COWLITZ COUNTY HEADQUARTERS LANDFILL

GROUNDWATER AND SURFACE WATER MONITORING

SECOND QUARTER REPORT FOR 2024

Prepared for

Cowlitz County Solid Waste

May 15, 2024

prepared by

Bright Fields Groundwater, Inc.

3800 NE 399th Street
La Center, Washington 98629
Phone: (360) 263-6307
Internet: ddykes@tds.net

CONTENTS

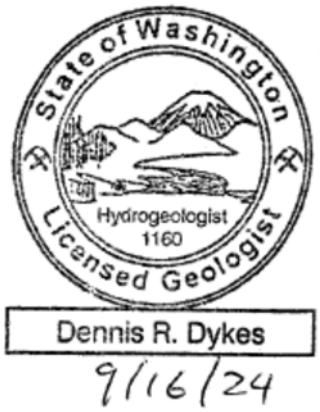
TABLES AND ILLUSTRATIONS

Figures

Tables

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, Second Quarter Report for 2024



Bright Fields Groundwater, Inc.

Dennis R. Dykes, B.S., M.S., LHG
Senior Hydrogeologist

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 ___X___ 3rd ___ 4th ___ YEAR 2024	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: May 14, 2024)	415, (3)		
Complete copy of the lab report with chain of custody record.		X	
Annual Groundwater Reports: *173-351-415 (1)* **YEAR_____**			
Summary of statistical results and trends	415, (1)	☐	
Summary of groundwater flow rate and direction for the year	415, (1)	☐	
Copy of all potentiometric maps for the year	415, (1)	☐	
Summary geochemical evaluation	415, (1)	☐	
For Quarterly and Annual Reports			
Stamped by a licensed professional	RCW 18.220	X	

Signature of Report Author	May 15, 2024	Headquarters Landfill
	Date	Landfill

1 INTRODUCTION

This is the second quarter 2024 report for the groundwater, surface water and leachate monitoring program at the Cowlitz County Headquarters Landfill (CCHQL). 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) (Bright Fields Groundwater, 2024a). The SAP was originally presented as Appendix G of the Hydrogeologic Report (Tuppan, 2013). The revisions focused the SAP on the methods that have been implemented under the permit, implements changes to the sampling locations and analytical programs, and include statistical procedures to determine background groundwater quality. The sampling methods that have been used under the permit were. Additionally, the background groundwater quality has been reevaluated following the procedures included in the SAP. This reevaluation determined statistically appropriate parameters and prediction limits that are used to test whether a statistically significant change in groundwater quality has occurred at the downgradient sampling locations. The details of this re-evaluation were reported separately. The updated prediction limits are used in this report.

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.

The CCHQL is located at 3434 Silver Lake Road, Castle Rock, Washington (Figure 1). The landfill is being monitored as one area (Figure 2).

Water levels are measured in monitoring wells and piezometers located at the landfill. The monitoring points are screened in shallow groundwater in weathered tuff and basalt (Tuppan, 2013). The water level data were plotted, the hydraulic gradient estimated, and the horizontal linear groundwater velocity estimated as described in Section 2.

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. Cell 9 has been constructed and filled to a working grade. Landfill operations are progressing back across Cells 7 and 8 to bring the grade to the final elevation.

Preparation for construction of 10, located east of Cell 9, began in 2018 with clear cutting of the forest and monitoring of groundwater levels for engineering purposes using temporary piezometers. The temporary piezometers were abandoned in September 2019 and the area was graded the summer and fall of 2020. Construction of the Cell 10 liner is scheduled for 2024 and 2025.

Groundwater samples representing the second quarter were collected in April 2024 from five monitoring wells completed in the shallow aquifer and the main outlet of the hydraulic gradient control system (HGCS). The groundwater analytical results are described in Section 3. One well that was include in the original monitoring program, MW-1, was not included in the revised monitoring program. This well is no longer sampled although groundwater levels are measured.

One surface water and one leachate sample were also collected. Previously the leachate samples collected monthly as required by the Discharge Permit were included in the quarterly reports. These data are not included in the revised monitoring program and not described in this report. The surface water and leachate analytical results are described in Section 4.

Water level measurements and elevations are included in Appendix A, with the water level contour plot, hydrographs 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 sampling procedures and analytical data validation are included in Appendix D. The laboratory analytical data report for the groundwater, surface water and leachate samples is also included in this appendix.

2 GROUNDWATER LEVELS AND FLOW DIRECTIONS

Water level measurements are included in Appendix A. A water level contour plot for the shallow aquifer zone is provided in Appendix A.

2.1 Groundwater Levels

Groundwater levels were measured in five monitoring wells and 10 piezometers during the monitoring round as specified in the SAP except for the abandoned piezometers as described above and P-12 as described below. Water levels were measured on April 2 and 4, 2024.

The groundwater levels at the time of measurement were near or above the average of measured levels for this time of year at most locations measured. Exceptions were at U-1 which was below the average and at the wells that typical change very little.

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. Measurement of the water level in this well was suspended to prevent fouling of the well probe. The constant level is used to estimate the groundwater level at this piezometer.

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.

2.2 Hydraulic Gradients

The horizontal hydraulic gradient was estimated for two areas using the contour plot generated from the water level data. These areas are in the hydrologic basin where landfilling has occurred. They are under the older existing landfill area and upgradient of this area where the next phases of expansion are taking place. The gradient under the old cells of the landfill was estimated for the second quarter 2024 to be 0.0568. The gradient under the southern expansion area was estimated to be 0.0492. The estimated gradients are shown on a table included in Appendix A.

2.3 Groundwater Flow

In April 2024, overall groundwater flow was to the northwest in the drainage basin where landfilling has occurred. Flow on the northern side of this drainage basin was to the west and on the southern side to the north and northwest in a pattern that describes discharge to the HGCS

and eventually the southern tributary of Sucker Creek. (Appendix A). Flow under the undeveloped northeastern forested part of the landfill was generally to the north.

The linear velocity of groundwater was estimated using the hydraulic parameters defined in the Hydrogeologic Report (Tuppan, 2013). 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 linear velocity of groundwater was estimated to be between 0.027 and 0.142 feet per day under the old cells of the landfill and between 0.023 and 0.123 feet per day under the southern expansion area. This is an average annual velocity of 30.7 feet per year under the old cells of the landfill area and 26.6 feet per year under the southern expansion area. These velocities are substantially higher than previously reported because the slug tests completed in October 2012 and reported in the revised Hydrogeologic Report (Tuppan, 2013) 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.

3 GROUNDWATER QUALITY

Groundwater samples were collected on April 2, 2024 from five monitoring wells completed in the shallow aquifer. Three compliance wells and two upgradient wells were sampled. The sampling procedures are described in a memorandum included in Appendix D.

The groundwater samples 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, 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 samples were analyzed by ALS Environmental Laboratories located in Kelso, Washington. ALS is accredited by Ecology for each type of the analysis performed. Documentation of this is included in the laboratory report in Appendix D. The validation of the data is described in a memorandum also included in Appendix D. 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, statistical calculations, and trilinear diagrams for the sampling event are 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 are upgradient and monitoring wells C-1 and C-2 are downgradient of the landfill. The recent re-evaluation of background determined that the data samples from the upgradient and downgradient wells are not spatially stationary. Intrawell testing was then evaluated and a look back period representing background for each parameter at each downgradient well was identified.

3.1 Prediction Limit Determination and Data Evaluation

3.1.1 Prediction Limit Method

A non-parametric prediction limit method was selected as the statistical procedure for use evaluating the groundwater quality results. This method was selected during an extensive statistical review of eleven years of data collected from 2013 to 2023 (Bright Fields Groundwater, 2024b). The data samples for parameters from each well were determined to be from statistically different populations from the other wells (spatially non-stationary). Therefore intrawell testing was evaluated and a look back period for each parameter at the downgradient wells selected as representative of background. Additionally a substantial portion of the data samples tested as nonparametric. Non-parametric prediction limits were selected for each parameter from the applicable background data sample. .

The downgradient data generated each quarter are compared point by point to the prediction limit. A datum that exceeds its prediction limit is evaluated as a potential statistically significant increase (SSI) in that parameter. This evaluation includes retesting to confirm the value and consideration of whether the datum is an outlier. The procedures for evaluation of an SSI are described in the SAP.

Inorganic parameters and metals were evaluated. VOCs were not evaluated because they were effectively not detected in groundwater. The following constituents were evaluated:

Alkalinity	Chloride	Sulfate	TDS
Barium	Chromium	Copper	Nickel
Zinc	Calcium	Magnesium	Potassium	Sodium

Data are periodically reviewed to determine if they are apparent outliers and not representative of background conditions. Criteria for this review are described in the SAP.

3.1.2 Data Evaluation

The water quality prediction limits for the shallow aquifer are shown on Table 1. The concentrations of four parameters were above the prediction limits at C-1 and C-2 during the second quarter with two of these parameters above the prediction limit at both wells. Chloride and potassium were above the prediction limits at both wells last quarter and this quarter but were not in the previous four quarters. Concentrations of these parameters at P-9 and U-1 were also higher than typically measured. These concentrations for these parameters are unusual and not consistent with other parameters which were at typical concentrations. Concentrations of these parameters at each of the four wells were lower in the second quarter than in the first quarter. These parameters will be retested using the third quarter data.

Calcium and magnesium were slightly above the prediction limits in the sample from C-2. They were not above the prediction limit the previous five quarters. Concentrations of these parameters at this well appear to show a gradual rising trend over several years in contrast to the sudden rise in chloride and potassium concentrations.

At the upgradient well, U-1, several metals and other inorganic parameters are typically detected at significantly higher concentrations than at most other wells and the concentrations show significant variability. This appears to be related to the particular groundwater chemistry at this site which affects sampling conditions. A precipitate, most likely iron, had caused the valves in the bladder pump to become stuck between sampling events necessitating removal of the pump and freeing of the valve each quarter. The pumps in all wells were removed, inspected and cleaned where necessary shortly after the July 2015 sampling event. Only the pump at U-1 required acid cleaning to remove a coating that caused the valves to stick. All pumps were thoroughly rinsed with distilled water before reinstallation and pumped after reinstallation. Unfortunately the valve in the U-1 pump stuck again in January 2016 and required freeing before sample collection. Sampling procedures have been changed to included removal of the pump in U-1 after sample collection each quarter, storage of the pump in clean plastic between sampling events, and reinstallation before use during each sampling event.

The concentrations of cobalt and manganese at C-2 have shown trends that differed from other parameters. They showed a general rising trend in 2014 and 2015 and dropped to near concentrations at other wells in October 2015. In 2016 concentrations of these metals began to rise again but cobalt stabilized in mid-2017 and manganese in 2018/19. Manganese has since followed a steadily falling trend and for a few years follows a possible seasonal cycle from concentrations similar to other wells in the wet season and slight higher in the dry season. Cobalt fell until late 2020 to concentrations near those of other wells but has fluctuated since at concentrations significantly less than one microgram per liter. Cobalt was at a concentration similar to other wells this quarter. The manganese and cobalt concentrations are substantially higher at the upgradient well U-1 and in the HGCS. Sodium at C-2 continued to be at a concentration similar to the upgradient wells this quarter, it was

higher than upgradient several years ago. The concentrations of several other metals at this well show variability that include increases and decreases in concentration that are not as consistent as the trends for cobalt and manganese.

The concentrations of several geochemical parameters have shown increases and decreases over the last several years. This appears to be defining natural variability as well as variations caused by the laboratories. Sulfate at C-2, which showed a rising trend beginning in 2018 to concentrations above the upgradient wells, then followed a slightly falling trend for several years, has been at a stable concentration for nearly a year albeit at concentrations above the average for the upgradient wells. Sulfate at the upgradient well P-9 fluctuates significantly seasonally to concentrations typically above the C-2 concentrations in the dry season. These parameters will be evaluated in the annual report.

Beryllium at C-1 has typically been detected at concentrations somewhat higher than at the other wells although below the concentrations at the upgradient well U-1 before 2019. The concentrations also appear to follow a seasonal trend of rising in the wet season and falling in the dry season. Beginning in 2019 concentrations of this metal generally increased somewhat at C-1 and decreased at U-1.

Silver at this well followed a rising trend from mid-2021 to spring 2022 then fell substantially and has been at a concentrations similar to other wells for several quarters. This and last quarter, however, silver concentrations were unusually high at all locations except the HGCS and are likely to be outliers resulting from laboratory error. Concentrations this quarter were less than a quarter of those reported in the first quarter although still significantly higher than typical previous concentrations.

The detection and reporting limits for several metals from the previous laboratory were higher. This may cause the appearance of an increase in concentration where the metal was not detected. The current laboratory is now reporting detected concentrations below the MRL although these concentrations are qualified as estimated. The reporting limits for chloride and sulfate from the previous laboratory were also substantially higher which must be considered when reviewing these results. The arsenic detection limit from the previous lab was lower resulting in the detection of much lower concentrations at several wells. Most of these data have been identified as outliers and are not included in the plots or statistical analysis.

The data for the HGCS discharge shows generally low concentrations for most of the analyzed parameters which are generally similar to monitoring well data, albeit with somewhat more variability. This variability is likely the result of variations in flow that results from changes in groundwater levels as well as construction activities that extend the HGCS to landfill expansion areas. Additionally aeration of water within the HGCS may be altering the water chemistry before it discharges. The sulfate, chloride, iron, manganese, cobalt, copper and zinc concentrations have shown a substantial increase over several years. Several of these have substantially declined or fluctuated in the last year. Many other metals and geochemical parameters declined, were steady or followed site wide changes in

concentrations. Site wide changes are likely an artifact of the laboratory analyses or field conditions. Iron shows substantial variability quarter to quarter independent of the trends of other parameters. Chloride and sulfate are also slightly higher in the HGCS samples than in groundwater but do not typically follow rising trends. Not surprisingly, the HGCS temperature is higher than for groundwater and surface water.

No VOC were detected in groundwater in April 2024.

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. One Washington standard was exceeded this quarter in the upgradient and HGCS samples (see Table 2). Arsenic was detected at concentrations above the Washington criterion (0.05 µg/L) at both upgradient wells and the HGCS. The concentrations were below the federal MCL (10 ug/L). The highest concentration was at the upgradient well U-1. Naturally occurring arsenic is commonly detected in the site vicinity at these concentrations.

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 April 2024 analytical data included calculations of cation-anion balances and preparation of trilinear diagrams (Appendix B).

3.4.1 Cation-Anion Balance

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

Bicarbonate is the dominant anion and is present in each sample at much higher equivalent concentrations than the other anions. Cation species equivalent concentrations are typically much lower than the bicarbonate concentration and the total cation equivalents are primarily distributed among calcium, magnesium and sodium. Changes in bicarbonate or these cation species that are not balanced by the other can shift the balance calculations.

3.4.2 Trilinear Diagrams

Piper trilinear diagrams were prepared for each shallow monitoring well (Appendix B). 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 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.

The plotted locations for the second quarter data fall within the cluster of data points for P-9 and the HGCS but are the right of the cluster at C-1 and U-1 and above the cluster at C-2. The plotted locations outside the clusters appear to be because of unusually high chloride and potassium concentrations. It's unlikely that these parameters would rise suddenly both up and downgradient and these are likely outliers caused by laboratory or field procedures. The plotted locations this quarter are closer to the data clusters than they were for the first quarter data.

The data for C-1 and C-2, define more widely spread data clusters indicating greater natural variability of the geochemistry of these locations. The U-1 and P-9 data clusters are much tighter than for the other wells. The cluster for C-2 data is somewhat lower than was plotted for historic data and for the other wells data. This may be the result of the change to low flow sampling and filtering of the sample water analyzed for geochemical metals. Some of these variations appear to be defining the natural variability in groundwater geochemistry although others have resulted from difference at the laboratories. The data cluster for the HGCS is slightly higher on the diagrams than the wells. This could be natural spatial variability in the geochemistry because the HGCS collects groundwater from a wide area. The site geology is predominantly a lithic tuff with some basalt and andesitic basalt beds. Three of the four monitoring wells are however installed in basalt beds and likely to have different geochemistry. The HGCS geochemistry is also likely influenced by the disturbed and altered material in the collection area as well as aeration of the water within the system prior to discharge.

4 SURFACE WATER AND LEACHATE QUALITY

One surface water sample was collected and analyzed in April 2024. A leachate sample was also collected from the outfall to the leachate pond and analyzed as specified in the revised SAP. This is the third quarter that a leachate sample has been collected and analyzed. Previously leachate analysis required for the discharge permit was included in the quarterly reports. The samples were collected and analyzed as described in the SAP. Summary tables of the analytical results for the surface water and leachate samples are included in Appendix C. Sample collection procedures were documented for the sampling event in a memorandum included in Appendix D.

4.1 Surface Water

The surface water sample was 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. Nitrate, sulfate, ammonia, TOC, TDS and seventeen total metals were analyzed in the laboratory and pH, specific conductance, temperature, dissolved oxygen, ORP and turbidity were measured in the field. A qualitative observation of flow was also made.

This is the third quarter that nitrate, TDS and metals were analyzed in surface water for the detection monitoring program and the second quarter they are being reported. Trends cannot be described for these parameters. Concentrations were low as is typical for surface water in this environment. Iron, manganese and barium were detected at the highest concentrations with chromium, cobalt, copper, lead, nickel, vanadium, and zinc at lower concentrations. Arsenic was also detected at a low concentration.

Slight seasonal variations in temperature, specific conductance, dissolved oxygen and turbidity are apparent. Additionally, dissolved oxygen and turbidity appear to be affected by whether the samples were collected near periods of higher precipitation. Surface water quality appears to meet primary and secondary standards where promulgated for the parameters tested when evaluated as allowed by the available data. The temperature and turbidity show counter trends with temperature rising in the warm dry season when flow is low and turbidity rising in the wet season when flow is higher. Flow in April was observed to be moderate with the flow filling the main flow area within the channel banks.

4.2 Leachate

A leachate sample was collected at the discharge to the leachate pond (see Figure 2). The sample was analyzed for the same parameters as for groundwater except that the geochemical

metals were not filtered and therefore are total rather than dissolved. Field measurements of temperature, pH and specific conductance were made. The monitoring location is identified as L-1.

This is the third quarter the leachate was sampled for the detection monitoring program and the second quarter it is being reported. The data is therefore limited and cannot be used to describe trends. Concentrations of the parameters were typical of landfill leachate with most at much higher concentrations than detected in groundwater. Eight VOCs were detected in this quarter's sample.

Previously analytical results for samples collected and analyzed for the discharge permit was described in the quarterly reports. The analytical results for these leachate samples appear to describe annual cycles for some parameters. Temperature declines in the wet season and rises in the dry season. Other parameters show variability that may generally follow a seasonal cycle although with significant month to month deviations.

5 DISCUSSION

5.1 Summary

In April 2024 Cowlitz County completed the second quarterly sampling event of 2024 at the Headquarters Landfill. The sampling event was guided by the newly revised SAP dated March 2024 (Bright Fields Groundwater, 2024a). The revisions to the SAP focus sampling on the procedures that have been implemented for ten years under the permit, add leachate sampling and discontinue sampling MW-1 (because the data generated for well is not used). The analytical program was revised to align the HGCS, leachate and surface water sampling more closely.

A periodic re-evaluation of background was completed last quarter. Documentation of this re-evaluation was prepared separate from this report. The re-evaluation determined the data samples from each monitoring well are not spatially stationary and a look back period for intrawell background was identified for selected parameters at the downgradient wells. The spatial non-stationarity of the data samples appears to result from the different geology penetrated at each well.

Groundwater flow in the shallow aquifer in the drainage basin at the site where landfilling has occurred was determined to be generally to the northwest. Flow in the drainage basin north of this area is generally to the north. The linear groundwater velocity was estimated for two sections of the drainage basin at the site where landfilling has occurred: under the filled area and an area upgradient where Cells 7, 8 and Cell 9 are being filled. Cell 9 has been filled to a working level and Cells 7 and 8 are being brought up to the final elevation. The groundwater flow rate under the older filled area was estimated to be between 0.027 and 0.142 feet per day. The groundwater flow rate in the upgradient area was estimated to be between 0.023 and 0.123 feet per day. These rates are similar to previous estimates as described in the Hydrogeologic Report (Tuppan, June, 2013) although are significantly higher than historically reported rates 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. The concentrations of two parameters were above the respective prediction limits at both downgradient however the concentrations were much higher than typical. These concentrations will be retested using the third quarter data. This quarter continues the eleventh year of

detection monitoring under the MSW permit although no MSW had been received at the time of the first sampling.

5.2 Discussion

The general trends in the groundwater quality data will be monitored during 2024. Apparent trends will be evaluated in the 2024 annual report which will be combined with the fourth quarter report.

REFERENCES

Bright Fields Groundwater, 2024a. *Sampling and Analysis Plan for the Cowlitz County Headquarters Landfill*. March 2024 Revision.

Bright Fields Groundwater, 2024b. *2024 Background Data Reevaluation Procedures for the Cowlitz County Headquarters Landfill*. April.

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

Washington DOE, 2018 (revision data). *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.

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.

APPENDIX A

WATER LEVEL DATA AND CONTOUR PLOTS

APPENDIX B

GROUNDWATER AND SURFACE WATER QUALITY DATA, STATISTICAL CALCULATIONS, CATION-ANION BALANCES, AND TRILINEAR DIAGRAMS

APPENDIX C

SURFACE WATER AND LEACHATE QUALITY DATA

APPENDIX D

TECHNICAL MEMORANDA WITH ANALYTICAL DATA REPORTS

DRAFT

COWLITZ COUNTY HEADQUARTERS LANDFILL

GROUNDWATER AND SURFACE WATER MONITORING

SECOND QUARTER REPORT FOR 2024

Prepared for

Cowlitz County Solid Waste

May 15, 2024

prepared by

Bright Fields Groundwater, Inc.

3800 NE 399th Street
La Center, Washington 98629
Phone: (360) 263-6307
Internet: ddykes@tds.net

CONTENTS

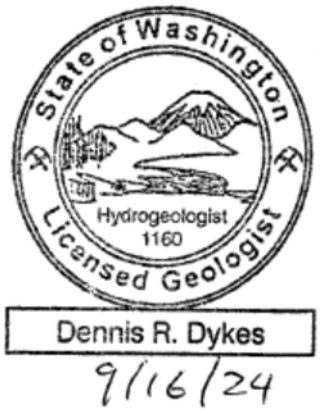
TABLES AND ILLUSTRATIONS

Figures

Tables

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, Second Quarter Report for 2024



Bright Fields Groundwater, Inc.

Dennis R. Dykes, B.S., M.S., LHG
Senior Hydrogeologist

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 __X__ 3rd ___ 4th ___ YEAR 2024	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: May 10, 2024)	415, (3)		
Complete copy of the lab report with chain of custody record.		X	
Annual Groundwater Reports: *173-351-415 (1)* **YEAR_____**			
Summary of statistical results and trends	415, (1)	☐	
Summary of groundwater flow rate and direction for the year	415, (1)	☐	
Copy of all potentiometric maps for the year	415, (1)	☐	
Summary geochemical evaluation	415, (1)	☐	
For Quarterly and Annual Reports			
Stamped by a licensed professional	RCW 18.220	X	

Signature of Report Author	May 15, 2024 Date	Headquarters Landfill Landfill

1 INTRODUCTION

This is the second quarter 2024 report for the groundwater, surface water and leachate monitoring program at the Cowlitz County Headquarters Landfill (CCHQL). 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) (Bright Fields Groundwater, 2024a). The SAP was originally presented as Appendix G of the Hydrogeologic Report (Tuppan, 2013). The revisions focused the SAP on the methods that have been implemented under the permit, implements changes to the sampling locations and analytical programs, and include statistical procedures to determine background groundwater quality. The sampling methods that have been used under the permit were. Additionally, the background groundwater quality has been reevaluated following the procedures included in the SAP. This reevaluation determined statistically appropriate parameters and prediction limits that are used to test whether a statistically significant change in groundwater quality has occurred at the downgradient sampling locations. The details of this re-evaluation were reported separately. The updated prediction limits are used in this report.

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.

The CCHQL is located at 3434 Silver Lake Road, Castle Rock, Washington (Figure 1). The landfill is being monitored as one area (Figure 2).

Water levels are measured in monitoring wells and piezometers located at the landfill. The monitoring points are screened in shallow groundwater in weathered tuff and basalt (Tuppan, 2013). The water level data were plotted, the hydraulic gradient estimated, and the horizontal linear groundwater velocity estimated as described in Section 2.

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. Cell 9 has been constructed and filled to a working grade. Landfill operations are progressing back across Cells 7 and 8 to bring the grade to the final elevation.

Preparation for construction of 10, located east of Cell 9, began in 2018 with clear cutting of the forest and monitoring of groundwater levels for engineering purposes using temporary piezometers. The temporary piezometers were abandoned in September 2019 and the area was graded the summer and fall of 2020. Construction of the Cell 10 liner is scheduled for 2024 and 2025.

Groundwater samples representing the second quarter were collected in April 2024 from five monitoring wells completed in the shallow aquifer and the main outlet of the hydraulic gradient control system (HGCS). The groundwater analytical results are described in Section 3. One well that was include in the original monitoring program, MW-1, was not included in the revised monitoring program. This well is no longer sampled although groundwater levels are measured.

One surface water and one leachate sample were also collected. Previously the leachate samples collected monthly as required by the Discharge Permit were included in the quarterly reports. These data are not included in the revised monitoring program and not described in this report. The surface water and leachate analytical results are described in Section 4.

Water level measurements and elevations are included in Appendix A, with the water level contour plot, hydrographs 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 sampling procedures and analytical data validation are included in Appendix D. The laboratory analytical data report for the groundwater, surface water and leachate samples is also included in this appendix.

2 GROUNDWATER LEVELS AND FLOW DIRECTIONS

Water level measurements are included in Appendix A. A water level contour plot for the shallow aquifer zone is provided in Appendix A.

2.1 Groundwater Levels

Groundwater levels were measured in five monitoring wells and 10 piezometers during the monitoring round as specified in the SAP except for the abandoned piezometers as described above and P-12 as described below. Water levels were measured on April 2 and 4, 2024.

The groundwater levels at the time of measurement were near or above the average of measured levels for this time of year at most locations measured. Exceptions were at U-1 which was below the average and at the wells that typical change very little.

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. Measurement of the water level in this well was suspended to prevent fouling of the well probe. The constant level is used to estimate the groundwater level at this piezometer.

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.

2.2 Hydraulic Gradients

The horizontal hydraulic gradient was estimated for two areas using the contour plot generated from the water level data. These areas are in the hydrologic basin where landfilling has occurred. They are under the older existing landfill area and upgradient of this area where the next phases of expansion are taking place. The gradient under the old cells of the landfill was estimated for the second quarter 2024 to be 0.0568. The gradient under the southern expansion area was estimated to be 0.0492. The estimated gradients are shown on a table included in Appendix A.

2.3 Groundwater Flow

In April 2024, overall groundwater flow was to the northwest in the drainage basin where landfilling has occurred. Flow on the northern side of this drainage basin was to the west and on the southern side to the north and northwest in a pattern that describes discharge to the HGCS

and eventually the southern tributary of Sucker Creek. (Appendix A). Flow under the undeveloped northeastern forested part of the landfill was generally to the north.

The linear velocity of groundwater was estimated using the hydraulic parameters defined in the Hydrogeologic Report (Tuppan, 2013). 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 linear velocity of groundwater was estimated to be between 0.027 and 0.142 feet per day under the old cells of the landfill and between 0.023 and 0.123 feet per day under the southern expansion area. This is an average annual velocity of 30.7 feet per year under the old cells of the landfill area and 26.6 feet per year under the southern expansion area. These velocities are substantially higher than previously reported because the slug tests completed in October 2012 and reported in the revised Hydrogeologic Report (Tuppan, 2013) 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.

3 GROUNDWATER QUALITY

Groundwater samples were collected on April 2, 2024 from five monitoring wells completed in the shallow aquifer. Three compliance wells and two upgradient wells were sampled. The sampling procedures are described in a memorandum included in Appendix D.

The groundwater samples 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, 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 samples were analyzed by ALS Environmental Laboratories located in Kelso, Washington. ALS is accredited by Ecology for each type of the analysis performed. Documentation of this is included in the laboratory report in Appendix D. The validation of the data is described in a memorandum also included in Appendix D. 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, statistical calculations, and trilinear diagrams for the sampling event are 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 are upgradient and monitoring wells C-1 and C-2 are downgradient of the landfill. The recent re-evaluation of background determined that the data samples from the upgradient and downgradient wells are not spatially stationary. Intrawell testing was then evaluated and a look back period representing background for each parameter at each downgradient well was identified.

3.1 Prediction Limit Determination and Data Evaluation

3.1.1 Prediction Limit Method

A non-parametric prediction limit method was selected as the statistical procedure for use evaluating the groundwater quality results. This method was selected during an extensive statistical review of eleven years of data collected from 2013 to 2023 (Bright Fields Groundwater, 2024b). The data samples for parameters from each well were determined to be from statistically different populations from the other wells (spatially non-stationary). Therefore intrawell testing was evaluated and a look back period for each parameter at the downgradient wells selected as representative of background. Additionally a substantial portion of the data samples tested as nonparametric. Non-parametric prediction limits were selected for each parameter from the applicable background data sample. .

The downgradient data generated each quarter are compared point by point to the prediction limit. A datum that exceeds its prediction limit is evaluated as a potential statistically significant increase (SSI) in that parameter. This evaluation includes retesting to confirm the value and consideration of whether the datum is an outlier. The procedures for evaluation of an SSI are described in the SAP.

Inorganic parameters and metals were evaluated. VOCs were not evaluated because they were effectively not detected in groundwater. The following constituents were evaluated:

Alkalinity	Chloride	Sulfate	TDS	
Barium	Chromium	Copper	Nickel	
Zinc	Calcium	Magnesium	Potassium	Sodium

Data are periodically reviewed to determine if they are apparent outliers and not representative of background conditions. Criteria for this review are described in the SAP.

3.1.2 Data Evaluation

The water quality prediction limits for the shallow aquifer are shown on Table 1. The concentrations of four parameters were above the prediction limits at C-1 and C-2 during the second quarter with two of these parameters above the prediction limit at both wells. Chloride and potassium were above the prediction limits at both wells last quarter and this quarter but were not in the previous four quarters. Concentrations of these parameters at P-9 and U-1 were also higher than typically measured. These concentrations for these parameters are unusual and not consistent with other parameters which were at typical concentrations. Concentrations of these parameters at each of the four wells were lower in the second quarter than in the first quarter. These parameters will be retested using the third quarter data.

Calcium and magnesium were slightly above the prediction limits in the sample from C-2. They were not above the prediction limit the previous five quarters. Concentrations of these parameters at this well appear to show a gradual rising trend over several years in contrast to the sudden rise in chloride and potassium concentrations.

At the upgradient well, U-1, several metals and other inorganic parameters are typically detected at significantly higher concentrations than at most other wells and the concentrations show significant variability. This appears to be related to the particular groundwater chemistry at this site which affects sampling conditions. A precipitate, most likely iron, had caused the valves in the bladder pump to become stuck between sampling events necessitating removal of the pump and freeing of the valve each quarter. The pumps in all wells were removed, inspected and cleaned where necessary shortly after the July 2015 sampling event. Only the pump at U-1 required acid cleaning to remove a coating that caused the valves to stick. All pumps were thoroughly rinsed with distilled water before reinstallation and pumped after reinstallation. Unfortunately the valve in the U-1 pump stuck again in January 2016 and required freeing before sample collection. Sampling procedures have been changed to included removal of the pump in U-1 after sample collection each quarter, storage of the pump in clean plastic between sampling events, and reinstallation before use during each sampling event.

The concentrations of cobalt and manganese at C-2 have shown trends that differed from other parameters. They showed a general rising trend in 2014 and 2015 and dropped to near concentrations at other wells in October 2015. In 2016 concentrations of these metals began to rise again but cobalt stabilized in mid-2017 and manganese in 2018/19. Manganese has since followed a steadily falling trend and for a few years follows a possible seasonal cycle from concentrations similar to other wells in the wet season and slight higher in the dry season. Cobalt fell until late 2020 to concentrations near those of other wells but has fluctuated since at concentrations significantly less than one microgram per liter. Cobalt was at a concentration similar to other wells this quarter. The manganese and cobalt concentrations are substantially higher at the upgradient well U-1 and in the HGCS. Sodium at C-2 continued to be at a concentration similar to the upgradient wells this quarter, it was

higher than upgradient several years ago. The concentrations of several other metals at this well show variability that include increases and decreases in concentration that are not as consistent as the trends for cobalt and manganese.

The concentrations of several geochemical parameters have shown increases and decreases over the last several years. This appears to be defining natural variability as well as variations caused by the laboratories. Sulfate at C-2, which showed a rising trend beginning in 2018 to concentrations above the upgradient wells, then followed a slightly falling trend for several years, has been at a stable concentration for nearly a year albeit at concentrations above the average for the upgradient wells. Sulfate at the upgradient well P-9 fluctuates significantly seasonally to concentrations typically above the C-2 concentrations in the dry season. These parameters will be evaluated in the annual report.

Beryllium at C-1 has typically been detected at concentrations somewhat higher than at the other wells although below the concentrations at the upgradient well U-1 before 2019. The concentrations also appear to follow a seasonal trend of rising in the wet season and falling in the dry season. Beginning in 2019 concentrations of this metal generally increased somewhat at C-1 and decreased at U-1.

Silver at this well followed a rising trend from mid-2021 to spring 2022 then fell substantially and has been at a concentrations similar to other wells for several quarters. This and last quarter, however, silver concentrations were unusually high at all locations except the HGCS and are likely to be outliers resulting from laboratory error. Concentrations this quarter were less than a quarter of those reported in the first quarter although still significantly higher than typical previous concentrations.

The detection and reporting limits for several metals from the previous laboratory were higher. This may cause the appearance of an increase in concentration where the metal was not detected. The current laboratory is now reporting detected concentrations below the MRL although these concentrations are qualified as estimated. The reporting limits for chloride and sulfate from the previous laboratory were also substantially higher which must be considered when reviewing these results. The arsenic detection limit from the previous lab was lower resulting in the detection of much lower concentrations at several wells. Most of these data have been identified as outliers and are not included in the plots or statistical analysis.

The data for the HGCS discharge shows generally low concentrations for most of the analyzed parameters which are generally similar to monitoring well data, albeit with somewhat more variability. This variability is likely the result of variations in flow that results from changes in groundwater levels as well as construction activities that extend the HGCS to landfill expansion areas. Additionally aeration of water within the HGCS may be altering the water chemistry before it discharges. The sulfate, chloride, iron, manganese, cobalt, copper and zinc concentrations have shown a substantial increase over several years. Several of these have substantially declined or fluctuated in the last year. Many other metals and geochemical parameters declined, were steady or followed site wide changes in

concentrations. Site wide changes are likely an artifact of the laboratory analyses or field conditions. Iron shows substantial variability quarter to quarter independent of the trends of other parameters. Chloride and sulfate are also slightly higher in the HGCS samples than in groundwater but do not typically follow rising trends. Not surprisingly, the HGCS temperature is higher than for groundwater and surface water.

No VOC were detected in groundwater in April 2024.

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. One Washington standard was exceeded this quarter in the upgradient and HGCS samples (see Table 2). Arsenic was detected at concentrations above the Washington criterion (0.05 µg/L) at both upgradient wells and the HGCS. The concentrations were below the federal MCL (10 ug/L). The highest concentration was at the upgradient well U-1. Naturally occurring arsenic is commonly detected in the site vicinity at these concentrations.

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 April 2024 analytical data included calculations of cation-anion balances and preparation of trilinear diagrams (Appendix B).

3.4.1 Cation-Anion Balance

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

Bicarbonate is the dominant anion and is present in each sample at much higher equivalent concentrations than the other anions. Cation species equivalent concentrations are typically much lower than the bicarbonate concentration and the total cation equivalents are primarily distributed among calcium, magnesium and sodium. Changes in bicarbonate or these cation species that are not balanced by the other can shift the balance calculations.

3.4.2 Trilinear Diagrams

Piper trilinear diagrams were prepared for each shallow monitoring well (Appendix B). 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 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.

The plotted locations for the second quarter data fall within the cluster of data points for P-9 and the HGCS but are the right of the cluster at C-1 and U-1 and above the cluster at C-2. The plotted locations outside the clusters appear to be because of unusually high chloride and potassium concentrations. It's unlikely that these parameters would rise suddenly both up and downgradient and these are likely outliers caused by laboratory or field procedures. The plotted locations this quarter are closer to the data clusters than they were for the first quarter data.

The data for C-1 and C-2, define more widely spread data clusters indicating greater natural variability of the geochemistry of these locations. The U-1 and P-9 data clusters are much tighter than for the other wells. The cluster for C-2 data is somewhat lower than was plotted for historic data and for the other wells data. This may be the result of the change to low flow sampling and filtering of the sample water analyzed for geochemical metals. Some of these variations appear to be defining the natural variability in groundwater geochemistry although others have resulted from difference at the laboratories. The data cluster for the HGCS is slightly higher on the diagrams than the wells. This could be natural spatial variability in the geochemistry because the HGCS collects groundwater from a wide area. The site geology is predominantly a lithic tuff with some basalt and andesitic basalt beds. Three of the four monitoring wells are however installed in basalt beds and likely to have different geochemistry. The HGCS geochemistry is also likely influenced by the disturbed and altered material in the collection area as well as aeration of the water within the system prior to discharge.

4 SURFACE WATER AND LEACHATE QUALITY

One surface water sample was collected and analyzed in April 2024. A leachate sample was also collected from the outfall to the leachate pond and analyzed as specified in the revised SAP. This is the third quarter that a leachate sample has been collected and analyzed. Previously leachate analysis required for the discharge permit was included in the quarterly reports. The samples were collected and analyzed as described in the SAP. Summary tables of the analytical results for the surface water and leachate samples are included in Appendix C. Sample collection procedures were documented for the sampling event in a memorandum included in Appendix D.

4.1 Surface Water

The surface water sample was 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. Nitrate, sulfate, ammonia, TOC, TDS and seventeen total metals were analyzed in the laboratory and pH, specific conductance, temperature, dissolved oxygen, ORP and turbidity were measured in the field. A qualitative observation of flow was also made.

This is the third quarter that nitrate, TDS and metals were analyzed in surface water for the detection monitoring program and the second quarter they are being reported. Trends cannot be described for these parameters. Concentrations were low as is typical for surface water in this environment. Iron, manganese and barium were detected at the highest concentrations with chromium, cobalt, copper, lead, nickel, vanadium, and zinc at lower concentrations. Arsenic was also detected at a low concentration.

Slight seasonal variations in temperature, specific conductance, dissolved oxygen and turbidity are apparent. Additionally, dissolved oxygen and turbidity appear to be affected by whether the samples were collected near periods of higher precipitation. Surface water quality appears to meet primary and secondary standards where promulgated for the parameters tested when evaluated as allowed by the available data. The temperature and turbidity show counter trends with temperature rising in the warm dry season when flow is low and turbidity rising in the wet season when flow is higher. Flow in April was observed to be moderate with the flow filling the main flow area within the channel banks.

4.2 Leachate

A leachate sample was collected at the discharge to the leachate pond (see Figure 2). The sample was analyzed for the same parameters as for groundwater except that the geochemical

metals were not filtered and therefore are total rather than dissolved. Field measurements of temperature, pH and specific conductance were made. The monitoring location is identified as L-1.

This is the third quarter the leachate was sampled for the detection monitoring program and the second quarter it is being reported. The data is therefore limited and cannot be used to describe trends. Concentrations of the parameters were typical of landfill leachate with most at much higher concentrations than detected in groundwater. Eight VOCs were detected in this quarter's sample.

Previously analytical results for samples collected and analyzed for the discharge permit was described in the quarterly reports. The analytical results for these leachate samples appear to describe annual cycles for some parameters. Temperature declines in the wet season and rises in the dry season. Other parameters show variability that may generally follow a seasonal cycle although with significant month to month deviations.

5 DISCUSSION

5.1 Summary

In April 2024 Cowlitz County completed the second quarterly sampling event of 2024 at the Headquarters Landfill. The sampling event was guided by the newly revised SAP dated March 2024 (Bright Fields Groundwater, 2024a). The revisions to the SAP focus sampling on the procedures that have been implemented for ten years under the permit, add leachate sampling and discontinue sampling MW-1 (because the data generated for well is not used). The analytical program was revised to align the HGCS, leachate and surface water sampling more closely.

A periodic re-evaluation of background was completed last quarter. Documentation of this re-evaluation was prepared separate from this report. The re-evaluation determined the data samples from each monitoring well are not spatially stationary and a look back period for intrawell background was identified for selected parameters at the downgradient wells. The spatial non-stationarity of the data samples appears to result from the different geology penetrated at each well.

Groundwater flow in the shallow aquifer in the drainage basin at the site where landfilling has occurred was determined to be generally to the northwest. Flow in the drainage basin north of this area is generally to the north. The linear groundwater velocity was estimated for two sections of the drainage basin at the site where landfilling has occurred: under the filled area and an area upgradient where Cells 7, 8 and Cell 9 are being filled. Cell 9 has been filled to a working level and Cells 7 and 8 are being brought up to the final elevation. The groundwater flow rate under the older filled area was estimated to be between 0.027 and 0.142 feet per day. The groundwater flow rate in the upgradient area was estimated to be between 0.023 and 0.123 feet per day. These rates are similar to previous estimates as described in the Hydrogeologic Report (Tuppan, June, 2013) although are significantly higher than historically reported rates 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. The concentrations of two parameters were above the respective prediction limits at both downgradient however the concentrations were much higher than typical. These concentrations will be retested using the third quarter data. This quarter continues the eleventh year of

detection monitoring under the MSW permit although no MSW had been received at the time of the first sampling.

5.2 Discussion

The general trends in the groundwater quality data will be monitored during 2024. Apparent trends will be evaluated in the 2024 annual report which will be combined with the fourth quarter report.

REFERENCES

Bright Fields Groundwater, 2024a. *Sampling and Analysis Plan for the Cowlitz County Headquarters Landfill*. March 2024 Revision.

Bright Fields Groundwater, 2024b. *2024 Background Data Reevaluation Procedures for the Cowlitz County Headquarters Landfill*. April.

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

Washington DOE, 2018 (revision data). *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.

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.

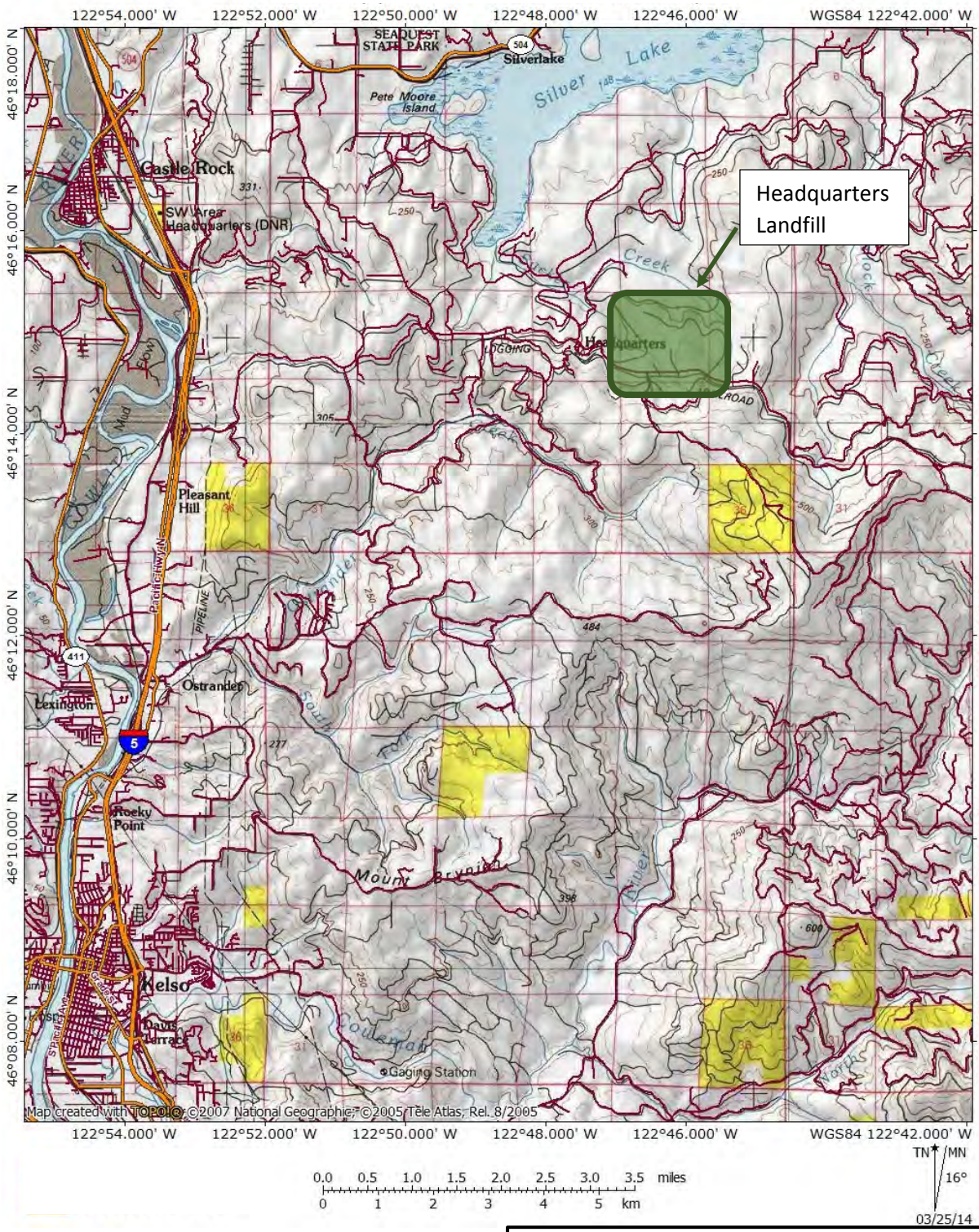


Figure 1
Cowlitz County Headquarter Landfill
Castle Rock, Washington
Site Location Map

Bright Fields Groundwater, Inc.

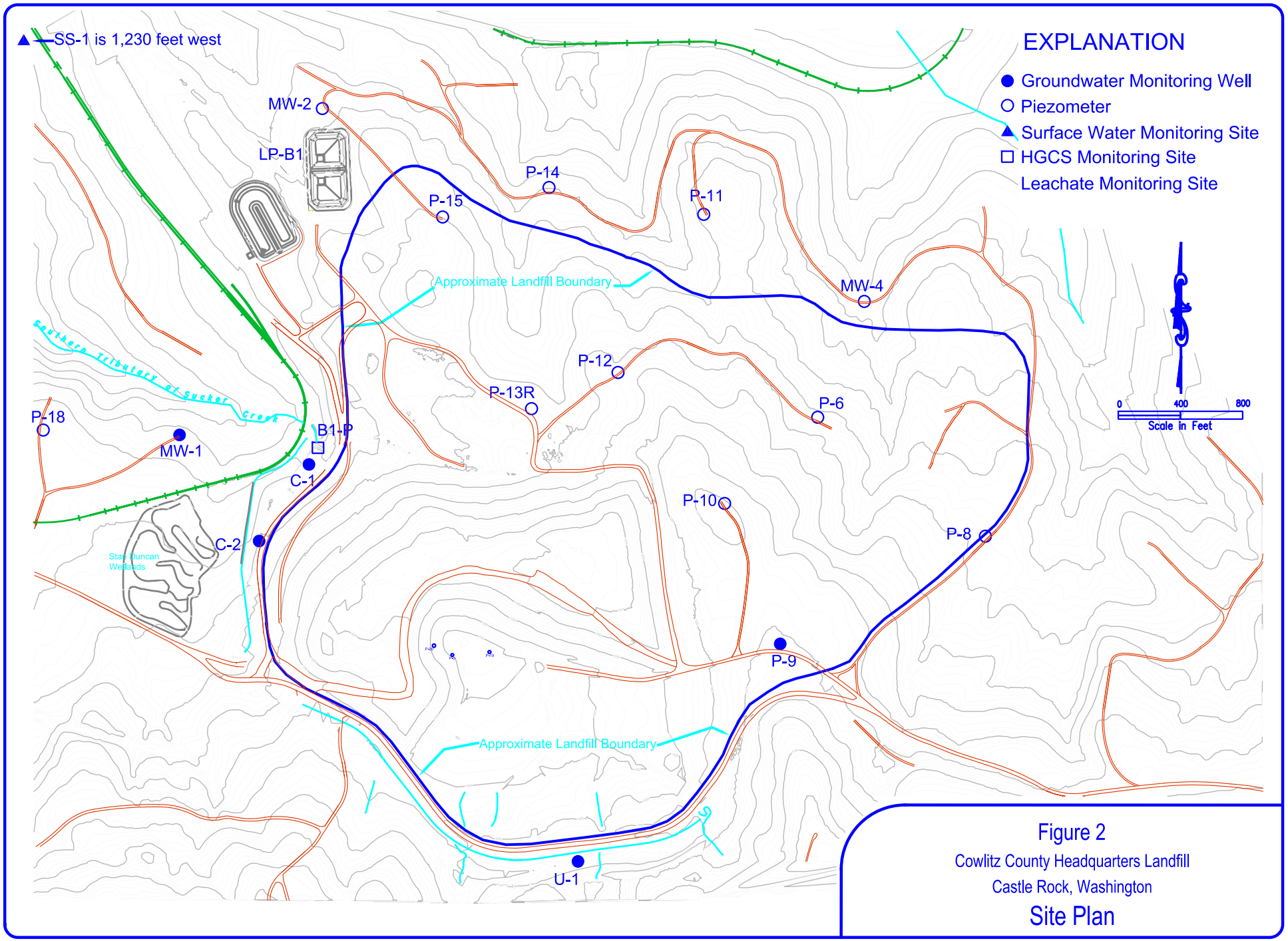


Figure 2

Cowlitz County Headquarters Landfill

Castle Rock, Washington

Site Plan

Table 1
Cowlitz County Headquarters Landfill
Parameters Exceeding Prediction Limit in 2023/24

Parameter Units	Alkalinity mg/l	Chloride mg/l	Sulfate mg/l	TDS mg/l	Barium ug/l	Chromium ug/l	Copper ug/l	Nickel ug/l	Zinc ug/l	Calcium ug/l	Magnesium ug/l	Potassium ug/l	Sodium ug/l
C-1													
Prediction Limit	67.3	2.94	0.64	118	7.9	0.28	0.33	0.24	1.7	11,400	5,270	1,390	7,940
1st Quarter													
2nd Quarter													
3rd Quarter													
4th Quarter													
1st Quarter		11										9,600	
2nd Quarter		8										7,360	
C-2													
Prediction Limit	39	3.6	1.69	75	9.4	0.28	0.70	0.54	2.07	3,630	1,830	990	9,960
1st Quarter													
2nd Quarter													
3rd Quarter													
4th Quarter													
1st Quarter		9										8,760	
2nd Quarter		6								3,650	1,890	4,730	

Note: Prediction limits are the maximun values detected in the background data look back period for each well.
J = Data qualifier assigned. The associated value is an estimate.
T = Detected below reporting limit. Value is an estimate.

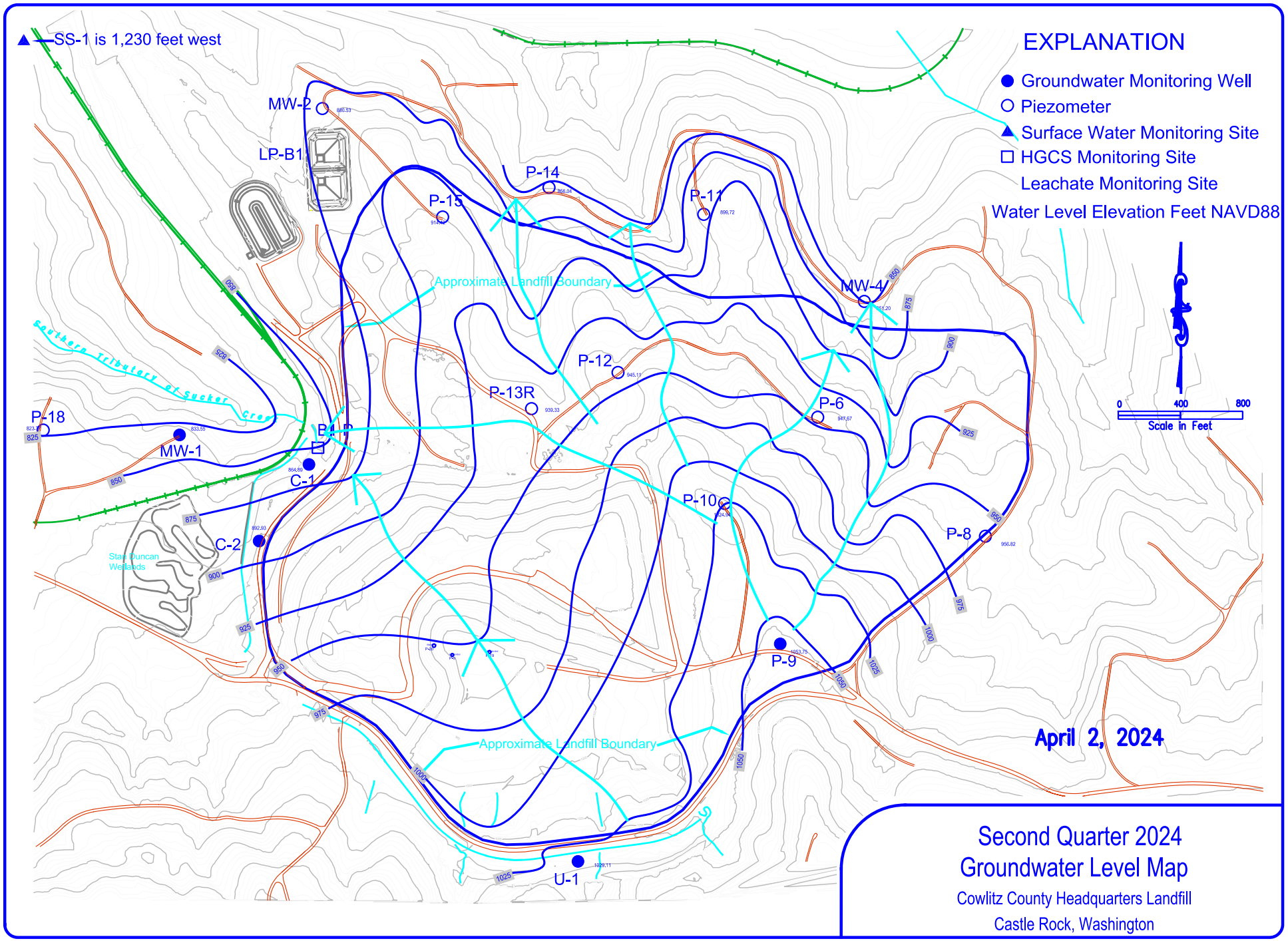
Table 2
Cowlitz County Headquarters Landfill
Concentrations Above Primary Standards
2018 to 2024

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
P-9	1st	Arsenic	0.05	10	0.5	0.52
U-1	1st	Arsenic	0.05	10	0.5	3.7
B1-P	1st	Arsenic	0.05	10	0.5	0.88
P-9	2nd	Arsenic	0.05	10	0.5	.48T
U-1	2nd	Arsenic	0.05	10	0.5	3.7
B1-P	2nd	Arsenic	0.05	10	0.5	0.73

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 DATA AND CONTOUR PLOTS


▲—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
B-1
C-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
April 2, 2024
Second Quarter 2024
Groundwater Level Map
Cowlitz County Headquarters Landfill
Castle Rock, Washington

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

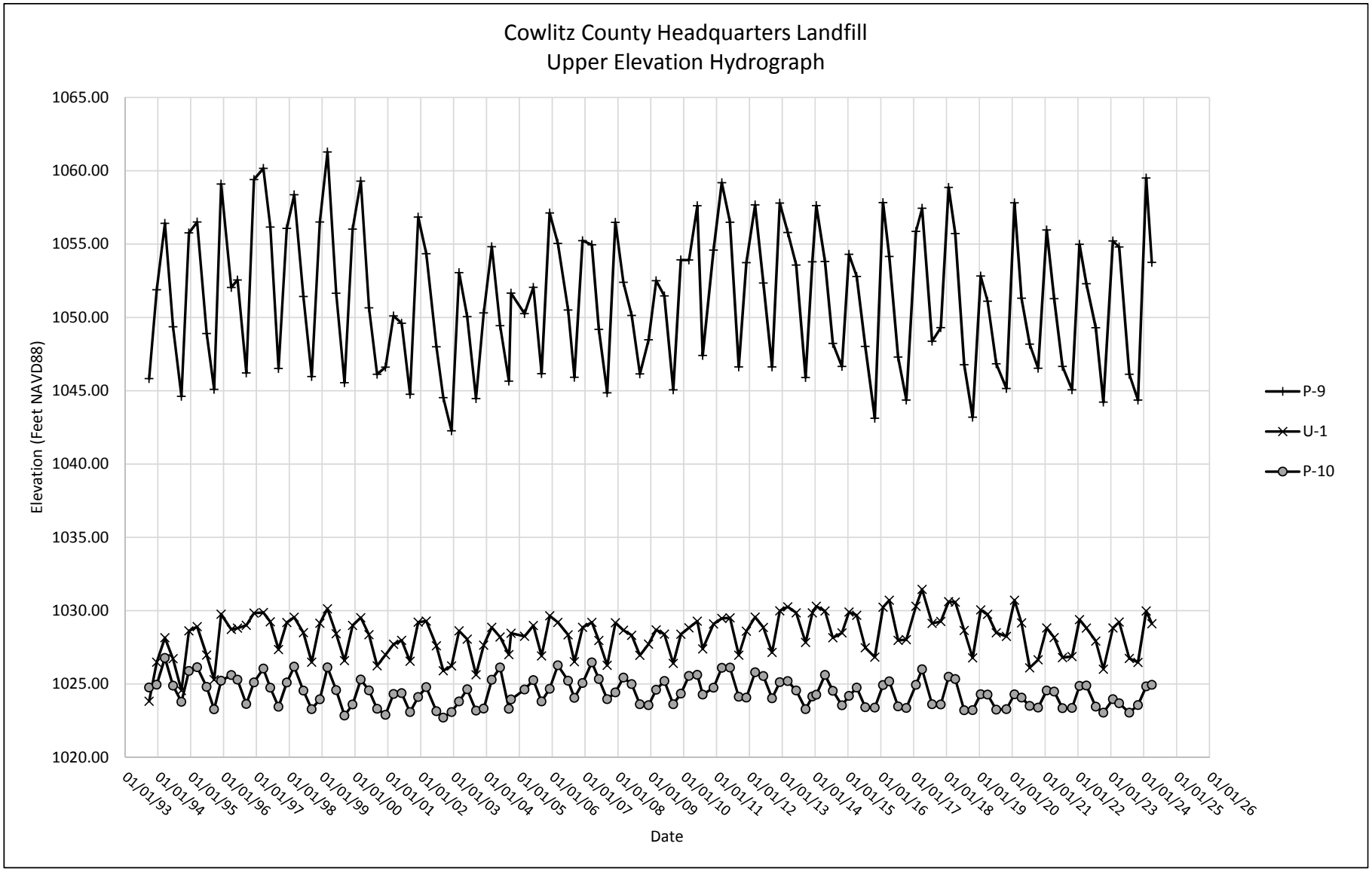
Date	Hydraulic Conductivity K (feet/day)	Effective Porosity n		Hydraulic Gradient I (feet/feet)	Low Linear Groundwater Velocity (feet/day)	High Linear Groundwater Velocity (feet/day)	Average Annual Groundwater Velocity (feet/year)	Apparent Groundwater Flow Direction
		Low	High					
1/14/2015	0.15	0.06	0.32	0.0609	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
1/30/2024	0.15	0.06	0.32	0.0534	0.025	0.134	28.9	Northwest
4/2/2024	0.15	0.06	0.32	0.0566	0.027	0.142	30.7	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		

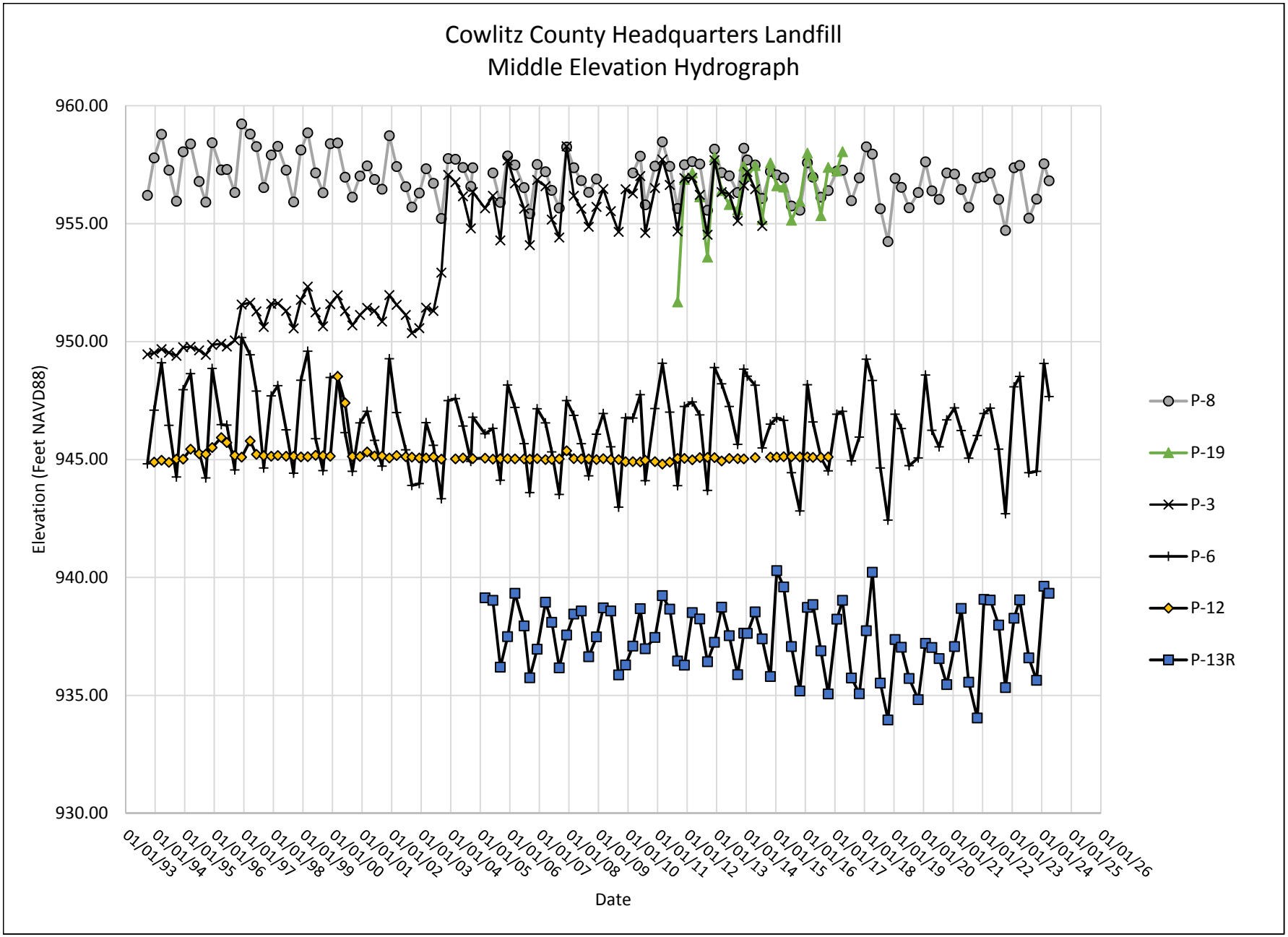
Notes: Hydraulic conductivity and effective porosity taken from Tuppan, 2013a.
Hydraulic gradient estimated using contour plots.
Linear groundwater velocity calculated as KI/n.
Apparent groundwater flow direction estimated as downgradient direction on the contour plots.

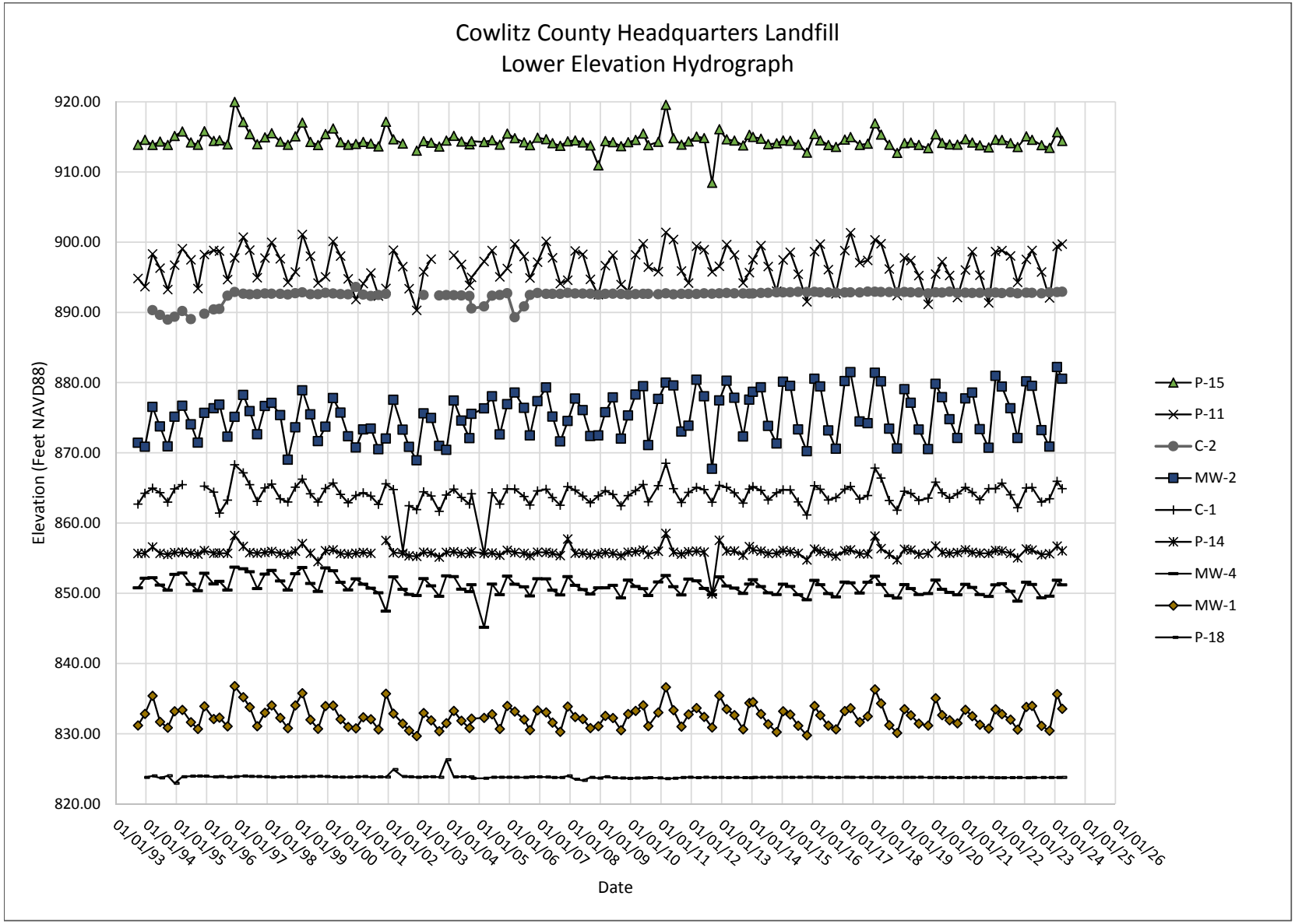
Cowlitz County Headquarter Landfill
Hydraulic Characteristics Summary
Southern Expansion Area of Landfill

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
1/30/2024	0.15	0.06	0.32	0.0498	0.023	0.124	27.0	Northwest
4/2/2024	0.15	0.06	0.32	0.0492	0.023	0.123	26.6	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
7/12/2016	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
1/30/2024	21.42	14.52	35.17	25.16	11.05	7.22	8.76	4.31	20.15
4/2/2024	22.29	15.57	35.12	27.25	12.73	7.88	10.16	5.03	25.90

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
7/12/2016	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
1/30/2024	54.47	30.67	NM	21.95	20.98	30.48	65.09
4/2/2024	54.36	30.35	NM	22.25	21.66	31.71	65.08

NOTES: NM = Not MMeasured

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
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
1/30/2024		1029.98	865.94	892.88	835.64	882.21	851.86	949.07	957.54	1059.50
4/2/2024		1029.11	864.89	892.93	833.55	880.53	851.20	947.67	956.82	1053.75

NOTES: NM = Not Measured

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

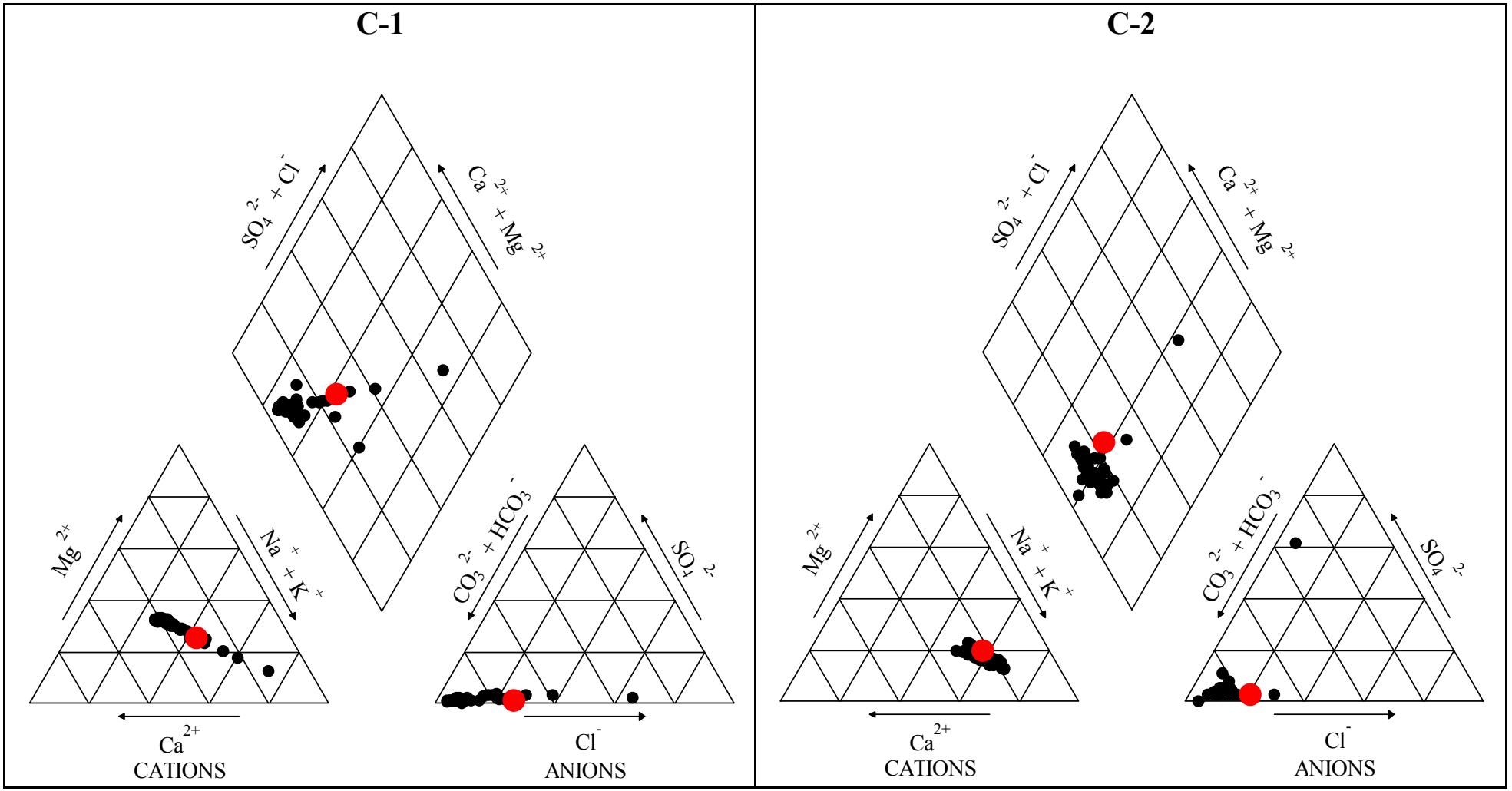
Date Measured	MP Elev.	P-10 1079.3	P-11 930.07	P-12 988.12	P-13R 961.58	P-14 877.7	P-15 946.13	P-18 888.85
1/27/2016		1024.92	898.66	945.11	938.73	856.28	915.41	823.81
4/5/2016		1025.18	899.73	945.09	938.85	855.95	914.49	823.75
7/12/2016		1023.47	896.10	945.09	936.89	855.69	913.83	823.78
10/11/2016		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
1/30/2024		1024.83	899.40	NM	939.63	856.72	915.65	823.76
4/2/2024		1024.94	899.72	NM	939.33	856.04	914.42	823.77

NOTES: NM = Not Measured

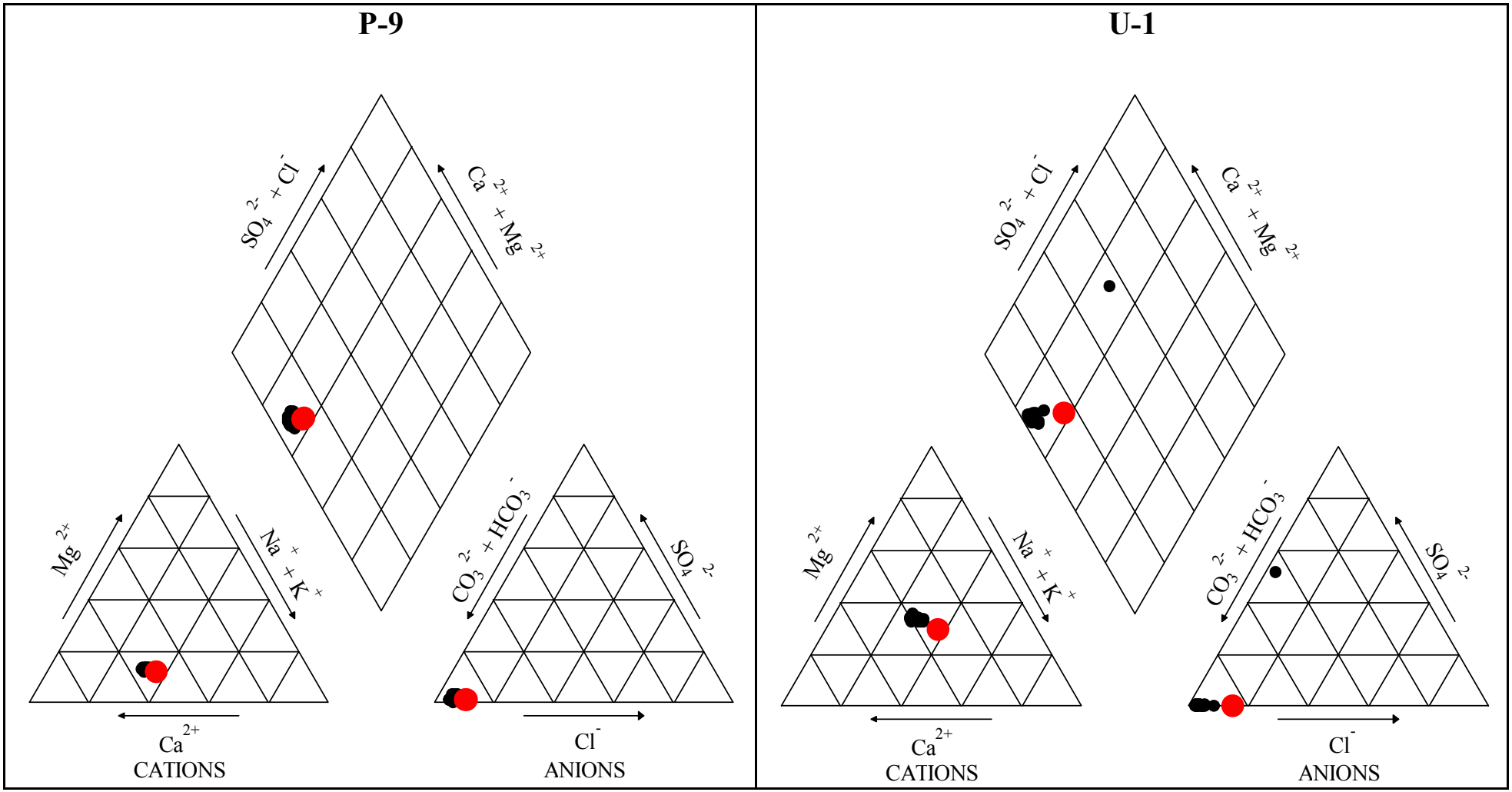
APPENDIX B

GROUNDWATER AND SURFACE WATER QUALITY DATA, STATISTICAL CALCULATIONS, CATION-ANION BALANCES, AND TRILINEAR DIAGRAMS

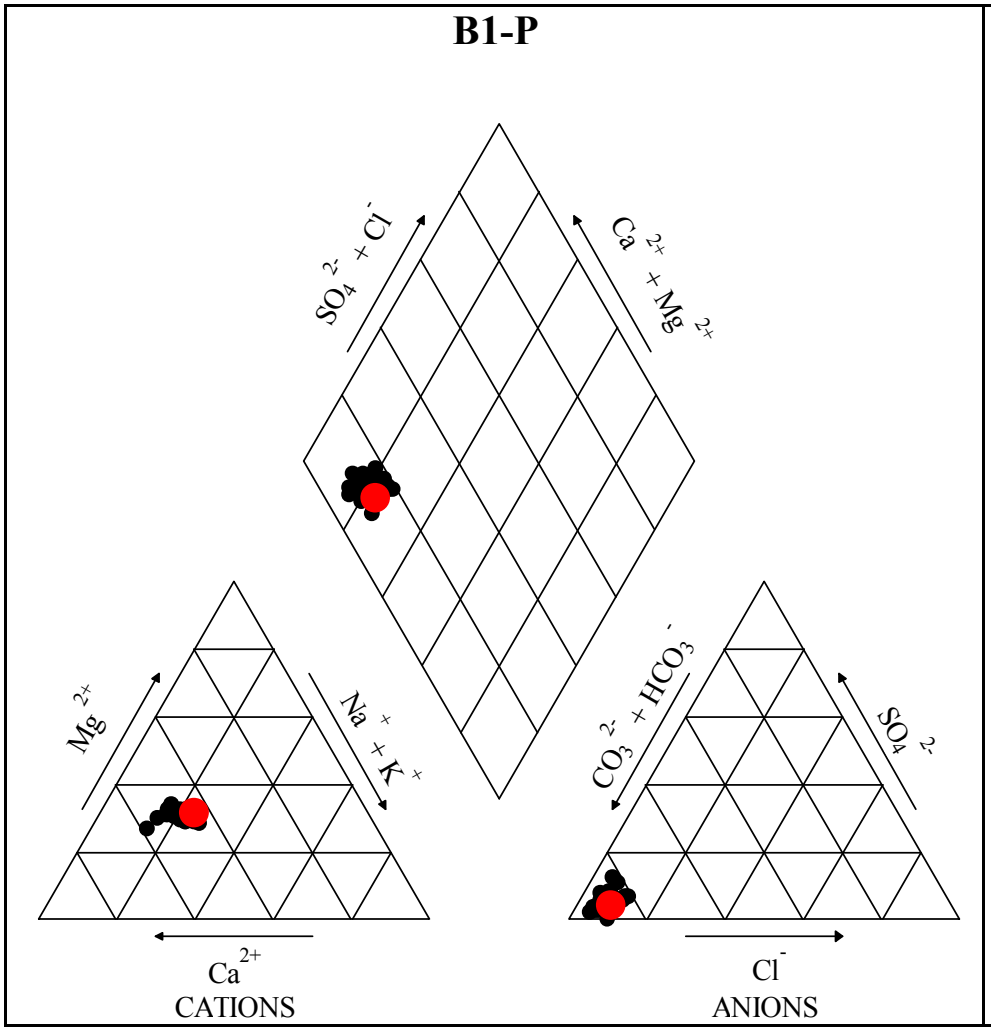
Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
April 2024 Data Point is Larger



Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
April 2024 Data Point is Larger



Cowlitz County Headquarters Landfill
Piper Trilinear Diagrams
April 2024 Data Point is Larger



Cowlitz County Headquarters Landfill
Cation-Anion Balance Calculations
April 2024

Well	Ion	Equivalent Weight	Concentration (mg/L)	Equivalents per million Cations	Equivalents per million Anions	Difference (meq/L)	Difference (%)
C-1	Calcium	20.04	5.8	0.29			
	Magnesium	12.16	2.8	0.23			
	Potassium	39.10	7.4	0.19			
	Sodium	22.99	4.8	0.21			
	Iron	55.85	0.02	0.0004			
	Bicarbonate	61.02	40.6		0.67		
	Chloride	35.45	8.3		0.23		
	Sulfate	48.03	0.5		0.01		
			Total	**0.92**	**0.91**	**0.01**	**0.48**
C-2	Calcium	20.04	3.7	0.18			
	Magnesium	12.16	1.9	0.16			
	Potassium	39.10	4.7	0.12			
	Sodium	22.99	7.9	0.34			
	Iron	55.85	0.01	0.00			
	Bicarbonate	61.02	39.5		0.65		
	Chloride	35.45	6.0		0.17		
	Sulfate	48.03	1.1		0.02		
			Total	**0.80**	**0.84**	**-0.04**	**-2.20**
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	8.0	0.35			
	Iron	55.85	0.00	0.00			
	Bicarbonate	61.02	62.5		1.03		
	Chloride	35.45	2.2		0.06		
	Sulfate	48.03	0.6		0.01		
			Total	**1.11**	**1.10**	**0.02**	**0.73**
U-1	Calcium	20.04	11.1	0.55			
	Magnesium	12.16	6.0	0.49			
	Potassium	39.10	9.8	0.25			
	Sodium	22.99	8.8	0.38			
	Iron	55.85	5.66	0.10			
	Bicarbonate	61.02	99.1		1.62		
	Chloride	35.45	9.9		0.28		
	Sulfate	48.03	0.1		0.00		
			Total	**1.78**	**1.91**	**-0.13**	**-3.42**

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

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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.89* 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	0.05* 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
	01/29/24	9.3	8	10.5	0.03 B1	0.37	0.4	1.4	10	40	5.6	51	10.7	5.7	6.1	253
	04/02/24	40.6	33	8.3	0.05 B1	0.36	0.5	0.7	5 U	74	6.0	81	11.1	1.8	5.9	125
	count	46	46	47	14	48	45	26	12	45						
	max	82.1	67.3	10.5	0.660	0.59	0.6	2.2 U	28 U	118						
	min			1.5	0.010 T	0.28	0.3	0.1 T	5 U	24						
	non-detects				35		1	21	35	2						
	average	39.6	32.5	2.4	0.1	0.4	0.5	0.5	11.2	60.0						
	sample stdev	17	14	2	0	0	0	1	7	23						
	variance	296.6	199.5	2.6	0.0	0.0	0.0	0.4	51.6	522.4						
	coeff. of variation	2.3	2.3	1.5	0.6	6.8	7.5	0.8	2	2.6						
	standard error	2.5	2.1	0.2	0.1	0.0	0.0	0.1	2	3.4						

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	3.97*	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	0.05* 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*	2.4 T	0.1* 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	0.1* 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	0.1* U	0.5* 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	0.1* U	0.5* 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	0.1* 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	0.1* U	1.2	0.67* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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* B1	2.2	0.05* B1	0.1* 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	0.05* B1	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* U	1.1	0.1 T	5* U	46	5.6	63	11.5	0.1	0.8	56
	01/29/24	38.5	31.6	9.2	0.04 B1	0.12	1.1	1.2	5 U	69	6.1	98	11.9	0.0	0.9	240
	04/02/24	39.5	32.4	6.0	0.05 B1	0.01 T	1.1	0.6	5 U	64	5.9	86	18.5	0.2	1.1	153
	count	43	43	46	15	16	44	25	3	41						
	max	47.5	39.0	9.2	0.095 J	0.1 U	27.6	1.2 U	5 U	75						
	min			1.8	0.009 T	0.01 T	0.7	0.1 T	5 U	29						
	non-detects	1	1		34	41	1	16	45							
	average	35.2	28.8	2.6	0.0	0.1	1.7	0.2	5.0	52.6						
	sample stdev	6.4	5.3	1.2	0.0	0.0	4.0	0.2		10.0						
	variance	41.2	27.7	1.4	0.0	0.0	16.0	0.1		99.8						
	coeff. of variation	5.5	5.5	2.2	1.5	1.8	0.4	1.0	#DIV/0!	5.3						
	standard error	1.0	0.8	0.2	0.0	0.0	0.6	0.0		1.6						

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	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	65.5* 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	0.05* B1	0.1* 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	0.05* B1	0.1* 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						
	01/29/24	64.4	52.8	4.6	0.02 B1	0.06 T	0.7	0.5	5 U	121	6.7	107	10.1	0.4	6.1	226
	01/29/24	65.2	53.5	4.7	0.04 B1	0.06 T	0.6	0.4 T	5 U	115						
	04/02/24	61.8	50.7	4.2	0.05 B1	0.06 T	0.6	0.2 T	5 U	119	6.6	99	10.7	0.4	5.6	128
	04/02/24	62.4	51.2	4.0	0.05 B1	0.05 T	0.6	0.4 T	5 U	118						
	count	88	88	91	25	91	95	40	9	94						
	max	84.1	69.0	4.7	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				70	4	2	55	90	2						
	average	64.4	52.8	2.3	0.0	0.1	1.9	0.2	2.8	105.3						
	sample stdev	10.5	8.6	0.5	0.0	0.0	7.1	0.2	2.6	29.2						
	variance	109.7	73.8	0.2	0.0	0.0	50.5	0.0	6.9	853.2						
	coeff. of variation	6.1	6.1	4.7	1.2	2.1	0.3	1.3	1	3.6						
	standard error	1.1	0.9	0.1	0.0	0.0	0.7	0.0	1	3.0						

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	01/27/16	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	0.1* 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	0.1* 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	0.1* U	0.2* 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	0.1* 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	0.1* 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	0.4* B1	5.8*	33.0	100	7.1	194	9.0	NM	0.0	-13
	07/17/18	84.1	69	2.34*	0.59	0.1* 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	0.1* 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	0.1* U	0.2* 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	0.1* U	0.18 T	3.0	22.5	129	6.5	180	10.2	NM	0.0	-12
	10/28/19	39*	32	1.6	0.37	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.055*	0.1* 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	0.1* 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*	0.1* 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	0.1* 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	2.18*	0.54	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* 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	0.1* U	0.4* U	2.7	16.5	116	6.4	161	8.7	10.6	0.6	10
	01/29/24	95.2	78.1	10.9	0.49	0.10 U	0.2 T	4.1	15.5	130	7.0	213	9.9	8.2	1.0	-96
	04/02/24	99.1	81.3	9.9	0.41	0.02 T	0.1 T	4.0	8.0	121	6.7	204	10.1	10.4	0.2	-110
	count	44	45	38	41	10	38	43	43	45						
	max	107.3	88.0	10.9	0.72	0.1 U	0.6	4.1	131.0	149						
	min			1.2	0.22 B1	0.02 U	0.06 U	1.8	8	82						
	non-detects				2	41	7		3							
	average	83.6	67.7	1.9	0.4	0.0	0.2	2.7	32.4	109.5						
	sample stdev	14.2	12.7	2.0	0.1	0.0	0.1	0.4	24.4	15.6						
	variance	202.0	162.5	4.1	0.0	0.0	0.0	0.2	594.3	244.6						
	coeff. of variation	5.9	5.3	0.9	4.9	1.4	2.0	6.6	1	7.0						
	standard error	2.1	1.9	0.3	0.0	0.0	0.0	0.1	4	2.3						

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 B1-P	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
	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	0.05* 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	0.05* 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	0.05* 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	0.05* 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
	01/29/24	43.4	35.6	2.7	0.04 B1		1.8	0.7	5 U	62	5.9	80	14.3	NM	NM	117
	04/02/24	46.3	38.0	2.7	0.05 B1		1.6	1.2	5 U	49	5.6	83	15.2	1.1	3.5	117
	count	42	42	42	13		42	41	5	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				31		1	1	38	2						
	average	57.4	47.1	2.7	0.2		3.9	0.7	6.7	76.0						
	sample stdev	15.5	12.7	0.2	0.4		7.4	0.2	3.8	19.5						
	variance	239.8	161.3	0.0	0.2		55.3	0.0	14.5	379.7						
	coeff. of variation	3.7	3.7	13.5	0.4		0.5	3.4	2	3.9						
	standard error	2.4	2.0	0.0	0.1		1.1	0.0	2	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.
* = Outlier data point or other not used in statistical calculations.
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					
	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	0.5* U	0.12	5.6	0.5* U	0.250 U	0.5* U	0.032 T	0.38 T	0.100	0.24 T	1* U
	10/30/17	0.5* U	0.07 T	3.5	0.5* U	0.250 U	0.5* U	1.0* U	0.46 T	0.1* U	0.24 T	1* U
	01/31/18	1.0* U	0.06 T	7.9	0.5* U	0.250 U	0.5* U	0.046 T	0.41 T	0.220 B	0.12 T	1* U
	04/09/18	1.0* U	0.05 T	6.6	0.5* 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	0.2* 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	8.42*	0.106*	0.038*	0.2	0.058	0.33	0.44* 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	0.2* U	1* U
	07/13/21	0.05* U	0.12 T	4.7	0.032	0.009 T	0.2 T	0.02* U	0.13	0.026	0.17 T	1* U
	10/27/21	0.05* U	0.5* 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	0.5* 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	0.5* 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	0.02* 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	0.5* U	7.8	0.068	0.009 T	0.1 T	0.02* U	0.11	0.130	0.07 T	1* U
	04/04/23	0.05* U	0.5* 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	0.5* U	4.5	0.047	0.011 T	0.1 T	0.014 T	0.15	0.050 J	0.24	1* U
	01/29/24	0.05 U	0.5 U	7.5	0.060	0.013 T	0.1 T	0.036	0.33	0.137	0.09 T	1.0 U
	04/02/24	0.05 U	0.5 U	6.1	0.052	0.012 T	0.1 T	0.015 T	0.06 T	0.046	0.08 T	1.0 U
	count	12	32	50	45	50	41	43	50	46	49	5
	max	0.050	0.5 U	7.9	0.09	0.250	0.28	0.058	0.46	0.220	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	40	21		5	4	10	7	1	2	2	48
	average	0.02	0.14	4.9	0.04	0.03	0.13	0.021	0.18	0.057	0.14	0.6
	sample stdev	0.01	0.10	1.2	0.01	0.07	0.06	0.011	0.10	0.045	0.10	0.4
	variance	0.00	0.01	1.4	0.00	0.00	0.00	0.000	0.01	0.002	0.01	0.2
	coeff. of variation	1.3	1.4	4.1	2.9	0.5	2.1	1.9	1.8	1.3	1.5	1.4
	standard error	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2

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					
	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	0.779*	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	1.0* U	0.74 T	0.78 T	6,300	10* U	3,100	6.4	1,200	5,200
	10/30/17	0.75*	1.0* U	0.31 T	0.87 T	4,000	10* U	1,800	3.1	2,700*	3,900
	01/31/18	0.81*	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	2.0* B1	8,170	21* U	4,100	5.9	1,390	5,890
	10/21/18	0.065 J	0.02* U	0.71	1.1 T	6,480	21* U	3,390	3.9	520	5,520
	01/16/19	0.114 J	0.03	0.89	1.3 T	5,790	21* U	2,890	6.0	770	5,000
	04/03/19	0.176 J	0.02	0.73	0.9 T	6,210	21* U	2,980	7.0	950	4,930
	07/08/19	0.229	0.02* U	0.90	0.9 T	7,000	13 T	3,540	6.8	2,660*	4,920
	10/29/19	0.076 J	0.04	0.67	1.0 T	7,570	10 T	3,700	3.4	650	6,140
	01/26/20	0.169 J	0.04	0.41	2.5*	1,640	11 T	859	7.6	270	2,910
	04/14/20	0.070	0.02* U	0.63	1.5 T	5,800	21* U	2,950	5.7	480	4,700
	07/14/20	0.056	0.01 JT	0.76	1.2 JT	6,850	21* U	3,290	6.0	470	5,220
	10/16/20	0.059	0.02* U	0.41	0.9 T	4,450	12 T	2,110	3.0	530	3,760
	01/20/21	0.087	0.02* U	0.43	1.7 T	4,740	21* U	2,370	6.9	450	4,670
	04/12/21	0.042 J	0.02* U	0.60	1.1 T	6,280	21* U	3,100	6.4	570	4,810
	07/13/21	0.072	0.02* U	0.74	1.4 T	7,950	21* U	3,970	7.1	590	5,630
	10/27/21	0.221	0.02* U	0.30	1.1 T	3,530	21* B1	1,700	6.0	1,010	3,580
	01/19/22	0.368	0.02* U	0.28	1.5 T	4,990	21* U	2,390	6.9	1,230	4,130
	04/05/22	0.439	0.02* U	0.12 T	1.1 T	2,000	21* U	953	7.4	1,270	2,860
	07/18/22	0.074	0.02* U	0.61	0.9 T	6,770	21* U	3,280	6.4	580	5,070
	10/11/22	0.069	0.02* U	0.68	0.7 T	7,610	21* U	3,770	4.2	610	5,370
	01/25/23	0.055	0.02* U	0.15 T	3.0* J	3,370	15 T	1,670	7.8	310	3,820
	04/04/23	0.094	0.01 T	0.21	1.3 T	2,390	28	1,190	9.6	270	3,150
	07/26/23	0.043 J	0.02* U	0.76	1.0 T	7,440	21* U	3,640	6.0	620	5,690
	10/30/23	0.989*	0.02* U	0.19 T	1.2 T	2,510	21* U	1,280	6.4	330	3,160
	01/29/24	6.000	0.02 U	0.16 T	1.6 T	1,340	21 U	715	8.8	9,600	2,540
	04/02/24	1.500	0.02 U	0.51	1.0 T	5,820	21 U	2,830	7.2	7,360	4,750
	count	47	11	51	46	49	16	49	49	45	49
	max	6.000	0.04 U	1.37	1.70	11,400	28 T	5,270	9.6	9,600	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		42		2		37				
	average	0.277	0.02	0.58	1.01	5,725.1	13.6	2,815.0	6.1	1,008.7	4,786.3
	sample stdev	0.882	0.01	0.28	0.28	2,362.4	7.1	1,124.7	1.8	1,667.4	1,208.6
	variance	0.778	0.00	0.08	0.08	5,580,917.2	49.8	1,264,844.4	3.1	2,780,087.8	1,460,627.9
	coeff. of variation	0.3	1.3	2.1	3.6	2.4	1.9	2.5	3.4	0.6	4.0
	standard error	0.1	0.0	0.0	0.0	337.5	1.8	160.7	0.3	248.6	172.7

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-2							Total					
	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	0.2* 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	0.02* U	0.016 T	0.2* U	0.769	0.24	0.020	0.54	1* U
	04/05/17	0.05* U	0.5* U	8.8	0.02* U	0.018 T	0.27	0.938	0.23	0.008 T	0.29	0.3 T
	07/25/17	0.5* U	0.04 T	9.4	0.5* U	0.25* U	0.5* U	1.100	0.60	0.1* U	0.34 T	1* U
	10/30/17	0.5* U	0.1* U	8.0	0.5* U	0.25* U	0.5* U	1.100	0.70	0.1* U	0.33 T	1* U
	01/31/18	1.0* U	0.04 T	8.2	0.5* U	0.25* U	0.5* U	1.400	0.57	.015* B	0.32 T	0.3 T
	04/09/18	1.0* U	0.1* U	8.4	0.5* U	0.25* U	0.5* 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	0.2* 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	0.02* U	0.18 T	1* U
	07/07/19	0.05* U	0.09 T	8.6	0.013 T	0.018 T	0.2* 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	0.02* 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	0.02* U	0.25	1* U
	07/13/21	0.05* U	0.5* U	7.6	0.006 T	0.2* 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	0.2* 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	0.2* 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	0.2* U	0.14 T	0.042	0.09 T	0.02* U	0.19 T	1* U
	10/12/22	0.05* U	0.5* U	7.4	0.010 T	0.2* U	0.19 JT	0.327	0.06 T	0.02* U	0.17 T	1* U
	01/25/23	0.05* U	0.5* U	7.4	0.007 T	0.2* U	0.21	0.056	0.09 T	0.02* 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	0.02* U	0.14 T	1* U
	07/26/23	0.05* U	0.5* U	7.5	0.012 T	0.2* U	0.17 T	0.174	0.07 T	0.02* 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	0.02* U	0.14 T	1* U
	01/29/24	0.05 U	0.5 U	7.8	0.010 T	0.020 U	0.12 T	0.140	0.06 T	0.020 U	0.11 T	1 U
	04/02/24	0.05 U	0.5 U	7.8	0.013 T	0.020 U	0.18 T	0.048	0.10	0.020 U	0.17 T	1 U
	count	9	5	49	42	36	35	49	49	37	49	6
	max	0.05 U	0.5 U	9.4	0.02 U	0.02 U	0.28	1.970 J	0.70	0.045	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	0.11 T	0.3 U
	non-detects	42	46		9	15	13			13		45
	average	0.0	0.2	8.1	0.01	0.01	0.12	0.610	0.24	0.024	0.24	0.6
	sample stdev	0.0	0.2	0.5	0.00	0.00	0.07	0.458	0.14	0.010	0.09	0.3
	variance	0.0	0.1	0.3	0.00	0.00	0.00	0.210	0.02	0.000	0.01	0.1
	coeff. of variation	1.3	1.0	15.5	4.0	3.0	1.8	1.3	1.7	2.3	2.7	1.7
	standard error	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1

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					
	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	0.2* B1	0.90 T	3,050	21* U	1,260	64.4	570	7,310
	07/25/17	0.25* U	1.0* U	0.08 T	0.87 T	3,000	12	1,200	70.0	630 T	8,100
	10/30/17	0.25* U	1.0* U	0.07 T	0.90 T	3,000	4 T	1,100	64.0	1,800*	8,500
	01/31/18	0.22*	0.36* U	0.18* T	0.81 T	2,600	10* U	1,000	73.0	1,700*	9,100
	04/09/18	0.18* 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	2.0* B1	2,600	14 T	1,190	112.0	1,350*	9,560
	10/21/18	0.018 JT	0.02* U	0.2* 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	0.13*	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	0.02* 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	0.02* U	0.2* U	0.90 T	2,580	21* U	1,210	96.7	500	8,680
	07/14/20	0.086	0.02* U	0.06 T	1.50 JT	2,510	14 T	1,130	96.8	460	8,950
	10/15/20	0.009 T	0.02* 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	0.2* U	1.60 T	2,590	21* U	1,260	81.6	540	8,890
	04/13/21	0.012 T	0.02* U	0.06 T	1.40 T	3,000	21* U	1,470	70.2	510	8,320
	07/13/21	0.02* U	0.02* U	0.06 T	1.50 T	2,750	12 T	1,230	59.9	440	8,230
	10/27/21	0.060	0.02* U	0.05 T	0.90 T	2,720	21* B1	1,220	46.4	840	7,640
	01/19/22	0.079*	0.02* U	0.04 T	1.10 T	3,040	21* U	1,420	42.7	720	7,900
	04/05/22	0.148*	0.02* U	0.2* U	0.90 T	3,130	21* U	1,420	37.1	970	8,020
	07/18/22	0.019 T	0.02* U	0.2* U	0.80 T	3,440	21* U	1,830	10.8	570	7,600
	10/12/22	0.014 T	0.02* U	0.2* U	0.90 T	3,160	21 T	1,550	28.6	460	7,640
	01/25/23	0.02* U	0.02* U	0.07 T	4.6* J	3,330	11 T	1,760	11.9	460	7,720
	04/05/23	0.02* U	0.02* U	0.2* U	0.90 T	3,090	21* U	1,440	32.1	480	8,200
	07/26/23	0.016 JT	0.02* U	0.04 T	1.00 T	3,220	11 T	1,600	19.6	540	7,940
	10/30/23	0.012 T	0.02* U	0.2* U	0.80 T	3,140	21* U	1,480	33.9	520	7,910
	01/29/24	2.370	0.020 U	0.20 U	1.10 T	3,310	21 U	1,660	23.5	8,760	7,790
	04/02/24	0.491	0.020 U	0.20 U	1.00 T	3,650	13 T	1,890	21.7	4,730	7,930
	count	35	19	38	47	47	22	47	47	41	47
	max	2.370	0.02 U	0.20	2.1	3,650	21 U	1,890	133.0	8,760	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	38	11	1		26				
	average	0.101	0.02	0.08	1.11	2,998.3	10.0	1,310.4	52.4	884.6	8,163.4
	sample stdev	0.403	0.01	0.04	0.33	334.0	5.2	202.2	36.6	1,424.1	870.5
	variance	0.162	0.00	0.00	0.11	111,584.0	26.6	40,899.8	1,340.6	2,028,160.7	757,722.9
	coeff. of variation	0.3	2.1	2.2	3.4	9.0	1.9	6.5	1.4	0.6	9.4
	standard error	0.1	0.0	0.0	0.0	48.7	1.1	29.5	5.3	222.4	127.0

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					
	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	1.0* 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	1.0* U
	04/15/20	0.1* U	0.49 T	0.8	0.02* U	0.02* U	0.2 T	0.02* U	0.07 T	0.016 T	0.06 T	1.0* U
	04/15/20	0.1* U	0.48 T	0.8	0.02* U	0.02* U	0.2	0.02* U	0.06 T	0.016 T	0.08 T	1.0* U
	07/14/20	0.1* U	0.57	0.9	0.02* U	0.02* U	0.2	0.02* U	0.08 T	0.017 JT	0.07 T	1.0* U
	07/14/20	0.1* U	0.57	0.9	0.02* U	0.02* U	0.2 T	0.02* U	0.08 T	0.024 J	0.10 T	1.0* 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	1.0* U
	10/16/20	0.1* U	0.54	0.9	0.02* U	0.02* U	0.2 T	0.02* U	0.09 T	0.030	0.08 T	1.0* 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	1.0* 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	1.0* U
	04/13/21	0.1* U	0.55	1.1	0.01 T	0.02* U	0.2 T	0.02* U	0.14 J	0.035 J	0.08 T	1.0* 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	1.0* U
	07/13/21	0.1* U	0.48 T	1.0	0.02* U	0.02* U	0.2	0.02* U	0.07 T	0.016 T	0.08 T	1.0* U
	07/13/21	0.1* U	0.62	1.1	0.02* U	0.02* U	0.3	0.02* U	0.08 T	0.016 T	0.06 T	1.0* U
	10/27/21	0.1* U	0.46 T	0.9	0.01 T	0.02* U	0.2	0.02* U	0.05 JT	0.013 T	0.07 T	1.0* 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	1.0* U
	01/19/22	0.1* U	0.54	1.1	0.01 T	0.02* U	0.3	0.02* U	0.08 T	0.018 T	0.09 T	1.0* U
	01/19/22	0.1* U	0.60	1.2	0.01 T	0.02* U	0.3	0.02* U	0.07 T	0.017 T	0.06 T	1.0* U
	04/05/22	0.1* U	0.44 T	1.3	0.01 T	0.02* U	0.2	0.02* U	0.06 T	0.019 T	0.08 T	1.0* U
	04/05/22	0.1* U	0.51	1.3	0.01 T	0.02* U	0.2	0.02* U	0.06 T	0.020	0.05 T	1.0* U
	07/18/22	0.1* U	0.50	1.4	0.01 T	0.02* U	0.2	0.02* U	0.1* U	0.019 T	0.07 T	1.0* U
	07/18/22	0.1* U	0.53	1.2	0.01 T	0.02* U	0.2	0.02* U	0.07 T	0.017 T	0.07 T	1.0* 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	1.0* U
	10/12/22	0.1* U	0.57	1.4	0.02* U	0.02* U	0.2 J	0.009 T	0.1* U	0.014 T	0.09 T	1.0* U
	01/25/23	0.1* U	0.57	1.2	0.02* U	0.02* U	0.3	0.02* U	0.07 T	0.011 T	0.05 T	1.0* U
	01/25/23	0.1* U	0.61	1.3	0.02* U	0.02* U	0.3	0.02* U	0.08 T	0.008 T	0.07 T	1.0* U
	04/05/23	0.1* U	0.51	1.3	0.01 T	0.02* U	0.2	0.02* U	0.07 T	0.009 T	0.07 T	1.0* U
	04/05/23	0.1* U	0.51	1.2	0.02* U	0.02* U	0.2	0.02* U	0.05 T	0.013 T	0.05 T	1.0* U
	07/26/23	0.1* U	0.58	1.3	0.01 T	0.02* U	0.2	0.02* U	0.08 T	0.020	0.11 T	1.0* U
	07/26/23	0.1* U	0.58	1.3	0.01 T	0.02* U	0.2	0.02* U	0.07 T	0.013 T	0.09 T	1.0* U
	10/30/23	0.1* U	0.50 T	0.9	0.01 T	0.02* U	0.1 T	0.02* U	0.07 T	0.015 JT	0.09 T	1.0* U
	10/30/23	0.1* U	0.50	0.9	0.02* U	0.02* U	0.2 T	0.02* U	0.07 T	0.014 JT	0.13 T	1.0* U
	01/29/24	0.1* U	0.52	1.3	0.01 T	0.02* U	0.2 T	0.02* U	0.07 T	0.018 T	0.07 T	1.0* U
	01/29/24	0.1 U	0.55	1.4	0.01 T	0.02 U	0.2 T	0.020 U	0.10	0.019 T	0.07 T	1 U
	04/02/24	0.1 U	0.48 T	1.5	0.01 T	0.01 T	0.2 T	0.020 U	0.06 T	0.019 T	0.13 T	1 U
	04/02/24	0.1 U	0.50	1.5	0.02 U	0.01 T	0.2	0.020 U	0.06 T	0.023	0.11 T	1 U
	count	16	94	94	41	12	79	56	84	82	94	15
	max	0.05 U	0.69	1.6	0.13 U	0.02 U	0.38	0.068	0.25	0.073	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	81			54	83	15	41	2	8	4	82
	average	0.0	0.6	1.2	0.01	0.01	0.18	0.022	0.11	0.024	0.16	0.4
	sample stdev	0.0	0.1	0.2	0.02	0.00	0.07	0.010	0.05	0.012	0.11	0.3
	variance	0.0	0.0	0.0	0.00	0.00	0.00	0.000	0.00	0.000	0.01	0.1
	coeff. of variation	1.1	11.0	6.8	0.5	2.1	2.7	2.2	2.2	2.1	1.5	1.4
	standard error	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

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					
	01/26/20	0.06 J	0.02* U	2.72	2.0* U	12,400	21* U	1,840	0.2 T	760	8,070
	01/26/20	0.03 J	0.02* U	2.77	2.0* U	12,300	21* U	1,810	0.2 T	760	8,000
	04/15/20	0.02 T	0.02* U	2.43	0.60 T	11,600	21* U	1,690	1.1* U	670	7,770
	04/15/20	0.02	0.02* U	2.41	0.60 T	11,600	21* U	1,690	1.1* U	680	7,690
	07/14/20	0.02 T	0.02* U	2.56	0.80 JT	12,300	21* U	1,690	1.1* U	680	8,260
	07/14/20	0.02 T	0.02* U	2.59	0.70 JT	12,200	12 T	1,680	1.1* U	690	8,390
	10/16/20	0.02	0.02* U	2.30	0.60 T	12,300	11 T	1,710	1.1* U	790	7,600
	10/16/20	0.02 T	0.02* U	2.38	0.50 T	12,500	16 T	1,710	1.1* U	750	7,590
	01/20/21	0.02 T	0.02* U	2.71	1.00 T	11,400	21* U	1,620	1.1* U	710	8,340
	01/20/21	0.02	0.02* U	2.68	0.50 T	11,100	21* U	1,580	1.1* U	750	8,230
	04/13/21	0.08 J	0.02* U	2.50	0.70 T	11,800	21* U	1,690	0.3 T	740	7,810
	04/13/21	0.05 J	0.02* U	2.62	0.70 T	11,700	21* U	1,680	0.3 T	730	7,870
	07/13/21	0.02	0.02* U	2.38	0.50 T	12,900	21* U	1,820	0.5 T	710	8,270
	07/13/21	0.01 T	0.02* U	2.44	2.0* U	13,500	21* U	1,860	0.8 T	740	8,450
	10/27/21	0.07	0.02* U	2.37	0.60 T	11,600	21* U	1,630	0.4 T	900	7,360
	10/27/21	0.06	0.02* U	2.30	1.00 T	11,800	21* U	1,650	0.3 T	930	7,470
	01/19/22	0.02 T	0.02* U	2.59	0.60 T	12,100	21* U	1,750	1.1* U	790	7,870
	01/19/22	0.02	0.02* U	2.71	0.60 T	12,200	21* U	1,760	1.1* U	720	7,960
	04/05/22	0.03	0.02* U	2.46	2.0* U	12,300	21* U	1,740	1.1* U	870	7,920
	04/05/22	0.03	0.02* U	2.42	2.0* U	12,300	21* U	1,730	1.1* U	930	7,940
	07/18/22	0.01 T	0.02* U	2.49	2.0* U	11,500	21* U	1,670	0.3 T	710	7,780
	07/18/22	0.01 T	0.02* U	2.53	2.0* U	11,400	21* U	1,650	1.1* U	730	7,810
	10/12/22	0.01 T	0.02* U	2.44	2.0* U	13,300	9 T	1,920	1.1* U	740	8,110
	10/12/22	0.02* U	0.02* U	2.53	2.0* U	13,300	13 T	1,920	1.1* U	740	8,050
	01/25/23	0.02* U	0.02* U	2.72	2.7* J	12,100	21* U	1,710	0.2 T	690	9,190
	01/25/23	0.02* U	0.02* U	2.76	3.9* J	12,100	21* U	1,710	1.1* U	700	8,050
	04/05/23	0.02 T	0.02* U	2.54	0.50 T	12,200	21* U	1,760	0.3 T	740	8,240
	04/05/23	0.01 T	0.02* U	2.40	2.0* U	12,100	21* U	1,740	0.7 T	700	8,040
	07/26/23	0.02 JT	0.02* U	2.66	2.0* U	12,700	21* U	1,840	0.3 T	810	8,870
	07/26/23	0.04 J	0.02* U	2.61	0.60 T	12,700	21* U	1,850	1.1* U	820	8,870
	10/30/23	0.02 T	0.02* U	2.31	0.50 T	12,800	21* U	1,820	1.1* U	750	8,140
	10/30/23	0.02 T	0.02* U	2.43	0.80 T	12,600	21* U	1,800	1.1* U	730	8,090
	01/29/24	1.78	0.020 U	2.55	0.80 T	12,200	21 U	1,730	1.1* U	3,720	8,120
	01/29/24	1.57	0.020 U	2.63	0.90 T	12,300	21 U	1,730	1.1 U	3,300	8,160
	04/02/24	0.37	0.020 U	2.45	2.00 U	12,200	21 U	1,680	0.3 T	2,950	8,150
	04/02/24	0.38	0.020 U	2.54	0.60 T	12,100	21 U	1,670	0.2 T	2,640	8,240
	count	62	11	94	67	92	26	92	53	80	92
	max	1.780	1.00 U	3.00	2.0	13,500	21 U	1,940	1.3 T	3,720	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	88		25		80		40		
	average	0.107	0.12	2.53	0.60	12,262	12	1,768	0.34	875	8,226
	sample stdev	0.298	0.30	0.18	0.29	469	6	83	0.25	539	362
	variance	0.089	0.09	0.03	0.09	220,405	32	6,841	0.06	291,032	131,030
	coeff. of variation	0.4	0.4	14.2	2.0	26.1	2.1	21.4	1.3	1.6	22.7
	standard error	0.0	0.1	0.0	0.0	48.9	1.1	8.6	0.0	60.3	37.7

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
U-1								Total					
	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	0.136*	0.022 J	1.78*	6.32	3.06	1.43*	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		0.05* B1	5.2	51	0.03	0.012 T	1.3*	5.65	0.76	0.361	1.26	1* U
	07/11/16		0.015 T	5.1	56	0.04	0.02* U	1.79*	6.55	0.93	0.416	2.14	1* U
	10/11/16		0.05* U	4.7	66	0.07	0.009 T	1.2*	6.85	1.08	0.654	5.15*	1* U
	01/26/17		0.05* U	4.7	54	0.05	0.02* 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		0.05* U	5.5	55	0.5* U	0.25* U	0.57	6.00	1.20	0.410	2.50	1.0* U
	10/30/17		0.05* U	5.6	51	0.5* U	0.25* U	0.62	6.00	1.40	0.480	2.00	1* U
	01/31/18		1.000 U	5.2	51	0.5* U	0.25* U	0.84	6.80	1.00	0.350	2.70	1* U
	04/09/18		1.000 U	5.4	51	0.5* U	0.25* 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		0.05* 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		0.05* 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		0.05* U	3.8	50	0.03	0.02* U	0.32	6.97	1.09	0.453	1.51	1* U
	07/08/19		0.05* U	2.3	38	0.02* U	0.02* U	0.04 T	6.01 J	0.41	0.040 J	1.17	1* U
	10/28/19		0.05* 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		0.05* 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		0.05* U	3.6	49	0.02 T	0.02* 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		0.05* U	5.1	50	0.03	0.018 T	0.25	5.80	0.94	0.299	1.77	1* U
	01/20/21		0.05* U	4.5	48	0.02 T	0.02* U	0.20 T	6.75	0.61	0.189	1.49	1* U
	04/12/21		0.05* 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		0.05* U	4.4	49	0.02 T	0.02* U	0.24	6.28	0.49	0.172	1.34	1* U
	10/27/21		0.05* U	5.7	47	0.02 T	0.02* U	0.48	5.48	0.44 J	0.156	1.34	1* U
	01/18/22		0.05* U	4.4	52	0.01 T	0.02* U	0.22	7.17	0.38	0.125	1.64	1* U
	04/05/22		0.05* U	4.5	49	0.02	0.011 T	0.28	6.82	0.69	0.214	1.70	1* U
	07/18/22		0.05* U	5.1	48	0.01 T	0.02* U	0.17 T	6.31	0.45	0.145	1.13	1* U
	10/12/22		0.05* U	5.6	45	0.01 T	0.02* U	0.23 J	5.76	0.32	0.083	0.94	1* U
	01/25/23		0.05* U	5.8	49	0.02* U	0.02* 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		0.05* U	5.9	47	0.01 T	0.02* U	0.18 T	6.23	1.43	0.197	1.12	1* U
	10/30/23		0.05* U	6.0	46	0.01 T	0.02* U	0.13 T	5.45	0.35	0.108 J	0.89	1* U
	01/29/24		0.050 U	3.7	48	0.01 T	0.009 T	0.14 T	7.25	0.36	0.101	1.28	1* U
	04/02/24		0.050 U	3.7	48	0.02 T	0.017 T	0.18 T	7.51	0.39	0.113	1.21	1* U
	count		19	50	50	33	28	41	50	50	49	49	3
	max		1.00 U	8.2	66	0.08 U	0.11	0.84	7.51	3.06	0.784	3.46	0 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		35			16	22	1					46
	average		0.1	5.0	50.8	0.03	0.01	0.27	6.198	0.73	0.226	1.43	0.3
	sample stdev		0.3	1.0	4.7	0.02	0.02	0.19	0.625	0.60	0.207	0.63	0.1
	variance		0.1	1.0	22.3	0.00	0.00	0.04	0.391	0.36	0.043	0.40	0.0
	coeff. of variation		0.4	5.1	10.7	1.4	0.8	1.4	9.9	1.2	1.1	2.3	5.8
	standard error		0.1	0.1	0.7	0.0	0.0	0.0	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					
	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	2.7*	8.6* 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	0.25* U	1.0* U	1.50	2.20	9,400	640	5,100	300	1,300*	8,500
	10/30/17	0.25* U	1.0* U	2.10	2.90	10,000	630	5,400	310	960 T	8,100
	01/31/18	0.49*	0.36* U	1.20	2.10	10,000	3,100	5,600	360	3000*	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	0.079*	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
	01/29/24	7.670	0.01 T	0.30	2.20	11,400	3,480	6,000	376	11,900	8,380
	04/02/24	1.720	0.02 U	0.36	1.80 T	11,100	5,660	6,010	386	9,780	8,770
	count	44	28	49	49	47	47	47	47	39	47
	max	7.670	0.06	2.10	5.1	11,400	17,400	6,200	386	11,900	8,770
	min	0.015 T	0.005 T	0.12 T	0.70	9,400	5	5,100	285	660	7,460
	non-detects	3	18								
	average	0.318	0.02	0.60	2.28	10,427	4,489	5,513	339	1,382	8,029
	sample stdev	1.164	0.01	0.46	1.08	420	4,700	244	21	2,242	293
	variance	1.356	0.00	0.21	1.16	176,621	22,087,495	59,320	449	5,028,335	86,019
	coeff. of variation	0.3	1.3	1.3	2.1	24.8	1.0	22.6	16.0	0.6	27.4
	standard error	0.2	0.0	0.1	0.2	61.3	685.5	35.5	3.1	359.1	42.8

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					
	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
	01/29/24		0.05 U	0.88	14	0.02 T	0.01 T	0.12 T	3.97	2.06	0.008 T	2.12	1 U
	04/02/24		0.05 U	0.73	15	0.02	0.02 T	0.13 T	4.57	2.07	0.011 T	2.28	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.
* = outlier data point or other not used in statistical calculations

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					
	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
	01/29/24	0.020 U	0.02 U	0.06 T	3.10	6,760	1,570	2,920	500	540	3,760
	04/02/24	0.020 U	0.02 U	0.06 T	3.10	6,950	1,900	2,940	575	560	3,920
	count					42	42	42	42	42	42
	max					18,600	3,050	5,790	1,210	1,550	6,200
	min										
	non-detects						16			1	
	average					9,888.6	499.0	3,775.5	480.0	682.0	4,247.4
	sample stdev					3,394.9	767.5	1,161.0	397.9	211.6	930.3
	variance					11,525,461.3	589,112.9	1,347,942.5	158,341.4	44,767.2	865,517.4
	coeff. of variation					2.9	0.7	3.3	1.2	3.2	4.6
	standard error					523.8	118.4	179.1	61.4	32.6	143.6

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.
* = outlier data point or other not used in statistical calculations

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
	01/29/24	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
	04/02/24	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
	01/29/24	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
	04/02/24	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
	01/29/24	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
	04/02/24	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
	01/29/24	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
	04/02/24	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
	01/29/24	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
	04/02/24	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
	01/29/24	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
	04/02/24	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	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
	01/29/24	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
	01/29/24	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
	04/02/24	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
	04/02/24	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	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
	01/29/24	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
	01/29/24	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
	04/02/24	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
	04/02/24	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	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
	01/29/24	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
	01/29/24	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
	04/02/24	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
	04/02/24	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	01/26/17	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
	01/29/24	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
	04/02/24	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
	01/29/24	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
	04/02/24	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	01/26/17	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
	01/29/24	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
	04/02/24	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
	01/29/24	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
	04/02/24	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	01/26/17	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
	01/29/24	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
	04/02/24	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
	01/29/24	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
	04/02/24	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.

APPENDIX C

SURFACE WATER AND LEACHATE QUALITY DATA

Cowlitz County Headquarters Landfill
Surface Water Quality Data

Location	Date	mg/L							Field Measurements						
		Chloride	Nitrate	Ammonia	Sulfate	TDS	TOC	Total Phosphorus	pH	Specific Conductance (umhos/cm)	Temperature (C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)	Flow
	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 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	NM	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	NM	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	0.5	0.05	1.4	49	1.4	0.02	6.7	65	5.0	2.1	10.2	-4	Moderate
	01/29/24	2.3	1.4	0.04 B1	0.9	35	1.3	0.02 B	7.5	44	9.2	5.3	9.2	NM	High
	04/02/24		1.0	0.07	0.9	40	1.1		7.3	48	8.8	4.4	8.7	93	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
Surface Water Quality Data
Total Metals
ug/l (ppb)

Site	Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese
SS-1												
	10/30/23	0.05 U	0.1 T	8.5	0.006 T	0.01 T	0.22	0.069	0.85	198	0.036 J	3.5
	01/29/24	0.05 U	0.5 U	8.3	0.012 T	0.02 U	0.45	0.133	0.86	282	0.066	11.3
	04/02/24	0.05 U	0.1 T	8.0	0.010 T	0.02 T	0.42	0.133	0.88	258	0.063	10.5

U = Not detected. Method Reporting Limit shown.
T = Detected below reporting limit. Value is an estimate.
B = detected in bland, reported concentration may be affected.
J = The associated value is qualified as an estimate.
B1 = blank corrected to MRL.

Cowlitz County Headquarters Landfill
Surface Water Quality Data
Total Metals
ug/l (ppb)

Site	Date	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
SS-1							
	10/30/23	0.17 T	1 U	0.020 U	0.02 T	0.56	0.90 T
	01/29/24	0.21	1 U	0.020 U	0.01 T	0.69	1.80 T
	04/02/24	0.21	1 U	0.020 U	0.02 U	0.71	1.30 T

U = Not detected. Method Reporting Limit shown.
T = Detected below reporting limit. Value is an estimate.
B = detected in bland, reported concentration may be affected.
J = The associated value is qualified as an estimate.
B1 = blank corrected to MRL.

Cowlitz County Headquarters Landfill
Leachate Quality Data
Inorganics

Location	Date	mg/L									Field Measurements		
		Alkalinity as CaCO3	Bicarbonate	Chloride	Ammonia	Nitrate	Sulfate	TOC	Total Dissolved Solids	Total Suspended Solids	pH	Specific Conduct. (umhos/cm)	Temp. (C)
L-1													
	10/29/23	6,267	5,140	790	141	0.89	16.2	850	8,180	10.5	8.0	10,270	26.2
	01/30/24	3,658	3,000	442	102	0.36	35.0	450	4,210	30.0	7.5	6,870	21.7
	04/02/24	5,682	4,660	739	158	0.20 UJ	24.2	1100	7,420	16.0	7.7	9,950	26.7

Note: U = Not detected. Method Reporting Limit shown. J = The associated value is an estimate.
T = Detected below reporting limit. Value is an estimate. B1 = blank corrected to MRL
HCO3 calculated from Alkalinity (as CaCO3) divided by 0.8202 as described in USGS WSP 2254a (Hem, 1985).

Cowlitz County Headquarters Landfill
Leachate Quality Data
Total Metals
ug/l (ppb)

Site	Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese
	10/29/23	9.95	36	494	0.05 T	0.09	77,300	148	12	22	1,260	4.5	80,100	847
	01/30/24	3.19	18	539	0.03	0.64	121,000	83.8	8.7	244	4,360	37	79,700	883
	04/02/24	4.75	26	557	0.05 T	0.18	105,000	120	12	79.3	3,000	16	98,200	797

U = Not detected. Method Reporting Limit shown.
T = Detected below reporting limit. Value is an estimate.
B = detected in bland, reported concentration may be affected.
J = The associated value is qualified as an estimate.
UB1 = blank corrected to MRL.

Cowlitz County Headquarters Landfill
Leachate Quality Data
Total Metals
ug/l (ppb)

Site	Date	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
	10/29/23	127	333,000	0.8 T	0.04	2,280,000	0.02 U	72	38
	01/30/24	86	223,000	0.4 T	0.12 T	1,290,000	0.01 T	32	247
	04/02/24	119	316,000	5.0 U	0.06 T	2,040,000	0.05 U	48	96

U = Not detected. Method Reporting Limit sh J = The associated value is qualified as an estimat
T = Detected below reporting limit. Value is a UB1 = blank corrected to MRL.
B = detected in bland, reported concentration may be affected.

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

Sample Location	Date Sampled	1,1,1,2-Tetra-chloro-ethane	1,1,1-Tri-chloro-ethane	1,1,2,2-Tetra-chloro-ethane	1,1,2-Tri-chloro-ethane	1,1-Di-chloro-ethane	1,1-Di-chloro ethene	1,2,3-Trichloro propane	1,2-Di-bromo-3-chloro-propane	1,2-Di-chloro-benzene	1,2-Di-chloro-ethane	1,2-Di-chloro-propane	1,4-Di-chloro-benzene	2-Hexanone	Acetone
L-1															
	10/29/23	5 U	5 U	5 U	5 U	5 U	5 U	5 U	20 U	5 U	5 U	5 U	5 U	200 U	**410**
	01/30/24	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	10 U	2.5 U	2.5 U	2.5 U	2.5 U	100 U	**410**
	04/02/24	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	10 U	2.5 U	2.5 U	2.5 U	2.5 U	100 U	**530**

Note: U = not detected, MRL shown.
T = Detected below reporting limit. Value is an estima B = detected in bland, reported concentration may be affected.
JT = Detected below elevated reporting limit, value is estimate. B1 = Detected in blank and sample below MRL shown.

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

Sample Location	Date Sampled	Benzene	Bromo-chloro-methane	Bromo-form	Bromo-methane	Carbon Disulfide	Carbon Tetra-chloride	Trichloro-fluoro-methane (CFC-11)	Chloro-benzene	Dibromo-chloro-methane	Chloro-ethane	Chloroform	Chloro-methane	cis-1,2-Di-chloro-ethene
L-1														
	10/29/23	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	01/30/24	**1.3 T**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	04/02/24	**0.5 T**	2.5 U	2.5 U	2.5 U	**0.4 T**	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Note: U = not detected, MRL shown.
T = Detected below reporting limit. Value is an estimate B = detected in bland, reported concentration may be affected.
JT = Detected below elevated reporting limit, value is estimate. B1 = Detected in blank and sample below MRL shown.

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

Sample Location	Date Sampled	cis-1,3-Dichloro-propene	Dibromo-methane	Bromo-dichloro-methane	Ethyl-benzene	1,2-Di-bromo-ethane (EDB)	2-Butanone (MEK)	Iodo-methane	4-Methyl-2-pentanone (MIBK)	Methylene Chloride	Styrene	Tetra-chloro-ethene	Toluene	Total Xylenes
L-1														
	10/29/23	5 U	5 U	5 U	5 U	20 U	**150 T**	50 U	200 U	**3.8 T**	5 U	5 U	**1.2 T**	5 U
	01/30/24	2.5 U	2.5 U	2.5 U	**1.8 T**	10 U	**390**	25 U	100 U	**0.55 T**	**0.9 T**	2.5 U	**7.6**	**4.7 T**
	04/02/24	2.5 U		2.5 U	**0.65 T**	10 U	**180**	25 U	100 U	**0.65 T**	2.5 U	2.5 U	**1.9 T**	**1.55 T**

Note: U = not detected, MRL shown.
T = Detected below reporting limit. Value is an estimate. B = detected in bland, reported concentration may be affected.
JT = Detected below elevated reporting limit, value is estimate. B1 = Detected in blank and sample below MRL shown.

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

Sample Location	Date Sampled	trans-1,2-Di-chloro-ethene	trans-1,3-Dichloro-propene	Tri-chloro-ethene	Vinyl chloride	Acrylo-nitrile	trans+cis-1,4-Di-chloro-2-butene	Vinyl Acetate
L-1								
	10/29/23	5 U	5 U	5 U	5 U	50 U	100 U	50 U
	01/30/24	2.5 U	2.5 U	2.5 U	2.5 U	25 U	50 U	25 U
	04/02/24	2.5 U	2.5 U	2.5 U	2.5 U	25 U	50 U	25 U

Note: U = not detected, MRL shown.
T = Detected below reporting limit. Value is an estimate.
JT = Detected below elevated reporting limit, value is estimate.
B = detected in bland, reported concentration may be affected.
B1 = Detected in blank and sample below MRL shown.

APPENDIX D

TECHNICAL MEMORANDA WITH ANALYTICAL DATA REPORTS

MEMORANDUM

April 17, 2024

TO: Cowlitz County Headquarters Landfill Project File

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

SUBJECT: 2nd Quarter 2024 Field Sampling Procedures

The 2nd quarter 2024 sampling event at the Cowlitz County Headquarters Landfill was conducted on April 2 and 4, 2024. Four 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 revised Sampling and Analysis Plan dated March 5, 2024. The revised SAP implements approved changes to the sampling locations and analytical program and minor changes to sampling procedures.

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 include removal of the pump after sampling and storage 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 45 ml/minute to approximately 450 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, turbidity, 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.

The bottle labels were marked with the project site, blind sample numbers and the date and time. A duplicate sample was collected at P-9 by alternately filling sample bottles. 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. Four sample bottles were filled at this location. Flow was observed to be bank to bank in the main channel although significantly below bank full and therefore characterized as moderate to high. The culvert a short distance downstream of the sampling location was replaced several years ago. The portion of the stream bed that had been disturbed by construction has become less obvious and the sample was collected at a convenient location about 30 feet upstream of the culvert. It appears that high wet season flow rates move and reorganize the bed load which reconfigures the streambed between sampling events. 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 those specified in the permit 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 about two inches deep and was characterized as moderate to high 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. Flow 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 location was added to the monitoring program as part of the SAP revision. The analyses specified for this sample were 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 April 2nd under chain of custody documentation.

The depth to water was measured in 15 monitoring wells and piezometers on April 2 and 4, 2024. The measurements in sampled wells were made prior to sampling and in piezometers on April 4th 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 the previous 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.

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
2nd Quarter 2024

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	W4-402	15.57	17.29	1.72	133.3	6.0	5
C-2	W5-402	35.12	36.15	1.03	45.0	4.05	3
P-9	W6-402	25.90	25.99	0.09	450	11.25	3
U-1	W3-402	22.29	23.77	1.48	109.1	4.9	3
HGCS B1-P	W2-402	---	---	---	---	---	---
SS-1	W1-402	---	---	---	---	---	---
LPN-B1	W8-402	---	---	---	---	---	---
P-9 Duplicate	W7-402	---	---	---	---	---	---

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: 2nd Qtr 2024
Measured by: DRD
Weather: Overcast Cool Calm

Location	Date	Time	Measurement	Comments
U-1	4/2	10:37	22.29	
C-1	"	12:02	1557	
C-2	"	1320	35.12	
MW-1	4/4	1149	27.25	
MW-2	"	1016	12.73	
MW-4	"	957	7.58	
P-6	"	935	10.16	
P-8	"	954	5.03	
P-9	4/2 1500	~~1141~~	~~25.90~~ 25.90	
P-10	4/4	943	54.36	
P-11	"	1001	30.25	
~~P-12~~	~~—~~	~~—~~		
P-13R	"	936	22.25	
P-14	"	1005	21.66	
P-15	"	1013	31.71	
P-18	"	1145	65.08	

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: SS-1
Sampling Event: **2nd Qtr 2024** Sample Field Identifier: 4Q1-402
Sampler: Dennis R. Dykes Start Date/Time: 4/2/24 950
Weather: Clear, 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	7.32	47.7	8.8	4.41	8.67	93

Sampling

Date/Time	Containers (number/volume/type/preservative)	Depth Taken (ft)	Field Filtration	Sampling Method
4/2 1000	1 500ml poly None	Surface	no	Dipped
" "	1 125ml poly H2SO4	"	"	"
" "	1 40ml glass H2SO4	"	"	"
" "	1 125ml poly HNO3	"	"	"

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

Comments: Flow filling main channel

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: HGCS B1-P
Sampling Event: **2nd Qtr 2024** Sample Field Identifier: W2-402
Sampler: Dennis R. Dykes Start Date/Time: 4/2/24 1200
Weather: Sunny Mild Lt Breeze

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	555	83.4	15.2	1.06	3.54	117

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
4/2 1200	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:

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: C-1
Sampling Event: **2nd Qtr 2024** Sample Field Identifier: W4-402
Sampler: Dennis R. Dykes Start Date/Time: 4/2/24 1200
Weather: Sunny Mild Lt Breeze

Well Pumping Data

		Measurement	Date	Time	Method
Depth to Water:	Prepumping	19.57	4/2	1202	Well Probe
	Final pumping	17.29	"	1310	

Pumping Time	Rate	Discharge	Fill Time	DTW	Liters Pumped	Rate (ml/min)
4	220ml/63s	4	30	16.73		
15				17.61		
17	220/90s	4	42	17.53 (20)	2.5	146.7
27				17.38		
35				17.30		
43	220/46s	4	41	17.29	3.5	133.3
Flow through cells apparatus volume = approx. 120ml.					6.0	

Field Water Quality Measurements

Pumping Time	pH	Specific Conductance (uS/cm)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)
10	5.60	63.3	10.8		6.27	121
14	5.66	69.4	10.7	3.08	6.21	124
21	5.82	76.8	11.0	2.85	5.98	125
25	5.98	84.5	11.1	1.72	5.83	124
30	5.96	86.2	11.1	1.77	5.86	125

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
4/2 1230	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	"
" "	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: C-2

Sampling Event: **2nd Qtr 2024** Sample Field Identifier: CW5-402

Sampler: Dennis R. Dykes Start Date/Time: 4/2/24 1315

Weather: Sunny Warm Light

Well Pumping Data

		Measurement	Date	Time	Method
Depth to Water:	Prepumping	35.12	4/2	1320	Well Probe
	Final pumping	36.15	"	1455	

Pumping Time	Rate	Discharge	Fill Time	DTW	Liters Pumped	Rate (ml/min)
6	100/120s	5	60	35.64		
40				36.05		
54				36.10		
90	90/120s	"	"	36.15		

Flow through cells apparatus volume = approx. 120ml.

Field Water Quality Measurements

Pumping Time	pH	Specific Conductance (uS/cm)	In Sq Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Eh (mV)
40	5.89	90.9	17.8	0.20	1.21	146
49	5.88	87.7	18.3	0.27	1.28	148
58	5.86	86.0	18.5	0.22	1.13	153

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
4/2 1400	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	"
" "	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: P-9
Sampling Event: **2nd Qtr 2024** Sample Field Identifier: CCC-902
Sampler: Dennis R. Dykes Start Date/Time: 4/2/24 1500
Weather: Sunny Warm Light Breeze

Well Pumping Data

		Measurement	Date	Time	Method
Depth to Water:	Prepumping	25.90	4/2	1500	Well Probe
	Final pumping	25.99	"	1530	

Pumping Time	Rate	Discharge	Fill Time	DTW	Liters Pumped	Rate (ml/min)
2	245/385	6	13	25.95		
25	240/32	"	11	25.99	11.25	450

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	6.56	98.5	10.9	0.41	5.75	127
13	6.56	99.3	10.8	0.38	5.73	127
16	6.57	98.6	10.7	0.40	5.69	128

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
4/2 1430	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	"
" "	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: Bottles Filled alternately w/ P-9 Dup

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: P-9 Duplicate
Sampling Event: **2nd Qtr 2024** Sample Field Identifier: W 4-902
Sampler: Dennis R. Dykes Start Date/Time: 4/2/24
Weather: Sunny Warm Breezy

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)

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)

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
4/2 1500	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	"
" "	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: Bottles filled & hanging w/P-9

Bright Fields Groundwater, Inc.

Field Sampling Data

Project Location: **Cowlitz Co- Headquarters Rd Landfill** Sample Location: U-1
Sampling Event: **2nd Qtr 2024** Sample Field Identifier: W3-402
Sampler: Dennis R. Dykes Start Date/Time: 4/2/24 1025
Weather: Clear, Cool, Calm

Well Pumping Data

		Measurement	Date	Time	Method
Depth to Water:	Prepumping	22.29	4/2	1037	Well Probe
	Final pumping	23.77	"	1134	

Pumping Time	Rate	Discharge	Fill Time	DTW	Liters Pumped	Rate (ml/min)
7	155/885	3	39	22.69		
24				23.38		
35	~~160/885~~	~~4~~	~~39~~	23.60		
45	160/885	4	39	23.77	4.9	109.1

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	6.66	201	10.1	13.7	0.30	-106
25	6.67	203	10.0	10.7	0.24	-108
30	6.67	204	10.1		0.22	-110

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
4/2 1100	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	"
" "	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: Leachate LF MW-B1

Sampling Event: **2nd Qtr 2024** Sample Field Identifier: WS-402

Sampler: Dennis R. Dykes Start Date/Time: 4/2/24 1550

Weather: Sunny Light breeze

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	7.73	9950	26.7			

Sampling

Date/Time	Containers (number/volume/type/preservative)				Depth Taken (ft)	Field Filtration	Sampling Method
4/2 1600	1	1000ml	poly	none	Surface	no	Flow stream
" "	1	125ml	poly	HNO3	"	"	from pipe
" "	3	40ml	glass	HCl	"	"	"
" "	1	40ml	glass	H2SO4	"	"	"
" "	1	125ml	poly	H2SO4	"	"	"

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

Sample Appearance: Dark brown Sample Handling: Cooler, deliver to lab same day

Comments:

CHAIN OF CUSTODY
137060

008

SR# 170

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: Dennis Dykes
Company: BFGW Inc
Address, City, State:
Phone #: 360 263 6307
email: ddykes@bfgw.net
Sampler Signature:
Sampler Printed Name: Dennis Dykes

CLIENT SAMPLE ID	LABID	SAMPLING Date Time State	Matrix	NUMBER OF CONTAINERS	300.0 / NO3 (48H)	SM 2540 C / TDS (7D)	SM 2540 D / TSS (7D)	8260C / VOC FP (14D)	SM 2320 B / Alkalinity Titr (14D)	300.0 / Chloride (28D)	300.0 / SO4 (28D)	SM 4500-NH3 E / Ammonia (28D)	SM 5310 B / TOC T (28D)	200.7 / Metals D (180D)	200.7 / Metals T (180D)	200.8 / Metals T (180D)	Filter Met / Filter Met (999D)	1	2	3	4	5	Remarks
1. W1-402		4/2 1000 WA	W	4											X								
2. W2-402		1200		8																			
3. W3-402		1100		8																			
4. W4-402		1230		8																			
5. W5-402		1400		8																			
6. W6-402		1430		6																			
7. W7-402		1500		8																			
8. W8-402		1600		7											X								
9. [redacted]																							
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.

___ 5 Day

X Standard

Requested Report Date

Circle which metals are to be analyzed

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

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

Special Instructions/Comments:

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

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	M. Mulligan	Signature	Signature	Signature	Signature
Printed Name: Dennis Dykes	Printed Name: M. Mulligan	Printed Name	Printed Name	Printed Name	Printed Name
Firm: BFGW	Firm: ALS	Firm	Firm	Firm	Firm
Date/Time: 4/2/24 1650	Date/Time: 4/2/24 1650	Date/Time	Date/Time	Date/Time	Date/Time

Cowlitz County Headquarters Landfill
Quarterly Detection Monitoring Data Validation
Second Quarter 2024

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 K2403464**
Date(s) Sampled: April 2, 2024
Data Reviewer: Dennis R. Dykes, Bright Fields Groundwater, Inc
Date Reviewed: May 6, 2024
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 nitrate MRL because slightly past hold time
B1 data qualifier assigned to low ammonia because Method Blank det

Precision:	Analytical precision acceptable; field duplication not evaluate
Accuracy:	Spike, surrogate, and method blank results acceptable except as noted.
Representativeness:	Sampling completeness confirms representativeness as specified in SAI
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 1-2 days, Cl 1-2 and 14 days, SO4 1-2 day,
		TDS 7 days, TSS 2 days, and Alk 3-4 days
		Ammonia 14 days, TOC 1 to 3 days
		Total metals 3 days to extraction, 3 to 7 days to analysis.
		Diss metals 3 days to extraction, 7 days to analysis
Blanks:	Method:	Non detect except alkalinity (1.2T), NH3 (.030T), chloride (.01T)
		Dissolved metals: not reported, Total metals: Ca (5T)

Cowlitz County Headquarters Landfill
Quarterly Detection Monitoring Data Validation
Second Quarter 2024

Duplicates: Lab:	OK for Alk, NO3, SO4 Others not reported.	
	None for Diss. Metals, Total only geochem ok	
	None reported for TOC, Cl, TSS, TDS and NH3	
Field:	OK except NH3, TOC, Mn, Cd, Cr <MRL invalid	
MS/MSD:	OK	Metals: dissolved not reported, total MS for geochem only OK
		Not reported for NH3, Cl, Alk, TDS, TSS, TOC
		Ok for NO3 and SO4. Others not reported.

Laboratory Control Samples: OK except dissolved metals not reported

Method Reporting Limits: Acceptable.

Other:

Cowlitz County Headquarters Landfill
Quarterly Detection Monitoring Data Validation
Second Quarter 2024

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 K2403464**
Date(s) Sampled: April 2, 2024
Data Reviewer: Dennis R. Dykes, Bright Fields Groundwater, Inc
Date Reviewed: May 6, 2024
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
T data qualifier assigned to detections below MRL without other qualifiers

Precision:	Analytical precision acceptable; field duplication not evaluate
Accuracy:	Spike, surrogate, and method blank results acceptable.
Representativeness:	Sampling completeness confirms representativeness as specified in SAI
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 6 days after sampling,

Blanks: Method - none detected

Trip- Chloromethane (.08T). and Methylene Chloride (.12T)

Field Duplicate: None detected
Detection limits: Acceptable, W8 leachate dilute 5X
Surrogate Recovery: OK
Matrix Spike/Matrix Spike Duplicates Not reported

LCS/DLCS: OK

Method Reporting Limits: Acceptable. W9 leachate dilute 5X 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

Cowlitz County Headquarters Landfill
Quarterly Detection Monitoring Data Validation
Second Quarter 2024

Sample Identification Summary

Sample Location	Field Identifier	Laboratory Identifie	Date	Sample Type
C-1	W4-402	K2403464-004	4/2/2024	Groundwater
C-2	W5-402	K2403464-005	4/2/2024	Groundwater
MW-1	W2-402	K2403464-00	4/2/2024	Groundwater
P-9	W6-402	K2403464-006	4/2/2024	Groundwater
U-1	W3-402	K2403464-003	4/2/2024	Groundwater
HGCS B1-P	W2-402	K2403464-002	4/2/2024	Groundwater
SS-1	W1-402	K2403464-001	4/2/2024	Surface Water
Leachate Outfall	W8-402	K2403464-008	4/2/2024	Leachate
P-9 Duplicate	W7-402	K2403464-007	4/2/2024	Groundwater
Trip Blank	Trip Blank	K2403464-009		Lab Prepared

April 17, 2024 Service Request No:K2403464

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

Laboratory Results for: Cowlitz Co. Headquarters Landfill Detection Mont.

Dear Dan,

Enclosed are the results of the sample(s) submitted to our laboratory April 02, 2024
For your reference, these analyses have been assigned our service request number **K2403464.**

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 Mont.
Sample Matrix: Water
Service Request: K2403464
Date Received: 04/02/2024

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:

Nine water samples were received for analysis at ALS Environmental on 04/02/2024. 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:

Method 300.0, 04/04/2024: The analysis of sample W8-402 for Nitrate as Nitrogen was initially performed within the recommended holding time. As a result of a matrix interference a reanalysis at a larger dilution was required. The reanalysis was performed approximately 5 hours past the recommended holding time. The results from the second analysis were reported.

Volatiles by GC/MS:

Method 8260C, 04/08/2024:Bromoform, 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, 04/08/2024:Sample W8-402 was analyzed at a dilution due to foaming. This is reflected in the elevated detection limits.

Approved by Sydney A Wolfe Date 04/17/2024

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: W8-402			Lab ID: K2403464-008			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
2-Butanone (MEK)	180		9.5	100	ug/L	8260C
Acetone	530		17	100	ug/L	8260C
Alkalinity as CaCO3, Total	4660		6	20	mg/L	SM 2320 B
Ammonia as Nitrogen	158		0.02	0.10	mg/L	SM 4500-NH3 E
Antimony	4.75		0.10	0.25	ug/L	200.8
Arsenic	25.9		0.5	2.5	ug/L	200.8
Barium	557		0.10	0.25	ug/L	200.8
Benzene	0.45	J	0.31	2.5	ug/L	8260C
Beryllium	0.05	J	0.03	0.10	ug/L	200.8
Cadmium	0.18		0.04	0.10	ug/L	200.8
Calcium	105000		30	210	ug/L	200.7
Carbon Disulfide	0.35	J	0.35	2.5	ug/L	8260C
Carbon, Total Organic (TOC)	1100		50	250	mg/L	SM 5310 B
Chloride	739		0.5	10	mg/L	300.0
Chromium	120		0.2	1.0	ug/L	200.8
Cobalt	12.0		0.05	0.10	ug/L	200.8
Copper	79.3		0.25	0.50	ug/L	200.8
Ethylbenzene	0.65	J	0.25	2.5	ug/L	8260C
Iron	3000		80	210	ug/L	200.7
Lead	16.2		0.03	0.10	ug/L	200.8
m,p-Xylenes	0.95	J	0.55	2.5	ug/L	8260C
Magnesium	98200		4	53	ug/L	200.7
Manganese	797		2	11	ug/L	200.7
Methylene Chloride	0.65	J	0.50	10	ug/L	8260C
Nickel	119		0.2	1.0	ug/L	200.8
o-Xylene	0.60	J	0.37	2.5	ug/L	8260C
Potassium	316000		600	2100	ug/L	200.7
Silver	0.06	J	0.05	0.10	ug/L	200.8
Sodium	2040000		300	2100	ug/L	200.7
Solids, Total Dissolved	7420			200	mg/L	SM 2540 C
Solids, Total Suspended (TSS)	16.0			5.0	mg/L	SM 2540 D
Sulfate	24.2		0.2	2.0	mg/L	300.0
Toluene	1.9	J	0.27	2.5	ug/L	8260C
Vanadium	48.4		0.2	1.0	ug/L	200.8
Zinc	96		3	10	ug/L	200.8

CLIENT ID: W2-402			Lab ID: K2403464-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	38.0		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	0.73		0.09	0.50	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: W2-402			Lab ID: K2403464-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Barium	15.4		0.020	0.050	ug/L	200.8
Beryllium	0.022		0.005	0.020	ug/L	200.8
Cadmium	0.016	J	0.008	0.020	ug/L	200.8
Calcium, Dissolved	6950		3	21	ug/L	200.7
Carbon, Total Organic (TOC)	1.20		0.10	0.50	mg/L	SM 5310 B
Chloride	2.72		0.010	0.20	mg/L	300.0
Chromium	0.13	J	0.03	0.20	ug/L	200.8
Cobalt	4.57		0.009	0.020	ug/L	200.8
Copper	2.07		0.05	0.10	ug/L	200.8
Iron, Dissolved	1900		8	21	ug/L	200.7
Lead	0.011	J	0.006	0.020	ug/L	200.8
Magnesium, Dissolved	2940		0.4	5.3	ug/L	200.7
Manganese, Dissolved	575		0.2	1.1	ug/L	200.7
Nickel	2.28		0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.17		0.006	0.10	mg/L	300.0
Potassium, Dissolved	560		60	210	ug/L	200.7
Sodium, Dissolved	3920		30	210	ug/L	200.7
Solids, Total Dissolved	49			10	mg/L	SM 2540 C
Sulfate	1.64		0.02	0.20	mg/L	300.0
Vanadium	0.06	J	0.04	0.20	ug/L	200.8
Zinc	3.1		0.5	2.0	ug/L	200.8

CLIENT ID: W3-402			Lab ID: K2403464-003			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	81.3		0.6	2.0	mg/L	SM 2320 B
Ammonia as Nitrogen	0.410		0.009	0.050	mg/L	SM 4500-NH3 E
Arsenic	3.71		0.09	0.50	ug/L	200.8
Barium	48.3		0.020	0.050	ug/L	200.8
Beryllium	0.015	J	0.005	0.020	ug/L	200.8
Cadmium	0.017	J	0.008	0.020	ug/L	200.8
Calcium, Dissolved	11100		3	21	ug/L	200.7
Carbon, Total Organic (TOC)	4.00		0.10	0.50	mg/L	SM 5310 B
Chloride	9.92		0.010	0.20	mg/L	300.0
Chromium	0.18	J	0.03	0.20	ug/L	200.8
Cobalt	7.51		0.009	0.020	ug/L	200.8
Copper	0.39		0.05	0.10	ug/L	200.8
Iron, Dissolved	5660		8	21	ug/L	200.7
Lead	0.113		0.006	0.020	ug/L	200.8
Magnesium, Dissolved	6010		0.4	5.3	ug/L	200.7
Manganese, Dissolved	386		0.2	1.1	ug/L	200.7
Nickel	1.21		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: W3-402			Lab ID: K2403464-003			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Nitrate as Nitrogen	0.02	J	0.006	0.10	mg/L	300.0
Potassium, Dissolved	9780		60	210	ug/L	200.7
Silver	1.72		0.009	0.020	ug/L	200.8
Sodium, Dissolved	8770		30	210	ug/L	200.7
Solids, Total Dissolved	121			10	mg/L	SM 2540 C
Solids, Total Suspended (TSS)	8.0			5.0	mg/L	SM 2540 D
Sulfate	0.14	J	0.02	0.20	mg/L	300.0
Vanadium	0.36		0.04	0.20	ug/L	200.8
Zinc	1.8	J	0.5	2.0	ug/L	200.8

CLIENT ID: W4-402			Lab ID: K2403464-004			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	33.3		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	6.05		0.020	0.050	ug/L	200.8
Beryllium	0.052		0.005	0.020	ug/L	200.8
Cadmium	0.012	J	0.008	0.020	ug/L	200.8
Calcium, Dissolved	5820		3	21	ug/L	200.7
Carbon, Total Organic (TOC)	0.70		0.10	0.50	mg/L	SM 5310 B
Chloride	8.30		0.010	0.20	mg/L	300.0
Chromium	0.10	J	0.03	0.20	ug/L	200.8
Cobalt	0.015	J	0.009	0.020	ug/L	200.8
Copper	0.06	J	0.05	0.10	ug/L	200.8
Lead	0.046		0.006	0.020	ug/L	200.8
Magnesium, Dissolved	2830		0.4	5.3	ug/L	200.7
Manganese, Dissolved	7.2		0.2	1.1	ug/L	200.7
Nickel	0.08	J	0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.36		0.006	0.10	mg/L	300.0
Potassium, Dissolved	7360		60	210	ug/L	200.7
Silver	1.50		0.009	0.020	ug/L	200.8
Sodium, Dissolved	4750		30	210	ug/L	200.7
Solids, Total Dissolved	74			10	mg/L	SM 2540 C
Sulfate	0.49		0.02	0.20	mg/L	300.0
Vanadium	0.51		0.04	0.20	ug/L	200.8
Zinc	1.0	J	0.5	2.0	ug/L	200.8

CLIENT ID: W5-402			Lab ID: K2403464-005			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	32.4		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	7.80		0.020	0.050	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: W5-402			Lab ID: K2403464-005			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Beryllium	0.013	J	0.005	0.020	ug/L	200.8
Calcium, Dissolved	3650		3	21	ug/L	200.7
Carbon, Total Organic (TOC)	0.60		0.10	0.50	mg/L	SM 5310 B
Chloride	5.99		0.010	0.20	mg/L	300.0
Chromium	0.18	J	0.03	0.20	ug/L	200.8
Cobalt	0.048		0.009	0.020	ug/L	200.8
Copper	0.10		0.05	0.10	ug/L	200.8
Iron, Dissolved	13	J	8	21	ug/L	200.7
Magnesium, Dissolved	1890		0.4	5.3	ug/L	200.7
Manganese, Dissolved	21.7		0.2	1.1	ug/L	200.7
Nickel	0.17	J	0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.01	J	0.006	0.10	mg/L	300.0
Potassium, Dissolved	4730		60	210	ug/L	200.7
Silver	0.491		0.009	0.020	ug/L	200.8
Sodium, Dissolved	7930		30	210	ug/L	200.7
Solids, Total Dissolved	64			10	mg/L	SM 2540 C
Sulfate	1.13		0.02	0.20	mg/L	300.0
Zinc	1.0	J	0.5	2.0	ug/L	200.8

CLIENT ID: W6-402			Lab ID: K2403464-006			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	50.7		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
Arsenic	0.48	J	0.09	0.50	ug/L	200.8
Barium	1.46		0.020	0.050	ug/L	200.8
Beryllium	0.006	J	0.005	0.020	ug/L	200.8
Cadmium	0.009	J	0.008	0.020	ug/L	200.8
Calcium, Dissolved	12200		3	21	ug/L	200.7
Carbon, Total Organic (TOC)	0.24	J	0.10	0.50	mg/L	SM 5310 B
Chloride	4.15		0.010	0.20	mg/L	300.0
Chromium	0.15	J	0.03	0.20	ug/L	200.8
Copper	0.06	J	0.05	0.10	ug/L	200.8
Lead	0.019	J	0.006	0.020	ug/L	200.8
Magnesium, Dissolved	1680		0.4	5.3	ug/L	200.7
Manganese, Dissolved	0.3	J	0.2	1.1	ug/L	200.7
Nickel	0.13	J	0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.06	J	0.006	0.10	mg/L	300.0
Potassium, Dissolved	2950		60	210	ug/L	200.7
Silver	0.365		0.009	0.020	ug/L	200.8
Sodium, Dissolved	8150		30	210	ug/L	200.7
Solids, Total Dissolved	119			10	mg/L	SM 2540 C

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: W6-402			Lab ID: K2403464-006			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Sulfate	0.56		0.02	0.20	mg/L	300.0
Vanadium	2.45		0.04	0.20	ug/L	200.8

CLIENT ID: W7-402			Lab ID: K2403464-007			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Alkalinity as CaCO3, Total	51.2		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		0.09	0.50	ug/L	200.8
Barium	1.49		0.020	0.050	ug/L	200.8
Cadmium	0.012	J	0.008	0.020	ug/L	200.8
Calcium, Dissolved	12100		3	21	ug/L	200.7
Carbon, Total Organic (TOC)	0.36	J	0.10	0.50	mg/L	SM 5310 B
Chloride	4.01		0.010	0.20	mg/L	300.0
Chromium	0.20		0.03	0.20	ug/L	200.8
Copper	0.06	J	0.05	0.10	ug/L	200.8
Lead	0.023		0.006	0.020	ug/L	200.8
Magnesium, Dissolved	1670		0.4	5.3	ug/L	200.7
Manganese, Dissolved	0.2	J	0.2	1.1	ug/L	200.7
Nickel	0.11	J	0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.05	J	0.006	0.10	mg/L	300.0
Potassium, Dissolved	2640		60	210	ug/L	200.7
Silver	0.377		0.009	0.020	ug/L	200.8
Sodium, Dissolved	8240		30	210	ug/L	200.7
Solids, Total Dissolved	118			10	mg/L	SM 2540 C
Sulfate	0.55		0.02	0.20	mg/L	300.0
Vanadium	2.54		0.04	0.20	ug/L	200.8
Zinc	0.6	J	0.5	2.0	ug/L	200.8

CLIENT ID: W1-402			Lab ID: K2403464-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Ammonia as Nitrogen	0.070		0.009	0.050	mg/L	SM 4500-NH3 E
Arsenic	0.09	J	0.09	0.50	ug/L	200.8
Barium	8.04		0.020	0.050	ug/L	200.8
Beryllium	0.010	J	0.005	0.020	ug/L	200.8
Cadmium	0.015	J	0.008	0.020	ug/L	200.8
Carbon, Total Organic (TOC)	1.10		0.10	0.50	mg/L	SM 5310 B
Chromium	0.42		0.03	0.20	ug/L	200.8
Cobalt	0.133		0.009	0.020	ug/L	200.8
Copper	0.88		0.05	0.10	ug/L	200.8
Iron	258		8	21	ug/L	200.7
Lead	0.063		0.006	0.020	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: W1-402			Lab ID: K2403464-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Manganese	10.5		0.2	1.1	ug/L	200.7
Nickel	0.21		0.04	0.20	ug/L	200.8
Nitrate as Nitrogen	0.96		0.006	0.10	mg/L	300.0
Solids, Total Dissolved	40			10	mg/L	SM 2540 C
Sulfate	0.85		0.02	0.20	mg/L	300.0
Vanadium	0.71		0.04	0.20	ug/L	200.8
Zinc	1.3	J	0.5	2.0	ug/L	200.8

CLIENT ID: Trip Blanks			Lab ID: K2403464-009			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Chloromethane	0.080	J	0.068	0.50	ug/L	8260C
Methylene Chloride	0.12	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:**K2403464

Project: Cowlitz Co. Headquarters Landfill Detection Mont.

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2403464-001	W1-402	4/2/2024	1000
K2403464-002	W2-402	4/2/2024	1200
K2403464-003	W3-402	4/2/2024	1100
K2403464-004	W4-402	4/2/2024	1230
K2403464-005	W5-402	4/2/2024	1400
K2403464-006	W6-402	4/2/2024	1430
K2403464-007	W7-402	4/2/2024	1500
K2403464-008	W8-402	4/2/2024	1600
K2403464-009	Trip Blanks	4/2/2024	

ALS Environmental

CHAIN OF CUSTODY
137060

008

SR# K2403464 (40)

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: Lewis Co Headworks Landfill Detection Monitoring
Project Number:
Project Manager: Dennis Dykes
Company: BFGW Inc
Address, City, State:
Phone#: 360 263 6337
email: ddykes@bfgw.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: 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. W1-402		4/2 1000 WA	W	4											X								
2. W2-402		1200		8																			
3. W3-402		1100		8																			
4. W4-402		1230		8																			
5. W5-402		1400		8																			
6. W6-402		1430		6																			
7. W7-402		1500		8																			
8. W8-402		1600		7											X								
9. ~~W9-402~~																							
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.#
Bill To: Public Works

Turnaround Requirements

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard

Requested Report Date

Circle which metals are to be analyzed

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

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

Special Instructions/Comments:

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

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name: Dennis Dykes	Printed Name: M Mulligan	Printed Name	Printed Name	Printed Name	Printed Name
Firm: BFGW	Firm: AES	Firm	Firm	Firm	Firm
Date/Time: 4/2/24 1650	Date/Time: 4/2/24 1650	Date/Time	Date/Time	Date/Time	Date/Time

PM SCW

Cooler Receipt and Preservation Form

Client BFGW Service Request K24 034604

Received: 4/2/24 Opened: 4/2/24 By: VM Unloaded: 4/2/24 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
	10.6	IR06					

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
WS-402	125mL			X	HNO3	.5mL	REI 0610-G	VM	1700

Notes, Discrepancies, Resolutions: Lab to preserve 40mL for sample WS-402 with HCl

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:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont./		

Sample Name:	W1-402	**Date Collected:**	04/2/24
Lab Code:	K2403464-001	**Date Received:**	04/2/24
Sample Matrix:	Water		

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

Sample Name:	W2-402	**Date Collected:**	04/2/24
Lab Code:	K2403464-002	**Date Received:**	04/2/24
Sample Matrix:	Water		

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

Sample Name:	W3-402	**Date Collected:**	04/2/24
Lab Code:	K2403464-003	**Date Received:**	04/2/24
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.7	ABOYER	AMCKORNEY
200.8	ABOYER	EMCALLISTER
300.0		NFOTH
8260C		GROETTGER
SM 2320 B		MRICH

Client: Cowlitz County Public Works **Service Request:** K2403464
Project: Cowlitz Co. Headquarters Landfill Detection Mont./

Sample Name: W3-402 **Date Collected:** 04/2/24
Lab Code: K2403464-003 **Date Received:** 04/2/24
Sample Matrix: Water

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

Sample Name: W4-402 **Date Collected:** 04/2/24
Lab Code: K2403464-004 **Date Received:** 04/2/24
Sample Matrix: Water

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

Sample Name: W4-402 **Date Collected:** 04/2/24
Lab Code: K2403464-004.R01 **Date Received:** 04/2/24
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
SM 5310 B		MSPECHT

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont./		

Sample Name:	W5-402	**Date Collected:**	04/2/24
Lab Code:	K2403464-005	**Date Received:**	04/2/24
Sample Matrix:	Water		

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

Sample Name:	W5-402	**Date Collected:**	04/2/24
Lab Code:	K2403464-005.R01	**Date Received:**	04/2/24
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
SM 5310 B		MSPECHT

Sample Name:	W6-402	**Date Collected:**	04/2/24
Lab Code:	K2403464-006	**Date Received:**	04/2/24
Sample Matrix:	Water		

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

Client: Cowlitz County Public Works **Service Request:** K2403464
Project: Cowlitz Co. Headquarters Landfill Detection Mont./

Sample Name: W6-402 **Date Collected:** 04/2/24
Lab Code: K2403464-006.R01 **Date Received:** 04/2/24
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
SM 5310 B		MSPECHT

Sample Name: W7-402 **Date Collected:** 04/2/24
Lab Code: K2403464-007 **Date Received:** 04/2/24
Sample Matrix: Water

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

Sample Name: W7-402 **Date Collected:** 04/2/24
Lab Code: K2403464-007.R01 **Date Received:** 04/2/24
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
SM 5310 B		MSPECHT

Sample Name: W8-402 **Date Collected:** 04/2/24
Lab Code: K2403464-008 **Date Received:** 04/2/24
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:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont./		

Sample Name:	W8-402	**Date Collected:**	04/2/24
Lab Code:	K2403464-008	**Date Received:**	04/2/24
Sample Matrix:	Water		

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

Sample Name:	W8-402	**Date Collected:**	04/2/24
Lab Code:	K2403464-008.R01	**Date Received:**	04/2/24
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
300.0		NFOTH
SM 5310 B		MSPECHT

Sample Name:	Trip Blanks	**Date Collected:**	04/2/24
Lab Code:	K2403464-009	**Date Received:**	04/2/24
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
8260C		GROETTGER

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:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 12:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W2-402	**Units:**	ug/L
Lab Code:	K2403464-002	**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	04/08/24 17:48	
Acrylonitrile	ND U	5.0	0.53	1	04/08/24 17:48	
Benzene	ND U	0.50	0.062	1	04/08/24 17:48	
Bromochloromethane	ND U	0.50	0.16	1	04/08/24 17:48	
Bromodichloromethane	ND U	0.50	0.091	1	04/08/24 17:48	
Bromoform	ND U	0.50	0.16	1	04/08/24 17:48	*
Bromomethane	ND U	0.50	0.16	1	04/08/24 17:48	*
2-Butanone (MEK)	ND U	20	1.9	1	04/08/24 17:48	
Carbon Disulfide	ND U	0.50	0.069	1	04/08/24 17:48	
Carbon Tetrachloride	ND U	0.50	0.096	1	04/08/24 17:48	
Chlorobenzene	ND U	0.50	0.11	1	04/08/24 17:48	
Chloroethane	ND U	0.50	0.16	1	04/08/24 17:48	
Chloroform	ND U	0.50	0.072	1	04/08/24 17:48	
Chloromethane	ND U	0.50	0.068	1	04/08/24 17:48	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	04/08/24 17:48	*
Dibromochloromethane	ND U	0.50	0.14	1	04/08/24 17:48	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	04/08/24 17:48	
Dibromomethane	ND U	0.50	0.15	1	04/08/24 17:48	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	04/08/24 17:48	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 17:48	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 17:48	
1,1-Dichloroethane	ND U	0.50	0.077	1	04/08/24 17:48	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	04/08/24 17:48	
1,1-Dichloroethene	ND U	0.50	0.080	1	04/08/24 17:48	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	04/08/24 17:48	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	04/08/24 17:48	
1,2-Dichloropropane	ND U	0.50	0.095	1	04/08/24 17:48	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	04/08/24 17:48	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	04/08/24 17:48	
Ethylbenzene	ND U	0.50	0.050	1	04/08/24 17:48	
2-Hexanone	ND U	20	2.7	1	04/08/24 17:48	
Iodomethane	ND U	5.0	0.12	1	04/08/24 17:48	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	04/08/24 17:48	
Methylene Chloride	ND U	2.0	0.10	1	04/08/24 17:48	
Styrene	ND U	0.50	0.089	1	04/08/24 17:48	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	04/08/24 17:48	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	04/08/24 17:48	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	04/08/24 17:48	
Toluene	ND U	0.50	0.054	1	04/08/24 17:48	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	04/08/24 17:48	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	04/08/24 17:48	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 12:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W2-402	**Units:**	ug/L
Lab Code:	K2403464-002	**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	04/08/24 17:48	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	04/08/24 17:48	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	04/08/24 17:48	
Vinyl Acetate	ND U	5.0	0.43	1	04/08/24 17:48	
Vinyl Chloride	ND U	0.50	0.075	1	04/08/24 17:48	
o-Xylene	ND U	0.50	0.074	1	04/08/24 17:48	
m,p-Xylenes	ND U	0.50	0.11	1	04/08/24 17:48	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	92	68 - 117	04/08/24 17:48	
Dibromofluoromethane	93	73 - 122	04/08/24 17:48	
Toluene-d8	95	65 - 144	04/08/24 17:48	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 11:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W3-402	**Units:**	ug/L
Lab Code:	K2403464-003	**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	04/08/24 18:12	
Acrylonitrile	ND U	5.0	0.53	1	04/08/24 18:12	
Benzene	ND U	0.50	0.062	1	04/08/24 18:12	
Bromochloromethane	ND U	0.50	0.16	1	04/08/24 18:12	
Bromodichloromethane	ND U	0.50	0.091	1	04/08/24 18:12	
Bromoform	ND U	0.50	0.16	1	04/08/24 18:12	*
Bromomethane	ND U	0.50	0.16	1	04/08/24 18:12	*
2-Butanone (MEK)	ND U	20	1.9	1	04/08/24 18:12	
Carbon Disulfide	ND U	0.50	0.069	1	04/08/24 18:12	
Carbon Tetrachloride	ND U	0.50	0.096	1	04/08/24 18:12	
Chlorobenzene	ND U	0.50	0.11	1	04/08/24 18:12	
Chloroethane	ND U	0.50	0.16	1	04/08/24 18:12	
Chloroform	ND U	0.50	0.072	1	04/08/24 18:12	
Chloromethane	ND U	0.50	0.068	1	04/08/24 18:12	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	04/08/24 18:12	*
Dibromochloromethane	ND U	0.50	0.14	1	04/08/24 18:12	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	04/08/24 18:12	
Dibromomethane	ND U	0.50	0.15	1	04/08/24 18:12	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	04/08/24 18:12	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 18:12	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 18:12	
1,1-Dichloroethane	ND U	0.50	0.077	1	04/08/24 18:12	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	04/08/24 18:12	
1,1-Dichloroethene	ND U	0.50	0.080	1	04/08/24 18:12	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	04/08/24 18:12	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	04/08/24 18:12	
1,2-Dichloropropane	ND U	0.50	0.095	1	04/08/24 18:12	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	04/08/24 18:12	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	04/08/24 18:12	
Ethylbenzene	ND U	0.50	0.050	1	04/08/24 18:12	
2-Hexanone	ND U	20	2.7	1	04/08/24 18:12	
Iodomethane	ND U	5.0	0.12	1	04/08/24 18:12	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	04/08/24 18:12	
Methylene Chloride	ND U	2.0	0.10	1	04/08/24 18:12	
Styrene	ND U	0.50	0.089	1	04/08/24 18:12	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	04/08/24 18:12	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	04/08/24 18:12	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	04/08/24 18:12	
Toluene	ND U	0.50	0.054	1	04/08/24 18:12	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	04/08/24 18:12	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	04/08/24 18:12	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 11:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W3-402	**Units:**	ug/L
Lab Code:	K2403464-003	**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	04/08/24 18:12	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	04/08/24 18:12	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	04/08/24 18:12	
Vinyl Acetate	ND U	5.0	0.43	1	04/08/24 18:12	
Vinyl Chloride	ND U	0.50	0.075	1	04/08/24 18:12	
o-Xylene	ND U	0.50	0.074	1	04/08/24 18:12	
m,p-Xylenes	ND U	0.50	0.11	1	04/08/24 18:12	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	91	68 - 117	04/08/24 18:12	
Dibromofluoromethane	95	73 - 122	04/08/24 18:12	
Toluene-d8	94	65 - 144	04/08/24 18:12	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 12:30
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W4-402	**Units:**	ug/L
Lab Code:	K2403464-004	**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	04/08/24 18:36	
Acrylonitrile	ND U	5.0	0.53	1	04/08/24 18:36	
Benzene	ND U	0.50	0.062	1	04/08/24 18:36	
Bromochloromethane	ND U	0.50	0.16	1	04/08/24 18:36	
Bromodichloromethane	ND U	0.50	0.091	1	04/08/24 18:36	
Bromoform	ND U	0.50	0.16	1	04/08/24 18:36	*
Bromomethane	ND U	0.50	0.16	1	04/08/24 18:36	*
2-Butanone (MEK)	ND U	20	1.9	1	04/08/24 18:36	
Carbon Disulfide	ND U	0.50	0.069	1	04/08/24 18:36	
Carbon Tetrachloride	ND U	0.50	0.096	1	04/08/24 18:36	
Chlorobenzene	ND U	0.50	0.11	1	04/08/24 18:36	
Chloroethane	ND U	0.50	0.16	1	04/08/24 18:36	
Chloroform	ND U	0.50	0.072	1	04/08/24 18:36	
Chloromethane	ND U	0.50	0.068	1	04/08/24 18:36	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	04/08/24 18:36	*
Dibromochloromethane	ND U	0.50	0.14	1	04/08/24 18:36	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	04/08/24 18:36	
Dibromomethane	ND U	0.50	0.15	1	04/08/24 18:36	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	04/08/24 18:36	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 18:36	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 18:36	
1,1-Dichloroethane	ND U	0.50	0.077	1	04/08/24 18:36	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	04/08/24 18:36	
1,1-Dichloroethene	ND U	0.50	0.080	1	04/08/24 18:36	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	04/08/24 18:36	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	04/08/24 18:36	
1,2-Dichloropropane	ND U	0.50	0.095	1	04/08/24 18:36	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	04/08/24 18:36	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	04/08/24 18:36	
Ethylbenzene	ND U	0.50	0.050	1	04/08/24 18:36	
2-Hexanone	ND U	20	2.7	1	04/08/24 18:36	
Iodomethane	ND U	5.0	0.12	1	04/08/24 18:36	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	04/08/24 18:36	
Methylene Chloride	ND U	2.0	0.10	1	04/08/24 18:36	
Styrene	ND U	0.50	0.089	1	04/08/24 18:36	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	04/08/24 18:36	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	04/08/24 18:36	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	04/08/24 18:36	
Toluene	ND U	0.50	0.054	1	04/08/24 18:36	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	04/08/24 18:36	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	04/08/24 18:36	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 12:30
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W4-402	**Units:**	ug/L
Lab Code:	K2403464-004	**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	04/08/24 18:36	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	04/08/24 18:36	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	04/08/24 18:36	
Vinyl Acetate	ND U	5.0	0.43	1	04/08/24 18:36	
Vinyl Chloride	ND U	0.50	0.075	1	04/08/24 18:36	
o-Xylene	ND U	0.50	0.074	1	04/08/24 18:36	
m,p-Xylenes	ND U	0.50	0.11	1	04/08/24 18:36	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	91	68 - 117	04/08/24 18:36	
Dibromofluoromethane	92	73 - 122	04/08/24 18:36	
Toluene-d8	94	65 - 144	04/08/24 18:36	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 14:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W5-402	**Units:**	ug/L
Lab Code:	K2403464-005	**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	04/08/24 19:01	
Acrylonitrile	ND U	5.0	0.53	1	04/08/24 19:01	
Benzene	ND U	0.50	0.062	1	04/08/24 19:01	
Bromochloromethane	ND U	0.50	0.16	1	04/08/24 19:01	
Bromodichloromethane	ND U	0.50	0.091	1	04/08/24 19:01	
Bromoform	ND U	0.50	0.16	1	04/08/24 19:01	*
Bromomethane	ND U	0.50	0.16	1	04/08/24 19:01	*
2-Butanone (MEK)	ND U	20	1.9	1	04/08/24 19:01	
Carbon Disulfide	ND U	0.50	0.069	1	04/08/24 19:01	
Carbon Tetrachloride	ND U	0.50	0.096	1	04/08/24 19:01	
Chlorobenzene	ND U	0.50	0.11	1	04/08/24 19:01	
Chloroethane	ND U	0.50	0.16	1	04/08/24 19:01	
Chloroform	ND U	0.50	0.072	1	04/08/24 19:01	
Chloromethane	ND U	0.50	0.068	1	04/08/24 19:01	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	04/08/24 19:01	*
Dibromochloromethane	ND U	0.50	0.14	1	04/08/24 19:01	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	04/08/24 19:01	
Dibromomethane	ND U	0.50	0.15	1	04/08/24 19:01	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	04/08/24 19:01	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 19:01	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 19:01	
1,1-Dichloroethane	ND U	0.50	0.077	1	04/08/24 19:01	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	04/08/24 19:01	
1,1-Dichloroethene	ND U	0.50	0.080	1	04/08/24 19:01	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	04/08/24 19:01	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	04/08/24 19:01	
1,2-Dichloropropane	ND U	0.50	0.095	1	04/08/24 19:01	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	04/08/24 19:01	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	04/08/24 19:01	
Ethylbenzene	ND U	0.50	0.050	1	04/08/24 19:01	
2-Hexanone	ND U	20	2.7	1	04/08/24 19:01	
Iodomethane	ND U	5.0	0.12	1	04/08/24 19:01	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	04/08/24 19:01	
Methylene Chloride	ND U	2.0	0.10	1	04/08/24 19:01	
Styrene	ND U	0.50	0.089	1	04/08/24 19:01	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	04/08/24 19:01	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	04/08/24 19:01	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	04/08/24 19:01	
Toluene	ND U	0.50	0.054	1	04/08/24 19:01	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	04/08/24 19:01	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	04/08/24 19:01	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 14:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W5-402	**Units:**	ug/L
Lab Code:	K2403464-005	**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	04/08/24 19:01	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	04/08/24 19:01	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	04/08/24 19:01	
Vinyl Acetate	ND U	5.0	0.43	1	04/08/24 19:01	
Vinyl Chloride	ND U	0.50	0.075	1	04/08/24 19:01	
o-Xylene	ND U	0.50	0.074	1	04/08/24 19:01	
m,p-Xylenes	ND U	0.50	0.11	1	04/08/24 19:01	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	92	68 - 117	04/08/24 19:01	
Dibromofluoromethane	94	73 - 122	04/08/24 19:01	
Toluene-d8	96	65 - 144	04/08/24 19:01	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 14:30
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W6-402	**Units:**	ug/L
Lab Code:	K2403464-006	**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	04/08/24 19:25	
Acrylonitrile	ND U	5.0	0.53	1	04/08/24 19:25	
Benzene	ND U	0.50	0.062	1	04/08/24 19:25	
Bromochloromethane	ND U	0.50	0.16	1	04/08/24 19:25	
Bromodichloromethane	ND U	0.50	0.091	1	04/08/24 19:25	
Bromoform	ND U	0.50	0.16	1	04/08/24 19:25	*
Bromomethane	ND U	0.50	0.16	1	04/08/24 19:25	*
2-Butanone (MEK)	ND U	20	1.9	1	04/08/24 19:25	
Carbon Disulfide	ND U	0.50	0.069	1	04/08/24 19:25	
Carbon Tetrachloride	ND U	0.50	0.096	1	04/08/24 19:25	
Chlorobenzene	ND U	0.50	0.11	1	04/08/24 19:25	
Chloroethane	ND U	0.50	0.16	1	04/08/24 19:25	
Chloroform	ND U	0.50	0.072	1	04/08/24 19:25	
Chloromethane	ND U	0.50	0.068	1	04/08/24 19:25	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	04/08/24 19:25	*
Dibromochloromethane	ND U	0.50	0.14	1	04/08/24 19:25	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	04/08/24 19:25	
Dibromomethane	ND U	0.50	0.15	1	04/08/24 19:25	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	04/08/24 19:25	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 19:25	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 19:25	
1,1-Dichloroethane	ND U	0.50	0.077	1	04/08/24 19:25	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	04/08/24 19:25	
1,1-Dichloroethene	ND U	0.50	0.080	1	04/08/24 19:25	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	04/08/24 19:25	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	04/08/24 19:25	
1,2-Dichloropropane	ND U	0.50	0.095	1	04/08/24 19:25	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	04/08/24 19:25	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	04/08/24 19:25	
Ethylbenzene	ND U	0.50	0.050	1	04/08/24 19:25	
2-Hexanone	ND U	20	2.7	1	04/08/24 19:25	
Iodomethane	ND U	5.0	0.12	1	04/08/24 19:25	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	04/08/24 19:25	
Methylene Chloride	ND U	2.0	0.10	1	04/08/24 19:25	
Styrene	ND U	0.50	0.089	1	04/08/24 19:25	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	04/08/24 19:25	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	04/08/24 19:25	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	04/08/24 19:25	
Toluene	ND U	0.50	0.054	1	04/08/24 19:25	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	04/08/24 19:25	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	04/08/24 19:25	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 14:30
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W6-402	**Units:**	ug/L
Lab Code:	K2403464-006	**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	04/08/24 19:25	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	04/08/24 19:25	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	04/08/24 19:25	
Vinyl Acetate	ND U	5.0	0.43	1	04/08/24 19:25	
Vinyl Chloride	ND U	0.50	0.075	1	04/08/24 19:25	
o-Xylene	ND U	0.50	0.074	1	04/08/24 19:25	
m,p-Xylenes	ND U	0.50	0.11	1	04/08/24 19:25	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	92	68 - 117	04/08/24 19:25	
Dibromofluoromethane	98	73 - 122	04/08/24 19:25	
Toluene-d8	96	65 - 144	04/08/24 19:25	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 15:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W7-402	**Units:**	ug/L
Lab Code:	K2403464-007	**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	04/08/24 19:50	
Acrylonitrile	ND U	5.0	0.53	1	04/08/24 19:50	
Benzene	ND U	0.50	0.062	1	04/08/24 19:50	
Bromochloromethane	ND U	0.50	0.16	1	04/08/24 19:50	
Bromodichloromethane	ND U	0.50	0.091	1	04/08/24 19:50	
Bromoform	ND U	0.50	0.16	1	04/08/24 19:50	*
Bromomethane	ND U	0.50	0.16	1	04/08/24 19:50	*
2-Butanone (MEK)	ND U	20	1.9	1	04/08/24 19:50	
Carbon Disulfide	ND U	0.50	0.069	1	04/08/24 19:50	
Carbon Tetrachloride	ND U	0.50	0.096	1	04/08/24 19:50	
Chlorobenzene	ND U	0.50	0.11	1	04/08/24 19:50	
Chloroethane	ND U	0.50	0.16	1	04/08/24 19:50	
Chloroform	ND U	0.50	0.072	1	04/08/24 19:50	
Chloromethane	ND U	0.50	0.068	1	04/08/24 19:50	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	04/08/24 19:50	*
Dibromochloromethane	ND U	0.50	0.14	1	04/08/24 19:50	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	04/08/24 19:50	
Dibromomethane	ND U	0.50	0.15	1	04/08/24 19:50	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	04/08/24 19:50	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 19:50	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 19:50	
1,1-Dichloroethane	ND U	0.50	0.077	1	04/08/24 19:50	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	04/08/24 19:50	
1,1-Dichloroethene	ND U	0.50	0.080	1	04/08/24 19:50	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	04/08/24 19:50	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	04/08/24 19:50	
1,2-Dichloropropane	ND U	0.50	0.095	1	04/08/24 19:50	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	04/08/24 19:50	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	04/08/24 19:50	
Ethylbenzene	ND U	0.50	0.050	1	04/08/24 19:50	
2-Hexanone	ND U	20	2.7	1	04/08/24 19:50	
Iodomethane	ND U	5.0	0.12	1	04/08/24 19:50	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	04/08/24 19:50	
Methylene Chloride	ND U	2.0	0.10	1	04/08/24 19:50	
Styrene	ND U	0.50	0.089	1	04/08/24 19:50	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	04/08/24 19:50	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	04/08/24 19:50	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	04/08/24 19:50	
Toluene	ND U	0.50	0.054	1	04/08/24 19:50	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	04/08/24 19:50	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	04/08/24 19:50	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 15:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W7-402	**Units:**	ug/L
Lab Code:	K2403464-007	**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	04/08/24 19:50	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	04/08/24 19:50	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	04/08/24 19:50	
Vinyl Acetate	ND U	5.0	0.43	1	04/08/24 19:50	
Vinyl Chloride	ND U	0.50	0.075	1	04/08/24 19:50	
o-Xylene	ND U	0.50	0.074	1	04/08/24 19:50	
m,p-Xylenes	ND U	0.50	0.11	1	04/08/24 19:50	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	92	68 - 117	04/08/24 19:50	
Dibromofluoromethane	98	73 - 122	04/08/24 19:50	
Toluene-d8	95	65 - 144	04/08/24 19:50	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 16:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W8-402	**Units:**	ug/L
Lab Code:	K2403464-008	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Acetone	**530**	100	17	5	04/08/24 20:39	
Acrylonitrile	ND U	25	2.7	5	04/08/24 20:39	
Benzene	**0.45 J**	2.5	0.31	5	04/08/24 20:39	
Bromochloromethane	ND U	2.5	0.80	5	04/08/24 20:39	
Bromodichloromethane	ND U	2.5	0.46	5	04/08/24 20:39	
Bromoform	ND U	2.5	0.80	5	04/08/24 20:39	*
Bromomethane	ND U	2.5	0.80	5	04/08/24 20:39	*
2-Butanone (MEK)	**180**	100	9.5	5	04/08/24 20:39	
Carbon Disulfide	**0.35 J**	2.5	0.35	5	04/08/24 20:39	
Carbon Tetrachloride	ND U	2.5	0.48	5	04/08/24 20:39	
Chlorobenzene	ND U	2.5	0.55	5	04/08/24 20:39	
Chloroethane	ND U	2.5	0.80	5	04/08/24 20:39	
Chloroform	ND U	2.5	0.36	5	04/08/24 20:39	
Chloromethane	ND U	2.5	0.34	5	04/08/24 20:39	
1,2-Dibromo-3-chloropropane	ND U	10	1.1	5	04/08/24 20:39	*
Dibromochloromethane	ND U	2.5	0.70	5	04/08/24 20:39	
1,2-Dibromoethane (EDB)	ND U	10	0.50	5	04/08/24 20:39	
Dibromomethane	ND U	2.5	0.75	5	04/08/24 20:39	
trans-1,4-Dichloro-2-butene	ND U	50	1.8	5	04/08/24 20:39	
1,2-Dichlorobenzene	ND U	2.5	0.60	5	04/08/24 20:39	
1,4-Dichlorobenzene	ND U	2.5	0.60	5	04/08/24 20:39	
1,1-Dichloroethane	ND U	2.5	0.39	5	04/08/24 20:39	
1,2-Dichloroethane (EDC)	ND U	2.5	0.40	5	04/08/24 20:39	
1,1-Dichloroethene	ND U	2.5	0.40	5	04/08/24 20:39	
cis-1,2-Dichloroethene	ND U	2.5	0.34	5	04/08/24 20:39	
trans-1,2-Dichloroethene	ND U	2.5	0.36	5	04/08/24 20:39	
1,2-Dichloropropane	ND U	2.5	0.48	5	04/08/24 20:39	
cis-1,3-Dichloropropene	ND U	2.5	0.90	5	04/08/24 20:39	
trans-1,3-Dichloropropene	ND U	2.5	0.34	5	04/08/24 20:39	
Ethylbenzene	**0.65 J**	2.5	0.25	5	04/08/24 20:39	
2-Hexanone	ND U	100	14	5	04/08/24 20:39	
Iodomethane	ND U	25	0.60	5	04/08/24 20:39	
4-Methyl-2-pentanone (MIBK)	ND U	100	13	5	04/08/24 20:39	
Methylene Chloride	**0.65 J**	10	0.50	5	04/08/24 20:39	
Styrene	ND U	2.5	0.45	5	04/08/24 20:39	
1,1,1,2-Tetrachloroethane	ND U	2.5	0.55	5	04/08/24 20:39	
1,1,2,2-Tetrachloroethane	ND U	2.5	0.80	5	04/08/24 20:39	
Tetrachloroethene (PCE)	ND U	2.5	0.50	5	04/08/24 20:39	
Toluene	**1.9 J**	2.5	0.27	5	04/08/24 20:39	
1,1,2-Trichloroethane	ND U	2.5	0.70	5	04/08/24 20:39	
1,1,1-Trichloroethane (TCA)	ND U	2.5	0.38	5	04/08/24 20:39	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 16:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W8-402	**Units:**	ug/L
Lab Code:	K2403464-008	**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	2.5	0.50	5	04/08/24 20:39	
Trichlorofluoromethane (CFC 11)	ND	U	2.5	0.60	5	04/08/24 20:39	
1,2,3-Trichloropropane	ND	U	2.5	1.0	5	04/08/24 20:39	
Vinyl Acetate	ND	U	25	2.2	5	04/08/24 20:39	
Vinyl Chloride	ND	U	2.5	0.38	5	04/08/24 20:39	
o-Xylene	**0.60**	**J**	2.5	0.37	5	04/08/24 20:39	
m,p-Xylenes	**0.95**	**J**	2.5	0.55	5	04/08/24 20:39	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	92	68 - 117	04/08/24 20:39	
Dibromofluoromethane	97	73 - 122	04/08/24 20:39	
Toluene-d8	95	65 - 144	04/08/24 20:39	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	Trip Blanks	**Units:**	ug/L
Lab Code:	K2403464-009	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analysis Method: 8260C
Prep Method: None

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Q
Acetone	ND	U	20	3.3	1	04/08/24 20:14	
Acrylonitrile	ND	U	5.0	0.53	1	04/08/24 20:14	
Benzene	ND	U	0.50	0.062	1	04/08/24 20:14	
Bromochloromethane	ND	U	0.50	0.16	1	04/08/24 20:14	
Bromodichloromethane	ND	U	0.50	0.091	1	04/08/24 20:14	
Bromoform	ND	U	0.50	0.16	1	04/08/24 20:14	*
Bromomethane	ND	U	0.50	0.16	1	04/08/24 20:14	*
2-Butanone (MEK)	ND	U	20	1.9	1	04/08/24 20:14	
Carbon Disulfide	ND	U	0.50	0.069	1	04/08/24 20:14	
Carbon Tetrachloride	ND	U	0.50	0.096	1	04/08/24 20:14	
Chlorobenzene	ND	U	0.50	0.11	1	04/08/24 20:14	
Chloroethane	ND	U	0.50	0.16	1	04/08/24 20:14	
Chloroform	ND	U	0.50	0.072	1	04/08/24 20:14	
Chloromethane	**0.080**	**J**	0.50	0.068	1	04/08/24 20:14	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.22	1	04/08/24 20:14	*
Dibromochloromethane	ND	U	0.50	0.14	1	04/08/24 20:14	
1,2-Dibromoethane (EDB)	ND	U	2.0	0.10	1	04/08/24 20:14	
Dibromomethane	ND	U	0.50	0.15	1	04/08/24 20:14	
trans-1,4-Dichloro-2-butene	ND	U	10	0.35	1	04/08/24 20:14	
1,2-Dichlorobenzene	ND	U	0.50	0.12	1	04/08/24 20:14	
1,4-Dichlorobenzene	ND	U	0.50	0.12	1	04/08/24 20:14	
1,1-Dichloroethane	ND	U	0.50	0.077	1	04/08/24 20:14	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.080	1	04/08/24 20:14	
1,1-Dichloroethene	ND	U	0.50	0.080	1	04/08/24 20:14	
cis-1,2-Dichloroethene	ND	U	0.50	0.067	1	04/08/24 20:14	
trans-1,2-Dichloroethene	ND	U	0.50	0.072	1	04/08/24 20:14	
1,2-Dichloropropane	ND	U	0.50	0.095	1	04/08/24 20:14	
cis-1,3-Dichloropropene	ND	U	0.50	0.18	1	04/08/24 20:14	
trans-1,3-Dichloropropene	ND	U	0.50	0.068	1	04/08/24 20:14	
Ethylbenzene	ND	U	0.50	0.050	1	04/08/24 20:14	
2-Hexanone	ND	U	20	2.7	1	04/08/24 20:14	
Iodomethane	ND	U	5.0	0.12	1	04/08/24 20:14	
4-Methyl-2-pentanone (MIBK)	ND	U	20	2.6	1	04/08/24 20:14	
Methylene Chloride	**0.12**	**J**	2.0	0.10	1	04/08/24 20:14	
Styrene	ND	U	0.50	0.089	1	04/08/24 20:14	
1,1,1,2-Tetrachloroethane	ND	U	0.50	0.11	1	04/08/24 20:14	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.16	1	04/08/24 20:14	
Tetrachloroethene (PCE)	ND	U	0.50	0.099	1	04/08/24 20:14	
Toluene	ND	U	0.50	0.054	1	04/08/24 20:14	
1,1,2-Trichloroethane	ND	U	0.50	0.14	1	04/08/24 20:14	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.075	1	04/08/24 20:14	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	Trip Blanks	**Units:**	ug/L
Lab Code:	K2403464-009	**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	0.50	0.10	1	04/08/24 20:14	
Trichlorofluoromethane (CFC 11)	ND	U	0.50	0.12	1	04/08/24 20:14	
1,2,3-Trichloropropane	ND	U	0.50	0.20	1	04/08/24 20:14	
Vinyl Acetate	ND	U	5.0	0.43	1	04/08/24 20:14	
Vinyl Chloride	ND	U	0.50	0.075	1	04/08/24 20:14	
o-Xylene	ND	U	0.50	0.074	1	04/08/24 20:14	
m,p-Xylenes	ND	U	0.50	0.11	1	04/08/24 20:14	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	91	68 - 117	04/08/24 20:14	
Dibromofluoromethane	96	73 - 122	04/08/24 20:14	
Toluene-d8	96	65 - 144	04/08/24 20:14	

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:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 10:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W1-402	**Basis:**	NA
Lab Code:	K2403464-001		

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	04/05/24 15:06	04/05/24	
Arsenic	200.8	**0.09**	**J**	ug/L	0.50	0.09	1	04/05/24 15:06	04/05/24	
Barium	200.8	**8.04**		ug/L	0.050	0.020	1	04/05/24 15:06	04/05/24	
Beryllium	200.8	**0.010**	**J**	ug/L	0.020	0.005	1	04/05/24 15:06	04/05/24	
Cadmium	200.8	**0.015**	**J**	ug/L	0.020	0.008	1	04/05/24 15:06	04/05/24	
Chromium	200.8	**0.42**		ug/L	0.20	0.03	1	04/05/24 15:06	04/05/24	
Cobalt	200.8	**0.133**		ug/L	0.020	0.009	1	04/05/24 15:06	04/05/24	
Copper	200.8	**0.88**		ug/L	0.10	0.05	1	04/05/24 15:06	04/05/24	
Iron	200.7	**258**		ug/L	21	8	1	04/09/24 10:08	04/05/24	
Lead	200.8	**0.063**		ug/L	0.020	0.006	1	04/05/24 15:06	04/05/24	
Manganese	200.7	**10.5**		ug/L	1.1	0.2	1	04/09/24 10:08	04/05/24	
Nickel	200.8	**0.21**		ug/L	0.20	0.04	1	04/05/24 15:06	04/05/24	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	04/05/24 15:06	04/05/24	
Silver	200.8	ND	U	ug/L	0.020	0.009	1	04/05/24 15:06	04/05/24	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	04/05/24 15:06	04/05/24	
Vanadium	200.8	**0.71**		ug/L	0.20	0.04	1	04/05/24 15:06	04/05/24	
Zinc	200.8	**1.3**	**J**	ug/L	2.0	0.5	1	04/05/24 15:06	04/05/24	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 12:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W2-402	**Basis:**	NA
Lab Code:	K2403464-002		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**6950**	ug/L	21	3	1	04/09/24 10:28	04/05/24	
Iron	200.7	**1900**	ug/L	21	8	1	04/09/24 10:28	04/05/24	
Magnesium	200.7	**2940**	ug/L	5.3	0.4	1	04/09/24 10:28	04/05/24	
Manganese	200.7	**575**	ug/L	1.1	0.2	1	04/09/24 10:28	04/05/24	
Potassium	200.7	**560**	ug/L	210	60	1	04/09/24 10:28	04/05/24	
Sodium	200.7	**3920**	ug/L	210	30	1	04/09/24 10:28	04/05/24	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 12:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W2-402	**Basis:**	NA
Lab Code:	K2403464-002		

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	04/05/24 15:10	04/05/24	
Arsenic	200.8	**0.73**		ug/L	0.50	0.09	1	04/05/24 15:10	04/05/24	
Barium	200.8	**15.4**		ug/L	0.050	0.020	1	04/05/24 15:10	04/05/24	
Beryllium	200.8	**0.022**		ug/L	0.020	0.005	1	04/05/24 15:10	04/05/24	
Cadmium	200.8	**0.016**	**J**	ug/L	0.020	0.008	1	04/05/24 15:10	04/05/24	
Chromium	200.8	**0.13**	**J**	ug/L	0.20	0.03	1	04/05/24 15:10	04/05/24	
Cobalt	200.8	**4.57**		ug/L	0.020	0.009	1	04/05/24 15:10	04/05/24	
Copper	200.8	**2.07**		ug/L	0.10	0.05	1	04/05/24 15:10	04/05/24	
Lead	200.8	**0.011**	**J**	ug/L	0.020	0.006	1	04/05/24 15:10	04/05/24	
Nickel	200.8	**2.28**		ug/L	0.20	0.04	1	04/05/24 15:10	04/05/24	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	04/05/24 15:10	04/05/24	
Silver	200.8	ND	U	ug/L	0.020	0.009	1	04/05/24 15:10	04/05/24	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	04/05/24 15:10	04/05/24	
Vanadium	200.8	**0.06**	**J**	ug/L	0.20	0.04	1	04/05/24 15:10	04/05/24	
Zinc	200.8	**3.1**		ug/L	2.0	0.5	1	04/05/24 15:10	04/05/24	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 11:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W3-402	**Basis:**	NA
Lab Code:	K2403464-003		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**11100**	ug/L	21	3	1	04/09/24 10:31	04/05/24	
Iron	200.7	**5660**	ug/L	21	8	1	04/09/24 10:31	04/05/24	
Magnesium	200.7	**6010**	ug/L	5.3	0.4	1	04/09/24 10:31	04/05/24	
Manganese	200.7	**386**	ug/L	1.1	0.2	1	04/09/24 10:31	04/05/24	
Potassium	200.7	**9780**	ug/L	210	60	1	04/09/24 10:31	04/05/24	
Sodium	200.7	**8770**	ug/L	210	30	1	04/09/24 10:31	04/05/24	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 11:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W3-402	**Basis:**	NA
Lab Code:	K2403464-003		

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	04/05/24 15:12	04/05/24	
Arsenic	200.8	**3.71**		ug/L	0.50	0.09	1	04/05/24 15:12	04/05/24	
Barium	200.8	**48.3**		ug/L	0.050	0.020	1	04/05/24 15:12	04/05/24	
Beryllium	200.8	**0.015**	**J**	ug/L	0.020	0.005	1	04/05/24 15:12	04/05/24	
Cadmium	200.8	**0.017**	**J**	ug/L	0.020	0.008	1	04/05/24 15:12	04/05/24	
Chromium	200.8	**0.18**	**J**	ug/L	0.20	0.03	1	04/05/24 15:12	04/05/24	
Cobalt	200.8	**7.51**		ug/L	0.020	0.009	1	04/05/24 15:12	04/05/24	
Copper	200.8	**0.39**		ug/L	0.10	0.05	1	04/05/24 15:12	04/05/24	
Lead	200.8	**0.113**		ug/L	0.020	0.006	1	04/05/24 15:12	04/05/24	
Nickel	200.8	**1.21**		ug/L	0.20	0.04	1	04/05/24 15:12	04/05/24	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	04/05/24 15:12	04/05/24	
Silver	200.8	**1.72**		ug/L	0.020	0.009	1	04/05/24 15:12	04/05/24	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	04/05/24 15:12	04/05/24	
Vanadium	200.8	**0.36**		ug/L	0.20	0.04	1	04/05/24 15:12	04/05/24	
Zinc	200.8	**1.8**	**J**	ug/L	2.0	0.5	1	04/05/24 15:12	04/05/24	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 12:30
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W4-402	**Basis:**	NA
Lab Code:	K2403464-004		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**5820**	ug/L	21	3	1	04/09/24 10:33	04/05/24	
Iron	200.7	ND U	ug/L	21	8	1	04/09/24 10:33	04/05/24	
Magnesium	200.7	**2830**	ug/L	5.3	0.4	1	04/09/24 10:33	04/05/24	
Manganese	200.7	**7.2**	ug/L	1.1	0.2	1	04/09/24 10:33	04/05/24	
Potassium	200.7	**7360**	ug/L	210	60	1	04/09/24 10:33	04/05/24	
Sodium	200.7	**4750**	ug/L	210	30	1	04/09/24 10:33	04/05/24	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 12:30
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W4-402	**Basis:**	NA
Lab Code:	K2403464-004		

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	04/05/24 15:15	04/05/24	
Arsenic	200.8	ND	U	ug/L	0.50	0.09	1	04/05/24 15:15	04/05/24	
Barium	200.8	**6.05**		ug/L	0.050	0.020	1	04/05/24 15:15	04/05/24	
Beryllium	200.8	**0.052**		ug/L	0.020	0.005	1	04/05/24 15:15	04/05/24	
Cadmium	200.8	**0.012**	**J**	ug/L	0.020	0.008	1	04/05/24 15:15	04/05/24	
Chromium	200.8	**0.10**	**J**	ug/L	0.20	0.03	1	04/05/24 15:15	04/05/24	
Cobalt	200.8	**0.015**	**J**	ug/L	0.020	0.009	1	04/05/24 15:15	04/05/24	
Copper	200.8	**0.06**	**J**	ug/L	0.10	0.05	1	04/05/24 15:15	04/05/24	
Lead	200.8	**0.046**		ug/L	0.020	0.006	1	04/05/24 15:15	04/05/24	
Nickel	200.8	**0.08**	**J**	ug/L	0.20	0.04	1	04/05/24 15:15	04/05/24	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	04/05/24 15:15	04/05/24	
Silver	200.8	**1.50**		ug/L	0.020	0.009	1	04/05/24 15:15	04/05/24	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	04/05/24 15:15	04/05/24	
Vanadium	200.8	**0.51**		ug/L	0.20	0.04	1	04/05/24 15:15	04/05/24	
Zinc	200.8	**1.0**	**J**	ug/L	2.0	0.5	1	04/05/24 15:15	04/05/24	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 14:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W5-402	**Basis:**	NA
Lab Code:	K2403464-005		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**3650**	ug/L	21	3	1	04/09/24 10:36	04/05/24	
Iron	200.7	**13 J**	ug/L	21	8	1	04/09/24 10:36	04/05/24	
Magnesium	200.7	**1890**	ug/L	5.3	0.4	1	04/09/24 10:36	04/05/24	
Manganese	200.7	**21.7**	ug/L	1.1	0.2	1	04/09/24 10:36	04/05/24	
Potassium	200.7	**4730**	ug/L	210	60	1	04/09/24 10:36	04/05/24	
Sodium	200.7	**7930**	ug/L	210	30	1	04/09/24 10:36	04/05/24	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 14:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W5-402	**Basis:**	NA
Lab Code:	K2403464-005		

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	04/05/24 15:17	04/05/24	
Arsenic	200.8	ND	U	ug/L	0.50	0.09	1	04/05/24 15:17	04/05/24	
Barium	200.8	**7.80**		ug/L	0.050	0.020	1	04/05/24 15:17	04/05/24	
Beryllium	200.8	**0.013**	**J**	ug/L	0.020	0.005	1	04/05/24 15:17	04/05/24	
Cadmium	200.8	ND	U	ug/L	0.020	0.008	1	04/05/24 15:17	04/05/24	
Chromium	200.8	**0.18**	**J**	ug/L	0.20	0.03	1	04/05/24 15:17	04/05/24	
Cobalt	200.8	**0.048**		ug/L	0.020	0.009	1	04/05/24 15:17	04/05/24	
Copper	200.8	**0.10**		ug/L	0.10	0.05	1	04/05/24 15:17	04/05/24	
Lead	200.8	ND	U	ug/L	0.020	0.006	1	04/05/24 15:17	04/05/24	
Nickel	200.8	**0.17**	**J**	ug/L	0.20	0.04	1	04/05/24 15:17	04/05/24	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	04/05/24 15:17	04/05/24	
Silver	200.8	**0.491**		ug/L	0.020	0.009	1	04/05/24 15:17	04/05/24	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	04/05/24 15:17	04/05/24	
Vanadium	200.8	ND	U	ug/L	0.20	0.04	1	04/05/24 15:17	04/05/24	
Zinc	200.8	**1.0**	**J**	ug/L	2.0	0.5	1	04/05/24 15:17	04/05/24	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 14:30
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W6-402	**Basis:**	NA
Lab Code:	K2403464-006		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**12200**	ug/L	21	3	1	04/09/24 10:38	04/05/24	
Iron	200.7	ND U	ug/L	21	8	1	04/09/24 10:38	04/05/24	
Magnesium	200.7	**1680**	ug/L	5.3	0.4	1	04/09/24 10:38	04/05/24	
Manganese	200.7	**0.3 J**	ug/L	1.1	0.2	1	04/09/24 10:38	04/05/24	
Potassium	200.7	**2950**	ug/L	210	60	1	04/09/24 10:38	04/05/24	
Sodium	200.7	**8150**	ug/L	210	30	1	04/09/24 10:38	04/05/24	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 14:30
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W6-402	**Basis:**	NA
Lab Code:	K2403464-006		

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	04/05/24 15:19	04/05/24	
Arsenic	200.8	**0.48**	**J**	ug/L	0.50	0.09	1	04/05/24 15:19	04/05/24	
Barium	200.8	**1.46**		ug/L	0.050	0.020	1	04/05/24 15:19	04/05/24	
Beryllium	200.8	**0.006**	**J**	ug/L	0.020	0.005	1	04/05/24 15:19	04/05/24	
Cadmium	200.8	**0.009**	**J**	ug/L	0.020	0.008	1	04/05/24 15:19	04/05/24	
Chromium	200.8	**0.15**	**J**	ug/L	0.20	0.03	1	04/05/24 15:19	04/05/24	
Cobalt	200.8	ND	U	ug/L	0.020	0.009	1	04/05/24 15:19	04/05/24	
Copper	200.8	**0.06**	**J**	ug/L	0.10	0.05	1	04/05/24 15:19	04/05/24	
Lead	200.8	**0.019**	**J**	ug/L	0.020	0.006	1	04/05/24 15:19	04/05/24	
Nickel	200.8	**0.13**	**J**	ug/L	0.20	0.04	1	04/05/24 15:19	04/05/24	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	04/05/24 15:19	04/05/24	
Silver	200.8	**0.365**		ug/L	0.020	0.009	1	04/05/24 15:19	04/05/24	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	04/05/24 15:19	04/05/24	
Vanadium	200.8	**2.45**		ug/L	0.20	0.04	1	04/05/24 15:19	04/05/24	
Zinc	200.8	ND	U	ug/L	2.0	0.5	1	04/05/24 15:19	04/05/24	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 15:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W7-402	**Basis:**	NA
Lab Code:	K2403464-007		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**12100**	ug/L	21	3	1	04/09/24 10:41	04/05/24	
Iron	200.7	ND U	ug/L	21	8	1	04/09/24 10:41	04/05/24	
Magnesium	200.7	**1670**	ug/L	5.3	0.4	1	04/09/24 10:41	04/05/24	
Manganese	200.7	**0.2 J**	ug/L	1.1	0.2	1	04/09/24 10:41	04/05/24	
Potassium	200.7	**2640**	ug/L	210	60	1	04/09/24 10:41	04/05/24	
Sodium	200.7	**8240**	ug/L	210	30	1	04/09/24 10:41	04/05/24	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 15:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W7-402	**Basis:**	NA
Lab Code:	K2403464-007		

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	04/05/24 15:22	04/05/24	
Arsenic	200.8	**0.50**		ug/L	0.50	0.09	1	04/05/24 15:22	04/05/24	
Barium	200.8	**1.49**		ug/L	0.050	0.020	1	04/05/24 15:22	04/05/24	
Beryllium	200.8	ND	U	ug/L	0.020	0.005	1	04/05/24 15:22	04/05/24	
Cadmium	200.8	**0.012**	**J**	ug/L	0.020	0.008	1	04/05/24 15:22	04/05/24	
Chromium	200.8	**0.20**		ug/L	0.20	0.03	1	04/05/24 15:22	04/05/24	
Cobalt	200.8	ND	U	ug/L	0.020	0.009	1	04/05/24 15:22	04/05/24	
Copper	200.8	**0.06**	**J**	ug/L	0.10	0.05	1	04/05/24 15:22	04/05/24	
Lead	200.8	**0.023**		ug/L	0.020	0.006	1	04/05/24 15:22	04/05/24	
Nickel	200.8	**0.11**	**J**	ug/L	0.20	0.04	1	04/05/24 15:22	04/05/24	
Selenium	200.8	ND	U	ug/L	1.0	0.2	1	04/05/24 15:22	04/05/24	
Silver	200.8	**0.377**		ug/L	0.020	0.009	1	04/05/24 15:22	04/05/24	
Thallium	200.8	ND	U	ug/L	0.020	0.009	1	04/05/24 15:22	04/05/24	
Vanadium	200.8	**2.54**		ug/L	0.20	0.04	1	04/05/24 15:22	04/05/24	
Zinc	200.8	**0.6**	**J**	ug/L	2.0	0.5	1	04/05/24 15:22	04/05/24	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 16:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W8-402	**Basis:**	NA
Lab Code:	K2403464-008		

Total Metals

Analyte Name	Analysis Method	Result	Q	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	200.8	**4.75**		ug/L	0.25	0.10	5	04/05/24 15:24	04/05/24	
Arsenic	200.8	**25.9**		ug/L	2.5	0.5	5	04/05/24 15:24	04/05/24	
Barium	200.8	**557**		ug/L	0.25	0.10	5	04/05/24 15:24	04/05/24	
Beryllium	200.8	**0.05**	**J**	ug/L	0.10	0.03	5	04/05/24 15:24	04/05/24	
Cadmium	200.8	**0.18**		ug/L	0.10	0.04	5	04/05/24 15:24	04/05/24	
Calcium	200.7	**105000**		ug/L	210	30	10	04/09/24 10:25	04/05/24	
Chromium	200.8	**120**		ug/L	1.0	0.2	5	04/05/24 15:24	04/05/24	
Cobalt	200.8	**12.0**		ug/L	0.10	0.05	5	04/05/24 15:24	04/05/24	
Copper	200.8	**79.3**		ug/L	0.50	0.25	5	04/05/24 15:24	04/05/24	
Iron	200.7	**3000**		ug/L	210	80	10	04/09/24 10:25	04/05/24	
Lead	200.8	**16.2**		ug/L	0.10	0.03	5	04/05/24 15:24	04/05/24	
Magnesium	200.7	**98200**		ug/L	53	4	10	04/09/24 10:25	04/05/24	
Manganese	200.7	**797**		ug/L	11	2	10	04/09/24 10:25	04/05/24	
Nickel	200.8	**119**		ug/L	1.0	0.2	5	04/05/24 15:24	04/05/24	
Potassium	200.7	**316000**		ug/L	2100	600	10	04/09/24 10:25	04/05/24	
Selenium	200.8	ND	U	ug/L	5.0	1.0	5	04/05/24 15:24	04/05/24	
Silver	200.8	**0.06**	**J**	ug/L	0.10	0.05	5	04/05/24 15:24	04/05/24	
Sodium	200.7	**2040000**		ug/L	2100	300	10	04/09/24 10:25	04/05/24	
Thallium	200.8	ND	U	ug/L	0.10	0.05	5	04/05/24 15:24	04/05/24	
Vanadium	200.8	**48.4**		ug/L	1.0	0.2	5	04/05/24 15:24	04/05/24	
Zinc	200.8	**96**		ug/L	10	3	5	04/05/24 15:24	04/05/24	

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:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 10:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W1-402	**Basis:**	NA
Lab Code:	K2403464-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Ammonia as Nitrogen	SM 4500-NH3 E	**0.070**	mg/L	0.050	0.009	1	04/16/24 10:30	
Carbon, Total Organic (TOC)	SM 5310 B	**1.10**	mg/L	0.50	0.10	1	04/03/24 20:06	
Nitrate as Nitrogen	300.0	**0.96**	mg/L	0.10	0.006	2	04/03/24 17:13	
Sulfate	300.0	**0.85**	mg/L	0.20	0.02	2	04/03/24 17:13	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 10:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W1-402	**Basis:**	NA
Lab Code:	K2403464-001		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**40**	mg/L	10	-	1	04/09/24 11:06	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 12:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W2-402	**Basis:**	NA
Lab Code:	K2403464-002		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**38.0**		mg/L	2.0	0.6	1	04/05/24 11:12	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.040**	**J**	mg/L	0.050	0.009	1	04/16/24 10:30	
Carbon, Total Organic (TOC)	SM 5310 B	**1.20**		mg/L	0.50	0.10	1	04/03/24 20:06	
Chloride	300.0	**2.72**		mg/L	0.20	0.010	2	04/03/24 17:47	
Nitrate as Nitrogen	300.0	**0.17**		mg/L	0.10	0.006	2	04/03/24 17:47	
Solids, Total Suspended (TSS)	SM 2540 D	ND	U	mg/L	5.0	-	1	04/04/24 09:56	
Sulfate	300.0	**1.64**		mg/L	0.20	0.02	2	04/03/24 17:47	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 12:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W2-402	**Basis:**	NA
Lab Code:	K2403464-002		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**49**	mg/L	10	-	1	04/09/24 11:06	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 11:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W3-402	**Basis:**	NA
Lab Code:	K2403464-003		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**81.3**	mg/L	2.0	0.6	1	04/05/24 11:12	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.410**	mg/L	0.050	0.009	1	04/16/24 10:30	
Carbon, Total Organic (TOC)	SM 5310 B	**4.00**	mg/L	0.50	0.10	1	04/03/24 20:06	
Chloride	300.0	**9.92**	mg/L	0.20	0.010	2	04/03/24 17:56	
Nitrate as Nitrogen	300.0	**0.02 J**	mg/L	0.10	0.006	2	04/03/24 17:56	
Solids, Total Suspended (TSS)	SM 2540 D	**8.0**	mg/L	5.0	-	1	04/04/24 09:56	
Sulfate	300.0	**0.14 J**	mg/L	0.20	0.02	2	04/03/24 17:56	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 11:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W3-402	**Basis:**	NA
Lab Code:	K2403464-003		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**121**	mg/L	10	-	1	04/09/24 11:06	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 12:30
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W4-402	**Basis:**	NA
Lab Code:	K2403464-004		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**33.3**		mg/L	2.0	0.6	1	04/05/24 11:12	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.040**	**J**	mg/L	0.050	0.009	1	04/16/24 10:30	
Carbon, Total Organic (TOC)	SM 5310 B	**0.70**		mg/L	0.50	0.10	1	04/05/24 15:33	
Chloride	300.0	**8.30**		mg/L	0.20	0.010	2	04/03/24 18:05	
Nitrate as Nitrogen	300.0	**0.36**		mg/L	0.10	0.006	2	04/03/24 18:05	
Solids, Total Suspended (TSS)	SM 2540 D	ND	U	mg/L	5.0	-	1	04/04/24 09:56	
Sulfate	300.0	**0.49**		mg/L	0.20	0.02	2	04/03/24 18:05	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 12:30
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W4-402	**Basis:**	NA
Lab Code:	K2403464-004		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**74**	mg/L	10	-	1	04/09/24 11:06	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 14:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W5-402	**Basis:**	NA
Lab Code:	K2403464-005		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**32.4**		mg/L	2.0	0.6	1	04/05/24 11:12	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.030**	**J**	mg/L	0.050	0.009	1	04/16/24 10:30	
Carbon, Total Organic (TOC)	SM 5310 B	**0.60**		mg/L	0.50	0.10	1	04/05/24 15:33	
Chloride	300.0	**5.99**		mg/L	0.20	0.010	2	04/03/24 18:13	
Nitrate as Nitrogen	300.0	**0.01**	**J**	mg/L	0.10	0.006	2	04/03/24 18:13	
Solids, Total Suspended (TSS)	SM 2540 D	ND	U	mg/L	5.0	-	1	04/04/24 09:56	
Sulfate	300.0	**1.13**		mg/L	0.20	0.02	2	04/03/24 18:13	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 14:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W5-402	**Basis:**	NA
Lab Code:	K2403464-005		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**64**	mg/L	10	-	1	04/09/24 11:06	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 14:30
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W6-402	**Basis:**	NA
Lab Code:	K2403464-006		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**50.7**		mg/L	2.0	0.6	1	04/05/24 11:12	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.020**	**J**	mg/L	0.050	0.009	1	04/16/24 10:30	
Carbon, Total Organic (TOC)	SM 5310 B	**0.24**	**J**	mg/L	0.50	0.10	1	04/05/24 15:33	
Chloride	300.0	**4.15**		mg/L	0.20	0.010	2	04/03/24 18:22	
Nitrate as Nitrogen	300.0	**0.06**	**J**	mg/L	0.10	0.006	2	04/03/24 18:22	
Solids, Total Suspended (TSS)	SM 2540 D	ND	U	mg/L	5.0	-	1	04/04/24 09:56	
Sulfate	300.0	**0.56**		mg/L	0.20	0.02	2	04/03/24 18:22	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 14:30
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W6-402	**Basis:**	NA
Lab Code:	K2403464-006		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**119**	mg/L	10	-	1	04/09/24 11:06	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 15:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W7-402	**Basis:**	NA
Lab Code:	K2403464-007		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**51.2**		mg/L	2.0	0.6	1	04/05/24 11:12	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.040**	**J**	mg/L	0.050	0.009	1	04/16/24 10:30	
Carbon, Total Organic (TOC)	SM 5310 B	**0.36**	**J**	mg/L	0.50	0.10	1	04/05/24 15:33	
Chloride	300.0	**4.01**		mg/L	0.20	0.010	2	04/03/24 18:31	
Nitrate as Nitrogen	300.0	**0.05**	**J**	mg/L	0.10	0.006	2	04/03/24 18:31	
Solids, Total Suspended (TSS)	SM 2540 D	ND	U	mg/L	5.0	-	1	04/04/24 09:56	
Sulfate	300.0	**0.55**		mg/L	0.20	0.02	2	04/03/24 18:31	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 15:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W7-402	**Basis:**	NA
Lab Code:	K2403464-007		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**118**	mg/L	10	-	1	04/09/24 11:06	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 16:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W8-402	**Basis:**	NA
Lab Code:	K2403464-008		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**4660**	mg/L	20	6	10	04/06/24 12:10	
Ammonia as Nitrogen	SM 4500-NH3 E	**158**	mg/L	0.10	0.02	2	04/16/24 10:30	
Carbon, Total Organic (TOC)	SM 5310 B	**1100**	mg/L	250	50	500	04/05/24 15:33	
Chloride	300.0	**739**	mg/L	10	0.5	100	04/04/24 20:40	
Nitrate as Nitrogen	300.0	ND U	mg/L	2.5	0.2	50	04/04/24 20:48	*
Solids, Total Suspended (TSS)	SM 2540 D	**16.0**	mg/L	5.0	-	1	04/04/24 09:56	
Sulfate	300.0	**24.2**	mg/L	2.0	0.2	20	04/03/24 19:14	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24 16:00
Sample Matrix:	Water	**Date Received:**	04/02/24 16:50
Sample Name:	W8-402	**Basis:**	NA
Lab Code:	K2403464-008		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Solids, Total Dissolved	SM 2540 C	**7420**	mg/L	200	-	1	04/09/24 11:06	

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:** K2403464
Project: Cowlitz Co. Headquarters Landfill Detection Mont.
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
W2-402	K2403464-002	92	93	95
W3-402	K2403464-003	91	95	94
W4-402	K2403464-004	91	92	94
W5-402	K2403464-005	92	94	96
W6-402	K2403464-006	92	98	96
W7-402	K2403464-007	92	98	95
W8-402	K2403464-008	92	97	95
Trip Blanks	K2403464-009	91	96	96
Lab Control Sample	KQ2405654-03	102	100	98
Duplicate Lab Control Sample	KQ2405654-04	100	100	99
Method Blank	KQ2405654-05	94	90	95

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KQ2405654-05	**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	04/08/24 12:14	
Acrylonitrile	ND U	5.0	0.53	1	04/08/24 12:14	
Benzene	ND U	0.50	0.062	1	04/08/24 12:14	
Bromochloromethane	ND U	0.50	0.16	1	04/08/24 12:14	
Bromodichloromethane	ND U	0.50	0.091	1	04/08/24 12:14	
Bromoform	ND U	0.50	0.16	1	04/08/24 12:14	
Bromomethane	ND U	0.50	0.16	1	04/08/24 12:14	
2-Butanone (MEK)	ND U	20	1.9	1	04/08/24 12:14	
Carbon Disulfide	ND U	0.50	0.069	1	04/08/24 12:14	
Carbon Tetrachloride	ND U	0.50	0.096	1	04/08/24 12:14	
Chlorobenzene	ND U	0.50	0.11	1	04/08/24 12:14	
Chloroethane	ND U	0.50	0.16	1	04/08/24 12:14	
Chloroform	ND U	0.50	0.072	1	04/08/24 12:14	
Chloromethane	ND U	0.50	0.068	1	04/08/24 12:14	
1,2-Dibromo-3-chloropropane	ND U	2.0	0.22	1	04/08/24 12:14	
Dibromochloromethane	ND U	0.50	0.14	1	04/08/24 12:14	
1,2-Dibromoethane (EDB)	ND U	2.0	0.10	1	04/08/24 12:14	
Dibromomethane	ND U	0.50	0.15	1	04/08/24 12:14	
trans-1,4-Dichloro-2-butene	ND U	10	0.35	1	04/08/24 12:14	
1,2-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 12:14	
1,4-Dichlorobenzene	ND U	0.50	0.12	1	04/08/24 12:14	
1,1-Dichloroethane	ND U	0.50	0.077	1	04/08/24 12:14	
1,2-Dichloroethane (EDC)	ND U	0.50	0.080	1	04/08/24 12:14	
1,1-Dichloroethene	ND U	0.50	0.080	1	04/08/24 12:14	
cis-1,2-Dichloroethene	ND U	0.50	0.067	1	04/08/24 12:14	
trans-1,2-Dichloroethene	ND U	0.50	0.072	1	04/08/24 12:14	
1,2-Dichloropropane	ND U	0.50	0.095	1	04/08/24 12:14	
cis-1,3-Dichloropropene	ND U	0.50	0.18	1	04/08/24 12:14	
trans-1,3-Dichloropropene	ND U	0.50	0.068	1	04/08/24 12:14	
Ethylbenzene	ND U	0.50	0.050	1	04/08/24 12:14	
2-Hexanone	ND U	20	2.7	1	04/08/24 12:14	
Iodomethane	ND U	5.0	0.12	1	04/08/24 12:14	
4-Methyl-2-pentanone (MIBK)	ND U	20	2.6	1	04/08/24 12:14	
Methylene Chloride	ND U	2.0	0.10	1	04/08/24 12:14	
Styrene	ND U	0.50	0.089	1	04/08/24 12:14	
1,1,1,2-Tetrachloroethane	ND U	0.50	0.11	1	04/08/24 12:14	
1,1,2,2-Tetrachloroethane	ND U	0.50	0.16	1	04/08/24 12:14	
Tetrachloroethene (PCE)	ND U	0.50	0.099	1	04/08/24 12:14	
Toluene	ND U	0.50	0.054	1	04/08/24 12:14	
1,1,2-Trichloroethane	ND U	0.50	0.14	1	04/08/24 12:14	
1,1,1-Trichloroethane (TCA)	ND U	0.50	0.075	1	04/08/24 12:14	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KQ2405654-05	**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	04/08/24 12:14	
Trichlorofluoromethane (CFC 11)	ND U	0.50	0.12	1	04/08/24 12:14	
1,2,3-Trichloropropane	ND U	0.50	0.20	1	04/08/24 12:14	
Vinyl Acetate	ND U	5.0	0.43	1	04/08/24 12:14	
Vinyl Chloride	ND U	0.50	0.075	1	04/08/24 12:14	
o-Xylene	ND U	0.50	0.074	1	04/08/24 12:14	
m,p-Xylenes	ND U	0.50	0.11	1	04/08/24 12:14	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	94	68 - 117	04/08/24 12:14	
Dibromofluoromethane	90	73 - 122	04/08/24 12:14	
Toluene-d8	95	65 - 144	04/08/24 12:14	

QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Analyzed:**	04/08/24
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:	837149

	Lab Control Sample KQ2405654-03			Duplicate Lab Control Sample KQ2405654-04					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
1,1,1,2-Tetrachloroethane	8.10	10.0	81	7.94	10.0	79	66-124	2	30
1,1,1-Trichloroethane (TCA)	8.37	10.0	84	8.12	10.0	81	59-136	3	30
1,1,2,2-Tetrachloroethane	8.38	10.0	84	8.53	10.0	85	70-127	2	30
1,1,2-Trichloroethane	8.81	10.0	88	8.67	10.0	87	74-118	2	30
1,1-Dichloroethane	8.55	10.0	86	8.45	10.0	85	68-132	1	30
1,1-Dichloroethene	8.14	10.0	81	7.94	10.0	79	66-129	2	30
1,2,3-Trichloropropane	8.59	10.0	86	8.42	10.0	84	69-123	2	30
1,2-Dibromo-3-chloropropane	6.76	10.0	68	6.53	10.0	65	55-132	3	30
1,2-Dibromoethane (EDB)	9.26	10.0	93	8.95	10.0	90	74-118	3	30
1,2-Dichlorobenzene	8.62	10.0	86	8.60	10.0	86	72-115	<1	30
1,2-Dichloroethane (EDC)	8.60	10.0	86	8.42	10.0	84	56-142	2	30
1,2-Dichloropropane	8.32	10.0	83	8.18	10.0	82	67-126	2	30
1,4-Dichlorobenzene	8.81	10.0	88	8.64	10.0	86	73-115	2	30
2-Butanone (MEK)	46.7	50.0	93	45.7	50.0	91	71-149	2	30
2-Hexanone	46.6	50.0	93	45.8	50.0	92	59-131	2	30
4-Methyl-2-pentanone (MIBK)	43.0	50.0	86	43.8	50.0	88	64-134	2	30
Acetone	49.0	50.0	98	48.0	50.0	96	68-135	2	30
Acrylonitrile	35.6	40.0	89	35.2	40.0	88	65-129	1	30
Benzene	8.94	10.0	89	8.77	10.0	88	69-124	2	30
Bromochloromethane	9.03	10.0	90	8.86	10.0	89	75-131	2	30
Bromodichloromethane	7.95	10.0	80	7.84	10.0	78	63-129	1	30
Bromoform	7.12	10.0	71	7.11	10.0	71	52-144	<1	30
Bromomethane	6.39	10.0	64	6.39	10.0	64	35-113	<1	30
Carbon Disulfide	16.6	20.0	83	16.1	20.0	81	46-144	3	30
Carbon Tetrachloride	7.95	10.0	80	7.84	10.0	78	55-140	1	30
Chlorobenzene	9.30	10.0	93	8.89	10.0	89	72-116	5	30
Chloroethane	9.00	10.0	90	8.70	10.0	87	58-134	3	30
Chloroform	8.79	10.0	88	8.51	10.0	85	70-129	3	30
Chloromethane	7.56	10.0	76	7.38	10.0	74	34-130	2	30
cis-1,2-Dichloroethene	8.28	10.0	83	8.05	10.0	81	71-118	3	30
cis-1,3-Dichloropropene	8.12	10.0	81	8.02	10.0	80	62-132	1	30
Dibromochloromethane	7.58	10.0	76	7.61	10.0	76	67-126	<1	30
Dibromomethane	8.49	10.0	85	8.55	10.0	86	69-128	<1	30
Ethylbenzene	9.16	10.0	92	8.83	10.0	88	67-121	4	30
Iodomethane	27.5	30.0	92	26.5	30.0	88	51-164	4	30
m,p-Xylenes	18.8	20.0	94	18.1	20.0	91	69-121	4	30
Methylene Chloride	9.03	10.0	90	8.81	10.0	88	71-122	2	30
o-Xylene	9.24	10.0	92	8.99	10.0	90	71-119	3	30
Styrene	9.00	10.0	90	8.72	10.0	87	74-121	3	30
Tetrachloroethene (PCE)	9.15	10.0	92	8.83	10.0	88	62-126	4	30
Toluene	8.87	10.0	89	8.60	10.0	86	69-124	3	30

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Analyzed:**	04/08/24
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:	837149

	Lab Control Sample KQ2405654-03			Duplicate Lab Control Sample KQ2405654-04					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
trans-1,2-Dichloroethene	8.39	10.0	84	8.29	10.0	83	67-125	1	30
trans-1,3-Dichloropropene	8.00	10.0	80	7.66	10.0	77	59-125	4	30
trans-1,4-Dichloro-2-butene	23.2	30.0	77	24.4	30.0	81	46-170	5	30
Trichloroethene (TCE)	8.69	10.0	87	8.49	10.0	85	67-128	2	30
Trichlorofluoromethane (CFC 11)	9.07	10.0	91	8.95	10.0	90	52-141	1	30
Vinyl Acetate	41.1	50.0	82	40.7	50.0	81	44-156	1	30
Vinyl Chloride	8.22	10.0	82	8.08	10.0	81	55-123	2	30

Metals

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

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2404905-01		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Calcium	200.7	**5 J**	ug/L	21	3	1	04/09/24 09:46	04/05/24	
Iron	200.7	ND U	ug/L	21	8	1	04/09/24 09:46	04/05/24	
Magnesium	200.7	ND U	ug/L	5.3	0.4	1	04/09/24 09:46	04/05/24	
Manganese	200.7	ND U	ug/L	1.1	0.2	1	04/09/24 09:46	04/05/24	
Potassium	200.7	ND U	ug/L	210	60	1	04/09/24 09:46	04/05/24	
Sodium	200.7	ND U	ug/L	210	30	1	04/09/24 09:46	04/05/24	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2404907-01		

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	04/05/24 14:22	04/05/24	
Arsenic	200.8	ND U	ug/L	0.50	0.09	1	04/05/24 14:22	04/05/24	
Barium	200.8	ND U	ug/L	0.050	0.020	1	04/05/24 14:22	04/05/24	
Beryllium	200.8	ND U	ug/L	0.020	0.005	1	04/05/24 14:22	04/05/24	
Cadmium	200.8	ND U	ug/L	0.020	0.008	1	04/05/24 14:22	04/05/24	
Chromium	200.8	ND U	ug/L	0.20	0.03	1	04/05/24 14:22	04/05/24	
Cobalt	200.8	ND U	ug/L	0.020	0.009	1	04/05/24 14:22	04/05/24	
Copper	200.8	ND U	ug/L	0.10	0.05	1	04/05/24 14:22	04/05/24	
Lead	200.8	ND U	ug/L	0.020	0.006	1	04/05/24 14:22	04/05/24	
Nickel	200.8	ND U	ug/L	0.20	0.04	1	04/05/24 14:22	04/05/24	
Selenium	200.8	ND U	ug/L	1.0	0.2	1	04/05/24 14:22	04/05/24	
Silver	200.8	ND U	ug/L	0.020	0.009	1	04/05/24 14:22	04/05/24	
Thallium	200.8	ND U	ug/L	0.020	0.009	1	04/05/24 14:22	04/05/24	
Vanadium	200.8	ND U	ug/L	0.20	0.04	1	04/05/24 14:22	04/05/24	
Zinc	200.8	ND U	ug/L	2.0	0.5	1	04/05/24 14:22	04/05/24	

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24
Sample Matrix:	Water	**Date Received:**	04/02/24
		Date Analyzed:	04/9/24
		Date Extracted:	04/5/24

Matrix Spike Summary
Total Metals

Sample Name:	W1-402	**Units:**	ug/L
Lab Code:	K2403464-001	**Basis:**	NA
Analysis Method:	200.7		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2404905-04

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Calcium	3860	14200	10000	103	70-130
Iron	258	1240	1000	98	70-130
Magnesium	1650	11900	10000	103	70-130
Manganese	10.5	513	500	100	70-130
Potassium	450	10700	10000	102	70-130
Sodium	3540	14100	10000	106	70-130

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

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

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

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.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24
Sample Matrix:	Water	**Date Received:**	04/02/24
		Date Analyzed:	04/09/24

Replicate Sample Summary

Total Metals

Sample Name:	W1-402	**Units:**	ug/L
Lab Code:	K2403464-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample KQ2404905-03 Result	Average	RPD	RPD Limit
Calcium	200.7	21	3	3860	3790	3830	2	20
Iron	200.7	21	8	258	249	254	4	20
Magnesium	200.7	5.3	0.4	1650	1630	1640	1	20
Manganese	200.7	1.1	0.2	10.5	10.2	10.4	3	20
Potassium	200.7	210	60	450	410	430	9	20
Sodium	200.7	210	30	3540	3490	3520	1	20

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

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

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

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

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

Service Request: K2403464
Date Analyzed: 04/09/24

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2404905-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Calcium	200.7	13100	12500	105	85-115
Iron	200.7	2480	2500	99	85-115
Magnesium	200.7	12700	12500	102	85-115
Manganese	200.7	1260	1250	101	85-115
Potassium	200.7	12700	12500	101	85-115
Sodium	200.7	13200	12500	106	85-115

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Analyzed:**	04/05/24
Sample Matrix:	Water		

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2404907-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Antimony	200.8	9.78	10.0	98	85-115
Arsenic	200.8	51.2	50.0	102	85-115
Barium	200.8	100	100	100	85-115
Beryllium	200.8	2.57	2.50	103	85-115
Cadmium	200.8	24.9	25.0	99	85-115
Chromium	200.8	10.2	10.0	102	85-115
Cobalt	200.8	25.7	25.0	103	85-115
Copper	200.8	13.0	12.5	104	85-115
Lead	200.8	49.1	50.0	98	85-115
Nickel	200.8	25.5	25.0	102	85-115
Selenium	200.8	51.8	50.0	104	85-115
Silver	200.8	13.0	12.5	104	85-115
Thallium	200.8	49.1	50.0	98	85-115
Vanadium	200.8	25.4	25.0	102	85-115
Zinc	200.8	26.2	25.0	105	85-115

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:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2403464-MB1		

General Chemistry Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Q
Alkalinity as CaCO3, Total	SM 2320 B	**1.2**	**J**	mg/L	2.0	0.6	1	04/05/24 11:12	
Ammonia as Nitrogen	SM 4500-NH3 E	**0.030**	**J**	mg/L	0.050	0.009	1	04/16/24 10:30	
Carbon, Total Organic (TOC)	SM 5310 B	ND	U	mg/L	0.50	0.10	1	04/03/24 20:06	
Chloride	300.0	**0.01**	**J**	mg/L	0.10	0.005	1	04/03/24 16:56	
Nitrate as Nitrogen	300.0	ND	U	mg/L	0.050	0.003	1	04/03/24 16:56	
Solids, Total Suspended (TSS)	SM 2540 D	ND	U	mg/L	5.0	-	1	04/04/24 09:56	
Sulfate	300.0	ND	U	mg/L	0.10	0.010	1	04/03/24 16:56	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2403464-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	04/09/24 11:06	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2403464-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	04/06/24 12:10	
Carbon, Total Organic (TOC)	SM 5310 B	ND U	mg/L	0.50	0.10	1	04/05/24 15:33	
Chloride	300.0	**0.01 J**	mg/L	0.10	0.005	1	04/03/24 18:57	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	0.003	1	04/03/24 18:57	
Solids, Total Suspended (TSS)	SM 2540 D	ND U	mg/L	5.0	-	1	04/04/24 09:56	
Sulfate	300.0	ND U	mg/L	0.10	0.010	1	04/03/24 18:57	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2403464-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	04/09/24 11:06	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2403464-MB3		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Chloride	300.0	**0.01 J**	mg/L	0.10	0.005	1	04/03/24 20:58	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	0.003	1	04/03/24 20:58	
Sulfate	300.0	ND U	mg/L	0.10	0.010	1	04/03/24 20:58	

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2403464-MB4		

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	04/04/24 17:38	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	0.003	1	04/04/24 17:38	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	K2403464-MB5		

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Chloride	300.0	**0.005 J**	mg/L	0.10	0.005	1	04/04/24 19:39	
Nitrate as Nitrogen	300.0	ND U	mg/L	0.050	0.003	1	04/04/24 19:39	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24
Sample Matrix:	Water	**Date Received:**	04/02/24
		Date Analyzed:	4/3/24

Duplicate Matrix Spike Summary
General Chemistry Parameters

Sample Name:	W1-402	**Units:**	mg/L
Lab Code:	K2403464-001	**Basis:**	NA

			Matrix Spike				Duplicate Matrix Spike				
			K2403464-001MS				K2403464-001DMS				
Analyte Name	**Method**	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Nitrate as Nitrogen	300.0	0.96	8.89	8.00	99	8.91	8.00	99	90-110	<1	20
Sulfate	300.0	0.85	16.5	16.0	98	16.6	16.0	98	90-110	<1	20

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

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

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

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24
Sample Matrix:	Water	**Date Received:**	04/02/24
		Date Analyzed:	04/03/24

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	W1-402	**Units:**	mg/L
Lab Code:	K2403464-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K2403464-001DUP Result	Average	RPD	RPD Limit
Nitrate as Nitrogen	300.0	0.10	0.006	0.96	0.94	0.950	1	20
Sulfate	300.0	0.20	0.02	0.85	0.84	0.843	1	20

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

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

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

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Collected:**	04/02/24
Sample Matrix:	Water	**Date Received:**	04/02/24
		Date Analyzed:	04/05/24

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	W2-402	**Units:**	mg/L
Lab Code:	K2403464-002	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K2403464-002DUP Result	Average	RPD	RPD Limit
Alkalinity as CaCO3, Total	SM 2320 B	2.0	0.6	38.0	38.6	38.3	2	20

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

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

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

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

Service Request: K2403464
Date Analyzed: 04/03/24 - 04/16/24

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2403464-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, Total	SM 2320 B	51.3	50.2	102	85-115
Ammonia as Nitrogen	SM 4500-NH3 E	3.38	3.79	89	85-115
Carbon, Total Organic (TOC)	SM 5310 B	26.3	25.0	105	85-115
Chloride	300.0	4.87	5.00	97	90-110
Nitrate as Nitrogen	300.0	2.53	2.50	101	90-110
Solids, Total Dissolved	SM 2540 C	1410	1430	98	85-115
Solids, Total Suspended (TSS)	SM 2540 D	372	390	95	85-115
Sulfate	300.0	5.00	5.00	100	90-110

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

Service Request: K2403464
Date Analyzed: 04/03/24 - 04/05/24

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2403464-LCS2

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, Total	SM 2320 B	54.3	50.2	108	85-115
Carbon, Total Organic (TOC)	SM 5310 B	23.8	25.0	95	85-115
Chloride	300.0	4.89	5.00	98	90-110
Nitrate as Nitrogen	300.0	2.54	2.50	102	90-110
Sulfate	300.0	5.02	5.00	100	90-110

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

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

Service Request: K2403464
Date Analyzed: 04/03/24 - 04/06/24

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2403464-LCS3

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, Total	SM 2320 B	51.6	50.2	103	85-115
Chloride	300.0	4.89	5.00	98	90-110
Nitrate as Nitrogen	300.0	2.54	2.50	101	90-110
Sulfate	300.0	5.00	5.00	100	90-110

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

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

Service Request: K2403464
Date Analyzed: 04/04/24 - 04/06/24

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2403464-LCS4

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Alkalinity as CaCO3, Total	SM 2320 B	52.0	50.2	104	85-115
Chloride	300.0	4.89	5.00	98	90-110
Nitrate as Nitrogen	300.0	2.52	2.50	101	90-110

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Cowlitz County Public Works	**Service Request:**	K2403464
Project:	Cowlitz Co. Headquarters Landfill Detection Mont.	**Date Analyzed:**	04/04/24
Sample Matrix:	Water		

Lab Control Sample Summary
General Chemistry Parameters

Units:mg/L
Basis:NA

Lab Control Sample
K2403464-LCS5

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chloride	300.0	4.92	5.00	98	90-110
Nitrate as Nitrogen	300.0	2.54	2.50	101	90-110