Tetrachloroethene (PCE)	ND	U	0.50	0.099	1	11/02/23 13:03	
Toluene	ND	U	0.50	0.054	1	11/02/23 13:03	
1,1,2-Trichloroethane	ND	U	0.50	0.14	1	11/02/23 13:03	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.075	1	11/02/23 13:03	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	Trip Blanks	**Units:**	ug/L
Lab Code:	K2312341-010	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Trichloroethene (TCE)	ND U	0.50	0.10	1	11/02/23 13:03	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	11/02/23 13:03	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	11/02/23 13:03	
Vinyl Acetate	ND U	5.0	0.43	1	11/02/23 13:03	
Vinyl Chloride	ND U	0.50	0.075	1	11/02/23 13:03	
o-Xylene	ND U	0.50	0.074	1	11/02/23 13:03	
m,p-Xylenes	ND U	0.50	0.11	1	11/02/23 13:03	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	94	68 - 117	11/02/23 13:03	
Dibromofluoromethane	102	73 - 122	11/02/23 13:03	
Toluene-d8	99	65 - 144	11/02/23 13:03	

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 10:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W1-1030	**Basis:**	NA
Lab Code:	K2312341-001		

Total Metals

Analyte Name	Analysis Method	Result	Q	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	200.8	ND	U	ug/L	0.050	0.020	1	11/06/23 17:54	11/03/23	
Arsenic	200.8	**0.09**	**J**	ug/L	0.50	0.09	1	11/06/23 17:54	11/03/23	
Barium	200.8	**8.46**		ug/L	0.050	0.020	1	11/06/23 17:54	11/03/23	
Beryllium	200.8	**0.006**	**J**	ug/L	0.020	0.005	1	11/06/23 17:54	11/03/23	
Cadmium	200.8	**0.008**	**J**	ug/L	0.020	0.008	1	11/06/23 17:54	11/03/23	
Calcium	200.7	**5840**		ug/L	21	3	1	11/06/23 09:54	11/03/23	
Chromium	200.8	**0.22**		ug/L	0.20	0.03	1	11/06/23 17:54	11/03/23	
Cobalt	200.8	**0.069**		ug/L	0.020	0.009	1	11/06/23 17:54	11/03/23	
Copper	200.8	**0.85**		ug/L	0.10	0.05	1	11/06/23 17:54	11/03/23	
Iron	200.7	**198**		ug/L	21	8	1	11/06/23 09:54	11/03/23	
Lead	200.8	**0.036**		ug/L	0.020	0.006	1	11/06/23 17:54	11/03/23	
Magnesium	200.7	**2510**		ug/L	5.3	0.4	1	11/06/23 09:54	11/03/23	
Manganese	200.7	**3.5**		ug/L	1.1	0.2	1	11/06/23 09:54	11/03/23	
Nickel	200.8	**0.17**	**J**	ug/L	0.20	0.04	1	11/06/23 17:54	11/03/23	
Potassium	200.7	**660**		ug/L	210	60	1	11/06/23 09:54	11/03/23	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	11/06/23 17:54	11/03/23	
Silver	200.8	ND	U	ug/L	0.020	0.009	1	11/06/23 17:54	11/03/23	
Sodium	200.7	**4760**		ug/L	210	30	1	11/06/23 09:54	11/03/23	
Thallium	200.8	**0.019**	**J**	ug/L	0.020	0.009	1	11/06/23 17:54	11/03/23	
Vanadium	200.8	**0.56**		ug/L	0.20	0.04	1	11/06/23 17:54	11/03/23	
Zinc	200.8	**0.9**	**J**	ug/L	2.0	0.5	1	11/06/23 17:54	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 11:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W2-1030	**Basis:**	NA
Lab Code:	K2312341-002		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**9220**	ug/L	21	3	1	11/06/23 10:02	11/03/23	
Iron	200.7	ND U	ug/L	21	8	1	11/06/23 10:02	11/03/23	
Magnesium	200.7	**3800**	ug/L	5.3	0.4	1	11/06/23 10:02	11/03/23	
Manganese	200.7	**1.4**	ug/L	1.1	0.2	1	11/06/23 10:02	11/03/23	
Potassium	200.7	**600**	ug/L	210	60	1	11/06/23 10:02	11/03/23	
Sodium	200.7	**6170**	ug/L	210	30	1	11/06/23 10:02	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 11:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W2-1030	**Basis:**	NA
Lab Code:	K2312341-002		

Total Metals

Analyte Name	Analysis Method	Result	Q	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	200.8	ND	U	ug/L	0.050	0.020	1	11/06/23 18:01	11/03/23	
Arsenic	200.8	ND	U	ug/L	0.50	0.09	1	11/06/23 18:01	11/03/23	
Barium	200.8	**2.42**		ug/L	0.050	0.020	1	11/06/23 18:01	11/03/23	
Beryllium	200.8	**0.008**	**J**	ug/L	0.020	0.005	1	11/06/23 18:01	11/03/23	
Cadmium	200.8	ND	U	ug/L	0.020	0.008	1	11/06/23 18:01	11/03/23	
Chromium	200.8	**0.13**	**J**	ug/L	0.20	0.03	1	11/06/23 18:01	11/03/23	
Cobalt	200.8	**0.023**		ug/L	0.020	0.009	1	11/06/23 18:01	11/03/23	
Copper	200.8	**0.22**		ug/L	0.10	0.05	1	11/06/23 18:01	11/03/23	
Lead	200.8	**0.031**		ug/L	0.020	0.006	1	11/06/23 18:01	11/03/23	
Nickel	200.8	**0.55**		ug/L	0.20	0.04	1	11/06/23 18:01	11/03/23	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	11/06/23 18:01	11/03/23	
Silver	200.8	**0.088**		ug/L	0.020	0.009	1	11/06/23 18:01	11/03/23	
Thallium	200.8	**0.012**	**J**	ug/L	0.020	0.009	1	11/06/23 18:01	11/03/23	
Vanadium	200.8	**0.57**		ug/L	0.20	0.04	1	11/06/23 18:01	11/03/23	
Zinc	200.8	**1.1**	**J**	ug/L	2.0	0.5	1	11/06/23 18:01	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 13:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W3-1030	**Basis:**	NA
Lab Code:	K2312341-003		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**11000**	ug/L	21	3	1	11/06/23 10:04	11/03/23	
Iron	200.7	**6670**	ug/L	21	8	1	11/06/23 10:04	11/03/23	
Magnesium	200.7	**5770**	ug/L	5.3	0.4	1	11/06/23 10:04	11/03/23	
Manganese	200.7	**334**	ug/L	1.1	0.2	1	11/06/23 10:04	11/03/23	
Potassium	200.7	**850**	ug/L	210	60	1	11/06/23 10:04	11/03/23	
Sodium	200.7	**8250**	ug/L	210	30	1	11/06/23 10:04	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 13:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W3-1030	**Basis:**	NA
Lab Code:	K2312341-003		

Total Metals

Analyte Name	Analysis Method	Result	Q	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	200.8	ND	U	ug/L	0.050	0.020	1	11/06/23 18:04	11/03/23	
Arsenic	200.8	**6.01**		ug/L	0.50	0.09	1	11/06/23 18:04	11/03/23	
Barium	200.8	**45.6**		ug/L	0.050	0.020	1	11/06/23 18:04	11/03/23	
Beryllium	200.8	**0.014**	**J**	ug/L	0.020	0.005	1	11/06/23 18:04	11/03/23	
Cadmium	200.8	ND	U	ug/L	0.020	0.008	1	11/06/23 18:04	11/03/23	
Chromium	200.8	**0.13**	**J**	ug/L	0.20	0.03	1	11/06/23 18:04	11/03/23	
Cobalt	200.8	**5.45**		ug/L	0.020	0.009	1	11/06/23 18:04	11/03/23	
Copper	200.8	**0.35**		ug/L	0.10	0.05	1	11/06/23 18:04	11/03/23	
Lead	200.8	**0.108**		ug/L	0.020	0.006	1	11/06/23 18:04	11/03/23	
Nickel	200.8	**0.89**		ug/L	0.20	0.04	1	11/06/23 18:04	11/03/23	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	11/06/23 18:04	11/03/23	
Silver	200.8	**0.061**		ug/L	0.020	0.009	1	11/06/23 18:04	11/03/23	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	11/06/23 18:04	11/03/23	
Vanadium	200.8	**0.32**		ug/L	0.20	0.04	1	11/06/23 18:04	11/03/23	
Zinc	200.8	**1.8**	**J**	ug/L	2.0	0.5	1	11/06/23 18:04	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 13:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W4-1030	**Basis:**	NA
Lab Code:	K2312341-004		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**10600**	ug/L	21	3	1	11/06/23 10:07	11/03/23	
Iron	200.7	ND U	ug/L	21	8	1	11/06/23 10:07	11/03/23	
Magnesium	200.7	**4400**	ug/L	5.3	0.4	1	11/06/23 10:07	11/03/23	
Manganese	200.7	**906**	ug/L	1.1	0.2	1	11/06/23 10:07	11/03/23	
Potassium	200.7	**790**	ug/L	210	60	1	11/06/23 10:07	11/03/23	
Sodium	200.7	**4570**	ug/L	210	30	1	11/06/23 10:07	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 13:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W4-1030	**Basis:**	NA
Lab Code:	K2312341-004		

Total Metals

Analyte Name	Analysis Method	Result	Q	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	200.8	ND	U	ug/L	0.050	0.020	1	11/06/23 18:19	11/03/23	
Arsenic	200.8	**0.45**	**J**	ug/L	0.50	0.09	1	11/06/23 18:19	11/03/23	
Barium	200.8	**21.2**		ug/L	0.050	0.020	1	11/06/23 18:19	11/03/23	
Beryllium	200.8	**0.024**		ug/L	0.020	0.005	1	11/07/23 14:25	11/03/23	
Cadmium	200.8	**0.013**	**J**	ug/L	0.020	0.008	1	11/06/23 18:19	11/03/23	
Chromium	200.8	**0.11**	**J**	ug/L	0.20	0.03	1	11/06/23 18:19	11/03/23	
Cobalt	200.8	**7.33**		ug/L	0.020	0.009	1	11/06/23 18:19	11/03/23	
Copper	200.8	**3.09**		ug/L	0.10	0.05	1	11/06/23 18:19	11/03/23	
Lead	200.8	**0.061**		ug/L	0.020	0.006	1	11/06/23 18:19	11/03/23	
Nickel	200.8	**3.40**		ug/L	0.20	0.04	1	11/06/23 18:19	11/03/23	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	11/06/23 18:19	11/03/23	
Silver	200.8	ND	U	ug/L	0.020	0.009	1	11/06/23 18:19	11/03/23	
Thallium	200.8	**0.009**	**J**	ug/L	0.020	0.009	1	11/06/23 18:19	11/03/23	
Vanadium	200.8	**0.07**	**J**	ug/L	0.20	0.04	1	11/06/23 18:19	11/03/23	
Zinc	200.8	**5.2**		ug/L	2.0	0.5	1	11/06/23 18:19	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 14:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W5-1030	**Basis:**	NA
Lab Code:	K2312341-005		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**2510**	ug/L	21	3	1	11/06/23 10:10	11/03/23	
Iron	200.7	ND U	ug/L	21	8	1	11/06/23 10:10	11/03/23	
Magnesium	200.7	**1280**	ug/L	5.3	0.4	1	11/06/23 10:10	11/03/23	
Manganese	200.7	**6.4**	ug/L	1.1	0.2	1	11/06/23 10:10	11/03/23	
Potassium	200.7	**330**	ug/L	210	60	1	11/06/23 10:10	11/03/23	
Sodium	200.7	**3160**	ug/L	210	30	1	11/06/23 10:10	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 14:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W5-1030	**Basis:**	NA
Lab Code:	K2312341-005		

Total Metals

Analyte Name	Analysis Method	Result	Q	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	200.8	ND	U	ug/L	0.050	0.020	1	11/06/23 18:22	11/03/23	
Arsenic	200.8	ND	U	ug/L	0.50	0.09	1	11/06/23 18:22	11/03/23	
Barium	200.8	**4.48**		ug/L	0.050	0.020	1	11/06/23 18:22	11/03/23	
Beryllium	200.8	**0.047**		ug/L	0.020	0.005	1	11/07/23 14:28	11/03/23	
Cadmium	200.8	**0.011**	**J**	ug/L	0.020	0.008	1	11/06/23 18:22	11/03/23	
Chromium	200.8	**0.13**	**J**	ug/L	0.20	0.03	1	11/06/23 18:22	11/03/23	
Cobalt	200.8	**0.014**	**J**	ug/L	0.020	0.009	1	11/06/23 18:22	11/03/23	
Copper	200.8	**0.15**		ug/L	0.10	0.05	1	11/06/23 18:22	11/03/23	
Lead	200.8	**0.050**		ug/L	0.020	0.006	1	11/06/23 18:22	11/03/23	
Nickel	200.8	**0.24**		ug/L	0.20	0.04	1	11/06/23 18:22	11/03/23	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	11/06/23 18:22	11/03/23	
Silver	200.8	**0.989**		ug/L	0.020	0.009	1	11/06/23 18:22	11/03/23	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	11/06/23 18:22	11/03/23	
Vanadium	200.8	**0.19**	**J**	ug/L	0.20	0.04	1	11/06/23 18:22	11/03/23	
Zinc	200.8	**1.2**	**J**	ug/L	2.0	0.5	1	11/06/23 18:22	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 15:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W6-1030	**Basis:**	NA
Lab Code:	K2312341-006		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**3140**	ug/L	21	3	1	11/06/23 10:12	11/03/23	
Iron	200.7	ND U	ug/L	21	8	1	11/06/23 10:12	11/03/23	
Magnesium	200.7	**1480**	ug/L	5.3	0.4	1	11/06/23 10:12	11/03/23	
Manganese	200.7	**33.9**	ug/L	1.1	0.2	1	11/06/23 10:12	11/03/23	
Potassium	200.7	**520**	ug/L	210	60	1	11/06/23 10:12	11/03/23	
Sodium	200.7	**7910**	ug/L	210	30	1	11/06/23 10:12	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 15:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W6-1030	**Basis:**	NA
Lab Code:	K2312341-006		

Total Metals

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	200.8	ND	U	ug/L	0.050	0.020	1	11/06/23 18:24	11/03/23	
Arsenic	200.8	ND	U	ug/L	0.50	0.09	1	11/06/23 18:24	11/03/23	
Barium	200.8	**7.03**		ug/L	0.050	0.020	1	11/06/23 18:24	11/03/23	
Beryllium	200.8	**0.011**	**J**	ug/L	0.020	0.005	1	11/07/23 14:30	11/03/23	
Cadmium	200.8	**0.008**	**J**	ug/L	0.020	0.008	1	11/06/23 18:24	11/03/23	
Chromium	200.8	**0.09**	**J**	ug/L	0.20	0.03	1	11/06/23 18:24	11/03/23	
Cobalt	200.8	**0.245**		ug/L	0.020	0.009	1	11/06/23 18:24	11/03/23	
Copper	200.8	**0.06**	**J**	ug/L	0.10	0.05	1	11/06/23 18:24	11/03/23	
Lead	200.8	ND	U	ug/L	0.020	0.006	1	11/06/23 18:24	11/03/23	
Nickel	200.8	**0.14**	**J**	ug/L	0.20	0.04	1	11/06/23 18:24	11/03/23	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	11/06/23 18:24	11/03/23	
Silver	200.8	**0.012**	**J**	ug/L	0.020	0.009	1	11/06/23 18:24	11/03/23	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	11/06/23 18:24	11/03/23	
Vanadium	200.8	ND	U	ug/L	0.20	0.04	1	11/06/23 18:24	11/03/23	
Zinc	200.8	**0.8**	**J**	ug/L	2.0	0.5	1	11/06/23 18:24	11/03/23	

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Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 16:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W7-1030	**Basis:**	NA
Lab Code:	K2312341-007		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**12800**	ug/L	21	3	1	11/06/23 10:15	11/03/23	
Iron	200.7	ND U	ug/L	21	8	1	11/06/23 10:15	11/03/23	
Magnesium	200.7	**1820**	ug/L	5.3	0.4	1	11/06/23 10:15	11/03/23	
Manganese	200.7	ND U	ug/L	1.1	0.2	1	11/06/23 10:15	11/03/23	
Potassium	200.7	**750**	ug/L	210	60	1	11/06/23 10:15	11/03/23	
Sodium	200.7	**8140**	ug/L	210	30	1	11/06/23 10:15	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 16:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W7-1030	**Basis:**	NA
Lab Code:	K2312341-007		

Total Metals

Analyte Name	Analysis Method	Result	Q	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	200.8	ND	U	ug/L	0.050	0.020	1	11/06/23 18:27	11/03/23	
Arsenic	200.8	**0.50**	**J**	ug/L	0.50	0.09	1	11/06/23 18:27	11/03/23	
Barium	200.8	**0.917**		ug/L	0.050	0.020	1	11/06/23 18:27	11/03/23	
Beryllium	200.8	**0.006**	**J**	ug/L	0.020	0.005	1	11/07/23 14:32	11/03/23	
Cadmium	200.8	ND	U	ug/L	0.020	0.008	1	11/06/23 18:27	11/03/23	
Chromium	200.8	**0.14**	**J**	ug/L	0.20	0.03	1	11/06/23 18:27	11/03/23	
Cobalt	200.8	ND	U	ug/L	0.020	0.009	1	11/06/23 18:27	11/03/23	
Copper	200.8	**0.07**	**J**	ug/L	0.10	0.05	1	11/06/23 18:27	11/03/23	
Lead	200.8	**0.015**	**J**	ug/L	0.020	0.006	1	11/06/23 18:27	11/03/23	
Nickel	200.8	**0.09**	**J**	ug/L	0.20	0.04	1	11/06/23 18:27	11/03/23	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	11/06/23 18:27	11/03/23	
Silver	200.8	**0.019**	**J**	ug/L	0.020	0.009	1	11/06/23 18:27	11/03/23	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	11/06/23 18:27	11/03/23	
Vanadium	200.8	**2.31**		ug/L	0.20	0.04	1	11/06/23 18:27	11/03/23	
Zinc	200.8	**0.5**	**J**	ug/L	2.0	0.5	1	11/06/23 18:27	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 16:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W8-1030	**Basis:**	NA
Lab Code:	K2312341-008		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**12600**	ug/L	21	3	1	11/06/23 10:18	11/03/23	
Iron	200.7	ND U	ug/L	21	8	1	11/06/23 10:18	11/03/23	
Magnesium	200.7	**1800**	ug/L	5.3	0.4	1	11/06/23 10:18	11/03/23	
Manganese	200.7	ND U	ug/L	1.1	0.2	1	11/06/23 10:18	11/03/23	
Potassium	200.7	**730**	ug/L	210	60	1	11/06/23 10:18	11/03/23	
Sodium	200.7	**8090**	ug/L	210	30	1	11/06/23 10:18	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 16:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W8-1030	**Basis:**	NA
Lab Code:	K2312341-008		

Total Metals

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	200.8	ND	U	ug/L	0.050	0.020	1	11/06/23 18:29	11/03/23	
Arsenic	200.8	**0.50**		ug/L	0.50	0.09	1	11/06/23 18:29	11/03/23	
Barium	200.8	**0.891**		ug/L	0.050	0.020	1	11/06/23 18:29	11/03/23	
Beryllium	200.8	ND	U	ug/L	0.020	0.005	1	11/07/23 14:35	11/03/23	
Cadmium	200.8	ND	U	ug/L	0.020	0.008	1	11/06/23 18:29	11/03/23	
Chromium	200.8	**0.15**	**J**	ug/L	0.20	0.03	1	11/06/23 18:29	11/03/23	
Cobalt	200.8	ND	U	ug/L	0.020	0.009	1	11/06/23 18:29	11/03/23	
Copper	200.8	**0.07**	**J**	ug/L	0.10	0.05	1	11/06/23 18:29	11/03/23	
Lead	200.8	**0.014**	**J**	ug/L	0.020	0.006	1	11/06/23 18:29	11/03/23	
Nickel	200.8	**0.13**	**J**	ug/L	0.20	0.04	1	11/06/23 18:29	11/03/23	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	11/06/23 18:29	11/03/23	
Silver	200.8	**0.018**	**J**	ug/L	0.020	0.009	1	11/06/23 18:29	11/03/23	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	11/06/23 18:29	11/03/23	
Vanadium	200.8	**2.43**		ug/L	0.20	0.04	1	11/06/23 18:29	11/03/23	
Zinc	200.8	**0.8**	**J**	ug/L	2.0	0.5	1	11/06/23 18:29	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 17:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W9-1030	**Basis:**	NA
Lab Code:	K2312341-009		

Total Metals

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	200.8	**9.95**		ug/L	0.050	0.020	1	11/06/23 18:32	11/03/23	
Arsenic	200.8	**36.3**		ug/L	0.50	0.09	1	11/06/23 18:32	11/03/23	
Barium	200.8	**494**		ug/L	0.050	0.020	1	11/06/23 18:32	11/03/23	
Beryllium	200.8	**0.05**	**J**	ug/L	0.10	0.03	5	11/07/23 14:37	11/03/23	
Cadmium	200.8	**0.094**		ug/L	0.020	0.008	1	11/06/23 18:32	11/03/23	
Calcium	200.7	**77300**		ug/L	110	20	5	11/06/23 10:44	11/03/23	
Chromium	200.8	**148**		ug/L	0.20	0.03	1	11/06/23 18:32	11/03/23	
Cobalt	200.8	**12.2**		ug/L	0.020	0.009	1	11/06/23 18:32	11/03/23	
Copper	200.8	**22.2**		ug/L	0.10	0.05	1	11/06/23 18:32	11/03/23	
Iron	200.7	**1260**		ug/L	110	40	5	11/06/23 10:44	11/03/23	
Lead	200.8	**4.54**		ug/L	0.020	0.006	1	11/06/23 18:32	11/03/23	
Magnesium	200.7	**80100**		ug/L	26	2	5	11/06/23 10:44	11/03/23	
Manganese	200.7	**847**		ug/L	5.3	1.1	5	11/06/23 10:44	11/03/23	
Nickel	200.8	**127**		ug/L	0.20	0.04	1	11/06/23 18:32	11/03/23	
Potassium	200.7	**333000**		ug/L	1100	300	5	11/06/23 10:44	11/03/23	
Selenium	200.8	**0.8**	**J**	ug/L	1.0	0.2	1	11/06/23 18:32	11/03/23	
Silver	200.8	**0.040**		ug/L	0.020	0.009	1	11/06/23 18:32	11/03/23	
Sodium	200.7	**2280000**		ug/L	1100	200	5	11/06/23 10:44	11/03/23	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	11/06/23 18:32	11/03/23	
Vanadium	200.8	**71.8**		ug/L	0.20	0.04	1	11/06/23 18:32	11/03/23	
Zinc	200.8	**37.8**		ug/L	2.0	0.5	1	11/06/23 18:32	11/03/23	

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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www.alsglobal.com

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 10:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W1-1030	**Basis:**	NA
Lab Code:	K2312341-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Ammonia as Nitrogen	SM 4500-NH3 E	**0.050**	mg/L	0.050	0.009	1	11/01/23 09:15	NA	
Carbon, Total Organic (TOC)	SM 5310 B	**1.40**	mg/L	0.50	0.10	1	11/06/23 18:37	NA	
Chloride	300.0	**2.68**	mg/L	0.20	0.010	2	11/13/23 20:08	NA	
Nitrate as Nitrogen	300.0	**0.47**	mg/L	0.10	0.03	2	10/31/23 14:50	NA	
Phosphorus, Total	365.3	**0.022**	mg/L	0.020	0.005	1	11/01/23 17:41	11/01/23	
Sulfate	300.0	**1.37**	mg/L	0.40	0.12	2	10/31/23 14:50	NA	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 10:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W1-1030	**Basis:**	NA
Lab Code:	K2312341-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Solids, Total Dissolved	SM 2540 C	**49**	mg/L	10	-	1	11/02/23 10:58	NA	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 11:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W2-1030	**Basis:**	NA
Lab Code:	K2312341-002		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**48.1**		mg/L	2.0	0.6	1	11/10/23 13:53	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.040**	**J**	mg/L	0.050	0.009	1	11/01/23 09:15	
Carbon, Total Organic (TOC)	SM 5310 B	ND	U	mg/L	0.50	0.10	1	11/06/23 18:37	
Chloride	300.0	**1.99**		mg/L	0.20	0.010	2	10/31/23 14:15	
Nitrate as Nitrogen	300.0	**0.74**		mg/L	0.10	0.03	2	10/31/23 14:15	
Solids, Total Suspended (TSS)	SM 2540 D	ND	U	mg/L	5.0	-	1	11/02/23 11:57	
Sulfate	300.0	**0.43**		mg/L	0.40	0.12	2	10/31/23 14:15	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 11:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W2-1030	**Basis:**	NA
Lab Code:	K2312341-002		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**87**	mg/L	10	-	1	11/02/23 10:58	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 13:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W3-1030	**Basis:**	NA
Lab Code:	K2312341-003		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**69.0**	mg/L	2.0	0.6	1	11/10/23 13:53	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.330**	mg/L	0.050	0.009	1	11/01/23 09:15	
Carbon, Total Organic (TOC)	SM 5310 B	**2.70**	mg/L	0.50	0.10	1	11/06/23 18:37	
Chloride	300.0	**1.43**	mg/L	0.20	0.010	2	10/31/23 14:59	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.10	0.03	2	10/31/23 14:59	
Solids, Total Suspended (TSS)	SM 2540 D	**16.5**	mg/L	5.0	-	1	11/02/23 11:57	
Sulfate	300.0	ND U	mg/L	0.40	0.12	2	10/31/23 14:59	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 13:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W3-1030	**Basis:**	NA
Lab Code:	K2312341-003		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**116**	mg/L	10	-	1	11/02/23 10:58	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 13:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W4-1030	**Basis:**	NA
Lab Code:	K2312341-004		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**50.0**	mg/L	2.0	0.6	1	11/10/23 13:53	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.050**	mg/L	0.050	0.009	1	11/01/23 09:15	
Carbon, Total Organic (TOC)	SM 5310 B	**0.70**	mg/L	0.50	0.10	1	11/06/23 18:37	
Chloride	300.0	**2.72**	mg/L	0.20	0.010	2	10/31/23 15:07	
Nitrate as Nitrogen	300.0	**0.09 J**	mg/L	0.10	0.03	2	10/31/23 15:07	
Solids, Total Suspended (TSS)	SM 2540 D	ND U	mg/L	5.0	-	1	11/02/23 11:57	
Sulfate	300.0	**2.24**	mg/L	0.40	0.12	2	10/31/23 15:07	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 13:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W4-1030	**Basis:**	NA
Lab Code:	K2312341-004		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**66**	mg/L	10	-	1	11/02/23 10:58	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 14:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W5-1030	**Basis:**	NA
Lab Code:	K2312341-005		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**13.4**	mg/L	2.0	0.6	1	11/10/23 13:53	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.030 J**	mg/L	0.050	0.009	1	11/01/23 09:15	
Carbon, Total Organic (TOC)	SM 5310 B	**0.13 J**	mg/L	0.50	0.10	1	11/06/23 18:37	
Chloride	300.0	**1.92**	mg/L	0.20	0.010	2	10/31/23 15:16	
Nitrate as Nitrogen	300.0	**0.41**	mg/L	0.10	0.03	2	10/31/23 15:16	
Solids, Total Suspended (TSS)	SM 2540 D	**5.5**	mg/L	5.0	-	1	11/02/23 11:57	
Sulfate	300.0	**0.52**	mg/L	0.40	0.12	2	10/31/23 15:16	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 14:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W5-1030	**Basis:**	NA
Lab Code:	K2312341-005		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**26**	mg/L	10	-	1	11/02/23 10:58	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 15:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W6-1030	**Basis:**	NA
Lab Code:	K2312341-006		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**30.1**	mg/L	2.0	0.6	1	11/10/23 13:53	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.020 J**	mg/L	0.050	0.009	1	11/01/23 09:15	
Carbon, Total Organic (TOC)	SM 5310 B	**0.12 J**	mg/L	0.50	0.10	1	11/06/23 18:37	
Chloride	300.0	**2.29**	mg/L	0.20	0.010	2	10/31/23 15:25	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.10	0.03	2	10/31/23 15:25	
Solids, Total Suspended (TSS)	SM 2540 D	ND U	mg/L	5.0	-	1	11/02/23 11:57	
Sulfate	300.0	**1.14**	mg/L	0.40	0.12	2	10/31/23 15:25	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 15:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W6-1030	**Basis:**	NA
Lab Code:	K2312341-006		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**46**	mg/L	10	-	1	11/02/23 10:58	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 16:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W7-1030	**Basis:**	NA
Lab Code:	K2312341-007		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**52.6**		mg/L	2.0	0.6	1	11/10/23 13:53	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.040**	**J**	mg/L	0.050	0.009	1	11/01/23 09:15	
Carbon, Total Organic (TOC)	SM 5310 B	ND	U	mg/L	0.50	0.10	1	11/06/23 18:37	
Chloride	300.0	**2.11**		mg/L	0.20	0.010	2	10/31/23 16:00	
Nitrate as Nitrogen	300.0	**0.05**	**J**	mg/L	0.10	0.03	2	10/31/23 16:00	
Solids, Total Suspended (TSS)	SM 2540 D	ND	U	mg/L	5.0	-	1	11/02/23 11:57	
Sulfate	300.0	**0.58**		mg/L	0.40	0.12	2	10/31/23 16:00	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 16:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W7-1030	**Basis:**	NA
Lab Code:	K2312341-007		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**110**	mg/L	10	-	1	11/02/23 10:58	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 16:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W8-1030	**Basis:**	NA
Lab Code:	K2312341-008		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**53.2**		mg/L	2.0	0.6	1	11/10/23 13:53	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.030**	**J**	mg/L	0.050	0.009	1	11/01/23 09:15	
Carbon, Total Organic (TOC)	SM 5310 B	ND	U	mg/L	0.50	0.10	1	11/06/23 18:37	
Chloride	300.0	**2.11**		mg/L	0.20	0.010	2	10/31/23 16:09	
Nitrate as Nitrogen	300.0	**0.05**	**J**	mg/L	0.10	0.03	2	10/31/23 16:09	
Solids, Total Suspended (TSS)	SM 2540 D	ND	U	mg/L	5.0	-	1	11/02/23 11:57	
Sulfate	300.0	**0.58**		mg/L	0.40	0.12	2	10/31/23 16:09	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 16:30
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W8-1030	**Basis:**	NA
Lab Code:	K2312341-008		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**107**	mg/L	10	-	1	11/02/23 10:58	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 17:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W9-1030	**Basis:**	NA
Lab Code:	K2312341-009		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**5140**	mg/L	4.0	1.2	2	11/13/23 16:58	
Ammonia as Nitrogen	SM 4500-NH3 E	**141**	mg/L	0.10	0.02	2	11/01/23 09:15	
Carbon, Total Organic (TOC)	SM 5310 B	**850**	mg/L	130	30	250	11/06/23 18:37	
Chloride	300.0	**790**	mg/L	50	3	500	11/13/23 20:17	
Nitrate as Nitrogen	300.0	**0.89**	mg/L	0.50	0.13	10	11/01/23 16:16	
Solids, Total Suspended (TSS)	SM 2540 D	**10.5**	mg/L	5.0	-	1	11/02/23 11:57	
Sulfate	300.0	**16.2**	mg/L	1.0	0.3	5	10/31/23 16:17	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23 17:00
Sample Matrix:	Water	**Date Received:**	10/31/23 09:20
Sample Name:	W9-1030	**Basis:**	NA
Lab Code:	K2312341-009		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**8180**	mg/L	200	-	1	11/02/23 10:58	

QC Summary Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Volatile Organic Compounds by GC/MS

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Cowlitz County Public Works **Service Request:** K2312341
Project: Cowlitz Co Headquarters Landfill Detection Monitor
Sample Matrix: Water

SURROGATE RECOVERY SUMMARY
Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Extraction Method: None

Sample Name	Lab Code	4-Bromofluorobenzene 68 - 117	Dibromofluoromethane 73 - 122	Toluene-d8 65 - 144
W2-1030	K2312341-002	91	107	100
W3-1030	K2312341-003	92	106	98
W4-1030	K2312341-004	92	108	99
W5-1030	K2312341-005	93	108	100
W6-1030	K2312341-006	92	106	99
W7-1030	K2312341-007	93	106	99
W8-1030	K2312341-008	91	108	100
W9-1030	K2312341-009	93	109	100
Trip Blanks	K2312341-010	94	102	99
Lab Control Sample	KQ2319626-03	104	107	106
Duplicate Lab Control Sample	KQ2319626-04	103	107	105
Method Blank	KQ2319626-05	93	100	99

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KQ2319626-05	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Q
Acetone	ND	U	20	3.3	1	11/02/23 12:39	
Acrylonitrile	ND	U	5.0	0.53	1	11/02/23 12:39	
Benzene	ND	U	0.50	0.062	1	11/02/23 12:39	
Bromochloromethane	ND	U	0.50	0.16	1	11/02/23 12:39	
Bromodichloromethane	ND	U	0.50	0.091	1	11/02/23 12:39	
Bromoform	ND	U	0.50	0.16	1	11/02/23 12:39	
Bromomethane	ND	U	0.50	0.16	1	11/02/23 12:39	
2-Butanone (MEK)	ND	U	20	1.9	1	11/02/23 12:39	
Carbon Disulfide	ND	U	0.50	0.069	1	11/02/23 12:39	
Carbon Tetrachloride	ND	U	0.50	0.096	1	11/02/23 12:39	
Chlorobenzene	ND	U	0.50	0.11	1	11/02/23 12:39	
Chloroethane	ND	U	0.50	0.16	1	11/02/23 12:39	
Chloroform	ND	U	0.50	0.072	1	11/02/23 12:39	
Chloromethane	ND	U	0.50	0.068	1	11/02/23 12:39	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.22	1	11/02/23 12:39	
Dibromochloromethane	ND	U	0.50	0.14	1	11/02/23 12:39	
1,2-Dibromoethane (EDB)	ND	U	2.0	0.10	1	11/02/23 12:39	
Dibromomethane	ND	U	0.50	0.15	1	11/02/23 12:39	
trans-1,4-Dichloro-2-butene	ND	U	10	0.35	1	11/02/23 12:39	
1,2-Dichlorobenzene	ND	U	0.50	0.12	1	11/02/23 12:39	
1,4-Dichlorobenzene	ND	U	0.50	0.12	1	11/02/23 12:39	
1,1-Dichloroethane	ND	U	0.50	0.077	1	11/02/23 12:39	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.080	1	11/02/23 12:39	
1,1-Dichloroethene	ND	U	0.50	0.080	1	11/02/23 12:39	
cis-1,2-Dichloroethene	ND	U	0.50	0.067	1	11/02/23 12:39	
trans-1,2-Dichloroethene	ND	U	0.50	0.072	1	11/02/23 12:39	
1,2-Dichloropropane	ND	U	0.50	0.095	1	11/02/23 12:39	
cis-1,3-Dichloropropene	ND	U	0.50	0.18	1	11/02/23 12:39	
trans-1,3-Dichloropropene	ND	U	0.50	0.068	1	11/02/23 12:39	
Ethylbenzene	ND	U	0.50	0.050	1	11/02/23 12:39	
2-Hexanone	ND	U	20	2.7	1	11/02/23 12:39	
Iodomethane	ND	U	5.0	0.12	1	11/02/23 12:39	
4-Methyl-2-pentanone (MIBK)	ND	U	20	2.6	1	11/02/23 12:39	
Methylene Chloride	**0.31**	**J**	2.0	0.10	1	11/02/23 12:39	
Styrene	ND	U	0.50	0.089	1	11/02/23 12:39	
1,1,1,2-Tetrachloroethane	ND	U	0.50	0.11	1	11/02/23 12:39	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.16	1	11/02/23 12:39	
Tetrachloroethene (PCE)	ND	U	0.50	0.099	1	11/02/23 12:39	
Toluene	ND	U	0.50	0.054	1	11/02/23 12:39	
1,1,2-Trichloroethane	ND	U	0.50	0.14	1	11/02/23 12:39	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.075	1	11/02/23 12:39	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KQ2319626-05	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Trichloroethene (TCE)	ND U	0.50	0.10	1	11/02/23 12:39	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	11/02/23 12:39	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	11/02/23 12:39	
Vinyl Acetate	ND U	5.0	0.43	1	11/02/23 12:39	
Vinyl Chloride	ND U	0.50	0.075	1	11/02/23 12:39	
o-Xylene	ND U	0.50	0.074	1	11/02/23 12:39	
m,p-Xylenes	ND U	0.50	0.11	1	11/02/23 12:39	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	93	68 - 117	11/02/23 12:39	
Dibromofluoromethane	100	73 - 122	11/02/23 12:39	
Toluene-d8	99	65 - 144	11/02/23 12:39	

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QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Analyzed:**	11/02/23
Sample Matrix:	Water	**Date Extracted:**	NA

Duplicate Lab Control Sample Summary
Volatile Organic Compounds by GC/MS

Analysis Method:	8260C	**Units:**	ug/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	822707

	Lab Control Sample KQ2319626-03			Duplicate Lab Control Sample KQ2319626-04					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
1,1,1,2-Tetrachloroethane	10.9	10.0	109	10.2	10.0	102	66-124	7	30
1,1,1-Trichloroethane (TCA)	10.4	10.0	104	9.76	10.0	98	59-136	7	30
1,1,2,2-Tetrachloroethane	9.88	10.0	99	9.68	10.0	97	70-127	2	30
1,1,2-Trichloroethane	10.3	10.0	103	9.87	10.0	99	74-118	5	30
1,1-Dichloroethane	10.5	10.0	105	9.78	10.0	98	68-132	7	30
1,1-Dichloroethene	9.27	10.0	93	8.62	10.0	86	66-129	7	30
1,2,3-Trichloropropane	10.2	10.0	102	9.85	10.0	99	69-123	4	30
1,2-Dibromo-3-chloropropane	8.31	10.0	83	7.70	10.0	77	55-132	8	30
1,2-Dibromoethane (EDB)	11.1	10.0	111	10.5	10.0	105	74-118	6	30
1,2-Dichlorobenzene	10.2	10.0	102	9.64	10.0	96	72-115	6	30
1,2-Dichloroethane (EDC)	10.9	10.0	109	10.3	10.0	103	56-142	6	30
1,2-Dichloropropane	10.2	10.0	102	9.62	10.0	96	67-126	6	30
1,4-Dichlorobenzene	10.1	10.0	101	9.52	10.0	95	73-115	6	30
2-Butanone (MEK)	60.2	50.0	120	57.6	50.0	115	71-149	4	30
2-Hexanone	58.3	50.0	117	54.0	50.0	108	59-131	8	30
4-Methyl-2-pentanone (MIBK)	55.5	50.0	111	51.8	50.0	104	64-134	7	30
Acetone	60.6	50.0	121	60.7	50.0	121	68-135	<1	30
Acrylonitrile	45.1	40.0	113	43.3	40.0	108	65-129	4	30
Benzene	10.6	10.0	106	9.86	10.0	99	69-124	7	30
Bromochloromethane	11.6	10.0	116	10.8	10.0	108	75-131	7	30
Bromodichloromethane	11.1	10.0	111	10.3	10.0	103	63-129	7	30
Bromoform	10.3	10.0	103	9.70	10.0	97	52-144	6	30
Bromomethane	8.63	10.0	86	8.11	10.0	81	35-113	6	30
Carbon Disulfide	17.8	20.0	89	16.7	20.0	83	46-144	6	30
Carbon Tetrachloride	10.6	10.0	106	9.69	10.0	97	55-140	9	30
Chlorobenzene	10.9	10.0	109	10.1	10.0	101	72-116	7	30
Chloroethane	9.59	10.0	96	9.03	10.0	90	58-134	6	30
Chloroform	11.3	10.0	113	10.8	10.0	108	70-129	5	30
Chloromethane	8.64	10.0	86	8.21	10.0	82	34-130	5	30
cis-1,2-Dichloroethene	10.6	10.0	106	9.89	10.0	99	71-118	7	30
cis-1,3-Dichloropropene	9.28	10.0	93	8.73	10.0	87	62-132	6	30
Dibromochloromethane	9.63	10.0	96	9.03	10.0	90	67-126	6	30
Dibromomethane	11.3	10.0	113	11.0	10.0	110	69-128	3	30
Ethylbenzene	10.7	10.0	107	9.88	10.0	99	67-121	8	30
Iodomethane	28.1	30.0	94	25.9	30.0	86	51-164	8	30
m,p-Xylenes	21.9	20.0	109	20.2	20.0	101	69-121	8	30
Methylene Chloride	10.1	10.0	101	9.68	10.0	97	71-122	4	30
o-Xylene	11.0	10.0	110	10.2	10.0	102	71-119	7	30
Styrene	10.9	10.0	109	10.2	10.0	102	74-121	6	30
Tetrachloroethene (PCE)	10.2	10.0	102	9.40	10.0	94	62-126	8	30
Toluene	10.6	10.0	106	9.92	10.0	99	69-124	7	30

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QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Analyzed:**	11/02/23
Sample Matrix:	Water	**Date Extracted:**	NA

Duplicate Lab Control Sample Summary
Volatile Organic Compounds by GC/MS

Analysis Method:	8260C	**Units:**	ug/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	822707

	Lab Control Sample KQ2319626-03			Duplicate Lab Control Sample KQ2319626-04					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
trans-1,2-Dichloroethene	10.5	10.0	105	9.62	10.0	96	67-125	9	30
trans-1,3-Dichloropropene	8.93	10.0	89	8.36	10.0	84	59-125	7	30
trans-1,4-Dichloro-2-butene	27.8	30.0	93	27.5	30.0	92	46-170	1	30
Trichloroethene (TCE)	10.4	10.0	104	9.66	10.0	97	67-128	7	30
Trichlorofluoromethane (CFC 11)	10.2	10.0	102	9.57	10.0	96	52-141	6	30
Vinyl Acetate	55.1	50.0	110	51.0	50.0	102	44-156	8	30
Vinyl Chloride	9.47	10.0	95	8.86	10.0	89	55-123	7	30

Metals

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Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2319322-01		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**3 J**	ug/L	21	3	1	11/06/23 09:20	11/03/23	
Iron	200.7	ND U	ug/L	21	8	1	11/06/23 09:20	11/03/23	
Magnesium	200.7	ND U	ug/L	5.3	0.4	1	11/06/23 09:20	11/03/23	
Manganese	200.7	ND U	ug/L	1.1	0.2	1	11/06/23 09:20	11/03/23	
Potassium	200.7	ND U	ug/L	210	60	1	11/06/23 09:20	11/03/23	
Sodium	200.7	ND U	ug/L	210	30	1	11/06/23 09:20	11/03/23	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2319325-01		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	200.8	ND U	ug/L	0.050	0.020	1	11/06/23 17:41	11/03/23	
Arsenic	200.8	ND U	ug/L	0.50	0.09	1	11/06/23 17:41	11/03/23	
Barium	200.8	ND U	ug/L	0.050	0.020	1	11/06/23 17:41	11/03/23	
Beryllium	200.8	ND U	ug/L	0.020	0.005	1	11/06/23 17:41	11/03/23	
Cadmium	200.8	ND U	ug/L	0.020	0.008	1	11/06/23 17:41	11/03/23	
Chromium	200.8	ND U	ug/L	0.20	0.03	1	11/06/23 17:41	11/03/23	
Cobalt	200.8	ND U	ug/L	0.020	0.009	1	11/06/23 17:41	11/03/23	
Copper	200.8	ND U	ug/L	0.10	0.05	1	11/06/23 17:41	11/03/23	
Lead	200.8	ND U	ug/L	0.020	0.006	1	11/06/23 17:41	11/03/23	
Nickel	200.8	ND U	ug/L	0.20	0.04	1	11/06/23 17:41	11/03/23	
Selenium	200.8	ND U	ug/L	1.0	0.2	1	11/06/23 17:41	11/03/23	
Silver	200.8	ND U	ug/L	0.020	0.009	1	11/06/23 17:41	11/03/23	
Thallium	200.8	ND U	ug/L	0.020	0.009	1	11/06/23 17:41	11/03/23	
Vanadium	200.8	ND U	ug/L	0.20	0.04	1	11/06/23 17:41	11/03/23	
Zinc	200.8	ND U	ug/L	2.0	0.5	1	11/06/23 17:41	11/03/23	

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23
Sample Matrix:	Water	**Date Received:**	10/31/23
		Date Analyzed:	11/6/23
		Date Extracted:	11/3/23

Matrix Spike Summary
Total Metals

Sample Name:	W1-1030	**Units:**	ug/L
Lab Code:	K2312341-001	**Basis:**	NA
Analysis Method:	200.7		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2319322-06

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Calcium	5840	16400	10000	106	70-130
Iron	198	1210	1000	101	70-130
Magnesium	2510	12300	10000	98	70-130
Manganese	3.5	505	500	100	70-130
Potassium	660	10500	10000	98	70-130
Sodium	4760	14800	10000	101	70-130

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

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23
Sample Matrix:	Water	**Date Received:**	10/31/23
		Date Analyzed:	11/6/23
		Date Extracted:	11/3/23

Matrix Spike Summary
Total Metals

Sample Name:	W1-1030	**Units:**	ug/L
Lab Code:	K2312341-001	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2319325-06

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Antimony	ND U	10.5	10.0	105	70-130
Arsenic	0.09 J	49.0	50.0	98	70-130
Barium	8.46	110	100	101	70-130
Beryllium	0.006 J	2.64	2.50	105	70-130
Cadmium	0.008 J	24.5	25.0	98	70-130
Chromium	0.22	10.1	10.0	99	70-130
Cobalt	0.069	24.7	25.0	99	70-130
Copper	0.85	13.1	12.5	98	70-130
Lead	0.036	48.7	50.0	97	70-130
Nickel	0.17 J	24.7	25.0	98	70-130
Selenium	ND U	49.9	50.0	100	70-130
Silver	ND U	12.3	12.5	98	70-130
Thallium	0.019 J	53.0	50.0	106	70-130
Vanadium	0.56	26.3	25.0	103	70-130
Zinc	0.9 J	25.5	25.0	98	70-130

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Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23
Sample Matrix:	Water	**Date Received:**	10/31/23
		Date Analyzed:	11/06/23

Replicate Sample Summary
Total Metals

Sample Name:	W1-1030	**Units:**	ug/L
Lab Code:	K2312341-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2319322-05 Result	Average	RPD	RPD Limit
Calcium	200.7	21	3	5840	5800	5820	<1	20
Iron	200.7	21	8	198	201	200	2	20
Magnesium	200.7	5.3	0.4	2510	2480	2500	1	20
Manganese	200.7	1.1	0.2	3.5	3.5	3.5	<1	20
Potassium	200.7	210	60	660	600	630	10	20
Sodium	200.7	210	30	4760	4680	4720	2	20

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QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23
Sample Matrix:	Water	**Date Received:**	10/31/23
		Date Analyzed:	11/06/23

Replicate Sample Summary
Total Metals

Sample Name:	W1-1030	**Units:**	ug/L
Lab Code:	K2312341-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2319325-05 Result	Average	RPD	RPD Limit
Antimony	200.8	0.050	0.020	ND U	ND U	ND	-	20
Arsenic	200.8	0.50	0.09	0.09 J	0.09 J	0.09	<1	20
Barium	200.8	0.050	0.020	8.46	8.37	8.42	1	20
Beryllium	200.8	0.020	0.005	0.006 J	ND U	NC	NC	20
Cadmium	200.8	0.020	0.008	0.008 J	ND U	NC	NC	20
Chromium	200.8	0.20	0.03	0.22	0.20 J	0.21	10	20
Cobalt	200.8	0.020	0.009	0.069	0.063	0.066	9	20
Copper	200.8	0.10	0.05	0.85	0.88	0.87	3	20
Lead	200.8	0.020	0.006	0.036	0.028	0.032	25 #	20
Nickel	200.8	0.20	0.04	0.17 J	0.16 J	0.17	6	20
Selenium	200.8	1.0	0.2	ND U	ND U	ND	-	20
Silver	200.8	0.020	0.009	ND U	ND U	ND	-	20
Thallium	200.8	0.020	0.009	0.019 J	ND U	NC	NC	20
Vanadium	200.8	0.20	0.04	0.56	0.52	0.54	7	20
Zinc	200.8	2.0	0.5	0.9 J	0.8 J	0.9	12	20

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QA/QC Report

Client: Cowlitz County Public Works
Project: Cowlitz Co Headquarters Landfill Detection Monitor
Sample Matrix: Water

Service Request: K2312341
Date Analyzed: 11/06/23

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2319322-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Calcium	200.7	13200	12500	105	85-115
Iron	200.7	2480	2500	99	85-115
Magnesium	200.7	12200	12500	98	85-115
Manganese	200.7	1240	1250	99	85-115
Potassium	200.7	12200	12500	97	85-115
Sodium	200.7	12700	12500	102	85-115

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QA/QC Report

Client: Cowlitz County Public Works
Project: Cowlitz Co Headquarters Landfill Detection Monitor
Sample Matrix: Water

Service Request: K2312341
Date Analyzed: 11/06/23

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2319325-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Antimony	200.8	10.1	10.0	101	85-115
Arsenic	200.8	48.4	50.0	97	85-115
Barium	200.8	97.3	100	97	85-115
Beryllium	200.8	2.52	2.50	101	85-115
Cadmium	200.8	24.1	25.0	96	85-115
Chromium	200.8	9.75	10.0	98	85-115
Cobalt	200.8	24.4	25.0	97	85-115
Copper	200.8	12.0	12.5	96	85-115
Lead	200.8	48.4	50.0	97	85-115
Nickel	200.8	24.2	25.0	97	85-115
Selenium	200.8	49.9	50.0	100	85-115
Silver	200.8	12.2	12.5	97	85-115
Thallium	200.8	51.8	50.0	104	85-115
Vanadium	200.8	24.8	25.0	99	85-115
Zinc	200.8	24.1	25.0	96	85-115

General Chemistry

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Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2312341-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	ND	U	mg/L	2.0	0.6	1	11/10/23 13:53	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.030**	**J**	mg/L	0.050	0.009	1	11/01/23 09:15	
Carbon, Total Organic (TOC)	SM 5310 B	ND	U	mg/L	0.50	0.10	1	11/06/23 18:37	
Chloride	300.0	ND	U	mg/L	0.10	0.005	1	10/31/23 12:14	
Nitrate as Nitrogen	300.0	ND	U	mg/L	0.050	0.013	1	10/31/23 12:14	
Phosphorus, Total	365.3	**0.010**	**J**	mg/L	0.020	0.005	1	11/01/23 17:41	
Solids, Total Suspended (TSS)	SM 2540 D	ND	U	mg/L	5.0	-	1	11/02/23 11:57	
Sulfate	300.0	ND	U	mg/L	0.20	0.06	1	10/31/23 12:14	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2312341-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	10	-	1	11/02/23 10:58	

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Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2312341-MB2		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	ND	U	mg/L	2.0	0.6	1	11/13/23 16:58	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.020**	**J**	mg/L	0.050	0.009	1	11/01/23 09:15	
Carbon, Total Organic (TOC)	SM 5310 B	ND	U	mg/L	0.50	0.10	1	11/06/23 18:37	
Chloride	300.0	ND	U	mg/L	0.10	0.005	1	11/13/23 17:05	
Nitrate as Nitrogen	300.0	ND	U	mg/L	0.050	0.013	1	11/01/23 18:10	
Solids, Total Suspended (TSS)	SM 2540 D	ND	U	mg/L	5.0	-	1	11/02/23 11:57	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2312341-MB2		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	ND U	mg/L	10	-	1	11/02/23 10:58	

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Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2312341-MB3		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Chloride	300.0	ND U	mg/L	0.10	0.005	1	11/13/23 20:52	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	0.013	1	11/01/23 21:56	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2312341-MB4		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	0.013	1	11/01/23 23:57	

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QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project:	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23
Sample Matrix:	Water	**Date Received:**	10/31/23
		Date Analyzed:	10/31/23

Duplicate Matrix Spike Summary
General Chemistry Parameters

Sample Name:	W2-1030	**Units:**	mg/L
Lab Code:	K2312341-002	**Basis:**	NA

			Matrix Spike				Duplicate Matrix Spike				
			K2312341-002MS				K2312341-002DMS				
Analyte Name	**Method**	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Chloride	300.0	1.99	9.39	8.00	93	9.47	8.00	94	90-110	<1	20
Nitrate as Nitrogen	300.0	0.74	4.67	4.00	98	4.72	4.00	99	90-110	<1	20
Sulfate	300.0	0.43	8.12	8.00	96	8.20	8.00	97	90-110	1	20

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QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23
Sample Matrix:	Water	**Date Received:**	10/31/23
		Date Analyzed:	10/31/23

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	W2-1030	**Units:**	mg/L
Lab Code:	K2312341-002	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K2312341-002DUP Result	Average	RPD	RPD Limit
Chloride	300.0	0.20	0.010	1.99	1.98	1.98	<1	20
Nitrate as Nitrogen	300.0	0.10	0.03	0.74	0.74	0.742	<1	20
Sulfate	300.0	0.40	0.12	0.43	0.42	0.423	<1	20

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QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312341
Project	Cowlitz Co Headquarters Landfill Detection Monitor	**Date Collected:**	10/30/23
Sample Matrix:	Water	**Date Received:**	10/31/23
		Date Analyzed:	11/13/23

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	W9-1030	**Units:**	mg/L
Lab Code:	K2312341-009	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K2312341-009DUP Result	Average	RPD	RPD Limit
Alkalinity as CaCO3, Total	SM 2320 B	4.0	1.2	5140	5110	5120	<1	20

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QA/QC Report

Client: Cowlitz County Public Works
Project: Cowlitz Co Headquarters Landfill Detection Monitor
Sample Matrix: Water

Service Request: K2312341
Date Analyzed: 10/31/23 - 11/10/23

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2312341-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, Total	SM 2320 B	154	149	103	85-115
Ammonia as Nitrogen	SM 4500-NH3 E	3.33	3.79	88	85-115
Carbon, Total Organic (TOC)	SM 5310 B	24.5	25.0	98	85-115
Chloride	300.0	4.81	5.00	96	90-110
Nitrate as Nitrogen	300.0	2.51	2.50	100	90-110
Phosphorus, Total	365.3	2.61	2.66	98	85-115
Solids, Total Dissolved	SM 2540 C	1380	1430	97	85-115
Solids, Total Suspended (TSS)	SM 2540 D	376	390	96	85-115
Sulfate	300.0	4.96	5.00	99	90-110

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QA/QC Report

Client: Cowlitz County Public Works
Project: Cowlitz Co Headquarters Landfill Detection Monitor
Sample Matrix: Water

Service Request: K2312341
Date Analyzed: 11/01/23 - 11/13/23

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2312341-LCS2

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, Total	SM 2320 B	156	149	105	85-115
Ammonia as Nitrogen	SM 4500-NH3 E	3.26	3.79	86	85-115
Carbon, Total Organic (TOC)	SM 5310 B	25.1	25.0	100	85-115
Chloride	300.0	4.80	5.00	96	90-110
Nitrate as Nitrogen	300.0	2.53	2.50	101	90-110

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Cowlitz County Public Works
Project: Cowlitz Co Headquarters Landfill Detection Monitor
Sample Matrix: Water

Service Request: K2312341
Date Analyzed: 11/01/23 - 11/13/23

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2312341-LCS3

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, Total	SM 2320 B	154	149	103	85-115
Ammonia as Nitrogen	SM 4500-NH3 E	3.29	3.79	87	85-115
Chloride	300.0	4.83	5.00	97	90-110
Nitrate as Nitrogen	300.0	2.56	2.50	102	90-110

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Cowlitz County Public Works
Project: Cowlitz Co Headquarters Landfill Detection Monitor
Sample Matrix: Water

Service Request: K2312341
Date Analyzed: 11/02/23 - 11/13/23

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2312341-LCS4

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, Total	SM 2320 B	154	149	103	85-115
Nitrate as Nitrogen	300.0	2.54	2.50	101	90-110

September 15, 2023 Service Request No:K2309946

Dan Bales
Cowlitz County Public Works
1600 13th Avenue South
Kelso, WA 98626

Laboratory Results for: HQLF Leachate

Dear Dan,

Enclosed are the results of the sample(s) submitted to our laboratory September 07, 2023
For your reference, these analyses have been assigned our service request number **K2309946.**

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 3377. You may also contact me via email at Sydney.Wolf@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Sydney A. Wolf
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Cowlitz County Public Works
Project: HQLF Leachate
Sample Matrix: Water

Service Request: K2309946
Date Received: 09/07/2023

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

One water sample was received for analysis at ALS Environmental on 09/07/2023. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by _____ Date 09/15/2023

SAMPLE DETECTION SUMMARY

This form includes only detections above the reporting levels. For a full listing of sample results, continue to the Sample Results section of this Report.

CLIENT ID: HQLF Leachate			Lab ID: K2309946-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Ammonia as Nitrogen	136			0.10	mg/L	SM 4500-NH3 E
Biochemical Oxygen Demand (BOD)	690			200	mg/L	SM 5210 B
Solids, Total Suspended (TSS)	12.5			5.0	mg/L	SM 2540 D

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Cowlitz County Public Works **Service Request:**K2309946
Project: HQLF Leachate

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2309946-001	HQLF Leachate	9/7/2023	0701

ALS Environmental

CHAIN OF COUSTODY

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111419

003

SR# K2309946

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: HQLF leachate	Project Number:
Project Manager: Dan Bales	
Company: Cowlitz County Public Works	
Address, City, State: 1600 13th Ave S Kelso, WA 98626	
Phone #: 360-274-6492	email: balesd@cowlitzwa.gov
Sampler Signature: Denny R K[signature]	Sampler Printed Name: Denny King

CLIENT SAMPLE ID	LABID	SAMPLING Date Time State	Matrix	NUMBER OF CONTAINERS	48H SM 5210 B / BOD 5 Day	7D SM 2540 D / TSS	28D SM 4500-NH3 E / Ammonia	1	2	3	4	5	Remarks
1. HQLF leachate		9-7-23 7:01		2	X	X	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

____ 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

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

Special Instructions/Comments:

ph 7.57

temp 54°

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature: Denny R K[signature]	Signature: Naomi Pedersen[signature]	Signature	Signature	Signature	Signature
Printed Name: Denny King	Printed Name: AG	Printed Name	Printed Name	Printed Name	Printed Name
Firm: CCPW	Firm: 9/7/23 0920	Firm	Firm	Firm	Firm
Date/Time: 9-7-23 9:20	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

PM Loyd

Cooler Receipt and Preservation Form

Client CRW Service Request K23 09946

Received: 9/7/23 Opened: 9/7/23 By: AR Unloaded: 9/7/23 By: AR

1. Samples were received via? *USPS* *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

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
19.1	18.5	1R02	130245 / 5 of 5				
18.1	18.6	1R02	129006 / 4 of 5				
17.4	11.4	1R02	130646 / 3 of 5				
19.9	21.3	1R02	128810 / 2 of 5				
16.5	14.4	1R02	111419 / 1 of 5				

4. Was a Temperature Blank present in cooler? NA (Y) N If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y (N)
   If no, were they received on ice and same day as collected? If not, notate the cooler # above and notify the PM. NA (Y) N
   If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*
6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N
15. Were samples received within the method specified time limit? If not, notate the error below and notify the PM (NA) Y N
16. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? (NA) Y N Underfilled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:

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

SHORT HOLD

Notes, Discrepancies, Resolutions: Did not PH due to nature of Sample

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
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.
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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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.

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.

ALS Group USA, Corp.
dba ALS Environmental

Analyst Summary report

Client:	Cowlitz County Public Works	**Service Request:**	K2309946
Project:	HQLF Leachate/		

Sample Name:	HQLF Leachate	**Date Collected:**	09/7/23
Lab Code:	K2309946-001	**Date Received:**	09/7/23
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
SM 2540 D		JBYMAN
SM 4500-NH3 E		ACHEATLEY
SM 5210 B		SATKINSON

Sample Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2309946
Project:	HQLF Leachate	**Date Collected:**	09/07/23 07:01
Sample Matrix:	Water	**Date Received:**	09/07/23 09:20
Sample Name:	HQLF Leachate	**Basis:**	NA
Lab Code:	K2309946-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Ammonia as Nitrogen	SM 4500-NH3 E	**136**	mg/L	0.10	2	09/11/23 10:45	
Biochemical Oxygen Demand (BOD)	SM 5210 B	**690**	mg/L	200	100	09/07/23 15:15	
Solids, Total Suspended (TSS)	SM 2540 D	**12.5**	mg/L	5.0	1	09/13/23 16:16	

QC Summary Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2309946
Project:	HQLF Leachate	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2309946-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Ammonia as Nitrogen	SM 4500-NH3 E	ND U	mg/L	0.050	1	09/11/23 10:45	
Solids, Total Suspended (TSS)	SM 2540 D	ND U	mg/L	5.0	1	09/13/23 16:16	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2309946
Project:	HQLF Leachate	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2309946-MB2		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Suspended (TSS)	SM 2540 D	ND U	mg/L	5.0	1	09/13/23 16:16	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Cowlitz County Public Works
Project: HQLF Leachate
Sample Matrix: Water

Service Request: K2309946
Date Analyzed: 09/07/23 - 09/13/23

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2309946-LCS

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Ammonia as Nitrogen	SM 4500-NH3 E	3.87	3.79	102	85-115
Biochemical Oxygen Demand (BOD)	SM 5210 B	94.6	115	82	78-122
Solids, Total Suspended (TSS)	SM 2540 D	380	390	97	85-115

October 19, 2023 Service Request No:K2311452

Dan Bales
Cowlitz County Public Works
1600 13th Avenue South
Kelso, WA 98626

Laboratory Results for: HQLF Leachate

Dear Dan,

Enclosed are the results of the sample(s) submitted to our laboratory October 10, 2023
For your reference, these analyses have been assigned our service request number **K2311452.**

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 3377. You may also contact me via email at Sydney.Wolf@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Sydney A. Wolf
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Cowlitz County Public Works
Project: HQLF Leachate
Sample Matrix: Water

Service Request: K2311452
Date Received: 10/10/2023

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

One water sample was received for analysis at ALS Environmental on 10/10/2023. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by _____ Date 10/19/2023

SAMPLE DETECTION SUMMARY

This form includes only detections above the reporting levels. For a full listing of sample results, continue to the Sample Results section of this Report.

CLIENT ID: HQLF Leachate			Lab ID: K2311452-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Ammonia as Nitrogen	104			0.10	mg/L	SM 4500-NH3 E
Biochemical Oxygen Demand (BOD)	570			200	mg/L	SM 5210 B
Solids, Total Suspended (TSS)	11.0			5.0	mg/L	SM 2540 D

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Cowlitz County Public Works **Service Request:**K2311452
Project: HQLF Leachate

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2311452-001	HQLF Leachate	10/10/2023	0655

V2311452

ALS Environmental

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SR#______

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: HOLF leachate	Project Number:
Project Manager: Dan Bales	
Company: Cowlitz County Public Works	
Address, City, State: 1600 13th Ave S Kelso WA 98626	
Phone #: 360-274-6492	email: balesd@cowlitzwa.gov
Sampler Signature: Denny R King	Sampler Printed Name: Denny King

CLIENT SAMPLE ID	LABID	SAMPLING Date Time State	Matrix	NUMBER OF CONTAINERS	48H SM 5210 B / BOD 5 Day	7D SM 2540 D / TSS	28D SM 4500-NH3 E / Ammonia	1	2	3	4	5	Remarks
1. HOLF leachate		10-10-23 6:55		2	X	X	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
____ 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:

ph 7.44

temp 51°

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

	Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	Denny R King	Hayleigh Smith				
Printed Name	Denny King	Hayleigh Smith				
Firm	CCPW	ALS				
Date/Time	10-10-23 9:30	10/10/23 0940				

PM SW

Cooler Receipt and Preservation Form

Client Cowlitz County Public Works Service Request K23 11452

Received: 10/10/23 Opened: 10/10/23 By: HS Unloaded: 10/10/23 By: HS

1. Samples were received via? *USPS* *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 on front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
15.6	15.0	IR02	1 of 5				
14.4	9.4	↓	2 of 5				
16.3	17.0		3 of 5				
15.5	11.6		4 of 5				
16.2	16.6		5 of 5				

4. Was a Temperature Blank present in cooler? NA (Y) N If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y (N)
   If no, were they received on ice and same day as collected? If not, notate the cooler # above and notify the PM. NA (Y) N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

6. Packing material: *Inserts* (*Baggies*) (*Bubble Wrap*) *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y (N)
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N
15. Were samples received within the method specified time limit? If not, notate the error below and notify the PM (NA) Y N
16. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? (NA) Y N Underfilled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:
		SHORT HOLD

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
HQLF Leachate PW	125ml P			\	H2SO4	.5ml	19-Gen-07-86-J	HS	1011
HQLF Leachate Influent	500ml P			\	H2SO4	1ml	↓	HS	↓
TWLF Leachate	250ml P			\	NaOH	.5ml	19-Gen-07-83-	HS	↓
							G		

Notes, Discrepancies, Resolutions: _____

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
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.
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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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.

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.

ALS Group USA, Corp.
dba ALS Environmental

Analyst Summary report

Client:	Cowlitz County Public Works	**Service Request:**	K2311452
Project:	HQLF Leachate/		

Sample Name:	HQLF Leachate	**Date Collected:**	10/10/23
Lab Code:	K2311452-001	**Date Received:**	10/10/23
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
SM 2540 D		AWILSON
SM 4500-NH3 E		ACHEATLEY
SM 5210 B		SATKINSON

Sample Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2311452
Project:	HQLF Leachate	**Date Collected:**	10/10/23 06:55
Sample Matrix:	Water	**Date Received:**	10/10/23 09:40
Sample Name:	HQLF Leachate	**Basis:**	NA
Lab Code:	K2311452-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Ammonia as Nitrogen	SM 4500-NH3 E	**104**	mg/L	0.10	2	10/17/23 13:15	
Biochemical Oxygen Demand (BOD)	SM 5210 B	**570**	mg/L	200	100	10/11/23 14:40	
Solids, Total Suspended (TSS)	SM 2540 D	**11.0**	mg/L	5.0	1	10/12/23 11:09	

QC Summary Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2311452
Project:	HQLF Leachate	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2311452-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Ammonia as Nitrogen	SM 4500-NH3 E	ND U	mg/L	0.050	1	10/17/23 13:15	
Solids, Total Suspended (TSS)	SM 2540 D	ND U	mg/L	5.0	1	10/12/23 11:09	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2311452
Project:	HQLF Leachate	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2311452-MB2		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Suspended (TSS)	SM 2540 D	ND U	mg/L	5.0	1	10/12/23 11:09	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Cowlitz County Public Works
Project: HQLF Leachate
Sample Matrix: Water

Service Request: K2311452
Date Analyzed: 10/11/23 - 10/17/23

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2311452-LCS

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Ammonia as Nitrogen	SM 4500-NH3 E	3.31	3.79	87	85-115
Biochemical Oxygen Demand (BOD)	SM 5210 B	132	115	115	78-122
Solids, Total Suspended (TSS)	SM 2540 D	370	390	95	85-115

November 21, 2023 Service Request No:K2312717

Dan Bales
Cowlitz County Public Works
1600 13th Avenue South
Kelso, WA 98626

Laboratory Results for: HQLF Leachate

Dear Dan,

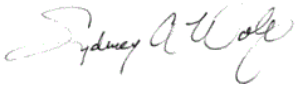
Enclosed are the results of the sample(s) submitted to our laboratory November 09, 2023
For your reference, these analyses have been assigned our service request number **K2312717.**

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 3377. You may also contact me via email at Sydney.Wolf@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental



Sydney A. Wolf
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Cowlitz County Public Works
Project: HQLF Leachate
Sample Matrix: Water

Service Request: K2312717
Date Received: 11/09/2023

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

One water sample was received for analysis at ALS Environmental on 11/09/2023. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by _____ Date 11/21/2023

SAMPLE DETECTION SUMMARY

This form includes only detections above the reporting levels. For a full listing of sample results, continue to the Sample Results section of this Report.

CLIENT ID: HQLF Leachate			Lab ID: K2312717-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Ammonia as Nitrogen	64.5			0.050	mg/L	SM 4500-NH3 E
Biochemical Oxygen Demand (BOD)	207			86	mg/L	SM 5210 B
Solids, Total Suspended (TSS)	20.5			5.0	mg/L	SM 2540 D

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Cowlitz County Public Works **Service Request:**K2312717
Project: HQLF Leachate

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2312717-001	HQLF Leachate	11/9/2023	0650

ALS Environmental

CHAIN OF CUSTODY
111419

003

K2312717

SR#_____

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: HQLF leachate	Project Number:
Project Manager: Michele Horn	
Company: Cowlitz County Public Works	
Address, City, State: 1600 13th Ave S Kelso, WA 98626	
Phone #: 360-274-6492	email: hornm@cowlitzwa.gov
Sampler Signature: Denny King	Sampler Printed Name: Denny King

CLIENT SAMPLE ID	LABID	SAMPLING Date Time State	Matrix	NUMBER OF CONTAINERS	48H SM 5210 B / BOD 5 Day	7D SM 2540 D / TSS	28D SM 4500-NH3 E / Ammonia	1	2	3	4	5	Remarks
1. HQLF leachate		11-9-23 6:50		2	X	X	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

___ 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:

temp 53.2

ph 7.01

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

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature: Denny King	Signature: Hayleigh Smith	Signature	Signature	Signature	Signature
Printed Name: Denny King	Printed Name: Hayleigh Smith	Printed Name	Printed Name	Printed Name	Printed Name
Firm: CCPW	Firm: AIS	Firm	Firm	Firm	Firm
Date/Time: 11-9-23 9:20	Date/Time: 11/9/23 0920	Date/Time	Date/Time	Date/Time	Date/Time

PM SLC

Cooler Receipt and Preservation Form

Client Cowlitz County Service Request K23 12717

Received: 11/9/23 Opened: 11/9/23 By: HS Unloaded: 11/9/23 By: HS

1. Samples were received via? *USPS* *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 on front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp Indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
13.3	11.2	IR01	1 of 4				
14.0	9.6		2 of 4				
13.4	13.9		3 of 4				
15.8	14.6		4 of 4				

4. Was a Temperature Blank present in cooler? NA (Y) N If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y (N)
   If no, were they received on ice and same day as collected? If not, notate the cooler # above and notify the PM. NA (Y) N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y (N)
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y (N)
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N
15. Were samples received within the method specified time limit? If not, notate the error below and notify the PM (NA) Y N
16. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? (NA) Y N Underfilled Overfilled

SHORT HOLD

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
HQLF Leachate Influent	500ml D			\	H2SO4	1ml	19-Gen-07-86J	HS	943

Notes, Discrepancies, Resolutions: Sample TWLF Leachate SitA had 1 empty oil and grease bottle

Miscellaneous Forms

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Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
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.
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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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.

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.

Analyst Summary report

Client:	Cowlitz County Public Works	**Service Request:**	K2312717
Project:	HQLF Leachate/		

Sample Name:	HQLF Leachate	**Date Collected:**	11/9/23
Lab Code:	K2312717-001	**Date Received:**	11/9/23
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
SM 2540 D		AWILSON
SM 4500-NH3 E		ACHEATLEY
SM 5210 B		SATKINSON

Sample Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

General Chemistry

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www.alsglobal.com

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312717
Project:	HQLF Leachate	**Date Collected:**	11/09/23 06:50
Sample Matrix:	Water	**Date Received:**	11/09/23 09:20
Sample Name:	HQLF Leachate	**Basis:**	NA
Lab Code:	K2312717-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Ammonia as Nitrogen	SM 4500-NH3 E	**64.5**	mg/L	0.050	1	11/09/23 11:25	
Biochemical Oxygen Demand (BOD)	SM 5210 B	**207**	mg/L	86	43	11/09/23 13:45	
Solids, Total Suspended (TSS)	SM 2540 D	**20.5**	mg/L	5.0	1	11/16/23 11:37	

QC Summary Forms

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General Chemistry

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Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312717
Project:	HQLF Leachate	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2312717-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Ammonia as Nitrogen	SM 4500-NH3 E	ND U	mg/L	0.050	1	11/09/23 11:25	
Solids, Total Suspended (TSS)	SM 2540 D	ND U	mg/L	5.0	1	11/16/23 11:37	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312717
Project:	HQLF Leachate	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2312717-MB2		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Suspended (TSS)	SM 2540 D	ND U	mg/L	5.0	1	11/16/23 11:37	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Cowlitz County Public Works
Project: HQLF Leachate
Sample Matrix: Water

Service Request: K2312717
Date Analyzed: 11/09/23 - 11/16/23

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2312717-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Ammonia as Nitrogen	SM 4500-NH3 E	3.51	3.79	93	85-115
Biochemical Oxygen Demand (BOD)	SM 5210 B	117	115	101	78-122
Solids, Total Suspended (TSS)	SM 2540 D	384	390	98	85-115

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2312717
Project:	HQLF Leachate	**Date Analyzed:**	11/09/23
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Ammonia as Nitrogen

Analysis Method:	SM 4500-NH3 E	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	823511

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K2312717-LCS2	3.59	3.79	95	85-115

December 21, 2023 Service Request No:K2313792

Dan Bales
Cowlitz County Public Works
1600 13th Avenue South
Kelso, WA 98626

Laboratory Results for: HQLF Leachate

Dear Dan,

Enclosed are the results of the sample(s) submitted to our laboratory December 08, 2023
For your reference, these analyses have been assigned our service request number **K2313792.**

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 3377. You may also contact me via email at Sydney.Wolf@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Sydney A. Wolf
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
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Phone (360) 577-7222 Fax (360) 425-9096
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Client: Cowlitz County Public Works
Project: HQLF Leachate
Sample Matrix: Water

Service Request: K2313792
Date Received: 12/08/2023

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

One water sample was received for analysis at ALS Environmental on 12/08/2023. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

General Chemistry:

No significant anomalies were noted with this analysis.

Approved by _____ Date 12/21/2023

SAMPLE DETECTION SUMMARY

This form includes only detections above the reporting levels. For a full listing of sample results, continue to the Sample Results section of this Report.

CLIENT ID: HQLF Leachate			Lab ID: K2313792-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Ammonia as Nitrogen	59.4			0.050	mg/L	SM 4500-NH3 E
Biochemical Oxygen Demand (BOD)	183			86	mg/L	SM 5210 B
Solids, Total Suspended (TSS)	22.0			5.0	mg/L	SM 2540 D

Sample Receipt Information

ALS Environmental—Kelso Laboratory
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Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Cowlitz County Public Works **Service Request:**K2313792
Project: HQLF Leachate

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2313792-001	HQLF Leachate	12/8/2023	0700

ALS Environmental

CHAIN OF CUSTODY
111419

003

SR# K2313792

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: HALF leachate	Project Number:
Project Manager: Michele Horn	
Company: Cowlitz County Public Works	
Address, City, State: 1600 13th Ave S Kelso, WA 98626	
Phone #: 360-274-6492	email: hornm@cowlitzwa.gov
Sampler Signature: Denny R King	Sampler Printed Name: Denny King

CLIENT SAMPLE ID	LABID	SAMPLING Date Time State	Matrix	NUMBER OF CONTAINERS	48H SM 5210 B / BOD 5 Day	7D SM 2540 D / TSS	28D SM 4500-NH3 E / Ammonia	1	2	3	4	5	Remarks
1. HALF leachate		12-8-23 7:00		2	X	X	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

___ 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:

temp 55.2

ph 6.62

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

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature: Denny R King	Signature:	Signature	Signature	Signature	Signature
Printed Name: Denny King	Printed Name: Kaitlyn Mitolo	Printed Name	Printed Name	Printed Name	Printed Name
Firm: CCPW	Firm: ALS	Firm	Firm	Firm	Firm
Date/Time: 12-8-23 9:10	Date/Time: 12/8/23 0910	Date/Time	Date/Time	Date/Time	Date/Time

PM SW

Cooler Receipt and Preservation Form

Client CCPW Service Request K23 13792

Received: 12/8/23 Opened: 12/8/23 By: VM Unloaded: 12/8/23 By: VM

1. Samples were received via? *USPS* *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

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
12.7	10.1	IR01					

4. Was a Temperature Blank present in cooler? NA (Y) N If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA Y (N)
   If no, were they received on ice and same day as collected? If not, notate the cooler # above and notify the PM. NA (Y) N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA (Y) N
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N
15. Were samples received within the method specified time limit? If not, notate the error below and notify the PM (NA) Y N
16. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? (NA) Y N Underfilled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:

SHORT HOLD

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

Notes, Discrepancies, Resolutions: _____

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
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www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
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.
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 DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	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	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	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/EnvironmentalLabCertification/	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
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
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.
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Acronyms

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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.

Analyst Summary report

Client:	Cowlitz County Public Works	**Service Request:**	K2313792
Project:	HQLF Leachate/		

Sample Name:	HQLF Leachate	**Date Collected:**	12/8/23
Lab Code:	K2313792-001	**Date Received:**	12/8/23
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
SM 2540 D		AWILSON
SM 4500-NH3 E		ACHEATLEY
SM 5210 B		SATKINSON

Sample Results

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General Chemistry

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Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2313792
Project:	HQLF Leachate	**Date Collected:**	12/08/23 07:00
Sample Matrix:	Water	**Date Received:**	12/08/23 09:10
Sample Name:	HQLF Leachate	**Basis:**	NA
Lab Code:	K2313792-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Ammonia as Nitrogen	SM 4500-NH3 E	**59.4**	mg/L	0.050	1	12/12/23 14:25	
Biochemical Oxygen Demand (BOD)	SM 5210 B	**183**	mg/L	86	43	12/08/23 13:50	
Solids, Total Suspended (TSS)	SM 2540 D	**22.0**	mg/L	5.0	1	12/14/23 14:13	

QC Summary Forms

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Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2313792
Project:	HQLF Leachate	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2313792-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Ammonia as Nitrogen	SM 4500-NH3 E	ND U	mg/L	0.050	1	12/12/23 14:25	
Solids, Total Suspended (TSS)	SM 2540 D	ND U	mg/L	5.0	1	12/14/23 14:13	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2313792
Project:	HQLF Leachate	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2313792-MB2		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Solids, Total Suspended (TSS)	SM 2540 D	ND U	mg/L	5.0	1	12/14/23 14:13	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Cowlitz County Public Works
Project: HQLF Leachate
Sample Matrix: Water

Service Request: K2313792
Date Analyzed: 12/08/23 - 12/14/23

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2313792-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Ammonia as Nitrogen	SM 4500-NH3 E	3.33	3.79	88	85-115
Biochemical Oxygen Demand (BOD)	SM 5210 B	110	115	96	78-122
Solids, Total Suspended (TSS)	SM 2540 D	384	390	98	85-115

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QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2313792
Project:	HQLF Leachate	**Date Analyzed:**	12/12/23
Sample Matrix:	Water	**Date Extracted:**	NA

Lab Control Sample Summary
Ammonia as Nitrogen

Analysis Method:	SM 4500-NH3 E	**Units:**	mg/L
Prep Method:	None	**Basis:**	NA
		Analysis Lot:	826835

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K2313792-LCS2	3.28	3.79	87	85-115