



Westside Regional Wastewater Treatment Plant Annual Report 2023

Prepared by: A. Lambrecht, PTech, RDCO Senior Process Technologist



Westside Regional Wastewater Treatment Plant Annual Report 2023

Purpose

This report is submitted by the Regional District of Central Okanagan according to the requirement for an annual report as stated in Operational Certificate (OC) PE 11652, Section 4.2 for the Westside Regional Wastewater Treatment Plant.

Introduction and Facility/Operator Classifications

The British Columbia Environmental Operators Certification Program (EOCP) classifies the Westside Regional Wastewater Treatment Plant (WRWTP) as a Level IV facility, EOCP # 157. Under this classification the facility must have one designated Level IV Chief Operator (**Table 1**).

The Plant is in the City of West Kelowna (CWK), British Columbia and is operated by the Regional District of Central Okanagan (RDCO). The WRWTP receives wastewater from the City of West Kelowna (CWK), the District of Peachland and Westbank First Nation (WFN) Reserves #9 and #10.

The WRWTP operates the Westbank Process that uses biological nutrient removal (BNR) in sequential anaerobic, anoxic, and aerobic zones. The three-stage activated sludge process removes both nitrogen and phosphorus from the wastewater and achieves a high carbonaceous biochemical oxygen demand (c-BOD) removal. Aluminum sulphate is used for supplemental phosphorus removal. This, along with

clarifiers, Aqua Cloth Media filters and an ultraviolet disinfection system reduce the pathogens, solids and nutrients that discharge into Okanagan Lake.

Table 1 – 2023 WRWTP Staff and EOCP Designations

Operator Name	EOCP Number	EOCP Certificates
Mike Wyman (Chief Operator)	1144	MWWT-4
Bryan Mazda	6424	MWWT-4, WWC-1
Andrew Wannop	7807	MWWT-3
Douglas Murray	8918	MWWT-2
Scott Bruce	4841	WWC-1, MWWT-1
Ranjit Singh	1000544	MWWT-2
Quinn Dartnell	1001952	OIT
Angela Lambrecht (Lab)	6468	MWWT-1
Greg Beloin (Lab)	7787	MWWT-2, WWC-1

Records of Effluent Water Balance and Water Reclamation (Service Water)

Effluent Water Balance

Flow Monitoring devices are in place at the treatment plant – a Parshall Flume is situated in the influent channel located before the Headworks building and two ultrasonic meters in the Final effluent channel(s) before the cloth filters in the tertiary treatment section of the plant. **Table 2** shows the average daily and monthly flows for 2023. The average daily flow into the WRWTP during 2023 was approximately **11,339 m³/day**.

Flow Verification was confirmed on both Influent and Effluent meters in 2023 by RDCO Electrical Staff:

WWTP INFLUENT FLOW METER PROVING							
TAG:	Description:	Date:	Time:	Visual Measured	As per 24" Flow Chart	Tx Measured	% Error +/-
FI-A-1202	24" Influent	Jan 5/24		762mm	812.8mm		6.7

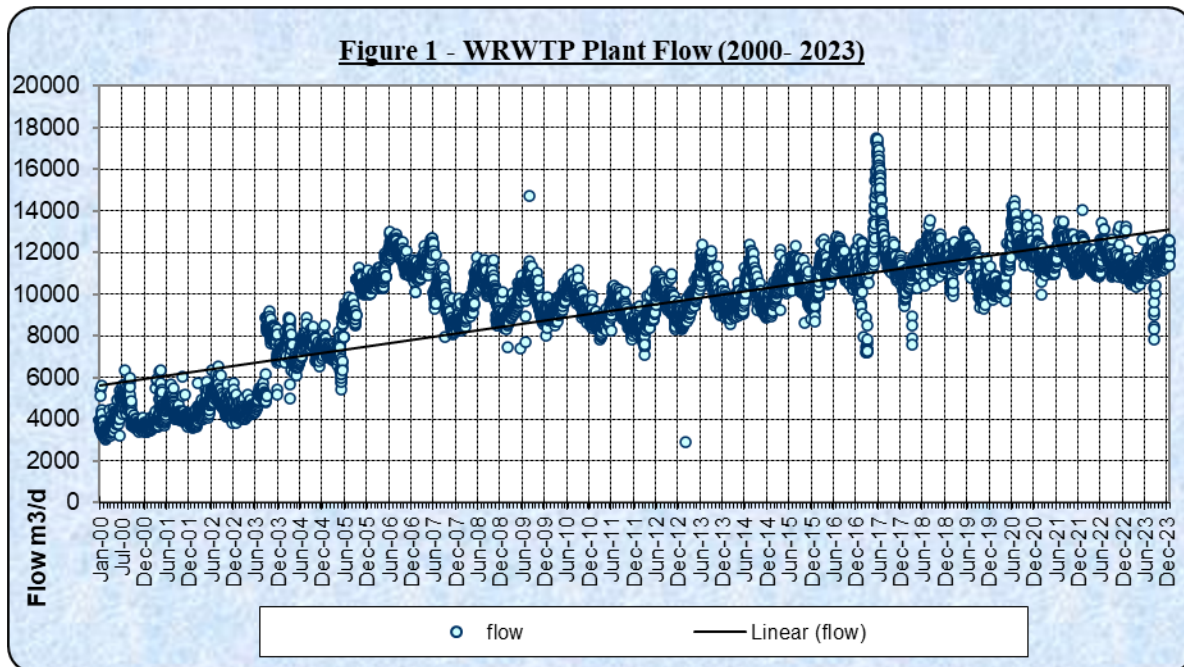
WWTP EFFLUENT FLOW METER PROVING						
TAG:	Description:	Date:	% Error +/-	Test Meter	Test Meter Model #	Comments
FE-F-4160	Bio 5/6	Jan 18/24	1.10	Rosemount	354778	
FE-F-4271	Bio 1/2/3/4	Jan 18/24	1.12	EH ProSonic	E108D102000	

Table 2 – Average Daily and Monthly Flows for 2023

2023	Average Daily Flow (m3/day)		Total Monthly Flow (m3/month)	
	Influent	Outfall	Influent	Outfall
Jan	10,702	11,318	331,754	350,847
Feb	10,434	10,848	292,163	303,754
Mar	10,441	10,813	323,656	335,217
Apr	10,816	10,981	324,465	329,430
May	10,720	11,181	332,309	346,617
Jun	10,591	11,184	317,723	335,513
Jul	10,928	11,792	338,758	365,551
Aug	10,184	10,978	315,691	340,312
Sep	10,755	11,606	322,638	348,192
Oct	10,585	11,648	328,130	361,074
Nov	10,356	11,649	310,685	349,477
Dec	10,450	12,029	323,953	372,892

Figure 1 illustrates the WRWTP Daily flow from January 2000 - December 2023.

Figure 1 – WRWTP Flow



Note: Low flows recorded from August 19-24, 2023, due to the McDougal Creek Wildfire and evacuation orders for West Kelowna area residents.

Water Reclamation (Service water)

Plant effluent is utilized for wash-down water, polymer make down, pump seal water and irrigation. Commonly referred to as service water, this water is metered and chlorinated. The duration of irrigation for 2023 was from March 30 -October 5, 2023. The total service water used was **119, 831 m³** while the total irrigation water used was **2,664 m³**.

General Reporting Requirements and Monitoring Programs

Federal Regulations were implemented for all Wastewater Facilities in 2013. Under these Regulations each facility is required to issue quarterly reports on the Effluent Quality and Quantity. It is anticipated that a reciprocity agreement will be reached so that only one report is required that satisfies both Federal and Provincial Regulations. Currently the RDCO WRWTP is complying with both requirements.

The WRWTP Lab follows the terms and conditions of the Quality Assurance Regulation (EDQA) and is an Accredited Laboratory in good standing with CALA's Laboratory Proficiency Program and is listed in the Directory of Qualified Laboratories on gov.bc.ca (Environmental Protection and Sustainability). The lab also incorporates a quality control program which is checked daily against known standards.

All analysis conducted in the lab follows Standard Methods for the Examination of Water and Wastewater, 23rd Edition. Ten percent of the samples collected are duplicated to provide data quality assurance including field and sample blanks, the number of quality control samples are 20% of all samples collected (every five samples) and additional quality control standards are added during sample analysis as required.

CARO Analytical Services and ALS Environmental are accredited independent laboratories located in BC. Samples from the WRWTP are sent to **CARO Analytical Services and/or ALS Environmental** to be analyzed and data is uploaded to the MOE EMS site monthly as required under the provincial OC.

Additional sample analysis is required under the Federal Regulations and is reported quarterly using the ERRIS (Effluent Regulatory Reporting Information System). Where and when possible, sampling for both Provincial and Federal Regulations are combined. Data from the accredited independent laboratories include QA/QC, sample duplicates, and blanks (sample, trip, and field). These results aid in maintaining an appropriate level of quality assurance and quality control within the RDCO lab.

The influent and final effluent data reports for 2023 are provided in **Appendix A**.

Effluent Monitoring Program

Table 3 – 2023 Monthly Average Final Effluent data

2023	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Avg
Est. Total Nitrogen (mg/L)	5.38	5.10	3.65	4.88	7.98	9.46	9.31	4.91	4.36	5.69	9.42	10.62	6.73
Total Kjeldhal Nitrogen (mg/L)	1.90	1.96	1.86	2.24	2.01	1.75	3.15	1.54	1.64	2.09	1.97	2.57	2.06
Organic Nitrogen (mg/L)	1.64	1.68	1.61	1.99	1.71	1.38	2.53	1.38	1.53	1.78	1.61	1.77	1.72
Nitrate/Nitrite (mg/L)	3.48	3.15	1.79	2.64	5.97	7.85	6.16	3.37	2.73	3.61	7.45	8.05	4.69
Ammonia (mg/L)	0.27	0.28	0.25	0.25	0.30	0.36	0.61	0.16	0.10	0.31	0.37	0.80	0.34
Total Phosphorus (mg/L)	0.288	0.366	0.399	0.345	0.264	0.269	0.189	0.224	0.180	0.194	0.196	0.160	0.256
Ortho Phosphate (mg/L)	0.19	0.26	0.30	0.18	0.13	0.16	0.09	0.14	0.08	0.11	0.14	0.11	0.16
C-BOD (mg/L)	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.0	2.5	3.0	1.5	2.0	2.1
COD (mg/L)	24	19	17	22	17	32	28	27	19	20	20	19	22
Total Suspended Solids (mg/L)	3.1	4.4	4.1	3.6	1.5	3.1	1.9	1.9	1.9	1.9	2.3	3.5	2.8

Influent Monitoring Program

Table 4 – 2023 Monthly Average Raw Influent data

2023	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Avg
Est. Total Nitrogen (mg/L)	53.8	55.3	46.0	49.1	61.5	50.7	59.8	51.9	57.9	54.7	61.0	60.7	55.2
Total Kjeldahl Nitrogen (mg/L)	51.2	53.5	46.0	48.2	59.6	47.1	59.0	49.0	55.8	51.9	61.2	56.4	53.2
Organic Nitrogen (mg/L)	17.0	18.3	8.0	11.9	25.8	14.1	21.7	15.7	23.6	16.8	23.6	22.6	18.3
Nitrate/Nitrite (mg/L)	0.21	0.22	0.24	0.28	0.25	0.22	0.11	0.24	0.37	0.17	0.44	0.95	0.31
Ammonia (mg/L)	36.6	36.7	37.8	37.0	35.4	36.4	38.0	36.0	33.9	37.8	37.0	37.2	36.7
Total Phosphorus (mg/L)	7.1	6.3	8.7	6.6	6.6	6.5	6.9	6.1	6.5	5.9	6.8	6.8	6.7
Ortho Phosphate (mg/L)	3.64	3.90	4.64	4.06	3.81	4.24	4.09	3.86	3.68	3.95	4.24	4.04	4.01
pH	7.49	7.50	7.53	7.56	7.52	7.60	7.64	7.55	7.56	7.62	7.62	7.64	7.57
BOD (mg/L)	269	270	265	266	266	356	288	297	257	284	391	337	295
COD (mg/L)	498	492	485	478	446	562	485	444	483	547	566	519	500
Total Suspended Solids (mg/L)	310	331	344	345	378	256	406	325	358	358	366	413	349

Peachland Emergency Storage and Infiltration Facility

The RDCO has implemented an Emergency Response Manual (contingency plan), which is updated regularly and sent to the Ministry of Environment (MOE) as required. The manual provides guidelines and a sufficient level of detail to address the appropriate course of action for many preconceived emergencies. The contingency plan includes spill procedures, first response, notification, and environmental regulations for the collection, treatment, and disposal systems for all the wastewater utilities.

Also included in the Emergency Response Manual is detailed protocol for the Peachland force main that runs along the bottom of Okanagan Lake. A leak response plan as well as an emergency response flow chart and emergency storage schematic are readily available to system operators and others needing information should a problem occur (**Appendix B**). A static pressure test is conducted annually by RDCO staff on the Peachland Force Main and the

capacity at the Emergency Storage Facility is one day storage (District of Peachland to research capacity issues), based on current flows.

The RDCO is working to remove this section from the Operation Certificate (OC). The use of the emergency discharge facility should be classified as a true emergency. As such this triggers reporting as an emergency rather than being managed as part of the operational certificate. Consequently, the RDCO is pursuing the removal of any clause relating to the emergency facility from the OC.

Flow meters are located at either end of the Force Main. Logic resides in the Telemetry Alarm Dialer that compares the Peachland Main flowmeter to the Peachland/WRWTP flowmeter.

The meter comparison is the difference between the two daily flow totalizers - a deviation alarm is generated if the totalizer exceeds +/- 5.0 m3 (the meter comparison is the flowing % difference between the flowmeters).

The Peachland force main pressure test was conducted on April 19, 2023. A maximum pressure of 60 psi was held by the check/isolation valves with both pumps off for a period of 30 minutes.

Table 5 – 2023 Peachland Flow

Month	Flow (m3)
January	21,908
February	18,885
March	21,871
April	20,578
May	23,894
June	26,017
July	29,782
August	27,936
September	24,245
October	23,534
November	22,609
December	23,864

Sludge Monitoring Program

Both Fermenter sludge and DAF sludge are analyzed every six months for total metals and TKN. Analyses are done by CARO Analytical Services and/or ALS Environmental (independently accredited laboratories). The Fermenter and DAF sludge results are provided in **Appendix A**.

The Biosolids produced by the centrifuge are trucked offsite to a contracted compost site and each month a sample is sent for complete metal testing to CARO Analytical Services and/or ALS Environmental.

Integrated Stormwater/Rainwater Management

The RDCO is collaborating with the Stakeholders to ensure that a formalized Storm Water Management Plan exists for each local authority. RDCO staff will have access to those plans, but the RDCO has no authority over storm water management in the wastewater treatment plant capture zone and surrounding areas. The RDCO is currently working on an amendment to the Liquid Waste Management Plan (LWMP) that will address Stormwater management within the RDCO.

- » City of West Kelowna – Master Drainage Plan October 25, 2011
- » District of Peachland – Subdivision Development Servicing Amended Bylaw - 2017
- » Westbank First Nations – WFN Master Drainage Plan - 2013

Lake Sampling Monitoring Program

The Lake Sampling Program was replaced in 2011 with a Collaborative Monitoring Agreement. A Memorandum of Understanding (MOU) was signed between the MOE, the Okanagan Water Basin Board (OBWB), the City of Kelowna, the District of Summerland and the RDCO which established a framework for implementing a cost shared monitoring program of Okanagan Lake.

The 2023 Lake Monitoring Report will be made available to the public and a link is posted on the RDCO website.

Exceedances 2023

1. Daily Maximum TN – **3 reported exceedances: June 24-July 21, Nov 12-18, 26 – Dec 2, and Dec 11-31, 2023**
2. Annual Average – **2 exceedances: TP and TN**

Initial response: investigate high ammonia/phosphorus loading issues.

Actions taken: adjusted dissolved oxygen and equalization setpoints, contacted external consultant, and expanded efforts to work with our neighboring municipalities to amend Sewer Use Bylaws to include surcharge rates.

Continued development of our Source Control Program to identify non-compliant system users and requiring compliance, or an Action Plan describing how they will achieve compliance within a reasonable period.

Future action items: monitoring influent loading and collaborating with local industrial customers (wineries) to eliminate high organic loading being discharged to the collection system. Amend Sewer Use Bylaws to include overstrength surcharge rates.

Treatment Works

The WRWTP has installed two new process blowers and commissioning to be completed in 2024.

Outfall Inspection

The WRWTP Outfall pipe was video inspected in 2021. The next scheduled inspection is 2026.

Water Management and Conservation

An Inflow and Infiltration Study was awarded to Urban Systems in early December 2015 and completed in May 2016. The study findings concluded that it would be a questionable return on investment to implement an extensive control program to reduce I&I (Infiltration and Inflow) flows. It was noted that the RDCO's sewer system has I&I combined rates that are well below the acceptable limits for infiltration on existing and new systems. Recommendations included that RDCO continue to collect and monitor rainfall data and identify a 5-year storm (or larger) and re-evaluate the inflow and infiltration levels during this event.

A Flow monitoring program is also in place that currently tracks total flow and rainfall events to apply a flow-based cost recovery program to each jurisdiction. This program could be expanded in the future to track potential sites for infiltration and inflow. The RDCO is working with the Stakeholders to ensure that Cross Connection Programs exist for each local authority.

A Source Control Program was initiated in 2023 to monitoring domestic, industrial, and commercial wastewater discharged to the sewage collection system. The RDCO is collaborating with the residents and owners cooperatively through public awareness and information sharing. Changes to the Sewer Use Bylaws for local jurisdictions is recommended and will include overstrength waste surcharges for non-compliant users based on the source control monitoring results.

Bylaws

RDCO Sewer System Bylaw No. 1315, November 2012 (**Appendix C**) regulates the operation and use of the sanitary sewer systems within the boundaries of the RDCO on the west side of Okanagan Lake. RDCO Bylaws are reviewed every 10 years or as required (Bylaw No. 1315 to be updated in 2024 to include overstrength waste surcharge rates).

Administration

The RDCO works with the stakeholders of the WRWTP, DWK, WFN and the District of Peachland to administer Bylaw No.1315. Stakeholder meetings take place where any pertinent information is discussed.

- » Service connection standards
- » Connection requirements
- » Building sewer construction standards
- » Interference with the sewer system
- » Septic tanks
- » Prohibited wastes
- » Standards for restricted wastes
- » Accidental discharges
- » Requirements for pre-treatment
- » Special control manholes
- » Wastewater monitoring
- » Control of waste disposal

- » Provisions for sewer disconnection
- » Recovery of costs for damage to the system

Biosolids (Sludge withdrawal) Records

The WRWTP Biosolids are deposited into a tri-axle trailer - when full, a hauling contractor trucks them off-site to one of two land composting facilities contracted by the RDCO -Ingerbelle Composting Facility in Princeton and Curtis Farms in Spallumcheen. All sites comply with Provincial Environment Standards for Composting Facilities.

In 2023 the plant generated approximately **5500** wet metric tonnes of Biosolids material.

Table 6 – 2023 Biosolids Metals Analysis

2023												
Biosolids												
Parameter	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23
Aluminum	7020	6770	6820	7260	6190	8690	10100	3190	10100	3060	3110	6720
Antimony	.90	1.00	.90	.90	.90	.90	.90	.80	.90	.80	.60	.80
Arsenic	1.50	1.20	1.00	1.30	1.40	1.40	1.30	1.30	1.20	1.00	.80	.90
Barium	90	81	79	92	106	132	157	167	124	121	74	81
Beryllium	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
Bismuth	16	18	13	15	16	16	17	16.00	15	14	12	15
boron	12	10	11	12	17	21	13	13	18	11	15	9
Cadmium	.46	.47	.49	.49	.52	.50	.54	.51	.49	.46	.42	.55
Calcium	8540	7950	8090	8660	8860	10000	8650	6500	13700	6560	12300	7030
Chromium	13	10	9	8	9	9	8	9	7	8	5	8
Cobalt	1.90	1.30	1.10	1.10	1.00	1.00	.90	.90	.90	1.00	.70	1.10
Copper	298	273	256	271	313	282	287	331	272	267	204	228
Iron	3410	2570	2050	1930	1750	1750	1540	1450	1430	2180	1750	1730
Lead	4	4	3	3	4	4	4	4	4	4	3	4
Lithium	2	2	2	2	2	1	1	2	1	2	.4	2
Magnesium	4740	3780	3430	4660	5350	3720	3170	4860	3250	3770	2870	2960
Manganese	68	57	49	57	51	48	52	54	64	56	37	42
Molybdenum	6	5	5	6	6	5	5	5	6	6	4	5
Nickel	10	8	9	7	8	7	6	6	6	6	4	6
Phosphorus	20200	17300	18800	22000	25500	21000	20500	17800	19200	19800	15700	17100
Potassium	6310	4690	4570	6130	5180	4630	3520	5580	3610	4600	3360	4200
Selenium	2	2	2	2	2	2	2	2	3	2	2	2
Silver	1	1	1	1	1	1	1	1	1	1	1	1
Sodium	431	384	342	411	395	351	354	325	421	399	245	333
Strontium	86	86	81	150	83	89	104	75	101	58	72	66
Sulfur	4500	3700	3600	3900	4500	4630	4650	4400	4600	4800	3400	3800
Tin	9	9	4	7	10	10	11	9	9	8	7	9
Titanium	44	36	19	26	32	66	47	29	42	22	31	36
Uranium	6	6	4	5	5	5	5	5	5	4	3	4
Vanadium	8	6	5	5	4	4	4	4	4	4	3	4
Zinc	269	237	245	264	282	351	328	323	295	328	251	296
Zirconium	5	3	3	5	9	11	18	5	21	4	4	12
Moisture (%)	77	75	77	80	80	75	78	78	57	79	69	75
Solids (%)	18	14	25	20	20	22	22	22	21	22	32	18
Volatile Solids (%)	82	86	18	85	86	85	86	83	86	82	56	82
TKN (%)	4.93	5.46	4.89	5.96	5.67	4.86	5.30	4.91	2.88	6.10	4.27	4.78

Records of Nutrients in Kg discharged into Okanagan Lake

Figures 2, 3 and 4 show the amount (in Kg) of Ammonia, Nitrate/Nitrite, Total Nitrogen, Total Phosphorus and Ortho-Phosphorus being discharged into Okanagan Lake in 2023.

Figure 2 - Effluent Ammonia and Nitrate/Nitrite (Kg)

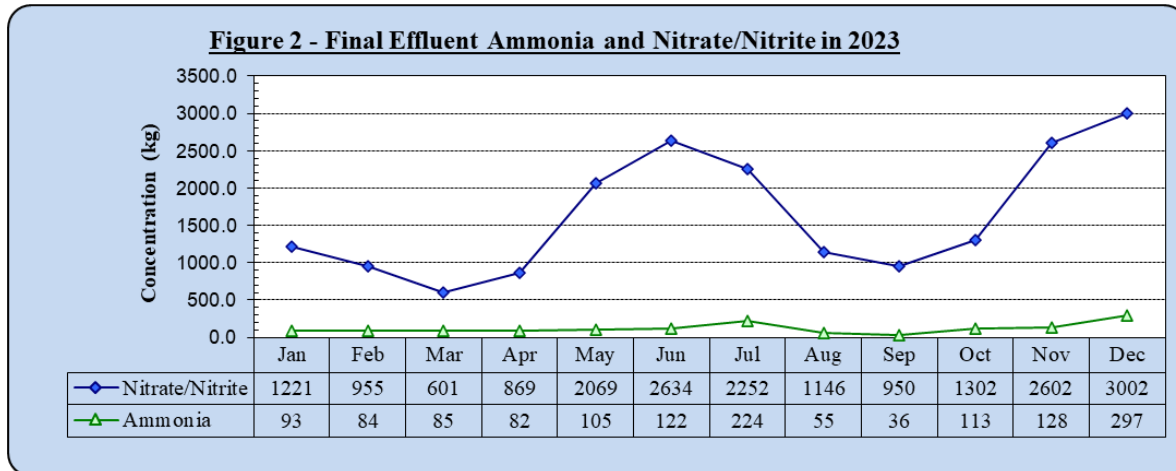


Figure 3 - Effluent Total Nitrogen (Kg)

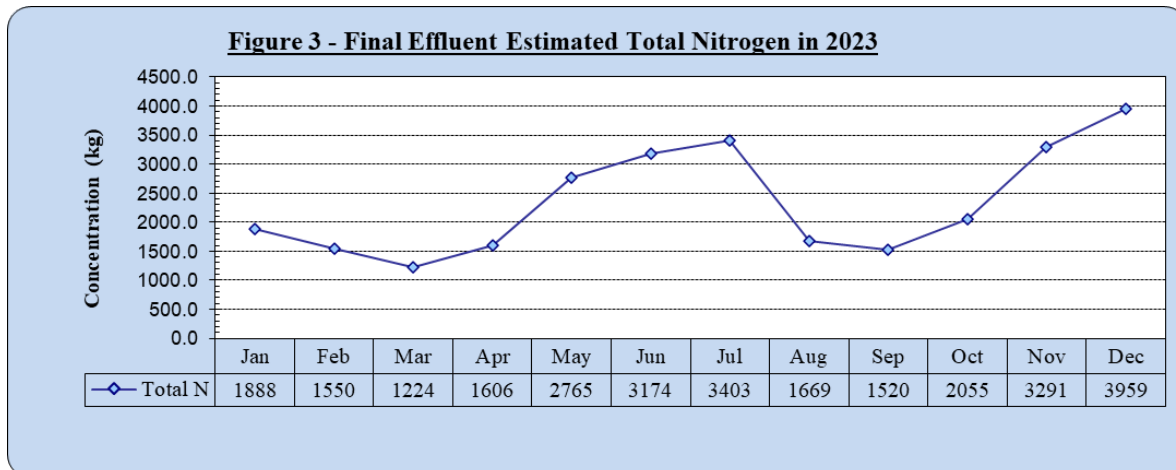
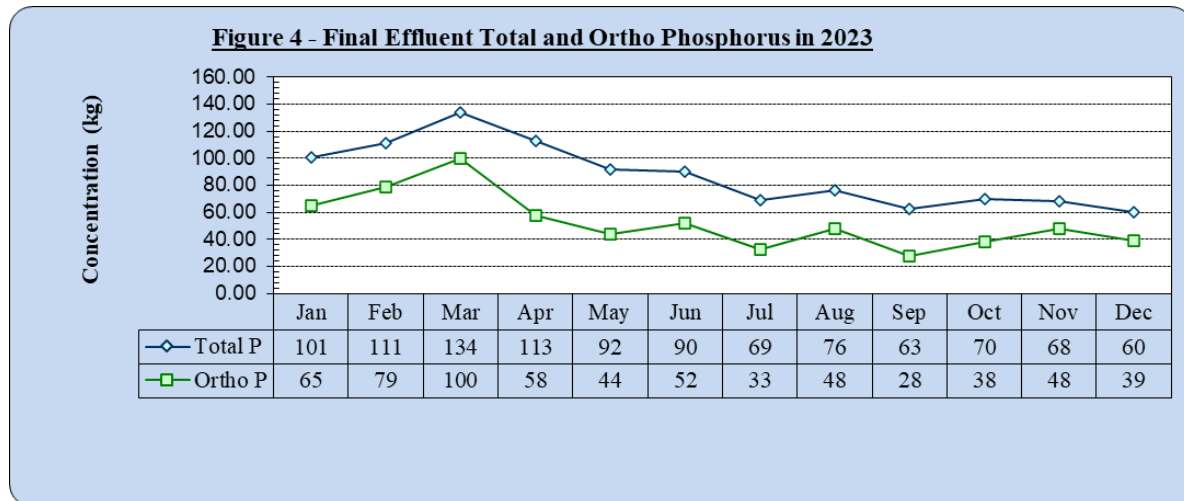


Figure 4 – Effluent Ortho Phosphorus (Kg)



Total Kilogram discharge of nutrients to Okanagan Lake in 2023 were as follows:

1. **1,047 kg** Total Phosphorus (approximately **632 kg** was Orthophosphate)
2. **19,603 kg** of Nitrate/Nitrite Nitrogen
3. **1,424 kg** of Ammonia Nitrogen
4. **28,104 kg** of Total Nitrogen

Conclusion

On average, the WRWTP removed **96%** of the Total Phosphorus entering the plant and discharged **1047 kg** of Total Phosphorus to Okanagan Lake in 2023.

In addition, Total Nitrogen was reduced by **88%**, with a BOD and solids reduction of more than **99%**.

The WRWTP is committed to preserving the quality of Okanagan Lake and providing the CWK, District of Peachland and WFN with quality ongoing service.

Appendix A

WRWTP Final Effluent, Raw Influent and WRWTP Sludge Solids Analyses from CARO Analytical Services and ALS Environmental



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

(Matrix: Water)

Client sampling date / time					Outfall Comp E104954	----	----	----	----
06-Apr-2023 08:00						----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A7587-001	-----	-----	-----	-----
Result						----	----	----	----
Physical Tests									
pH	----	E108	0.10	pH units	7.84	----	----	----	----
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	3.2	----	----	----	----
Aggregate Organics									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	2.4	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	43	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

Client sampling date / time					Outfall Grab E104954	Outfall Grab E104955	----	----	----
06-Apr-2023 08:00						28-Mar-2023 09:25	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A7587-002	VA23A7587-003	-----	-----	-----
Result						Result	----	----	----
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	1.65	1.69	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA23A7587	Page	: 1 of 7
Client	: Regional District of Central Okanagan	Laboratory	: Vancouver - Environmental
Contact	: Angela Lambrecht	Account Manager	: Emmanuel Mariano
Address	: 1450 KLO Road Kelowna BC Canada V1W 3Z4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: RDCO WWTP Federal	Date Samples Received	: 10-Apr-2023 10:55
PO	: 60247	Issue Date	: 18-Apr-2023 11:24
C-O-C number	: ----		
Sampler	: AL		
Site	: RDCO WWTP		
Quote number	: VA21-RDCO100-002		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: Water

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Anions and Nutrients	Anonymous	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.133 % TKND	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

Result Qualifiers

Qualifier	Description
TKND	TKN duplication was poor due to interference from high nitrate, which causes negative bias on TKN.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp E104954	E555	06-Apr-2023	----	----	----		11-Apr-2023	3 days	5 days	✖ EHTR
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E559-L	06-Apr-2023	----	----	----		14-Apr-2023	28 days	8 days	✔
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104955	E318	28-Mar-2023	14-Apr-2023	----	----		15-Apr-2023	28 days	18 days	✔
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	06-Apr-2023	14-Apr-2023	----	----		15-Apr-2023	28 days	9 days	✔
Physical Tests : pH by Meter										
HDPE Outfall Comp E104954	E108	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	0.25 hrs	15.25 hrs	✖ EHTR-FM
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp E104954	E160-L	06-Apr-2023	----	----	----		14-Apr-2023	7 days	8 days	✖ EHT

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHT: Exceeded ALS recommended hold time prior to analysis.



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	892467	1	17	5.8	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	897796	1	18	5.5	5.0	✓
pH by Meter	E108	899484	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	897608	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	892467	1	17	5.8	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	897796	1	18	5.5	5.0	✓
pH by Meter	E108	899484	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	897608	1	13	7.6	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	896941	1	9	11.1	5.0	✓
Method Blanks (MB)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	892467	1	17	5.8	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	897796	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	897608	1	13	7.6	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	896941	1	9	11.1	5.0	✓
Matrix Spikes (MS)							
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	897796	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	897608	1	13	7.6	5.0	✓



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at $104 \pm 1^{\circ}\text{C}$, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.

QUALITY CONTROL REPORT

Work Order	: VA23A7587	Page	: 1 of 4
Client	: Regional District of Central Okanagan	Laboratory	: Vancouver - Environmental
Contact	: Angela Lambrecht	Account Manager	: Emmanuel Mariano
Address	: 1450 KLO Road Kelowna BC Canada V1W 3Z4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: RDCO WWTP Federal	Date Samples Received	: 10-Apr-2023 10:55
PO	: 60247	Date Analysis Commenced	: 11-Apr-2023
C-O-C number	: ----	Issue Date	: 18-Apr-2023 11:24
Sampler	: AL		
Site	: RDCO WWTP		
Quote number	: VA21-RDCO100-002		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

- Key :
- Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
 - CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
 - DQO = Data Quality Objective.
 - LOR = Limit of Reporting (detection limit).
 - RPD = Relative Percent Difference
 - # = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 899484)											
VA23A7600-018	Anonymous	pH	----	E108	0.10	pH units	4.98	4.98	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 897608)											
KS2301088-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.183	# <0.050	0.133	Diff <2x LOR	TKND
Aggregate Organics (QC Lot: 892467)											
VA23A7381-001	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 897796)											
VA23A7573-004	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	<10	0	Diff <2x LOR	----



Qualifiers

Qualifier	Description
TKND	TKN duplication was poor due to interference from high nitrate, which causes negative bias on TKN.

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 896941)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 897608)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Aggregate Organics (QCLot: 892467)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 897796)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 896941)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	97.5	85.0	115	----
Physical Tests (QCLot: 899484)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Anions and Nutrients (QCLot: 897608)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	91.7	75.0	125	----
Aggregate Organics (QCLot: 892467)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	102	85.0	115	----
Aggregate Organics (QCLot: 897796)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	94.4	85.0	115	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Laboratory sample ID					Matrix Spike (MS) Report				
					Spike		Recovery (%)	Recovery Limits (%)	
					Concentration	Target	MS	Low	High
Anions and Nutrients (QCLot: 897608)									
KS2301088-003	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.28 mg/L	2.5 mg/L	91.4	70.0	130
Aggregate Organics (QCLot: 897796)									
VA23A7573-005	Anonymous	Chemical oxygen demand [COD]	----	E559-L	98 mg/L	100 mg/L	98.0	75.0	125

CERTIFICATE OF ANALYSIS

Work Order	: VA23A7981	Page	: 1 of 9
Client	: Regional District of Central Okanagan	Laboratory	: Vancouver - Environmental
Contact	: Angela Lambrecht	Account Manager	: Emmanuel Mariano
Address	: 1450 KLO Road Kelowna BC Canada V1W 3Z4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: RDCO WWTP Monthly	Date Samples Received	: 13-Apr-2023 11:50
PO	: 60247	Date Analysis Commenced	: 13-Apr-2023
C-O-C number	: ----	Issue Date	: 21-Apr-2023 08:24
Sampler	: Angela Lambrecht		
Site	: RDCO WWTP		
Quote number	: VA21-RDCO100-002		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Brieanna Allen	Production/Validation Manager	Inorganics, Burnaby, British Columbia
Colby Bingham	Laboratory Supervisor	Sask Soils, Saskatoon, Saskatchewan
Greg Pokocky	Manager - Inorganics	Centralized Prep, Waterloo, Ontario
Lindsay Gung	Supervisor - Water Chemistry	Microbiology, Burnaby, British Columbia
Michelle Michalchuk	Analyst	Organics, Winnipeg, Manitoba
Niral Patel		Centralized Prep, Waterloo, Ontario
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	Description
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
MPN/100mL	most probable number per hundred millilitres
MPN/g	most probable number per gram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
FR5	As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:5 due to high soil organic content
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.
RRV	Reported result verified by repeat analysis.



Analytical Results

Sub-Matrix: Composite Effluent (Matrix: Water)					Client sample ID	Outfall Comp E104954	----	----	----	----
Client sampling date / time						12-Apr-2023 07:15	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A7981-001	Result	-----	-----	-----	-----
Physical Tests										
pH	----	E108	0.10	pH units	7.92	----	----	----	----	----
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	1.9	----	----	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.499	----	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	4.34	----	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.329	----	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.193	----	----	----	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.322	----	----	----	----	----
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	2.4	----	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	55	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Composite Influent

Client sample ID

(Matrix: Water)

					Raw Influent Comp E222796	----	----	----	----
Client sampling date / time					12-Apr-2023 07:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A7981-002	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	262	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	37.0	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	48.2	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0250 ^{DLDS}	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0050 ^{DLDS, HTD}	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	4.17	----	----	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	6.60	----	----	----	----
Aggregate Organics									
Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	266	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

Client sampling date / time					Bioreactor	Fermenter Supernatant	Outfall Grab E104954	----	----
Client sampling date / time					12-Apr-2023 07:05	12-Apr-2023 07:10	12-Apr-2023 07:20	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A7981-003	VA23A7981-005	VA23A7981-006	-----	-----
					Result	Result	Result	----	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	207	----	----	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	361	----	----	----	----
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	----	----	2.03	----	----
Microbiological Tests									
Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	----	----	2	----	----
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	----	----	4	----	----
Total Metals									
Aluminum, total	7429-90-5	E420	0.0030	mg/L	44.4	----	----	----	----
Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00366	----	----	----	----
Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00792	----	----	----	----
Barium, total	7440-39-3	E420	0.00010	mg/L	0.482	----	----	----	----
Beryllium, total	7440-41-7	E420	0.000100	mg/L	0.000234	----	----	----	----
Bismuth, total	7440-69-9	E420	0.000050	mg/L	0.0779	----	----	----	----
Boron, total	7440-42-8	E420	0.010	mg/L	0.282	----	----	----	----
Cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.00252	----	----	----	----
Calcium, total	7440-70-2	E420	0.050	mg/L	80.0	----	----	----	----
Cesium, total	7440-46-2	E420	0.000010	mg/L	0.000521	----	----	----	----
Chromium, total	7440-47-3	E420	0.00050	mg/L	0.0310	----	----	----	----
Cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00557	----	----	----	----
Copper, total	7440-50-8	E420	0.00050	mg/L	1.41	----	----	----	----
Iron, total	7439-89-6	E420	0.010	mg/L	5.34	----	----	----	----
Lead, total	7439-92-1	E420	0.000050	mg/L	0.0140	----	----	----	----
Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0087	----	----	----	----
Magnesium, total	7439-95-4	E420	0.0050	mg/L	39.2	----	----	----	----
Manganese, total	7439-96-5	E420	0.00010	mg/L	0.327	----	----	----	----
Mercury, total	7439-97-6	E508	0.0000050	mg/L	0.000380	----	----	----	----
Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.0330	----	----	----	----
Nickel, total	7440-02-0	E420	0.00050	mg/L	0.0354	----	----	----	----
Phosphorus, total	7723-14-0	E420	0.050	mg/L	153	----	----	----	----



Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

					Bioreactor	Fermenter Supernatant	Outfall Grab E104954	----	----
Client sampling date / time					12-Apr-2023 07:05	12-Apr-2023 07:10	12-Apr-2023 07:20	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A7981-003	VA23A7981-005	VA23A7981-006	-----	-----
					Result	Result	Result	----	----
Total Metals									
Potassium, total	7440-09-7	E420	0.050	mg/L	69.3	----	----	----	----
Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0405	----	----	----	----
Selenium, total	7782-49-2	E420	0.000050	mg/L	0.0102	----	----	----	----
Silicon, total	7440-21-3	E420	0.10	mg/L	13.1	----	----	----	----
Silver, total	7440-22-4	E420	0.000010	mg/L	0.00340	----	----	----	----
Sodium, total	7440-23-5	E420	0.050	mg/L	68.6	----	----	----	----
Strontium, total	7440-24-6	E420	0.00020	mg/L	1.03 ^{RRV}	----	----	----	----
Sulfur, total	7704-34-9	E420	0.50	mg/L	40.1	----	----	----	----
Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00100 ^{DLA}	----	----	----	----
Thallium, total	7440-28-0	E420	0.000010	mg/L	0.000106	----	----	----	----
Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00050 ^{DLA}	----	----	----	----
Tin, total	7440-31-5	E420	0.00010	mg/L	0.00278	----	----	----	----
Titanium, total	7440-32-6	E420	0.00030	mg/L	0.0346	----	----	----	----
Tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00246	----	----	----	----
Uranium, total	7440-61-1	E420	0.000010	mg/L	0.0298	----	----	----	----
Vanadium, total	7440-62-2	E420	0.00050	mg/L	0.0189	----	----	----	----
Zinc, total	7440-66-6	E420	0.0030	mg/L	1.12	----	----	----	----
Zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00563	----	----	----	----
Fatty Acids									
Acetic acid	64-19-7	E676	10	mg/L	----	91	----	----	----
Butyric acid	107-92-6	E676	1.0	mg/L	----	29.1	----	----	----
Formic acid	64-18-6	E676	30	mg/L	----	<30	----	----	----
Hexanoic acid	142-62-1	E676	1.0	mg/L	----	<1.0	----	----	----
Isobutyric acid	79-31-2	E676	1.0	mg/L	----	2.7	----	----	----
Isovaleric acid	503-74-2	E676	1.0	mg/L	----	<1.0	----	----	----
Propanoic acid	79-09-4	E676	5.0	mg/L	----	48.5	----	----	----
Valeric acid	109-52-4	E676	1.0	mg/L	----	<1.0	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	12-Apr-2023 09:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A7981-004	Result	----	----	----	----
Physical Tests										
Moisture	----	E144	0.25	%	79.9	----	----	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	5.84 ^{FRS}	----	----	----	----	----
Solids, fixed [FS]	----	E169	0.10	%	14.9	----	----	----	----	----
Solids, total [TS]	----	E157	0.10	%	20.3	----	----	----	----	----
Solids, volatile [VS]	----	EC165	0.10	%	85.1	----	----	----	----	----
Microbiological Tests										
Coliforms, Escherichia coli [E. coli]	----	E014.EC	2	MPN/g	>8120000	----	----	----	----	----
Coliforms, thermotolerant [fecal]	----	E014.FC	2	MPN/g	>8120000	----	----	----	----	----
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	7260	----	----	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg	0.87	----	----	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg	1.25	----	----	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg	92.2	----	----	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	----	----	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg	15.2	----	----	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg	11.9	----	----	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg	0.492	----	----	----	----	----
Calcium	7440-70-2	E440	50	mg/kg	8660	----	----	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg	8.30	----	----	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg	1.09	----	----	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg	271	----	----	----	----	----
Iron	7439-89-6	E440	50	mg/kg	1930	----	----	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg	3.04	----	----	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg	<2.0	----	----	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg	4660	----	----	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg	56.9	----	----	----	----	----
Mercury	7439-97-6	E510	0.0050	mg/kg	0.116	----	----	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg	5.58	----	----	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg	7.27	----	----	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg	22000	----	----	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					Biosolids E231763	----	----	----	----
Client sampling date / time					12-Apr-2023 09:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A7981-004	-----	-----	-----	-----
					Result	---	---	---	---
Metals									
Potassium	7440-09-7	E440	100	mg/kg	6130	---	---	---	---
Selenium	7782-49-2	E440	0.20	mg/kg	2.40	---	---	---	---
Silver	7440-22-4	E440	0.10	mg/kg	0.78	---	---	---	---
Sodium	7440-23-5	E440	50	mg/kg	411	---	---	---	---
Strontium	7440-24-6	E440	0.50	mg/kg	150	---	---	---	---
Sulfur	7704-34-9	E440	1000	mg/kg	3900	---	---	---	---
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	---	---	---	---
Tin	7440-31-5	E440	2.0	mg/kg	7.3	---	---	---	---
Titanium	7440-32-6	E440	1.0	mg/kg	26.3	---	---	---	---
Tungsten	7440-33-7	E440	0.50	mg/kg	0.60	---	---	---	---
Uranium	7440-61-1	E440	0.050	mg/kg	4.50	---	---	---	---
Vanadium	7440-62-2	E440	0.20	mg/kg	4.59	---	---	---	---
Zinc	7440-66-6	E440	2.0	mg/kg	264	---	---	---	---
Zirconium	7440-67-7	E440	1.0	mg/kg	4.6	---	---	---	---
Leachable Anions & Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E319	0.020	%	5.96	---	---	---	---

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Water					Client sample ID	Trip Blank	----	----	----	----
(Matrix: Water)										
					Client sampling date / time	12-Apr-2023	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A7981-007	Result	----	----	----	----
Physical Tests										
pH	----	E108	0.10	pH units	5.52	----	----	----	----	----
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	<1.0	----	----	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	----	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	----	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	----	----	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	----	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	----	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	----	----	----	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	----	----	----	----	----
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	----	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA23A7981	Page	: 1 of 17
Client	: Regional District of Central Okanagan	Laboratory	: Vancouver - Environmental
Contact	: Angela Lambrecht	Account Manager	: Emmanuel Mariano
Address	: 1450 KLO Road Kelowna BC Canada V1W 3Z4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: RDCO WWTP Monthly	Date Samples Received	: 13-Apr-2023 11:50
PO	: 60247	Issue Date	: 21-Apr-2023 08:24
C-O-C number	: ----		
Sampler	: Angela Lambrecht		
Site	: RDCO WWTP		
Quote number	: VA21-RDCO100-002		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Physical Tests	VA23A7981-004	Biosolids E231763	Solids, fixed [FS]	----	E169	50.7 % DUP-PH	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-PH	Duplicate pH result meets ALS Data Quality Objective for low ionic strength samples (+/- 1 pH unit where EC < 200 uS).

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Anions and Nutrients	Anonymous	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.133 % TKND	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

Result Qualifiers

Qualifier	Description
TKND	TKN duplication was poor due to interference from high nitrate, which causes negative bias on TKN.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: Soil/Solid

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Leachable Anions & Nutrients : Total Kjeldahl Nitrogen by Colourimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E319	12-Apr-2023	17-Apr-2023	----	----		17-Apr-2023	365 days	5 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap Biosolids E231763	E510	12-Apr-2023	20-Apr-2023	----	----		20-Apr-2023	28 days	8 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap Biosolids E231763	E440	12-Apr-2023	20-Apr-2023	----	----		20-Apr-2023	180 days	8 days	✓
Microbiological Tests : E. coli (MTF)										
Glass soil jar/Teflon lined cap Biosolids E231763	E014.EC	12-Apr-2023	14-Apr-2023	2 days	2 days	✓	14-Apr-2023	2 days	0 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliforms (MTF)										
Glass soil jar/Teflon lined cap Biosolids E231763	E014.FC	12-Apr-2023	14-Apr-2023	2 days	2 days	✓	14-Apr-2023	2 days	0 days	✓
Physical Tests : FS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E169	12-Apr-2023	----	----	----		19-Apr-2023	7 days	7 days	✓
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E144	12-Apr-2023	----	----	----		18-Apr-2023	----	----	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap Biosolids E231763	E108	12-Apr-2023	20-Apr-2023	----	----		20-Apr-2023	30 days	8 days	✓
Physical Tests : TS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E157	12-Apr-2023	----	----	----		19-Apr-2023	14 days	7 days	✓

Matrix: Water

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] Raw Influent Comp E222796	E550	12-Apr-2023	----	----	----		14-Apr-2023	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp E104954	E555	12-Apr-2023	----	----	----		14-Apr-2023	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Trip Blank	E555	12-Apr-2023	----	----	----		14-Apr-2023	3 days	3 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E559-L	12-Apr-2023	----	----	----		18-Apr-2023	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
HDPE Trip Blank	E559-L	12-Apr-2023	----	----	----		14-Apr-2023	3 days	3 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Outfall Comp E104954	E298	12-Apr-2023	18-Apr-2023	----	----		19-Apr-2023	28 days	8 days	✓



Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E298	12-Apr-2023	18-Apr-2023	----	----		19-Apr-2023	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (lab preserved) Trip Blank	E298	12-Apr-2023	14-Apr-2023	3 days	2 days	✓	14-Apr-2023	28 days	0 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE Outfall Comp E104954	E378-U	12-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE Raw Influent Comp E222796	E378-U	12-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE Trip Blank	E378-U	12-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Outfall Comp E104954	E235.NO3-L	12-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Raw Influent Comp E222796	E235.NO3-L	12-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO3-L	12-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	3 days	2 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Outfall Comp E104954	E235.NO2-L	12-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Raw Influent Comp E222796	E235.NO2-L	12-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO2-L	12-Apr-2023	14-Apr-2023	----	----		14-Apr-2023	3 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	12-Apr-2023	18-Apr-2023	----	----		19-Apr-2023	28 days	7 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E318	12-Apr-2023	18-Apr-2023	----	----		19-Apr-2023	28 days	7 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (lab preserved) Trip Blank	E318	12-Apr-2023	14-Apr-2023	3 days	2 days	✓	15-Apr-2023	28 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E372-U	12-Apr-2023	18-Apr-2023	----	----		20-Apr-2023	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E372-U	12-Apr-2023	18-Apr-2023	----	----		20-Apr-2023	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (lab preserved) Trip Blank	E372-U	12-Apr-2023	14-Apr-2023	3 days	2 days	✓	17-Apr-2023	28 days	3 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Fatty Acids : Volatile Fatty and Carboxylic Acid (VFA) by GC-MS										
Glass vial (sodium bisulfate) Fermenter Supernatant	E676	12-Apr-2023	----	----	----		19-Apr-2023	14 days	7 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab E104954	E010.FC	12-Apr-2023	----	----	----		13-Apr-2023	30 hrs	38 hrs	✖ EHTL
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab E104954	E010	12-Apr-2023	----	----	----		13-Apr-2023	30 hrs	38 hrs	✖ EHTL
Physical Tests : Alkalinity Species by Titration										
HDPE Bioreactor	E290	12-Apr-2023	14-Apr-2023	----	----		15-Apr-2023	14 days	3 days	✓
Physical Tests : pH by Meter										
HDPE Outfall Comp E104954	E108	12-Apr-2023	14-Apr-2023	----	----		15-Apr-2023	0.25 hrs	27.25 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE Trip Blank	E108	12-Apr-2023	14-Apr-2023	----	----		15-Apr-2023	0.25 hrs	27.25 hrs	✖ EHTR-FM
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp E104954	E160-L	12-Apr-2023	----	----	----		17-Apr-2023	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Raw Influent Comp E222796	E160-L	12-Apr-2023	----	----	----		17-Apr-2023	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Trip Blank	E160-L	12-Apr-2023	----	----	----		17-Apr-2023	7 days	6 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) Bioreactor	E508	12-Apr-2023	19-Apr-2023	----	----		19-Apr-2023	28 days	7 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved) Bioreactor	E420	12-Apr-2023	16-Apr-2023	----	----		18-Apr-2023	180 days	6 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
E. coli (MTF)	E014.EC	897916	1	1	100.0	5.0	✔
FS by Gravimetry	E169	902987	1	2	50.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	901397	1	7	14.2	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	901398	1	7	14.2	5.0	✔
Moisture Content by Gravimetry	E144	901402	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	901399	1	7	14.2	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	897915	1	1	100.0	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	900181	1	6	16.6	5.0	✔
TS by Gravimetry	E157	902986	1	4	25.0	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	901397	2	7	28.5	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	901398	2	7	28.5	10.0	✔
Moisture Content by Gravimetry	E144	901402	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	901399	1	7	14.2	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	900181	2	6	33.3	10.0	✔
TS by Gravimetry	E157	902986	1	4	25.0	5.0	✔
Method Blanks (MB)							
E. coli (MTF)	E014.EC	897916	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	901397	1	7	14.2	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	901398	1	7	14.2	5.0	✔
Moisture Content by Gravimetry	E144	901402	1	13	7.6	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	897915	1	1	100.0	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	900181	1	6	16.6	5.0	✔
TS by Gravimetry	E157	902986	1	4	25.0	5.0	✔

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	897037	1	9	11.1	5.0	✔
Ammonia by Fluorescence	E298	897611	2	26	7.6	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	897400	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	898171	1	16	6.2	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	897796	2	37	5.4	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	897045	1	4	25.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	897040	1	16	6.2	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	897041	1	17	5.8	5.0	✔
pH by Meter	E108	897035	1	18	5.5	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	896451	1	7	14.2	10.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	896898	0	1	0.0	10.0	✖
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	897608	2	24	8.3	5.0	✔
Total Mercury in Water by CVAAS	E508	902257	1	20	5.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	899138	1	12	8.3	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	897612	2	22	9.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	903440	1	8	12.5	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	897037	1	9	11.1	5.0	✔
Ammonia by Fluorescence	E298	897611	2	26	7.6	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	897400	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	898171	1	16	6.2	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	897796	2	37	5.4	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	897045	1	4	25.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	897040	1	16	6.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	897041	1	17	5.8	5.0	✔
pH by Meter	E108	897035	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	897608	2	24	8.3	5.0	✔
Total Mercury in Water by CVAAS	E508	902257	1	20	5.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	899138	1	12	8.3	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	897612	2	22	9.0	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	900708	1	16	6.2	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	903440	1	8	12.5	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	897037	1	9	11.1	5.0	✔
Ammonia by Fluorescence	E298	897611	2	26	7.6	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	897400	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	898171	1	16	6.2	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	897796	2	37	5.4	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	897045	1	4	25.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	897040	1	16	6.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	897041	1	17	5.8	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	896451	1	7	14.2	5.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	896898	1	1	100.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	897608	2	24	8.3	5.0	✔
Total Mercury in Water by CVAAS	E508	902257	1	20	5.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	899138	1	12	8.3	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
<i>Analytical Methods</i>	<i>Method</i>	<i>QC Lot #</i>	<i>QC</i>	<i>Regular</i>	<i>Actual</i>	<i>Expected</i>	<i>Evaluation</i>
Method Blanks (MB) - Continued							
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	897612	2	22	9.0	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	900708	1	16	6.2	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	903440	1	8	12.5	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	897611	2	26	7.6	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	897796	2	37	5.4	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	897045	1	4	25.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	897040	1	16	6.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	897041	1	17	5.8	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	897608	2	24	8.3	5.0	✔
Total Mercury in Water by CVAAS	E508	902257	1	20	5.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	899138	1	12	8.3	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	897612	2	22	9.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	903440	1	8	12.5	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MTF)	E014.EC Vancouver - Environmental	Soil/Solid	TMECC 07.00 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism.
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC Vancouver - Environmental	Soil/Solid	EPA 1680 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism. Moisture determination is performed to report test results on a dry-weight basis.
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C . Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
TS by Gravimetry	E157 Waterloo - Environmental	Soil/Solid	APHA 2540 B (mod)	Total Solids (TS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. The increase in weight over that of the empty dish represents the total solids. Results are reported as the percentage of the total sample.
FS by Gravimetry	E169 Waterloo - Environmental	Soil/Solid	APHA 2540 G (mod)	Fixed Solids (FS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. This residue is ignited to constant weight at 550°C . The remaining solids represent the Fixed Solids (FS). Results are reported as the percentage of the total solids.
Total Kjeldahl Nitrogen by Colourimetry	E319 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO_4 and K_2SO_4 catalysts. Ammonia in the soil extract is determined colorimetrically at 660 nm.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl, followed by CVAAS analysis.
VS by Gravimetry	EC165 Waterloo - Environmental	Soil/Solid	APHA 2540 G (mod)	Volatile Solids (VS) are determined by drying a sample in a weighed dish to constant weight in an oven at 104 ± 1°C. The increase in weight over that of the empty dish represents the total solids. This residue is ignited to constant weight at 550°C. The remaining solids represent the fixed total solids while the weight lost on ignition is the volatile solids. Results are reported as Percent of the Total Solids which are Volatile Solids. VS at 550°C can be used as an estimation of Organic Matter (CSSS 2008).
Total Coliforms and E. coli (Enzyme Substrate)	E010 Vancouver - Environmental	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ± 0.5°C for either 18 or 24 hours (dependent on reagent used).
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC Vancouver - Environmental	Water	APHA 9223 (mod)	The enzyme substrate test detects Thermotolerant Coliforms in a 100 mL sample after an 18 hour incubation at 44.5 ± 0.2°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand - 5 day	E550 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676 Winnipeg - Environmental	Water	ASTM D2908-91 (mod)	Volatile Fatty and Carboxylic Acid are analyzed GCMS.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Solid sample preparation (MTF)	EP014 Vancouver - Environmental	Soil/Solid	EPA 1680 (mod)	The procedure involves mixing the sample with deionized/distilled water at a 1:10 ratio of sample to water.
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Kjeldahl Digestion for soils	EP319 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO ₄ and K ₂ SO ₄ catalysts.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Dry and Grind in Soil/Solid <60°C	EPP442 Saskatoon - Environmental	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.



Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

QUALITY CONTROL REPORT

Work Order	: VA23A7981	Page	: 1 of 20
Client	: Regional District of Central Okanagan	Laboratory	: Vancouver - Environmental
Contact	: Angela Lambrecht	Account Manager	: Emmanuel Mariano
Address	: 1450 KLO Road Kelowna BC Canada V1W 3Z4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: RDCO WWTP Monthly	Date Samples Received	: 13-Apr-2023 11:50
PO	: 60247	Date Analysis Commenced	: 13-Apr-2023
C-O-C number	: ----	Issue Date	: 21-Apr-2023 08:24
Sampler	: Angela Lambrecht		
Site	: RDCO WWTP		
Quote number	: VA21-RDCO100-002		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Brieanna Allen	Production/Validation Manager	Vancouver Inorganics, Burnaby, British Columbia
Colby Bingham	Laboratory Supervisor	Saskatoon Sask Soils, Saskatoon, Saskatchewan
Greg Pokocky	Manager - Inorganics	Waterloo Centralized Prep, Waterloo, Ontario
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Microbiology, Burnaby, British Columbia
Michelle Michalchuk	Analyst	Winnipeg Organics, Winnipeg, Manitoba
Niral Patel		Waterloo Centralized Prep, Waterloo, Ontario
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Vancouver Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 901399)											
VA23A7872-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	9.04	9.09	0.6%	5%	----
Physical Tests (QC Lot: 901402)											
VA23A7938-001	Anonymous	Moisture	----	E144	0.25	%	33.5	33.6	0.279%	20%	----
Physical Tests (QC Lot: 902986)											
VA23A7981-004	Biosolids E231763	Solids, total [TS]	----	E157	0.10	%	20.3	21.8	7.28%	20%	----
Physical Tests (QC Lot: 902987)											
VA23A7981-004	Biosolids E231763	Solids, fixed [FS]	----	E169	0.10	%	14.9	25.0	50.7%	30%	DUP-PH
Microbiological Tests (QC Lot: 897915)											
VA23A7981-004	Biosolids E231763	Coliforms, thermotolerant [fecal]	----	E014.FC	10000	MPN/g	>8120000	8080000	0.439%	100%	----
Microbiological Tests (QC Lot: 897916)											
VA23A7981-004	Biosolids E231763	Coliforms, Escherichia coli [E. coli]	----	E014.EC	10000	MPN/g	>8120000	8080000	0.439%	100%	----
Metals (QC Lot: 901397)											
VA23A7872-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0588	0.0640	0.0052	Diff <2x LOR	----
Metals (QC Lot: 901398)											
VA23A7872-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	21000	19800	5.87%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.46	0.44	0.02	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	14.2	13.4	5.88%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	259	246	4.92%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.79	0.77	2.38%	30%	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	13.2	12.3	0.9	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.088	0.097	0.009	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	24800	23900	3.82%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	31.8	29.7	6.69%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	19.0	18.2	4.26%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	540	511	5.52%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	59000	56500	4.26%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	2.64	2.62	0.584%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	16.4	15.8	4.17%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	14400	13900	4.10%	30%	----



Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 901398) - continued											
VA23A7872-001	Anonymous	Manganese	7439-96-5	E440	1.0	mg/kg	605	565	6.94%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	4.58	4.31	6.22%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	17.2	16.5	4.37%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	1180	1190	1.15%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	1930	1820	5.66%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.75	0.76	0.009	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.21	0.20	0.01	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	1900	1850	2.66%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	159	152	4.75%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	2200	2030	8.40%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	0.81	0.74	0.07	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.08	1.02	6.50%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	214	202	5.33%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	56.0	54.1	3.47%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	5.1	4.7	0.3	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 900181)											
VA23A7689-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	0.041 %	400	8	Diff <2x LOR	----
Sub-Matrix: Water							Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 897035)											
VA23A7892-001	Anonymous	pH	----	E108	0.10	pH units	7.94	7.97	0.377%	4%	----
Physical Tests (QC Lot: 897037)											
VA23A7892-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	61.9	61.1	1.30%	20%	----
Anions and Nutrients (QC Lot: 897040)											
KS2301142-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.104	0.104	0.0926%	20%	----
Anions and Nutrients (QC Lot: 897041)											
KS2301142-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 897045)											
VA23A7867-003	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 897608)											



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 897608) - continued											
KS2301088-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.183	# <0.050	0.133	Diff <2x LOR	TKND
Anions and Nutrients (QC Lot: 897611)											
KS2301088-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 897612)											
KS2301088-002	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0095	0.0092	0.0003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 901997)											
FJ2300805-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0118	0.0133	0.0015	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 901999)											
FJ2300805-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.697	0.724	3.74%	20%	----
Anions and Nutrients (QC Lot: 902000)											
VA23A7806-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.50	mg/L	78.1	79.3	1.55%	20%	----
Microbiological Tests (QC Lot: 896451)											
VA23A7829-001	Anonymous	Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 899138)											
VA23A8083-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0150	mg/L	0.795	0.765	3.81%	20%	----
		Antimony, total	7440-36-0	E420	0.00050	mg/L	0.00077	0.00080	0.00004	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00050	mg/L	0.00427	0.00410	0.00016	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00050	mg/L	0.0319	0.0313	2.10%	20%	----
		Beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.050	mg/L	1.61	1.61	0.231%	20%	----
		Cadmium, total	7440-43-9	E420	0.0000450	mg/L	<0.0000450	<0.0000450	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.250	mg/L	304	296	2.85%	20%	----
		Cesium, total	7440-46-2	E420	0.000050	mg/L	0.000095	0.000104	0.000009	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	0.00136	0.00135	0.000007	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00050	mg/L	0.00070	0.00075	0.00005	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00250	mg/L	0.0214	0.0220	0.00057	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.050	mg/L	0.856	0.857	0.142%	20%	----
		Lead, total	7439-92-1	E420	0.000250	mg/L	<0.000250	<0.000250	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0050	mg/L	0.0172	0.0171	0.0001	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0250	mg/L	324	313	3.52%	20%	----
		Manganese, total	7439-96-5	E420	0.00050	mg/L	0.0581	0.0568	2.22%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000250	mg/L	0.0752	0.0758	0.683%	20%	----
		Nickel, total	7440-02-0	E420	0.00250	mg/L	0.00286	0.00279	0.00008	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 899138) - continued											
VA23A8083-001	Anonymous	Phosphorus, total	7723-14-0	E420	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.250	mg/L	34.2	33.4	2.32%	20%	----
		Rubidium, total	7440-17-7	E420	0.00100	mg/L	0.00751	0.00747	0.00004	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000250	mg/L	0.0126	0.0124	0.992%	20%	----
		Silicon, total	7440-21-3	E420	0.50	mg/L	9.58	9.27	3.25%	20%	----
		Silver, total	7440-22-4	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.250	mg/L	809	788	2.73%	20%	----
		Strontium, total	7440-24-6	E420	0.00100	mg/L	7.10	7.03	1.04%	20%	----
		Sulfur, total	7704-34-9	E420	2.50	mg/L	1210	1190	1.38%	20%	----
		Tellurium, total	13494-80-9	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00150	mg/L	0.0195	0.0180	8.00%	20%	----
		Tungsten, total	7440-33-7	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000050	mg/L	0.00508	0.00517	1.75%	20%	----
		Vanadium, total	7440-62-2	E420	0.00250	mg/L	0.00480	0.00474	0.00006	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0150	mg/L	<0.0150	<0.0150	0	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
Total Metals (QC Lot: 902257)											
VA23A7952-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 897400)											
VA23A7713-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	2.8	3.3	0.5	Diff <2x LOR	----
Aggregate Organics (QC Lot: 897796)											
VA23A7573-004	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	<10	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 898171)											
VA23A7879-001	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 901898)											
VA23A7796-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	210000 µg/L	214	1.71%	20%	----
Fatty Acids (QC Lot: 903440)											
CG2304454-002	Anonymous	Acetic acid	64-19-7	E676	10	mg/L	28	28	0.08	Diff <2x LOR	----
		Butyric acid	107-92-6	E676	1.0	mg/L	1.0	1.0	0.02	Diff <2x LOR	----
		Formic acid	64-18-6	E676	30	mg/L	<30	<30	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Fatty Acids (QC Lot: 903440) - continued											
CG2304454-002	Anonymous	Hexanoic acid	142-62-1	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isobutyric acid	79-31-2	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isovaleric acid	503-74-2	E676	1.0	mg/L	1.1	1.0	0.05	Diff <2x LOR	----
		Propanoic acid	79-09-4	E676	5.0	mg/L	<5.0	<5.0	0	Diff <2x LOR	----
		Valeric acid	109-52-4	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----

Qualifiers

Qualifier	Description
DUP-PH	Duplicate pH result meets ALS Data Quality Objective for low ionic strength samples (+/- 1 pH unit where EC < 200 uS).
TKND	TKN duplication was poor due to interference from high nitrate, which causes negative bias on TKN.



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 901402)						
Moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 902986)						
Solids, total [TS]	----	E157	0.1	%	<0.10	----
Microbiological Tests (QCLot: 897915)						
Coliforms, thermotolerant [fecal]	----	E014.FC	2	MPN/g	<2	----
Microbiological Tests (QCLot: 897916)						
Coliforms, Escherichia coli [E. coli]	----	E014.EC	2	MPN/g	<2	----
Metals (QCLot: 901397)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 901398)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----



Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 901398) - continued						
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Leachable Anions & Nutrients (QCLot: 900181)						
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	<200	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 897037)						
Alkalinity, total (as CaCO ₃)	----	E290	1	mg/L	1.0	----
Physical Tests (QCLot: 900708)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 897040)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 897041)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 897045)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 897608)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 897611)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 897612)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 901997)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 901999)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 902000)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Microbiological Tests (QCLot: 896451)						
Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	<1	----
Microbiological Tests (QCLot: 896898)						
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
Total Metals (QCLot: 899138)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 899138) - continued						
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 902257)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 897400)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 897796)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Aggregate Organics (QCLot: 898171)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 901898)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Fatty Acids (QCLot: 903440)						
Acetic acid	64-19-7	E676	10	mg/L	<10	----
Butyric acid	107-92-6	E676	1	mg/L	<1.0	----
Formic acid	64-18-6	E676	30	mg/L	<30	----
Hexanoic acid	142-62-1	E676	1	mg/L	<1.0	----
Isobutyric acid	79-31-2	E676	1	mg/L	<1.0	----
Isovaleric acid	503-74-2	E676	1	mg/L	<1.0	----
Propanoic acid	79-09-4	E676	5	mg/L	<5.0	----
Valeric acid	109-52-4	E676	1	mg/L	<1.0	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 901399)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 901402)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 902986)									
Solids, total [TS]	----	E157	0.1	%	50 %	98.4	85.0	115	----
Metals (QCLot: 901397)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	105	80.0	120	----
Metals (QCLot: 901398)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	96.5	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.4	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	94.4	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	95.4	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	93.6	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	91.9	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	96.4	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	92.9	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	91.0	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	92.1	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	92.4	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	92.0	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	94.7	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	92.6	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	104	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	89.9	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	92.3	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	92.0	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	88.8	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	93.0	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	98.4	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	86.4	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	99.7	80.0	120	----



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 901398) - continued									
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	97.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	90.2	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	96.7	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	91.2	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	88.6	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	89.8	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	92.0	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	94.3	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	98.2	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	84.6	80.0	120	----
Leachable Anions & Nutrients (QCLot: 900181)									
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	1000 mg/kg	97.4	80.0	120	----
Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 897035)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 897037)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	108	85.0	115	----
Physical Tests (QCLot: 900708)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	90.7	85.0	115	----
Anions and Nutrients (QCLot: 897040)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 897041)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.3	90.0	110	----
Anions and Nutrients (QCLot: 897045)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	108	80.0	120	----
Anions and Nutrients (QCLot: 897608)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	91.7	75.0	125	----
Anions and Nutrients (QCLot: 897611)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	98.8	85.0	115	----
Anions and Nutrients (QCLot: 897612)									



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 897612) - continued									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	91.7	80.0	120	----
Anions and Nutrients (QCLot: 901997)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	95.0	80.0	120	----
Anions and Nutrients (QCLot: 901999)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	95.7	85.0	115	----
Anions and Nutrients (QCLot: 902000)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	92.7	75.0	125	----
Total Metals (QCLot: 899138)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	107	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	108	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	100	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	98.2	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	106	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	104	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.9	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	104	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	99.2	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.2	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	104	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	100.0	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	109	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	108	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	108	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	98.7	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	98.0	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	99.9	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	110	80.0	120	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit					
Total Metals (QCLot: 899138) - continued									
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	101	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	108	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	101	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	99.9	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	100	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.8	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	92.8	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	99.4	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	98.5	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	99.2	80.0	120	----
Total Metals (QCLot: 902257)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	98.0	80.0	120	----
Aggregate Organics (QCLot: 897400)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	104	85.0	115	----
Aggregate Organics (QCLot: 897796)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	94.4	85.0	115	----
Aggregate Organics (QCLot: 898171)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	97.9	85.0	115	----
Aggregate Organics (QCLot: 901898)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	109	85.0	115	----
Fatty Acids (QCLot: 903440)									
Acetic acid	64-19-7	E676	10	mg/L	40 mg/L	113	70.0	130	----
Butyric acid	107-92-6	E676	1	mg/L	40 mg/L	109	70.0	130	----
Formic acid	64-18-6	E676	30	mg/L	160 mg/L	111	70.0	130	----
Hexanoic acid	142-62-1	E676	1	mg/L	40 mg/L	106	70.0	130	----
Isobutyric acid	79-31-2	E676	1	mg/L	40 mg/L	112	70.0	130	----
Isovaleric acid	503-74-2	E676	1	mg/L	40 mg/L	120	70.0	130	----
Propanoic acid	79-09-4	E676	5	mg/L	40 mg/L	113	70.0	130	----
Valeric acid	109-52-4	E676	1	mg/L	40 mg/L	111	70.0	130	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 897040)										
VA23A7970-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.52 mg/L	2.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 897041)										
VA23A7970-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.492 mg/L	0.5 mg/L	98.4	75.0	125	----
Anions and Nutrients (QCLot: 897045)										
VA23A7981-001	Outfall Comp E104954	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	ND mg/L	0.03 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 897608)										
KS2301088-003	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.28 mg/L	2.5 mg/L	91.4	70.0	130	----
Anions and Nutrients (QCLot: 897611)										
KS2301088-003	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0890 mg/L	0.1 mg/L	89.0	75.0	125	----
Anions and Nutrients (QCLot: 897612)										
KS2301088-003	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0472 mg/L	0.05 mg/L	94.3	70.0	130	----
Anions and Nutrients (QCLot: 901997)										
VA23A7855-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 901999)										
VA23A7806-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Anions and Nutrients (QCLot: 902000)										
VA23A7937-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	232 mg/L	2.5 mg/L	92.8	70.0	130	----
Total Metals (QCLot: 899138)										
VA23A8083-002	Anonymous	Aluminum, total	7429-90-5	E420	0.921 mg/L	1 mg/L	92.1	70.0	130	----
		Antimony, total	7440-36-0	E420	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		Barium, total	7440-39-3	E420	0.0934 mg/L	0.1 mg/L	93.4	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.187 mg/L	0.2 mg/L	93.5	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.0447 mg/L	0.05 mg/L	89.4	70.0	130	----
		Boron, total	7440-42-8	E420	ND mg/L	0.5 mg/L	ND	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.0501 mg/L	0.05 mg/L	100	70.0	130	----
		Chromium, total	7440-47-3	E420	0.194 mg/L	0.2 mg/L	96.8	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 899138) - continued										
VA23A8083-002	Anonymous	Cobalt, total	7440-48-4	E420	0.0938 mg/L	0.1 mg/L	93.8	70.0	130	----
		Copper, total	7440-50-8	E420	0.0914 mg/L	0.1 mg/L	91.4	70.0	130	----
		Iron, total	7439-89-6	E420	9.28 mg/L	10 mg/L	92.8	70.0	130	----
		Lead, total	7439-92-1	E420	0.0929 mg/L	0.1 mg/L	92.9	70.0	130	----
		Lithium, total	7439-93-2	E420	0.450 mg/L	0.5 mg/L	90.0	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	5 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0924 mg/L	0.1 mg/L	92.4	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Nickel, total	7440-02-0	E420	0.185 mg/L	0.2 mg/L	92.7	70.0	130	----
		Phosphorus, total	7723-14-0	E420	49.6 mg/L	50 mg/L	99.2	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.0970 mg/L	0.1 mg/L	97.0	70.0	130	----
		Selenium, total	7782-49-2	E420	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		Silicon, total	7440-21-3	E420	45.7 mg/L	50 mg/L	91.4	70.0	130	----
		Silver, total	7440-22-4	E420	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	ND mg/L	100 mg/L	ND	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.205 mg/L	0.2 mg/L	103	70.0	130	----
		Thallium, total	7440-28-0	E420	0.0181 mg/L	0.02 mg/L	90.4	70.0	130	----
		Thorium, total	7440-29-1	E420	0.0983 mg/L	0.1 mg/L	98.3	70.0	130	----
		Tin, total	7440-31-5	E420	0.0991 mg/L	0.1 mg/L	99.1	70.0	130	----
		Titanium, total	7440-32-6	E420	0.192 mg/L	0.2 mg/L	96.0	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.0894 mg/L	0.1 mg/L	89.4	70.0	130	----
		Uranium, total	7440-61-1	E420	0.0190 mg/L	0.02 mg/L	95.2	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.497 mg/L	0.5 mg/L	99.4	70.0	130	----
		Zinc, total	7440-66-6	E420	1.85 mg/L	2 mg/L	92.4	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.203 mg/L	0.2 mg/L	101	70.0	130	----
Total Metals (QCLot: 902257)										
VA23A7981-003	Bioreactor	Mercury, total	7439-97-6	E508	0.00482 mg/L	0.005 mg/L	96.5	70.0	130	----
Aggregate Organics (QCLot: 897796)										
VA23A7573-005	Anonymous	Chemical oxygen demand [COD]	----	E559-L	98 mg/L	100 mg/L	98.0	75.0	125	----
Aggregate Organics (QCLot: 901898)										
VA23A7847-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	105 mg/L	100 mg/L	105	75.0	125	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Fatty Acids (QCLot: 903440)										
CG2304454-002	Anonymous	Acetic acid	64-19-7	E676	48 mg/L	40 mg/L	120	70.0	130	----
		Butyric acid	107-92-6	E676	46.7 mg/L	40 mg/L	117	70.0	130	----
		Formic acid	64-18-6	E676	167 mg/L	160 mg/L	105	70.0	130	----
		Hexanoic acid	142-62-1	E676	44.4 mg/L	40 mg/L	111	70.0	130	----
		Isobutyric acid	79-31-2	E676	46.6 mg/L	40 mg/L	116	70.0	130	----
		Isovaleric acid	503-74-2	E676	47.0 mg/L	40 mg/L	117	70.0	130	----
		Propanoic acid	79-09-4	E676	45.9 mg/L	40 mg/L	115	70.0	130	----
		Valeric acid	109-52-4	E676	43.5 mg/L	40 mg/L	109	70.0	130	----

Qualifiers

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.



Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method			Low	High	
Metals (QCLot: 901397)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	94.2	70.0	130	----
Metals (QCLot: 901398)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	106	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	99.3	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	97.5	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	98.9	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	110	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	119	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	96.6	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	100	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	106	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	97.4	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	95.4	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	99.1	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	99.8	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	100	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	111	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	98.2	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	97.8	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	96.0	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	91.0	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	109	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	98.3	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	101	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	97.1	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	102	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	116	70.0	130	----



Sub-Matrix:					Reference Material (RM) Report			
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)	
							Low	High
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method				Qualifier
Metals (QCLot: 901398) - continued								
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	101	70.0	130
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	102	70.0	130
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	98.3	70.0	130
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	82.4	70.0	130
Leachable Anions & Nutrients (QCLot: 900181)								
	RM	Kjeldahl nitrogen, total [TKN]	----	E319	1040 mg/kg	99.1	80.0	120



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

(Matrix: Water)

Client sampling date / time					Outfall Comp	----	----	----	----
02-Aug-2023 07:00						----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-001	-----	-----	-----	-----
Result						----	----	----	----
Physical Tests									
pH	----	E108/VA	0.10	pH units	7.80	----	----	----	----
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	1.6	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	0.142	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/V A	0.0050	mg/L	3.80	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	0.281	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	0.0726	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	0.160	----	----	----	----
Aggregate Organics									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L	<2.0	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L/VA	10	mg/L	47	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Composite Influent

Client sample ID

(Matrix: Water)

					Raw Influent Comp	----	----	----	----
Client sampling date / time					02-Aug-2023 06:45	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-002	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	202	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	36.1	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318/VA	0.050	mg/L	49.0	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NQ3-L/V A	0.0050	mg/L	<0.0250 ^{DLDS}	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	<0.0050 ^{DLDS}	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	3.99	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	6.11	----	----	----	----
Aggregate Organics									
Biochemical oxygen demand [BOD]	----	E550/VA	2.0	mg/L	297	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

					Bioreactor	Fermenter Supernatant	Outfall Grab	Trip Blank	----
Client sampling date / time					02-Aug-2023 06:50	02-Aug-2023 06:55	02-Aug-2023 07:05	02-Aug-2023 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-003	VA23B7915-005	VA23B7915-006	VA23B7915-007	-----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	---	E290/VA	1.0	mg/L	170	---	---	---	---
Hardness (as CaCO3), from total Ca/Mg	---	EC100A/VA	0.60	mg/L	335	---	---	---	---
pH	---	E108/VA	0.10	pH units	---	---	---	5.32	---
Solids, total suspended [TSS]	---	E160-L/VA	1.0	mg/L	---	---	---	<1.0	---
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	---	---	---	<0.0050	---
Kjeldahl nitrogen, total [TKN]	---	E318/VA	0.050	mg/L	---	---	1.47	<0.050	---
Nitrate (as N)	14797-55-8	E235.NO3-L/V A	0.0050	mg/L	---	---	---	<0.0050	---
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	---	---	---	<0.0010	---
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	---	---	---	<0.0010	---
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	---	---	---	<0.0020	---
Microbiological Tests									
Coliforms, thermotolerant [fecal]	---	E010.FC/VA	1	MPN/100mL	---	---	<1	---	---
Coliforms, Escherichia coli [E. coli]	---	E010/VA	1	MPN/100mL	---	---	<1	---	---
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	15.7	---	---	---	---
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L	0.00273	---	---	---	---
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L	0.00655	---	---	---	---
Barium, total	7440-39-3	E420/VA	0.00010	mg/L	0.464	---	---	---	---
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L	0.000207	---	---	---	---
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L	0.0566	---	---	---	---
Boron, total	7440-42-8	E420/VA	0.010	mg/L	0.348	---	---	---	---
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L	0.00167	---	---	---	---
Calcium, total	7440-70-2	E420/VA	0.050	mg/L	71.4	---	---	---	---
Cesium, total	7440-46-2	E420/VA	0.000010	mg/L	0.000494	---	---	---	---
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L	0.0205	---	---	---	---
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L	0.00356	---	---	---	---
Copper, total	7440-50-8	E420/VA	0.00050	mg/L	1.10	---	---	---	---



Analytical Results

Sub-Matrix: Grab Effluent					Client sample ID	Bioreactor	Fermenter Supernatant	Outfall Grab	Trip Blank	----
(Matrix: Water)					Client sampling date / time	02-Aug-2023 06:50	02-Aug-2023 06:55	02-Aug-2023 07:05	02-Aug-2023 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-003	VA23B7915-005	VA23B7915-006	VA23B7915-007	-----	
					Result	Result	Result	Result	----	
Total Metals										
Iron, total	7439-89-6	E420/VA	0.010	mg/L	3.60	----	----	----	----	----
Lead, total	7439-92-1	E420/VA	0.000050	mg/L	0.0111	----	----	----	----	----
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L	0.0061	----	----	----	----	----
Magnesium, total	7439-95-4	E420/VA	0.0050	mg/L	38.0	----	----	----	----	----
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L	0.302	----	----	----	----	----
Mercury, total	7439-97-6	E508/VA	0.0000050	mg/L	0.000372	----	----	----	----	----
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L	0.0218	----	----	----	----	----
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L	0.0238	----	----	----	----	----
Phosphorus, total	7723-14-0	E420/VA	0.050	mg/L	133	----	----	----	----	----
Potassium, total	7440-09-7	E420/VA	0.050	mg/L	55.9	----	----	----	----	----
Rubidium, total	7440-17-7	E420/VA	0.00020	mg/L	0.0311	----	----	----	----	----
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L	0.00945	----	----	----	----	----
Silicon, total	7440-21-3	E420/VA	0.10	mg/L	9.86	----	----	----	----	----
Silver, total	7440-22-4	E420/VA	0.000010	mg/L	0.00311	----	----	----	----	----
Sodium, total	7440-23-5	E420/VA	0.050	mg/L	63.6	----	----	----	----	----
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L	0.538	----	----	----	----	----
Sulfur, total	7704-34-9	E420/VA	0.50	mg/L	33.2	----	----	----	----	----
Tellurium, total	13494-80-9	E420/VA	0.00020	mg/L	<0.00020	----	----	----	----	----
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L	0.000066	----	----	----	----	----
Thorium, total	7440-29-1	E420/VA	0.00010	mg/L	<0.00010	----	----	----	----	----
Tin, total	7440-31-5	E420/VA	0.00010	mg/L	0.00178	----	----	----	----	----
Titanium, total	7440-32-6	E420/VA	0.00030	mg/L	0.0276	----	----	----	----	----
Tungsten, total	7440-33-7	E420/VA	0.00010	mg/L	0.00122	----	----	----	----	----
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L	0.0243	----	----	----	----	----
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L	0.0122	----	----	----	----	----
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L	1.01	----	----	----	----	----
Zirconium, total	7440-67-7	E420/VA	0.00020	mg/L	0.00208	----	----	----	----	----
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L	----	----	----	----	<2.0	----



Analytical Results

Sub-Matrix: Grab Effluent (Matrix: Water)					Client sample ID	Bioreactor	Fermenter Supernatant	Outfall Grab	Trip Blank	----
Client sampling date / time						02-Aug-2023 06:50	02-Aug-2023 06:55	02-Aug-2023 07:05	02-Aug-2023 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-003	VA23B7915-005	VA23B7915-006	VA23B7915-007	-----	
					Result	Result	Result	Result	Result	----
Aggregate Organics										
Chemical oxygen demand [COD]	----	E559-LVA	10	mg/L	----	----	----	----	<10	----
Fatty Acids										
Acetic acid	64-19-7	E676/WP	10	mg/L	----	106	----	----	----	----
Butyric acid	107-92-6	E676/WP	1.0	mg/L	----	10.2	----	----	----	----
Formic acid	64-18-6	E676/WP	30	mg/L	----	<30	----	----	----	----
Hexanoic acid	142-62-1	E676/WP	1.0	mg/L	----	<1.0	----	----	----	----
Isobutyric acid	79-31-2	E676/WP	1.0	mg/L	----	<1.0	----	----	----	----
Isovaleric acid	503-74-2	E676/WP	1.0	mg/L	----	<1.0	----	----	----	----
Propanoic acid	79-09-4	E676/WP	5.0	mg/L	----	87.9	----	----	----	----
Valeric acid	109-52-4	E676/WP	1.0	mg/L	----	5.5	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

Client sampling date / time					Biosolids	----	----	----	----
02-Aug-2023 09:45						----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-004	-----	-----	-----	-----
Result						----	----	----	----
Physical Tests									
Moisture	---	E144/VA	0.25	%	78.1	----	----	----	----
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	5.73 ^{FR8}	----	----	----	----
Solids, fixed [FS]	---	E169/WT	0.10	%	16.8	----	----	----	----
Solids, total [TS]	---	E157/WT	0.10	%	22.2	----	----	----	----
Solids, volatile [VS]	---	EC165/WT	0.10	%	83.2	----	----	----	----
Organic / Inorganic Carbon									
Carbon, total [TC]	---	E351/SK	0.050	%	42.0	----	----	----	----
Carbon, inorganic [IC]	---	E354/SK	0.050	%	0.520	----	----	----	----
Carbon, inorganic [IC], (as CaCO3 equivalent)	---	E354/SK	0.40	%	4.33	----	----	----	----
Carbon, total organic [TOC]	---	EC356/SK	0.050	%	41.5	----	----	----	----
Organic matter	---	EC356/SK	0.10	%	71.5	----	----	----	----
Microbiological Tests									
Coliforms, Escherichia coli [E. coli]	---	E014.EC/VA	2	MPN/g	1030000	----	----	----	----
Coliforms, thermotolerant [fecal]	---	E014.FC/VA	2	MPN/g	2530000	----	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	160	----	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	<0.10	----	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	<0.10	----	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	8.33	----	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	<0.10	----	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	0.78	----	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	<5.0	----	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	0.026	----	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	325	----	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	<0.50	----	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	<0.10	----	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	16.6	----	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	73	----	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	<0.50	----	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	<2.0	----	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					Biosolids	----	----	----	----
Client sampling date / time					02-Aug-2023 09:45	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-004	-----	-----	-----	-----
					Result	---	---	---	---
Metals									
Magnesium	7439-95-4	E440/VA	20	mg/kg	243	---	---	---	---
Manganese	7439-96-5	E440/VA	1.0	mg/kg	2.7	---	---	---	---
Mercury	7439-97-6	E510/VA	0.0050	mg/kg	0.269	---	---	---	---
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	0.25	---	---	---	---
Nickel	7440-02-0	E440/VA	0.50	mg/kg	<0.50	---	---	---	---
Phosphorus	7723-14-0	E440/VA	50	mg/kg	891	---	---	---	---
Potassium	7440-09-7	E440/VA	100	mg/kg	280	---	---	---	---
Selenium	7782-49-2	E440/VA	0.20	mg/kg	<0.20	---	---	---	---
Silver	7440-22-4	E440/VA	0.10	mg/kg	<0.10	---	---	---	---
Sodium	7440-23-5	E440/VA	50	mg/kg	<50	---	---	---	---
Strontium	7440-24-6	E440/VA	0.50	mg/kg	3.74	---	---	---	---
Sulfur	7704-34-9	E440/VA	1000	mg/kg	<1000	---	---	---	---
Thallium	7440-28-0	E440/VA	0.050	mg/kg	<0.050	---	---	---	---
Tin	7440-31-5	E440/VA	2.0	mg/kg	<2.0	---	---	---	---
Titanium	7440-32-6	E440/VA	1.0	mg/kg	1.5	---	---	---	---
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	<0.50	---	---	---	---
Uranium	7440-61-1	E440/VA	0.050	mg/kg	0.230	---	---	---	---
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	<0.20	---	---	---	---
Zinc	7440-66-6	E440/VA	2.0	mg/kg	16.1	---	---	---	---
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	<1.0	---	---	---	---
Leachable Anions & Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E319/SK	0.020	%	4.91	---	---	---	---

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Leachable Anions & Nutrients : Total Kjeldahl Nitrogen by Colourimetry										
Glass soil jar/Teflon lined cap Biosolids	E319	02-Aug-2023	08-Aug-2023	365 days	6 days	✓	08-Aug-2023	365 days	6 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap Biosolids	E510	02-Aug-2023	11-Aug-2023	28 days	9 days	✓	11-Aug-2023	28 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap Biosolids	E440	02-Aug-2023	11-Aug-2023	180 days	9 days	✓	12-Aug-2023	180 days	10 days	✓
Microbiological Tests : E. coli (MTF)										
Glass soil jar/Teflon lined cap Biosolids	E014.EC	02-Aug-2023	03-Aug-2023	2 days	1 days	✓	03-Aug-2023	2 days	1 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliforms (MTF)										
Glass soil jar/Teflon lined cap Biosolids	E014.FC	02-Aug-2023	03-Aug-2023	2 days	1 days	✓	03-Aug-2023	2 days	1 days	✓
Organic / Inorganic Carbon : Total Carbon by Combustion										
Glass soil jar/Teflon lined cap Biosolids	E351	02-Aug-2023	08-Aug-2023	----	----		08-Aug-2023	0 days	0 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Acetic Acid pH Standard Curve										
Glass soil jar/Teflon lined cap Biosolids	E354	02-Aug-2023	----	----	----		08-Aug-2023	----	6 days	



Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : FS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids	E169	02-Aug-2023	----	----	----		13-Aug-2023	7 days	11 days	✖ EHT
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids	E144	02-Aug-2023	----	----	----		10-Aug-2023	----	8 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap Biosolids	E108	02-Aug-2023	11-Aug-2023	30 days	9 days	✓	11-Aug-2023	30 days	9 days	✓
Physical Tests : TS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids	E157	02-Aug-2023	----	----	----		13-Aug-2023	14 days	11 days	✓

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE Raw Influent Comp	E550	02-Aug-2023	----	----	----		04-Aug-2023	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp	E555	02-Aug-2023	----	----	----		05-Aug-2023	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Trip Blank	E555	02-Aug-2023	----	----	----		05-Aug-2023	3 days	3 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Trip Blank	E559-L	02-Aug-2023	----	----	----		08-Aug-2023	28 days	6 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (lab preserved) Outfall Comp	E559-L	02-Aug-2023	----	----	----		04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Raw Influent Comp	E298	02-Aug-2023	09-Aug-2023	28 days	7 days	✓	09-Aug-2023	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Trip Blank	E298	02-Aug-2023	09-Aug-2023	28 days	7 days	✓	09-Aug-2023	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (lab preserved) Outfall Comp	E298	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	05-Aug-2023	28 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE Trip Blank	E378-U	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE Outfall Comp	E378-U	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE Raw Influent Comp	E378-U	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Outfall Comp	E235.NO3-L	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Raw Influent Comp	E235.NO3-L	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO3-L	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Outfall Comp	E235.NO2-L	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Raw Influent Comp	E235.NO2-L	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO2-L	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab	E318	02-Aug-2023	09-Aug-2023	28 days	7 days	✓	10-Aug-2023	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Raw Influent Comp	E318	02-Aug-2023	09-Aug-2023	28 days	7 days	✓	10-Aug-2023	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Trip Blank	E318	02-Aug-2023	09-Aug-2023	28 days	7 days	✓	10-Aug-2023	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Raw Influent Comp	E372-U	02-Aug-2023	05-Aug-2023	28 days	3 days	✓	09-Aug-2023	28 days	7 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Trip Blank	E372-U	02-Aug-2023	05-Aug-2023	28 days	3 days	✓	09-Aug-2023	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (lab preserved) Outfall Comp	E372-U	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	09-Aug-2023	28 days	5 days	✓
Fatty Acids : Volatile Fatty and Carboxylic Acid (VFA) by GC-MS										
Glass vial (sodium bisulfate) Fermenter Supernatant	E676	02-Aug-2023	----	----	----		08-Aug-2023	14 days	6 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab	E010.FC	02-Aug-2023	----	----	----		03-Aug-2023	30 hrs	35 hrs	✖ EHTL
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab	E010	02-Aug-2023	----	----	----		03-Aug-2023	30 hrs	35 hrs	✖ EHTL
Physical Tests : Alkalinity Species by Titration										
HDPE Bioreactor	E290	02-Aug-2023	04-Aug-2023	14 days	2 days	✓	04-Aug-2023	14 days	2 days	✓
Physical Tests : pH by Meter										
HDPE Trip Blank	E108	02-Aug-2023	04-Aug-2023	0.25 hrs	45 hrs	✖ EHTR-FM	04-Aug-2023	0.25 hrs	46 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE Outfall Comp	E108	02-Aug-2023	04-Aug-2023	0.25 hrs	53 hrs	✖ EHTR-FM	04-Aug-2023	0.25 hrs	54 hrs	✖ EHTR-FM
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp	E160-L	02-Aug-2023	----	----	----		09-Aug-2023	7 days	7 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Raw Influent Comp	E160-L	02-Aug-2023	----	----	----		09-Aug-2023	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Trip Blank	E160-L	02-Aug-2023	----	----	----		09-Aug-2023	7 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) Bioreactor	E508	02-Aug-2023	09-Aug-2023	28 days	7 days	✓	09-Aug-2023	28 days	7 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved) Bioreactor	E420	02-Aug-2023	05-Aug-2023	180 days	3 days	✓	08-Aug-2023	180 days	6 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
E. coli (MTF)	E014.EC	1070913	0	1	0.0	5.0	✖
FS by Gravimetry	E169	1083033	1	2	50.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	1079418	1	6	16.6	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1079417	1	14	7.1	5.0	✔
Moisture Content by Gravimetry	E144	1079637	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1079419	1	6	16.6	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	1070912	0	1	0.0	5.0	✖
Total Carbon by Combustion	E351	1073754	1	16	6.2	5.0	✔
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1075488	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	1074796	1	11	9.0	5.0	✔
TS by Gravimetry	E157	1083032	1	2	50.0	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1079418	2	6	33.3	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1079417	2	14	14.2	10.0	✔
Moisture Content by Gravimetry	E144	1079637	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1079419	1	6	16.6	5.0	✔
Total Carbon by Combustion	E351	1073754	2	16	12.5	10.0	✔
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1075488	2	20	10.0	10.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	1074796	2	11	18.1	10.0	✔
TS by Gravimetry	E157	1083032	1	2	50.0	5.0	✔
Method Blanks (MB)							
E. coli (MTF)	E014.EC	1070913	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	1079418	1	6	16.6	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1079417	1	14	7.1	5.0	✔
Moisture Content by Gravimetry	E144	1079637	1	13	7.6	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	1070912	1	1	100.0	5.0	✔
Total Carbon by Combustion	E351	1073754	1	16	6.2	5.0	✔
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1075488	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	1074796	1	11	9.0	5.0	✔
TS by Gravimetry	E157	1083032	1	2	50.0	5.0	✔

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Evaluation			QC frequency outside specification		QC frequency within specification		
Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1071842	1	17	5.8	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP) - Continued							
Ammonia by Fluorescence	E298	1072751	2	22	9.0	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	1071835	1	17	5.8	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1073403	1	16	6.2	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1072836	2	23	8.7	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1071853	1	18	5.5	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1071847	1	19	5.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1071848	1	19	5.2	5.0	✔
pH by Meter	E108	1071840	1	18	5.5	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	1070206	1	10	10.0	10.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	1070698	1	4	25.0	10.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1073731	1	7	14.2	5.0	✔
Total Mercury in Water by CVAAS	E508	1076692	1	20	5.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	1071113	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1072753	2	28	7.1	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1075360	1	7	14.2	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1071842	1	17	5.8	5.0	✔
Ammonia by Fluorescence	E298	1072751	2	22	9.0	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	1071835	1	17	5.8	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1073403	1	16	6.2	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1072836	2	23	8.7	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1071853	1	18	5.5	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1071847	1	19	5.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1071848	1	19	5.2	5.0	✔
pH by Meter	E108	1071840	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1073731	1	7	14.2	5.0	✔
Total Mercury in Water by CVAAS	E508	1076692	1	20	5.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	1071113	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1072753	2	28	7.1	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	1076501	1	20	5.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1075360	1	7	14.2	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1071842	1	17	5.8	5.0	✔
Ammonia by Fluorescence	E298	1072751	2	22	9.0	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	1071835	1	17	5.8	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1073403	1	16	6.2	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1072836	2	23	8.7	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1071853	1	18	5.5	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1071847	1	19	5.2	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Method Blanks (MB) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	1071848	1	19	5.2	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	1070206	1	10	10.0	5.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	1070698	1	4	25.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1073731	1	7	14.2	5.0	✔
Total Mercury in Water by CVAAS	E508	1076692	1	20	5.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	1071113	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1072753	2	28	7.1	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	1076501	1	20	5.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1075360	1	7	14.2	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1072751	2	22	9.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1072836	2	23	8.7	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1071853	1	18	5.5	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1071847	1	19	5.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1071848	1	19	5.2	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1073731	1	7	14.2	5.0	✔
Total Mercury in Water by CVAAS	E508	1076692	1	20	5.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	1071113	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1072753	2	28	7.1	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1075360	1	7	14.2	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MTF)	E014.EC ALS Environmental - Vancouver	Soil/Solid	TMECC 07.00 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism.
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC ALS Environmental - Vancouver	Soil/Solid	EPA 1680 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism. Moisture determination is performed to report test results on a dry-weight basis.
pH by Meter (1:2 Soil:Water Extraction)	E108 ALS Environmental - Vancouver	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 ALS Environmental - Vancouver	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C . Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
TS by Gravimetry	E157 ALS Environmental - Waterloo	Soil/Solid	APHA 2540 B (mod)	Total Solids (TS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. The increase in weight over that of the empty dish represents the total solids. Results are reported as the percentage of the total sample.
FS by Gravimetry	E169 ALS Environmental - Waterloo	Soil/Solid	APHA 2540 G (mod)	Fixed Solids (FS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. This residue is ignited to constant weight at 550°C . The remaining solids represent the Fixed Solids (FS). Results are reported as the percentage of the total solids.
Total Kjeldahl Nitrogen by Colourimetry	E319 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO_4 and K_2SO_4 catalysts. Ammonia in the soil extract is determined colourimetrically at 660 nm.
Total Carbon by Combustion	E351 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 21.2 (mod)	Total Carbon is determined by the high temperature combustion method with measurement by an infrared detector.
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 20.2	Total Inorganic Carbon is determined by acetic acid pH standard curve, where a known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Vancouver	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl, followed by CVAAS analysis.
VS by Gravimetry	EC165 ALS Environmental - Waterloo	Soil/Solid	APHA 2540 G (mod)	Volatile Solids (VS) are determined by drying a sample in a weighed dish to constant weight in an oven at 104 ± 1°C. The increase in weight over that of the empty dish represents the total solids. This residue is ignited to constant weight at 550°C. The remaining solids represent the fixed total solids while the weight lost on ignition is the volatile solids. Results are reported as Percent of the Total Solids which are Volatile Solids. VS at 550°C can be used as an estimation of Organic Matter (CSSS 2008).
Total Organic Carbon (Calculated) in soil	EC356 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 21.2	Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon (TIC).
Total Coliforms and E. coli (Enzyme Substrate)	E010 ALS Environmental - Vancouver	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ± 0.5°C for either 18 or 24 hours (dependent on reagent used).
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC ALS Environmental - Vancouver	Water	APHA 9223 (mod)	The enzyme substrate test detects Thermotolerant Coliforms in a 100 mL sample after an 18 hour incubation at 44.5 ± 0.2°C.
pH by Meter	E108 ALS Environmental - Vancouver	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L ALS Environmental - Vancouver	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Nitrite in Water by IC (Low Level)	E235.NO2-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Vancouver	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 ALS Environmental - Vancouver	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U ALS Environmental - Vancouver	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total metals in Water by CRC ICPMS	E420 ALS Environmental - Vancouver	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 ALS Environmental - Vancouver	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand - 5 day	E550 ALS Environmental - Vancouver	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 ALS Environmental - Vancouver	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L ALS Environmental - Vancouver	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676 ALS Environmental - Winnipeg	Water	ASTM D2908-91 (mod)	Volatile Fatty and Carboxylic Acid are analyzed GCMS.
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Solid sample preparation (MTF)	EP014 ALS Environmental - Vancouver	Soil/Solid	EPA 1680 (mod)	The procedure involves mixing the sample with deionized/distilled water at a 1:10 ratio of sample to water.
Leach 1:2 Soil:Water for pH/EC	EP108 ALS Environmental - Vancouver	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Kjeldahl Digestion for soils	EP319 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO ₄ and K ₂ SO ₄ catalysts.
Digestion for Metals and Mercury	EP440 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Dry and Grind in Soil/Solid <60°C	EPP442 ALS Environmental - Saskatoon	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 ALS Environmental - Vancouver	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 ALS Environmental - Vancouver	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1079419)											
VA23B7893-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.23	7.52	3.9%	5%	----
Physical Tests (QC Lot: 1079637)											
VA23B7893-001	Anonymous	Moisture	----	E144	0.25	%	6.08	6.00	1.31%	20%	----
Physical Tests (QC Lot: 1083032)											
VA23B7915-004	Biosolids	Solids, total [TS]	----	E157	0.10	%	22.2	21.9	1.05%	20%	----
Physical Tests (QC Lot: 1083033)											
VA23B7915-004	Biosolids	Solids, fixed [FS]	----	E169	0.10	%	16.8	15.6	7.34%	30%	----
Organic / Inorganic Carbon (QC Lot: 1073754)											
EO2306968-022	Anonymous	Carbon, total [TC]	----	E351	0.050	%	2.49	2.40	3.43%	20%	----
Organic / Inorganic Carbon (QC Lot: 1075488)											
CG2308457-001	Anonymous	Carbon, inorganic [IC]	----	E354	0.050	%	0.170	0.168	0.002	Diff <2x LOR	----
Metals (QC Lot: 1079417)											
VA23B7883-013	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	16700	16300	2.59%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.56	0.57	0.004	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	17.3	17.6	1.42%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	50.5	48.9	3.25%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.30	0.30	0.006	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	127	113	11.6%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	3.39	3.27	3.50%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	8690	7080	20.3%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	38.2	37.1	2.86%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	5.94	5.88	0.997%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	64.5	64.0	0.795%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	25900	25500	1.63%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	30.6	30.6	0.187%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	18.4	17.4	5.70%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12200	11800	3.63%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	191	186	2.28%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	15.6	15.3	1.69%	40%	----



Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 1079417) - continued											
VA23B7883-013	Anonymous	Nickel	7440-02-0	E440	0.50	mg/kg	24.2	23.3	3.72%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	1020	916	10.6%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	3020	2950	2.56%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	1.89	1.80	4.94%	30%	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.24	0.24	0.006	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	35700	35500	0.566%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	107	86.2	21.2%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	21800	20900	4.36%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.423	0.410	3.23%	30%	----
		Tin	7440-31-5	E440	2.0	mg/kg	7.4	7.9	0.4	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	833	793	4.93%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	4.88	4.82	1.09%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	59.8	57.6	3.90%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	116	113	2.58%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	7.1	6.9	2.91%	30%	----
Metals (QC Lot: 1079418)											
VA23B7893-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 1074796)											
VA23B7834-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	0.204 %	2160	5.44%	20%	----
Sub-Matrix: Water							Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1071840)											
WR2300800-001	Anonymous	pH	----	E108	0.10	pH units	8.36	8.38	0.239%	4%	----
Physical Tests (QC Lot: 1071842)											
WR2300800-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	152	153	0.262%	20%	----
Anions and Nutrients (QC Lot: 1071847)											
VA23B7869-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	5.28	5.50	3.98%	20%	----
Anions and Nutrients (QC Lot: 1071848)											
VA23B7869-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	0.0207	0.0224	0.0017	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1071853)											
VA23B7869-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.100	mg/L	2.55	2.53	0.748%	20%	----
Anions and Nutrients (QC Lot: 1072751)											



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 1072751) - continued											
FJ2301943-008	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1072753)											
FJ2301943-008	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1073730)											
VA23B7915-002	Raw Influent Comp	Ammonia, total (as N)	7664-41-7	E298	0.250	mg/L	36.1	38.3	5.94%	20%	----
Anions and Nutrients (QC Lot: 1073731)											
VA23B7915-002	Raw Influent Comp	Kjeldahl nitrogen, total [TKN]	----	E318	1.00	mg/L	49.0	45.0	8.39%	20%	----
Anions and Nutrients (QC Lot: 1073732)											
VA23B7915-002	Raw Influent Comp	Phosphorus, total	7723-14-0	E372-U	0.200	mg/L	6.11	5.95	2.57%	20%	----
Microbiological Tests (QC Lot: 1070206)											
VA23B7863-001	Anonymous	Coliforms, thermotolerant [fecal]	----	E010.FC	10	MPN/100mL	3260	2250	36.6%	65%	----
Microbiological Tests (QC Lot: 1070698)											
VA23B7888-031	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 1071113)											
VA23B7857-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0329	0.0285	14.4%	20%	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00011	<0.00010	0.000009	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00233	0.00226	2.97%	20%	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.0635	0.0638	0.398%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000062	<0.0000050	0.0000012	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	80.3	85.2	5.87%	20%	----
		Cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.00117	0.00111	0.00006	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.068	0.062	0.006	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.100	mg/L	16.1	16.4	1.45%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.00643	0.00578	10.5%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00104	0.00107	3.10%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 1071113) - continued											
VA23B7857-001	Anonymous	Phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.100	mg/L	1.58	1.57	0.436%	20%	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00033	0.00031	0.00002	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	0.000529	0.000576	8.49%	20%	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	6.79	6.72	0.968%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	5.89	5.86	0.506%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.270	0.276	2.29%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	65.2	65.3	0.0524%	20%	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	0.00137	0.00156	0.00019	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000191	0.000189	1.13%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00140	0.00138	0.00002	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 1076692)											
VA23B7915-003	Bioreactor	Mercury, total	7439-97-6	E508	0.000100	mg/L	0.000372	0.000335	0.0000374	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1071835)											
KS2302837-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1072836)											
VA23B7688-011	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	60	68	8	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1073403)											
KS2302851-001	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 1075455)											
VA23B7777-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	40	mg/L	5690	5670	0.310%	20%	----
Fatty Acids (QC Lot: 1075360)											
WT2323758-001	Anonymous	Acetic acid	64-19-7	E676	100	mg/L	174	197	24	Diff <2x LOR	----
		Butyric acid	107-92-6	E676	1.0	mg/L	4.6	5.0	0.4	Diff <2x LOR	----
		Formic acid	64-18-6	E676	30	mg/L	<30	<30	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Fatty Acids (QC Lot: 1075360) - continued											
WT2323758-001	Anonymous	Hexanoic acid	142-62-1	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isobutyric acid	79-31-2	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isovaleric acid	503-74-2	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Propanoic acid	79-09-4	E676	5.0	mg/L	54.7	55.5	1.59%	30%	----
		Valeric acid	109-52-4	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1079637)						
Moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 1083032)						
Solids, total [TS]	----	E157	0.1	%	<0.10	----
Organic / Inorganic Carbon (QCLot: 1073754)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Organic / Inorganic Carbon (QCLot: 1075488)						
Carbon, inorganic [IC]	----	E354	0.05	%	<0.050	----
Microbiological Tests (QCLot: 1070912)						
Coliforms, thermotolerant [fecal]	----	E014.FC	2	MPN/g	<2	----
Microbiological Tests (QCLot: 1070913)						
Coliforms, Escherichia coli [E. coli]	----	E014.EC	2	MPN/g	<2	----
Metals (QCLot: 1079417)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1079417) - continued						
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 1079418)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Leachable Anions & Nutrients (QCLot: 1074796)						
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	<200	----

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1071842)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1076501)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1071847)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1071848)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1071853)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1072751)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1072753)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 1073730)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1073731)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 1073732)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Microbiological Tests (QCLot: 1070206)						
Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	<1	----
Microbiological Tests (QCLot: 1070698)						
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
Total Metals (QCLot: 1071113)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 1071113) - continued						
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 1076692)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 1071835)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 1072836)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Aggregate Organics (QCLot: 1075455)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Fatty Acids (QCLot: 1075360)						
Acetic acid	64-19-7	E676	10	mg/L	<10	----
Butyric acid	107-92-6	E676	1	mg/L	<1.0	----
Formic acid	64-18-6	E676	30	mg/L	<30	----
Hexanoic acid	142-62-1	E676	1	mg/L	<1.0	----
Isobutyric acid	79-31-2	E676	1	mg/L	<1.0	----
Isovaleric acid	503-74-2	E676	1	mg/L	<1.0	----
Propanoic acid	79-09-4	E676	5	mg/L	<5.0	----
Valeric acid	109-52-4	E676	1	mg/L	<1.0	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1079419)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 1079637)									
Moisture	----	E144	0.25	%	50 %	99.0	90.0	110	----
Physical Tests (QCLot: 1083032)									
Solids, total [TS]	----	E157	0.1	%	50 %	99.5	85.0	115	----
Organic / Inorganic Carbon (QCLot: 1073754)									
Carbon, total [TC]	----	E351	0.05	%	48 %	102	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1075488)									
Carbon, inorganic [IC]	----	E354	0.05	%	0.5 %	97.1	90.0	110	----
Metals (QCLot: 1079417)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	95.5	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	120	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	98.1	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	97.2	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.1	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	115	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	90.2	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	95.9	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	95.2	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	92.2	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	93.4	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	89.5	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	80.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	106	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.5	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	110	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	91.7	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	95.4	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.1	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.1	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	109	80.0	120	----



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Analyte	CAS Number	Method	LOR	Unit					
Metals (QCLot: 1079417) - continued									
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	89.8	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	85.6	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	106	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	111	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	98.8	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	117	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	94.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.6	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	94.1	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	93.3	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	94.8	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	88.6	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	92.3	80.0	120	----
Metals (QCLot: 1079418)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	106	80.0	120	----
Leachable Anions & Nutrients (QCLot: 1074796)									
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	1000 mg/kg	97.5	80.0	120	----
Sub-Matrix: Water									
					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Analyte	CAS Number	Method	LOR	Unit					
Physical Tests (QCLot: 1071840)									
pH	----	E108	----	pH units	7 pH units	99.7	98.0	102	----
Physical Tests (QCLot: 1071842)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	106	85.0	115	----
Physical Tests (QCLot: 1076501)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 1071847)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	98.8	90.0	110	----
Anions and Nutrients (QCLot: 1071848)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	95.2	90.0	110	----
Anions and Nutrients (QCLot: 1071853)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	104	80.0	120	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit					
Anions and Nutrients (QCLot: 1072751)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	92.3	85.0	115	----
Anions and Nutrients (QCLot: 1072753)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	97.6	80.0	120	----
Anions and Nutrients (QCLot: 1073730)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	96.2	85.0	115	----
Anions and Nutrients (QCLot: 1073731)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	88.2	75.0	125	----
Anions and Nutrients (QCLot: 1073732)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	98.0	80.0	120	----
Total Metals (QCLot: 1071113)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	108	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	108	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	113	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	107	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	100.0	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	111	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	100	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	105	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	107	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	108	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	109	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	110	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	105	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	117	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	111	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	100	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	111	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	111	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	109	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	118	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	110	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	117	80.0	120	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1071113) - continued									
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	103	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	113	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	109	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	112	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	112	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	103	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	112	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	111	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	112	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
Total Metals (QCLot: 1076692)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	100	80.0	120	----
Aggregate Organics (QCLot: 1071835)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	97.0	85.0	115	----
Aggregate Organics (QCLot: 1072836)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	109	85.0	115	----
Aggregate Organics (QCLot: 1075455)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	111	85.0	115	----
Fatty Acids (QCLot: 1075360)									
Acetic acid	64-19-7	E676	10	mg/L	40 mg/L	117	70.0	130	----
Butyric acid	107-92-6	E676	1	mg/L	40 mg/L	95.6	70.0	130	----
Formic acid	64-18-6	E676	30	mg/L	160 mg/L	113	70.0	130	----
Hexanoic acid	142-62-1	E676	1	mg/L	40 mg/L	99.8	70.0	130	----
Isobutyric acid	79-31-2	E676	1	mg/L	40 mg/L	106	70.0	130	----
Isovaleric acid	503-74-2	E676	1	mg/L	40 mg/L	100.0	70.0	130	----
Propanoic acid	79-09-4	E676	5	mg/L	40 mg/L	112	70.0	130	----
Valeric acid	109-52-4	E676	1	mg/L	40 mg/L	104	70.0	130	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1071847)										
VA23B7869-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	50 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 1071848)										
VA23B7869-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	9.51 mg/L	10 mg/L	95.1	75.0	125	----
Anions and Nutrients (QCLot: 1071853)										
VA23B7869-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	2.90 mg/L	3 mg/L	96.8	70.0	130	----
Anions and Nutrients (QCLot: 1072751)										
KS2302859-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0963 mg/L	0.1 mg/L	96.3	75.0	125	----
Anions and Nutrients (QCLot: 1072753)										
KS2302859-002	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0495 mg/L	0.05 mg/L	98.9	70.0	130	----
Anions and Nutrients (QCLot: 1073730)										
VA23B7915-007	Trip Blank	Ammonia, total (as N)	7664-41-7	E298	0.0936 mg/L	0.1 mg/L	93.6	75.0	125	----
Anions and Nutrients (QCLot: 1073731)										
VA23B7915-006	Outfall Grab	Kjeldahl nitrogen, total [TKN]	----	E318	2.20 mg/L	2.5 mg/L	88.1	70.0	130	----
Anions and Nutrients (QCLot: 1073732)										
VA23B7915-007	Trip Blank	Phosphorus, total	7723-14-0	E372-U	0.0484 mg/L	0.05 mg/L	96.9	70.0	130	----
Total Metals (QCLot: 1071113)										
VA23B7857-002	Anonymous	Aluminum, total	7429-90-5	E420	0.200 mg/L	0.2 mg/L	100	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0213 mg/L	0.02 mg/L	106	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00908 mg/L	0.01 mg/L	90.8	70.0	130	----
		Boron, total	7440-42-8	E420	0.095 mg/L	0.1 mg/L	95.3	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00390 mg/L	0.004 mg/L	97.6	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 1071113) - continued										
VA23B7857-002	Anonymous	Copper, total	7440-50-8	E420	0.0180 mg/L	0.02 mg/L	90.3	70.0	130	----
		Iron, total	7439-89-6	E420	2.02 mg/L	2 mg/L	101	70.0	130	----
		Lead, total	7439-92-1	E420	0.0185 mg/L	0.02 mg/L	92.5	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0945 mg/L	0.1 mg/L	94.5	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		Phosphorus, total	7723-14-0	E420	11.1 mg/L	10 mg/L	111	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0420 mg/L	0.04 mg/L	105	70.0	130	----
		Silicon, total	7440-21-3	E420	9.90 mg/L	10 mg/L	99.0	70.0	130	----
		Silver, total	7440-22-4	E420	0.00372 mg/L	0.004 mg/L	93.0	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00373 mg/L	0.004 mg/L	93.2	70.0	130	----
		Thorium, total	7440-29-1	E420	0.0211 mg/L	0.02 mg/L	105	70.0	130	----
		Tin, total	7440-31-5	E420	0.0189 mg/L	0.02 mg/L	94.5	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00409 mg/L	0.004 mg/L	102	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		Zinc, total	7440-66-6	E420	0.380 mg/L	0.4 mg/L	95.1	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
Total Metals (QCLot: 1076692)										
VA23B7984-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000976 mg/L	0.0001 mg/L	97.6	70.0	130	----
Aggregate Organics (QCLot: 1072836)										
VA23B7688-012	Anonymous	Chemical oxygen demand [COD]	----	E559-L	89 mg/L	100 mg/L	88.7	75.0	125	----
Aggregate Organics (QCLot: 1075455)										
VA23B7800-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	ND mg/L	100 mg/L	ND	75.0	125	----
Fatty Acids (QCLot: 1075360)										



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Fatty Acids (QCLot: 1075360) - continued										
WT2323758-001	Anonymous	Acetic acid	64-19-7	E676	ND mg/L	40 mg/L	ND	70.0	130	----
		Butyric acid	107-92-6	E676	32.1 mg/L	40 mg/L	80.2	70.0	130	----
		Formic acid	64-18-6	E676	185 mg/L	160 mg/L	116	70.0	130	----
		Hexanoic acid	142-62-1	E676	32.7 mg/L	40 mg/L	81.8	70.0	130	----
		Isobutyric acid	79-31-2	E676	34.2 mg/L	40 mg/L	85.6	70.0	130	----
		Isovaleric acid	503-74-2	E676	35.5 mg/L	40 mg/L	88.6	70.0	130	----
		Propanoic acid	79-09-4	E676	ND mg/L	40 mg/L	ND	70.0	130	----
		Valeric acid	109-52-4	E676	29.5 mg/L	40 mg/L	73.7	70.0	130	----



Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method			Low	High	
Organic / Inorganic Carbon (QCLot: 1073754)									
	RM	Carbon, total [TC]	----	E351	1.4 %	99.4	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1075488)									
	RM	Carbon, inorganic [IC]	----	E354	0.383 %	101	80.0	120	----
Metals (QCLot: 1079417)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	122	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	98.0	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	98.4	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	100	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	113	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	124	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	99.3	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	120	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	110	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	100	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	89.8	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	99.4	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	124	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	108	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	117	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	101	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	98.4	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	98.0	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	90.8	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	110	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	95.8	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	116	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	103	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	94.7	70.0	130	----



Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					
Metals (QCLot: 1079417) - continued									
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	117	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	99.0	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	102	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	90.8	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	88.5	70.0	130	----
Metals (QCLot: 1079418)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	101	70.0	130	----
Leachable Anions & Nutrients (QCLot: 1074796)									
	RM	Kjeldahl nitrogen, total [TKN]	----	E319	1040 mg/kg	103	80.0	120	----



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

(Matrix: Water)

Client sampling date / time					Outfall Comp	----	----	----	----
02-Aug-2023 07:00						----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-001	-----	-----	-----	-----
Result						----	----	----	----
Physical Tests									
pH	----	E108/VA	0.10	pH units	7.80	----	----	----	----
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	1.6	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	0.142	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/V A	0.0050	mg/L	3.80	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	0.281	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	0.0726	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	0.160	----	----	----	----
Aggregate Organics									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L	<2.0	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L/VA	10	mg/L	47	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Composite Influent

Client sample ID

(Matrix: Water)

					Raw Influent Comp	----	----	----	----
Client sampling date / time					02-Aug-2023 06:45	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-002	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	202	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	36.1	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318/VA	0.050	mg/L	49.0	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/V A	0.0050	mg/L	<0.0250 ^{DLDS}	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	<0.0050 ^{DLDS}	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	3.99	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	6.11	----	----	----	----
Aggregate Organics									
Biochemical oxygen demand [BOD]	----	E550/VA	2.0	mg/L	297	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

Client sampling date / time					Bioreactor	Fermenter Supernatant	Outfall Grab	Trip Blank	----
Client sampling date / time					02-Aug-2023 06:50	02-Aug-2023 06:55	02-Aug-2023 07:05	02-Aug-2023 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-003	VA23B7915-005	VA23B7915-006	VA23B7915-007	-----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	---	E290/VA	1.0	mg/L	170	---	---	---	---
Hardness (as CaCO3), from total Ca/Mg	---	EC100A/VA	0.60	mg/L	335	---	---	---	---
pH	---	E108/VA	0.10	pH units	---	---	---	5.32	---
Solids, total suspended [TSS]	---	E160-L/VA	1.0	mg/L	---	---	---	<1.0	---
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	---	---	---	<0.0050	---
Kjeldahl nitrogen, total [TKN]	---	E318/VA	0.050	mg/L	---	---	1.47	<0.050	---
Nitrate (as N)	14797-55-8	E235.NO3-L/V A	0.0050	mg/L	---	---	---	<0.0050	---
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	---	---	---	<0.0010	---
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	---	---	---	<0.0010	---
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	---	---	---	<0.0020	---
Microbiological Tests									
Coliforms, thermotolerant [fecal]	---	E010.FC/VA	1	MPN/100mL	---	---	<1	---	---
Coliforms, Escherichia coli [E. coli]	---	E010/VA	1	MPN/100mL	---	---	<1	---	---
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	15.7	---	---	---	---
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L	0.00273	---	---	---	---
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L	0.00655	---	---	---	---
Barium, total	7440-39-3	E420/VA	0.00010	mg/L	0.464	---	---	---	---
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L	0.000207	---	---	---	---
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L	0.0566	---	---	---	---
Boron, total	7440-42-8	E420/VA	0.010	mg/L	0.348	---	---	---	---
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L	0.00167	---	---	---	---
Calcium, total	7440-70-2	E420/VA	0.050	mg/L	71.4	---	---	---	---
Cesium, total	7440-46-2	E420/VA	0.000010	mg/L	0.000494	---	---	---	---
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L	0.0205	---	---	---	---
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L	0.00356	---	---	---	---
Copper, total	7440-50-8	E420/VA	0.00050	mg/L	1.10	---	---	---	---



Analytical Results

Sub-Matrix: Grab Effluent (Matrix: Water)					Client sample ID	Bioreactor	Fermenter Supernatant	Outfall Grab	Trip Blank	----
Client sampling date / time						02-Aug-2023 06:50	02-Aug-2023 06:55	02-Aug-2023 07:05	02-Aug-2023 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-003	VA23B7915-005	VA23B7915-006	VA23B7915-007	-----	
					Result	Result	Result	Result	----	
Total Metals										
Iron, total	7439-89-6	E420/VA	0.010	mg/L	3.60	----	----	----	----	----
Lead, total	7439-92-1	E420/VA	0.000050	mg/L	0.0111	----	----	----	----	----
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L	0.0061	----	----	----	----	----
Magnesium, total	7439-95-4	E420/VA	0.0050	mg/L	38.0	----	----	----	----	----
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L	0.302	----	----	----	----	----
Mercury, total	7439-97-6	E508/VA	0.0000050	mg/L	0.000372	----	----	----	----	----
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L	0.0218	----	----	----	----	----
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L	0.0238	----	----	----	----	----
Phosphorus, total	7723-14-0	E420/VA	0.050	mg/L	133	----	----	----	----	----
Potassium, total	7440-09-7	E420/VA	0.050	mg/L	55.9	----	----	----	----	----
Rubidium, total	7440-17-7	E420/VA	0.00020	mg/L	0.0311	----	----	----	----	----
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L	0.00945	----	----	----	----	----
Silicon, total	7440-21-3	E420/VA	0.10	mg/L	9.86	----	----	----	----	----
Silver, total	7440-22-4	E420/VA	0.000010	mg/L	0.00311	----	----	----	----	----
Sodium, total	7440-23-5	E420/VA	0.050	mg/L	63.6	----	----	----	----	----
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L	0.538	----	----	----	----	----
Sulfur, total	7704-34-9	E420/VA	0.50	mg/L	33.2	----	----	----	----	----
Tellurium, total	13494-80-9	E420/VA	0.00020	mg/L	<0.00020	----	----	----	----	----
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L	0.000066	----	----	----	----	----
Thorium, total	7440-29-1	E420/VA	0.00010	mg/L	<0.00010	----	----	----	----	----
Tin, total	7440-31-5	E420/VA	0.00010	mg/L	0.00178	----	----	----	----	----
Titanium, total	7440-32-6	E420/VA	0.00030	mg/L	0.0276	----	----	----	----	----
Tungsten, total	7440-33-7	E420/VA	0.00010	mg/L	0.00122	----	----	----	----	----
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L	0.0243	----	----	----	----	----
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L	0.0122	----	----	----	----	----
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L	1.01	----	----	----	----	----
Zirconium, total	7440-67-7	E420/VA	0.00020	mg/L	0.00208	----	----	----	----	----
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L	----	----	----	----	<2.0	----



Analytical Results

Sub-Matrix: Grab Effluent (Matrix: Water)					Client sample ID	Bioreactor	Fermenter Supernatant	Outfall Grab	Trip Blank	----
Client sampling date / time						02-Aug-2023 06:50	02-Aug-2023 06:55	02-Aug-2023 07:05	02-Aug-2023 00:00	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-003	VA23B7915-005	VA23B7915-006	VA23B7915-007	-----	
					Result	Result	Result	Result	Result	----
Aggregate Organics										
Chemical oxygen demand [COD]	----	E559-LVA	10	mg/L	----	----	----	----	<10	----
Fatty Acids										
Acetic acid	64-19-7	E676/WP	10	mg/L	----	106	----	----	----	----
Butyric acid	107-92-6	E676/WP	1.0	mg/L	----	10.2	----	----	----	----
Formic acid	64-18-6	E676/WP	30	mg/L	----	<30	----	----	----	----
Hexanoic acid	142-62-1	E676/WP	1.0	mg/L	----	<1.0	----	----	----	----
Isobutyric acid	79-31-2	E676/WP	1.0	mg/L	----	<1.0	----	----	----	----
Isovaleric acid	503-74-2	E676/WP	1.0	mg/L	----	<1.0	----	----	----	----
Propanoic acid	79-09-4	E676/WP	5.0	mg/L	----	87.9	----	----	----	----
Valeric acid	109-52-4	E676/WP	1.0	mg/L	----	5.5	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids	----	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	02-Aug-2023 09:45	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-004	Result	-----	-----	-----	-----
Physical Tests										
Moisture	---	E144/VA	0.25	%	78.1	---	---	---	---	---
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	5.73 ^{FR8}	---	---	---	---	---
Solids, fixed [FS]	---	E169/WT	0.10	%	16.8	---	---	---	---	---
Solids, total [TS]	---	E157/WT	0.10	%	22.2	---	---	---	---	---
Solids, volatile [VS]	---	EC165/WT	0.10	%	83.2	---	---	---	---	---
Organic / Inorganic Carbon										
Carbon, total [TC]	---	E351/SK	0.050	%	42.0	---	---	---	---	---
Carbon, inorganic [IC]	---	E354/SK	0.050	%	0.520	---	---	---	---	---
Carbon, inorganic [IC], (as CaCO3 equivalent)	---	E354/SK	0.40	%	4.33	---	---	---	---	---
Carbon, total organic [TOC]	---	EC356/SK	0.050	%	41.5	---	---	---	---	---
Organic matter	---	EC356/SK	0.10	%	71.5	---	---	---	---	---
Microbiological Tests										
Coliforms, Escherichia coli [E. coli]	---	E014.EC/VA	2	MPN/g	1030000	---	---	---	---	---
Coliforms, thermotolerant [fecal]	---	E014.FC/VA	2	MPN/g	2530000	---	---	---	---	---
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg	3190	---	---	---	---	---
Antimony	7440-36-0	E440/VA	0.10	mg/kg	0.84	---	---	---	---	---
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	1.27	---	---	---	---	---
Barium	7440-39-3	E440/VA	0.50	mg/kg	167	---	---	---	---	---
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	<0.10	---	---	---	---	---
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	15.7	---	---	---	---	---
Boron	7440-42-8	E440/VA	5.0	mg/kg	13.4	---	---	---	---	---
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	0.511	---	---	---	---	---
Calcium	7440-70-2	E440/VA	50	mg/kg	6500	---	---	---	---	---
Chromium	7440-47-3	E440/VA	0.50	mg/kg	8.56	---	---	---	---	---
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	0.87	---	---	---	---	---
Copper	7440-50-8	E440/VA	0.50	mg/kg	331	---	---	---	---	---
Iron	7439-89-6	E440/VA	50	mg/kg	1450	---	---	---	---	---
Lead	7439-92-1	E440/VA	0.50	mg/kg	4.05	---	---	---	---	---
Lithium	7439-93-2	E440/VA	2.0	mg/kg	<2.0	---	---	---	---	---



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids	----	----	----	----
(Matrix: Soil/Solid)										
					Client sampling date / time	02-Aug-2023 09:45	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B7915-004	Result	-----	-----	-----	-----
Metals										
Magnesium	7439-95-4	E440/VA	20	mg/kg	4860	----	----	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	54.0	----	----	----	----	----
Mercury	7439-97-6	E510/VA	0.0050	mg/kg	0.269	----	----	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	5.09	----	----	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	6.34	----	----	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	17800	----	----	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	5580	----	----	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	2.33	----	----	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	1.03	----	----	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	325	----	----	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	74.9	----	----	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	4400	----	----	----	----	----
Thallium	7440-28-0	E440/VA	0.050	mg/kg	<0.050	----	----	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg	9.0	----	----	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg	29.2	----	----	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	<0.50	----	----	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg	4.60	----	----	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	3.76	----	----	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg	323	----	----	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	5.0	----	----	----	----	----
Leachable Anions & Nutrients										
Kjeldahl nitrogen, total [TKN]	----	E319/SK	0.020	%	4.91	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Leachable Anions & Nutrients : Total Kjeldahl Nitrogen by Colourimetry										
Glass soil jar/Teflon lined cap Biosolids	E319	02-Aug-2023	08-Aug-2023	365 days	6 days	✓	08-Aug-2023	365 days	6 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap Biosolids	E510	02-Aug-2023	11-Aug-2023	28 days	9 days	✓	11-Aug-2023	28 days	10 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap Biosolids	E440	02-Aug-2023	11-Aug-2023	180 days	9 days	✓	12-Aug-2023	180 days	10 days	✓
Microbiological Tests : E. coli (MTF)										
Glass soil jar/Teflon lined cap Biosolids	E014.EC	02-Aug-2023	03-Aug-2023	2 days	1 days	✓	03-Aug-2023	2 days	1 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliforms (MTF)										
Glass soil jar/Teflon lined cap Biosolids	E014.FC	02-Aug-2023	03-Aug-2023	2 days	1 days	✓	03-Aug-2023	2 days	1 days	✓
Organic / Inorganic Carbon : Total Carbon by Combustion										
Glass soil jar/Teflon lined cap Biosolids	E351	02-Aug-2023	08-Aug-2023	----	----		08-Aug-2023	0 days	0 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Acetic Acid pH Standard Curve										
Glass soil jar/Teflon lined cap Biosolids	E354	02-Aug-2023	----	----	----		08-Aug-2023	----	6 days	



Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : FS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids	E169	02-Aug-2023	----	----	----		13-Aug-2023	7 days	11 days	✖ EHT
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids	E144	02-Aug-2023	----	----	----		10-Aug-2023	----	8 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap Biosolids	E108	02-Aug-2023	11-Aug-2023	30 days	9 days	✓	11-Aug-2023	30 days	9 days	✓
Physical Tests : TS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids	E157	02-Aug-2023	----	----	----		13-Aug-2023	14 days	11 days	✓

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE Raw Influent Comp	E550	02-Aug-2023	----	----	----		04-Aug-2023	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp	E555	02-Aug-2023	----	----	----		05-Aug-2023	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Trip Blank	E555	02-Aug-2023	----	----	----		05-Aug-2023	3 days	3 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Trip Blank	E559-L	02-Aug-2023	----	----	----		08-Aug-2023	28 days	6 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (lab preserved) Outfall Comp	E559-L	02-Aug-2023	----	----	----		04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Raw Influent Comp	E298	02-Aug-2023	09-Aug-2023	28 days	7 days	✓	09-Aug-2023	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Trip Blank	E298	02-Aug-2023	09-Aug-2023	28 days	7 days	✓	09-Aug-2023	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (lab preserved) Outfall Comp	E298	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	05-Aug-2023	28 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE Trip Blank	E378-U	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE Outfall Comp	E378-U	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE Raw Influent Comp	E378-U	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Outfall Comp	E235.NO3-L	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Raw Influent Comp	E235.NO3-L	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO3-L	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Outfall Comp	E235.NO2-L	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Raw Influent Comp	E235.NO2-L	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO2-L	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	04-Aug-2023	3 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab	E318	02-Aug-2023	09-Aug-2023	28 days	7 days	✓	10-Aug-2023	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Raw Influent Comp	E318	02-Aug-2023	09-Aug-2023	28 days	7 days	✓	10-Aug-2023	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Trip Blank	E318	02-Aug-2023	09-Aug-2023	28 days	7 days	✓	10-Aug-2023	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Raw Influent Comp	E372-U	02-Aug-2023	05-Aug-2023	28 days	3 days	✓	09-Aug-2023	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Trip Blank	E372-U	02-Aug-2023	05-Aug-2023	28 days	3 days	✓	09-Aug-2023	28 days	7 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (lab preserved) Outfall Comp	E372-U	02-Aug-2023	04-Aug-2023	3 days	2 days	✓	09-Aug-2023	28 days	5 days	✓
Fatty Acids : Volatile Fatty and Carboxylic Acid (VFA) by GC-MS										
Glass vial (sodium bisulfate) Fermenter Supernatant	E676	02-Aug-2023	----	----	----		08-Aug-2023	14 days	6 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab	E010.FC	02-Aug-2023	----	----	----		03-Aug-2023	30 hrs	35 hrs	✗ EHTL
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab	E010	02-Aug-2023	----	----	----		03-Aug-2023	30 hrs	35 hrs	✗ EHTL
Physical Tests : Alkalinity Species by Titration										
HDPE Bioreactor	E290	02-Aug-2023	04-Aug-2023	14 days	2 days	✓	04-Aug-2023	14 days	2 days	✓
Physical Tests : pH by Meter										
HDPE Trip Blank	E108	02-Aug-2023	04-Aug-2023	0.25 hrs	45 hrs	✗ EHTR-FM	04-Aug-2023	0.25 hrs	46 hrs	✗ EHTR-FM
Physical Tests : pH by Meter										
HDPE Outfall Comp	E108	02-Aug-2023	04-Aug-2023	0.25 hrs	53 hrs	✗ EHTR-FM	04-Aug-2023	0.25 hrs	54 hrs	✗ EHTR-FM
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp	E160-L	02-Aug-2023	----	----	----		09-Aug-2023	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Raw Influent Comp	E160-L	02-Aug-2023	----	----	----		09-Aug-2023	7 days	7 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Trip Blank	E160-L	02-Aug-2023	----	----	----		09-Aug-2023	7 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) Bioreactor	E508	02-Aug-2023	09-Aug-2023	28 days	7 days	✓	09-Aug-2023	28 days	0 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) Bioreactor	E420	02-Aug-2023	05-Aug-2023	180 days	3 days	✓	08-Aug-2023	180 days	6 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended
 EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
 Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
E. coli (MTF)	E014.EC	1070913	0	1	0.0	5.0	✖
FS by Gravimetry	E169	1083033	1	2	50.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	1079418	1	6	16.6	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1079417	1	14	7.1	5.0	✔
Moisture Content by Gravimetry	E144	1079637	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1079419	1	6	16.6	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	1070912	0	1	0.0	5.0	✖
Total Carbon by Combustion	E351	1073754	1	16	6.2	5.0	✔
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1075488	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	1074796	1	11	9.0	5.0	✔
TS by Gravimetry	E157	1083032	1	2	50.0	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1079418	2	6	33.3	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1079417	2	14	14.2	10.0	✔
Moisture Content by Gravimetry	E144	1079637	1	13	7.6	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1079419	1	6	16.6	5.0	✔
Total Carbon by Combustion	E351	1073754	2	16	12.5	10.0	✔
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1075488	2	20	10.0	10.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	1074796	2	11	18.1	10.0	✔
TS by Gravimetry	E157	1083032	1	2	50.0	5.0	✔
Method Blanks (MB)							
E. coli (MTF)	E014.EC	1070913	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	1079418	1	6	16.6	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1079417	1	14	7.1	5.0	✔
Moisture Content by Gravimetry	E144	1079637	1	13	7.6	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	1070912	1	1	100.0	5.0	✔
Total Carbon by Combustion	E351	1073754	1	16	6.2	5.0	✔
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1075488	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	1074796	1	11	9.0	5.0	✔
TS by Gravimetry	E157	1083032	1	2	50.0	5.0	✔

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Evaluation			QC frequency outside specification		QC frequency within specification		
Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1071842	1	17	5.8	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP) - Continued							
Ammonia by Fluorescence	E298	1072751	2	22	9.0	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	1071835	1	17	5.8	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1073403	1	16	6.2	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1072836	2	23	8.7	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1071853	1	18	5.5	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1071847	1	19	5.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1071848	1	19	5.2	5.0	✔
pH by Meter	E108	1071840	1	18	5.5	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	1070206	1	10	10.0	10.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	1070698	1	4	25.0	10.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1073731	1	7	14.2	5.0	✔
Total Mercury in Water by CVAAS	E508	1076692	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1071113	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1072753	2	28	7.1	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1075360	1	7	14.2	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1071842	1	17	5.8	5.0	✔
Ammonia by Fluorescence	E298	1072751	2	22	9.0	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	1071835	1	17	5.8	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1073403	1	16	6.2	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1072836	2	23	8.7	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1071853	1	18	5.5	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1071847	1	19	5.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1071848	1	19	5.2	5.0	✔
pH by Meter	E108	1071840	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1073731	1	7	14.2	5.0	✔
Total Mercury in Water by CVAAS	E508	1076692	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1071113	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1072753	2	28	7.1	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	1076501	1	20	5.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1075360	1	7	14.2	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1071842	1	17	5.8	5.0	✔
Ammonia by Fluorescence	E298	1072751	2	22	9.0	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	1071835	1	17	5.8	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1073403	1	16	6.2	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1072836	2	23	8.7	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1071853	1	18	5.5	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1071847	1	19	5.2	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Method Blanks (MB) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	1071848	1	19	5.2	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	1070206	1	10	10.0	5.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	1070698	1	4	25.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1073731	1	7	14.2	5.0	✔
Total Mercury in Water by CVAAS	E508	1076692	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1071113	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1072753	2	28	7.1	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	1076501	1	20	5.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1075360	1	7	14.2	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1072751	2	22	9.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1072836	2	23	8.7	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1071853	1	18	5.5	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1071847	1	19	5.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1071848	1	19	5.2	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1073731	1	7	14.2	5.0	✔
Total Mercury in Water by CVAAS	E508	1076692	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1071113	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1072753	2	28	7.1	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1075360	1	7	14.2	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MTF)	E014.EC ALS Environmental - Vancouver	Soil/Solid	TMECC 07.00 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism.
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC ALS Environmental - Vancouver	Soil/Solid	EPA 1680 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism. Moisture determination is performed to report test results on a dry-weight basis.
pH by Meter (1:2 Soil:Water Extraction)	E108 ALS Environmental - Vancouver	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 ALS Environmental - Vancouver	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C . Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
TS by Gravimetry	E157 ALS Environmental - Waterloo	Soil/Solid	APHA 2540 B (mod)	Total Solids (TS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. The increase in weight over that of the empty dish represents the total solids. Results are reported as the percentage of the total sample.
FS by Gravimetry	E169 ALS Environmental - Waterloo	Soil/Solid	APHA 2540 G (mod)	Fixed Solids (FS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. This residue is ignited to constant weight at 550°C . The remaining solids represent the Fixed Solids (FS). Results are reported as the percentage of the total solids.
Total Kjeldahl Nitrogen by Colourimetry	E319 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO_4 and K_2SO_4 catalysts. Ammonia in the soil extract is determined colourimetrically at 660 nm.
Total Carbon by Combustion	E351 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 21.2 (mod)	Total Carbon is determined by the high temperature combustion method with measurement by an infrared detector.
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 20.2	Total Inorganic Carbon is determined by acetic acid pH standard curve, where a known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Vancouver	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl, followed by CVAAS analysis.
VS by Gravimetry	EC165 ALS Environmental - Waterloo	Soil/Solid	APHA 2540 G (mod)	Volatile Solids (VS) are determined by drying a sample in a weighed dish to constant weight in an oven at 104 ± 1°C. The increase in weight over that of the empty dish represents the total solids. This residue is ignited to constant weight at 550°C. The remaining solids represent the fixed total solids while the weight lost on ignition is the volatile solids. Results are reported as Percent of the Total Solids which are Volatile Solids. VS at 550°C can be used as an estimation of Organic Matter (CSSS 2008).
Total Organic Carbon (Calculated) in soil	EC356 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 21.2	Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon (TIC).
Total Coliforms and E. coli (Enzyme Substrate)	E010 ALS Environmental - Vancouver	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ± 0.5°C for either 18 or 24 hours (dependent on reagent used).
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC ALS Environmental - Vancouver	Water	APHA 9223 (mod)	The enzyme substrate test detects Thermotolerant Coliforms in a 100 mL sample after an 18 hour incubation at 44.5 ± 0.2°C.
pH by Meter	E108 ALS Environmental - Vancouver	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L ALS Environmental - Vancouver	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Nitrite in Water by IC (Low Level)	E235.NO2-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Vancouver	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 ALS Environmental - Vancouver	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U ALS Environmental - Vancouver	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Vancouver	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 ALS Environmental - Vancouver	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand - 5 day	E550 ALS Environmental - Vancouver	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 ALS Environmental - Vancouver	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L ALS Environmental - Vancouver	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676 ALS Environmental - Winnipeg	Water	ASTM D2908-91 (mod)	Volatile Fatty and Carboxylic Acid are analyzed GCMS.
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Solid sample preparation (MTF)	EP014 ALS Environmental - Vancouver	Soil/Solid	EPA 1680 (mod)	The procedure involves mixing the sample with deionized/distilled water at a 1:10 ratio of sample to water.
Leach 1:2 Soil:Water for pH/EC	EP108 ALS Environmental - Vancouver	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Kjeldahl Digestion for soils	EP319 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO ₄ and K ₂ SO ₄ catalysts.
Digestion for Metals and Mercury	EP440 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Dry and Grind in Soil/Solid <60°C	EPP442 ALS Environmental - Saskatoon	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 ALS Environmental - Vancouver	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 ALS Environmental - Vancouver	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1079419)											
VA23B7893-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.23	7.52	3.9%	5%	----
Physical Tests (QC Lot: 1079637)											
VA23B7893-001	Anonymous	Moisture	----	E144	0.25	%	6.08	6.00	1.31%	20%	----
Physical Tests (QC Lot: 1083032)											
VA23B7915-004	Biosolids	Solids, total [TS]	----	E157	0.10	%	22.2	21.9	1.05%	20%	----
Physical Tests (QC Lot: 1083033)											
VA23B7915-004	Biosolids	Solids, fixed [FS]	----	E169	0.10	%	16.8	15.6	7.34%	30%	----
Organic / Inorganic Carbon (QC Lot: 1073754)											
EO2306968-022	Anonymous	Carbon, total [TC]	----	E351	0.050	%	2.49	2.40	3.43%	20%	----
Organic / Inorganic Carbon (QC Lot: 1075488)											
CG2308457-001	Anonymous	Carbon, inorganic [IC]	----	E354	0.050	%	0.170	0.168	0.002	Diff <2x LOR	----
Metals (QC Lot: 1079417)											
VA23B7883-013	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	16700	16300	2.59%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.56	0.57	0.004	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	17.3	17.6	1.42%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	50.5	48.9	3.25%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.30	0.30	0.006	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	127	113	11.6%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	3.39	3.27	3.50%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	8690	7080	20.3%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	38.2	37.1	2.86%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	5.94	5.88	0.997%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	64.5	64.0	0.795%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	25900	25500	1.63%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	30.6	30.6	0.187%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	18.4	17.4	5.70%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12200	11800	3.63%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	191	186	2.28%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	15.6	15.3	1.69%	40%	----



Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 1079417) - continued											
VA23B7883-013	Anonymous	Nickel	7440-02-0	E440	0.50	mg/kg	24.2	23.3	3.72%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	1020	916	10.6%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	3020	2950	2.56%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	1.89	1.80	4.94%	30%	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.24	0.24	0.006	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	35700	35500	0.566%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	107	86.2	21.2%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	21800	20900	4.36%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.423	0.410	3.23%	30%	----
		Tin	7440-31-5	E440	2.0	mg/kg	7.4	7.9	0.4	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	833	793	4.93%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	4.88	4.82	1.09%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	59.8	57.6	3.90%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	116	113	2.58%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	7.1	6.9	2.91%	30%	----
Metals (QC Lot: 1079418)											
VA23B7893-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 1074796)											
VA23B7834-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	0.204 %	2160	5.44%	20%	----
Sub-Matrix: Water							Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1071840)											
WR2300800-001	Anonymous	pH	----	E108	0.10	pH units	8.36	8.38	0.239%	4%	----
Physical Tests (QC Lot: 1071842)											
WR2300800-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	152	153	0.262%	20%	----
Anions and Nutrients (QC Lot: 1071847)											
VA23B7869-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	5.28	5.50	3.98%	20%	----
Anions and Nutrients (QC Lot: 1071848)											
VA23B7869-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	0.0207	0.0224	0.0017	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1071853)											
VA23B7869-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.100	mg/L	2.55	2.53	0.748%	20%	----
Anions and Nutrients (QC Lot: 1072751)											

Page : 5 of 20
 Work Order : VA23B7915 Amendment 1
 Client : Regional District of Central Okanagan
 Project : RDCO WWTP Monthly



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 1072751) - continued											
FJ2301943-008	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1072753)											
FJ2301943-008	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1073730)											
VA23B7915-002	Raw Influent Comp	Ammonia, total (as N)	7664-41-7	E298	0.250	mg/L	36.1	38.3	5.94%	20%	----
Anions and Nutrients (QC Lot: 1073731)											
VA23B7915-002	Raw Influent Comp	Kjeldahl nitrogen, total [TKN]	----	E318	1.00	mg/L	49.0	45.0	8.39%	20%	----
Anions and Nutrients (QC Lot: 1073732)											
VA23B7915-002	Raw Influent Comp	Phosphorus, total	7723-14-0	E372-U	0.200	mg/L	6.11	5.95	2.57%	20%	----
Microbiological Tests (QC Lot: 1070206)											
VA23B7863-001	Anonymous	Coliforms, thermotolerant [fecal]	----	E010.FC	10	MPN/100mL	3260	2250	36.6%	65%	----
Microbiological Tests (QC Lot: 1070698)											
VA23B7888-031	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 1071113)											
VA23B7857-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0329	0.0285	14.4%	20%	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00011	<0.00010	0.000009	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00233	0.00226	2.97%	20%	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.0635	0.0638	0.398%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000062	<0.0000050	0.0000012	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	80.3	85.2	5.87%	20%	----
		Cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.00117	0.00111	0.00006	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.068	0.062	0.006	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.100	mg/L	16.1	16.4	1.45%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.00643	0.00578	10.5%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00104	0.00107	3.10%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 1071113) - continued											
VA23B7857-001	Anonymous	Phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.100	mg/L	1.58	1.57	0.436%	20%	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00033	0.00031	0.00002	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	0.000529	0.000576	8.49%	20%	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	6.79	6.72	0.968%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	5.89	5.86	0.506%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.270	0.276	2.29%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	65.2	65.3	0.0524%	20%	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	0.00137	0.00156	0.00019	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000191	0.000189	1.13%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00140	0.00138	0.00002	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 1076692)											
VA23B7915-003	Bioreactor	Mercury, total	7439-97-6	E508	0.000100	mg/L	0.000372	0.000335	0.0000374	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1071835)											
KS2302837-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1072836)											
VA23B7688-011	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	60	68	8	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1073403)											
KS2302851-001	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 1075455)											
VA23B7777-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	40	mg/L	5690	5670	0.310%	20%	----
Fatty Acids (QC Lot: 1075360)											
WT2323758-001	Anonymous	Acetic acid	64-19-7	E676	100	mg/L	174	197	24	Diff <2x LOR	----
		Butyric acid	107-92-6	E676	1.0	mg/L	4.6	5.0	0.4	Diff <2x LOR	----
		Formic acid	64-18-6	E676	30	mg/L	<30	<30	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Fatty Acids (QC Lot: 1075360) - continued											
WT2323758-001	Anonymous	Hexanoic acid	142-62-1	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isobutyric acid	79-31-2	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isovaleric acid	503-74-2	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Propanoic acid	79-09-4	E676	5.0	mg/L	54.7	55.5	1.59%	30%	----
		Valeric acid	109-52-4	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1079637)						
Moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 1083032)						
Solids, total [TS]	----	E157	0.1	%	<0.10	----
Organic / Inorganic Carbon (QCLot: 1073754)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Organic / Inorganic Carbon (QCLot: 1075488)						
Carbon, inorganic [IC]	----	E354	0.05	%	<0.050	----
Microbiological Tests (QCLot: 1070912)						
Coliforms, thermotolerant [fecal]	----	E014.FC	2	MPN/g	<2	----
Microbiological Tests (QCLot: 1070913)						
Coliforms, Escherichia coli [E. coli]	----	E014.EC	2	MPN/g	<2	----
Metals (QCLot: 1079417)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1079417) - continued						
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 1079418)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Leachable Anions & Nutrients (QCLot: 1074796)						
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	<200	----

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1071842)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1076501)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1071847)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1071848)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1071853)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1072751)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1072753)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 1073730)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1073731)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 1073732)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Microbiological Tests (QCLot: 1070206)						
Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	<1	----
Microbiological Tests (QCLot: 1070698)						
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
Total Metals (QCLot: 1071113)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 1071113) - continued						
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 1076692)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 1071835)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 1072836)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Aggregate Organics (QCLot: 1075455)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Fatty Acids (QCLot: 1075360)						
Acetic acid	64-19-7	E676	10	mg/L	<10	----
Butyric acid	107-92-6	E676	1	mg/L	<1.0	----
Formic acid	64-18-6	E676	30	mg/L	<30	----
Hexanoic acid	142-62-1	E676	1	mg/L	<1.0	----
Isobutyric acid	79-31-2	E676	1	mg/L	<1.0	----
Isovaleric acid	503-74-2	E676	1	mg/L	<1.0	----
Propanoic acid	79-09-4	E676	5	mg/L	<5.0	----
Valeric acid	109-52-4	E676	1	mg/L	<1.0	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1079419)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 1079637)									
Moisture	----	E144	0.25	%	50 %	99.0	90.0	110	----
Physical Tests (QCLot: 1083032)									
Solids, total [TS]	----	E157	0.1	%	50 %	99.5	85.0	115	----
Organic / Inorganic Carbon (QCLot: 1073754)									
Carbon, total [TC]	----	E351	0.05	%	48 %	102	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1075488)									
Carbon, inorganic [IC]	----	E354	0.05	%	0.5 %	97.1	90.0	110	----
Metals (QCLot: 1079417)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	95.5	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	120	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	98.1	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	97.2	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.1	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	115	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	90.2	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	95.9	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	95.2	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	92.2	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	93.4	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	89.5	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	80.7	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	106	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.5	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	110	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	91.7	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	95.4	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.1	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.1	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	109	80.0	120	----



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1079417) - continued									
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	89.8	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	85.6	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	106	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	111	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	98.8	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	117	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	94.0	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.6	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	94.1	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	93.3	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	94.8	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	88.6	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	92.3	80.0	120	----
Metals (QCLot: 1079418)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	106	80.0	120	----
Leachable Anions & Nutrients (QCLot: 1074796)									
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	1000 mg/kg	97.5	80.0	120	----
Sub-Matrix: Water									
					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1071840)									
pH	----	E108	----	pH units	7 pH units	99.7	98.0	102	----
Physical Tests (QCLot: 1071842)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	106	85.0	115	----
Physical Tests (QCLot: 1076501)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 1071847)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	98.8	90.0	110	----
Anions and Nutrients (QCLot: 1071848)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	95.2	90.0	110	----
Anions and Nutrients (QCLot: 1071853)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	104	80.0	120	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit					
Anions and Nutrients (QCLot: 1072751)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	92.3	85.0	115	----
Anions and Nutrients (QCLot: 1072753)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	97.6	80.0	120	----
Anions and Nutrients (QCLot: 1073730)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	96.2	85.0	115	----
Anions and Nutrients (QCLot: 1073731)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	88.2	75.0	125	----
Anions and Nutrients (QCLot: 1073732)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	98.0	80.0	120	----
Total Metals (QCLot: 1071113)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	108	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	108	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	113	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	107	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	100.0	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	111	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	100	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	105	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	107	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	108	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	109	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	110	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	105	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	117	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	111	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	100	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	111	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	111	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	109	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	118	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	110	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	117	80.0	120	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1071113) - continued									
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	103	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	113	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	109	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	112	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	112	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	103	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	112	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	111	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	112	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
Total Metals (QCLot: 1076692)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	100	80.0	120	----
Aggregate Organics (QCLot: 1071835)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	97.0	85.0	115	----
Aggregate Organics (QCLot: 1072836)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	109	85.0	115	----
Aggregate Organics (QCLot: 1075455)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	111	85.0	115	----
Fatty Acids (QCLot: 1075360)									
Acetic acid	64-19-7	E676	10	mg/L	40 mg/L	117	70.0	130	----
Butyric acid	107-92-6	E676	1	mg/L	40 mg/L	95.6	70.0	130	----
Formic acid	64-18-6	E676	30	mg/L	160 mg/L	113	70.0	130	----
Hexanoic acid	142-62-1	E676	1	mg/L	40 mg/L	99.8	70.0	130	----
Isobutyric acid	79-31-2	E676	1	mg/L	40 mg/L	106	70.0	130	----
Isovaleric acid	503-74-2	E676	1	mg/L	40 mg/L	100.0	70.0	130	----
Propanoic acid	79-09-4	E676	5	mg/L	40 mg/L	112	70.0	130	----
Valeric acid	109-52-4	E676	1	mg/L	40 mg/L	104	70.0	130	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1071847)										
VA23B7869-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	50 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 1071848)										
VA23B7869-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	9.51 mg/L	10 mg/L	95.1	75.0	125	----
Anions and Nutrients (QCLot: 1071853)										
VA23B7869-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	2.90 mg/L	3 mg/L	96.8	70.0	130	----
Anions and Nutrients (QCLot: 1072751)										
KS2302859-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0963 mg/L	0.1 mg/L	96.3	75.0	125	----
Anions and Nutrients (QCLot: 1072753)										
KS2302859-002	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0495 mg/L	0.05 mg/L	98.9	70.0	130	----
Anions and Nutrients (QCLot: 1073730)										
VA23B7915-007	Trip Blank	Ammonia, total (as N)	7664-41-7	E298	0.0936 mg/L	0.1 mg/L	93.6	75.0	125	----
Anions and Nutrients (QCLot: 1073731)										
VA23B7915-006	Outfall Grab	Kjeldahl nitrogen, total [TKN]	----	E318	2.20 mg/L	2.5 mg/L	88.1	70.0	130	----
Anions and Nutrients (QCLot: 1073732)										
VA23B7915-007	Trip Blank	Phosphorus, total	7723-14-0	E372-U	0.0484 mg/L	0.05 mg/L	96.9	70.0	130	----
Total Metals (QCLot: 1071113)										
VA23B7857-002	Anonymous	Aluminum, total	7429-90-5	E420	0.200 mg/L	0.2 mg/L	100	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0213 mg/L	0.02 mg/L	106	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00908 mg/L	0.01 mg/L	90.8	70.0	130	----
		Boron, total	7440-42-8	E420	0.095 mg/L	0.1 mg/L	95.3	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00390 mg/L	0.004 mg/L	97.6	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	
Total Metals (QCLot: 1071113) - continued										
VA23B7857-002	Anonymous	Copper, total	7440-50-8	E420	0.0180 mg/L	0.02 mg/L	90.3	70.0	130	----
		Iron, total	7439-89-6	E420	2.02 mg/L	2 mg/L	101	70.0	130	----
		Lead, total	7439-92-1	E420	0.0185 mg/L	0.02 mg/L	92.5	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0945 mg/L	0.1 mg/L	94.5	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		Phosphorus, total	7723-14-0	E420	11.1 mg/L	10 mg/L	111	70.0	130	----
		Potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0420 mg/L	0.04 mg/L	105	70.0	130	----
		Silicon, total	7440-21-3	E420	9.90 mg/L	10 mg/L	99.0	70.0	130	----
		Silver, total	7440-22-4	E420	0.00372 mg/L	0.004 mg/L	93.0	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00373 mg/L	0.004 mg/L	93.2	70.0	130	----
		Thorium, total	7440-29-1	E420	0.0211 mg/L	0.02 mg/L	105	70.0	130	----
		Tin, total	7440-31-5	E420	0.0189 mg/L	0.02 mg/L	94.5	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00409 mg/L	0.004 mg/L	102	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		Zinc, total	7440-66-6	E420	0.380 mg/L	0.4 mg/L	95.1	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
Total Metals (QCLot: 1076692)										
VA23B7984-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000976 mg/L	0.0001 mg/L	97.6	70.0	130	----
Aggregate Organics (QCLot: 1072836)										
VA23B7688-012	Anonymous	Chemical oxygen demand [COD]	----	E559-L	89 mg/L	100 mg/L	88.7	75.0	125	----
Aggregate Organics (QCLot: 1075455)										
VA23B7800-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	ND mg/L	100 mg/L	ND	75.0	125	----
Fatty Acids (QCLot: 1075360)										



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Fatty Acids (QCLot: 1075360) - continued										
WT2323758-001	Anonymous	Acetic acid	64-19-7	E676	ND mg/L	40 mg/L	ND	70.0	130	----
		Butyric acid	107-92-6	E676	32.1 mg/L	40 mg/L	80.2	70.0	130	----
		Formic acid	64-18-6	E676	185 mg/L	160 mg/L	116	70.0	130	----
		Hexanoic acid	142-62-1	E676	32.7 mg/L	40 mg/L	81.8	70.0	130	----
		Isobutyric acid	79-31-2	E676	34.2 mg/L	40 mg/L	85.6	70.0	130	----
		Isovaleric acid	503-74-2	E676	35.5 mg/L	40 mg/L	88.6	70.0	130	----
		Propanoic acid	79-09-4	E676	ND mg/L	40 mg/L	ND	70.0	130	----
		Valeric acid	109-52-4	E676	29.5 mg/L	40 mg/L	73.7	70.0	130	----



Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method			Low	High	
Organic / Inorganic Carbon (QCLot: 1073754)									
	RM	Carbon, total [TC]	----	E351	1.4 %	99.4	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1075488)									
	RM	Carbon, inorganic [IC]	----	E354	0.383 %	101	80.0	120	----
Metals (QCLot: 1079417)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	122	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	98.0	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	98.4	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	100	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	113	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	124	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	99.3	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	120	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	110	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	100	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	89.8	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	99.4	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	124	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	108	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	117	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	101	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	98.4	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	98.0	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	90.8	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	110	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	95.8	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	116	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	103	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	94.7	70.0	130	----



Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					
Metals (QCLot: 1079417) - continued									
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	117	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	99.0	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	102	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	90.8	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	88.5	70.0	130	----
Metals (QCLot: 1079418)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	101	70.0	130	----
Leachable Anions & Nutrients (QCLot: 1074796)									
	RM	Kjeldahl nitrogen, total [TKN]	----	E319	1040 mg/kg	103	80.0	120	----



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

Outfall Comp
E104954

(Matrix: Water)

Client sampling date / time

06-Dec-2023
07:05

Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C9379-001	-----	-----	-----	-----
					Result	----	----	----	----

Physical Tests

pH	----	E108/VA	0.10	pH units	8.09	----	----	----	----
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	2.4	----	----	----	----

Anions and Nutrients

Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	0.560	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/V A	0.0050	mg/L	6.30	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	0.268	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	0.0908	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	0.201	----	----	----	----

Aggregate Organics

Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L	<2.0	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L/VA	10	mg/L	31	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Composite Influent

Client sample ID

(Matrix: Water)

					Raw Influent Comp E222796	----	----	----	----
Client sampling date / time					06-Dec-2023 06:45	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C9379-002	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	334	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	38.3	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318/VA	0.050	mg/L	56.4	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NQ3-L/V A	0.0050	mg/L	<0.0250 ^{DLDS}	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	<0.0050 ^{DLDS}	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	4.72	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	6.82	----	----	----	----
Aggregate Organics									
Biochemical oxygen demand [BOD]	----	E550/VA	2.0	mg/L	337	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Grab Effluent					Client sample ID	Bioreactor	Fermenter Supernatant	Outfall Grab E104954	----	----
(Matrix: Water)										
Client sampling date / time					06-Dec-2023 06:50	06-Dec-2023 06:55	06-Dec-2023 07:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C9379-003	VA23C9379-005	VA23C9379-006	-----	-----	-----
					Result	Result	Result	----	----	----
Physical Tests										
Alkalinity, total (as CaCO3)	---	E290/VA	1.0	mg/L	176	----	----	----	----	----
Hardness (as CaCO3), from total Ca/Mg	---	EC100A/VA	0.60	mg/L	238	----	----	----	----	----
Anions and Nutrients										
Kjeldahl nitrogen, total [TKN]	---	E318/VA	0.050	mg/L	----	----	1.86	----	----	----
Microbiological Tests										
Coliforms, thermotolerant [fecal]	---	E010.FC/VA	1	MPN/100mL	----	----	1	----	----	----
Coliforms, Escherichia coli [E. coli]	---	E010/VA	1	MPN/100mL	----	----	<1	----	----	----
Total Metals										
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	30.4	----	----	----	----	----
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L	0.00208	----	----	----	----	----
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L	0.00365	----	----	----	----	----
Barium, total	7440-39-3	E420/VA	0.00010	mg/L	0.256	----	----	----	----	----
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L	0.000142	----	----	----	----	----
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L	0.0362	----	----	----	----	----
Boron, total	7440-42-8	E420/VA	0.010	mg/L	0.258	----	----	----	----	----
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L	0.00154	----	----	----	----	----
Calcium, total	7440-70-2	E420/VA	0.050	mg/L	55.3	----	----	----	----	----
Cesium, total	7440-46-2	E420/VA	0.000010	mg/L	0.000227	----	----	----	----	----
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L	0.0139	----	----	----	----	----
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L	0.00315	----	----	----	----	----
Copper, total	7440-50-8	E420/VA	0.00050	mg/L	0.734	----	----	----	----	----
Iron, total	7439-89-6	E420/VA	0.010	mg/L	3.49	----	----	----	----	----
Lead, total	7439-92-1	E420/VA	0.000050	mg/L	0.00860	----	----	----	----	----
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L	0.0053	----	----	----	----	----
Magnesium, total	7439-95-4	E420/VA	0.0050	mg/L	24.4	----	----	----	----	----
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L	0.156	----	----	----	----	----
Mercury, total	7439-97-6	E508/VA	0.0000050	mg/L	0.0000302	----	----	----	----	----
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L	0.0177	----	----	----	----	----
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L	0.0172	----	----	----	----	----
Phosphorus, total	7723-14-0	E420/VA	0.050	mg/L	85.3	----	----	----	----	----



Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

					Bioreactor	Fermenter Supernatant	Outfall Grab E104954	----	----
Client sampling date / time					06-Dec-2023 06:50	06-Dec-2023 06:55	06-Dec-2023 07:00	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C9379-003	VA23C9379-005	VA23C9379-006	-----	-----
					Result	Result	Result	----	----
Total Metals									
Potassium, total	7440-09-7	E420/VA	0.050	mg/L	43.7	----	----	----	----
Rubidium, total	7440-17-7	E420/VA	0.00020	mg/L	0.0259	----	----	----	----
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L	0.00523	----	----	----	----
Silicon, total	7440-21-3	E420/VA	0.10	mg/L	8.82	----	----	----	----
Silver, total	7440-22-4	E420/VA	0.000010	mg/L	0.00197	----	----	----	----
Sodium, total	7440-23-5	E420/VA	0.050	mg/L	55.6	----	----	----	----
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L	0.470	----	----	----	----
Sulfur, total	7704-34-9	E420/VA	0.50	mg/L	27.3	----	----	----	----
Tellurium, total	13494-80-9	E420/VA	0.00020	mg/L	<0.00040 ^{DLA}	----	----	----	----
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L	0.000049	----	----	----	----
Thorium, total	7440-29-1	E420/VA	0.00010	mg/L	<0.00020 ^{DLA}	----	----	----	----
Tin, total	7440-31-5	E420/VA	0.00010	mg/L	0.00383	----	----	----	----
Titanium, total	7440-32-6	E420/VA	0.00030	mg/L	0.0391	----	----	----	----
Tungsten, total	7440-33-7	E420/VA	0.00010	mg/L	0.00094	----	----	----	----
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L	0.0142	----	----	----	----
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L	0.00812	----	----	----	----
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L	0.641	----	----	----	----
Zirconium, total	7440-67-7	E420/VA	0.00020	mg/L	0.0105	----	----	----	----
Fatty Acids									
Acetic acid	64-19-7	E676/WP	10	mg/L	----	54	----	----	----
Butyric acid	107-92-6	E676/WP	1.0	mg/L	----	10.8	----	----	----
Formic acid	64-18-6	E676/WP	30	mg/L	----	<30	----	----	----
Hexanoic acid	142-62-1	E676/WP	1.0	mg/L	----	<1.0	----	----	----
Isobutyric acid	79-31-2	E676/WP	1.0	mg/L	----	1.6	----	----	----
Isovaleric acid	503-74-2	E676/WP	1.0	mg/L	----	<1.0	----	----	----
Propanoic acid	79-09-4	E676/WP	5.0	mg/L	----	39.9	----	----	----
Valeric acid	109-52-4	E676/WP	1.0	mg/L	----	5.3	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	06-Dec-2023 09:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C9379-004	Result	----	----	----	----
Physical Tests										
Moisture	---	E144/VA	0.25	%	75.2	---	---	---	---	---
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	5.55 ^{FR10}	---	---	---	---	---
Solids, fixed [FS]	---	E169/WT	0.10	%	17.6	---	---	---	---	---
Solids, total [TS]	---	E157/WT	0.10	%	24.2	---	---	---	---	---
Solids, volatile [VS]	---	EC165/WT	0.10	%	82.4	---	---	---	---	---
Organic / Inorganic Carbon										
Carbon, total [TC]	---	E351/SK	0.050	%	45.2	---	---	---	---	---
Carbon, inorganic [IC]	---	E354/SK	0.050	%	0.461	---	---	---	---	---
Carbon, inorganic [IC], (as CaCO3 equivalent)	---	E354/SK	0.40	%	3.84	---	---	---	---	---
Carbon, total organic [TOC]	---	EC356/SK	0.050	%	44.7	---	---	---	---	---
Organic matter	---	EC356/SK	0.10	%	77.1	---	---	---	---	---
Microbiological Tests										
Coliforms, Escherichia coli [E. coli]	---	E014.EC/VA	2	MPN/g	660000	---	---	---	---	---
Coliforms, thermotolerant [fecal]	---	E014.FC/VA	2	MPN/g	>660000	---	---	---	---	---
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg	6720	---	---	---	---	---
Antimony	7440-36-0	E440/VA	0.10	mg/kg	0.79	---	---	---	---	---
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	0.92	---	---	---	---	---
Barium	7440-39-3	E440/VA	0.50	mg/kg	80.8	---	---	---	---	---
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	<0.10	---	---	---	---	---
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	15.0	---	---	---	---	---
Boron	7440-42-8	E440/VA	5.0	mg/kg	9.0	---	---	---	---	---
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	0.546	---	---	---	---	---
Calcium	7440-70-2	E440/VA	50	mg/kg	7030	---	---	---	---	---
Chromium	7440-47-3	E440/VA	0.50	mg/kg	7.69	---	---	---	---	---
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	1.09	---	---	---	---	---
Copper	7440-50-8	E440/VA	0.50	mg/kg	228	---	---	---	---	---
Iron	7439-89-6	E440/VA	50	mg/kg	1730	---	---	---	---	---
Lead	7439-92-1	E440/VA	0.50	mg/kg	4.11	---	---	---	---	---
Lithium	7439-93-2	E440/VA	2.0	mg/kg	<2.0	---	---	---	---	---



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)										
					Client sampling date / time	06-Dec-2023 09:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C9379-004	-----	-----	-----	-----	-----
					Result	----	----	----	----	----
Metals										
Magnesium	7439-95-4	E440/VA	20	mg/kg	2960	----	----	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	41.8	----	----	----	----	----
Mercury	7439-97-6	E510/VA	0.0050	mg/kg	0.388	----	----	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	4.71	----	----	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	5.91	----	----	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	17100	----	----	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	4200	----	----	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	2.16	----	----	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	0.96	----	----	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	333	----	----	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	66.0	----	----	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	3800	----	----	----	----	----
Thallium	7440-28-0	E440/VA	0.050	mg/kg	<0.050	----	----	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg	8.9	----	----	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg	36.4	----	----	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	0.56	----	----	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg	3.49	----	----	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	3.70	----	----	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg	296	----	----	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	12.2	----	----	----	----	----
Leachable Anions & Nutrients										
Kjeldahl nitrogen, total [TKN]	----	E319/SK	0.020	%	4.78	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Water					Client sample ID	Trip Blank	----	----	----	----
(Matrix: Water)										
Client sampling date / time					06-Dec-2023 00:00	----	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C9379-007	-----	-----	-----	-----	-----
					Result	----	----	----	----	----
Physical Tests										
pH	---	E108/VA	0.10	pH units	5.57	----	----	----	----	----
Solids, total suspended [TSS]	---	E160-L/VA	1.0	mg/L	<1.0	----	----	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	<0.0050	----	----	----	----	----
Kjeldahl nitrogen, total [TKN]	---	E318/VA	0.050	mg/L	<0.050	----	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/V A	0.0050	mg/L	<0.0050	----	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	<0.0010 ^{HTDC}	----	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	<0.0010	----	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	<0.0020	----	----	----	----	----
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L	<2.0	----	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L/VA	10	mg/L	<10	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Microbiological Tests	Anonymous	Anonymous	Coliforms, thermotolerant [fecal]	----	E014.FC	151 % DUP-H	100%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Leachable Anions & Nutrients : Total Kjeldahl Nitrogen by Colourimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E319	06-Dec-2023	11-Dec-2023	365 days	5 days	✓	12-Dec-2023	365 days	6 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap Biosolids E231763	E510	06-Dec-2023	13-Dec-2023	28 days	7 days	✓	13-Dec-2023	28 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap Biosolids E231763	E440	06-Dec-2023	13-Dec-2023	180 days	7 days	✓	13-Dec-2023	180 days	8 days	✓
Microbiological Tests : E. coli (MTF)										
Glass soil jar/Teflon lined cap Biosolids E231763	E014.EC	06-Dec-2023	07-Dec-2023	2 days	1 days	✓	07-Dec-2023	2 days	1 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliforms (MTF)										
Glass soil jar/Teflon lined cap Biosolids E231763	E014.FC	06-Dec-2023	07-Dec-2023	2 days	1 days	✓	07-Dec-2023	2 days	1 days	✓
Organic / Inorganic Carbon : Total Carbon by Combustion										
Glass soil jar/Teflon lined cap Biosolids E231763	E351	06-Dec-2023	13-Dec-2023	----	----		13-Dec-2023	0 days	0 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Acetic Acid pH Standard Curve										
Glass soil jar/Teflon lined cap Biosolids E231763	E354	06-Dec-2023	----	----	----		11-Dec-2023	----	5 days	



Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : FS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E169	06-Dec-2023	----	----	----		12-Dec-2023	7 days	6 days	✓
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E144	06-Dec-2023	----	----	----		12-Dec-2023	----	6 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap Biosolids E231763	E108	06-Dec-2023	13-Dec-2023	30 days	7 days	✓	13-Dec-2023	30 days	7 days	✓
Physical Tests : TS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E157	06-Dec-2023	----	----	----		12-Dec-2023	14 days	6 days	✓

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] Raw Influent Comp E222796	E550	06-Dec-2023	----	----	----		09-Dec-2023	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp E104954	E555	06-Dec-2023	----	----	----		09-Dec-2023	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Trip Blank	E555	06-Dec-2023	----	----	----		09-Dec-2023	3 days	4 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E559-L	06-Dec-2023	----	----	----		13-Dec-2023	28 days	7 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (lab preserved) Trip Blank	E559-L	06-Dec-2023	----	----	----		11-Dec-2023	3 days	5 days	✖ EHT
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Outfall Comp E104954	E298	06-Dec-2023	07-Dec-2023	28 days	1 days	✓	08-Dec-2023	28 days	3 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E298	06-Dec-2023	07-Dec-2023	28 days	1 days	✓	08-Dec-2023	28 days	3 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (lab preserved) Trip Blank	E298	06-Dec-2023	07-Dec-2023	3 days	2 days	✓	08-Dec-2023	28 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE Outfall Comp E104954	E378-U	06-Dec-2023	08-Dec-2023	3 days	2 days	✓	09-Dec-2023	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE Raw Influent Comp E222796	E378-U	06-Dec-2023	08-Dec-2023	3 days	2 days	✓	09-Dec-2023	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE Trip Blank	E378-U	06-Dec-2023	08-Dec-2023	3 days	2 days	✓	09-Dec-2023	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Outfall Comp E104954	E235.NO3-L	06-Dec-2023	08-Dec-2023	3 days	2 days	✓	08-Dec-2023	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Raw Influent Comp E222796	E235.NO3-L	06-Dec-2023	08-Dec-2023	3 days	2 days	✓	08-Dec-2023	3 days	2 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO3-L	06-Dec-2023	08-Dec-2023	3 days	2 days	✓	08-Dec-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Outfall Comp E104954	E235.NO2-L	06-Dec-2023	08-Dec-2023	3 days	2 days	✓	08-Dec-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Raw Influent Comp E222796	E235.NO2-L	06-Dec-2023	08-Dec-2023	3 days	2 days	✓	08-Dec-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO2-L	06-Dec-2023	08-Dec-2023	3 days	2 days	✓	08-Dec-2023	3 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	06-Dec-2023	07-Dec-2023	28 days	1 days	✓	08-Dec-2023	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E318	06-Dec-2023	07-Dec-2023	28 days	1 days	✓	08-Dec-2023	28 days	2 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (lab preserved) Trip Blank	E318	06-Dec-2023	07-Dec-2023	3 days	2 days	✓	08-Dec-2023	28 days	1 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E372-U	06-Dec-2023	07-Dec-2023	28 days	1 days	✓	11-Dec-2023	28 days	5 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E372-U	06-Dec-2023	07-Dec-2023	28 days	1 days	✓	11-Dec-2023	28 days	5 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (lab preserved) Trip Blank	E372-U	06-Dec-2023	07-Dec-2023	3 days	2 days	✓	11-Dec-2023	28 days	4 days	✓
Fatty Acids : Volatile Fatty and Carboxylic Acid (VFA) by GC-MS										
Glass vial (sodium bisulfate) Fermenter Supernatant	E676	06-Dec-2023	----	----	----		12-Dec-2023	14 days	6 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab E104954	E010.FC	06-Dec-2023	----	----	----		07-Dec-2023	30 hrs	30 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab E104954	E010	06-Dec-2023	----	----	----		07-Dec-2023	30 hrs	30 hrs	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Bioreactor	E290	06-Dec-2023	13-Dec-2023	14 days	7 days	✓	13-Dec-2023	14 days	7 days	✓
Physical Tests : pH by Meter										
HDPE Outfall Comp E104954	E108	06-Dec-2023	08-Dec-2023	0.25 hrs	52 hrs	✖ EHTR-FM	11-Dec-2023	0.25 hrs	119 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE Trip Blank	E108	06-Dec-2023	08-Dec-2023	0.25 hrs	59 hrs	✖ EHTR-FM	11-Dec-2023	0.25 hrs	126 hrs	✖ EHTR-FM
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp E104954	E160-L	06-Dec-2023	----	----	----		07-Dec-2023	7 days	1 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Raw Influent Comp E222796	E160-L	06-Dec-2023	----	----	----		07-Dec-2023	7 days	1 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Trip Blank	E160-L	06-Dec-2023	----	----	----		07-Dec-2023	7 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) Bioreactor	E508	06-Dec-2023	08-Dec-2023	28 days	3 days	✓	08-Dec-2023	28 days	0 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) Bioreactor	E420	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	09-Dec-2023	180 days	3 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
E. coli (MTF)	E014.EC	1268627	0	1	0.0	5.0	✖
FS by Gravimetry	E169	1273224	1	2	50.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	1274010	1	20	5.0	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1274011	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	1274019	1	20	5.0	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1274012	1	20	5.0	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	1268626	1	2	50.0	5.0	✔
Total Carbon by Combustion	E351	1275086	1	18	5.5	5.0	✔
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1271655	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	1271598	1	14	7.1	5.0	✔
TS by Gravimetry	E157	1273223	1	3	33.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1274010	2	20	10.0	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1274011	2	20	10.0	10.0	✔
Moisture Content by Gravimetry	E144	1274019	1	20	5.0	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1274012	1	20	5.0	5.0	✔
Total Carbon by Combustion	E351	1275086	2	18	11.1	10.0	✔
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1271655	2	18	11.1	10.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	1271598	2	14	14.2	10.0	✔
TS by Gravimetry	E157	1273223	1	3	33.3	5.0	✔
Method Blanks (MB)							
E. coli (MTF)	E014.EC	1268627	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	1274010	1	20	5.0	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1274011	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	1274019	1	20	5.0	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	1268626	1	2	50.0	5.0	✔
Total Carbon by Combustion	E351	1275086	1	18	5.5	5.0	✔
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1271655	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	1271598	1	14	7.1	5.0	✔
TS by Gravimetry	E157	1273223	1	3	33.3	5.0	✔

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Evaluation			QC frequency outside specification		QC frequency within specification		
Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1274994	0	1	0.0	5.0	✖



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP) - Continued							
Ammonia by Fluorescence	E298	1268263	1	17	5.8	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	1270554	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1271010	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1272065	2	37	5.4	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1269365	1	16	6.2	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1269377	1	15	6.6	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1269378	1	15	6.6	5.0	✔
pH by Meter	E108	1269361	1	17	5.8	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	1268251	1	8	12.5	10.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	1268252	2	20	10.0	10.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1268259	1	13	7.6	5.0	✔
Total Mercury in Water by CVAAS	E508	1270339	1	3	33.3	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1268474	1	15	6.6	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1268262	1	16	6.2	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1273469	1	8	12.5	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1274994	1	1	100.0	5.0	✔
Ammonia by Fluorescence	E298	1268263	1	17	5.8	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	1270554	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1271010	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1272065	2	37	5.4	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1269365	1	16	6.2	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1269377	1	15	6.6	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1269378	1	15	6.6	5.0	✔
pH by Meter	E108	1269361	1	17	5.8	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1268259	1	13	7.6	5.0	✔
Total Mercury in Water by CVAAS	E508	1270339	1	3	33.3	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1268474	1	15	6.6	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1268262	1	16	6.2	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	1268721	1	14	7.1	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1273469	1	8	12.5	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1274994	1	1	100.0	5.0	✔
Ammonia by Fluorescence	E298	1268263	1	17	5.8	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	1270554	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1271010	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1272065	2	37	5.4	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1269365	1	16	6.2	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1269377	1	15	6.6	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Method Blanks (MB) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	1269378	1	15	6.6	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	1268251	1	8	12.5	5.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	1268252	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1268259	1	13	7.6	5.0	✔
Total Mercury in Water by CVAAS	E508	1270339	1	3	33.3	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1268474	1	15	6.6	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1268262	1	16	6.2	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	1268721	1	14	7.1	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1273469	1	8	12.5	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1268263	1	17	5.8	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1272065	2	37	5.4	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1269365	1	16	6.2	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1269377	1	15	6.6	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1269378	1	15	6.6	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1268259	1	13	7.6	5.0	✔
Total Mercury in Water by CVAAS	E508	1270339	1	3	33.3	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1268474	1	15	6.6	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1268262	1	16	6.2	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1273469	1	8	12.5	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MTF)	E014.EC ALS Environmental - Vancouver	Soil/Solid	TMECC 07.00 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism.
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC ALS Environmental - Vancouver	Soil/Solid	EPA 1680 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism. Moisture determination is performed to report test results on a dry-weight basis.
pH by Meter (1:2 Soil:Water Extraction)	E108 ALS Environmental - Vancouver	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 ALS Environmental - Vancouver	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C . Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
TS by Gravimetry	E157 ALS Environmental - Waterloo	Soil/Solid	APHA 2540 B (mod)	Total Solids (TS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. The increase in weight over that of the empty dish represents the total solids. Results are reported as the percentage of the total sample.
FS by Gravimetry	E169 ALS Environmental - Waterloo	Soil/Solid	APHA 2540 G (mod)	Fixed Solids (FS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. This residue is ignited to constant weight at 550°C . The remaining solids represent the Fixed Solids (FS). Results are reported as the percentage of the total solids.
Total Kjeldahl Nitrogen by Colourimetry	E319 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO_4 and K_2SO_4 catalysts. Ammonia in the soil extract is determined colourimetrically at 660 nm.
Total Carbon by Combustion	E351 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 21.2 (mod)	Total Carbon is determined by the high temperature combustion method with measurement by an infrared detector.
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 20.2	Total Inorganic Carbon is determined by acetic acid pH standard curve, where a known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Vancouver	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl, followed by CVAAS analysis.
VS by Gravimetry	EC165 ALS Environmental - Waterloo	Soil/Solid	APHA 2540 G (mod)	Volatile Solids (VS) are determined by drying a sample in a weighed dish to constant weight in an oven at 104 ± 1°C. The increase in weight over that of the empty dish represents the total solids. This residue is ignited to constant weight at 550°C. The remaining solids represent the fixed total solids while the weight lost on ignition is the volatile solids. Results are reported as Percent of the Total Solids which are Volatile Solids. VS at 550°C can be used as an estimation of Organic Matter (CSSS 2008).
Total Organic Carbon (Calculated) in soil	EC356 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 21.2	Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon (TIC).
Total Coliforms and E. coli (Enzyme Substrate)	E010 ALS Environmental - Vancouver	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ± 0.5°C for either 18 or 24 hours (dependent on reagent used).
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC ALS Environmental - Vancouver	Water	APHA 9223 (mod)	The enzyme substrate test detects Thermotolerant Coliforms in a 100 mL sample after an 18 hour incubation at 44.5 ± 0.2°C.
pH by Meter	E108 ALS Environmental - Vancouver	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L ALS Environmental - Vancouver	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Nitrite in Water by IC (Low Level)	E235.NO2-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Vancouver	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 ALS Environmental - Vancouver	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U ALS Environmental - Vancouver	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Vancouver	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 ALS Environmental - Vancouver	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand - 5 day	E550 ALS Environmental - Vancouver	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 ALS Environmental - Vancouver	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L ALS Environmental - Vancouver	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676 ALS Environmental - Winnipeg	Water	ASTM D2908-91 (mod)	Volatile Fatty and Carboxylic Acid are analyzed GCMS.
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Solid sample preparation (MTF)	EP014 ALS Environmental - Vancouver	Soil/Solid	EPA 1680 (mod)	The procedure involves mixing the sample with deionized/distilled water at a 1:10 ratio of sample to water.
Leach 1:2 Soil:Water for pH/EC	EP108 ALS Environmental - Vancouver	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Kjeldahl Digestion for soils	EP319 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO ₄ and K ₂ SO ₄ catalysts.
Digestion for Metals and Mercury	EP440 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Dry and Grind in Soil/Solid <60°C	EPP442 ALS Environmental - Saskatoon	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 ALS Environmental - Vancouver	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 ALS Environmental - Vancouver	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1273223)											
VA23C9379-004	Biosolids E231763	Solids, total [TS]	----	E157	0.10	%	24.2	24.5	1.39%	20%	----
Physical Tests (QC Lot: 1273224)											
VA23C9379-004	Biosolids E231763	Solids, fixed [FS]	----	E169	0.10	%	17.6	17.0	3.80%	30%	----
Physical Tests (QC Lot: 1274012)											
VA23C9379-004	Biosolids E231763	pH (1:2 soil:water)	----	E108	0.10	pH units	5.55	5.61	1.1%	5%	----
Physical Tests (QC Lot: 1274019)											
VA23C9379-004	Biosolids E231763	Moisture	----	E144	0.25	%	75.2	75.3	0.135%	20%	----
Organic / Inorganic Carbon (QC Lot: 1271655)											
CG2317275-001	Anonymous	Carbon, inorganic [IC]	----	E354	0.050	%	0.212	0.214	0.003	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1275086)											
WP2332012-002	Anonymous	Carbon, total [TC]	----	E351	0.050	%	30.3	31.0	2.26%	20%	----
Microbiological Tests (QC Lot: 1268626)											
VA23C9399-009	Anonymous	Coliforms, thermotolerant [fecal]	----	E014.FC	1090	MPN/g	128000	17900	151%	100%	DUP-H
Metals (QC Lot: 1274010)											
VA23C9379-004	Biosolids E231763	Mercury	7439-97-6	E510	0.0050	mg/kg	0.388	0.360	7.29%	40%	----
Metals (QC Lot: 1274011)											
VA23C9379-004	Biosolids E231763	Aluminum	7429-90-5	E440	50	mg/kg	6720	6690	0.559%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.79	0.75	5.32%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	0.92	0.93	1.22%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	80.8	80.7	0.178%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	15.0	15.0	0.291%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	9.0	9.1	0.08	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.546	0.511	6.68%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	7030	6930	1.41%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	7.69	8.49	9.89%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	1.09	1.21	9.86%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	228	235	2.95%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	1730	1700	1.85%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	4.11	3.60	13.1%	40%	----



Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 1274011) - continued											
VA23C9379-004	Biosolids E231763	Lithium	7439-93-2	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	2960	2950	0.402%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	41.8	42.0	0.515%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	4.71	4.67	0.926%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	5.91	6.30	6.42%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	17100	17200	0.681%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	4200	4130	1.63%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	2.16	2.23	3.39%	30%	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.96	0.93	3.75%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	333	326	2.33%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	66.0	65.7	0.439%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	3800	4000	200	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	8.9	8.8	0.08	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	36.4	35.4	2.63%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	0.56	0.58	0.02	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	3.49	3.46	0.975%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	3.70	3.64	1.58%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	296	294	0.766%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	12.2	12.0	1.03%	30%	----
Leachable Anions & Nutrients (QC Lot: 1271598)											
CG2317282-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	0.083 %	860	30	Diff <2x LOR	----
Sub-Matrix: Water							Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1269361)											
VA23C9224-003	Anonymous	pH	----	E108	0.10	pH units	8.36	8.36	0.00%	4%	----
Anions and Nutrients (QC Lot: 1268259)											
FJ2303203-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.130	0.122	0.008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1268262)											
FJ2303203-005	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0081	0.0075	0.0006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1268263)											
VA23C9109-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.160	0.160	0.0252%	20%	----
Anions and Nutrients (QC Lot: 1269365)											



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 1269365) - continued											
VA23C9224-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1269377)											
VA23C9224-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1269378)											
VA23C9224-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 1268251)											
VA23C9381-001	Anonymous	Coliforms, thermotolerant [fecal]	----	E010.FC	10	MPN/100mL	>24200	>24200	0.00%	65%	----
Microbiological Tests (QC Lot: 1268252)											
VA23C9370-001	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
VA23C9429-003	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 1268474)											
KS2304701-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00029	0.00030	0.000009	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.0669	0.0683	2.06%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	57.4	58.3	1.48%	20%	----
		Cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.0152	0.0157	3.35%	20%	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.041	0.042	0.0006	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0016	0.0016	0.00002	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	14.5	14.8	1.89%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.0192	0.0199	3.82%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00605	0.00631	4.21%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	3.10	3.11	0.264%	20%	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	<0.00020	0.00024	0.00004	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 1268474) - continued											
KS2304701-001	Anonymous	Selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	6.28	6.34	0.950%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	8.53	8.96	4.93%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.543	0.560	3.05%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	9.71	9.72	0.164%	20%	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.00456	0.00468	2.59%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	0.0038	0.0038	0.00001	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 1270339)											
VA23C9326-003	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	0.0000056	0.0000060	0.0000004	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1270554)											
VA23C9372-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	2200 µg/L	2.2	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1271010)											
VA23C9379-001	Outfall Comp E104954	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 1272065)											
VA23C9358-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	167	168	0.603%	20%	----
Aggregate Organics (QC Lot: 1275821)											
FJ2303247-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	30	32	2	Diff <2x LOR	----
Fatty Acids (QC Lot: 1273469)											
CG2317372-001	Anonymous	Acetic acid	64-19-7	E676	10	mg/L	28	28	0.07	Diff <2x LOR	----
		Butyric acid	107-92-6	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Formic acid	64-18-6	E676	30	mg/L	<30	<30	0	Diff <2x LOR	----
		Hexanoic acid	142-62-1	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isobutyric acid	79-31-2	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isovaleric acid	503-74-2	E676	1.0	mg/L	1.0	1.0	0.001	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Fatty Acids (QC Lot: 1273469) - continued											
CG2317372-001	Anonymous	Propanoic acid	79-09-4	E676	5.0	mg/L	<5.0	<5.0	0	Diff <2x LOR	----
		Valeric acid	109-52-4	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----

Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1273223)						
Solids, total [TS]	----	E157	0.1	%	<0.10	----
Physical Tests (QCLot: 1274019)						
Moisture	----	E144	0.25	%	<0.25	----
Organic / Inorganic Carbon (QCLot: 1271655)						
Carbon, inorganic [IC]	----	E354	0.05	%	<0.050	----
Organic / Inorganic Carbon (QCLot: 1275086)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Microbiological Tests (QCLot: 1268626)						
Coliforms, thermotolerant [fecal]	----	E014.FC	2	MPN/g	<2	----
Microbiological Tests (QCLot: 1268627)						
Coliforms, Escherichia coli [E. coli]	----	E014.EC	2	MPN/g	<2	----
Metals (QCLot: 1274010)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1274011)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----



Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1274011) - continued						
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Leachable Anions & Nutrients (QCLot: 1271598)						
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	<200	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1268721)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 1274994)						
Alkalinity, total (as CaCO ₃)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1268259)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 1268262)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 1268263)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1269365)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1269377)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 1269378)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Microbiological Tests (QCLot: 1268251)						
Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	<1	----
Microbiological Tests (QCLot: 1268252)						
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
Total Metals (QCLot: 1268474)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 1268474) - continued						
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 1270339)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 1270554)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 1271010)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 1272065)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Aggregate Organics (QCLot: 1275821)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Fatty Acids (QCLot: 1273469)						
Acetic acid	64-19-7	E676	10	mg/L	<10	----
Butyric acid	107-92-6	E676	1	mg/L	<1.0	----
Formic acid	64-18-6	E676	30	mg/L	<30	----
Hexanoic acid	142-62-1	E676	1	mg/L	<1.0	----
Isobutyric acid	79-31-2	E676	1	mg/L	<1.0	----
Isovaleric acid	503-74-2	E676	1	mg/L	<1.0	----
Propanoic acid	79-09-4	E676	5	mg/L	<5.0	----
Valeric acid	109-52-4	E676	1	mg/L	<1.0	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1273223)									
Solids, total [TS]	----	E157	0.1	%	50 %	99.5	85.0	115	----
Physical Tests (QCLot: 1274012)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
Physical Tests (QCLot: 1274019)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1271655)									
Carbon, inorganic [IC]	----	E354	0.05	%	0.5 %	94.5	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1275086)									
Carbon, total [TC]	----	E351	0.05	%	48 %	98.9	90.0	110	----
Metals (QCLot: 1274010)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	108	80.0	120	----
Metals (QCLot: 1274011)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	100.0	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	109	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	103	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	106	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	97.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	100	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.3	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	96.8	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.5	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	99.3	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	101	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	108	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	104	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	104	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	----



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1274011) - continued									
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	97.2	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	102	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	106	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	89.9	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	102	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	104	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	103	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	98.8	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	96.0	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	102	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	100	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	101	80.0	120	----
Leachable Anions & Nutrients (QCLot: 1271598)									
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	1000 mg/kg	101	80.0	120	----
Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1268721)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	99.5	85.0	115	----
Physical Tests (QCLot: 1269361)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1274994)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	109	85.0	115	----
Anions and Nutrients (QCLot: 1268259)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	96.1	75.0	125	----
Anions and Nutrients (QCLot: 1268262)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	94.9	80.0	120	----
Anions and Nutrients (QCLot: 1268263)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	105	85.0	115	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit					
Anions and Nutrients (QCLot: 1269365)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	89.4	80.0	120	----
Anions and Nutrients (QCLot: 1269377)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 1269378)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	97.6	90.0	110	----
Total Metals (QCLot: 1268474)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	99.5	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	98.7	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	97.2	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.4	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	94.3	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	96.6	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	97.2	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	97.6	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	94.4	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	93.7	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	98.8	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	97.9	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	101	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	101	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	98.1	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.7	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	94.2	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	104	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	97.7	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	104	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	92.5	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	95.9	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	97.7	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	101	80.0	120	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit					
Total Metals (QCLot: 1268474) - continued									
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	97.1	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	98.4	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	95.8	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.1	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	95.4	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	95.2	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	97.6	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	96.8	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	96.6	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	97.2	80.0	120	----
Total Metals (QCLot: 1270339)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	100	80.0	120	----
Aggregate Organics (QCLot: 1270554)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	106	85.0	115	----
Aggregate Organics (QCLot: 1271010)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	98.2	85.0	115	----
Aggregate Organics (QCLot: 1272065)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	105	85.0	115	----
Aggregate Organics (QCLot: 1275821)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	110	85.0	115	----
Fatty Acids (QCLot: 1273469)									
Acetic acid	64-19-7	E676	10	mg/L	40 mg/L	96.4	70.0	130	----
Butyric acid	107-92-6	E676	1	mg/L	40 mg/L	92.0	70.0	130	----
Formic acid	64-18-6	E676	30	mg/L	160 mg/L	102	70.0	130	----
Hexanoic acid	142-62-1	E676	1	mg/L	40 mg/L	85.4	70.0	130	----
Isobutyric acid	79-31-2	E676	1	mg/L	40 mg/L	90.3	70.0	130	----
Isovaleric acid	503-74-2	E676	1	mg/L	40 mg/L	75.0	70.0	130	----
Propanoic acid	79-09-4	E676	5	mg/L	40 mg/L	86.9	70.0	130	----
Valeric acid	109-52-4	E676	1	mg/L	40 mg/L	78.6	70.0	130	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1268259)										
FJ2303203-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.44 mg/L	2.5 mg/L	97.7	70.0	130	----
Anions and Nutrients (QCLot: 1268262)										
FJ2303203-006	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0471 mg/L	0.05 mg/L	94.3	70.0	130	----
Anions and Nutrients (QCLot: 1268263)										
VA23C9109-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 1269365)										
VA23C9224-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0351 mg/L	0.03 mg/L	117	70.0	130	----
Anions and Nutrients (QCLot: 1269377)										
VA23C9224-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.63 mg/L	2.5 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 1269378)										
VA23C9224-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.525 mg/L	0.5 mg/L	105	75.0	125	----
Total Metals (QCLot: 1268474)										
KS2304701-002	Anonymous	Aluminum, total	7429-90-5	E420	0.192 mg/L	0.2 mg/L	96.2	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0363 mg/L	0.04 mg/L	90.7	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00886 mg/L	0.01 mg/L	88.6	70.0	130	----
		Boron, total	7440-42-8	E420	0.099 mg/L	0.1 mg/L	99.2	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00395 mg/L	0.004 mg/L	98.7	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.00981 mg/L	0.01 mg/L	98.1	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0187 mg/L	0.02 mg/L	93.5	70.0	130	----
		Copper, total	7440-50-8	E420	0.0180 mg/L	0.02 mg/L	90.2	70.0	130	----
		Iron, total	7439-89-6	E420	1.92 mg/L	2 mg/L	96.0	70.0	130	----
		Lead, total	7439-92-1	E420	0.0184 mg/L	0.02 mg/L	92.1	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0926 mg/L	0.1 mg/L	92.6	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0189 mg/L	0.02 mg/L	94.4	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 1268474) - continued										
KS2304701-002	Anonymous	Molybdenum, total	7439-98-7	E420	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0373 mg/L	0.04 mg/L	93.3	70.0	130	----
		Phosphorus, total	7723-14-0	E420	10.0 mg/L	10 mg/L	100	70.0	130	----
		Potassium, total	7440-09-7	E420	3.64 mg/L	4 mg/L	91.1	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.0192 mg/L	0.02 mg/L	95.8	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		Silicon, total	7440-21-3	E420	9.26 mg/L	10 mg/L	92.6	70.0	130	----
		Silver, total	7440-22-4	E420	0.00383 mg/L	0.004 mg/L	95.7	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	19.4 mg/L	20 mg/L	97.1	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.0393 mg/L	0.04 mg/L	98.4	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00362 mg/L	0.004 mg/L	90.6	70.0	130	----
		Thorium, total	7440-29-1	E420	0.0183 mg/L	0.02 mg/L	91.6	70.0	130	----
		Tin, total	7440-31-5	E420	0.0196 mg/L	0.02 mg/L	98.1	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.0185 mg/L	0.02 mg/L	92.6	70.0	130	----
		Uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0978 mg/L	0.1 mg/L	97.8	70.0	130	----
		Zinc, total	7440-66-6	E420	0.380 mg/L	0.4 mg/L	95.0	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.0400 mg/L	0.04 mg/L	100.0	70.0	130	----
Total Metals (QCLot: 1270339)										
VA23C9379-003	Bioreactor	Mercury, total	7439-97-6	E508	0.0000886 mg/L	0.0001 mg/L	88.6	70.0	130	----
Aggregate Organics (QCLot: 1272065)										
VA23C9358-002	Anonymous	Chemical oxygen demand [COD]	----	E559-L	98 mg/L	100 mg/L	98.4	75.0	125	----
Aggregate Organics (QCLot: 1275821)										
FJ2303247-002	Anonymous	Chemical oxygen demand [COD]	----	E559-L	110 mg/L	100 mg/L	110	75.0	125	----
Fatty Acids (QCLot: 1273469)										
CG2317372-001	Anonymous	Acetic acid	64-19-7	E676	38 mg/L	40 mg/L	95.4	70.0	130	----
		Butyric acid	107-92-6	E676	38.0 mg/L	40 mg/L	95.1	70.0	130	----
		Formic acid	64-18-6	E676	165 mg/L	160 mg/L	103	70.0	130	----
		Hexanoic acid	142-62-1	E676	30.6 mg/L	40 mg/L	76.5	70.0	130	----
		Isobutyric acid	79-31-2	E676	37.1 mg/L	40 mg/L	92.7	70.0	130	----
		Isovaleric acid	503-74-2	E676	30.1 mg/L	40 mg/L	75.2	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Fatty Acids (QCLot: 1273469) - continued										
CG2317372-001	Anonymous	Propanoic acid	79-09-4	E676	33.3 mg/L	40 mg/L	83.3	70.0	130	----
		Valeric acid	109-52-4	E676	31.0 mg/L	40 mg/L	77.5	70.0	130	----



Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method			Low	High	
Organic / Inorganic Carbon (QCLot: 1271655)									
	RM	Carbon, inorganic [IC]	----	E354	0.383 %	103	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1275086)									
	RM	Carbon, total [TC]	----	E351	1.4 %	104	80.0	120	----
Metals (QCLot: 1274010)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	105	70.0	130	----
Metals (QCLot: 1274011)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	105	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	102	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	107	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	103	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	111	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	115	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	103	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	113	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	114	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	102	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	115	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	106	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	109	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	110	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	115	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	109	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	107	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	105	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	93.0	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	114	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	99.9	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	106	70.0	130	----



Sub-Matrix:					Reference Material (RM) Report			
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)	
							Low	High
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method				Qualifier
Metals (QCLot: 1274011) - continued								
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	99.2	40.0	160
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	96.0	70.0	130
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	117	70.0	130
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	102	70.0	130
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	107	70.0	130
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	105	70.0	130
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	98.1	70.0	130
Leachable Anions & Nutrients (QCLot: 1271598)								
	RM	Kjeldahl nitrogen, total [TKN]	----	E319	1040 mg/kg	105	80.0	120



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

(Matrix: Water)

					Outfall Comp E104954	----	----	----	----
Client sampling date / time					13-Dec-2023 08:03	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23D0031-001	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
pH	----	E108/VA	0.10	pH units	7.49	----	----	----	----
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	2.6	----	----	----	----
Aggregate Organics									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L	<2.0	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L/VA	10	mg/L	40	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

					Outfall Grab E104954	----	----	----	----
Client sampling date / time					13-Dec-2023 08:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23D0031-002	-----	-----	-----	-----
					Result	----	----	----	----
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E318/VA	0.050	mg/L	1.83	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp E104954	E555	13-Dec-2023	----	----	----		16-Dec-2023	3 days	3 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E559-L	13-Dec-2023	----	----	----		20-Dec-2023	28 days	7 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	13-Dec-2023	20-Dec-2023	28 days	7 days	✓	21-Dec-2023	28 days	8 days	✓
Physical Tests : pH by Meter										
HDPE Outfall Comp E104954	E108	13-Dec-2023	20-Dec-2023	0.25 hrs	170 hrs	✖ EHTR-FM	20-Dec-2023	0.25 hrs	170 hrs	✖ EHTR-FM
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp E104954	E160-L	13-Dec-2023	----	----	----		19-Dec-2023	7 days	6 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1280024	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1284206	1	18	5.5	5.0	✔
pH by Meter	E108	1283833	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1283608	1	9	11.1	5.0	✔
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1280024	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1284206	1	18	5.5	5.0	✔
pH by Meter	E108	1283833	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1283608	1	9	11.1	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	1283183	1	12	8.3	5.0	✔
Method Blanks (MB)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1280024	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1284206	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1283608	1	9	11.1	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	1283183	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1284206	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1283608	1	9	11.1	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter	E108 ALS Environmental - Vancouver	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L ALS Environmental - Vancouver	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at $104 \pm 1^{\circ}\text{C}$, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 ALS Environmental - Vancouver	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 ALS Environmental - Vancouver	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L ALS Environmental - Vancouver	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 ALS Environmental - Vancouver	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

- Key :
- Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
 - CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
 - DQO = Data Quality Objective.
 - LOR = Limit of Reporting (detection limit).
 - RPD = Relative Percent Difference
 - # = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1283833)											
VA23C9972-010	Anonymous	pH	----	E108	0.10	pH units	7.71	7.72	0.130%	4%	----
Anions and Nutrients (QC Lot: 1283608)											
KS2304805-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.250	mg/L	21.3	21.5	0.899%	20%	----
Aggregate Organics (QC Lot: 1280024)											
KS2304795-001	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 1284206)											
FJ2303301-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	<10	0	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1283183)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1283608)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Aggregate Organics (QCLot: 1280024)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 1284206)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1283183)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	92.2	85.0	115	----
Physical Tests (QCLot: 1283833)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Anions and Nutrients (QCLot: 1283608)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	97.8	75.0	125	----
Aggregate Organics (QCLot: 1280024)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	110	85.0	115	----
Aggregate Organics (QCLot: 1284206)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	101	85.0	115	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method						
Anions and Nutrients (QCLot: 1283608)										
VA23C9944-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	125 mg/L	2.5 mg/L	99.8	70.0	130	----
Aggregate Organics (QCLot: 1284206)										
FJ2303301-002	Anonymous	Chemical oxygen demand [COD]	----	E559-L	105 mg/L	100 mg/L	105	75.0	125	----



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

Outfall Comp
E104954

(Matrix: Water)

Client sampling date / time

08-Feb-2023
08:00

Analyte	CAS Number	Method	LOR	Unit	VA23A3045-001	-----	-----	-----	-----
					Result	----	----	----	----

Physical Tests

pH	----	E108	0.10	pH units	7.93	----	----	----	----
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	2.5	----	----	----	----

Anions and Nutrients

Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.648	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	3.04	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.287	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.120	----	----	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.226	----	----	----	----

Aggregate Organics

Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	44	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Composite Influent

Client sample ID

(Matrix: Water)

					Raw Influent Comp E222796	----	----	----	----
Client sampling date / time					08-Feb-2023 07:45	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3045-002	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	224	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	39.0	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	53.5	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0250 ^{DLDS}	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0050 ^{DLDS}	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	3.57	----	----	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	6.29	----	----	----	----
Aggregate Organics									
Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	270	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Grab Effluent (Matrix: Water)					Client sample ID	Bioreactor	Fermenter Supernatant	Outfall Grab E104954	Trip Blank	----
Client sampling date / time						08-Feb-2023 07:50	08-Feb-2023 07:55	08-Feb-2023 08:05	08-Feb-2023	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3045-003	VA23A3045-005	VA23A3045-006	VA23A3045-007	-----	
					Result	Result	Result	Result	----	
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	178	----	----	----	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	338	----	----	----	----	----
pH	----	E108	0.10	pH units	----	----	----	5.07	----	----
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	----	----	----	<1.0	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	----	----	----	<0.0050	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	----	----	1.85	<0.050	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	----	----	----	<0.0050	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	----	----	----	<0.0010	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	----	----	----	<0.0010	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	----	----	----	<0.0020	----	----
Microbiological Tests										
Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	----	----	1	----	----	----
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	----	----	1	----	----	----
Total Metals										
Aluminum, total	7429-90-5	E420	0.0030	mg/L	45.6	----	----	----	----	----
Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00373	----	----	----	----	----
Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00714	----	----	----	----	----
Barium, total	7440-39-3	E420	0.00010	mg/L	0.464	----	----	----	----	----
Beryllium, total	7440-41-7	E420	0.000100	mg/L	0.000247	----	----	----	----	----
Bismuth, total	7440-69-9	E420	0.000050	mg/L	0.0802	----	----	----	----	----
Boron, total	7440-42-8	E420	0.010	mg/L	0.252	----	----	----	----	----
Cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.00241	----	----	----	----	----
Calcium, total	7440-70-2	E420	0.050	mg/L	76.6	----	----	----	----	----
Cesium, total	7440-46-2	E420	0.000010	mg/L	0.000847	----	----	----	----	----
Chromium, total	7440-47-3	E420	0.00050	mg/L	0.0329	----	----	----	----	----
Cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00658	----	----	----	----	----
Copper, total	7440-50-8	E420	0.00050	mg/L	1.58	----	----	----	----	----
Iron, total	7439-89-6	E420	0.010	mg/L	6.27	----	----	----	----	----
Lead, total	7439-92-1	E420	0.000050	mg/L	0.0144	----	----	----	----	----



Analytical Results

Sub-Matrix: Grab Effluent					Client sample ID	Bioreactor	Fermenter Supernatant	Outfall Grab E104954	Trip Blank	----
(Matrix: Water)										
					Client sampling date / time	08-Feb-2023 07:50	08-Feb-2023 07:55	08-Feb-2023 08:05	08-Feb-2023	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3045-003	VA23A3045-005	VA23A3045-006	VA23A3045-007	-----	
					Result	Result	Result	Result	----	
Total Metals										
Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0109	----	----	----	----	----
Magnesium, total	7439-95-4	E420	0.0050	mg/L	35.6	----	----	----	----	----
Manganese, total	7439-96-5	E420	0.00010	mg/L	0.292	----	----	----	----	----
Mercury, total	7439-97-6	E508	0.0000050	mg/L	0.000276 ^{DLM}	----	----	----	----	----
Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.0313	----	----	----	----	----
Nickel, total	7440-02-0	E420	0.00050	mg/L	0.0371	----	----	----	----	----
Phosphorus, total	7723-14-0	E420	0.050	mg/L	128	----	----	----	----	----
Potassium, total	7440-09-7	E420	0.050	mg/L	60.6	----	----	----	----	----
Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0394	----	----	----	----	----
Selenium, total	7782-49-2	E420	0.000050	mg/L	0.0114	----	----	----	----	----
Silicon, total	7440-21-3	E420	0.10	mg/L	16.1	----	----	----	----	----
Silver, total	7440-22-4	E420	0.000010	mg/L	0.00357	----	----	----	----	----
Sodium, total	7440-23-5	E420	0.050	mg/L	60.2	----	----	----	----	----
Strontium, total	7440-24-6	E420	0.00020	mg/L	0.710	----	----	----	----	----
Sulfur, total	7704-34-9	E420	0.50	mg/L	39.0	----	----	----	----	----
Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00100 ^{DLA}	----	----	----	----	----
Thallium, total	7440-28-0	E420	0.000010	mg/L	0.000111	----	----	----	----	----
Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00050 ^{DLA}	----	----	----	----	----
Tin, total	7440-31-5	E420	0.00010	mg/L	0.00168	----	----	----	----	----
Titanium, total	7440-32-6	E420	0.00030	mg/L	0.0344	----	----	----	----	----
Tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00467	----	----	----	----	----
Uranium, total	7440-61-1	E420	0.000010	mg/L	0.0354	----	----	----	----	----
Vanadium, total	7440-62-2	E420	0.00050	mg/L	0.0241	----	----	----	----	----
Zinc, total	7440-66-6	E420	0.0030	mg/L	1.03	----	----	----	----	----
Zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00175	----	----	----	----	----
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	----	----	----	----	<2.0	----
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	----	----	----	----	<10	----
Fatty Acids										



Analytical Results

Sub-Matrix: Grab Effluent
(Matrix: Water)

					Client sample ID	Bioreactor	Fermenter Supernatant	Outfall Grab E104954	Trip Blank	----
Client sampling date / time						08-Feb-2023 07:50	08-Feb-2023 07:55	08-Feb-2023 08:05	08-Feb-2023	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3045-003	VA23A3045-005	VA23A3045-006	VA23A3045-007	-----	
					Result	Result	Result	Result	Result	----
Fatty Acids										
Acetic acid	64-19-7	E676	10	mg/L	----	81	----	----	----	----
Butyric acid	107-92-6	E676	1.0	mg/L	----	13.7	----	----	----	----
Formic acid	64-18-6	E676	30	mg/L	----	<30	----	----	----	----
Hexanoic acid	142-62-1	E676	1.0	mg/L	----	<1.0	----	----	----	----
Isobutyric acid	79-31-2	E676	1.0	mg/L	----	<1.0	----	----	----	----
Isovaleric acid	503-74-2	E676	1.0	mg/L	----	<1.0	----	----	----	----
Propanoic acid	79-09-4	E676	5.0	mg/L	----	28.4	----	----	----	----
valeric acid	109-52-4	E676	1.0	mg/L	----	3.4	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)										
					Client sampling date / time	08-Feb-2023 09:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3045-004	-----	-----	-----	-----	
						Result	----	----	----	----
Physical Tests										
Moisture	----	E144	0.25	%	75.2	----	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	5.52 ^{FR8}	----	----	----	----	
Solids, fixed [FS]	----	E169	0.10	%	13.9	----	----	----	----	
Solids, total [TS]	----	E157	0.10	%	25.6	----	----	----	----	
Solids, volatile [VS]	----	EC165	0.10	%	86.1	----	----	----	----	
Microbiological Tests										
Coliforms, Escherichia coli [E. coli]	----	E014.EC	2	MPN/g	375000 ^{USC}	----	----	----	----	
Coliforms, thermotolerant [fecal]	----	E014.FC	2	MPN/g	375000 ^{USC}	----	----	----	----	
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	6770	----	----	----	----	
Antimony	7440-36-0	E440	0.10	mg/kg	1.04	----	----	----	----	
Arsenic	7440-38-2	E440	0.10	mg/kg	1.18	----	----	----	----	
Barium	7440-39-3	E440	0.50	mg/kg	81.4	----	----	----	----	
Beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	----	----	----	----	
Bismuth	7440-69-9	E440	0.20	mg/kg	17.9	----	----	----	----	
Boron	7440-42-8	E440	5.0	mg/kg	10.4	----	----	----	----	
Cadmium	7440-43-9	E440	0.020	mg/kg	0.467	----	----	----	----	
Calcium	7440-70-2	E440	50	mg/kg	7950	----	----	----	----	
Chromium	7440-47-3	E440	0.50	mg/kg	9.58	----	----	----	----	
Cobalt	7440-48-4	E440	0.10	mg/kg	1.28	----	----	----	----	
Copper	7440-50-8	E440	0.50	mg/kg	273	----	----	----	----	
Iron	7439-89-6	E440	50	mg/kg	2570	----	----	----	----	
Lead	7439-92-1	E440	0.50	mg/kg	3.56	----	----	----	----	
Lithium	7439-93-2	E440	2.0	mg/kg	<2.0	----	----	----	----	
Magnesium	7439-95-4	E440	20	mg/kg	3780	----	----	----	----	
Manganese	7439-96-5	E440	1.0	mg/kg	56.6	----	----	----	----	
Mercury	7439-97-6	E510	0.0050	mg/kg	0.140	----	----	----	----	
Molybdenum	7439-98-7	E440	0.10	mg/kg	5.36	----	----	----	----	
Nickel	7440-02-0	E440	0.50	mg/kg	7.72	----	----	----	----	
Phosphorus	7723-14-0	E440	50	mg/kg	17300	----	----	----	----	



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)										
					Client sampling date / time	08-Feb-2023 09:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3045-004	Result	-----	-----	-----	-----
Metals										
Potassium	7440-09-7	E440	100	mg/kg	4690	----	----	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg	1.96	----	----	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg	1.15	----	----	----	----	----
Sodium	7440-23-5	E440	50	mg/kg	384	----	----	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg	85.6	----	----	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg	3700	----	----	----	----	----
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	----	----	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg	8.6	----	----	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg	36.3	----	----	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg	1.37	----	----	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg	6.12	----	----	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg	6.29	----	----	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg	237	----	----	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg	<3.0 ^{DLM}	----	----	----	----	----
Leachable Anions & Nutrients										
Kjeldahl nitrogen, total [TKN]	----	E319	0.020	%	5.46	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Water					Client sample ID	Outfall Grab	----	----	----	----
(Matrix: Water)										
					Client sampling date / time	02-Feb-2023 11:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3045-008	-----	-----	-----	-----	
					Result	----	----	----	----	
Anions and Nutrients										
Kjeldahl nitrogen, total [TKN]		----	E318	0.050	mg/L	1.89	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

(Matrix: Water)

					Outfall Comp E104954	----	----	----	----
Client sampling date / time					15-Feb-2023 07:10	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3689-001	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
pH	----	E108	0.10	pH units	8.19	----	----	----	----
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	2.6	----	----	----	----
Aggregate Organics									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	41	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

					Outfall Grab E104954	----	----	----	----
Client sampling date / time					15-Feb-2023 07:15	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A3689-002	-----	-----	-----	-----
					Result	----	----	----	----
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	2.11	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp E104954	E555	15-Feb-2023	----	----	----		18-Feb-2023	3 days	3 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (lab preserved) Outfall Comp E104954	E559-L	15-Feb-2023	----	----	----		23-Feb-2023	3 days	8 days	✖ EHT
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	15-Feb-2023	23-Feb-2023	----	----		25-Feb-2023	28 days	10 days	✓
Physical Tests : pH by Meter										
HDPE Outfall Comp E104954	E108	15-Feb-2023	22-Feb-2023	----	----		23-Feb-2023	0.25 hrs	16.25 hrs	✖ EHTR-FM
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp E104954	E160-L	15-Feb-2023	----	----	----		23-Feb-2023	7 days	8 days	✖ EHT

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	839340	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	843455	1	20	5.0	5.0	✔
pH by Meter	E108	842138	1	12	8.3	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	843390	1	18	5.5	5.0	✔
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	839340	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	843455	1	20	5.0	5.0	✔
pH by Meter	E108	842138	1	12	8.3	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	843390	1	18	5.5	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	841911	1	20	5.0	5.0	✔
Method Blanks (MB)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	839340	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	843455	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	843390	1	18	5.5	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	841911	1	20	5.0	5.0	✔
Matrix Spikes (MS)							
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	843455	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	843390	1	18	5.5	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at $104 \pm 1^{\circ}\text{C}$, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

- Key :
- Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
 - CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
 - DQO = Data Quality Objective.
 - LOR = Limit of Reporting (detection limit).
 - RPD = Relative Percent Difference
 - # = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 842138)											
VA23A3806-003	Anonymous	pH	----	E108	0.10	pH units	8.28	8.28	0.00%	4%	----
Anions and Nutrients (QC Lot: 843390)											
CG2302021-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.280	0.239	0.042	Diff <2x LOR	----
Aggregate Organics (QC Lot: 839340)											
VA23A3570-001	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 843455)											
VA23A3533-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	100	mg/L	<100	<100	0	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 841911)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 843390)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Aggregate Organics (QCLot: 839340)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 843455)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 841911)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	104	85.0	115	----
Physical Tests (QCLot: 842138)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Anions and Nutrients (QCLot: 843390)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	95.6	75.0	125	----
Aggregate Organics (QCLot: 839340)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	106	85.0	115	----
Aggregate Organics (QCLot: 843455)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	99.9	85.0	115	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Laboratory sample ID					Matrix Spike (MS) Report				
					Spike		Recovery (%)	Recovery Limits (%)	
					Concentration	Target	MS	Low	High
Anions and Nutrients (QCLot: 843390)									
CG2302021-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.71 mg/L	2.5 mg/L	108	70.0	130
Aggregate Organics (QCLot: 843455)									
VA23A3533-002	Anonymous	Chemical oxygen demand [COD]	----	E559-L	ND mg/L	100 mg/L	ND	75.0	125



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

(Matrix: Water)

					Outfall Comp E104954	----	----	----	----
Client sampling date / time					11-Jan-2023 08:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A0824-001	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
pH	----	E108	0.10	pH units	8.01	----	----	----	----
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	2.6	----	----	----	----
Aggregate Organics									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	43	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

					Outfall Grab E104954	----	----	----	----
Client sampling date / time					11-Jan-2023 08:05	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A0824-002	-----	-----	-----	-----
					Result	----	----	----	----
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	1.92	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

(Matrix: Water)

Client sampling date / time					Outfall Comp E104954	----	----	----	----
18-Jan-2023 07:20						----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A1277-001	-----	-----	-----	-----
Result						----	----	----	----
Physical Tests									
pH	----	E108	0.10	pH units	7.71	----	----	----	----
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	1.8	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.324	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	4.64	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.245	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.250	----	----	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.394	----	----	----	----
Aggregate Organics									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	2.1	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	43	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Composite Influent

Client sample ID

(Matrix: Water)

					Raw Influent Comp E222796	----	----	----	----
Client sampling date / time					18-Jan-2023 07:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A1277-002	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	270	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	35.5	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	51.2	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0250 ^{DLDS}	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0050 ^{DLDS}	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	3.51	----	----	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	7.14	----	----	----	----
Aggregate Organics									
Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	269	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Grab Effluent (Matrix: Water)					Client sample ID	Bioreactor	Fermenter Supernatant	Outfall Grab E104954	----	----
Client sampling date / time						18-Jan-2023 07:15	18-Jan-2023 07:10	18-Jan-2023 07:25	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A1277-003	VA23A1277-005	VA23A1277-006	-----	-----	
					Result	Result	Result	----	----	
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	136	----	----	----	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L	352	----	----	----	----	----
Anions and Nutrients										
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	----	----	1.70	----	----	----
Microbiological Tests										
Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	----	----	<1	----	----	----
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	----	----	<32	----	----	----
Total Metals										
Aluminum, total	7429-90-5	E420	0.0030	mg/L	42.6	----	----	----	----	----
Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00366	----	----	----	----	----
Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00798	----	----	----	----	----
Barium, total	7440-39-3	E420	0.00010	mg/L	0.465	----	----	----	----	----
Beryllium, total	7440-41-7	E420	0.000100	mg/L	0.000365 RRV	----	----	----	----	----
Bismuth, total	7440-69-9	E420	0.000050	mg/L	0.0764	----	----	----	----	----
Boron, total	7440-42-8	E420	0.010	mg/L	0.262	----	----	----	----	----
Cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.00226	----	----	----	----	----
Calcium, total	7440-70-2	E420	0.050	mg/L	75.4	----	----	----	----	----
Cesium, total	7440-46-2	E420	0.000010	mg/L	0.00111	----	----	----	----	----
Chromium, total	7440-47-3	E420	0.00050	mg/L	0.0327	----	----	----	----	----
Cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00752 RRV	----	----	----	----	----
Copper, total	7440-50-8	E420	0.00050	mg/L	1.53	----	----	----	----	----
Iron, total	7439-89-6	E420	0.010	mg/L	8.47 RRV	----	----	----	----	----
Lead, total	7439-92-1	E420	0.000050	mg/L	0.0164	----	----	----	----	----
Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0117 RRV	----	----	----	----	----
Magnesium, total	7439-95-4	E420	0.0050	mg/L	39.7	----	----	----	----	----
Manganese, total	7439-96-5	E420	0.00010	mg/L	0.327	----	----	----	----	----
Mercury, total	7439-97-6	E508	0.0000050	mg/L	0.000345	----	----	----	----	----
Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.0312	----	----	----	----	----
Nickel, total	7440-02-0	E420	0.00050	mg/L	0.0387	----	----	----	----	----
Phosphorus, total	7723-14-0	E420	0.050	mg/L	130	----	----	----	----	----



Analytical Results

Sub-Matrix: Grab Effluent (Matrix: Water)					Client sample ID	Bioreactor	Fermenter Supernatant	Outfall Grab E104954	----	----
Client sampling date / time					18-Jan-2023 07:15	18-Jan-2023 07:10	18-Jan-2023 07:25	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA23A1277-003	VA23A1277-005	VA23A1277-006	-----	-----	
					Result	Result	Result	----	----	
Total Metals										
Potassium, total	7440-09-7	E420	0.050	mg/L	63.5	----	----	----	----	
Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0448 ^{RRV}	----	----	----	----	
Selenium, total	7782-49-2	E420	0.000050	mg/L	0.00979	----	----	----	----	
Silicon, total	7440-21-3	E420	0.10	mg/L	19.4 ^{RRV}	----	----	----	----	
Silver, total	7440-22-4	E420	0.000010	mg/L	0.00354	----	----	----	----	
Sodium, total	7440-23-5	E420	0.050	mg/L	59.2	----	----	----	----	
Strontium, total	7440-24-6	E420	0.00020	mg/L	0.792	----	----	----	----	
Sulfur, total	7704-34-9	E420	0.50	mg/L	40.5	----	----	----	----	
Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00100	----	----	----	----	
Thallium, total	7440-28-0	E420	0.000010	mg/L	0.000146 ^{RRV}	----	----	----	----	
Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00050	----	----	----	----	
Tin, total	7440-31-5	E420	0.00010	mg/L	0.00174	----	----	----	----	
Titanium, total	7440-32-6	E420	0.00030	mg/L	0.0588	----	----	----	----	
Tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00445 ^{RRV}	----	----	----	----	
Uranium, total	7440-61-1	E420	0.000010	mg/L	0.0336	----	----	----	----	
Vanadium, total	7440-62-2	E420	0.00050	mg/L	0.0273	----	----	----	----	
Zinc, total	7440-66-6	E420	0.0030	mg/L	1.15	----	----	----	----	
Zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00136	----	----	----	----	
Fatty Acids										
Acetic acid	64-19-7	E676	10	mg/L	----	49	----	----	----	
Butyric acid	107-92-6	E676	1.0	mg/L	----	7.5	----	----	----	
Formic acid	64-18-6	E676	30	mg/L	----	<30	----	----	----	
Hexanoic acid	142-62-1	E676	1.0	mg/L	----	<1.0	----	----	----	
Isobutyric acid	79-31-2	E676	1.0	mg/L	----	<1.0	----	----	----	
Isovaleric acid	503-74-2	E676	1.0	mg/L	----	<1.0	----	----	----	
Propanoic acid	79-09-4	E676	5.0	mg/L	----	20.6	----	----	----	
valeric acid	109-52-4	E676	1.0	mg/L	----	2.6	----	----	----	

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)										
					Client sampling date / time	18-Jan-2023 10:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A1277-004	-----	-----	-----	-----	-----
					Result	----	----	----	----	----
Physical Tests										
Moisture	----	E144	0.25	%	76.6	----	----	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	6.17	----	----	----	----	----
Solids, fixed [FS]	----	E169	0.10	%	18.4	----	----	----	----	----
Solids, total [TS]	----	E157	0.10	%	23.0	----	----	----	----	----
Solids, volatile [VS]	----	EC165	0.10	%	81.6	----	----	----	----	----
Microbiological Tests										
Coliforms, Escherichia coli [E. coli]	----	E014.EC	2	MPN/g	1490000	----	----	----	----	----
Coliforms, thermotolerant [fecal]	----	E014.FC	2	MPN/g	1490000	----	----	----	----	----
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	7020	----	----	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg	0.93	----	----	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg	1.45	----	----	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg	89.8	----	----	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	----	----	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg	15.6	----	----	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg	11.5	----	----	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg	0.464	----	----	----	----	----
Calcium	7440-70-2	E440	50	mg/kg	8540	----	----	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg	12.7	----	----	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg	1.85	----	----	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg	298	----	----	----	----	----
Iron	7439-89-6	E440	50	mg/kg	3410	----	----	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg	3.90	----	----	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg	<2.0	----	----	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg	4740	----	----	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg	68.3	----	----	----	----	----
Mercury	7439-97-6	E510	0.0050	mg/kg	0.0858	----	----	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg	5.61	----	----	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg	10.2	----	----	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg	20200	----	----	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)										
					Client sampling date / time	18-Jan-2023 10:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A1277-004	Result	-----	-----	-----	-----
Metals										
Potassium	7440-09-7	E440	100	mg/kg	6310	----	----	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg	2.15	----	----	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg	0.74	----	----	----	----	----
Sodium	7440-23-5	E440	50	mg/kg	431	----	----	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg	85.9	----	----	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg	4500	----	----	----	----	----
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	----	----	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg	8.7	----	----	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg	44.3	----	----	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg	1.05	----	----	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg	6.08	----	----	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg	7.94	----	----	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg	269	----	----	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg	5.0	----	----	----	----	----
Leachable Anions & Nutrients										
Kjeldahl nitrogen, total [TKN]	----	E319	0.020	%	4.93	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Water					Client sample ID	Trip Blank	----	----	----	----
(Matrix: Water)										
					Client sampling date / time	18-Jan-2023	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A1277-007	-----	-----	-----	-----	-----
					Result	----	----	----	----	----
Physical Tests										
pH	----	E108	0.10	pH units	5.31	----	----	----	----	----
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	<1.0	----	----	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	----	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	----	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	----	----	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	----	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	----	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	----	----	----	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	----	----	----	----	----
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	----	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

(Matrix: Water)

					Outfall Comp E104954	----	----	----	----
Client sampling date / time					08-Mar-2023 08:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A5083-001	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
pH	----	E108	0.10	pH units	7.95	----	----	----	----
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	2.4	----	----	----	----
Aggregate Organics									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	2.4	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	45	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

					Outfall Grab E104954	----	----	----	----
Client sampling date / time					08-Mar-2023 08:05	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A5083-002	-----	-----	-----	-----
					Result	----	----	----	----
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	1.66	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Water					Client sample ID	Outfall Grab E104955	Outfall Grab E104956	Outfall Grab E104956	----	----
(Matrix: Water)										
					Client sampling date / time	23-Feb-2023 10:00	03-Mar-2023 11:13	02-Mar-2023 10:15	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A5083-003	VA23A5083-004	VA23A5083-005	-----	-----	
					Result	Result	Result	----	----	
Anions and Nutrients										
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	1.98	2.13	1.96	----	----	

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp E104954	E555	08-Mar-2023	----	----	----		10-Mar-2023	3 days	2 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E559-L	08-Mar-2023	----	----	----		09-Mar-2023	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104956	E318	03-Mar-2023	11-Mar-2023	----	----		13-Mar-2023	28 days	10 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104956	E318	02-Mar-2023	11-Mar-2023	----	----		13-Mar-2023	28 days	11 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104955	E318	23-Feb-2023	11-Mar-2023	----	----		13-Mar-2023	28 days	18 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	08-Mar-2023	11-Mar-2023	----	----		13-Mar-2023	28 days	5 days	✓
Physical Tests : pH by Meter										
HDPE Outfall Comp E104954	E108	08-Mar-2023	14-Mar-2023	----	----		15-Mar-2023	0.25 hrs	19.25 hrs	✖ EHTR-FM

Page : 4 of 6
 Work Order : VA23A5083
 Client : Regional District of Central Okanagan
 Project : RDCO WWTP Federal



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp E104954	E160-L	08-Mar-2023	----	----	----		15-Mar-2023	7 days	7 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended
 Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	858979	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	858344	1	18	5.5	5.0	✔
pH by Meter	E108	862426	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	860499	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	858979	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	858344	1	18	5.5	5.0	✔
pH by Meter	E108	862426	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	860499	1	12	8.3	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	862117	1	7	14.2	5.0	✔
Method Blanks (MB)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	858979	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	858344	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	860499	1	12	8.3	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	862117	1	7	14.2	5.0	✔
Matrix Spikes (MS)							
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	858344	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	860499	1	12	8.3	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at $104 \pm 1^{\circ}\text{C}$, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

- Key :
- Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
 - CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
 - DQO = Data Quality Objective.
 - LOR = Limit of Reporting (detection limit).
 - RPD = Relative Percent Difference
 - # = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 862426)											
VA23A5091-001	Anonymous	pH	----	E108	0.10	pH units	6.75	6.76	0.148%	4%	----
Anions and Nutrients (QC Lot: 860499)											
VA23A5083-002	Outfall Grab E104954	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	1.66	1.62	1.99%	20%	----
Aggregate Organics (QC Lot: 858344)											
FJ2300498-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	13	12	0.3	Diff <2x LOR	----
Aggregate Organics (QC Lot: 858979)											
VA23A5083-001	Outfall Comp E104954	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	2.4	2.4	0.0%	30%	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 862117)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 860499)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Aggregate Organics (QCLot: 858344)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Aggregate Organics (QCLot: 858979)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 862117)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	93.5	85.0	115	----
Physical Tests (QCLot: 862426)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Anions and Nutrients (QCLot: 860499)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	93.7	75.0	125	----
Aggregate Organics (QCLot: 858344)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	106	85.0	115	----
Aggregate Organics (QCLot: 858979)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	102	85.0	115	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report						
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier	
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High		
Anions and Nutrients (QCLot: 860499)											
VA23A5083-003	Outfall Grab E104955	Kjeldahl nitrogen, total [TKN]	----	E318	2.44 mg/L	2.5 mg/L	97.7	70.0	130		----
Aggregate Organics (QCLot: 858344)											
KS2300645-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	105 mg/L	100 mg/L	105	75.0	125	----	



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

(Matrix: Water)

Client sampling date / time					Outfall Comp E104954	----	----	----	----
15-Mar-2023 07:15						----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A5669-001	-----	-----	-----	-----
Result						----	----	----	----
Physical Tests									
pH	----	E108	0.10	pH units	8.03	----	----	----	----
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	3.3	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.436	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	3.77	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.142	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.368 ^{RRV}	----	----	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.508	----	----	----	----
Aggregate Organics									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	2.1	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	43	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Composite Influent

Client sample ID

(Matrix: Water)

					Raw Influent Comp E222796	----	----	----	----
Client sampling date / time					15-Mar-2023 06:55	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A5669-002	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	336	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	37.1	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	46.0	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0250 ^{DLDS}	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0050 ^{DLDS}	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	5.62 ^{RRV}	----	----	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	8.70	----	----	----	----
Aggregate Organics									
Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	265	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

Client sampling date / time					Bioreactor	Fermenter Supernatant	Outfall Grab E104954	----	----
					15-Mar-2023 07:05	15-Mar-2023 07:00	15-Mar-2023 07:10	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A5669-003	VA23A5669-005	VA23A5669-006	-----	-----
					Result	Result	Result	----	----
Physical Tests									
Alkalinity, total (as CaCO ₃)	----	E290	1.0	mg/L	139	----	----	----	----
Hardness (as CaCO ₃), from total Ca/Mg	----	EC100A	0.60	mg/L	334	----	----	----	----
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	----	----	1.80	----	----
Microbiological Tests									
Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	----	----	<1	----	----
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	----	----	<1	----	----
Total Metals									
Aluminum, total	7429-90-5	E420	0.0030	mg/L	52.1	----	----	----	----
Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00378	----	----	----	----
Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00693	----	----	----	----
Barium, total	7440-39-3	E420	0.00010	mg/L	0.485	----	----	----	----
Beryllium, total	7440-41-7	E420	0.000100	mg/L	0.000272	----	----	----	----
Bismuth, total	7440-69-9	E420	0.000050	mg/L	0.0790	----	----	----	----
Boron, total	7440-42-8	E420	0.010	mg/L	0.284	----	----	----	----
Cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.00260	----	----	----	----
Calcium, total	7440-70-2	E420	0.050	mg/L	75.2	----	----	----	----
Cesium, total	7440-46-2	E420	0.000010	mg/L	0.000638	----	----	----	----
Chromium, total	7440-47-3	E420	0.00050	mg/L	0.0336	----	----	----	----
Cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00600	----	----	----	----
Copper, total	7440-50-8	E420	0.00050	mg/L	1.55	----	----	----	----
Iron, total	7439-89-6	E420	0.010	mg/L	5.30	----	----	----	----
Lead, total	7439-92-1	E420	0.000050	mg/L	0.0142	----	----	----	----
Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0090	----	----	----	----
Magnesium, total	7439-95-4	E420	0.0050	mg/L	35.4	----	----	----	----
Manganese, total	7439-96-5	E420	0.00010	mg/L	0.299	----	----	----	----
Mercury, total	7439-97-6	E508	0.0000050	mg/L	0.000284	----	----	----	----
Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.0351	----	----	----	----
Nickel, total	7440-02-0	E420	0.00050	mg/L	0.0460 ^{RRV}	----	----	----	----
Phosphorus, total	7723-14-0	E420	0.050	mg/L	147	----	----	----	----



Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

					Bioreactor	Fermenter Supernatant	Outfall Grab E104954	----	----
Client sampling date / time					15-Mar-2023 07:05	15-Mar-2023 07:00	15-Mar-2023 07:10	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A5669-003	VA23A5669-005	VA23A5669-006	-----	-----
					Result	Result	Result	----	----
Total Metals									
Potassium, total	7440-09-7	E420	0.050	mg/L	62.3	----	----	----	----
Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0368	----	----	----	----
Selenium, total	7782-49-2	E420	0.000050	mg/L	0.0110	----	----	----	----
Silicon, total	7440-21-3	E420	0.10	mg/L	13.2	----	----	----	----
Silver, total	7440-22-4	E420	0.000010	mg/L	0.00394	----	----	----	----
Sodium, total	7440-23-5	E420	0.050	mg/L	62.9	----	----	----	----
Strontium, total	7440-24-6	E420	0.00020	mg/L	0.770	----	----	----	----
Sulfur, total	7704-34-9	E420	0.50	mg/L	40.1	----	----	----	----
Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00100 ^{DLA}	----	----	----	----
Thallium, total	7440-28-0	E420	0.000010	mg/L	0.000109	----	----	----	----
Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00050 ^{DLA}	----	----	----	----
Tin, total	7440-31-5	E420	0.00010	mg/L	0.00210	----	----	----	----
Titanium, total	7440-32-6	E420	0.00030	mg/L	0.0343	----	----	----	----
Tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00468	----	----	----	----
Uranium, total	7440-61-1	E420	0.000010	mg/L	0.0332	----	----	----	----
Vanadium, total	7440-62-2	E420	0.00050	mg/L	0.0213	----	----	----	----
Zinc, total	7440-66-6	E420	0.0030	mg/L	1.12	----	----	----	----
Zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00215	----	----	----	----
Fatty Acids									
Acetic acid	64-19-7	E676	10	mg/L	----	53	----	----	----
Butyric acid	107-92-6	E676	1.0	mg/L	----	9.6	----	----	----
Formic acid	64-18-6	E676	30	mg/L	----	<30	----	----	----
Hexanoic acid	142-62-1	E676	1.0	mg/L	----	<1.0	----	----	----
Isobutyric acid	79-31-2	E676	1.0	mg/L	----	<1.0	----	----	----
Isovaleric acid	503-74-2	E676	1.0	mg/L	----	<1.0	----	----	----
Propanoic acid	79-09-4	E676	5.0	mg/L	----	23.5	----	----	----
Valeric acid	109-52-4	E676	1.0	mg/L	----	2.0	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	15-Mar-2023 09:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A5669-004	Result	----	----	----	----
Physical Tests										
Moisture	----	E144	0.25	%	76.5	----	----	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	5.72 ^{FR8}	----	----	----	----	----
Solids, fixed [FS]	----	E169	0.10	%	17.8	----	----	----	----	----
Solids, total [TS]	----	E157	0.10	%	24.8	----	----	----	----	----
Solids, volatile [VS]	----	EC165	0.10	%	82.2	----	----	----	----	----
Microbiological Tests										
Coliforms, Escherichia coli [E. coli]	----	E014.EC	2	MPN/g	3810000	----	----	----	----	----
Coliforms, thermotolerant [fecal]	----	E014.FC	2	MPN/g	3810000	----	----	----	----	----
Metals										
Aluminum	7429-90-5	E440	50	mg/kg	6820	----	----	----	----	----
Antimony	7440-36-0	E440	0.10	mg/kg	0.85	----	----	----	----	----
Arsenic	7440-38-2	E440	0.10	mg/kg	1.02	----	----	----	----	----
Barium	7440-39-3	E440	0.50	mg/kg	78.6	----	----	----	----	----
Beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	----	----	----	----	----
Bismuth	7440-69-9	E440	0.20	mg/kg	13.4	----	----	----	----	----
Boron	7440-42-8	E440	5.0	mg/kg	10.6	----	----	----	----	----
Cadmium	7440-43-9	E440	0.020	mg/kg	0.489	----	----	----	----	----
Calcium	7440-70-2	E440	50	mg/kg	8090	----	----	----	----	----
Chromium	7440-47-3	E440	0.50	mg/kg	8.91	----	----	----	----	----
Cobalt	7440-48-4	E440	0.10	mg/kg	1.08	----	----	----	----	----
Copper	7440-50-8	E440	0.50	mg/kg	256	----	----	----	----	----
Iron	7439-89-6	E440	50	mg/kg	2050	----	----	----	----	----
Lead	7439-92-1	E440	0.50	mg/kg	2.86	----	----	----	----	----
Lithium	7439-93-2	E440	2.0	mg/kg	<2.0	----	----	----	----	----
Magnesium	7439-95-4	E440	20	mg/kg	3430	----	----	----	----	----
Manganese	7439-96-5	E440	1.0	mg/kg	48.5	----	----	----	----	----
Mercury	7439-97-6	E510	0.0050	mg/kg	0.106	----	----	----	----	----
Molybdenum	7439-98-7	E440	0.10	mg/kg	5.19	----	----	----	----	----
Nickel	7440-02-0	E440	0.50	mg/kg	8.64	----	----	----	----	----
Phosphorus	7723-14-0	E440	50	mg/kg	18800	----	----	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)										
					Client sampling date / time	15-Mar-2023 09:30	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A5669-004	Result	-----	-----	-----	-----
Metals										
Potassium	7440-09-7	E440	100	mg/kg	4570	----	----	----	----	----
Selenium	7782-49-2	E440	0.20	mg/kg	2.07	----	----	----	----	----
Silver	7440-22-4	E440	0.10	mg/kg	0.71	----	----	----	----	----
Sodium	7440-23-5	E440	50	mg/kg	342	----	----	----	----	----
Strontium	7440-24-6	E440	0.50	mg/kg	80.7	----	----	----	----	----
Sulfur	7704-34-9	E440	1000	mg/kg	3600	----	----	----	----	----
Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	----	----	----	----	----
Tin	7440-31-5	E440	2.0	mg/kg	4.4	----	----	----	----	----
Titanium	7440-32-6	E440	1.0	mg/kg	19.1	----	----	----	----	----
Tungsten	7440-33-7	E440	0.50	mg/kg	1.03	----	----	----	----	----
Uranium	7440-61-1	E440	0.050	mg/kg	3.86	----	----	----	----	----
Vanadium	7440-62-2	E440	0.20	mg/kg	4.80	----	----	----	----	----
Zinc	7440-66-6	E440	2.0	mg/kg	245	----	----	----	----	----
Zirconium	7440-67-7	E440	1.0	mg/kg	2.5	----	----	----	----	----
Leachable Anions & Nutrients										
Kjeldahl nitrogen, total [TKN]	----	E319	0.020	%	4.89	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Water					Client sample ID	Trip Blank	----	----	----	----
(Matrix: Water)										
					Client sampling date / time	15-Mar-2023	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A5669-007	-----	-----	-----	-----	-----
					Result	----	----	----	----	----
Physical Tests										
pH	----	E108	0.10	pH units	5.45	----	----	----	----	----
Solids, total suspended [TSS]	----	E160-L	1.0	mg/L	<1.0	----	----	----	----	----
Anions and Nutrients										
Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	----	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	----	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	----	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	----	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	----	----	----	----	----
Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	<0.0020	----	----	----	----	----
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	----	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: Soil/Solid

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Leachable Anions & Nutrients : Total Kjeldahl Nitrogen by Colourimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E319	15-Mar-2023	20-Mar-2023	----	----		20-Mar-2023	365 days	5 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap Biosolids E231763	E510	15-Mar-2023	19-Mar-2023	----	----		20-Mar-2023	28 days	5 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap Biosolids E231763	E440	15-Mar-2023	19-Mar-2023	----	----		20-Mar-2023	180 days	5 days	✓
Microbiological Tests : E. coli (MTF)										
Glass soil jar/Teflon lined cap Biosolids E231763	E014.EC	15-Mar-2023	16-Mar-2023	2 days	1 days	✓	16-Mar-2023	2 days	0 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliforms (MTF)										
Glass soil jar/Teflon lined cap Biosolids E231763	E014.FC	15-Mar-2023	16-Mar-2023	2 days	1 days	✓	16-Mar-2023	2 days	0 days	✓
Physical Tests : FS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E169	15-Mar-2023	----	----	----		21-Mar-2023	7 days	6 days	✓
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E144	15-Mar-2023	----	----	----		18-Mar-2023	----	----	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap Biosolids E231763	E108	15-Mar-2023	19-Mar-2023	----	----		19-Mar-2023	30 days	4 days	✓
Physical Tests : TS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E157	15-Mar-2023	----	----	----		21-Mar-2023	14 days	6 days	✓

Matrix: Water

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] Raw Influent Comp E222796	E550	15-Mar-2023	----	----	----		17-Mar-2023	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp E104954	E555	15-Mar-2023	----	----	----		17-Mar-2023	3 days	2 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Trip Blank	E555	15-Mar-2023	----	----	----		17-Mar-2023	3 days	3 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E559-L	15-Mar-2023	----	----	----		21-Mar-2023	28 days	6 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Trip Blank	E559-L	15-Mar-2023	----	----	----		21-Mar-2023	28 days	7 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Outfall Comp E104954	E298	15-Mar-2023	20-Mar-2023	----	----		21-Mar-2023	28 days	6 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E298	15-Mar-2023	20-Mar-2023	----	----		21-Mar-2023	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Trip Blank	E298	15-Mar-2023	20-Mar-2023	----	----		21-Mar-2023	28 days	6 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE Outfall Comp E104954	E378-U	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE Raw Influent Comp E222796	E378-U	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE Trip Blank	E378-U	15-Mar-2023	17-Mar-2023	----	----		18-Mar-2023	3 days	4 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Outfall Comp E104954	E235.NO3-L	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Raw Influent Comp E222796	E235.NO3-L	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO3-L	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	3 days	3 days	✓



Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Outfall Comp E104954	E235.NO2-L	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Raw Influent Comp E222796	E235.NO2-L	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO2-L	15-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	3 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	15-Mar-2023	20-Mar-2023	----	----		23-Mar-2023	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E318	15-Mar-2023	20-Mar-2023	----	----		23-Mar-2023	28 days	8 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Trip Blank	E318	15-Mar-2023	20-Mar-2023	----	----		23-Mar-2023	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E372-U	15-Mar-2023	20-Mar-2023	----	----		21-Mar-2023	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Trip Blank	E372-U	15-Mar-2023	20-Mar-2023	----	----		21-Mar-2023	28 days	6 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E372-U	15-Mar-2023	20-Mar-2023	----	----		21-Mar-2023	28 days	9 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Fatty Acids : Volatile Fatty and Carboxylic Acid (VFA) by GC-MS										
Glass vial (sodium bisulfate) Fermenter Supernatant	E676	15-Mar-2023	----	----	----		20-Mar-2023	14 days	5 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab E104954	E010.FC	15-Mar-2023	----	----	----		16-Mar-2023	30 hrs	34 hrs	✖ EHTR
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab E104954	E010	15-Mar-2023	----	----	----		16-Mar-2023	30 hrs	34 hrs	✖ EHTR
Physical Tests : Alkalinity Species by Titration										
HDPE Bioreactor	E290	15-Mar-2023	17-Mar-2023	----	----		19-Mar-2023	14 days	4 days	✓
Physical Tests : pH by Meter										
HDPE Outfall Comp E104954	E108	15-Mar-2023	17-Mar-2023	----	----		19-Mar-2023	0.25 hrs	40.25 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE Trip Blank	E108	15-Mar-2023	17-Mar-2023	----	----		19-Mar-2023	0.25 hrs	40.25 hrs	✖ EHTR-FM
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp E104954	E160-L	15-Mar-2023	----	----	----		22-Mar-2023	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Raw Influent Comp E222796	E160-L	15-Mar-2023	----	----	----		22-Mar-2023	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Trip Blank	E160-L	15-Mar-2023	----	----	----		22-Mar-2023	7 days	7 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) Bioreactor	E508	15-Mar-2023	19-Mar-2023	----	----		19-Mar-2023	28 days	4 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved) Bioreactor	E420	15-Mar-2023	18-Mar-2023	----	----		19-Mar-2023	180 days	4 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
E. coli (MTF)	E014.EC	866316	1	3	33.3	5.0	✔
FS by Gravimetry	E169	870280	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	868281	1	7	14.2	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	868282	1	7	14.2	5.0	✔
Moisture Content by Gravimetry	E144	868284	1	3	33.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	868283	1	7	14.2	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	866315	0	2	0.0	5.0	✖
Total Kjeldahl Nitrogen by Colourimetry	E319	869269	1	2	50.0	5.0	✔
TS by Gravimetry	E157	870279	1	1	100.0	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	868281	2	7	28.5	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	868282	2	7	28.5	10.0	✔
Moisture Content by Gravimetry	E144	868284	1	3	33.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	868283	1	7	14.2	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	869269	2	2	100.0	10.0	✔
TS by Gravimetry	E157	870279	1	1	100.0	5.0	✔
Method Blanks (MB)							
E. coli (MTF)	E014.EC	866316	1	3	33.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	868281	1	7	14.2	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	868282	1	7	14.2	5.0	✔
Moisture Content by Gravimetry	E144	868284	1	3	33.3	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	866315	1	2	50.0	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	869269	1	2	50.0	5.0	✔
TS by Gravimetry	E157	870279	1	1	100.0	5.0	✔

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	867575	1	12	8.3	5.0	✔
Ammonia by Fluorescence	E298	869223	1	8	12.5	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	866896	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	867520	1	12	8.3	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	870758	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	867590	1	15	6.6	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	867580	1	14	7.1	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	867581	1	16	6.2	5.0	✔
pH by Meter	E108	867574	1	15	6.6	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	865969	2	11	18.1	10.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	865730	1	6	16.6	10.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	869225	1	3	33.3	5.0	✔
Total Mercury in Water by CVAAS	E508	868574	1	4	25.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	866468	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	869224	1	5	20.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	869039	1	5	20.0	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	867575	1	12	8.3	5.0	✔
Ammonia by Fluorescence	E298	869223	1	8	12.5	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	866896	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	867520	1	12	8.3	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	870758	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	867590	1	15	6.6	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	867580	1	14	7.1	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	867581	1	16	6.2	5.0	✔
pH by Meter	E108	867574	1	15	6.6	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	869225	1	3	33.3	5.0	✔
Total Mercury in Water by CVAAS	E508	868574	1	4	25.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	866468	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	869224	1	5	20.0	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	871019	1	14	7.1	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	869039	1	5	20.0	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	867575	1	12	8.3	5.0	✔
Ammonia by Fluorescence	E298	869223	1	8	12.5	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	866896	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	867520	1	12	8.3	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	870758	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	867590	1	15	6.6	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	867580	1	14	7.1	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	867581	1	16	6.2	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	865969	1	11	9.0	5.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	865730	1	6	16.6	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	869225	1	3	33.3	5.0	✔
Total Mercury in Water by CVAAS	E508	868574	1	4	25.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	866468	1	20	5.0	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
<i>Analytical Methods</i>	<i>Method</i>	<i>QC Lot #</i>	<i>QC</i>	<i>Regular</i>	<i>Actual</i>	<i>Expected</i>	<i>Evaluation</i>
Method Blanks (MB) - Continued							
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	869224	1	5	20.0	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	871019	1	14	7.1	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	869039	1	5	20.0	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	869223	1	8	12.5	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	870758	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	867590	1	15	6.6	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	867580	1	14	7.1	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	867581	1	16	6.2	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	869225	1	3	33.3	5.0	✔
Total Mercury in Water by CVAAS	E508	868574	1	4	25.0	5.0	✔
Total metals in Water by CRC ICPMS	E420	866468	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	869224	1	5	20.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	869039	1	5	20.0	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MTF)	E014.EC Vancouver - Environmental	Soil/Solid	TMECC 07.00 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism.
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC Vancouver - Environmental	Soil/Solid	EPA 1680 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism. Moisture determination is performed to report test results on a dry-weight basis.
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C . Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
TS by Gravimetry	E157 Waterloo - Environmental	Soil/Solid	APHA 2540 B (mod)	Total Solids (TS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. The increase in weight over that of the empty dish represents the total solids. Results are reported as the percentage of the total sample.
FS by Gravimetry	E169 Waterloo - Environmental	Soil/Solid	APHA 2540 G (mod)	Fixed Solids (FS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. This residue is ignited to constant weight at 550°C . The remaining solids represent the Fixed Solids (FS). Results are reported as the percentage of the total solids.
Total Kjeldahl Nitrogen by Colourimetry	E319 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO_4 and K_2SO_4 catalysts. Ammonia in the soil extract is determined colorimetrically at 660 nm.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl, followed by CVAAS analysis.
VS by Gravimetry	EC165 Waterloo - Environmental	Soil/Solid	APHA 2540 G (mod)	Volatile Solids (VS) are determined by drying a sample in a weighed dish to constant weight in an oven at 104 ± 1°C. The increase in weight over that of the empty dish represents the total solids. This residue is ignited to constant weight at 550°C. The remaining solids represent the fixed total solids while the weight lost on ignition is the volatile solids. Results are reported as Percent of the Total Solids which are Volatile Solids. VS at 550°C can be used as an estimation of Organic Matter (CSSS 2008).
Total Coliforms and E. coli (Enzyme Substrate)	E010 Vancouver - Environmental	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ± 0.5°C for either 18 or 24 hours (dependent on reagent used).
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC Vancouver - Environmental	Water	APHA 9223 (mod)	The enzyme substrate test detects Thermotolerant Coliforms in a 100 mL sample after an 18 hour incubation at 44.5 ± 0.2°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand - 5 day	E550 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676 Winnipeg - Environmental	Water	ASTM D2908-91 (mod)	Volatile Fatty and Carboxylic Acid are analyzed GCMS.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Solid sample preparation (MTF)	EP014 Vancouver - Environmental	Soil/Solid	EPA 1680 (mod)	The procedure involves mixing the sample with deionized/distilled water at a 1:10 ratio of sample to water.
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Kjeldahl Digestion for soils	EP319 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO ₄ and K ₂ SO ₄ catalysts.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Dry and Grind in Soil/Solid <60°C	EPP442 Saskatoon - Environmental	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.



Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 868283)											
VA23A5511-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.74	7.69	0.6%	5%	----
Physical Tests (QC Lot: 868284)											
VA23A5511-001	Anonymous	Moisture	----	E144	0.25	%	89.3	89.4	0.144%	20%	----
Physical Tests (QC Lot: 870279)											
VA23A5669-004	Biosolids E231763	Solids, total [TS]	----	E157	0.10	%	24.8	24.3	2.02%	20%	----
Physical Tests (QC Lot: 870280)											
VA23A5669-004	Biosolids E231763	Solids, fixed [FS]	----	E169	0.10	%	17.8	17.1	4.28%	30%	----
Microbiological Tests (QC Lot: 866316)											
VA23A5678-001	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E014.EC	2	MPN/g	<2	<2	0	Diff <2x LOR	----
Metals (QC Lot: 868281)											
VA23A5511-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	0.122	0.119	0.0026	Diff <2x LOR	----
Metals (QC Lot: 868282)											
VA23A5511-001	Anonymous	Aluminum	7429-90-5	E440	67	mg/kg	135000	125000	7.62%	40%	----
		Antimony	7440-36-0	E440	0.13	mg/kg	0.86	0.72	0.14	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.13	mg/kg	29.8	31.9	6.60%	30%	----
		Barium	7440-39-3	E440	0.67	mg/kg	224	194	14.0%	40%	----
		Beryllium	7440-41-7	E440	0.13	mg/kg	0.61	0.58	0.03	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.27	mg/kg	<0.28	<0.27	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	6.7	mg/kg	47.5	42.2	5.2	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.027	mg/kg	0.643	0.599	7.12%	30%	----
		Calcium	7440-70-2	E440	67	mg/kg	19900	18200	9.29%	30%	----
		Chromium	7440-47-3	E440	0.67	mg/kg	15.9	13.5	16.6%	30%	----
		Cobalt	7440-48-4	E440	0.13	mg/kg	14.6	13.0	11.1%	30%	----
		Copper	7440-50-8	E440	0.67	mg/kg	2000	2020	0.615%	30%	----
		Iron	7439-89-6	E440	67	mg/kg	17800	16000	10.6%	30%	----
		Lead	7439-92-1	E440	0.67	mg/kg	5.50	5.12	7.03%	40%	----
		Lithium	7439-93-2	E440	2.7	mg/kg	15.2	13.1	2.0	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	27	mg/kg	10700	9450	12.2%	30%	----
		Manganese	7439-96-5	E440	1.3	mg/kg	674	642	4.84%	30%	----
		Molybdenum	7439-98-7	E440	0.13	mg/kg	32.4	30.6	5.62%	40%	----



Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 868282) - continued											
VA23A5511-001	Anonymous	Nickel	7440-02-0	E440	0.67	mg/kg	19.6	17.8	9.96%	30%	----
		Phosphorus	7723-14-0	E440	67	mg/kg	859	846	1.58%	30%	----
		Potassium	7440-09-7	E440	130	mg/kg	1360	1130	18.3%	40%	----
		Selenium	7782-49-2	E440	0.27	mg/kg	21.7	20.6	5.25%	30%	----
		Silver	7440-22-4	E440	0.13	mg/kg	0.27	0.26	0.01	Diff <2x LOR	----
		Sodium	7440-23-5	E440	67	mg/kg	766	716	6.76%	40%	----
		Strontium	7440-24-6	E440	0.67	mg/kg	623	588	5.84%	40%	----
		Sulfur	7704-34-9	E440	1300	mg/kg	5500	5100	300	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.067	mg/kg	<0.069	<0.067	0.067	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.7	mg/kg	<2.8	<2.7	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.3	mg/kg	755	584	25.6%	40%	----
		Tungsten	7440-33-7	E440	0.67	mg/kg	0.72	<0.67	0.05	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.067	mg/kg	11.7	11.2	3.84%	30%	----
		Vanadium	7440-62-2	E440	0.27	mg/kg	52.8	46.4	12.9%	30%	----
		Zinc	7440-66-6	E440	2.7	mg/kg	189	176	7.66%	30%	----
		Zirconium	7440-67-7	E440	1.3	mg/kg	7.9	6.8	1.1	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 869269)											
WP2303180-007	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E319	6890	mg/kg	38400	38800	410	Diff <2x LOR	----
Sub-Matrix: Water							Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 867574)											
KS2300814-001	Anonymous	pH	----	E108	0.10	pH units	7.98	8.00	0.250%	4%	----
Physical Tests (QC Lot: 867575)											
KS2300814-003	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	173	174	0.576%	20%	----
Anions and Nutrients (QC Lot: 867580)											
KS2300814-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	<0.0250	<0.0250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 867581)											
KS2300814-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 867590)											
KS2300814-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0100	mg/L	0.192	0.193	0.557%	20%	----
Anions and Nutrients (QC Lot: 869223)											
VA23A5669-001	Outfall Comp E104954	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.436	0.431	1.08%	20%	----
Anions and Nutrients (QC Lot: 869224)											



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 869224) - continued											
VA23A5669-001	Outfall Comp E104954	Phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.508	0.505	0.552%	20%	----
Anions and Nutrients (QC Lot: 869225)											
VA23A5669-002	Raw Influent Comp E222796	Kjeldahl nitrogen, total [TKN]	----	E318	1.00	mg/L	46.0	44.6	3.02%	20%	----
Microbiological Tests (QC Lot: 865730)											
VA23A5626-001	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 865969)											
VA23A5621-001	Anonymous	Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
VA23A5674-001	Anonymous	Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	136	136	0.00%	65%	----
Total Metals (QC Lot: 866468)											
VA23A5652-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00086	0.00091	0.00005	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.0200	mg/L	0.0792	0.0785	0.00078	Diff <2x LOR	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.100	mg/L	43.6	43.6	0.139%	20%	----
		Cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00071	0.00071	0.000001	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00100	mg/L	0.0352	0.0351	0.254%	20%	----
		Iron, total	7439-89-6	E420	0.030	mg/L	0.046	0.047	0.002	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	0.00148	0.00148	0.0000006	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0107	0.0106	0.593%	20%	----
		Magnesium, total	7439-95-4	E420	0.100	mg/L	17.5	17.9	2.29%	20%	----
		Manganese, total	7439-96-5	E420	0.00200	mg/L	0.00602	0.00654	0.00052	Diff <2x LOR	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000667	0.000679	1.82%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	0.0242	0.0244	0.925%	20%	----
		Phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.100	mg/L	1.75	1.75	0.0622%	20%	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 866468) - continued											
VA23A5652-001	Anonymous	Silicon, total	7440-21-3	E420	0.10	mg/L	4.87	4.87	0.0437%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	0.000021	0.000019	0.000002	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	2.00	mg/L	2.81	2.87	0.064	Diff <2x LOR	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.230	0.229	0.419%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	22.2	22.4	1.07%	20%	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	0.00090	0.00088	0.00002	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00010	mg/L	0.00037	0.00037	0.000003	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000100	mg/L	0.00459	0.00455	0.954%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0500	mg/L	<0.0500	<0.0500	0	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 868574)											
VA23A5532-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 866896)											
VA23A5690-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 867520)											
VA23A5669-007	Trip Blank	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 870758)											
VA23A5562-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	40	mg/L	162	156	7	Diff <2x LOR	----
Fatty Acids (QC Lot: 869039)											
VA23A5669-005	Fermenter Supernatant	Acetic acid	64-19-7	E676	10	mg/L	53	58	5	Diff <2x LOR	----
		Butyric acid	107-92-6	E676	1.0	mg/L	9.6	10.4	8.79%	30%	----
		Formic acid	64-18-6	E676	30	mg/L	<30	<30	0	Diff <2x LOR	----
		Hexanoic acid	142-62-1	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isobutyric acid	79-31-2	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isovaleric acid	503-74-2	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Propanoic acid	79-09-4	E676	5.0	mg/L	23.5	25.9	2.4	Diff <2x LOR	----
		Valeric acid	109-52-4	E676	1.0	mg/L	2.0	2.1	0.1	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 868284)						
Moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 870279)						
Solids, total [TS]	----	E157	0.1	%	<0.10	----
Microbiological Tests (QCLot: 866315)						
Coliforms, thermotolerant [fecal]	----	E014.FC	2	MPN/g	<2	----
Microbiological Tests (QCLot: 866316)						
Coliforms, Escherichia coli [E. coli]	----	E014.EC	2	MPN/g	<2	----
Metals (QCLot: 868281)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 868282)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----



Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 868282) - continued						
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Leachable Anions & Nutrients (QCLot: 869269)						
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	<200	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 867575)						
Alkalinity, total (as CaCO ₃)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 871019)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 867580)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 867581)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 867590)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 869223)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 869224)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 869225)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Microbiological Tests (QCLot: 865730)						



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Microbiological Tests (QCLot: 865730) - continued						
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
Microbiological Tests (QCLot: 865969)						
Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	<1	----
Total Metals (QCLot: 866468)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 866468) - continued						
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 868574)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 866896)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 867520)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 870758)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Fatty Acids (QCLot: 869039)						
Acetic acid	64-19-7	E676	10	mg/L	<10	----
Butyric acid	107-92-6	E676	1	mg/L	<1.0	----
Formic acid	64-18-6	E676	30	mg/L	<30	----
Hexanoic acid	142-62-1	E676	1	mg/L	<1.0	----
Isobutyric acid	79-31-2	E676	1	mg/L	<1.0	----
Isovaleric acid	503-74-2	E676	1	mg/L	<1.0	----
Propanoic acid	79-09-4	E676	5	mg/L	<5.0	----
Valeric acid	109-52-4	E676	1	mg/L	<1.0	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 868283)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.8	95.0	105	----
Physical Tests (QCLot: 868284)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 870279)									
Solids, total [TS]	----	E157	0.1	%	50 %	99.9	85.0	115	----
Metals (QCLot: 868281)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	102	80.0	120	----
Metals (QCLot: 868282)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	93.7	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	96.6	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	91.1	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	92.3	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	97.5	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	95.8	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	89.9	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	92.5	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	91.7	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	93.4	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	92.4	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	94.3	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.4	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	98.4	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	91.1	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	99.1	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	92.4	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	106	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	94.4	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	99.3	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	84.7	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	91.5	80.0	120	----



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 868282) - continued									
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	94.6	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	95.1	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	95.6	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	95.2	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	90.7	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	92.5	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	89.0	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	94.4	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	99.0	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	85.0	80.0	120	----
Leachable Anions & Nutrients (QCLot: 869269)									
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	1000 mg/kg	89.6	80.0	120	----
Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 867574)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 867575)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	108	85.0	115	----
Physical Tests (QCLot: 871019)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	108	85.0	115	----
Anions and Nutrients (QCLot: 867580)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 867581)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 867590)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 869223)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 869224)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.4	80.0	120	----
Anions and Nutrients (QCLot: 869225)									



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 869225) - continued									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	96.7	75.0	125	----
Total Metals (QCLot: 866468)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	101	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	96.7	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	96.5	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	91.9	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.9	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	97.1	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	97.7	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	98.3	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	99.5	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.8	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	98.0	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.3	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	94.4	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	98.9	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.4	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.7	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	110	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	97.1	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	96.4	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	94.7	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	93.6	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	99.6	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.6	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	98.4	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	100	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	91.9	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	94.6	80.0	120	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit					
Total Metals (QCLot: 866468) - continued									
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	96.3	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	96.6	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	100	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	91.7	80.0	120	----
Total Metals (QCLot: 868574)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	104	80.0	120	----
Aggregate Organics (QCLot: 866896)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	104	85.0	115	----
Aggregate Organics (QCLot: 867520)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	103	85.0	115	----
Aggregate Organics (QCLot: 870758)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	100	85.0	115	----
Fatty Acids (QCLot: 869039)									
Acetic acid	64-19-7	E676	10	mg/L	40 mg/L	93.1	70.0	130	----
Butyric acid	107-92-6	E676	1	mg/L	40 mg/L	91.6	70.0	130	----
Formic acid	64-18-6	E676	30	mg/L	160 mg/L	110	70.0	130	----
Hexanoic acid	142-62-1	E676	1	mg/L	40 mg/L	92.0	70.0	130	----
Isobutyric acid	79-31-2	E676	1	mg/L	40 mg/L	93.7	70.0	130	----
Isovaleric acid	503-74-2	E676	1	mg/L	40 mg/L	96.1	70.0	130	----
Propanoic acid	79-09-4	E676	5	mg/L	40 mg/L	90.6	70.0	130	----
Valeric acid	109-52-4	E676	1	mg/L	40 mg/L	91.6	70.0	130	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 867580)										
KS2300814-002	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	50.2 mg/L	50 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 867581)										
KS2300814-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	10.3 mg/L	10 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 867590)										
KS2300814-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	ND mg/L	0.03 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 869223)										
VA23A5669-002	Raw Influent Comp E222796	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Anions and Nutrients (QCLot: 869224)										
VA23A5669-002	Raw Influent Comp E222796	Phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 869225)										
VA23A5669-006	Outfall Grab E104954	Kjeldahl nitrogen, total [TKN]	----	E318	2.39 mg/L	2.5 mg/L	95.5	70.0	130	----
Total Metals (QCLot: 866468)										
VA23A5652-002	Anonymous	Aluminum, total	7429-90-5	E420	0.185 mg/L	0.2 mg/L	92.5	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0370 mg/L	0.04 mg/L	92.6	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00905 mg/L	0.01 mg/L	90.5	70.0	130	----
		Boron, total	7440-42-8	E420	0.092 mg/L	0.1 mg/L	91.6	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00372 mg/L	0.004 mg/L	93.1	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.00961 mg/L	0.01 mg/L	96.1	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0367 mg/L	0.04 mg/L	91.8	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0182 mg/L	0.02 mg/L	90.8	70.0	130	----
		Copper, total	7440-50-8	E420	0.0179 mg/L	0.02 mg/L	89.3	70.0	130	----
		Iron, total	7439-89-6	E420	1.83 mg/L	2 mg/L	91.5	70.0	130	----
		Lead, total	7439-92-1	E420	0.0180 mg/L	0.02 mg/L	90.2	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0895 mg/L	0.1 mg/L	89.5	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 866468) - continued										
VA23A5652-002	Anonymous	Manganese, total	7439-96-5	E420	0.0182 mg/L	0.02 mg/L	91.0	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0362 mg/L	0.04 mg/L	90.5	70.0	130	----
		Phosphorus, total	7723-14-0	E420	9.63 mg/L	10 mg/L	96.3	70.0	130	----
		Potassium, total	7440-09-7	E420	3.64 mg/L	4 mg/L	91.0	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.0182 mg/L	0.02 mg/L	90.8	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0398 mg/L	0.04 mg/L	99.5	70.0	130	----
		Silicon, total	7440-21-3	E420	8.28 mg/L	10 mg/L	82.8	70.0	130	----
		Silver, total	7440-22-4	E420	0.00375 mg/L	0.004 mg/L	93.7	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.0378 mg/L	0.04 mg/L	94.5	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00361 mg/L	0.004 mg/L	90.2	70.0	130	----
		Thorium, total	7440-29-1	E420	0.0181 mg/L	0.02 mg/L	90.7	70.0	130	----
		Tin, total	7440-31-5	E420	0.0184 mg/L	0.02 mg/L	92.1	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0356 mg/L	0.04 mg/L	89.1	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.0181 mg/L	0.02 mg/L	90.6	70.0	130	----
		Uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0945 mg/L	0.1 mg/L	94.5	70.0	130	----
		Zinc, total	7440-66-6	E420	0.364 mg/L	0.4 mg/L	91.0	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.0386 mg/L	0.04 mg/L	96.6	70.0	130	----
Total Metals (QCLot: 868574)										
VA23A5548-002	Anonymous	Mercury, total	7439-97-6	E508	ND mg/L	0.0001 mg/L	ND	70.0	130	----
Aggregate Organics (QCLot: 870758)										
VA23A5611-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	104 mg/L	100 mg/L	104	75.0	125	----
Fatty Acids (QCLot: 869039)										
VA23A5669-005	Fermenter Supernatant	Acetic acid	64-19-7	E676	ND mg/L	40 mg/L	ND	70.0	130	----
		Butyric acid	107-92-6	E676	29.7 mg/L	40 mg/L	74.2	70.0	130	----
		Formic acid	64-18-6	E676	117 mg/L	160 mg/L	73.1	70.0	130	----
		Hexanoic acid	142-62-1	E676	31.0 mg/L	40 mg/L	77.5	70.0	130	----
		Isobutyric acid	79-31-2	E676	28.8 mg/L	40 mg/L	72.0	70.0	130	----
		Isovaleric acid	503-74-2	E676	28.2 mg/L	40 mg/L	70.6	70.0	130	----
		Propanoic acid	79-09-4	E676	31.9 mg/L	40 mg/L	79.8	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Fatty Acids (QCLot: 869039) - continued										
VA23A5669-005	Fermenter Supernatant	Valeric acid	109-52-4	E676	29.3 mg/L	40 mg/L	73.3	70.0	130	----

Qualifiers

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.



Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method			Low	High	
Metals (QCLot: 868281)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	106	70.0	130	----
Metals (QCLot: 868282)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	104	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	95.7	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	97.5	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	96.8	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	102	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	114	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	96.8	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	104	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	95.2	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	99.9	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	99.3	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	98.4	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	98.4	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	102	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	97.8	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	101	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	97.1	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	100	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	102	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	88.3	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	98.2	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	95.8	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	99.0	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	105	70.0	130	----



Sub-Matrix:					Reference Material (RM) Report			
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)	
							Low	High
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method				Qualifier
Metals (QCLot: 868282) - continued								
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	95.1	70.0	130
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	99.3	70.0	130
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	98.1	70.0	130
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	89.7	70.0	130
Leachable Anions & Nutrients (QCLot: 869269)								
	RM	Kjeldahl nitrogen, total [TKN]	----	E319	1040 mg/kg	89.4	80.0	120



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

(Matrix: Water)

					Outfall Comp E104954	----	----	----	----
Client sampling date / time					03-May-2023 07:15	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9678-001	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
pH	----	E108/VA A	0.10	pH units	7.88	----	----	----	----
Solids, total suspended [TSS]	----	E160-L/VA A	1.0	mg/L	2.9	----	----	----	----
Aggregate Organics									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA A	2.0	mg/L	<2.0	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L/VA A	10	mg/L	49	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

					Outfall Grab E104954	----	----	----	----
Client sampling date / time					03-May-2023 07:20	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9678-002	-----	-----	-----	-----
					Result	----	----	----	----
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E318/VA A	0.050	mg/L	2.23	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp E104954	E555	03-May-2023	----	----	----		05-May-2023	3 days	2 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E559-L	03-May-2023	----	----	----		10-May-2023	28 days	7 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	03-May-2023	09-May-2023	----	----		10-May-2023	28 days	7 days	✓
Physical Tests : pH by Meter										
HDPE Outfall Comp E104954	E108	03-May-2023	09-May-2023	----	----		09-May-2023	0.25 hrs	3.25 hrs	✖ EHTR-FM
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp E104954	E160-L	03-May-2023	----	----	----		05-May-2023	7 days	2 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	924459	1	5	20.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	930717	1	16	6.2	5.0	✔
pH by Meter	E108	927643	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	928663	1	10	10.0	5.0	✔
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	924459	1	5	20.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	930717	1	16	6.2	5.0	✔
pH by Meter	E108	927643	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	928663	1	10	10.0	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	924570	1	20	5.0	5.0	✔
Method Blanks (MB)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	924459	1	5	20.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	930717	1	16	6.2	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	928663	1	10	10.0	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	924570	1	20	5.0	5.0	✔
Matrix Spikes (MS)							
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	930717	1	16	6.2	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	928663	1	10	10.0	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at $104 \pm 1^{\circ}\text{C}$, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Vancouver - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

- Key :
- Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
 - CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
 - DQO = Data Quality Objective.
 - LOR = Limit of Reporting (detection limit).
 - RPD = Relative Percent Difference
 - # = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 927643)											
VA23A9472-001	Anonymous	pH	----	E108	0.10	pH units	6.10	6.08	0.328%	4%	----
Anions and Nutrients (QC Lot: 928663)											
VA23A9592-004	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 924459)											
VA23A9678-001	Outfall Comp E104954	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 930717)											
VA23A9661-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	40	mg/L	3170	3200	0.983%	20%	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 924570)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 928663)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Aggregate Organics (QCLot: 924459)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 930717)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 924570)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	102	85.0	115	----
Physical Tests (QCLot: 927643)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Anions and Nutrients (QCLot: 928663)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	90.0	75.0	125	----
Aggregate Organics (QCLot: 924459)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	99.4	85.0	115	----
Aggregate Organics (QCLot: 930717)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	104	85.0	115	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report						
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier	
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High		
Anions and Nutrients (QCLot: 928663)											
VA23A9678-002	Outfall Grab E104954	Kjeldahl nitrogen, total [TKN]	----	E318	2.47 mg/L	2.5 mg/L	98.9	70.0	130		----
Aggregate Organics (QCLot: 930717)											
VA23A9678-001	Outfall Comp E104954	Chemical oxygen demand [COD]	----	E559-L	104 mg/L	100 mg/L	104	75.0	125	----	



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

Outfall Comp
E104954

(Matrix: Water)

Client sampling date / time

17-May-2023
07:00

Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0949-001	-----	-----	-----	-----
					Result	----	----	----	----

Physical Tests

pH	----	E108/VA	0.10	pH units	7.94	----	----	----	----
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	3.2	----	----	----	----

Anions and Nutrients

Ammonia, total (as N)	7664-41-7	E298/CG	0.0050	mg/L	0.379	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/V A	0.0050	mg/L	6.58	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	0.197	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	0.282	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/CG	0.0020	mg/L	0.398	----	----	----	----

Aggregate Organics

Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L	<2.0	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L/CG	10	mg/L	43	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Composite Influent

Client sample ID

(Matrix: Water)

					Raw Influent Comp E222796	----	----	----	----
Client sampling date / time					17-May-2023 07:10	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0949-002	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	266	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/CG	0.0050	mg/L	36.4	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318/CG	0.050	mg/L	59.6	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NQ3-L/V A	0.0050	mg/L	<0.0250 ^{DLDS}	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	<0.0050 ^{DLDS}	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	4.39	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/CG	0.0020	mg/L	6.64	----	----	----	----
Aggregate Organics									
Biochemical oxygen demand [BOD]	----	E550/VA	2.0	mg/L	263	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

Client sampling date / time					Bioreactor	Fermenter Supernatant	Outfall Grab E104954	Trip Blank	Outfall Grab E104954
Client sampling date / time					17-May-2023 08:00	17-May-2023 07:30	17-May-2023 07:05	17-May-2023	12-May-2023 10:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0949-003	VA23B0949-005	VA23B0949-006	VA23B0949-007	VA23B0949-008
					Result	Result	Result	Result	Result
Physical Tests									
Alkalinity, total (as CaCO ₃)	---	E290/VA	1.0	mg/L	203	---	---	---	---
Hardness (as CaCO ₃), from total Ca/Mg	---	EC100A/VA	0.60	mg/L	327	---	---	---	---
pH	---	E108/VA	0.10	pH units	---	---	---	5.53	---
Solids, total suspended [TSS]	---	E160-L/VA	1.0	mg/L	---	---	---	<1.0	---
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/CG	0.0050	mg/L	---	---	---	<0.0050	---
Kjeldahl nitrogen, total [TKN]	---	E318/CG	0.050	mg/L	---	---	2.11	<0.050	2.02
Nitrate (as N)	14797-55-8	E235.NO3-L/V A	0.0050	mg/L	---	---	---	<0.0050	---
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	---	---	---	<0.0010	---
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	---	---	---	<0.0010	---
Phosphorus, total	7723-14-0	E372-U/CG	0.0020	mg/L	---	---	---	<0.0020	---
Microbiological Tests									
Coliforms, thermotolerant [fecal]	---	E010.FC/VA	1	MPN/100mL	---	---	<1	---	---
Coliforms, Escherichia coli [E. coli]	---	E010/VA	1	MPN/100mL	---	---	1	---	---
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	32.7	---	---	---	---
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L	0.00340	---	---	---	---
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L	0.00791	---	---	---	---
Barium, total	7440-39-3	E420/VA	0.00010	mg/L	0.485	---	---	---	---
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L	0.000234	---	---	---	---
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L	0.0744	---	---	---	---
Boron, total	7440-42-8	E420/VA	0.010	mg/L	0.335	---	---	---	---
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L	0.00218	---	---	---	---
Calcium, total	7440-70-2	E420/VA	0.050	mg/L	68.7	---	---	---	---
Cesium, total	7440-46-2	E420/VA	0.000010	mg/L	0.00209 ^{RRV}	---	---	---	---
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L	0.0277	---	---	---	---
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L	0.00459	---	---	---	---
Copper, total	7440-50-8	E420/VA	0.00050	mg/L	1.38	---	---	---	---



Analytical Results

Sub-Matrix: Grab Effluent
(Matrix: Water)

					Client sample ID	Bioreactor	Fermenter Supernatant	Outfall Grab E104954	Trip Blank	Outfall Grab E104954
Client sampling date / time						17-May-2023 08:00	17-May-2023 07:30	17-May-2023 07:05	17-May-2023	12-May-2023 10:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0949-003	VA23B0949-005	VA23B0949-006	VA23B0949-007	VA23B0949-008	
					Result	Result	Result	Result	Result	
Total Metals										
Iron, total	7439-89-6	E420/VA	0.010	mg/L	4.10	---	---	---	---	---
Lead, total	7439-92-1	E420/VA	0.000050	mg/L	0.0136	---	---	---	---	---
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L	0.0067	---	---	---	---	---
Magnesium, total	7439-95-4	E420/VA	0.0050	mg/L	37.8	---	---	---	---	---
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L	0.258	---	---	---	---	---
Mercury, total	7439-97-6	E508/VA	0.0000050	mg/L	0.000255	---	---	---	---	---
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L	0.0261	---	---	---	---	---
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L	0.0312	---	---	---	---	---
Phosphorus, total	7723-14-0	E420/VA	0.050	mg/L	144	---	---	---	---	---
Potassium, total	7440-09-7	E420/VA	0.050	mg/L	59.6	---	---	---	---	---
Rubidium, total	7440-17-7	E420/VA	0.00020	mg/L	0.0316	---	---	---	---	---
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L	0.0100	---	---	---	---	---
Silicon, total	7440-21-3	E420/VA	0.10	mg/L	11.7	---	---	---	---	---
Silver, total	7440-22-4	E420/VA	0.000010	mg/L	0.00424	---	---	---	---	---
Sodium, total	7440-23-5	E420/VA	0.050	mg/L	59.8	---	---	---	---	---
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L	0.614	---	---	---	---	---
Sulfur, total	7704-34-9	E420/VA	0.50	mg/L	35.5	---	---	---	---	---
Tellurium, total	13494-80-9	E420/VA	0.00020	mg/L	<0.00040 ^{DLA}	---	---	---	---	---
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L	0.000093	---	---	---	---	---
Thorium, total	7440-29-1	E420/VA	0.00010	mg/L	0.00034	---	---	---	---	---
Tin, total	7440-31-5	E420/VA	0.00010	mg/L	0.00310	---	---	---	---	---
Titanium, total	7440-32-6	E420/VA	0.00030	mg/L	0.0563	---	---	---	---	---
Tungsten, total	7440-33-7	E420/VA	0.00010	mg/L	0.00184	---	---	---	---	---
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L	0.0266	---	---	---	---	---
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L	0.0164	---	---	---	---	---
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L	1.08	---	---	---	---	---
Zirconium, total	7440-67-7	E420/VA	0.00020	mg/L	0.00627	---	---	---	---	---
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	---	E555/VA	2.0	mg/L	---	---	---	---	<2.0	---



Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

Client sampling date / time					Bioreactor	Fermenter Supernatant	Outfall Grab E104954	Trip Blank	Outfall Grab E104954
					17-May-2023 08:00	17-May-2023 07:30	17-May-2023 07:05	17-May-2023	12-May-2023 10:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0949-003	VA23B0949-005	VA23B0949-006	VA23B0949-007	VA23B0949-008
					Result	Result	Result	Result	Result
Aggregate Organics									
Chemical oxygen demand [COD]	---	E559-L/CG	10	mg/L	---	---	---	<10	---
Fatty Acids									
Acetic acid	64-19-7	E676/WP	10	mg/L	---	51	---	---	---
Butyric acid	107-92-6	E676/WP	1.0	mg/L	---	9.0	---	---	---
Formic acid	64-18-6	E676/WP	30	mg/L	---	<30	---	---	---
Hexanoic acid	142-62-1	E676/WP	1.0	mg/L	---	<1.0	---	---	---
Isobutyric acid	79-31-2	E676/WP	1.0	mg/L	---	<1.0	---	---	---
Isovaleric acid	503-74-2	E676/WP	1.0	mg/L	---	<1.0	---	---	---
Propanoic acid	79-09-4	E676/WP	5.0	mg/L	---	25.0	---	---	---
Valeric acid	109-52-4	E676/WP	1.0	mg/L	---	1.9	---	---	---

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	17-May-2023 09:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0949-004	Result	----	----	----	----
Physical Tests										
Moisture	---	E144/VA	0.25	%	79.8	---	---	---	---	---
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	5.64 ^{FR8}	---	---	---	---	---
Solids, fixed [FS]	---	E169/WT	0.10	%	14.4	---	---	---	---	---
Solids, total [TS]	---	E157/WT	0.10	%	20.4	---	---	---	---	---
Solids, volatile [VS]	---	EC165/WT	0.10	%	85.6	---	---	---	---	---
Microbiological Tests										
Coliforms, Escherichia coli [E. coli]	---	E014.EC/VA	2	MPN/g	4530000	---	---	---	---	---
Coliforms, thermotolerant [fecal]	---	E014.FC/VA	2	MPN/g	4530000	---	---	---	---	---
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg	6190	---	---	---	---	---
Antimony	7440-36-0	E440/VA	0.10	mg/kg	0.92	---	---	---	---	---
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	1.39	---	---	---	---	---
Barium	7440-39-3	E440/VA	0.50	mg/kg	106	---	---	---	---	---
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	<0.10	---	---	---	---	---
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	16.2	---	---	---	---	---
Boron	7440-42-8	E440/VA	5.0	mg/kg	16.5	---	---	---	---	---
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	0.522	---	---	---	---	---
Calcium	7440-70-2	E440/VA	50	mg/kg	8860	---	---	---	---	---
Chromium	7440-47-3	E440/VA	0.50	mg/kg	9.11	---	---	---	---	---
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	1.02	---	---	---	---	---
Copper	7440-50-8	E440/VA	0.50	mg/kg	313	---	---	---	---	---
Iron	7439-89-6	E440/VA	50	mg/kg	1750	---	---	---	---	---
Lead	7439-92-1	E440/VA	0.50	mg/kg	3.88	---	---	---	---	---
Lithium	7439-93-2	E440/VA	2.0	mg/kg	<2.0	---	---	---	---	---
Magnesium	7439-95-4	E440/VA	20	mg/kg	5350	---	---	---	---	---
Manganese	7439-96-5	E440/VA	1.0	mg/kg	51.1	---	---	---	---	---
Mercury	7439-97-6	E510/VA	0.0050	mg/kg	0.163	---	---	---	---	---
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	5.58	---	---	---	---	---
Nickel	7440-02-0	E440/VA	0.50	mg/kg	7.77	---	---	---	---	---
Phosphorus	7723-14-0	E440/VA	50	mg/kg	25500	---	---	---	---	---



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)										
					Client sampling date / time	17-May-2023 09:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B0949-004	Result	-----	-----	-----	-----
Metals										
Potassium	7440-09-7	E440/VA	100	mg/kg	5180	----	----	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	2.40	----	----	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	1.17	----	----	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	395	----	----	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	83.4	----	----	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	4500	----	----	----	----	----
Thallium	7440-28-0	E440/VA	0.050	mg/kg	<0.050	----	----	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg	9.9	----	----	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg	31.8	----	----	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	0.74	----	----	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg	5.28	----	----	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	4.26	----	----	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg	282	----	----	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	9.2	----	----	----	----	----
Leachable Anions & Nutrients										
Kjeldahl nitrogen, total [TKN]	----	E319/SK	0.020	%	5.67	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: Soil/Solid

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	Anonymous	Anonymous	Lead	7439-92-1	E440	41.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: Soil/Solid

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Leachable Anions & Nutrients : Total Kjeldahl Nitrogen by Colourimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E319	17-May-2023	25-May-2023	----	----		26-May-2023	365 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap Biosolids E231763	E510	17-May-2023	21-May-2023	----	----		23-May-2023	28 days	6 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap Biosolids E231763	E440	17-May-2023	21-May-2023	----	----		24-May-2023	180 days	7 days	✓
Microbiological Tests : E. coli (MTF)										
Glass soil jar/Teflon lined cap Biosolids E231763	E014.EC	17-May-2023	18-May-2023	2 days	1 days	✓	18-May-2023	2 days	0 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliforms (MTF)										
Glass soil jar/Teflon lined cap Biosolids E231763	E014.FC	17-May-2023	18-May-2023	2 days	1 days	✓	18-May-2023	2 days	0 days	✓
Physical Tests : FS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E169	17-May-2023	----	----	----		23-May-2023	7 days	6 days	✓
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E144	17-May-2023	----	----	----		18-May-2023	----	----	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap Biosolids E231763	E108	17-May-2023	21-May-2023	----	----		23-May-2023	30 days	6 days	✓
Physical Tests : TS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E157	17-May-2023	----	----	----		23-May-2023	14 days	6 days	✓

Matrix: Water

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] Raw Influent Comp E222796	E550	17-May-2023	----	----	----		20-May-2023	3 days	3 days	✔
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp E104954	E555	17-May-2023	----	----	----		20-May-2023	3 days	3 days	✔
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Trip Blank	E555	17-May-2023	----	----	----		20-May-2023	3 days	3 days	✔
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E559-L	17-May-2023	----	----	----		25-May-2023	28 days	8 days	✔
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Trip Blank	E559-L	17-May-2023	----	----	----		25-May-2023	28 days	8 days	✔
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Outfall Comp E104954	E298	17-May-2023	23-May-2023	----	----		23-May-2023	28 days	6 days	✔



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E298	17-May-2023	23-May-2023	----	----		23-May-2023	28 days	6 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Trip Blank	E298	17-May-2023	23-May-2023	----	----		23-May-2023	28 days	6 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE Outfall Comp E104954	E378-U	17-May-2023	20-May-2023	----	----		20-May-2023	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE Raw Influent Comp E222796	E378-U	17-May-2023	19-May-2023	----	----		19-May-2023	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE Trip Blank	E378-U	17-May-2023	20-May-2023	----	----		20-May-2023	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Outfall Comp E104954	E235.NO3-L	17-May-2023	20-May-2023	----	----		20-May-2023	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Raw Influent Comp E222796	E235.NO3-L	17-May-2023	19-May-2023	----	----		20-May-2023	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO3-L	17-May-2023	20-May-2023	----	----		20-May-2023	3 days	3 days	✓



Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Outfall Comp E104954	E235.NO2-L	17-May-2023	20-May-2023	----	----		20-May-2023	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Raw Influent Comp E222796	E235.NO2-L	17-May-2023	19-May-2023	----	----		20-May-2023	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO2-L	17-May-2023	20-May-2023	----	----		20-May-2023	3 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	12-May-2023	24-May-2023	----	----		24-May-2023	28 days	12 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	17-May-2023	24-May-2023	----	----		24-May-2023	28 days	7 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E318	17-May-2023	24-May-2023	----	----		24-May-2023	28 days	7 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Trip Blank	E318	17-May-2023	24-May-2023	----	----		24-May-2023	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E372-U	17-May-2023	24-May-2023	----	----		25-May-2023	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E372-U	17-May-2023	24-May-2023	----	----		25-May-2023	28 days	8 days	✓



Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Trip Blank	E372-U	17-May-2023	24-May-2023	----	----		25-May-2023	28 days	8 days	✓
Fatty Acids : Volatile Fatty and Carboxylic Acid (VFA) by GC-MS										
Glass vial (sodium bisulfate) Fermenter Supernatant	E676	17-May-2023	----	----	----		19-May-2023	14 days	2 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab E104954	E010.FC	17-May-2023	----	----	----		18-May-2023	30 hrs	32 hrs	✖ EHTL
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab E104954	E010	17-May-2023	----	----	----		18-May-2023	30 hrs	32 hrs	✖ EHTL
Physical Tests : Alkalinity Species by Titration										
HDPE Bioreactor	E290	17-May-2023	26-May-2023	----	----		27-May-2023	14 days	10 days	✓
Physical Tests : pH by Meter										
HDPE Outfall Comp E104954	E108	17-May-2023	20-May-2023	----	----		21-May-2023	0.25 hrs	28.25 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE Trip Blank	E108	17-May-2023	20-May-2023	----	----		21-May-2023	0.25 hrs	28.25 hrs	✖ EHTR-FM
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp E104954	E160-L	17-May-2023	----	----	----		24-May-2023	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Raw Influent Comp E222796	E160-L	17-May-2023	----	----	----		24-May-2023	7 days	7 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Trip Blank	E160-L	17-May-2023	----	----	----		24-May-2023	7 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) Bioreactor	E508	17-May-2023	21-May-2023	----	----		21-May-2023	28 days	4 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE - total (lab preserved) Bioreactor	E420	17-May-2023	19-May-2023	----	----		20-May-2023	180 days	3 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended
 EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
 Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: Soil/Solid

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
E. coli (MTF)	E014.EC	945332	1	1	100.0	5.0	✔
FS by Gravimetry	E169	951035	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	945750	1	5	20.0	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	945751	1	5	20.0	5.0	✔
Moisture Content by Gravimetry	E144	945757	1	19	5.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	945752	1	5	20.0	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	945331	1	2	50.0	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	954399	1	5	20.0	5.0	✔
TS by Gravimetry	E157	951034	1	1	100.0	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	945750	2	5	40.0	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	945751	2	5	40.0	10.0	✔
Moisture Content by Gravimetry	E144	945757	1	19	5.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	945752	1	5	20.0	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	954399	2	5	40.0	10.0	✔
TS by Gravimetry	E157	951034	1	1	100.0	5.0	✔
Method Blanks (MB)							
E. coli (MTF)	E014.EC	945332	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	945750	1	5	20.0	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	945751	1	5	20.0	5.0	✔
Moisture Content by Gravimetry	E144	945757	1	19	5.2	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	945331	1	2	50.0	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	954399	1	5	20.0	5.0	✔
TS by Gravimetry	E157	951034	1	1	100.0	5.0	✔

Matrix: Water

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	956744	1	16	6.2	5.0	✔
Ammonia by Fluorescence	E298	950200	1	20	5.0	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	948018	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	948463	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	954441	1	12	8.3	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	947694	2	20	10.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	947683	2	29	6.9	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	947684	2	34	5.8	5.0	✔
pH by Meter	E108	947918	1	20	5.0	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	944862	2	18	11.1	10.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	944861	1	8	12.5	10.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	950044	1	19	5.2	5.0	✔
Total Mercury in Water by CVAAS	E508	948960	1	13	7.6	5.0	✔
Total metals in Water by CRC ICPMS	E420	944924	1	18	5.5	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	951771	1	20	5.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	947005	1	5	20.0	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	956744	1	16	6.2	5.0	✔
Ammonia by Fluorescence	E298	950200	1	20	5.0	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	948018	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	948463	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	954441	1	12	8.3	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	947694	2	20	10.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	947683	2	29	6.9	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	947684	2	34	5.8	5.0	✔
pH by Meter	E108	947918	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	950044	1	19	5.2	5.0	✔
Total Mercury in Water by CVAAS	E508	948960	1	13	7.6	5.0	✔
Total metals in Water by CRC ICPMS	E420	944924	1	18	5.5	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	951771	1	20	5.0	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	951283	2	22	9.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	947005	1	5	20.0	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	956744	1	16	6.2	5.0	✔
Ammonia by Fluorescence	E298	950200	1	20	5.0	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	948018	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	948463	1	10	10.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	954441	1	12	8.3	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	947694	2	20	10.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	947683	2	29	6.9	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	947684	2	34	5.8	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	944862	1	18	5.5	5.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	944861	1	8	12.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	950044	1	19	5.2	5.0	✔
Total Mercury in Water by CVAAS	E508	948960	1	13	7.6	5.0	✔
Total metals in Water by CRC ICPMS	E420	944924	1	18	5.5	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
<i>Analytical Methods</i>	<i>Method</i>	<i>QC Lot #</i>	<i>QC</i>	<i>Regular</i>	<i>Actual</i>	<i>Expected</i>	<i>Evaluation</i>
Method Blanks (MB) - Continued							
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	951771	1	20	5.0	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	951283	2	22	9.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	947005	1	5	20.0	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	950200	1	20	5.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	954441	1	12	8.3	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	947694	2	20	10.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	947683	2	29	6.9	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	947684	2	34	5.8	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	950044	1	19	5.2	5.0	✔
Total Mercury in Water by CVAAS	E508	948960	1	13	7.6	5.0	✔
Total metals in Water by CRC ICPMS	E420	944924	1	18	5.5	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	951771	1	20	5.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	947005	1	5	20.0	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MTF)	E014.EC Vancouver - Environmental	Soil/Solid	TMECC 07.00 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism.
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC Vancouver - Environmental	Soil/Solid	EPA 1680 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism. Moisture determination is performed to report test results on a dry-weight basis.
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C . Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
TS by Gravimetry	E157 Waterloo - Environmental	Soil/Solid	APHA 2540 B (mod)	Total Solids (TS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. The increase in weight over that of the empty dish represents the total solids. Results are reported as the percentage of the total sample.
FS by Gravimetry	E169 Waterloo - Environmental	Soil/Solid	APHA 2540 G (mod)	Fixed Solids (FS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. This residue is ignited to constant weight at 550°C . The remaining solids represent the Fixed Solids (FS). Results are reported as the percentage of the total solids.
Total Kjeldahl Nitrogen by Colourimetry	E319 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO_4 and K_2SO_4 catalysts. Ammonia in the soil extract is determined colorimetrically at 660 nm.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl, followed by CVAAS analysis.
VS by Gravimetry	EC165 Waterloo - Environmental	Soil/Solid	APHA 2540 G (mod)	Volatile Solids (VS) are determined by drying a sample in a weighed dish to constant weight in an oven at 104 ± 1°C. The increase in weight over that of the empty dish represents the total solids. This residue is ignited to constant weight at 550°C. The remaining solids represent the fixed total solids while the weight lost on ignition is the volatile solids. Results are reported as Percent of the Total Solids which are Volatile Solids. VS at 550°C can be used as an estimation of Organic Matter (CSSS 2008).
Total Coliforms and E. coli (Enzyme Substrate)	E010 Vancouver - Environmental	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ± 0.5°C for either 18 or 24 hours (dependent on reagent used).
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC Vancouver - Environmental	Water	APHA 9223 (mod)	The enzyme substrate test detects Thermotolerant Coliforms in a 100 mL sample after an 18 hour incubation at 44.5 ± 0.2°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Calgary - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand - 5 day	E550 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Vancouver - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L Calgary - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676 Winnipeg - Environmental	Water	ASTM D2908-91 (mod)	Volatile Fatty and Carboxylic Acid are analyzed GCMS.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO ₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Solid sample preparation (MTF)	EP014 Vancouver - Environmental	Soil/Solid	EPA 1680 (mod)	The procedure involves mixing the sample with deionized/distilled water at a 1:10 ratio of sample to water.
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Kjeldahl Digestion for soils	EP319 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO ₄ and K ₂ SO ₄ catalysts.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Dry and Grind in Soil/Solid <60°C	EPP442 Saskatoon - Environmental	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 Calgary - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 945752)											
VA23B0938-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.41	7.58	2.3%	5%	----
Physical Tests (QC Lot: 945757)											
VA23B0977-001	Anonymous	Moisture	----	E144	0.25	%	8.06	8.60	6.60%	20%	----
Physical Tests (QC Lot: 951034)											
VA23B0949-004	Biosolids E231763	Solids, total [TS]	----	E157	0.10	%	20.4	20.4	0.318%	20%	----
Physical Tests (QC Lot: 951035)											
VA23B0949-004	Biosolids E231763	Solids, fixed [FS]	----	E169	0.10	%	14.4	14.1	1.84%	30%	----
Microbiological Tests (QC Lot: 945331)											
VA23B0949-004	Biosolids E231763	Coliforms, thermotolerant [fecal]	----	E014.FC	9860	MPN/g	4530000	2670000	51.6%	100%	----
Microbiological Tests (QC Lot: 945332)											
VA23B0949-004	Biosolids E231763	Coliforms, Escherichia coli [E. coli]	----	E014.EC	9860	MPN/g	4530000	2670000	51.6%	100%	----
Metals (QC Lot: 945750)											
VA23B0938-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0763	0.0603	0.0160	Diff <2x LOR	----
Metals (QC Lot: 945751)											
VA23B0938-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	20500	21100	2.99%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.33	0.30	0.03	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	5.41	4.95	8.94%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	85.3	77.0	10.2%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.35	0.34	0.008	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	8.4	8.6	0.2	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.138	0.123	0.016	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	24700	22900	7.64%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	41.9	44.0	4.81%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	12.4	12.3	0.676%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	40.0	38.1	4.90%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	27300	27700	1.48%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	12.6	8.28	41.2%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	18.4	19.2	4.29%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	11200	11900	6.38%	30%	----



Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 945751) - continued											
VA23B0938-001	Anonymous	Manganese	7439-96-5	E440	1.0	mg/kg	463	452	2.51%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.52	1.06	36.1%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	41.0	41.0	0.126%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	766	763	0.372%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	1810	1980	8.90%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.44	0.30	0.14	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.16	0.13	0.02	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	764	863	12.1%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	103	95.9	7.22%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	3500	2800	700	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.095	0.094	0.001	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	1180	1230	4.11%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	1.18	0.944	22.0%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	71.8	73.1	1.78%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	67.9	63.9	6.15%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	5.0	6.4	1.3	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 954399)											
VA23B0944-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	0.068 %	700	20	Diff <2x LOR	----
Sub-Matrix: Water							Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 947918)											
VA23B1132-017	Anonymous	pH	----	E108	0.10	pH units	8.28	8.29	0.121%	4%	----
Physical Tests (QC Lot: 956744)											
KS2301724-003	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	185	184	1.06%	20%	----
Anions and Nutrients (QC Lot: 947683)											
VA23B1186-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.280	0.282	0.713%	20%	----
Anions and Nutrients (QC Lot: 947684)											
VA23B0904-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0053	0.0053	0.00005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 947694)											
KS2301630-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0058	0.0059	0.00007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 947921)											



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 947921) - continued											
VA23B1132-015	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	1.21	1.22	0.300%	20%	----
Anions and Nutrients (QC Lot: 947922)											
VA23B1132-015	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0077	0.0076	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 947928)											
VA23B0949-001	Outfall Comp E104954	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0100	mg/L	0.282	0.276	1.93%	20%	----
Anions and Nutrients (QC Lot: 950044)											
VA23B0892-012	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.895	0.800	11.2%	20%	----
Anions and Nutrients (QC Lot: 950200)											
FJ2301122-001	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.551	0.523	5.24%	20%	----
Anions and Nutrients (QC Lot: 951771)											
FJ2301116-003	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0142	0.0133	0.0009	Diff <2x LOR	----
Microbiological Tests (QC Lot: 944861)											
VA23B0924-001	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 944862)											
VA23B0871-001	Anonymous	Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
VA23B0998-001	Anonymous	Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	21	19	13.0%	65%	----
Total Metals (QC Lot: 944924)											
VA23B0879-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0903	0.0989	9.03%	20%	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00014	0.00015	0.000003	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.0562	0.0556	1.24%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000400	0.0000388	0.0000012	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	14.4	14.7	1.79%	20%	----
		Cesium, total	7440-46-2	E420	0.000010	mg/L	0.000013	0.000015	0.000002	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	0.00054	0.00058	0.00003	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.103	0.104	1.28%	20%	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	0.000057	0.000061	0.000005	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0012	0.0012	0.00002	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	3.57	3.58	0.235%	20%	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 944924) - continued											
VA23B0879-001	Anonymous	Manganese, total	7439-96-5	E420	0.00010	mg/L	0.00254	0.00255	0.211%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000170	0.000176	0.000005	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	0.00070	0.00076	0.00006	Diff <2x LOR	----
		Phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	0.284	0.294	0.010	Diff <2x LOR	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00030	0.00038	0.00008	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	0.00102	0.00100	1.64%	20%	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	1.39	1.44	3.80%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	0.000013	0.000012	0.000001	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	0.422	0.422	0.0005	Diff <2x LOR	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.0271	0.0279	2.72%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	1.22	1.22	0.003	Diff <2x LOR	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	0.00100	0.00088	0.00012	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000052	0.000053	0.0000009	Diff <2x LOR	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00057	0.00060	0.00003	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	0.0033	0.0034	0.0002	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 948960)											
VA23B0896-002	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	0.0000077	0.0000077	0.00000003	Diff <2x LOR	----
Aggregate Organics (QC Lot: 948018)											
KS2301625-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	3.3	4.3	1.0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 948463)											
VA23B0949-001	Outfall Comp E104954	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 954441)											
SK2301937-014	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	289	290	0.339%	20%	----
Fatty Acids (QC Lot: 947005)											
WT2313206-001	Anonymous	Acetic acid	64-19-7	E676	10	mg/L	<10	<10	0	Diff <2x LOR	----
		Butyric acid	107-92-6	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Fatty Acids (QC Lot: 947005) - continued											
WT2313206-001	Anonymous	Formic acid	64-18-6	E676	30	mg/L	<30	<30	0	Diff <2x LOR	----
		Hexanoic acid	142-62-1	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isobutyric acid	79-31-2	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isovaleric acid	503-74-2	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Propanoic acid	79-09-4	E676	5.0	mg/L	<5.0	<5.0	0	Diff <2x LOR	----
		Valeric acid	109-52-4	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----

Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 945757)						
Moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 951034)						
Solids, total [TS]	----	E157	0.1	%	<0.10	----
Microbiological Tests (QCLot: 945331)						
Coliforms, thermotolerant [fecal]	----	E014.FC	2	MPN/g	<2	----
Microbiological Tests (QCLot: 945332)						
Coliforms, Escherichia coli [E. coli]	----	E014.EC	2	MPN/g	<2	----
Metals (QCLot: 945750)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 945751)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 945751) - continued						
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Leachable Anions & Nutrients (QCLot: 954399)						
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	<200	----

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 951283)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 951872)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 956744)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 947683)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 947684)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 947694)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 947921)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 947922)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 947928)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 950044)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 950200)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 951771)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Microbiological Tests (QCLot: 944861)						
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
Microbiological Tests (QCLot: 944862)						
Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	<1	----
Total Metals (QCLot: 944924)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 944924) - continued						
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 948960)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 948018)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 948463)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 954441)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Fatty Acids (QCLot: 947005)						
Acetic acid	64-19-7	E676	10	mg/L	<10	----
Butyric acid	107-92-6	E676	1	mg/L	<1.0	----
Formic acid	64-18-6	E676	30	mg/L	<30	----
Hexanoic acid	142-62-1	E676	1	mg/L	<1.0	----
Isobutyric acid	79-31-2	E676	1	mg/L	<1.0	----
Isovaleric acid	503-74-2	E676	1	mg/L	<1.0	----
Propanoic acid	79-09-4	E676	5	mg/L	<5.0	----
Valeric acid	109-52-4	E676	1	mg/L	<1.0	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 945752)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 945757)									
Moisture	----	E144	0.25	%	50 %	97.5	90.0	110	----
Physical Tests (QCLot: 951034)									
Solids, total [TS]	----	E157	0.1	%	50 %	99.3	85.0	115	----
Metals (QCLot: 945750)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	113	80.0	120	----
Metals (QCLot: 945751)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	105	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	109	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.9	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	98.6	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	96.6	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	100	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	102	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	99.8	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	100	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	97.2	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	108	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	118	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	105	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	92.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 945751) - continued									
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	98.5	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	102	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	104	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	103	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	106	80.0	120	----
Leachable Anions & Nutrients (QCLot: 954399)									
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	1000 mg/kg	103	80.0	120	----
Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 947918)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 951283)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	98.2	85.0	115	----
Physical Tests (QCLot: 951872)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	89.8	85.0	115	----
Physical Tests (QCLot: 956744)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	107	85.0	115	----
Anions and Nutrients (QCLot: 947683)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 947684)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.5	90.0	110	----
Anions and Nutrients (QCLot: 947694)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	103	80.0	120	----
Anions and Nutrients (QCLot: 947921)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 947922)									



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 947922) - continued									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	97.2	90.0	110	----
Anions and Nutrients (QCLot: 947928)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	100	80.0	120	----
Anions and Nutrients (QCLot: 950044)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	111	75.0	125	----
Anions and Nutrients (QCLot: 950200)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 951771)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.03 mg/L	99.3	80.0	120	----
Total Metals (QCLot: 944924)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	104	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.9	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	103	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	98.2	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	102	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	98.9	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	99.9	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.7	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	105	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	100	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.8	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	102	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	106	80.0	120	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit					
Total Metals (QCLot: 944924) - continued									
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	95.0	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	102	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	102	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	95.3	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	97.3	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	94.6	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	106	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	99.4	80.0	120	----
Total Metals (QCLot: 948960)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	93.0	80.0	120	----
Aggregate Organics (QCLot: 948018)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	97.9	85.0	115	----
Aggregate Organics (QCLot: 948463)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	95.4	85.0	115	----
Aggregate Organics (QCLot: 954441)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	103	85.0	115	----
Fatty Acids (QCLot: 947005)									
Acetic acid	64-19-7	E676	10	mg/L	40 mg/L	104	70.0	130	----
Butyric acid	107-92-6	E676	1	mg/L	40 mg/L	97.2	70.0	130	----
Formic acid	64-18-6	E676	30	mg/L	160 mg/L	126	70.0	130	----
Hexanoic acid	142-62-1	E676	1	mg/L	40 mg/L	101	70.0	130	----
Isobutyric acid	79-31-2	E676	1	mg/L	40 mg/L	94.6	70.0	130	----
Isovaleric acid	503-74-2	E676	1	mg/L	40 mg/L	98.0	70.0	130	----
Propanoic acid	79-09-4	E676	5	mg/L	40 mg/L	88.1	70.0	130	----
Valeric acid	109-52-4	E676	1	mg/L	40 mg/L	110	70.0	130	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 947683)										
VA23B1186-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.54 mg/L	2.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 947684)										
VA23B0819-002	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.505 mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 947694)										
KS2301630-002	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0371 mg/L	0.03 mg/L	124	70.0	130	----
Anions and Nutrients (QCLot: 947921)										
VA23B1132-016	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.52 mg/L	2.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 947922)										
VA23B1132-016	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.480 mg/L	0.5 mg/L	96.0	75.0	125	----
Anions and Nutrients (QCLot: 947928)										
VA23B0949-007	Trip Blank	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0309 mg/L	0.03 mg/L	103	70.0	130	----
Anions and Nutrients (QCLot: 950044)										
VA23B0892-013	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.77 mg/L	2.5 mg/L	111	70.0	130	----
Anions and Nutrients (QCLot: 950200)										
FJ2301122-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 951771)										
FJ2301116-004	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0517 mg/L	0.05 mg/L	103	70.0	130	----
Total Metals (QCLot: 944924)										
VA23B0879-002	Anonymous	Aluminum, total	7429-90-5	E420	0.196 mg/L	0.2 mg/L	97.8	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0186 mg/L	0.02 mg/L	93.3	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0195 mg/L	0.02 mg/L	97.3	70.0	130	----
		Barium, total	7440-39-3	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		Boron, total	7440-42-8	E420	0.096 mg/L	0.1 mg/L	96.5	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00409 mg/L	0.004 mg/L	102	70.0	130	----
		Calcium, total	7440-70-2	E420	3.86 mg/L	4 mg/L	96.6	70.0	130	----
		Cesium, total	7440-46-2	E420	0.00986 mg/L	0.01 mg/L	98.6	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0394 mg/L	0.04 mg/L	98.4	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 944924) - continued										
VA23B0879-002	Anonymous	Cobalt, total	7440-48-4	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		Copper, total	7440-50-8	E420	0.0200 mg/L	0.02 mg/L	99.8	70.0	130	----
		Iron, total	7439-89-6	E420	1.93 mg/L	2 mg/L	96.5	70.0	130	----
		Lead, total	7439-92-1	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0971 mg/L	0.1 mg/L	97.1	70.0	130	----
		Magnesium, total	7439-95-4	E420	0.987 mg/L	1 mg/L	98.7	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0187 mg/L	0.02 mg/L	93.3	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0419 mg/L	0.04 mg/L	105	70.0	130	----
		Phosphorus, total	7723-14-0	E420	9.53 mg/L	10 mg/L	95.3	70.0	130	----
		Potassium, total	7440-09-7	E420	4.10 mg/L	4 mg/L	103	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0396 mg/L	0.04 mg/L	98.9	70.0	130	----
		Silicon, total	7440-21-3	E420	9.91 mg/L	10 mg/L	99.1	70.0	130	----
		Silver, total	7440-22-4	E420	0.00385 mg/L	0.004 mg/L	96.3	70.0	130	----
		Sodium, total	7440-23-5	E420	1.97 mg/L	2 mg/L	98.3	70.0	130	----
		Strontium, total	7440-24-6	E420	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		Sulfur, total	7704-34-9	E420	18.3 mg/L	20 mg/L	91.5	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00392 mg/L	0.004 mg/L	98.1	70.0	130	----
		Thorium, total	7440-29-1	E420	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		Tin, total	7440-31-5	E420	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0379 mg/L	0.04 mg/L	94.8	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.0182 mg/L	0.02 mg/L	91.2	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00402 mg/L	0.004 mg/L	100	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0986 mg/L	0.1 mg/L	98.6	70.0	130	----
		Zinc, total	7440-66-6	E420	0.408 mg/L	0.4 mg/L	102	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.0377 mg/L	0.04 mg/L	94.3	70.0	130	----
Total Metals (QCLot: 948960)										
VA23B0896-003	Anonymous	Mercury, total	7439-97-6	E508	0.0000964 mg/L	0.0001 mg/L	96.4	70.0	130	----
Aggregate Organics (QCLot: 954441)										
SK2301937-015	Anonymous	Chemical oxygen demand [COD]	----	E559-L	ND mg/L	100 mg/L	ND	75.0	125	----
Fatty Acids (QCLot: 947005)										
WT2313206-001	Anonymous	Acetic acid	64-19-7	E676	44 mg/L	40 mg/L	110	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Fatty Acids (QCLot: 947005) - continued										
WT2313206-001	Anonymous	Butyric acid	107-92-6	E676	39.1 mg/L	40 mg/L	97.7	70.0	130	----
		Formic acid	64-18-6	E676	186 mg/L	160 mg/L	116	70.0	130	----
		Hexanoic acid	142-62-1	E676	38.5 mg/L	40 mg/L	96.2	70.0	130	----
		Isobutyric acid	79-31-2	E676	37.8 mg/L	40 mg/L	94.6	70.0	130	----
		Isovaleric acid	503-74-2	E676	38.6 mg/L	40 mg/L	96.4	70.0	130	----
		Propanoic acid	79-09-4	E676	35.2 mg/L	40 mg/L	88.0	70.0	130	----
		Valeric acid	109-52-4	E676	39.6 mg/L	40 mg/L	99.1	70.0	130	----



Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method			Low	High	
Metals (QCLot: 945750)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	113	70.0	130	----
Metals (QCLot: 945751)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	119	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	94.3	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	110	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	101	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	106	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	119	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	99.6	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	110	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	115	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	105	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	106	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	106	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	103	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	103	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	115	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	110	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	107	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	113	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	115	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	105	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	104	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	102	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	104	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	118	70.0	130	----



Sub-Matrix:					Reference Material (RM) Report			
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)	
							Low	High
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method				Qualifier
Metals (QCLot: 945751) - continued								
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	110	70.0	130
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	110	70.0	130
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	104	70.0	130
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	103	70.0	130
Leachable Anions & Nutrients (QCLot: 954399)								
	RM	Kjeldahl nitrogen, total [TKN]	----	E319	1040 mg/kg	99.1	80.0	120



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	Outfall Comp	Raw Influent Comp	----	----	----
Client sampling date / time						12-Jun-2023 08:00	12-Jun-2023 07:40	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B3336-001	VA23B3336-002	Result	Result	-----	-----
Physical Tests										
Microplastic particles	n/a	MicroPlasticS RN/1A	-	-	See attached	See attached	----	----	----	----
Pharmaceuticals & Personal Care Products										
Acetaminophen	103-90-2	E741A/WT	0.020	µg/L	0.020	178 ^{DLHC}	----	----	----	----
Caffeine	58-08-2	E729A/WT	0.0050	µg/L	0.218	164 ^{DLHC}	----	----	----	----
Albuterol	18559-94-9	E741A/WT	0.0010	µg/L	0.0132	0.0126	----	----	----	----
Amitriptyline	549-18-8	E741A/WT	0.0050	µg/L	0.104 ^{DLHC}	0.201 ^{DLHC}	----	----	----	----
Amlodipine	88150-42-9	E741A/WT	0.0050	µg/L	0.0402	0.160 ^{DLHC}	----	----	----	----
Amphetamine	300-62-9	E741A/WT	0.010	µg/L	<0.010	0.362 ^{DLHC}	----	----	----	----
Ampicillin	69-53-4	E741A/WT	0.020	µg/L	<0.040	<0.040	----	----	----	----
Atenolol	29122-68-7	E741A/WT	0.0050	µg/L	0.335 ^{DLHC}	0.767 ^{DLHC}	----	----	----	----
Atorvastatin	134523-00-5	E741A/WT	0.0050	µg/L	0.221 ^{DLHC}	0.322 ^{DLHC}	----	----	----	----
Bezafibrate	41859-67-0	E741A/WT	0.010	µg/L	<0.010	<0.010	----	----	----	----
Carbamazepine	298-46-4	E741A/WT	0.0020	µg/L	0.538 ^{DLHC}	0.232 ^{DLHC}	----	----	----	----
Cimetidine	51481-61-9	E741A/WT	0.0050	µg/L	0.101 ^{DLHC}	0.385 ^{DLHC}	----	----	----	----
Clotrimazole	23593-75-1	E741A/WT	0.050	µg/L	<0.050	<0.500 ^{DLM}	----	----	----	----
Codeine	76-57-3	E741A/WT	0.010	µg/L	0.774 ^{DLHC}	2.76 ^{DLHC}	----	----	----	----
Cotinine	486-56-6	E741A/WT	0.0050	µg/L	0.0793 ^{DLM}	4.34 ^{DLHC}	----	----	----	----
Cyclophosphamide	50-18-0	E741A/WT	0.0050	µg/L	<0.0050	<0.0050	----	----	----	----
Dehydronifedipine	67035-22-7	E741A/WT	0.0020	µg/L	0.0178	0.0027	----	----	----	----
Diazepam	439-14-5	E741A/WT	0.0050	µg/L	<0.0050	<0.0050	----	----	----	----
Diltiazem	42399-41-7	E741A/WT	0.0020	µg/L	0.170 ^{DLHC}	0.320 ^{DLHC}	----	----	----	----
Diphenhydramine	58-73-1	E741A/WT	0.0010	µg/L	0.381 ^{DLHC}	2.20 ^{DLHC}	----	----	----	----
Flumequine	42835-25-6	E741A/WT	0.050	µg/L	<0.050	<0.050	----	----	----	----
Fluoxetine	54910-89-3	E741A/WT	0.0020	µg/L	0.0726 ^{DLHC}	0.125 ^{DLHC}	----	----	----	----
Glipizide	29094-61-9	E741A/WT	0.010	µg/L	<0.010	<0.010	----	----	----	----
Glyburide	10238-21-8	E741A/WT	0.0050	µg/L	<0.0050	<0.0050	----	----	----	----
Hydroxy amitriptyline, 10-	246833-15-7	E741A/WT	0.0010	µg/L	0.0032	0.0855 ^{DLHC}	----	----	----	----
Indomethacin	53-86-1	E741A/WT	0.010	µg/L	0.045	0.061	----	----	----	----

Sub-Matrix: Water (Matrix: Water)					Client sample ID	Outfall Comp	Raw Influent Comp	----	----	----
					Client sampling date / time	12-Jun-2023 08:00	12-Jun-2023 07:40	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B3336-001	VA23B3336-002	-----	-----	-----	
					Result	Result	----	----	----	
Pharmaceuticals & Personal Care Products										
Ketoprofen	22071-15-4	E741A/WT	0.020	µg/L	<0.020	0.025	----	----	----	
Lidocaine	137-58-6	E741A/WT	0.00050	µg/L	0.650 ^{DLHC}	0.518 ^{DLHC}	----	----	----	
Lincomycin	154-21-2	E741A/WT	0.010	µg/L	<0.100 ^{DLM}	<0.100 ^{DLM}	----	----	----	
Metoprolol	37350-58-6	E741A/WT	0.010	µg/L	0.323 ^{DLHC}	0.386 ^{DLHC}	----	----	----	
Norgestimate	35189-28-7	E741A/WT	0.050	µg/L	<0.050	<0.050	----	----	----	
Novobiocin	303-81-1	E741A/WT	0.0050	µg/L	<0.0050	<0.0050	----	----	----	
Roxithromycin	80214-83-1	E741A/WT	0.0050	µg/L	<0.0050	<0.0050	----	----	----	
Thiabendazole	148-79-8	E741A/WT	0.0050	µg/L	0.0269	0.0264	----	----	----	
Trimethoprim	738-70-5	E741A/WT	0.0020	µg/L	0.267 ^{DLHC}	0.197 ^{DLHC}	----	----	----	
Tylosin	1401-69-0	E741A/WT	0.050	µg/L	<0.050	<0.050	----	----	----	

Please refer to the Accreditation section for an explanation of analyte accreditations.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Pharmaceuticals & Personal Care Products	QC-995909-002	----	Ampicillin	69-53-4	E741A	194 % ^{LCS-H}	50.0-150%	Recovery greater than upper control limit

Result Qualifiers

Qualifier *Description*

LCS-H *Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.*

Matrix Spike (MS) Recoveries

Pharmaceuticals & Personal Care Products	VA23B3336-001	Outfall Comp	Ampicillin	69-53-4	E741A	151 % ^K	60.0-140%	Recovery greater than upper data quality objective
Pharmaceuticals & Personal Care Products	VA23B3336-001	Outfall Comp	Lincomycin	154-21-2	E741A	144 % ^K	60.0-140%	Recovery greater than upper data quality objective

Result Qualifiers

Qualifier *Description*

K *Matrix Spike recovery outside ALS DQO due to sample matrix effects.*



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Pharmaceuticals & Personal Care Products : Caffeine in Water by LC/MS-MS										
Amber glass/Teflon lined cap Outfall Comp	E729A	12-Jun-2023	19-Jun-2023	7 days	7 days	✓	19-Jun-2023	14 days	0 days	✓
Pharmaceuticals & Personal Care Products : Caffeine in Water by LC/MS-MS										
Amber glass/Teflon lined cap Raw Influent Comp	E729A	12-Jun-2023	19-Jun-2023	7 days	7 days	✓	19-Jun-2023	14 days	0 days	✓
Pharmaceuticals & Personal Care Products : PPCP in Water by LC-MS-MS Positive Mode (Scan 1)										
Amber glass/Teflon lined cap Outfall Comp	E741A	12-Jun-2023	19-Jun-2023	7 days	7 days	✓	19-Jun-2023	7 days	0 days	✓
Pharmaceuticals & Personal Care Products : PPCP in Water by LC-MS-MS Positive Mode (Scan 1)										
Amber glass/Teflon lined cap Raw Influent Comp	E741A	12-Jun-2023	19-Jun-2023	7 days	7 days	✓	19-Jun-2023	7 days	0 days	✓
Physical Tests : Microplastic Particles Screening in pure water by SEM										
Amber glass/Teflon lined cap Outfall Comp	MicroPlasticSRN	12-Jun-2023	----	----	----		27-Jun-2023	----	----	
Physical Tests : Microplastic Particles Screening in pure water by SEM										
Amber glass/Teflon lined cap Raw Influent Comp	MicroPlasticSRN	12-Jun-2023	----	----	----		27-Jun-2023	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Caffeine in Water by LC/MS-MS	E729A	995902	1	2	50.0	5.0	✔
PPCP in Water by LC-MS-MS Positive Mode (Scan 1)	E741A	995909	1	2	50.0	5.0	✔
Laboratory Control Samples (LCS)							
Caffeine in Water by LC/MS-MS	E729A	995902	1	2	50.0	5.0	✔
PPCP in Water by LC-MS-MS Positive Mode (Scan 1)	E741A	995909	1	2	50.0	5.0	✔
Method Blanks (MB)							
Caffeine in Water by LC/MS-MS	E729A	995902	1	2	50.0	5.0	✔
PPCP in Water by LC-MS-MS Positive Mode (Scan 1)	E741A	995909	1	2	50.0	5.0	✔
Matrix Spikes (MS)							
Caffeine in Water by LC/MS-MS	E729A	995902	1	2	50.0	5.0	✔
PPCP in Water by LC-MS-MS Positive Mode (Scan 1)	E741A	995909	1	2	50.0	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Caffeine in Water by LC/MS-MS	E729A Waterloo - Environmental	Water	EPA 1694	An aliquot of filtered sample containing 5% organic is injected directly. Each compound is separated by reversed phase HPLC. Analyzed by Electro Spray Ionization MS/MS detection using Triple Quadrupole MS/MS detector. Quantitation with internal or external standard.
PPCP in Water by LC-MS-MS Positive Mode (Scan 1)	E741A Waterloo - Environmental	Water	EPA 1694	An aliquot of the water sample is filtered and internal standards are added. The water sample is analyzed by LC-MS/MS using electron ionization source with direct injection without sample cleanup.
Microplastic Particles Screening in pure water by SEM	MicroPlasticSRN Cincinnati - Environmental - 4388 Glendale-Milford Road Cincinnati Ohio United States 45242	Water	See attached.	Samples were prepared and analyzed according to ALS SOP Micro-Fluor-001 for the detection of microplastic particles in drinking water using Nile Red dye for fluorescent tagging. See attached report for details.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation of Caffeine in Water by LC-MS/MS	EP729 Waterloo - Environmental	Water	EPA 1694	An aliquot of filtered sample containing 5% organic is injected directly. Each compound is separated by reversed phase HPLC. Analyzed by Electro Spray Ionization MS/MS detection using Triple Quadrupole MS/MS detector. Quantitation with internal or external standard.
Preparation of PPCPs in Water by LC-MS-MS Positive Mode 1	EP741 Waterloo - Environmental	Water	EPA 1694	An aliquot of the water sample is filtered and internal standards are added.

QUALITY CONTROL REPORT

Work Order	: VA23B3336	Page	: 1 of 10
Client	: Regional District of Central Okanagan	Laboratory	: Vancouver - Environmental
Contact	: Angela Lambrecht	Account Manager	: Emmanuel Mariano
Address	: 1450 KLO Road Kelowna BC Canada V1W 3Z4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: RDCO WWTP PFAS	Date Samples Received	: 13-Jun-2023 11:00
PO	: 60247	Date Analysis Commenced	: 19-Jun-2023
C-O-C number	: ----	Issue Date	: 30-Jun-2023 09:29
Sampler	: AL		
Site	: ----		
Quote number	: VA21-RDCO100-002		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Katrina Zwambag	Supervisor - HPLC	Waterloo LCMS, Waterloo, Ontario
Sanja Risticvic	Department Manager - LCMS	Waterloo LCMS, Waterloo, Ontario
Virginia Smith	Account Manager Assistant	USA - Cincinnati Internal Subcontracting, Cincinnati, Ohio



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Pharmaceuticals & Personal Care Products (QC Lot: 995902)											
VA23B3336-002	Raw Influent Comp	Caffeine	58-08-2	E729A	0.500	µg/L	164	155	5.95%	30%	----
Pharmaceuticals & Personal Care Products (QC Lot: 995909)											
VA23B3336-001	Outfall Comp	Acetaminophen	103-90-2	E741A	0.020	µg/L	0.020	0.021	0.0010	Diff <2x LOR	----
		Albuterol	18559-94-9	E741A	0.0010	µg/L	0.0132	0.0128	3.14%	40%	----
		Amitriptyline	549-18-8	E741A	0.0500	µg/L	0.104	0.108	0.0041	Diff <2x LOR	----
		Amlodipine	88150-42-9	E741A	0.0050	µg/L	0.0402	0.0371	8.05%	40%	----
		Amphetamine	300-62-9	E741A	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Ampicillin	69-53-4	E741A	0.040	µg/L	<0.040	<0.040	0	Diff <2x LOR	----
		Atenolol	29122-68-7	E741A	0.0500	µg/L	0.335	0.337	0.417%	40%	----
		Atorvastatin	134523-00-5	E741A	0.0500	µg/L	0.221	0.207	0.0142	Diff <2x LOR	----
		Bezafibrate	41859-67-0	E741A	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Carbamazepine	298-46-4	E741A	0.200	µg/L	0.538	0.473	0.0650	Diff <2x LOR	----
		Cimetidine	51481-61-9	E741A	0.0500	µg/L	0.101	0.102	0.0010	Diff <2x LOR	----
		Clotrimazole	23593-75-1	E741A	0.050	µg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Codeine	76-57-3	E741A	0.100	µg/L	0.774	0.732	5.48%	40%	----
		Cotinine	486-56-6	E741A	0.0500	µg/L	0.0793	0.0659	0.0134	Diff <2x LOR	----
		Cyclophosphamide	50-18-0	E741A	0.0050	µg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		Dehydronifedipine	67035-22-7	E741A	0.0020	µg/L	0.0178	0.0192	7.29%	40%	----
		Diazepam	439-14-5	E741A	0.0050	µg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		Diltiazem	42399-41-7	E741A	0.0200	µg/L	0.170	0.194	12.6%	40%	----
		Diphenhydramine	58-73-1	E741A	0.100	µg/L	0.381	0.318	0.0630	Diff <2x LOR	----
		Flumequine	42835-25-6	E741A	0.050	µg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Fluoxetine	54910-89-3	E741A	0.0200	µg/L	0.0726	0.0677	0.0049	Diff <2x LOR	----
		Glipizide	29094-61-9	E741A	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Glyburide	10238-21-8	E741A	0.0050	µg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		Hydroxy amitriptyline, 10-	1246833-15-7	E741A	0.0010	µg/L	0.0032	0.0036	0.0004	Diff <2x LOR	----
		Indomethacin	53-86-1	E741A	0.010	µg/L	0.045	0.050	0.005	Diff <2x LOR	----
		Ketoprofen	22071-15-4	E741A	0.020	µg/L	<0.020	<0.020	0	Diff <2x LOR	----
		Lidocaine	137-58-6	E741A	0.0500	µg/L	0.650	0.689	5.82%	40%	----
		Lincomycin	154-21-2	E741A	0.100	µg/L	<0.100	<0.100	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Pharmaceuticals & Personal Care Products (QC Lot: 995909) - continued											
VA23B3336-001	Outfall Comp	Metoprolol	37350-58-6	E741A	0.100	µg/L	0.323	0.310	0.013	Diff <2x LOR	----
		Norgestimate	35189-28-7	E741A	0.050	µg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Novobiocin	303-81-1	E741A	0.0050	µg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		Roxithromycin	80214-83-1	E741A	0.0050	µg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		Thiabendazole	148-79-8	E741A	0.0050	µg/L	0.0269	0.0278	3.11%	40%	----
		Trimethoprim	738-70-5	E741A	0.0200	µg/L	0.267	0.262	2.12%	40%	----
		Tylosin	1401-69-0	E741A	0.050	µg/L	<0.050	<0.050	0	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Pharmaceuticals & Personal Care Products (QCLot: 995902)						
Caffeine	58-08-2	E729A	0.005	µg/L	<0.0050	----
Pharmaceuticals & Personal Care Products (QCLot: 995909)						
Acetaminophen	103-90-2	E741A	0.02	µg/L	<0.020	----
Albuterol	18559-94-9	E741A	0.001	µg/L	<0.0010	----
Amitriptyline	549-18-8	E741A	0.005	µg/L	<0.0050	----
Amlodipine	88150-42-9	E741A	0.005	µg/L	<0.0050	----
Amphetamine	300-62-9	E741A	0.01	µg/L	<0.010	----
Ampicillin	69-53-4	E741A	0.02	µg/L	<0.020	----
Atenolol	29122-68-7	E741A	0.005	µg/L	<0.0050	----
Atorvastatin	134523-00-5	E741A	0.005	µg/L	<0.0050	----
Bezafibrate	41859-67-0	E741A	0.01	µg/L	<0.010	----
Carbamazepine	298-46-4	E741A	0.002	µg/L	<0.0020	----
Cimetidine	51481-61-9	E741A	0.005	µg/L	<0.0050	----
Clotrimazole	23593-75-1	E741A	0.05	µg/L	<0.050	----
Codeine	76-57-3	E741A	0.01	µg/L	<0.010	----
Cotinine	486-56-6	E741A	0.005	µg/L	<0.0050	----
Cyclophosphamide	50-18-0	E741A	0.005	µg/L	<0.0050	----
Dehydronifedipine	67035-22-7	E741A	0.002	µg/L	<0.0020	----
Diazepam	439-14-5	E741A	0.005	µg/L	<0.0050	----
Diltiazem	42399-41-7	E741A	0.002	µg/L	<0.0020	----
Diphenhydramine	58-73-1	E741A	0.001	µg/L	<0.0010	----
Flumequine	42835-25-6	E741A	0.05	µg/L	<0.050	----
Fluoxetine	54910-89-3	E741A	0.002	µg/L	<0.0020	----
Glipizide	29094-61-9	E741A	0.01	µg/L	<0.010	----
Glyburide	10238-21-8	E741A	0.005	µg/L	<0.0050	----
Hydroxy amitriptyline, 10-	1246833-15-7	E741A	0.001	µg/L	<0.0010	----
Indomethacin	53-86-1	E741A	0.01	µg/L	<0.010	----
Ketoprofen	22071-15-4	E741A	0.02	µg/L	<0.020	----
Lidocaine	137-58-6	E741A	0.0005	µg/L	<0.00050	----
Lincomycin	154-21-2	E741A	0.01	µg/L	<0.010	----
Metoprolol	37350-58-6	E741A	0.01	µg/L	<0.010	----
Norgestimate	35189-28-7	E741A	0.05	µg/L	<0.050	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Pharmaceuticals & Personal Care Products (QCLot: 995909) - continued						
Novobiocin	303-81-1	E741A	0.005	µg/L	<0.0050	----
Roxithromycin	80214-83-1	E741A	0.005	µg/L	<0.0050	----
Thiabendazole	148-79-8	E741A	0.005	µg/L	<0.0050	----
Trimethoprim	738-70-5	E741A	0.002	µg/L	<0.0020	----
Tylosin	1401-69-0	E741A	0.05	µg/L	<0.050	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Pharmaceuticals & Personal Care Products (QCLot: 995902)									
Caffeine	58-08-2	E729A	0.005	µg/L	0.1 µg/L	92.4	70.0	130	----
Pharmaceuticals & Personal Care Products (QCLot: 995909)									
Acetaminophen	103-90-2	E741A	0.02	µg/L	0.16 µg/L	94.7	50.0	150	----
Albuterol	18559-94-9	E741A	0.001	µg/L	0.008 µg/L	93.8	50.0	150	----
Amitriptyline	549-18-8	E741A	0.005	µg/L	0.04 µg/L	75.1	50.0	150	----
Amlodipine	88150-42-9	E741A	0.005	µg/L	0.04 µg/L	105	50.0	150	----
Amphetamine	300-62-9	E741A	0.01	µg/L	0.08 µg/L	95.1	50.0	150	----
Ampicillin	69-53-4	E741A	0.02	µg/L	0.16 µg/L	# 194	50.0	150	LCS-H
Atenolol	29122-68-7	E741A	0.005	µg/L	0.04 µg/L	90.3	50.0	150	----
Atorvastatin	134523-00-5	E741A	0.005	µg/L	0.04 µg/L	120	50.0	150	----
Bezafibrate	41859-67-0	E741A	0.01	µg/L	0.08 µg/L	114	50.0	150	----
Carbamazepine	298-46-4	E741A	0.002	µg/L	0.016 µg/L	116	50.0	150	----
Cimetidine	51481-61-9	E741A	0.005	µg/L	0.04 µg/L	112	50.0	150	----
Clotrimazole	23593-75-1	E741A	0.05	µg/L	0.4 µg/L	102	50.0	150	----
Codeine	76-57-3	E741A	0.01	µg/L	0.08 µg/L	82.8	50.0	150	----
Cotinine	486-56-6	E741A	0.005	µg/L	0.04 µg/L	99.2	50.0	150	----
Cyclophosphamide	50-18-0	E741A	0.005	µg/L	0.04 µg/L	112	50.0	150	----
Dehydronifedipine	67035-22-7	E741A	0.002	µg/L	0.016 µg/L	112	50.0	150	----
Diazepam	439-14-5	E741A	0.005	µg/L	0.04 µg/L	117	50.0	150	----
Diltiazem	42399-41-7	E741A	0.002	µg/L	0.016 µg/L	101	50.0	150	----
Diphenhydramine	58-73-1	E741A	0.001	µg/L	0.008 µg/L	83.9	50.0	150	----
Flumequine	42835-25-6	E741A	0.05	µg/L	0.4 µg/L	110	50.0	150	----
Fluoxetine	54910-89-3	E741A	0.002	µg/L	0.016 µg/L	130	50.0	150	----
Glipizide	29094-61-9	E741A	0.01	µg/L	0.08 µg/L	109	50.0	150	----
Glyburide	10238-21-8	E741A	0.005	µg/L	0.04 µg/L	91.0	50.0	150	----
Hydroxy amitriptyline, 10-	1246833-15-7	E741A	0.001	µg/L	0.008 µg/L	120	50.0	150	----
Indomethacin	53-86-1	E741A	0.01	µg/L	0.08 µg/L	103	50.0	150	----
Ketoprofen	22071-15-4	E741A	0.02	µg/L	0.16 µg/L	108	50.0	150	----
Lidocaine	137-58-6	E741A	0.0005	µg/L	0.004 µg/L	97.0	50.0	150	----
Lincomycin	154-21-2	E741A	0.01	µg/L	0.08 µg/L	110	50.0	150	----
Metoprolol	37350-58-6	E741A	0.01	µg/L	0.08 µg/L	85.8	50.0	150	----
Norgestimate	35189-28-7	E741A	0.05	µg/L	0.4 µg/L	102	50.0	150	----
Novobiocin	303-81-1	E741A	0.005	µg/L	0.04 µg/L	104	50.0	150	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Pharmaceuticals & Personal Care Products (QCLot: 995909) - continued									
Roxithromycin	80214-83-1	E741A	0.005	µg/L	0.04 µg/L	108	50.0	150	----
Thiabendazole	148-79-8	E741A	0.005	µg/L	0.04 µg/L	104	50.0	150	----
Trimethoprim	738-70-5	E741A	0.002	µg/L	0.016 µg/L	89.9	50.0	150	----
Tylosin	1401-69-0	E741A	0.05	µg/L	0.4 µg/L	107	50.0	150	----

Qualifiers

Qualifier	Description
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Pharmaceuticals & Personal Care Products (QCLot: 995902)										
VA23B3336-002	Raw Influent Comp	Caffeine	58-08-2	E729A	ND µg/L	0.1 µg/L	ND	60.0	140	----
Pharmaceuticals & Personal Care Products (QCLot: 995909)										
VA23B3336-001	Outfall Comp	Acetaminophen	103-90-2	E741A	0.145 µg/L	0.16 µg/L	90.4	60.0	140	----
		Albuterol	18559-94-9	E741A	ND µg/L	0.008 µg/L	ND	60.0	140	----
		Amitriptyline	549-18-8	E741A	ND µg/L	0.04 µg/L	ND	60.0	140	----
		Amlodipine	88150-42-9	E741A	ND µg/L	0.04 µg/L	ND	60.0	140	----
		Amphetamine	300-62-9	E741A	0.079 µg/L	0.08 µg/L	99.1	60.0	140	----
		Ampicillin	69-53-4	E741A	0.242 µg/L	0.16 µg/L	151	60.0	140	K
		Atenolol	29122-68-7	E741A	ND µg/L	0.04 µg/L	ND	60.0	140	----
		Atorvastatin	134523-00-5	E741A	ND µg/L	0.04 µg/L	ND	60.0	140	----
		Bezafibrate	41859-67-0	E741A	0.083 µg/L	0.08 µg/L	104	60.0	140	----
		Carbamazepine	298-46-4	E741A	ND µg/L	0.016 µg/L	ND	60.0	140	----
		Cimetidine	51481-61-9	E741A	ND µg/L	0.04 µg/L	ND	60.0	140	----
		Clotrimazole	23593-75-1	E741A	0.407 µg/L	0.4 µg/L	102	60.0	140	----
		Codeine	76-57-3	E741A	ND µg/L	0.08 µg/L	ND	60.0	140	----
		Cotinine	486-56-6	E741A	ND µg/L	0.04 µg/L	ND	60.0	140	----
		Cyclophosphamide	50-18-0	E741A	0.0445 µg/L	0.04 µg/L	111	60.0	140	----
		Dehydronifedipine	67035-22-7	E741A	ND µg/L	0.016 µg/L	ND	60.0	140	----
		Diazepam	439-14-5	E741A	0.0455 µg/L	0.04 µg/L	114	60.0	140	----
		Diltiazem	42399-41-7	E741A	ND µg/L	0.016 µg/L	ND	60.0	140	----
		Diphenhydramine	58-73-1	E741A	ND µg/L	0.008 µg/L	ND	60.0	140	----
		Flumequine	42835-25-6	E741A	0.351 µg/L	0.4 µg/L	87.8	60.0	140	----
		Fluoxetine	54910-89-3	E741A	ND µg/L	0.016 µg/L	ND	60.0	140	----
		Glipizide	29094-61-9	E741A	0.080 µg/L	0.08 µg/L	99.9	60.0	140	----
		Glyburide	10238-21-8	E741A	0.0379 µg/L	0.04 µg/L	94.8	60.0	140	----
		Hydroxy amitriptyline, 10-	1246833-15-7	E741A	0.0095 µg/L	0.008 µg/L	119	60.0	140	----
		Indomethacin	53-86-1	E741A	0.080 µg/L	0.08 µg/L	101	60.0	140	----
		Ketoprofen	22071-15-4	E741A	0.196 µg/L	0.16 µg/L	122	60.0	140	----
		Lidocaine	137-58-6	E741A	ND µg/L	0.004 µg/L	ND	60.0	140	----
		Lincomycin	154-21-2	E741A	0.115 µg/L	0.08 µg/L	144	60.0	140	K
			Metoprolol	37350-58-6	E741A	ND µg/L	0.08 µg/L	ND	60.0	140



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Pharmaceuticals & Personal Care Products (QCLot: 995909) - continued										
VA23B3336-001	Outfall Comp	Norgestimate	35189-28-7	E741A	0.417 µg/L	0.4 µg/L	104	60.0	140	----
		Novobiocin	303-81-1	E741A	0.0358 µg/L	0.04 µg/L	89.5	60.0	140	----
		Roxithromycin	80214-83-1	E741A	0.0446 µg/L	0.04 µg/L	111	60.0	140	----
		Thiabendazole	148-79-8	E741A	0.0395 µg/L	0.04 µg/L	98.7	60.0	140	----
		Trimethoprim	738-70-5	E741A	ND µg/L	0.016 µg/L	ND	60.0	140	----
		Tylosin	1401-69-0	E741A	0.308 µg/L	0.4 µg/L	76.9	60.0	140	----

Qualifiers

Qualifier	Description
K	Matrix Spike recovery outside ALS DQO due to sample matrix effects.



Contact: Emmanuel Mariano
Company: ALS Environmental
Address: 8081 Loughheed HWY, Suite 100
Burnaby, BC V5A 1W9

Project / Location: VA23B3336

PO Number: VA23B3336

ALS Work Order: 23060782

NARRATIVE: Samples herein analyzed according to ALS SOP Micro-Fluor-001 for the detection of micro plastic particles (MPP) using fluorescent tagging with Nile Red (NR) stain. MPP are defined as polymeric <5mm. This method based on the study, "Synthetic Polymer Contamination in Bottled Water" conducted at the State University of New York (SUNY) at Fredonia. NR has been shown to be sufficient for the rapid detection of polymeric including polyethylene (PE), polypropylene (PP), polystyrene (PS) and nylon 6 (PA6) though it cannot differentiate between them.

This method was developed to detect MPP in drinking waters. The efficacy for use in detecting MPP in non-potable waters including waste, effluent, influent, ground, surface, or marine waters has not yet been conclusively determined.

Particle sizing and counting is performed using static image analysis of a series of representative two dimensional photomicrographs. Minimum caliper is the shortest distance between any 2 points along a single particle boundary and represents the approximate diameter. Maximum caliper is the longest distance between any 2 points along a single particle boundary and represents the approximate length. The smallest single particle dimension confidently resolved by this method at the magnification used has been determined to be approximately 6.5µm and particles whose largest single dimension is greater than 5mm fall outside the generally accepted definition of MPP. Therefore, the total MPP concentration reported includes only fluorescing particles >6.5µm≤5mm in the dimension of interest (DOI).

DOI is selected by the analyst based on observation of dominant particle morphology. Samples containing primarily fibrous MPP exhibiting a length to width aspect ratio of 3:1 or greater are categorized according to maximum caliper (length). Those containing primarily non-fibrous MPP are categorized according to minimum caliper (diameter). Samples containing an approximately equal mixture of fibrous and non-fibrous MPP are categorized according to total area in units squared.

The analytical sensitivity (AS) for this method is based on the detection of one particle in the total area analyzed. When possible, sufficient volume is analyzed to yield an AS<10 MPP/L. However, the volume of sample that can be analyzed is dependent upon water clarity. Therefore, samples with significant concentrations of interferences may not attain the desired AS. Interferences such as opaque suspended solids may result in a negative bias while lipid-rich interferences such as fats, waxes, and oils may result in a positive bias. For this reason, the filtered aliquot selected for analysis is one that exhibits the greatest number of adequately dispersed fluorescing MPP affected by the least amount of interference possible.

All sample collection is performed outside ALS and is the sole responsibility of the client. Samples archived for 60 days prior to disposal. Results apply only to portions analyzed. Microscopy is not suitable for the analysis of all types of materials. Therefore, additional testing may be required. Representative images available upon request for additional fee.

Pamela M. Hizar

Pamela M. Hizar

ALS Asbestos Technical Lead & Microscopy Department Manager

IDENTIFICATION

	VA23B3336-001	VA23B3336-002
Client Sample ID:	/ Outfall Comp	/ Raw Influent Comp
ALS Sample ID:	23060782-01A	23060782-02A
Collection Date:	6/12/2023	6/12/2023

ANALYSIS

Analyst:	Pamela Hizar	Pamela Hizar
Date:	6/16/2023	6/16/2023
Filtered Volume (mL):	25	5
AS (MPP/L):	54	268
DOI:	DIAMETER	DIAMETER

CONCENTRATION (MPP/L)

>6.5≤10μm:	11,665	23,276
>10≤100μm:	260,688	327,732
>100≤500μm:	1,712	5,618
>500μm≤1mm:	0	0
>1≤5mm:	0	0
TOTAL:	274,065	356,626

NOTES

This method was developed for the detection of micro plastic particles in drinking waters which are relatively free of interfering solids. The samples submitted however, were an outfall water and an effluent water. An outfall water sample is typically stormwater collected from a site's discharge point. An effluent water sample is typically a wastewater or other liquid, partially or completely treated, flowing from a reservoir, basin, treatment process, or treatment plant. Both of these types of samples are often heavily laden with organic and inorganic materials which may interfere with the detection of micro plastic particles via this method. For this reason, the volume of sample that could be analyzed was severely limited thereby greatly increasing the AS that could be achieved.



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

Outfall Comp
E104954

(Matrix: Water)

Client sampling date / time

04-Oct-2023
08:10

Analyte	CAS Number	Method/Lab	LOR	Unit
Result				

VA23C3720-001

Result

Physical Tests

pH	----	E108/VA	0.10	pH units	7.76	----	----	----	----
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	3.5	----	----	----	----

Anions and Nutrients

Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	0.441	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/V A	0.0050	mg/L	4.99	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	0.156	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	0.121	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	0.317	----	----	----	----

Aggregate Organics

Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L	3.3	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L/VA	10	mg/L	58	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Composite Influent

Client sample ID

(Matrix: Water)

					Raw Influent Comp E222796	----	----	----	----
Client sampling date / time					04-Oct-2023 07:55	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3720-002	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	235	----	----	----	----
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	E298/VA	0.0050	mg/L	36.5	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318/VA	0.050	mg/L	51.9	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NQ3-L/V A	0.0050	mg/L	<0.0250 ^{DLDS}	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/V A	0.0010	mg/L	<0.0050 ^{DLDS}	----	----	----	----
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U/VA	0.0010	mg/L	4.16	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/VA	0.0020	mg/L	5.86	----	----	----	----
Aggregate Organics									
Biochemical oxygen demand [BOD]	----	E550/VA	2.0	mg/L	284	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

					Bioreactor	Fermenter Supernatant	Outfall Grab E104954	----	----
Client sampling date / time					04-Oct-2023 08:00	04-Oct-2023 08:05	04-Oct-2023 08:15	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3720-003	VA23C3720-005	VA23C3720-006	-----	-----
					Result	Result	Result	----	----
Physical Tests									
Alkalinity, total (as CaCO ₃)	---	E290/VA	1.0	mg/L	166	----	----	----	----
Hardness (as CaCO ₃), from total Ca/Mg	---	EC100A/VA	0.60	mg/L	195	----	----	----	----
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]	---	E318/VA	0.050	mg/L	----	----	2.37	----	----
Microbiological Tests									
Coliforms, thermotolerant [fecal]	---	E010.FC/VA	1	MPN/100mL	----	----	<1	----	----
Coliforms, Escherichia coli [E. coli]	---	E010/VA	1	MPN/100mL	----	----	<1	----	----
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	5.70	----	----	----	----
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L	0.00141	----	----	----	----
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L	0.00264	----	----	----	----
Barium, total	7440-39-3	E420/VA	0.00010	mg/L	0.193	----	----	----	----
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L	<0.000100	----	----	----	----
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L	0.0217	----	----	----	----
Boron, total	7440-42-8	E420/VA	0.010	mg/L	0.312	----	----	----	----
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L	0.000726	----	----	----	----
Calcium, total	7440-70-2	E420/VA	0.050	mg/L	48.4	----	----	----	----
Cesium, total	7440-46-2	E420/VA	0.000010	mg/L	0.000186	----	----	----	----
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L	0.00826	----	----	----	----
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L	0.00196	----	----	----	----
Copper, total	7440-50-8	E420/VA	0.00050	mg/L	0.443	----	----	----	----
Iron, total	7439-89-6	E420/VA	0.010	mg/L	3.43	----	----	----	----
Lead, total	7439-92-1	E420/VA	0.000050	mg/L	0.00543	----	----	----	----
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L	0.0056	----	----	----	----
Magnesium, total	7439-95-4	E420/VA	0.0050	mg/L	18.1	----	----	----	----
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L	0.174	----	----	----	----
Mercury, total	7439-97-6	E508/WT	0.0000050	mg/L	<0.0000500 ^{DLM}	----	----	----	----
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L	0.0124	----	----	----	----
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L	0.0124	----	----	----	----
Phosphorus, total	7723-14-0	E420/VA	0.050	mg/L	59.1	----	----	----	----



Analytical Results

Sub-Matrix: Grab Effluent (Matrix: Water)					Client sample ID	Bioreactor	Fermenter Supernatant	Outfall Grab E104954	----	----
Client sampling date / time						04-Oct-2023 08:00	04-Oct-2023 08:05	04-Oct-2023 08:15	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3720-003	VA23C3720-005	VA23C3720-006	-----	-----	
					Result	Result	Result	----	----	
Total Metals										
Potassium, total	7440-09-7	E420/VA	0.050	mg/L	36.2	----	----	----	----	----
Rubidium, total	7440-17-7	E420/VA	0.00020	mg/L	0.0220	----	----	----	----	----
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L	0.00370	----	----	----	----	----
Silicon, total	7440-21-3	E420/VA	0.10	mg/L	7.70	----	----	----	----	----
Silver, total	7440-22-4	E420/VA	0.000010	mg/L	0.00107	----	----	----	----	----
Sodium, total	7440-23-5	E420/VA	0.050	mg/L	70.3	----	----	----	----	----
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L	0.346	----	----	----	----	----
Sulfur, total	7704-34-9	E420/VA	0.50	mg/L	23.9	----	----	----	----	----
Tellurium, total	13494-80-9	E420/VA	0.00020	mg/L	<0.00020	----	----	----	----	----
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L	0.000030	----	----	----	----	----
Thorium, total	7440-29-1	E420/VA	0.00010	mg/L	0.00017	----	----	----	----	----
Tin, total	7440-31-5	E420/VA	0.00010	mg/L	0.00309	----	----	----	----	----
Titanium, total	7440-32-6	E420/VA	0.00030	mg/L	0.0363	----	----	----	----	----
Tungsten, total	7440-33-7	E420/VA	0.00010	mg/L	0.00058	----	----	----	----	----
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L	0.00861	----	----	----	----	----
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L	0.00551	----	----	----	----	----
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L	0.479	----	----	----	----	----
Zirconium, total	7440-67-7	E420/VA	0.00020	mg/L	0.00694	----	----	----	----	----
Fatty Acids										
Acetic acid	64-19-7	E676/WP	10	mg/L	----	111	----	----	----	----
Butyric acid	107-92-6	E676/WP	1.0	mg/L	----	23.0	----	----	----	----
Formic acid	64-18-6	E676/WP	30	mg/L	----	<30	----	----	----	----
Hexanoic acid	142-62-1	E676/WP	1.0	mg/L	----	2.4	----	----	----	----
Isobutyric acid	79-31-2	E676/WP	1.0	mg/L	----	1.2	----	----	----	----
Isovaleric acid	503-74-2	E676/WP	1.0	mg/L	----	<1.0	----	----	----	----
Propanoic acid	79-09-4	E676/WP	5.0	mg/L	----	93.7	----	----	----	----
Valeric acid	109-52-4	E676/WP	1.0	mg/L	----	13.4	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.
Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	04-Oct-2023 09:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3720-004	Result	----	----	----	----
Physical Tests										
Moisture	---	E144/VA	0.25	%	78.8	----	----	----	----	----
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	5.50 ^{FR8}	----	----	----	----	----
Solids, fixed [FS]	---	E169/WT	0.10	%	17.8	----	----	----	----	----
Solids, total [TS]	---	E157/WT	0.10	%	21.6	----	----	----	----	----
Solids, volatile [VS]	---	EC165/WT	0.10	%	82.2	----	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	---	E351/SK	0.050	%	44.5	----	----	----	----	----
Carbon, inorganic [IC]	---	E354/SK	0.050	%	0.419	----	----	----	----	----
Carbon, inorganic [IC], (as CaCO3 equivalent)	---	E354/SK	0.40	%	3.49	----	----	----	----	----
Carbon, total organic [TOC]	---	EC356/SK	0.050	%	44.1	----	----	----	----	----
Organic matter	---	EC356/SK	0.10	%	76.0	----	----	----	----	----
Microbiological Tests										
Coliforms, Escherichia coli [E. coli]	---	E014.EC/VA	2	MPN/g	>7810000	----	----	----	----	----
Coliforms, thermotolerant [fecal]	---	E014.FC/VA	2	MPN/g	>7810000	----	----	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg	3060	----	----	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	0.79	----	----	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	1.04	----	----	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	121	----	----	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	<0.10	----	----	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	13.5	----	----	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	11.4	----	----	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	0.457	----	----	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	6560	----	----	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	7.52	----	----	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	0.98	----	----	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	267	----	----	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	2180	----	----	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	3.93	----	----	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	<2.0	----	----	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	Biosolids E231763	----	----	----	----
(Matrix: Soil/Solid)										
					Client sampling date / time	04-Oct-2023 09:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3720-004	Result	-----	-----	-----	-----
Metals										
Magnesium	7439-95-4	E440/VA	20	mg/kg	3770	----	----	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	56.2	----	----	----	----	----
Mercury	7439-97-6	E510/VA	0.0050	mg/kg	0.107	----	----	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	5.66	----	----	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	6.19	----	----	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	19800	----	----	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	4600	----	----	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	1.95	----	----	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	0.83	----	----	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	399	----	----	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	57.8	----	----	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	4800	----	----	----	----	----
Thallium	7440-28-0	E440/VA	0.050	mg/kg	<0.050	----	----	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg	8.3	----	----	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg	22.2	----	----	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	<0.50	----	----	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg	3.76	----	----	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	3.82	----	----	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg	328	----	----	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	3.6	----	----	----	----	----
Leachable Anions & Nutrients										
Kjeldahl nitrogen, total [TKN]	----	E319/SK	0.020	%	6.10	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Water					Client sample ID	Trip Blank	----	----	----	----
(Matrix: Water)					Client sampling date / time	04-Oct-2023 00:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3720-007	Result	-----	-----	-----	-----
Physical Tests										
pH	----	E108/VA	0.10	pH units	5.49	----	----	----	----	----
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	<1.0	----	----	----	----	----
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L	<2.0	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	Anonymous	Anonymous	Chromium	7440-47-3	E440	50.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier Description

DUP-H Duplicate results outside ALS DQO, due to sample heterogeneity.

Laboratory Control Sample (LCS) Recoveries

Metals	QC-MRG2-1173601 002	----	Silver	7440-22-4	E440	77.7 % MES	80.0-120%	Recovery less than lower control limit
--------	------------------------	------	--------	-----------	------	------------	-----------	--

Result Qualifiers

Qualifier Description

MES Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Leachable Anions & Nutrients : Total Kjeldahl Nitrogen by Colourimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E319	04-Oct-2023	10-Oct-2023	365 days	6 days	✓	11-Oct-2023	365 days	7 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap Biosolids E231763	E510	04-Oct-2023	07-Oct-2023	28 days	3 days	✓	09-Oct-2023	28 days	5 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap Biosolids E231763	E440	04-Oct-2023	07-Oct-2023	180 days	3 days	✓	10-Oct-2023	180 days	6 days	✓
Microbiological Tests : E. coli (MTF)										
Glass soil jar/Teflon lined cap Biosolids E231763	E014.EC	04-Oct-2023	05-Oct-2023	2 days	1 days	✓	05-Oct-2023	2 days	1 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliforms (MTF)										
Glass soil jar/Teflon lined cap Biosolids E231763	E014.FC	04-Oct-2023	05-Oct-2023	2 days	1 days	✓	05-Oct-2023	2 days	1 days	✓
Organic / Inorganic Carbon : Total Carbon by Combustion										
Glass soil jar/Teflon lined cap Biosolids E231763	E351	04-Oct-2023	07-Oct-2023	----	----		07-Oct-2023	0 days	0 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Acetic Acid pH Standard Curve										
Glass soil jar/Teflon lined cap Biosolids E231763	E354	04-Oct-2023	----	----	----		11-Oct-2023	----	7 days	



Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : FS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E169	04-Oct-2023	----	----	----		06-Oct-2023	7 days	2 days	✓
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E144	04-Oct-2023	----	----	----		06-Oct-2023	----	2 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap Biosolids E231763	E108	04-Oct-2023	07-Oct-2023	30 days	3 days	✓	08-Oct-2023	30 days	4 days	✓
Physical Tests : TS by Gravimetry										
Glass soil jar/Teflon lined cap Biosolids E231763	E157	04-Oct-2023	----	----	----		06-Oct-2023	14 days	2 days	✓

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d] Raw Influent Comp E222796	E550	04-Oct-2023	----	----	----		07-Oct-2023	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp E104954	E555	04-Oct-2023	----	----	----		07-Oct-2023	3 days	3 days	✓
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE Trip Blank	E555	04-Oct-2023	----	----	----		07-Oct-2023	3 days	4 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E559-L	04-Oct-2023	----	----	----		13-Oct-2023	28 days	9 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Outfall Comp E104954	E298	04-Oct-2023	16-Oct-2023	28 days	12 days	✓	17-Oct-2023	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E298	04-Oct-2023	16-Oct-2023	28 days	12 days	✓	18-Oct-2023	28 days	14 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE Outfall Comp E104954	E378-U	04-Oct-2023	07-Oct-2023	3 days	3 days	✓	07-Oct-2023	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE Raw Influent Comp E222796	E378-U	04-Oct-2023	07-Oct-2023	3 days	3 days	✓	07-Oct-2023	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Outfall Comp E104954	E235.NO3-L	04-Oct-2023	07-Oct-2023	3 days	3 days	✓	07-Oct-2023	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Raw Influent Comp E222796	E235.NO3-L	04-Oct-2023	07-Oct-2023	3 days	3 days	✓	07-Oct-2023	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Outfall Comp E104954	E235.NO2-L	04-Oct-2023	07-Oct-2023	3 days	3 days	✓	07-Oct-2023	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Raw Influent Comp E222796	E235.NO2-L	04-Oct-2023	07-Oct-2023	3 days	3 days	✓	07-Oct-2023	3 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	04-Oct-2023	16-Oct-2023	28 days	12 days	✓	17-Oct-2023	28 days	13 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E318	04-Oct-2023	16-Oct-2023	28 days	12 days	✓	17-Oct-2023	28 days	13 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E372-U	04-Oct-2023	16-Oct-2023	28 days	12 days	✓	18-Oct-2023	28 days	14 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) Raw Influent Comp E222796	E372-U	04-Oct-2023	16-Oct-2023	28 days	12 days	✓	18-Oct-2023	28 days	14 days	✓
Fatty Acids : Volatile Fatty and Carboxylic Acid (VFA) by GC-MS										
Glass vial (sodium bisulfate) Fermenter Supernatant	E676	04-Oct-2023	----	----	----		12-Oct-2023	14 days	8 days	✓
Microbiological Tests : Thermotolerant (Fecal) Coliform (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab E104954	E010.FC	04-Oct-2023	----	----	----		05-Oct-2023	30 hrs	29 hrs	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Outfall Grab E104954	E010	04-Oct-2023	----	----	----		05-Oct-2023	30 hrs	29 hrs	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Bioreactor	E290	04-Oct-2023	11-Oct-2023	14 days	7 days	✓	11-Oct-2023	14 days	7 days	✓
Physical Tests : pH by Meter										
HDPE Trip Blank	E108	04-Oct-2023	11-Oct-2023	0.25 hrs	170 hrs	✖ EHTR-FM	11-Oct-2023	0.25 hrs	173 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE Outfall Comp E104954	E108	04-Oct-2023	07-Oct-2023	0.25 hrs	66 hrs	✖ EHTR-FM	07-Oct-2023	0.25 hrs	72 hrs	✖ EHTR-FM



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp E104954	E160-L	04-Oct-2023	----	----	----		10-Oct-2023	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Raw Influent Comp E222796	E160-L	04-Oct-2023	----	----	----		10-Oct-2023	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Trip Blank	E160-L	04-Oct-2023	----	----	----		10-Oct-2023	7 days	7 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) Bioreactor	E508	04-Oct-2023	10-Oct-2023	28 days	6 days	✓	10-Oct-2023	28 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) Bioreactor	E420	04-Oct-2023	07-Oct-2023	180 days	3 days	✓	14-Oct-2023	180 days	10 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended
 Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
E. coli (MTF)	E014.EC	1170748	0	1	0.0	5.0	✖
FS by Gravimetry	E169	1172871	1	5	20.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	1173601	1	18	5.5	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1173602	1	18	5.5	5.0	✔
Moisture Content by Gravimetry	E144	1173613	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1173600	1	19	5.2	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	1169850	1	10	10.0	5.0	✔
Total Carbon by Combustion	E351	1174756	1	19	5.2	5.0	✔
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1178663	1	19	5.2	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	1176818	1	6	16.6	5.0	✔
TS by Gravimetry	E157	1172873	1	6	16.6	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1173601	2	18	11.1	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1173602	2	18	11.1	10.0	✔
Moisture Content by Gravimetry	E144	1173613	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1173600	1	19	5.2	5.0	✔
Total Carbon by Combustion	E351	1174756	2	19	10.5	10.0	✔
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1178663	2	19	10.5	10.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	1176818	2	6	33.3	10.0	✔
TS by Gravimetry	E157	1172873	1	6	16.6	5.0	✔
Method Blanks (MB)							
E. coli (MTF)	E014.EC	1170748	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	1173601	1	18	5.5	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1173602	1	18	5.5	5.0	✔
Moisture Content by Gravimetry	E144	1173613	1	18	5.5	5.0	✔
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC	1169850	1	10	10.0	5.0	✔
Total Carbon by Combustion	E351	1174756	1	19	5.2	5.0	✔
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1178663	1	19	5.2	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	1176818	1	6	16.6	5.0	✔
TS by Gravimetry	E157	1172873	1	6	16.6	5.0	✔

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1177801	1	18	5.5	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP) - Continued							
Ammonia by Fluorescence	E298	1187794	1	2	50.0	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	1174309	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1174651	1	12	8.3	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1184072	1	9	11.1	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1174077	1	7	14.2	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1174073	1	19	5.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1174074	1	20	5.0	5.0	✔
pH by Meter	E108	1174067	2	38	5.2	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	1170624	0	8	0.0	10.0	✖
Total Coliforms and E. coli (Enzyme Substrate)	E010	1170014	2	17	11.7	10.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1187795	1	2	50.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1175613	1	16	6.2	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1171315	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1187793	1	2	50.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1181073	1	10	10.0	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1177801	1	18	5.5	5.0	✔
Ammonia by Fluorescence	E298	1187794	1	2	50.0	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	1174309	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1174651	1	12	8.3	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1184072	1	9	11.1	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1174077	1	7	14.2	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1174073	1	19	5.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1174074	1	20	5.0	5.0	✔
pH by Meter	E108	1174067	2	38	5.2	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1187795	1	2	50.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1175613	1	16	6.2	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1171315	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1187793	1	2	50.0	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	1176885	1	6	16.6	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1181073	1	10	10.0	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1177801	1	18	5.5	5.0	✔
Ammonia by Fluorescence	E298	1187794	1	2	50.0	5.0	✔
Biochemical Oxygen Demand - 5 day	E550	1174309	1	20	5.0	5.0	✔
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1174651	1	12	8.3	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1184072	1	9	11.1	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1174077	1	7	14.2	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1174073	1	19	5.2	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Method Blanks (MB) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	1174074	1	20	5.0	5.0	✔
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC	1170624	1	8	12.5	5.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	1170014	1	17	5.8	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1187795	1	2	50.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1175613	1	16	6.2	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1171315	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1187793	1	2	50.0	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	1176885	1	6	16.6	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1181073	1	10	10.0	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1187794	1	2	50.0	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1184072	1	9	11.1	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	1174077	1	7	14.2	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1174073	1	19	5.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1174074	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1187795	1	2	50.0	5.0	✔
Total Mercury in Water by CVAAS	E508	1175613	1	16	6.2	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1171315	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	1187793	1	2	50.0	5.0	✔
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676	1181073	1	10	10.0	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MTF)	E014.EC ALS Environmental - Vancouver	Soil/Solid	TMECC 07.00 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism.
Thermotolerant (Fecal) Coliforms (MTF)	E014.FC ALS Environmental - Vancouver	Soil/Solid	EPA 1680 (mod)	Samples are processed, inoculated into a series of fermentation tubes followed by incubation and subsequent inoculations dependent on the target organisms. Fermentation tubes exhibiting positive reactions proceed to confirmation steps specific to the target organism. Moisture determination is performed to report test results on a dry-weight basis.
pH by Meter (1:2 Soil:Water Extraction)	E108 ALS Environmental - Vancouver	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 ALS Environmental - Vancouver	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C . Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
TS by Gravimetry	E157 ALS Environmental - Waterloo	Soil/Solid	APHA 2540 B (mod)	Total Solids (TS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. The increase in weight over that of the empty dish represents the total solids. Results are reported as the percentage of the total sample.
FS by Gravimetry	E169 ALS Environmental - Waterloo	Soil/Solid	APHA 2540 G (mod)	Fixed Solids (FS) are determined by drying a pre-weighed sample in a pre-weighed dish to constant weight in an oven at $104 \pm 1^{\circ}\text{C}$. This residue is ignited to constant weight at 550°C . The remaining solids represent the Fixed Solids (FS). Results are reported as the percentage of the total solids.
Total Kjeldahl Nitrogen by Colourimetry	E319 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO_4 and K_2SO_4 catalysts. Ammonia in the soil extract is determined colourimetrically at 660 nm.
Total Carbon by Combustion	E351 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 21.2 (mod)	Total Carbon is determined by the high temperature combustion method with measurement by an infrared detector.
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 20.2	Total Inorganic Carbon is determined by acetic acid pH standard curve, where a known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Vancouver	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO₃ and HCl, followed by CVAAS analysis.
VS by Gravimetry	EC165 ALS Environmental - Waterloo	Soil/Solid	APHA 2540 G (mod)	Volatile Solids (VS) are determined by drying a sample in a weighed dish to constant weight in an oven at 104 ± 1°C. The increase in weight over that of the empty dish represents the total solids. This residue is ignited to constant weight at 550°C. The remaining solids represent the fixed total solids while the weight lost on ignition is the volatile solids. Results are reported as Percent of the Total Solids which are Volatile Solids. VS at 550°C can be used as an estimation of Organic Matter (CSSS 2008).
Total Organic Carbon (Calculated) in soil	EC356 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 21.2	Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon (TIC).
Total Coliforms and E. coli (Enzyme Substrate)	E010 ALS Environmental - Vancouver	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ± 0.5°C for either 18 or 24 hours (dependent on reagent used).
Thermotolerant (Fecal) Coliform (Enzyme Substrate)	E010.FC ALS Environmental - Vancouver	Water	APHA 9223 (mod)	The enzyme substrate test detects Thermotolerant Coliforms in a 100 mL sample after an 18 hour incubation at 44.5 ± 0.2°C.
pH by Meter	E108 ALS Environmental - Vancouver	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L ALS Environmental - Vancouver	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Nitrite in Water by IC (Low Level)	E235.NO2-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L ALS Environmental - Vancouver	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Vancouver	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 ALS Environmental - Vancouver	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U ALS Environmental - Vancouver	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Vancouver	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Vancouver	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 ALS Environmental - Waterloo	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand - 5 day	E550 ALS Environmental - Vancouver	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 ALS Environmental - Vancouver	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L ALS Environmental - Vancouver	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Volatile Fatty and Carboxylic Acid (VFA) by GC-MS	E676 ALS Environmental - Winnipeg	Water	ASTM D2908-91 (mod)	Volatile Fatty and Carboxylic Acid are analyzed GCMS.
Hardness (Calculated) from Total Ca/Mg	EC100A ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO₃), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO₃ equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Solid sample preparation (MTF)	EP014 ALS Environmental - Vancouver	Soil/Solid	EPA 1680 (mod)	The procedure involves mixing the sample with deionized/distilled water at a 1:10 ratio of sample to water.
Leach 1:2 Soil:Water for pH/EC	EP108 ALS Environmental - Vancouver	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Kjeldahl Digestion for soils	EP319 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO ₄ and K ₂ SO ₄ catalysts.
Digestion for Metals and Mercury	EP440 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Dry and Grind in Soil/Solid <60°C	EPP442 ALS Environmental - Saskatoon	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Preparation for Ammonia	EP298 ALS Environmental - Vancouver	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 ALS Environmental - Vancouver	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 ALS Environmental - Vancouver	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1172871)											
FC2302866-001	Anonymous	Solids, fixed [FS]	----	E169	0.10	%	41.6	41.7	0.264%	30%	----
Physical Tests (QC Lot: 1172873)											
FC2302866-001	Anonymous	Solids, total [TS]	----	E157	0.10	%	75.6	75.3	0.444%	20%	----
Physical Tests (QC Lot: 1173600)											
VA23C3760-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	5.45	5.43	0.4%	5%	----
Physical Tests (QC Lot: 1173613)											
VA23C3720-004	Biosolids E231763	Moisture	----	E144	0.25	%	78.8	79.1	0.325%	20%	----
Organic / Inorganic Carbon (QC Lot: 1174756)											
YL2301295-001	Anonymous	Carbon, total [TC]	----	E351	0.050	%	1.76	1.88	6.74%	20%	----
Organic / Inorganic Carbon (QC Lot: 1178663)											
EO2309073-041	Anonymous	Carbon, inorganic [IC]	----	E354	0.050	%	0.939	0.951	1.23%	20%	----
Microbiological Tests (QC Lot: 1169850)											
VA23C3632-001	Anonymous	Coliforms, thermotolerant [fecal]	----	E014.FC	2	MPN/g	<2	<2	0	Diff <2x LOR	----
Metals (QC Lot: 1173601)											
VA23C3760-001	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 1173602)											
VA23C3760-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	10300	9140	12.2%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.12	0.12	0.002	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	1.38	1.36	1.88%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	37.6	32.2	15.5%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.036	0.039	0.003	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	3850	3530	8.81%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	21.2	12.6	50.8%	30%	DUP-H
		Cobalt	7440-48-4	E440	0.10	mg/kg	6.51	5.39	18.8%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	15.2	15.7	3.40%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	17200	15000	13.9%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	1.94	1.74	0.20	Diff <2x LOR	----



Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 1173602) - continued											
VA23C3760-001	Anonymous	Lithium	7439-93-2	E440	2.0	mg/kg	8.0	7.5	0.6	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	6830	5590	19.9%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	304	275	10.1%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	0.50	0.55	9.51%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	11.6	8.93	26.3%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	565	515	9.30%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	800	660	19.0%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	301	284	5.85%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	29.7	28.4	4.50%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	696	573	19.3%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.359	0.323	10.5%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	43.4	35.4	20.4%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	34.1	30.4	11.7%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.3	0.2	Diff <2x LOR	----

Leachable Anions & Nutrients (QC Lot: 1176818)

FC2302866-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E319	1320	mg/kg	2.47 %	24500	0.771%	20%	----
---------------	-----------	--------------------------------	------	------	------	-------	--------	-------	--------	-----	------

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1174067)											
KS2303849-002	Anonymous	pH	----	E108	0.10	pH units	7.94	7.94	0.00%	4%	----
Physical Tests (QC Lot: 1177800)											
VA23C3705-001	Anonymous	pH	----	E108	0.10	pH units	7.32	7.28	0.548%	4%	----
Physical Tests (QC Lot: 1177801)											
VA23C3705-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	39.9	40.3	1.01%	20%	----
Anions and Nutrients (QC Lot: 1174073)											
KS2303833-021	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0452	0.0454	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1174074)											



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 1174074) - continued											
KS2303833-021	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1174077)											
KS2303833-021	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1187793)											
VA23C3720-001	Outfall Comp E104954	Phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.317	0.320	0.949%	20%	----
Anions and Nutrients (QC Lot: 1187794)											
VA23C3720-001	Outfall Comp E104954	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.441	0.439	0.404%	20%	----
Anions and Nutrients (QC Lot: 1187795)											
VA23C3720-002	Raw Influent Comp E222796	Kjeldahl nitrogen, total [TKN]	----	E318	1.00	mg/L	51.9	51.6	0.636%	20%	----
Microbiological Tests (QC Lot: 1170014)											
VA23C3681-001	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
VA23C3718-001	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 1171315)											
FJ2302623-009	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0098	0.0092	0.0006	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	0.00015	0.00014	0.000006	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00015	0.00017	0.00002	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.252	0.245	2.76%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	0.012	0.012	0.0004	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000244	0.0000187	0.0000056	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	58.2	56.0	3.86%	20%	----
		Cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.050	0.050	0.0005	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	0.0120	0.0114	5.47%	20%	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	26.1	26.1	0.149%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.00140	0.00150	7.45%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000953	0.000963	1.07%	20%	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	0.00164	0.00166	0.00002	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 1171315) - continued											
FJ2302623-009	Anonymous	Phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	1.06	1.07	0.604%	20%	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00076	0.00067	0.00010	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	0.0103	0.0102	1.22%	20%	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	1.32	1.36	2.53%	20%	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	7.61	7.36	3.32%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.130	0.128	1.44%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	55.5	54.9	1.09%	20%	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.00160	0.00154	3.54%	20%	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 1175613)											
VA23C3707-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1174309)											
VA23C3952-008	Anonymous	Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1174651)											
VA23C3720-001	Outfall Comp E104954	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	3.3	4.0	19.2%	30%	----
Aggregate Organics (QC Lot: 1184072)											
VA23C3654-002	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	16	17	0.6	Diff <2x LOR	----
Fatty Acids (QC Lot: 1181073)											
CG2314070-001	Anonymous	Acetic acid	64-19-7	E676	10	mg/L	29	26	3	Diff <2x LOR	----
		Butyric acid	107-92-6	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Formic acid	64-18-6	E676	30	mg/L	<30	<30	0	Diff <2x LOR	----
		Hexanoic acid	142-62-1	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isobutyric acid	79-31-2	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Fatty Acids (QC Lot: 1181073) - continued											
CG2314070-001	Anonymous	Isovaleric acid	503-74-2	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Propanoic acid	79-09-4	E676	5.0	mg/L	<5.0	<5.0	0	Diff <2x LOR	----
		Valeric acid	109-52-4	E676	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----

Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1172873)						
Solids, total [TS]	----	E157	0.1	%	<0.10	----
Physical Tests (QCLot: 1173613)						
Moisture	----	E144	0.25	%	<0.25	----
Organic / Inorganic Carbon (QCLot: 1174756)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Organic / Inorganic Carbon (QCLot: 1178663)						
Carbon, inorganic [IC]	----	E354	0.05	%	<0.050	----
Microbiological Tests (QCLot: 1169850)						
Coliforms, thermotolerant [fecal]	----	E014.FC	2	MPN/g	<2	----
Microbiological Tests (QCLot: 1170748)						
Coliforms, Escherichia coli [E. coli]	----	E014.EC	2	MPN/g	<2	----
Metals (QCLot: 1173601)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1173602)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----



Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1173602) - continued						
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Leachable Anions & Nutrients (QCLot: 1176818)						
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	<200	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1176885)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Physical Tests (QCLot: 1177801)						
Alkalinity, total (as CaCO ₃)	----	E290	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1174073)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 1174074)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1174077)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 1187793)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 1187794)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 1187795)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Microbiological Tests (QCLot: 1170014)						
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
Microbiological Tests (QCLot: 1170624)						
Coliforms, thermotolerant [fecal]	----	E010.FC	1	MPN/100mL	<1	----
Total Metals (QCLot: 1171315)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 1171315) - continued						
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 1175613)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 1174309)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 1174651)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 1184072)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Fatty Acids (QCLot: 1181073)						
Acetic acid	64-19-7	E676	10	mg/L	<10	----
Butyric acid	107-92-6	E676	1	mg/L	<1.0	----
Formic acid	64-18-6	E676	30	mg/L	<30	----
Hexanoic acid	142-62-1	E676	1	mg/L	<1.0	----
Isobutyric acid	79-31-2	E676	1	mg/L	<1.0	----
Isovaleric acid	503-74-2	E676	1	mg/L	<1.0	----
Propanoic acid	79-09-4	E676	5	mg/L	<5.0	----
Valeric acid	109-52-4	E676	1	mg/L	<1.0	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1172873)									
Solids, total [TS]	----	E157	0.1	%	50 %	99.8	85.0	115	----
Physical Tests (QCLot: 1173600)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 1173613)									
Moisture	----	E144	0.25	%	50 %	97.8	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1174756)									
Carbon, total [TC]	----	E351	0.05	%	48 %	99.0	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1178663)									
Carbon, inorganic [IC]	----	E354	0.05	%	0.5 %	99.6	90.0	110	----
Metals (QCLot: 1173601)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	88.9	80.0	120	----
Metals (QCLot: 1173602)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	85.3	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	88.1	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	87.8	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	85.6	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	83.0	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	87.3	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	82.8	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	86.7	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	85.1	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	86.7	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	85.2	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	82.5	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	99.0	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	86.8	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	81.3	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	89.4	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	84.0	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	87.6	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	84.0	80.0	120	----



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1173602) - continued									
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	99.2	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	86.9	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	87.5	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	# 77.7	80.0	120	MES
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	89.6	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	83.4	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	91.5	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	82.5	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	80.3	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	81.2	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	83.8	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	85.0	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	85.6	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	83.3	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	81.6	80.0	120	----
Leachable Anions & Nutrients (QCLot: 1176818)									
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	1000 mg/kg	99.1	80.0	120	----
Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1174067)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1176885)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	89.7	85.0	115	----
Physical Tests (QCLot: 1177800)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1177801)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	109	85.0	115	----
Anions and Nutrients (QCLot: 1174073)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 1174074)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1174077)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	99.9	80.0	120	----
Anions and Nutrients (QCLot: 1187793)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	93.8	80.0	120	----
Anions and Nutrients (QCLot: 1187794)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	99.8	85.0	115	----
Anions and Nutrients (QCLot: 1187795)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	93.6	75.0	125	----
Total Metals (QCLot: 1171315)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	104	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	110	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	107	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	108	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	103	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	106	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	104	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.5	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	116	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	106	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	118	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	90.8	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	105	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	109	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	109	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	105	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	112	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	102	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	104	80.0	120	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1171315) - continued									
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	110	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	116	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	106	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	107	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	104	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	105	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	113	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	101	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	106	80.0	120	----
Total Metals (QCLot: 1175613)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	98.1	80.0	120	----
Aggregate Organics (QCLot: 1174309)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	100	85.0	115	----
Aggregate Organics (QCLot: 1174651)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	94.8	85.0	115	----
Aggregate Organics (QCLot: 1184072)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	110	85.0	115	----
Fatty Acids (QCLot: 1181073)									
Acetic acid	64-19-7	E676	10	mg/L	40 mg/L	96.1	70.0	130	----
Butyric acid	107-92-6	E676	1	mg/L	40 mg/L	99.3	70.0	130	----
Formic acid	64-18-6	E676	30	mg/L	160 mg/L	109	70.0	130	----
Hexanoic acid	142-62-1	E676	1	mg/L	40 mg/L	78.2	70.0	130	----
Isobutyric acid	79-31-2	E676	1	mg/L	40 mg/L	84.2	70.0	130	----
Isovaleric acid	503-74-2	E676	1	mg/L	40 mg/L	92.8	70.0	130	----
Propanoic acid	79-09-4	E676	5	mg/L	40 mg/L	100	70.0	130	----
Valeric acid	109-52-4	E676	1	mg/L	40 mg/L	94.2	70.0	130	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1174073)										
KS2303857-021	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3-L	2.40 mg/L	2.5 mg/L	95.9	75.0	125	----
Anions and Nutrients (QCLot: 1174074)										
KS2303857-021	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2-L	0.483 mg/L	0.5 mg/L	96.7	75.0	125	----
Anions and Nutrients (QCLot: 1174077)										
KS2303849-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0349 mg/L	0.03 mg/L	116	70.0	130	----
Anions and Nutrients (QCLot: 1187793)										
VA23C3720-002	Raw Influent Comp E222796	Phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 1187794)										
VA23C3720-002	Raw Influent Comp E222796	Ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Anions and Nutrients (QCLot: 1187795)										
VA23C3720-006	Outfall Grab E104954	Kjeldahl nitrogen, total [TKN]	----	E318	2.34 mg/L	2.5 mg/L	93.7	70.0	130	----
Total Metals (QCLot: 1171315)										
FJ2302623-016	Anonymous	Aluminum, total	7429-90-5	E420	0.193 mg/L	0.2 mg/L	96.7	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0199 mg/L	0.02 mg/L	99.6	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0373 mg/L	0.04 mg/L	93.3	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.00953 mg/L	0.01 mg/L	95.3	70.0	130	----
		Boron, total	7440-42-8	E420	0.093 mg/L	0.1 mg/L	93.2	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00379 mg/L	0.004 mg/L	94.8	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.0102 mg/L	0.01 mg/L	102	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0188 mg/L	0.02 mg/L	94.0	70.0	130	----
		Copper, total	7440-50-8	E420	0.0178 mg/L	0.02 mg/L	88.8	70.0	130	----
		Iron, total	7439-89-6	E420	1.95 mg/L	2 mg/L	97.3	70.0	130	----
		Lead, total	7439-92-1	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		Lithium, total	7439-93-2	E420	0.0980 mg/L	0.1 mg/L	98.0	70.0	130	----
				Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 1171315) - continued										
FJ2302623-016	Anonymous	Manganese, total	7439-96-5	E420	0.0190 mg/L	0.02 mg/L	94.8	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0368 mg/L	0.04 mg/L	92.1	70.0	130	----
		Phosphorus, total	7723-14-0	E420	10.1 mg/L	10 mg/L	101	70.0	130	----
		Potassium, total	7440-09-7	E420	3.86 mg/L	4 mg/L	96.4	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0413 mg/L	0.04 mg/L	103	70.0	130	----
		Silicon, total	7440-21-3	E420	9.59 mg/L	10 mg/L	95.9	70.0	130	----
		Silver, total	7440-22-4	E420	0.00396 mg/L	0.004 mg/L	98.9	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00381 mg/L	0.004 mg/L	95.3	70.0	130	----
		Thorium, total	7440-29-1	E420	0.0183 mg/L	0.02 mg/L	91.3	70.0	130	----
		Tin, total	7440-31-5	E420	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0376 mg/L	0.04 mg/L	94.1	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.0196 mg/L	0.02 mg/L	98.3	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00405 mg/L	0.004 mg/L	101	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		Zinc, total	7440-66-6	E420	0.370 mg/L	0.4 mg/L	92.6	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.0415 mg/L	0.04 mg/L	104	70.0	130	----
Total Metals (QCLot: 1175613)										
VA23C3707-002	Anonymous	Mercury, total	7439-97-6	E508	0.0000953 mg/L	0.0001 mg/L	95.3	70.0	130	----
Aggregate Organics (QCLot: 1184072)										
VA23C3654-003	Anonymous	Chemical oxygen demand [COD]	----	E559-L	118 mg/L	100 mg/L	118	75.0	125	----
Fatty Acids (QCLot: 1181073)										
CG2314070-001	Anonymous	Acetic acid	64-19-7	E676	33 mg/L	40 mg/L	83.0	70.0	130	----
		Butyric acid	107-92-6	E676	47.4 mg/L	40 mg/L	119	70.0	130	----
		Formic acid	64-18-6	E676	138 mg/L	160 mg/L	86.6	70.0	130	----
		Hexanoic acid	142-62-1	E676	47.3 mg/L	40 mg/L	118	70.0	130	----
		Isobutyric acid	79-31-2	E676	42.3 mg/L	40 mg/L	106	70.0	130	----
		Isovaleric acid	503-74-2	E676	40.7 mg/L	40 mg/L	102	70.0	130	----
		Propanoic acid	79-09-4	E676	44.7 mg/L	40 mg/L	112	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
					Concentration	Target	MS	Low	High	Qualifier
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method						
Fatty Acids (QCLot: 1181073) - continued										
CG2314070-001	Anonymous	Valeric acid	109-52-4	E676	47.0 mg/L	40 mg/L	117	70.0	130	----

Qualifiers

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.



Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Sub-Matrix:					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method			Low	High	
Organic / Inorganic Carbon (QCLot: 1174756)									
	RM	Carbon, total [TC]	----	E351	1.4 %	102	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1178663)									
	RM	Carbon, inorganic [IC]	----	E354	0.383 %	103	80.0	120	----
Metals (QCLot: 1173601)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	82.8	70.0	130	----
Metals (QCLot: 1173602)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	96.8	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	99.7	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	86.6	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	87.7	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	102	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	107	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	107	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	87.3	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	106	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	92.0	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	90.6	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	92.4	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	86.8	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	93.2	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	92.6	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	94.4	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	99.1	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	90.4	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	95.0	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	103	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	93.4	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	89.6	70.0	130	----



Sub-Matrix:					Reference Material (RM) Report			
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)	
							Low	High
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method				Qualifier
Metals (QCLot: 1173602) - continued								
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	85.3	40.0	160
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	80.3	70.0	130
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	101	70.0	130
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	87.6	70.0	130
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	94.0	70.0	130
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	85.8	70.0	130
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	88.4	70.0	130
Leachable Anions & Nutrients (QCLot: 1176818)								
	RM	Kjeldahl nitrogen, total [TKN]	----	E319	1040 mg/kg	106	80.0	120



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

(Matrix: Water)

					Outfall Comp E104954	----	----	----	----
Client sampling date / time					11-Oct-2023 07:15	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C4366-001	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
pH	----	E108/VA	0.10	pH units	7.51	----	----	----	----
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	3.1	----	----	----	----
Aggregate Organics									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L	3.3	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L/VA	10	mg/L	54	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

					Outfall Grab E104954	----	----	----	----
Client sampling date / time					11-Oct-2023 07:20	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C4366-002	-----	-----	-----	-----
					Result	----	----	----	----
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E318/VA	0.050	mg/L	2.68	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp E104954	E555	11-Oct-2023	----	----	----		14-Oct-2023	3 days	3 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E559-L	11-Oct-2023	----	----	----		18-Oct-2023	28 days	7 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	11-Oct-2023	22-Oct-2023	28 days	11 days	✓	24-Oct-2023	28 days	13 days	✓
Physical Tests : pH by Meter										
HDPE Outfall Comp E104954	E108	11-Oct-2023	23-Oct-2023	0.25 hrs	292 hrs	✖ EHTR-FM	23-Oct-2023	0.25 hrs	292 hrs	✖ EHTR-FM
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp E104954	E160-L	11-Oct-2023	----	----	----		18-Oct-2023	7 days	7 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1185726	1	14	7.1	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1192191	1	20	5.0	5.0	✔
pH by Meter	E108	1200617	1	12	8.3	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1199594	1	6	16.6	5.0	✔
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1185726	1	14	7.1	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1192191	1	20	5.0	5.0	✔
pH by Meter	E108	1200617	1	12	8.3	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1199594	1	6	16.6	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	1191850	1	20	5.0	5.0	✔
Method Blanks (MB)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1185726	1	14	7.1	5.0	✔
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1192191	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1199594	1	6	16.6	5.0	✔
TSS by Gravimetry (Low Level)	E160-L	1191850	1	20	5.0	5.0	✔
Matrix Spikes (MS)							
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1192191	1	20	5.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1199594	1	6	16.6	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter	E108 ALS Environmental - Vancouver	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L ALS Environmental - Vancouver	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at $104 \pm 1^{\circ}\text{C}$, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 ALS Environmental - Vancouver	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 ALS Environmental - Vancouver	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L ALS Environmental - Vancouver	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 ALS Environmental - Vancouver	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

- Key :
- Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
 - CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
 - DQO = Data Quality Objective.
 - LOR = Limit of Reporting (detection limit).
 - RPD = Relative Percent Difference
 - # = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1200617)											
KS2303987-001	Anonymous	pH	----	E108	0.10	pH units	8.59	8.60	0.116%	4%	----
Anions and Nutrients (QC Lot: 1199594)											
VA23C4336-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.378	0.384	0.005	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1185726)											
KS2303929-001	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 1192191)											
FJ2302726-001	Anonymous	Chemical oxygen demand [COD]	----	E559-L	10	mg/L	22	21	0.07	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1191850)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1199594)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Aggregate Organics (QCLot: 1185726)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 1192191)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1191850)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	102	85.0	115	----
Physical Tests (QCLot: 1200617)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Anions and Nutrients (QCLot: 1199594)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	95.9	75.0	125	----
Aggregate Organics (QCLot: 1185726)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	99.6	85.0	115	----
Aggregate Organics (QCLot: 1192191)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	104	85.0	115	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1199594)										
VA23C4366-002	Outfall Grab E104954	Kjeldahl nitrogen, total [TKN]	----	E318	ND mg/L	2.5 mg/L	ND	70.0	130	----
Aggregate Organics (QCLot: 1192191)										
FJ2302726-002	Anonymous	Chemical oxygen demand [COD]	----	E559-L	105 mg/L	100 mg/L	105	75.0	125	----



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

Outfall Comp
E104954

(Matrix: Water)

Client sampling date / time

09-Aug-2023
08:05

Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B8482-001	-----	-----	-----	-----
					Result	----	----	----	----
Physical Tests									
pH	----	E108/VA	0.10	pH units	7.53	----	----	----	----
Solids, total suspended [TSS]	----	E160-L/VA	1.0	mg/L	1.7	----	----	----	----
Aggregate Organics									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/VA	2.0	mg/L	<2.0	----	----	----	----
Chemical oxygen demand [COD]	----	E559-L/VA	10	mg/L	46	----	----	----	----
Perfluoroalkyl Substances (PFAS)									
Eicosafuoro-3-oxaundecane-1-sulfonic acid, 11-chloro- [11Cl-PF3OUdS]	763051-92-9	E745B/WT	0.020	µg/L	<0.020	----	----	----	----
Ethyl perfluorooctanesulfonamide, n- [NEtFOSA]	4151-50-2	E745B/WT	0.025	µg/L	<0.025	----	----	----	----
Ethyl perfluorooctanesulfonamidoacetic acid, n- [NEtFOSAA]	2991-50-6	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Ethyl perfluorooctanesulfonamidoethanol, n- [NEtFOSE]	1691-99-2	E745B/WT	0.030	µg/L	<0.030	----	----	----	----
Fluorotelomer sulfonic acid, 10:2 [10:2 FTS]	120226-60-0	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Fluorotelomer sulfonic acid, 4:2 [4:2 FTS]	757124-72-4	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Fluorotelomer sulfonic acid, 6:2 [6:2 FTS]	27619-97-2	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Fluorotelomer sulfonic acid, 8:2 [8:2 FTS]	39108-34-4	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Hexadecafluoro-3-oxanonane-1-sulfonic acid, 9-chloro- [9Cl-PF3ONS]	756426-58-1	E745B/WT	0.020	µg/L	<0.020	----	----	----	----
Hexafluoropropylene oxide dimer acid [HFPO-DA]	13252-13-6	E745B/WT	0.20	µg/L	<0.20	----	----	----	----
Methyl perfluorooctanesulfonamide, N- [NMeFOSA]	31506-32-8	E745B/WT	0.025	µg/L	<0.025	----	----	----	----
Methyl perfluorooctanesulfonamidoacetic acid, n- [NMeFOSAA]	2355-31-9	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Methyl perfluorooctanesulfonamidoethanol, n- [NMeFOSE]	24448-09-7	E745B/WT	0.030	µg/L	<0.030	----	----	----	----
Perfluorobutanesulfonic acid [PFBS]	375-73-5	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorobutanoic acid [PFBA]	375-22-4	E745B/WT	0.10	µg/L	<0.10	----	----	----	----
Perfluorodecane sulfonic acid [PFDS]	335-77-3	E745B/WT	0.010	µg/L	<0.010	----	----	----	----



Analytical Results

Sub-Matrix: Composite Effluent

Client sample ID

(Matrix: Water)

					Outfall Comp E104954	----	----	----	----
Client sampling date / time					09-Aug-2023 08:05	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B8482-001	-----	-----	-----	-----
					Result	---	---	---	---
Perfluoroalkyl Substances (PFAS)									
Perfluorodecanoic acid [PFDA]	335-76-2	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorododecanoic acid [PFDoA]	307-55-1	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluoroheptanesulfonic acid [PFHpS]	375-92-8	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluoroheptanoic acid [PFHpA]	375-85-9	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorohexanesulfonic acid [PFHxS]	355-46-4	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorohexanoic acid [PFHxA]	307-24-4	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorononanesulfonic acid [PFNS]	68259-12-1	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorononanoic acid [PFNA]	375-95-1	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorononanoic acid, 4,8-dioxa-3H- [ADONA]	919005-14-4	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorooctanesulfonamide [PFOSA]	754-91-6	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorooctanesulfonic acid [PFOS]	1763-23-1	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorooctanoic acid [PFOA]	335-67-1	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluoropentanesulfonic acid [PFPeS]	2706-91-4	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluoropentanoic acid [PFPeA]	2706-90-3	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorotetradecanoic acid [PFTeDA]	376-06-7	E745B/WT	0.025	µg/L	<0.025	----	----	----	----
Perfluorotridecanoic acid [PFTTrDA]	72629-94-8	E745B/WT	0.0250	µg/L	<0.0250	----	----	----	----
Perfluoroundecanoic acid [PFUnA]	2058-94-8	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluoroalkyl Substances (PFAS) Surrogates									
Perfluorooctanesulfonic acid [13C8-PFOS]	265893-05-6	E745B/WT	1.00	%	111	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analytical Results

Sub-Matrix: Composite Influent

Client sample ID

(Matrix: Water)

					Raw Influent Comp E222796	----	----	----	----
Client sampling date / time					09-Aug-2023 07:50	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B8482-003	-----	-----	-----	-----
					Result	---	---	---	---
Perfluoroalkyl Substances (PFAS)									
Eicosafluoro-3-oxaundecane-1-sulfonic acid, 11-chloro- [11CI-PF3OUdS]	763051-92-9	E745B/WT	0.020	µg/L	<0.020	----	----	----	----
Ethyl perfluorooctanesulfonamide, n- [NEtFOSA]	4151-50-2	E745B/WT	0.025	µg/L	<0.025	----	----	----	----
Ethyl perfluorooctanesulfonamidoacetic acid, n- [NEtFOSAA]	2991-50-6	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Ethyl perfluorooctanesulfonamidoethanol, n- [NEtFOSE]	1691-99-2	E745B/WT	0.030	µg/L	<0.030	----	----	----	----
Fluorotelomer sulfonic acid, 10:2 [10:2 FTS]	120226-60-0	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Fluorotelomer sulfonic acid, 4:2 [4:2 FTS]	757124-72-4	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Fluorotelomer sulfonic acid, 6:2 [6:2 FTS]	27619-97-2	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Fluorotelomer sulfonic acid, 8:2 [8:2 FTS]	39108-34-4	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Hexadecafluoro-3-oxanonane-1-sulfonic acid, 9-chloro- [9CI-PF3ONS]	756426-58-1	E745B/WT	0.020	µg/L	<0.020	----	----	----	----
Hexafluoropropylene oxide dimer acid [HFPO-DA]	13252-13-6	E745B/WT	0.20	µg/L	<0.20	----	----	----	----
Methyl perfluorooctanesulfonamide, N- [NMeFOSA]	31506-32-8	E745B/WT	0.025	µg/L	<0.025	----	----	----	----
Methyl perfluorooctanesulfonamidoacetic acid, n- [NMeFOSAA]	2355-31-9	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Methyl perfluorooctanesulfonamidoethanol, n- [NMeFOSE]	24448-09-7	E745B/WT	0.030	µg/L	<0.030	----	----	----	----
Perfluorobutanesulfonic acid [PFBS]	375-73-5	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorobutanoic acid [PFBA]	375-22-4	E745B/WT	0.10	µg/L	<0.10	----	----	----	----
Perfluorodecane sulfonic acid [PFDS]	335-77-3	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorodecanoic acid [PFDA]	335-76-2	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorododecanoic acid [PFDoA]	307-55-1	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluoroheptanesulfonic acid [PFHpS]	375-92-8	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluoroheptanoic acid [PFHpA]	375-85-9	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorohexanesulfonic acid [PFHxS]	355-46-4	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorohexanoic acid [PFHxA]	307-24-4	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorononanesulfonic acid [PFNS]	68259-12-1	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorononanoic acid [PFNA]	375-95-1	E745B/WT	0.010	µg/L	<0.010	----	----	----	----



Analytical Results

Sub-Matrix: Composite Influent

Client sample ID

(Matrix: Water)

					Raw Influent Comp E222796	----	----	----	----
Client sampling date / time					09-Aug-2023 07:50	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B8482-003	-----	-----	-----	-----
					Result	----	----	----	----
Perfluoroalkyl Substances (PFAS)									
Perfluorononanoic acid, 4,8-dioxa-3H- [ADONA]	919005-14-4	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorooctanesulfonamide [PFOSA]	754-91-6	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorooctanesulfonic acid [PFOS]	1763-23-1	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorooctanoic acid [PFOA]	335-67-1	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluoropentanesulfonic acid [PFPeS]	2706-91-4	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluoropentanoic acid [PFPeA]	2706-90-3	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluorotetradecanoic acid [PFTeDA]	376-06-7	E745B/WT	0.025	µg/L	<0.025	----	----	----	----
Perfluorotridecanoic acid [PFTeDA]	72629-94-8	E745B/WT	0.0250	µg/L	<0.0250	----	----	----	----
Perfluoroundecanoic acid [PFUnA]	2058-94-8	E745B/WT	0.010	µg/L	<0.010	----	----	----	----
Perfluoroalkyl Substances (PFAS) Surrogates									
Perfluorooctanesulfonic acid [13C8-PFOS]	265893-05-6	E745B/WT	1.00	%	100	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: Grab Effluent

Client sample ID

(Matrix: Water)

					Outfall Grab E104954	----	----	----	----
Client sampling date / time					09-Aug-2023 08:10	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B8482-002	-----	-----	-----	-----
					Result	----	----	----	----
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E318/VA	0.050	mg/L	1.62	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Biochemical Oxygen Demand (Carbonaceous) - 5 day										
HDPE [BOD HT 3d] Outfall Comp E104954	E555	09-Aug-2023	----	----	----		12-Aug-2023	3 days	3 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry (Low Level)										
Amber glass total (sulfuric acid) Outfall Comp E104954	E559-L	09-Aug-2023	----	----	----		16-Aug-2023	28 days	7 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Outfall Grab E104954	E318	09-Aug-2023	17-Aug-2023	28 days	8 days	✓	18-Aug-2023	28 days	9 days	✓
Perfluoroalkyl Substances (PFAS) : PFAS in Water by LC-MS-MS										
HDPE (teflon free) Outfall Comp E104954	E745B	09-Aug-2023	14-Aug-2023	28 days	5 days	✓	14-Aug-2023	28 days	0 days	✓
Perfluoroalkyl Substances (PFAS) : PFAS in Water by LC-MS-MS										
HDPE (teflon free) Raw Influent Comp E222796	E745B	09-Aug-2023	14-Aug-2023	28 days	5 days	✓	14-Aug-2023	28 days	0 days	✓
Physical Tests : pH by Meter										
HDPE Outfall Comp E104954	E108	09-Aug-2023	16-Aug-2023	0.25 hrs	166 hrs	✖ EHTR-FM	16-Aug-2023	0.25 hrs	167 hrs	✖ EHTR-FM
Physical Tests : TSS by Gravimetry (Low Level)										
HDPE Outfall Comp E104954	E160-L	09-Aug-2023	----	----	----		16-Aug-2023	7 days	7 days	✓



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1082547	1	7	14.2	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1088761	1	14	7.1	5.0	✓
PFAS in Water by LC-MS-MS	E745B	1083359	1	10	10.0	5.0	✓
pH by Meter	E108	1087181	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1089683	1	9	11.1	5.0	✓
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1082547	1	7	14.2	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1088761	1	14	7.1	5.0	✓
PFAS in Water by LC-MS-MS	E745B	1083359	1	10	10.0	5.0	✓
pH by Meter	E108	1087181	1	19	5.2	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1089683	1	9	11.1	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	1088826	1	9	11.1	5.0	✓
Method Blanks (MB)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	1082547	1	7	14.2	5.0	✓
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1088761	1	14	7.1	5.0	✓
PFAS in Water by LC-MS-MS	E745B	1083359	1	10	10.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1089683	1	9	11.1	5.0	✓
TSS by Gravimetry (Low Level)	E160-L	1088826	1	9	11.1	5.0	✓
Matrix Spikes (MS)							
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L	1088761	1	14	7.1	5.0	✓
PFAS in Water by LC-MS-MS	E745B	1083359	1	10	10.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	1089683	1	9	11.1	5.0	✓



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter	E108 ALS Environmental - Vancouver	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry (Low Level)	E160-L ALS Environmental - Vancouver	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at $104 \pm 1^{\circ}\text{C}$, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 ALS Environmental - Vancouver	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 ALS Environmental - Vancouver	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Chemical Oxygen Demand by Colourimetry (Low Level)	E559-L ALS Environmental - Vancouver	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
PFAS in Water by LC-MS-MS	E745B ALS Environmental - Waterloo	Water	MECP E3533	An aliquot of water is analyzed for PFAs by direct injection LC/MS/MS
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 ALS Environmental - Vancouver	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation of PFAS in Water by Direct Injection	EP745 ALS Environmental - Waterloo	Water	MECP E3533	An aliquot of water is analyzed for PFAs by direct injection LC/MS/MS



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1087181)											
VA23B8453-004	Anonymous	pH	----	E108	0.10	pH units	7.16	7.18	0.279%	4%	----
Anions and Nutrients (QC Lot: 1089683)											
VA23B8482-002	Outfall Grab E104954	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	1.62	1.94	18.3%	20%	----
Aggregate Organics (QC Lot: 1082547)											
VA23B8383-001	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	<2.0	<2.0	0.0%	30%	----
Aggregate Organics (QC Lot: 1088761)											
VA23B8372-021	Anonymous	Chemical oxygen demand [COD]	----	E559-L	100	mg/L	<100	<100	0	Diff <2x LOR	----
Perfluoroalkyl Substances (PFAS) (QC Lot: 1083359)											
EO2307058-001	Anonymous	Eicosafuoro-3-oxaundecane-1-sulfonic acid, 11-chloro-[11Cl-PF3OUdS]	763051-92-9	E745B	0.020	µg/L	<0.020	<0.020	0	Diff <2x LOR	----
		Ethyl perfluorooctanesulfonamide, n-[NEtFOSA]	4151-50-2	E745B	0.025	µg/L	<0.025	<0.025	0	Diff <2x LOR	----
		Ethyl perfluorooctanesulfonamido acetic acid, n-[NEtFOSAA]	2991-50-6	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Ethyl perfluorooctanesulfonamido ethanol, n-[NEtFOSE]	1691-99-2	E745B	0.030	µg/L	<0.030	<0.030	0	Diff <2x LOR	----
		Fluorotelomer sulfonic acid, 10:2 [10:2 FTS]	120226-60-0	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Fluorotelomer sulfonic acid, 4:2 [4:2 FTS]	757124-72-4	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Fluorotelomer sulfonic acid, 6:2 [6:2 FTS]	27619-97-2	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Fluorotelomer sulfonic acid, 8:2 [8:2 FTS]	39108-34-4	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Hexadecafluoro-3-oxanonane-1-sulfonic acid, 9-chloro-[9Cl-PF3ONS]	756426-58-1	E745B	0.020	µg/L	<0.020	<0.020	0	Diff <2x LOR	----
		Hexafluoropropylene oxide dimer acid [HFPO-DA]	13252-13-6	E745B	0.20	µg/L	<0.20	<0.20	0	Diff <2x LOR	----
		Methyl perfluorooctanesulfonamide, N-[NMeFOSA]	31506-32-8	E745B	0.025	µg/L	<0.025	<0.025	0	Diff <2x LOR	----
		Methyl perfluorooctanesulfonamido acetic acid, n-[NMeFOSAA]	2355-31-9	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Perfluoroalkyl Substances (PFAS) (QC Lot: 1083359) - continued											
EO2307058-001	Anonymous	Methyl perfluorooctanesulfonamido ethanol, n- [NMeFOSE]	24448-09-7	E745B	0.030	µg/L	<0.030	<0.030	0	Diff <2x LOR	----
		Perfluorobutanesulfonic acid [PFBS]	375-73-5	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluorobutanoic acid [PFBA]	375-22-4	E745B	0.10	µg/L	<0.10	<0.10	0	Diff <2x LOR	----
		Perfluorodecane sulfonic acid [PFDS]	335-77-3	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluorodecanoic acid [PFDA]	335-76-2	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluorododecanoic acid [PFDoA]	307-55-1	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluoroheptanesulfonic acid [PFHpS]	375-92-8	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluoroheptanoic acid [PFHpA]	375-85-9	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluorohexanesulfonic acid [PFHxS]	355-46-4	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluorohexanoic acid [PFHxA]	307-24-4	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluorononanesulfonic acid [PFNS]	68259-12-1	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluorononanoic acid [PFNA]	375-95-1	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluorononanoic acid, 4,8-dioxa-3H- [ADONA]	919005-14-4	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluorooctanesulfonamide [PFOSA]	754-91-6	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluorooctanesulfonic acid [PFOS]	1763-23-1	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluorooctanoic acid [PFOA]	335-67-1	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluoropentanesulfonic acid [PFPeS]	2706-91-4	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluoropentanoic acid [PFPeA]	2706-90-3	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Perfluorotetradecanoic acid [PFTeDA]	376-06-7	E745B	0.025	µg/L	<0.025	<0.025	0	Diff <2x LOR	----
		Perfluorotridecanoic acid [PFTrDA]	72629-94-8	E745B	0.0250	µg/L	<0.0250	<0.0250	0	Diff <2x LOR	----
		Perfluoroundecanoic acid [PFUnA]	2058-94-8	E745B	0.010	µg/L	<0.010	<0.010	0	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1088826)						
Solids, total suspended [TSS]	----	E160-L	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 1089683)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Aggregate Organics (QCLot: 1082547)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 1088761)						
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	<10	----
Perfluoroalkyl Substances (PFAS) (QCLot: 1083359)						
Eicosafluoro-3-oxaundecane-1-sulfonic acid, 11-chloro- [11Cl-PF3OUdS]	763051-92-9	E745B	0.02	µg/L	<0.020	----
Ethyl perfluorooctanesulfonamide, n- [NEtFOSA]	4151-50-2	E745B	0.025	µg/L	<0.025	----
Ethyl perfluorooctanesulfonamidoacetic acid, n- [NEtFOSAA]	2991-50-6	E745B	0.01	µg/L	<0.010	----
Ethyl perfluorooctanesulfonamidoethanol, n- [NEtFOSE]	1691-99-2	E745B	0.03	µg/L	<0.030	----
Fluorotelomer sulfonic acid, 10:2 [10:2 FTS]	120226-60-0	E745B	0.01	µg/L	<0.010	----
Fluorotelomer sulfonic acid, 4:2 [4:2 FTS]	757124-72-4	E745B	0.01	µg/L	<0.010	----
Fluorotelomer sulfonic acid, 6:2 [6:2 FTS]	27619-97-2	E745B	0.01	µg/L	<0.010	----
Fluorotelomer sulfonic acid, 8:2 [8:2 FTS]	39108-34-4	E745B	0.01	µg/L	<0.010	----
Hexadecafluoro-3-oxanonane-1-sulfonic acid, 9-chloro- [9Cl-PF3ONS]	756426-58-1	E745B	0.02	µg/L	<0.020	----
Hexafluoropropylene oxide dimer acid [HFPO-DA]	13252-13-6	E745B	0.2	µg/L	<0.20	----
Methyl perfluorooctanesulfonamide, N- [NMeFOSA]	31506-32-8	E745B	0.025	µg/L	<0.025	----
Methyl perfluorooctanesulfonamidoacetic acid, n- [NMeFOSAA]	2355-31-9	E745B	0.01	µg/L	<0.010	----
Methyl perfluorooctanesulfonamidoethanol, n- [NMeFOSE]	24448-09-7	E745B	0.03	µg/L	<0.030	----
Perfluorobutanesulfonic acid [PFBS]	375-73-5	E745B	0.01	µg/L	<0.010	----
Perfluorobutanoic acid [PFBA]	375-22-4	E745B	0.1	µg/L	<0.10	----
Perfluorodecane sulfonic acid [PFDS]	335-77-3	E745B	0.01	µg/L	<0.010	----
Perfluorodecanoic acid [PFDA]	335-76-2	E745B	0.01	µg/L	<0.010	----
Perfluorododecanoic acid [PFDoA]	307-55-1	E745B	0.01	µg/L	<0.010	----
Perfluoroheptanesulfonic acid [PFHpS]	375-92-8	E745B	0.01	µg/L	<0.010	----
Perfluoroheptanoic acid [PFHpA]	375-85-9	E745B	0.01	µg/L	<0.010	----
Perfluorohexanesulfonic acid [PFHxS]	355-46-4	E745B	0.01	µg/L	<0.010	----
Perfluorohexanoic acid [PFHxA]	307-24-4	E745B	0.01	µg/L	<0.010	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Perfluoroalkyl Substances (PFAS) (QCLot: 1083359) - continued						
Perfluorononanesulfonic acid [PFNS]	68259-12-1	E745B	0.01	µg/L	<0.010	----
Perfluorononanoic acid [PFNA]	375-95-1	E745B	0.01	µg/L	<0.010	----
Perfluorononanoic acid, 4,8-dioxa-3H- [ADONA]	919005-14-4	E745B	0.01	µg/L	<0.010	----
Perfluorooctanesulfonamide [PFOSA]	754-91-6	E745B	0.01	µg/L	<0.010	----
Perfluorooctanesulfonic acid [PFOS]	1763-23-1	E745B	0.01	µg/L	<0.010	----
Perfluorooctanoic acid [PFOA]	335-67-1	E745B	0.01	µg/L	<0.010	----
Perfluoropentanesulfonic acid [PFPeS]	2706-91-4	E745B	0.01	µg/L	<0.010	----
Perfluoropentanoic acid [PFPeA]	2706-90-3	E745B	0.01	µg/L	<0.010	----
Perfluorotetradecanoic acid [PFTeDA]	376-06-7	E745B	0.025	µg/L	<0.025	----
Perfluorotridecanoic acid [PFTrDA]	72629-94-8	E745B	0.025	µg/L	<0.0250	----
Perfluoroundecanoic acid [PFUnA]	2058-94-8	E745B	0.01	µg/L	<0.010	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1087181)									
pH	----	E108	----	pH units	7 pH units	99.7	98.0	102	----
Physical Tests (QCLot: 1088826)									
Solids, total suspended [TSS]	----	E160-L	1	mg/L	150 mg/L	96.8	85.0	115	----
Anions and Nutrients (QCLot: 1089683)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	97.3	75.0	125	----
Aggregate Organics (QCLot: 1082547)									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	90.8	85.0	115	----
Aggregate Organics (QCLot: 1088761)									
Chemical oxygen demand [COD]	----	E559-L	10	mg/L	100 mg/L	110	85.0	115	----
Perfluoroalkyl Substances (PFAS) (QCLot: 1083359)									
Eicosafuoro-3-oxaundecane-1-sulfonic acid, 11-chloro- [11Cl-PF3OUdS]	763051-92-9	E745B	0.02	µg/L	0.3 µg/L	103	50.0	150	----
Ethyl perfluorooctanesulfonamide, n- [NEtFOSA]	4151-50-2	E745B	0.025	µg/L	0.3 µg/L	100	50.0	150	----
Ethyl perfluorooctanesulfonamidoacetic acid, n- [NEtFOSAA]	2991-50-6	E745B	0.01	µg/L	0.3 µg/L	107	50.0	150	----
Ethyl perfluorooctanesulfonamidoethanol, n- [NEtFOSE]	1691-99-2	E745B	0.03	µg/L	0.3 µg/L	110	50.0	150	----
Fluorotelomer sulfonic acid, 10:2 [10:2 FTS]	120226-60-0	E745B	0.01	µg/L	0.3 µg/L	72.7	50.0	150	----
Fluorotelomer sulfonic acid, 4:2 [4:2 FTS]	757124-72-4	E745B	0.01	µg/L	0.3 µg/L	97.3	50.0	150	----
Fluorotelomer sulfonic acid, 6:2 [6:2 FTS]	27619-97-2	E745B	0.01	µg/L	0.3 µg/L	118	50.0	150	----
Fluorotelomer sulfonic acid, 8:2 [8:2 FTS]	39108-34-4	E745B	0.01	µg/L	0.3 µg/L	108	50.0	150	----
Hexadecafluoro-3-oxanonane-1-sulfonic acid, 9-chloro- [9Cl-PF3ONS]	756426-58-1	E745B	0.02	µg/L	0.3 µg/L	93.3	50.0	150	----
Hexafluoropropylene oxide dimer acid [HFPO-DA]	13252-13-6	E745B	0.2	µg/L	3 µg/L	97.6	50.0	150	----
Methyl perfluorooctanesulfonamide, N- [NMeFOSA]	31506-32-8	E745B	0.025	µg/L	0.3 µg/L	74.0	50.0	150	----
Methyl perfluorooctanesulfonamidoacetic acid, n- [NMeFOSAA]	2355-31-9	E745B	0.01	µg/L	0.3 µg/L	125	50.0	150	----
Methyl perfluorooctanesulfonamidoethanol, n- [NMeFOSE]	24448-09-7	E745B	0.03	µg/L	0.3 µg/L	90.7	50.0	150	----
Perfluorobutanesulfonic acid [PFBS]	375-73-5	E745B	0.01	µg/L	0.3 µg/L	90.7	50.0	150	----
Perfluorobutanoic acid [PFBA]	375-22-4	E745B	0.1	µg/L	1 µg/L	122	50.0	150	----
Perfluorodecane sulfonic acid [PFDS]	335-77-3	E745B	0.01	µg/L	0.3 µg/L	106	50.0	150	----



Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Perfluoroalkyl Substances (PFAS) (QCLot: 1083359) - continued									
Perfluorodecanoic acid [PFDA]	335-76-2	E745B	0.01	µg/L	0.3 µg/L	105	50.0	150	----
Perfluorododecanoic acid [PFDoA]	307-55-1	E745B	0.01	µg/L	0.3 µg/L	111	50.0	150	----
Perfluoroheptanesulfonic acid [PFHpS]	375-92-8	E745B	0.01	µg/L	0.3 µg/L	92.0	50.0	150	----
Perfluoroheptanoic acid [PFHpA]	375-85-9	E745B	0.01	µg/L	0.3 µg/L	93.3	50.0	150	----
Perfluorohexanesulfonic acid [PFHxS]	355-46-4	E745B	0.01	µg/L	0.3 µg/L	103	50.0	150	----
Perfluorohexanoic acid [PFHxA]	307-24-4	E745B	0.01	µg/L	0.3 µg/L	103	50.0	150	----
Perfluorononanesulfonic acid [PFNS]	68259-12-1	E745B	0.01	µg/L	0.3 µg/L	91.3	50.0	150	----
Perfluorononanoic acid [PFNA]	375-95-1	E745B	0.01	µg/L	0.3 µg/L	113	50.0	150	----
Perfluorononanoic acid, 4,8-dioxo-3H- [ADONA]	919005-14-4	E745B	0.01	µg/L	0.3 µg/L	85.3	50.0	150	----
Perfluorooctanesulfonamide [PFOSA]	754-91-6	E745B	0.01	µg/L	0.3 µg/L	101	50.0	150	----
Perfluorooctanesulfonic acid [PFOS]	1763-23-1	E745B	0.01	µg/L	0.3 µg/L	91.3	50.0	150	----
Perfluorooctanoic acid [PFOA]	335-67-1	E745B	0.01	µg/L	0.3 µg/L	94.7	50.0	150	----
Perfluoropentanesulfonic acid [PFPeS]	2706-91-4	E745B	0.01	µg/L	0.3 µg/L	117	50.0	150	----
Perfluoropentanoic acid [PFPeA]	2706-90-3	E745B	0.01	µg/L	0.3 µg/L	107	50.0	150	----
Perfluorotetradecanoic acid [PFTeDA]	376-06-7	E745B	0.025	µg/L	0.3 µg/L	111	50.0	150	----
Perfluorotridecanoic acid [PFTTrDA]	72629-94-8	E745B	0.025	µg/L	0.3 µg/L	105	50.0	150	----
Perfluoroundecanoic acid [PFUnA]	2058-94-8	E745B	0.01	µg/L	0.3 µg/L	107	50.0	150	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1089683)										
VA23B8761-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.43 mg/L	2.5 mg/L	97.4	70.0	130	----
Aggregate Organics (QCLot: 1088761)										
VA23B8372-028	Anonymous	Chemical oxygen demand [COD]	----	E559-L	106 mg/L	100 mg/L	106	75.0	125	----
Perfluoroalkyl Substances (PFAS) (QCLot: 1083359)										
EO2307058-001	Anonymous	Eicosafuoro-3-oxaundecane-1-sulfonic acid, 11-chloro- [11Cl-PF3OUdS]	763051-92-9	E745B	0.314 µg/L	0.3 µg/L	105	50.0	150	----
		Ethyl perfluorooctanesulfonamide, n- [NEtFOSA]	4151-50-2	E745B	0.252 µg/L	0.3 µg/L	84.0	50.0	150	----
		Ethyl perfluorooctanesulfonamidoacetic acid, n- [NEtFOSAA]	2991-50-6	E745B	0.306 µg/L	0.3 µg/L	102	50.0	150	----
		Ethyl perfluorooctanesulfonamidoethanol, n- [NEtFOSE]	1691-99-2	E745B	0.308 µg/L	0.3 µg/L	103	50.0	150	----
		Fluorotelomer sulfonic acid, 10:2 [10:2 FTS]	120226-60-0	E745B	0.242 µg/L	0.3 µg/L	80.7	50.0	150	----
		Fluorotelomer sulfonic acid, 4:2 [4:2 FTS]	757124-72-4	E745B	0.244 µg/L	0.3 µg/L	81.3	50.0	150	----
		Fluorotelomer sulfonic acid, 6:2 [6:2 FTS]	27619-97-2	E745B	0.272 µg/L	0.3 µg/L	90.7	50.0	150	----
		Fluorotelomer sulfonic acid, 8:2 [8:2 FTS]	39108-34-4	E745B	0.338 µg/L	0.3 µg/L	113	50.0	150	----
		Hexadecafluoro-3-oxanonane-1-sulfonic acid, 9-chloro- [9Cl-PF3ONS]	756426-58-1	E745B	0.308 µg/L	0.3 µg/L	103	50.0	150	----
		Hexafluoropropylene oxide dimer acid [HFPO-DA]	13252-13-6	E745B	2.84 µg/L	3 µg/L	94.5	50.0	150	----
		Methyl perfluorooctanesulfonamide, N- [NMeFOSA]	31506-32-8	E745B	0.210 µg/L	0.3 µg/L	70.0	50.0	150	----
		Methyl perfluorooctanesulfonamidoacetic acid, n- [NMeFOSAA]	2355-31-9	E745B	0.334 µg/L	0.3 µg/L	111	50.0	150	----
		Methyl perfluorooctanesulfonamidoethanol, n- [NMeFOSE]	24448-09-7	E745B	0.296 µg/L	0.3 µg/L	98.7	50.0	150	----
		Perfluorobutanesulfonic acid [PFBS]	375-73-5	E745B	0.256 µg/L	0.3 µg/L	85.3	50.0	150	----
		Perfluorobutanoic acid [PFBA]	375-22-4	E745B	1.02 µg/L	1 µg/L	102	50.0	150	----
		Perfluorodecane sulfonic acid [PFDS]	335-77-3	E745B	0.354 µg/L	0.3 µg/L	118	50.0	150	----
		Perfluorodecanoic acid [PFDA]	335-76-2	E745B	0.308 µg/L	0.3 µg/L	103	50.0	150	----
		Perfluorododecanoic acid [PFDoA]	307-55-1	E745B	0.320 µg/L	0.3 µg/L	107	50.0	150	----



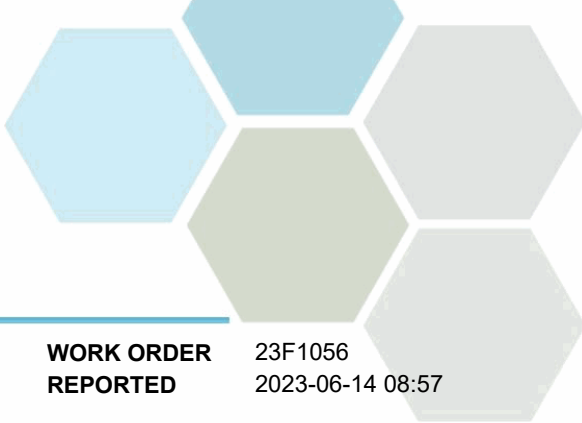
Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	
Perfluoroalkyl Substances (PFAS) (QCLOT: 1083359) - continued										
EO2307058-001	Anonymous	Perfluoroheptanesulfonic acid [PFHpS]	375-92-8	E745B	0.272 µg/L	0.3 µg/L	90.7	50.0	150	----
		Perfluoroheptanoic acid [PFHpA]	375-85-9	E745B	0.306 µg/L	0.3 µg/L	102	50.0	150	----
		Perfluorohexanesulfonic acid [PFHxS]	355-46-4	E745B	0.304 µg/L	0.3 µg/L	101	50.0	150	----
		Perfluorohexanoic acid [PFHxA]	307-24-4	E745B	0.296 µg/L	0.3 µg/L	98.7	50.0	150	----
		Perfluorononanesulfonic acid [PFNS]	68259-12-1	E745B	0.284 µg/L	0.3 µg/L	94.7	50.0	150	----
		Perfluorononanoic acid [PFNA]	375-95-1	E745B	0.328 µg/L	0.3 µg/L	109	50.0	150	----
		Perfluorononanoic acid, 4,8-dioxa-3H-[ADONA]	919005-14-4	E745B	0.286 µg/L	0.3 µg/L	95.3	50.0	150	----
		Perfluorooctanesulfonamide [PFOSA]	754-91-6	E745B	0.300 µg/L	0.3 µg/L	100	50.0	150	----
		Perfluorooctanesulfonic acid [PFOS]	1763-23-1	E745B	0.266 µg/L	0.3 µg/L	88.7	50.0	150	----
		Perfluorooctanoic acid [PFOA]	335-67-1	E745B	0.288 µg/L	0.3 µg/L	96.0	50.0	150	----
		Perfluoropentanesulfonic acid [PFPeS]	2706-91-4	E745B	0.348 µg/L	0.3 µg/L	116	50.0	150	----
		Perfluoropentanoic acid [PFPeA]	2706-90-3	E745B	0.318 µg/L	0.3 µg/L	106	50.0	150	----
		Perfluorotetradecanoic acid [PFTeDA]	376-06-7	E745B	0.352 µg/L	0.3 µg/L	117	50.0	150	----
		Perfluorotridecanoic acid [PFTrDA]	72629-94-8	E745B	0.336 µg/L	0.3 µg/L	112	50.0	150	----
		Perfluoroundecanoic acid [PFUnA]	2058-94-8	E745B	0.306 µg/L	0.3 µg/L	102	50.0	150	----

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Bioreactor

WORK ORDER REPORTED 23F1056
2023-06-14 08:57

Analyte	Result	RL	Units	Analyzed	Qualifier
Bioreactor (23F1056-01) Matrix: Water Sampled: 2023-06-07 06:50					
Calculated Parameters					
Hardness, Total (as CaCO ₃)	235	0.500	mg/L	N/A	
General Parameters					
Alkalinity, Total (as CaCO ₃)	148	1.0	mg/L	2023-06-12	
Alkalinity, Phenolphthalein (as CaCO ₃)	< 1.0	1.0	mg/L	2023-06-12	
Alkalinity, Bicarbonate (as CaCO ₃)	148	1.0	mg/L	2023-06-12	
Alkalinity, Carbonate (as CaCO ₃)	< 1.0	1.0	mg/L	2023-06-12	
Alkalinity, Hydroxide (as CaCO ₃)	< 1.0	1.0	mg/L	2023-06-12	
Total Metals					
Aluminum, total	46.0	0.0050	mg/L	2023-06-11	
Antimony, total	0.00239	0.00020	mg/L	2023-06-11	
Arsenic, total	0.00598	0.00050	mg/L	2023-06-11	
Barium, total	0.468	0.0050	mg/L	2023-06-11	
Beryllium, total	0.00025	0.00010	mg/L	2023-06-11	
Bismuth, total	0.0530	0.00010	mg/L	2023-06-11	
Boron, total	0.303	0.0500	mg/L	2023-06-11	
Cadmium, total	0.00163	0.000010	mg/L	2023-06-11	
Calcium, total	44.6	0.20	mg/L	2023-06-11	
Chromium, total	0.0196	0.00050	mg/L	2023-06-11	
Cobalt, total	0.00351	0.00010	mg/L	2023-06-11	
Copper, total	1.17	0.00040	mg/L	2023-06-11	
Iron, total	2.91	0.010	mg/L	2023-06-11	
Lead, total	0.0113	0.00020	mg/L	2023-06-11	
Lithium, total	0.00616	0.00010	mg/L	2023-06-11	
Magnesium, total	30.0	0.010	mg/L	2023-06-11	
Manganese, total	0.210	0.00020	mg/L	2023-06-11	
Mercury, total	< 0.000020	0.000010	mg/L	2023-06-12	
Molybdenum, total	0.0192	0.00010	mg/L	2023-06-11	
Nickel, total	0.0245	0.00040	mg/L	2023-06-11	
Phosphorus, total	116	0.050	mg/L	2023-06-11	
Potassium, total	49.5	0.10	mg/L	2023-06-11	
Selenium, total	0.00752	0.00050	mg/L	2023-06-11	
Silicon, total	9.6	1.0	mg/L	2023-06-11	
Silver, total	0.00309	0.000050	mg/L	2023-06-11	
Sodium, total	61.4	0.10	mg/L	2023-06-11	
Strontium, total	0.575	0.0010	mg/L	2023-06-11	
Sulfur, total	30.6	3.0	mg/L	2023-06-11	
Tellurium, total	< 0.00050	0.00050	mg/L	2023-06-11	
Thallium, total	0.000077	0.000020	mg/L	2023-06-11	
Thorium, total	0.00024	0.00010	mg/L	2023-06-13	
Tin, total	0.00465	0.00020	mg/L	2023-06-11	
Titanium, total	0.0335	0.0050	mg/L	2023-06-11	
Tungsten, total	0.0011	0.0010	mg/L	2023-06-11	



TEST RESULTS

REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Bioreactor	WORK ORDER REPORTED	23F1056 2023-06-14 08:57
---------------------	--	---------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Bioreactor (23F1056-01) | Matrix: Water | Sampled: 2023-06-07 06:50, Continued

Total Metals, Continued

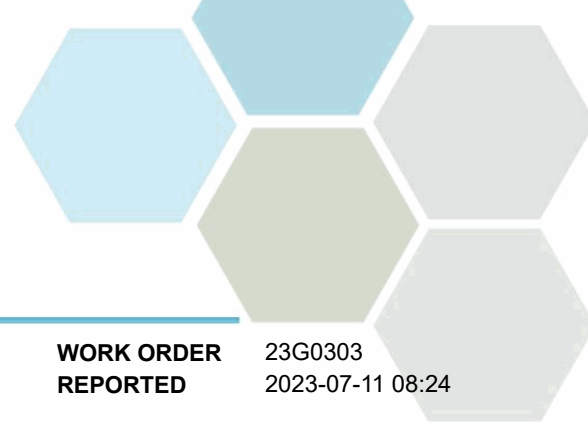
Uranium, total	0.0216	0.000020	mg/L	2023-06-11	
Vanadium, total	0.0134	0.0050	mg/L	2023-06-11	
Zinc, total	1.03	0.0040	mg/L	2023-06-11	
Zirconium, total	0.00588	0.00010	mg/L	2023-06-11	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Bioreactor

WORK ORDER REPORTED 23G0303
2023-07-11 08:24

Analyte	Result	RL	Units	Analyzed	Qualifier
Bioreactor (23G0303-01) Matrix: Wastewater Sampled: 2023-07-05 08:15					
Calculated Parameters					
Hardness, Total (as CaCO ₃)	287	0.500	mg/L	N/A	
General Parameters					
Alkalinity, Total (as CaCO ₃)	178	1.0	mg/L	2023-07-07	
Total Metals					
Aluminum, total	42.1	0.0050	mg/L	2023-07-09	
Antimony, total	0.00256	0.00020	mg/L	2023-07-09	
Arsenic, total	0.00559	0.00050	mg/L	2023-07-09	
Barium, total	0.487	0.0050	mg/L	2023-07-09	
Beryllium, total	0.00021	0.00010	mg/L	2023-07-09	
Bismuth, total	0.0503	0.00010	mg/L	2023-07-09	
Boron, total	0.353	0.0500	mg/L	2023-07-09	
Cadmium, total	0.00169	0.000010	mg/L	2023-07-09	
Calcium, total	74.8	0.20	mg/L	2023-07-09	
Chromium, total	0.0160	0.00050	mg/L	2023-07-09	
Cobalt, total	0.00288	0.00010	mg/L	2023-07-09	
Copper, total	0.977	0.00040	mg/L	2023-07-09	
Iron, total	2.74	0.010	mg/L	2023-07-09	
Lead, total	0.0111	0.00020	mg/L	2023-07-09	
Lithium, total	0.00650	0.00010	mg/L	2023-07-09	
Magnesium, total	24.3	0.010	mg/L	2023-07-09	
Manganese, total	0.223	0.00020	mg/L	2023-07-09	
Mercury, total	0.000340	0.000040	mg/L	2023-07-09	HG1
Molybdenum, total	0.0191	0.00010	mg/L	2023-07-09	
Nickel, total	0.0191	0.00040	mg/L	2023-07-09	
Phosphorus, total	103	0.050	mg/L	2023-07-09	
Potassium, total	38.0	0.10	mg/L	2023-07-09	
Selenium, total	0.00708	0.00050	mg/L	2023-07-09	
Silicon, total	9.0	1.0	mg/L	2023-07-09	
Silver, total	0.00287	0.000050	mg/L	2023-07-09	
Sodium, total	56.0	0.10	mg/L	2023-07-09	
Strontium, total	0.685	0.0010	mg/L	2023-07-09	
Sulfur, total	31.3	3.0	mg/L	2023-07-09	
Tellurium, total	< 0.00050	0.00050	mg/L	2023-07-09	
Thallium, total	0.000056	0.000020	mg/L	2023-07-09	
Thorium, total	0.00021	0.00010	mg/L	2023-07-09	
Tin, total	0.00267	0.00020	mg/L	2023-07-09	
Titanium, total	0.0259	0.0050	mg/L	2023-07-09	
Tungsten, total	0.0012	0.0010	mg/L	2023-07-09	
Uranium, total	0.0219	0.000020	mg/L	2023-07-09	
Vanadium, total	0.0102	0.0050	mg/L	2023-07-09	
Zinc, total	0.813	0.0040	mg/L	2023-07-09	
Zirconium, total	0.00610	0.00010	mg/L	2023-07-09	



TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Bioreactor

WORK ORDER REPORTED 23G0303
2023-07-11 08:24

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Sample Qualifiers:

HG1 Sample bottle and preservation submitted is not suitable for Mercury analysis and analyte stability may be affected.

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Bioreactor

WORK ORDER REPORTED 2310543
2023-09-12 13:44

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Bioreactor (2310543-01) | Matrix: Wastewater | Sampled: 2023-09-06 07:50

Calculated Parameters

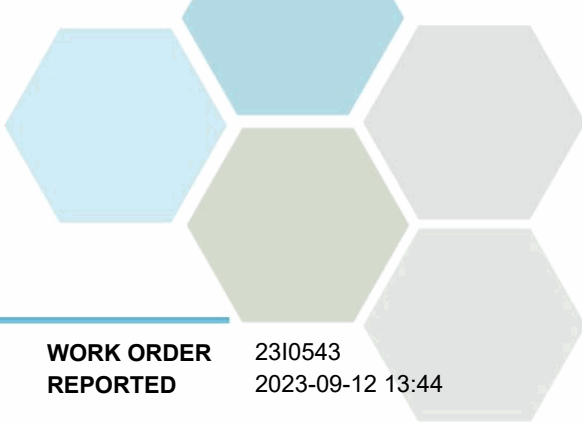
Hardness, Total (as CaCO ₃)	244	0.500	mg/L	N/A	
---	-----	-------	------	-----	--

General Parameters

Alkalinity, Total (as CaCO ₃)	144	1.0	mg/L	2023-09-07	
Alkalinity, Phenolphthalein (as CaCO ₃)	< 1.0	1.0	mg/L	2023-09-07	
Alkalinity, Bicarbonate (as CaCO ₃)	144	1.0	mg/L	2023-09-07	
Alkalinity, Carbonate (as CaCO ₃)	< 1.0	1.0	mg/L	2023-09-07	
Alkalinity, Hydroxide (as CaCO ₃)	< 1.0	1.0	mg/L	2023-09-07	

Total Metals

Aluminum, total	39.0	0.0050	mg/L	2023-09-09	
Antimony, total	0.00254	0.00020	mg/L	2023-09-09	
Arsenic, total	0.00458	0.00050	mg/L	2023-09-09	
Barium, total	0.357	0.0050	mg/L	2023-09-09	
Beryllium, total	0.00014	0.00010	mg/L	2023-09-09	
Bismuth, total	0.0435	0.00010	mg/L	2023-09-09	
Boron, total	0.319	0.0500	mg/L	2023-09-09	
Cadmium, total	0.00138	0.000010	mg/L	2023-09-09	
Calcium, total	59.7	0.20	mg/L	2023-09-09	
Chromium, total	0.0153	0.00050	mg/L	2023-09-09	
Cobalt, total	0.00278	0.00010	mg/L	2023-09-09	
Copper, total	0.892	0.00040	mg/L	2023-09-09	
Iron, total	2.30	0.010	mg/L	2023-09-09	
Lead, total	0.0103	0.00020	mg/L	2023-09-09	
Lithium, total	0.00550	0.00010	mg/L	2023-09-09	
Magnesium, total	23.0	0.010	mg/L	2023-09-09	
Manganese, total	0.256	0.00020	mg/L	2023-09-09	
Mercury, total	< 0.000010	0.000010	mg/L	2023-09-08	
Molybdenum, total	0.0220	0.00010	mg/L	2023-09-09	
Nickel, total	0.0181	0.00040	mg/L	2023-09-09	
Phosphorus, total	96.4	0.050	mg/L	2023-09-09	
Potassium, total	40.9	0.10	mg/L	2023-09-09	
Selenium, total	0.00896	0.00050	mg/L	2023-09-09	
Silicon, total	7.7	1.0	mg/L	2023-09-09	
Silver, total	0.00245	0.000050	mg/L	2023-09-09	
Sodium, total	59.3	0.10	mg/L	2023-09-09	
Strontium, total	0.502	0.0010	mg/L	2023-09-09	
Sulfur, total	30.0	3.0	mg/L	2023-09-09	
Tellurium, total	< 0.00050	0.00050	mg/L	2023-09-09	
Thallium, total	0.000046	0.000020	mg/L	2023-09-09	
Thorium, total	0.00024	0.00010	mg/L	2023-09-09	
Tin, total	0.00202	0.00020	mg/L	2023-09-09	
Titanium, total	0.0181	0.0050	mg/L	2023-09-09	
Tungsten, total	0.0010	0.0010	mg/L	2023-09-09	



TEST RESULTS

REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Bioreactor	WORK ORDER REPORTED	2310543 2023-09-12 13:44
----------------------------	--	----------------------------	-----------------------------

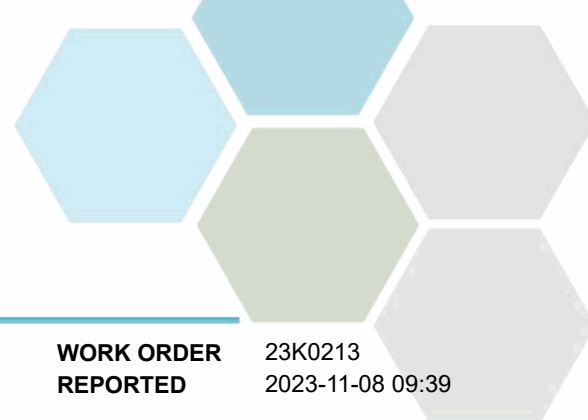
Analyte	Result	RL	Units	Analyzed	Qualifier
Bioreactor (2310543-01) Matrix: Wastewater Sampled: 2023-09-06 07:50, Continued					
<i>Total Metals, Continued</i>					
Uranium, total	0.0160	0.000020	mg/L	2023-09-09	
Vanadium, total	0.0088	0.0050	mg/L	2023-09-09	
Zinc, total	0.720	0.0040	mg/L	2023-09-09	
Zirconium, total	0.00448	0.00010	mg/L	2023-09-09	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Bioreactor

WORK ORDER REPORTED 23K0213
2023-11-08 09:39

Analyte	Result	RL	Units	Analyzed	Qualifier
Bioreactor (23K0213-01) Matrix: Wastewater Sampled: 2023-11-01 08:00					
Calculated Parameters					
Hardness, Total (as CaCO ₃)	226	0.500	mg/L	N/A	
General Parameters					
Alkalinity, Total (as CaCO ₃)	115	1.0	mg/L	2023-11-04	
Alkalinity, Phenolphthalein (as CaCO ₃)	< 1.0	1.0	mg/L	2023-11-04	
Alkalinity, Bicarbonate (as CaCO ₃)	115	1.0	mg/L	2023-11-04	
Alkalinity, Carbonate (as CaCO ₃)	< 1.0	1.0	mg/L	2023-11-04	
Alkalinity, Hydroxide (as CaCO ₃)	< 1.0	1.0	mg/L	2023-11-04	
Total Metals					
Aluminum, total	12.0	0.0050	mg/L	2023-11-07	
Antimony, total	0.00159	0.00020	mg/L	2023-11-07	
Arsenic, total	0.00287	0.00050	mg/L	2023-11-07	
Barium, total	0.234	0.0050	mg/L	2023-11-07	
Beryllium, total	0.00013	0.00010	mg/L	2023-11-07	
Bismuth, total	0.0288	0.00010	mg/L	2023-11-07	
Boron, total	0.238	0.0500	mg/L	2023-11-07	
Cadmium, total	0.00126	0.000010	mg/L	2023-11-07	
Calcium, total	51.7	0.20	mg/L	2023-11-07	
Chromium, total	0.0103	0.00050	mg/L	2023-11-07	
Cobalt, total	0.00254	0.00010	mg/L	2023-11-07	
Copper, total	0.681	0.00040	mg/L	2023-11-07	
Iron, total	3.31	0.010	mg/L	2023-11-07	
Lead, total	0.00845	0.00020	mg/L	2023-11-07	
Lithium, total	0.00500	0.00010	mg/L	2023-11-07	
Magnesium, total	23.5	0.010	mg/L	2023-11-07	
Manganese, total	0.177	0.00020	mg/L	2023-11-07	
Mercury, total	0.000182	0.000010	mg/L	2023-11-06	
Molybdenum, total	0.0170	0.00010	mg/L	2023-11-07	
Nickel, total	0.0131	0.00040	mg/L	2023-11-07	
Phosphorus, total	70.3	0.050	mg/L	2023-11-07	
Potassium, total	40.4	0.10	mg/L	2023-11-07	
Selenium, total	0.00414	0.00050	mg/L	2023-11-07	
Silicon, total	7.2	1.0	mg/L	2023-11-07	
Silver, total	0.00155	0.000050	mg/L	2023-11-07	
Sodium, total	58.6	0.10	mg/L	2023-11-07	
Strontium, total	0.372	0.0010	mg/L	2023-11-07	
Sulfur, total	23.7	3.0	mg/L	2023-11-07	
Tellurium, total	< 0.00050	0.00050	mg/L	2023-11-07	
Thallium, total	0.000040	0.000020	mg/L	2023-11-07	
Thorium, total	< 0.00010	0.00010	mg/L	2023-11-07	
Tin, total	0.00089	0.00020	mg/L	2023-11-07	
Titanium, total	0.0120	0.0050	mg/L	2023-11-07	
Tungsten, total	< 0.0010	0.0010	mg/L	2023-11-07	



TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Bioreactor

WORK ORDER REPORTED 23K0213
2023-11-08 09:39

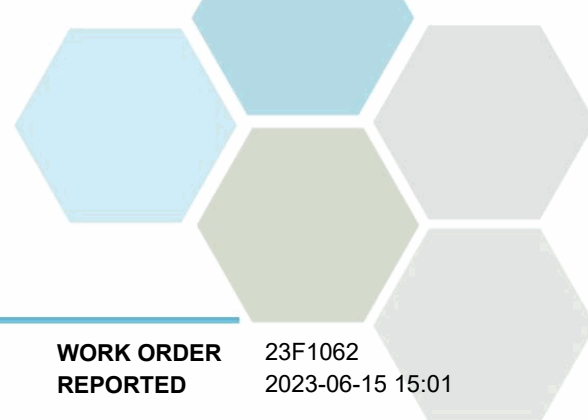
Analyte	Result	RL	Units	Analyzed	Qualifier
Bioreactor (23K0213-01) Matrix: Wastewater Sampled: 2023-11-01 08:00, Continued					
<i>Total Metals, Continued</i>					
Uranium, total	0.0110	0.000020	mg/L	2023-11-07	
Vanadium, total	0.0068	0.0050	mg/L	2023-11-07	
Zinc, total	0.613	0.0040	mg/L	2023-11-07	
Zirconium, total	0.00059	0.00010	mg/L	2023-11-07	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Cake

WORK ORDER REPORTED 23F1062
2023-06-15 15:01

Analyte	Result	RL	Units	Analyzed	Qualifier
BIOSOLIDS, E231763 (23F1062-01) Matrix: Soil Sampled: 2023-06-07 07:40					
General Parameters					
Moisture	74.9	1.0	% wet	2023-06-12	
Nitrogen, Total Kjeldahl	4.86	0.0004	% dry	2023-06-14	
pH (1:2 H2O Solution)	5.68	0.10	pH units	2023-06-11	
Solids, Total	21.8	0.1	% wet	2023-06-15	
Solids, Volatile	85.4	0.1	% dry	2023-06-15	
Microbiological Parameters					
Coliforms, Fecal	4400000	3.0	MPN/g dry	2023-06-08	
E. coli	4400000	3.0	MPN/g dry	2023-06-08	
Strong Acid Leachable Metals					
Aluminum	8690	40	mg/kg dry	2023-06-13	
Antimony	0.88	0.10	mg/kg dry	2023-06-13	
Arsenic	1.36	0.30	mg/kg dry	2023-06-13	
Barium	132	1.0	mg/kg dry	2023-06-13	
Beryllium	< 0.10	0.10	mg/kg dry	2023-06-13	
Bismuth	16.4	0.10	mg/kg dry	2023-06-13	
Boron	20.8	2.0	mg/kg dry	2023-06-13	
Cadmium	0.504	0.040	mg/kg dry	2023-06-13	
Calcium	10000	100	mg/kg dry	2023-06-13	
Chromium	8.6	1.0	mg/kg dry	2023-06-13	
Cobalt	0.96	0.10	mg/kg dry	2023-06-13	
Copper	282	0.40	mg/kg dry	2023-06-13	
Iron	1750	20.0	mg/kg dry	2023-06-13	
Lead	4.26	0.20	mg/kg dry	2023-06-13	
Lithium	0.69	0.10	mg/kg dry	2023-06-13	
Magnesium	3720	10	mg/kg dry	2023-06-13	
Manganese	48.0	0.40	mg/kg dry	2023-06-13	
Mercury	0.156	0.040	mg/kg dry	2023-06-13	
Molybdenum	4.74	0.10	mg/kg dry	2023-06-13	
Nickel	6.88	0.60	mg/kg dry	2023-06-13	
Phosphorus	21000	10	mg/kg dry	2023-06-13	
Potassium	4630	40	mg/kg dry	2023-06-13	
Selenium	2.37	0.20	mg/kg dry	2023-06-13	
Silver	0.97	0.10	mg/kg dry	2023-06-13	
Sodium	351	50	mg/kg dry	2023-06-13	
Strontium	89.4	0.20	mg/kg dry	2023-06-13	
Sulfur	4630	1000	mg/kg dry	2023-06-13	
Tellurium	< 0.10	0.10	mg/kg dry	2023-06-13	
Thallium	< 0.10	0.10	mg/kg dry	2023-06-13	
Thorium	0.54	0.50	mg/kg dry	2023-06-13	
Tin	9.75	0.20	mg/kg dry	2023-06-13	
Titanium	66.2	1.0	mg/kg dry	2023-06-13	
Tungsten	0.67	0.20	mg/kg dry	2023-06-13	



TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Cake

WORK ORDER REPORTED 23F1062
2023-06-15 15:01

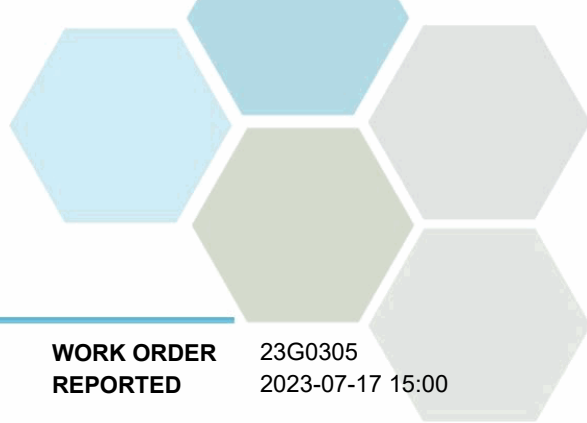
Analyte	Result	RL	Units	Analyzed	Qualifier
BIOSOLIDS, E231763 (23F1062-01) Matrix: Soil Sampled: 2023-06-07 07:40, Continued					
<i>Strong Acid Leachable Metals, Continued</i>					
Uranium	5.31	0.050	mg/kg dry	2023-06-13	
Vanadium	4.3	1.0	mg/kg dry	2023-06-13	
Zinc	351	2.0	mg/kg dry	2023-06-13	
Zirconium	10.9	2.0	mg/kg dry	2023-06-13	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Cake

WORK ORDER REPORTED 23G0305
2023-07-17 15:00

Analyte	Result	RL	Units	Analyzed	Qualifier
Biosolids (23G0305-01) Matrix: Biosolids Sampled: 2023-07-05 09:00					
General Parameters					
Moisture	77.7	1.0	% wet	2023-07-10	
Nitrogen, Total Kjeldahl	5.30	0.0004	% dry	2023-07-12	
Solids, Total	22.3	0.1	% wet	2023-07-10	
Solids, Volatile	86.0	0.1	% dry	2023-07-10	
Microbiological Parameters					
Coliforms, Fecal	2100000	3.0	MPN/g dry	2023-07-06	
E. coli	2100000	3.0	MPN/g dry	2023-07-06	
Strong Acid Leachable Metals					
Aluminum	10100	40	mg/kg dry	2023-07-14	
Antimony	0.88	0.10	mg/kg dry	2023-07-14	
Arsenic	1.31	0.30	mg/kg dry	2023-07-14	
Barium	157	1.0	mg/kg dry	2023-07-14	
Beryllium	< 0.10	0.10	mg/kg dry	2023-07-14	
Bismuth	16.8	0.10	mg/kg dry	2023-07-14	
Boron	13.1	2.0	mg/kg dry	2023-07-14	
Cadmium	0.538	0.040	mg/kg dry	2023-07-14	
Calcium	8650	100	mg/kg dry	2023-07-14	
Chromium	8.4	1.0	mg/kg dry	2023-07-14	
Cobalt	0.86	0.10	mg/kg dry	2023-07-14	
Copper	287	0.40	mg/kg dry	2023-07-14	
Iron	1540	20.0	mg/kg dry	2023-07-14	
Lead	3.96	0.20	mg/kg dry	2023-07-14	
Lithium	0.59	0.10	mg/kg dry	2023-07-14	
Magnesium	3170	10	mg/kg dry	2023-07-14	
Manganese	51.8	0.40	mg/kg dry	2023-07-14	
Mercury	0.192	0.040	mg/kg dry	2023-07-14	
Molybdenum	4.75	0.10	mg/kg dry	2023-07-14	
Nickel	6.16	0.60	mg/kg dry	2023-07-14	
Phosphorus	20500	10	mg/kg dry	2023-07-14	
Potassium	3520	40	mg/kg dry	2023-07-14	
Selenium	2.28	0.20	mg/kg dry	2023-07-14	
Silver	1.18	0.10	mg/kg dry	2023-07-14	
Sodium	354	50	mg/kg dry	2023-07-14	
Strontium	104	0.20	mg/kg dry	2023-07-14	
Sulfur	4650	1000	mg/kg dry	2023-07-14	
Tellurium	< 0.10	0.10	mg/kg dry	2023-07-14	
Thallium	< 0.10	0.10	mg/kg dry	2023-07-14	
Thorium	< 0.50	0.50	mg/kg dry	2023-07-14	
Tin	10.5	0.20	mg/kg dry	2023-07-14	
Titanium	47.4	1.0	mg/kg dry	2023-07-14	
Tungsten	0.50	0.20	mg/kg dry	2023-07-14	
Uranium	5.18	0.050	mg/kg dry	2023-07-14	



TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Cake

WORK ORDER REPORTED 23G0305
2023-07-17 15:00

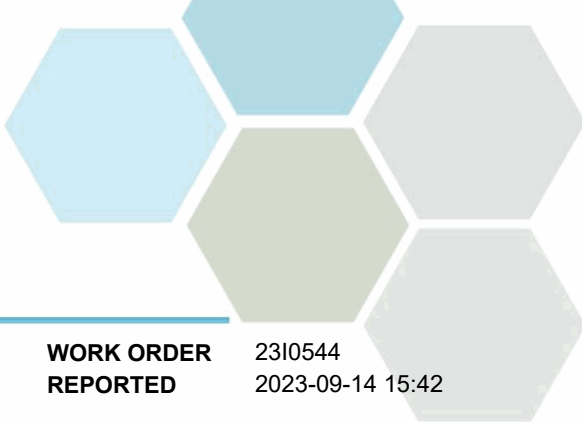
Analyte	Result	RL	Units	Analyzed	Qualifier
Biosolids (23G0305-01) Matrix: Biosolids Sampled: 2023-07-05 09:00, Continued					
<i>Strong Acid Leachable Metals, Continued</i>					
Vanadium	3.9	1.0	mg/kg dry	2023-07-14	
Zinc	328	2.0	mg/kg dry	2023-07-14	
Zirconium	17.5	2.0	mg/kg dry	2023-07-14	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Cake

WORK ORDER REPORTED 2310544
2023-09-14 15:42

Analyte	Result	RL	Units	Analyzed	Qualifier
BIOSOLIDS, E231763 (2310544-01) Matrix: Soil Sampled: 2023-09-06 09:30					
General Parameters					
Moisture	57.0	1.0	% wet	2023-09-11	
Nitrogen, Total Kjeldahl	2.88	0.0004	% dry	2023-09-14	
pH (1:2 H2O Solution)	7.30	0.10	pH units	2023-09-14	PH1
Solids, Total	21.3	0.1	% wet	2023-09-07	
Solids, Volatile	85.8	0.1	% dry	2023-09-07	
Microbiological Parameters					
Coliforms, Fecal	5600000	3.0	MPN/g dry	2023-09-07	
E. coli	2600000	3.0	MPN/g dry	2023-09-07	
Strong Acid Leachable Metals					
Aluminum	10100	40	mg/kg dry	2023-09-10	
Antimony	0.90	0.10	mg/kg dry	2023-09-10	
Arsenic	1.18	0.30	mg/kg dry	2023-09-10	
Barium	124	1.0	mg/kg dry	2023-09-10	
Beryllium	< 0.10	0.10	mg/kg dry	2023-09-10	
Bismuth	15.1	0.10	mg/kg dry	2023-09-10	
Boron	17.9	2.0	mg/kg dry	2023-09-10	
Cadmium	0.488	0.040	mg/kg dry	2023-09-10	
Calcium	13700	100	mg/kg dry	2023-09-10	
Chromium	7.4	1.0	mg/kg dry	2023-09-10	
Cobalt	0.85	0.10	mg/kg dry	2023-09-10	
Copper	272	0.40	mg/kg dry	2023-09-10	
Iron	1430	20.0	mg/kg dry	2023-09-10	
Lead	3.61	0.20	mg/kg dry	2023-09-10	
Lithium	0.46	0.10	mg/kg dry	2023-09-10	
Magnesium	3250	10	mg/kg dry	2023-09-10	
Manganese	63.5	0.40	mg/kg dry	2023-09-10	
Mercury	0.120	0.040	mg/kg dry	2023-09-10	
Molybdenum	5.78	0.10	mg/kg dry	2023-09-10	
Nickel	5.98	0.60	mg/kg dry	2023-09-10	
Phosphorus	19200	10	mg/kg dry	2023-09-10	
Potassium	3610	40	mg/kg dry	2023-09-10	
Selenium	2.80	0.20	mg/kg dry	2023-09-10	
Silver	1.04	0.10	mg/kg dry	2023-09-10	
Sodium	421	50	mg/kg dry	2023-09-10	
Strontium	101	0.20	mg/kg dry	2023-09-10	
Sulfur	4600	1000	mg/kg dry	2023-09-10	
Tellurium	< 0.10	0.10	mg/kg dry	2023-09-10	
Thallium	< 0.10	0.10	mg/kg dry	2023-09-10	
Thorium	< 0.50	0.50	mg/kg dry	2023-09-10	
Tin	8.93	0.20	mg/kg dry	2023-09-10	
Titanium	42.1	1.0	mg/kg dry	2023-09-10	
Tungsten	0.42	0.20	mg/kg dry	2023-09-10	



TEST RESULTS

REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Cake	WORK ORDER REPORTED	23I0544 2023-09-14 15:42
---------------------	--	---------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

BIOSOLIDS, E231763 (23I0544-01) | Matrix: Soil | Sampled: 2023-09-06 09:30, Continued

Strong Acid Leachable Metals, Continued

Uranium	4.59	0.050	mg/kg dry	2023-09-10	
Vanadium	3.5	1.0	mg/kg dry	2023-09-10	
Zinc	295	2.0	mg/kg dry	2023-09-10	
Zirconium	21.0	2.0	mg/kg dry	2023-09-10	

Sample Qualifiers:

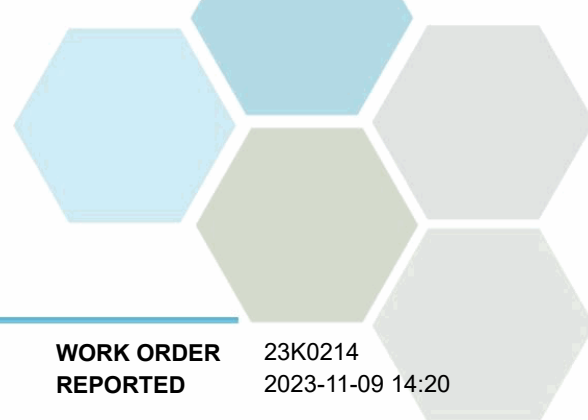
PH1 The ratio of water to soil was greater than 2:1 due to limited sample volume or matrix

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Cake

WORK ORDER REPORTED 23K0214
2023-11-09 14:20

Analyte	Result	RL	Units	Analyzed	Qualifier
BIOSOLIDS, E231763 (23K0214-01) Matrix: Soil Sampled: 2023-11-01 09:00					
General Parameters					
Moisture	68.5	1.0	% wet	2023-11-06	
Nitrogen, Total Kjeldahl	4.27	0.0004	% dry	2023-11-08	
pH (1:2 H2O Solution)	5.10	0.10	pH units	2023-11-09	PH1
Solids, Total	31.5	0.1	% wet	2023-11-07	
Solids, Volatile	55.5	0.1	% dry	2023-11-08	
Microbiological Parameters					
Coliforms, Fecal	760000	3.0	MPN/g dry	2023-11-02	
E. coli	760000	3.0	MPN/g dry	2023-11-02	
Strong Acid Leachable Metals					
Aluminum	3110	40	mg/kg dry	2023-11-05	
Antimony	0.60	0.10	mg/kg dry	2023-11-05	
Arsenic	0.78	0.30	mg/kg dry	2023-11-05	
Barium	73.9	1.0	mg/kg dry	2023-11-05	
Beryllium	< 0.10	0.10	mg/kg dry	2023-11-05	
Bismuth	11.9	0.10	mg/kg dry	2023-11-05	
Boron	15.1	2.0	mg/kg dry	2023-11-05	
Cadmium	0.422	0.040	mg/kg dry	2023-11-05	
Calcium	12300	100	mg/kg dry	2023-11-05	
Chromium	5.2	1.0	mg/kg dry	2023-11-05	
Cobalt	0.73	0.10	mg/kg dry	2023-11-05	
Copper	204	0.40	mg/kg dry	2023-11-05	
Iron	1750	20.0	mg/kg dry	2023-11-05	
Lead	3.12	0.20	mg/kg dry	2023-11-05	
Lithium	0.38	0.10	mg/kg dry	2023-11-05	
Magnesium	2870	10	mg/kg dry	2023-11-05	
Manganese	37.1	0.40	mg/kg dry	2023-11-05	
Mercury	0.110	0.040	mg/kg dry	2023-11-05	
Molybdenum	4.22	0.10	mg/kg dry	2023-11-05	
Nickel	3.89	0.60	mg/kg dry	2023-11-05	
Phosphorus	15700	10	mg/kg dry	2023-11-05	
Potassium	3360	40	mg/kg dry	2023-11-05	
Selenium	1.62	0.20	mg/kg dry	2023-11-05	
Silver	0.64	0.10	mg/kg dry	2023-11-05	
Sodium	245	50	mg/kg dry	2023-11-05	
Strontium	71.8	0.20	mg/kg dry	2023-11-05	
Sulfur	3400	1000	mg/kg dry	2023-11-05	
Tellurium	< 0.10	0.10	mg/kg dry	2023-11-05	
Thallium	< 0.10	0.10	mg/kg dry	2023-11-05	
Thorium	< 0.50	0.50	mg/kg dry	2023-11-05	
Tin	6.74	0.20	mg/kg dry	2023-11-05	
Titanium	30.8	1.0	mg/kg dry	2023-11-05	
Tungsten	0.36	0.20	mg/kg dry	2023-11-05	



TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Cake

WORK ORDER REPORTED 23K0214
2023-11-09 14:20

Analyte	Result	RL	Units	Analyzed	Qualifier
BIOSOLIDS, E231763 (23K0214-01) Matrix: Soil Sampled: 2023-11-01 09:00, Continued					
<i>Strong Acid Leachable Metals, Continued</i>					
Uranium	3.11	0.050	mg/kg dry	2023-11-05	
Vanadium	2.7	1.0	mg/kg dry	2023-11-05	
Zinc	251	2.0	mg/kg dry	2023-11-05	
Zirconium	3.7	2.0	mg/kg dry	2023-11-05	

Sample Qualifiers:

PH1 The ratio of water to soil was greater than 2:1 due to limited sample volume or matrix

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Cake

WORK ORDER REPORTED 23G1731
2023-07-20 16:42

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

DAF Sludge (23G1731-01) | Matrix: Soil | Sampled: 2023-07-12 08:45

General Parameters

Moisture	94.4	1.0	% wet	2023-07-20	
Nitrogen, Total Kjeldahl	6.66	0.0004	% dry	2023-07-19	
pH (1:2 H2O Solution)	6.43	0.10	pH units	2023-07-20	PH1
Solids, Total	5.6	0.1	% wet	2023-07-19	
Solids, Volatile	79.2	0.1	% dry	2023-07-19	

Strong Acid Leachable Metals

Aluminum	16200	40	mg/kg dry	2023-07-20	
Antimony	0.98	0.10	mg/kg dry	2023-07-20	
Arsenic	1.87	0.30	mg/kg dry	2023-07-20	
Barium	178	1.0	mg/kg dry	2023-07-20	
Beryllium	< 0.10	0.10	mg/kg dry	2023-07-20	
Bismuth	21.0	0.10	mg/kg dry	2023-07-20	
Boron	22.0	2.0	mg/kg dry	2023-07-20	
Cadmium	0.758	0.040	mg/kg dry	2023-07-20	
Calcium	13600	100	mg/kg dry	2023-07-20	
Chromium	9.2	1.0	mg/kg dry	2023-07-20	
Cobalt	1.03	0.10	mg/kg dry	2023-07-20	
Copper	417	0.40	mg/kg dry	2023-07-20	
Iron	1880	20.0	mg/kg dry	2023-07-20	
Lead	4.52	0.20	mg/kg dry	2023-07-20	
Lithium	0.60	0.10	mg/kg dry	2023-07-20	
Magnesium	6000	10	mg/kg dry	2023-07-20	
Manganese	74.9	0.40	mg/kg dry	2023-07-20	
Mercury	0.165	0.040	mg/kg dry	2023-07-20	
Molybdenum	6.84	0.10	mg/kg dry	2023-07-20	
Nickel	7.82	0.60	mg/kg dry	2023-07-20	
Phosphorus	36600	10	mg/kg dry	2023-07-20	
Potassium	8030	40	mg/kg dry	2023-07-20	
Selenium	3.25	0.20	mg/kg dry	2023-07-20	
Silver	1.26	0.10	mg/kg dry	2023-07-20	
Sodium	1240	50	mg/kg dry	2023-07-20	
Strontium	198	0.20	mg/kg dry	2023-07-20	
Sulfur	5660	1000	mg/kg dry	2023-07-20	
Tellurium	< 0.10	0.10	mg/kg dry	2023-07-20	
Thallium	< 0.10	0.10	mg/kg dry	2023-07-20	
Thorium	< 0.50	0.50	mg/kg dry	2023-07-20	
Tin	12.2	0.20	mg/kg dry	2023-07-20	
Titanium	57.4	1.0	mg/kg dry	2023-07-20	
Tungsten	0.59	0.20	mg/kg dry	2023-07-20	
Uranium	8.66	0.050	mg/kg dry	2023-07-20	
Vanadium	4.3	1.0	mg/kg dry	2023-07-20	
Zinc	343	2.0	mg/kg dry	2023-07-20	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Cake

WORK ORDER REPORTED 23G1731
2023-07-20 16:42

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

DAF Sludge (23G1731-01) | Matrix: Soil | Sampled: 2023-07-12 08:45, Continued

Strong Acid Leachable Metals, Continued

Zirconium	36.5	2.0	mg/kg dry	2023-07-20	
-----------	------	-----	-----------	------------	--

Fermenter Sludge (23G1731-02) | Matrix: Soil | Sampled: 2023-07-12 08:30

General Parameters

Moisture	92.5	1.0	% wet	2023-07-20	
Nitrogen, Total Kjeldahl	3.33	0.0004	% dry	2023-07-19	
pH (1:2 H2O Solution)	5.36	0.10	pH units	2023-07-20	PH1
Solids, Total	7.6	0.1	% wet	2023-07-19	
Solids, Volatile	91.5	0.1	% dry	2023-07-19	

Strong Acid Leachable Metals

Aluminum	2450	40	mg/kg dry	2023-07-20	
Antimony	0.90	0.10	mg/kg dry	2023-07-20	
Arsenic	0.76	0.30	mg/kg dry	2023-07-20	
Barium	110	1.0	mg/kg dry	2023-07-20	
Beryllium	< 0.10	0.10	mg/kg dry	2023-07-20	
Bismuth	14.3	0.10	mg/kg dry	2023-07-20	
Boron	9.0	2.0	mg/kg dry	2023-07-20	
Cadmium	0.411	0.040	mg/kg dry	2023-07-20	
Calcium	5000	100	mg/kg dry	2023-07-20	
Chromium	8.9	1.0	mg/kg dry	2023-07-20	
Cobalt	0.75	0.10	mg/kg dry	2023-07-20	
Copper	186	0.40	mg/kg dry	2023-07-20	
Iron	1840	20.0	mg/kg dry	2023-07-20	
Lead	4.32	0.20	mg/kg dry	2023-07-20	
Lithium	0.66	0.10	mg/kg dry	2023-07-20	
Magnesium	907	10	mg/kg dry	2023-07-20	
Manganese	28.8	0.40	mg/kg dry	2023-07-20	
Mercury	0.424	0.040	mg/kg dry	2023-07-20	
Molybdenum	3.67	0.10	mg/kg dry	2023-07-20	
Nickel	5.13	0.60	mg/kg dry	2023-07-20	
Phosphorus	6730	10	mg/kg dry	2023-07-20	
Potassium	1430	40	mg/kg dry	2023-07-20	
Selenium	1.58	0.20	mg/kg dry	2023-07-20	
Silver	1.09	0.10	mg/kg dry	2023-07-20	
Sodium	706	50	mg/kg dry	2023-07-20	
Strontium	31.0	0.20	mg/kg dry	2023-07-20	
Sulfur	3160	1000	mg/kg dry	2023-07-20	
Tellurium	< 0.10	0.10	mg/kg dry	2023-07-20	
Thallium	< 0.10	0.10	mg/kg dry	2023-07-20	
Thorium	< 0.50	0.50	mg/kg dry	2023-07-20	
Tin	8.39	0.20	mg/kg dry	2023-07-20	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Cake

WORK ORDER REPORTED 23G1731
2023-07-20 16:42

Analyte	Result	RL	Units	Analyzed	Qualifier
Fermenter Sludge (23G1731-02) Matrix: Soil Sampled: 2023-07-12 08:30, Continued					
<i>Strong Acid Leachable Metals, Continued</i>					
Titanium	32.2	1.0	mg/kg dry	2023-07-20	
Tungsten	0.60	0.20	mg/kg dry	2023-07-20	
Uranium	2.42	0.050	mg/kg dry	2023-07-20	
Vanadium	3.8	1.0	mg/kg dry	2023-07-20	
Zinc	419	2.0	mg/kg dry	2023-07-20	
Zirconium	3.6	2.0	mg/kg dry	2023-07-20	

Sample Qualifiers:

PH1 The ratio of water to soil was greater than 2:1 due to limited sample volume or matrix

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Fermenter Supernatant

WORK ORDER REPORTED 23F1064
2023-06-13 15:08

Analyte	Result	RL	Units	Analyzed	Qualifier
FERMENTER SUPERNATANT (23F1064-01) Matrix: Water Sampled: 2023-06-07 06:45					
<i>Volatile Fatty Acids</i>					
Acetic Acid	113	3.0	mg/L	2023-06-12	
Butyric Acid	14.5	2.0	mg/L	2023-06-12	
Caproic Acid	< 2.0	2.0	mg/L	2023-06-12	
Heptanoic Acid	< 2.0	2.0	mg/L	2023-06-12	
Iso-Butyric Acid	2.7	2.0	mg/L	2023-06-12	
Iso-Caproic Acid	< 2.0	2.0	mg/L	2023-06-12	
Iso-Valeric Acid	3.9	2.0	mg/L	2023-06-12	
Propionic Acid	67.0	2.0	mg/L	2023-06-12	
Valeric Acid	5.7	2.0	mg/L	2023-06-12	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Fermenter Supernatant

WORK ORDER REPORTED 23G0308
2023-07-11 10:55

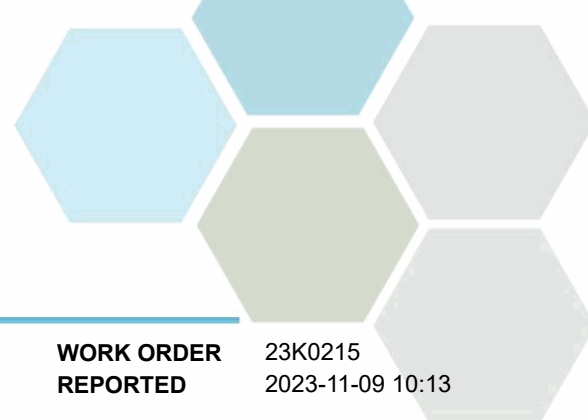
Analyte	Result	RL	Units	Analyzed	Qualifier
Fermenter Supernatant (23G0308-01) Matrix: Wastewater Sampled: 2023-07-05					
<i>Volatile Fatty Acids</i>					
Acetic Acid	123	3.0	mg/L	2023-07-09	
Butyric Acid	23.2	2.0	mg/L	2023-07-09	
Caproic Acid	< 2.0	2.0	mg/L	2023-07-09	
Heptanoic Acid	< 2.0	2.0	mg/L	2023-07-09	
Iso-Butyric Acid	3.5	2.0	mg/L	2023-07-09	
Iso-Caproic Acid	< 2.0	2.0	mg/L	2023-07-09	
Iso-Valeric Acid	3.3	2.0	mg/L	2023-07-09	
Propionic Acid	145	2.0	mg/L	2023-07-09	
Valeric Acid	12.6	2.0	mg/L	2023-07-09	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Fermenter Supernatant

WORK ORDER REPORTED 2310545
2023-09-12 14:45

Analyte	Result	RL	Units	Analyzed	Qualifier
FERMENTER SUPERNATANT (2310545-01) Matrix: Wastewater Sampled: 2023-09-06 07:55					
<i>Volatile Fatty Acids</i>					
Acetic Acid	162	3.0	mg/L	2023-09-10	
Butyric Acid	29.6	2.0	mg/L	2023-09-11	
Caproic Acid	2.8	2.0	mg/L	2023-09-11	
Heptanoic Acid	< 2.0	2.0	mg/L	2023-09-11	
Iso-Butyric Acid	2.7	2.0	mg/L	2023-09-11	
Iso-Caproic Acid	< 2.0	2.0	mg/L	2023-09-11	
Iso-Valeric Acid	< 2.0	2.0	mg/L	2023-09-11	
Propionic Acid	68.5	2.0	mg/L	2023-09-11	
Valeric Acid	12.5	2.0	mg/L	2023-09-11	



TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Fermenter Supernatant

WORK ORDER REPORTED 23K0215
2023-11-09 10:13

Analyte	Result	RL	Units	Analyzed	Qualifier
FERMENTER SUPERNATANT (23K0215-01) Matrix: Wastewater Sampled: 2023-11-01 07:55					
<i>Volatile Fatty Acids</i>					
Acetic Acid	78.9	3.0	mg/L	2023-11-07	
Butyric Acid	14.3	2.0	mg/L	2023-11-07	
Caproic Acid	< 2.0	2.0	mg/L	2023-11-07	
Heptanoic Acid	< 2.0	2.0	mg/L	2023-11-07	
Iso-Butyric Acid	< 2.0	2.0	mg/L	2023-11-07	
Iso-Caproic Acid	< 2.0	2.0	mg/L	2023-11-07	
Iso-Valeric Acid	< 2.0	2.0	mg/L	2023-11-07	
Propionic Acid	80.2	2.0	mg/L	2023-11-07	
Valeric Acid	6.2	2.0	mg/L	2023-11-07	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Raw Influent- PE11652

WORK ORDER REPORTED 23F1054
2023-06-14 14:14

Analyte	Result	RL	Units	Analyzed	Qualifier
RAW INFL COMP, E222796 (23F1054-01) Matrix: Water Sampled: 2023-06-07 06:40					
Anions					
Nitrate (as N)	< 0.100	0.010	mg/L	2023-06-09	RA1
Nitrite (as N)	< 0.100	0.010	mg/L	2023-06-09	RA1
Phosphate (as P)	1.61	0.0050	mg/L	2023-06-09	
Calculated Parameters					
Nitrate+Nitrite (as N)	< 0.100	0.100	mg/L	N/A	
General Parameters					
Ammonia, Total (as N)	31.1	0.050	mg/L	2023-06-08	
BOD, 5-day	356	2.0	mg/L	2023-06-14	
Nitrogen, Total Kjeldahl	47.1	0.050	mg/L	2023-06-12	
Phosphorus, Total (as P)	6.50	0.0050	mg/L	2023-06-09	
Solids, Total Suspended	320	2.0	mg/L	2023-06-13	

Sample Qualifiers:

RA1 The Reporting Limit for this sample has been raised due to matrix interference.

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Raw Influent- PE11652

WORK ORDER REPORTED 23G0301
2023-07-12 12:42

Analyte	Result	RL	Units	Analyzed	Qualifier
Raw Influent Comp E222796 (23G0301-01) Matrix: Wastewater Sampled: 2023-07-05 07:00					
Anions					
Nitrate+Nitrite (as N)	0.0167	0.0050	mg/L	2023-07-07	
Nitrite (as N)	0.0124	0.0050	mg/L	2023-07-07	
Phosphate (as P)	3.59	0.0050	mg/L	2023-07-06	RA5
Calculated Parameters					
Nitrate (as N)	< 0.0100	0.0100	mg/L	N/A	
General Parameters					
Ammonia, Total (as N)	39.9	0.050	mg/L	2023-07-06	
BOD, 5-day	288	2.0	mg/L	2023-07-12	
Nitrogen, Total Kjeldahl	59.0	0.050	mg/L	2023-07-07	
Phosphorus, Total (as P)	6.90	0.0050	mg/L	2023-07-07	
Solids, Total Suspended	174	2.0	mg/L	2023-07-06	

Sample Qualifiers:

RA5 The sample cannot be accurately quantified due to matrix interference. Result is Semi-Quantitative.

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Raw Influent- PE11652

WORK ORDER REPORTED 2310542
2023-09-13 09:38

Analyte	Result	RL	Units	Analyzed	Qualifier
RAW INFL COMP, E222796 (2310542-01) Matrix: Water Sampled: 2023-09-06 07:45					
Anions					
Nitrate (as N)	< 0.010	0.010	mg/L	2023-09-08	
Nitrite (as N)	< 0.010	0.010	mg/L	2023-09-08	
Phosphate (as P)	2.57	0.0050	mg/L	2023-09-08	RA5
Calculated Parameters					
Nitrate+Nitrite (as N)	< 0.0100	0.0100	mg/L	N/A	
General Parameters					
Ammonia, Total (as N)	32.6	0.050	mg/L	2023-09-07	
BOD, 5-day	257	2.0	mg/L	2023-09-12	
Nitrogen, Total Kjeldahl	55.8	0.050	mg/L	2023-09-12	
Phosphorus, Total (as P)	6.50	0.0050	mg/L	2023-09-08	
Solids, Total Suspended	298	2.0	mg/L	2023-09-08	

Sample Qualifiers:

RA5 The sample cannot be accurately quantified due to matrix interference. Result is Semi-Quantitative.

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Raw Influent- PE11652

WORK ORDER REPORTED 23K0211
2023-11-08 12:46

Analyte	Result	RL	Units	Analyzed	Qualifier
RAW INFL COMP, E222796 (23K0211-01) Matrix: Water Sampled: 2023-11-01 07:50					
Anions					
Nitrate (as N)	< 0.010	0.010	mg/L	2023-11-03	
Nitrite (as N)	0.017	0.010	mg/L	2023-11-03	
Phosphate (as P)	2.77	0.0050	mg/L	2023-11-03	
Calculated Parameters					
Nitrate+Nitrite (as N)	0.0168	0.0100	mg/L	N/A	
General Parameters					
Ammonia, Total (as N)	37.0	0.050	mg/L	2023-11-03	
BOD, 5-day	391	2.0	mg/L	2023-11-08	
Nitrogen, Total Kjeldahl	61.2	0.050	mg/L	2023-11-05	
Phosphorus, Total (as P)	6.84	0.0050	mg/L	2023-11-03	
Solids, Total Suspended	334	2.0	mg/L	2023-11-03	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Grab- PE11652

WORK ORDER REPORTED 23C2626
2023-03-28 09:58

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Grab (23C2626-01) | Matrix: Wastewater | Sampled: 2023-03-22 13:30

General Parameters

Nitrogen, Total Kjeldahl	2.01	0.050	mg/L	2023-03-28	
--------------------------	------	-------	------	------------	--

Raw Influent Grab (23C2626-02) | Matrix: Water | Sampled: 2023-03-22 15:00

Calculated Parameters

Hardness, Total (as CaCO3)	134	0.500	mg/L	N/A	
----------------------------	-----	-------	------	-----	--

Total Metals

Aluminum, total	0.792	0.0050	mg/L	2023-03-26	
Antimony, total	0.00083	0.00020	mg/L	2023-03-26	
Arsenic, total	0.00096	0.00050	mg/L	2023-03-26	
Barium, total	0.0520	0.0050	mg/L	2023-03-26	
Beryllium, total	< 0.00010	0.00010	mg/L	2023-03-26	
Bismuth, total	0.00470	0.00010	mg/L	2023-03-26	
Boron, total	0.311	0.0500	mg/L	2023-03-26	
Cadmium, total	0.000334	0.000010	mg/L	2023-03-26	
Calcium, total	37.1	0.20	mg/L	2023-03-26	
Chromium, total	0.00439	0.00050	mg/L	2023-03-26	
Cobalt, total	0.00100	0.00010	mg/L	2023-03-26	
Copper, total	0.115	0.00040	mg/L	2023-03-26	
Iron, total	1.09	0.010	mg/L	2023-03-26	
Lead, total	0.00230	0.00020	mg/L	2023-03-26	
Lithium, total	0.00543	0.00010	mg/L	2023-03-26	
Magnesium, total	9.99	0.010	mg/L	2023-03-26	
Manganese, total	0.0675	0.00020	mg/L	2023-03-26	
Molybdenum, total	0.00554	0.00010	mg/L	2023-03-26	
Nickel, total	0.00399	0.00040	mg/L	2023-03-26	
Phosphorus, total	7.98	0.050	mg/L	2023-03-26	
Potassium, total	22.9	0.10	mg/L	2023-03-26	
Selenium, total	0.00076	0.00050	mg/L	2023-03-26	
Silicon, total	6.4	1.0	mg/L	2023-03-26	
Silver, total	0.000253	0.000050	mg/L	2023-03-26	
Sodium, total	44.1	0.10	mg/L	2023-03-26	
Strontium, total	0.224	0.0010	mg/L	2023-03-26	
Sulfur, total	12.2	3.0	mg/L	2023-03-26	
Tellurium, total	< 0.00050	0.00050	mg/L	2023-03-26	
Thallium, total	< 0.000020	0.000020	mg/L	2023-03-26	
Thorium, total	0.00012	0.00010	mg/L	2023-03-26	
Tin, total	0.00286	0.00020	mg/L	2023-03-26	
Titanium, total	0.0439	0.0050	mg/L	2023-03-26	
Tungsten, total	< 0.0010	0.0010	mg/L	2023-03-26	
Uranium, total	0.00167	0.000020	mg/L	2023-03-26	
Vanadium, total	< 0.0050	0.0050	mg/L	2023-03-26	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Grab- PE11652

WORK ORDER REPORTED 23C2626
2023-03-28 09:58

Analyte	Result	RL	Units	Analyzed	Qualifier
Raw Influent Grab (23C2626-02) Matrix: Water Sampled: 2023-03-22 15:00, Continued					
<i>Total Metals, Continued</i>					
Zinc, total	0.176	0.0040	mg/L	2023-03-26	
Zirconium, total	0.00247	0.00010	mg/L	2023-03-26	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Raw Influent- PE11652

WORK ORDER REPORTED 23G1741
2023-07-20 16:33

Analyte	Result	RL	Units	Analyzed	Qualifier
Raw Influent Comp (23G1741-01) Matrix: Wastewater Sampled: 2023-07-12 08:00					
Calculated Parameters					
Hardness, Total (as CaCO ₃)	119	0.500	mg/L	N/A	
Total Metals					
Aluminum, total	0.292	0.0050	mg/L	2023-07-18	
Antimony, total	0.00066	0.00020	mg/L	2023-07-18	
Arsenic, total	0.00084	0.00050	mg/L	2023-07-18	
Barium, total	0.0455	0.0050	mg/L	2023-07-18	
Beryllium, total	< 0.00010	0.00010	mg/L	2023-07-18	
Bismuth, total	0.00507	0.00010	mg/L	2023-07-18	
Boron, total	0.231	0.0500	mg/L	2023-07-18	
Cadmium, total	0.000185	0.000010	mg/L	2023-07-18	
Calcium, total	31.7	0.20	mg/L	2023-07-18	
Chromium, total	0.00210	0.00050	mg/L	2023-07-18	
Cobalt, total	0.00056	0.00010	mg/L	2023-07-18	
Copper, total	0.103	0.00040	mg/L	2023-07-18	
Iron, total	0.425	0.010	mg/L	2023-07-18	
Lead, total	0.00138	0.00020	mg/L	2023-07-18	
Lithium, total	0.00450	0.00010	mg/L	2023-07-18	
Magnesium, total	9.71	0.010	mg/L	2023-07-18	
Manganese, total	0.0442	0.00020	mg/L	2023-07-18	
Mercury, total	0.000011	0.000010	mg/L	2023-07-19	
Molybdenum, total	0.00489	0.00010	mg/L	2023-07-18	
Nickel, total	0.00300	0.00040	mg/L	2023-07-18	
Phosphorus, total	6.74	0.050	mg/L	2023-07-18	
Potassium, total	18.4	0.10	mg/L	2023-07-18	
Selenium, total	0.00080	0.00050	mg/L	2023-07-18	
Silicon, total	5.5	1.0	mg/L	2023-07-18	
Silver, total	0.000502	0.000050	mg/L	2023-07-18	
Sodium, total	52.9	0.10	mg/L	2023-07-18	
Strontium, total	0.230	0.0010	mg/L	2023-07-18	
Sulfur, total	13.3	3.0	mg/L	2023-07-18	
Tellurium, total	< 0.00050	0.00050	mg/L	2023-07-18	
Thallium, total	< 0.000020	0.000020	mg/L	2023-07-18	
Thorium, total	< 0.00010	0.00010	mg/L	2023-07-18	
Tin, total	0.00275	0.00020	mg/L	2023-07-18	
Titanium, total	0.0130	0.0050	mg/L	2023-07-18	
Tungsten, total	< 0.0010	0.0010	mg/L	2023-07-18	
Uranium, total	0.00214	0.000020	mg/L	2023-07-18	
Vanadium, total	< 0.0050	0.0050	mg/L	2023-07-18	
Zinc, total	0.157	0.0040	mg/L	2023-07-18	
Zirconium, total	0.00311	0.00010	mg/L	2023-07-18	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Comp.- PE11652

WORK ORDER REPORTED 23F1044
2023-06-14 14:20

Analyte	Result	RL	Units	Analyzed	Qualifier
OUTFALL comp, E104954 (23F1044-01) Matrix: Water Sampled: 2023-06-07 06:55					
Anions					
Phosphate (as P)	0.0505	0.0050	mg/L	2023-06-09	
General Parameters					
Ammonia, Total (as N)	0.197	0.050	mg/L	2023-06-08	
BOD, 5-day Carbonaceous	1.6	2.0	mg/L	2023-06-14	
Chemical Oxygen Demand	39	20	mg/L	2023-06-09	
Phosphorus, Total (as P)	0.294	0.0050	mg/L	2023-06-09	
Solids, Total Suspended	< 5.0	2.0	mg/L	2023-06-13	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Comp.- PE11652

WORK ORDER REPORTED 23F1044
2023-06-15 16:31

Analyte	Result	RL	Units	Analyzed	Qualifier
OUTFALL comp, E104954 (23F1044-01) Matrix: Wastewater Sampled: 2023-06-07 06:55					
Anions					
Nitrate (as N)	8.72	0.010	mg/L	2023-06-09	
Nitrite (as N)	0.150	0.010	mg/L	2023-06-09	
Phosphate (as P)	0.0505	0.0050	mg/L	2023-06-09	
Calculated Parameters					
Nitrate+Nitrite (as N)	8.87	0.0100	mg/L	N/A	
General Parameters					
Ammonia, Total (as N)	0.197	0.050	mg/L	2023-06-08	
BOD, 5-day Carbonaceous	1.6	2.0	mg/L	2023-06-14	
Chemical Oxygen Demand	39	20	mg/L	2023-06-09	
Phosphorus, Total (as P)	0.294	0.0050	mg/L	2023-06-09	
Solids, Total Suspended	< 5.0	2.0	mg/L	2023-06-13	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Comp.- PE11652

WORK ORDER REPORTED 23F1887
2023-06-20 16:35

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Comp (23F1887-01) | Matrix: Water | Sampled: 2023-06-14 08:30

General Parameters

BOD, 5-day Carbonaceous	2.1	2.0	mg/L	2023-06-20	
Chemical Oxygen Demand	40	20	mg/L	2023-06-16	
pH	7.18	0.10	pH units	2023-06-15	HT2
Solids, Total Suspended	2.6	2.0	mg/L	2023-06-18	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

TEST RESULTS

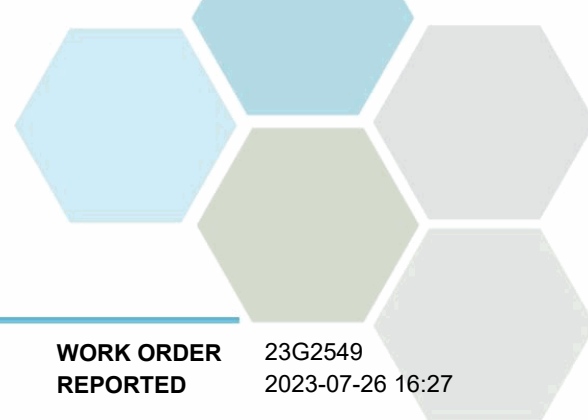
REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Comp.- PE11652

WORK ORDER REPORTED 23G0299
2023-07-12 11:16

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Comp E104954 (23G0299-01) Matrix: Wastewater Sampled: 2023-07-05 07:15					
Anions					
Nitrate (as N)	6.91	0.010	mg/L	2023-07-06	
Nitrite (as N)	0.270	0.010	mg/L	2023-07-06	
Phosphate (as P)	0.0343	0.0050	mg/L	2023-07-06	
Calculated Parameters					
Nitrate+Nitrite (as N)	7.18	0.0100	mg/L	N/A	
General Parameters					
Ammonia, Total (as N)	1.32	0.050	mg/L	2023-07-06	
BOD, 5-day Carbonaceous	3.3	2.0	mg/L	2023-07-12	
Chemical Oxygen Demand	43	20	mg/L	2023-07-06	
pH	7.67	0.10	pH units	2023-07-06	HT2
Phosphorus, Total (as P)	0.262	0.0050	mg/L	2023-07-06	
Solids, Total Suspended	8.3	2.0	mg/L	2023-07-06	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.



TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Comp.- PE11652

WORK ORDER REPORTED 23G2549
2023-07-26 16:27

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Comp (23G2549-01) | Matrix: Wastewater | Sampled: 2023-07-19 07:15

General Parameters

BOD, 5-day Carbonaceous	< 7.1	2.0	mg/L	2023-07-26	
Chemical Oxygen Demand	28	20	mg/L	2023-07-22	
pH	7.55	0.10	pH units	2023-07-23	HT2
Solids, Total Suspended	< 2.0	2.0	mg/L	2023-07-25	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

TEST RESULTS

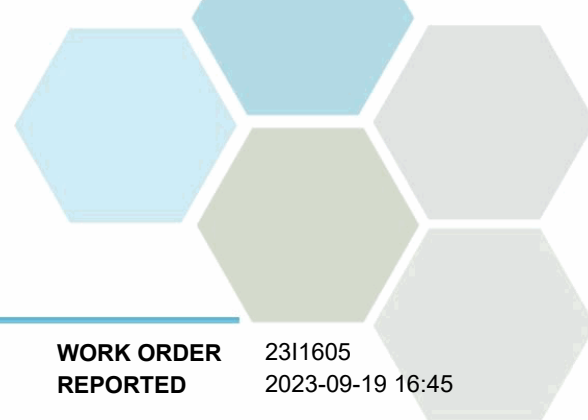
REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Comp.- PE11652

WORK ORDER REPORTED 2310541
2023-09-13 09:41

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Comp E104954 (2310541-01) Matrix: Wastewater Sampled: 2023-09-06 08:00					
Anions					
Nitrate (as N)	4.03	0.010	mg/L	2023-09-08	
Nitrite (as N)	0.072	0.010	mg/L	2023-09-08	
Phosphate (as P)	0.0620	0.0050	mg/L	2023-09-08	
Calculated Parameters					
Nitrate+Nitrite (as N)	4.10	0.0100	mg/L	N/A	
General Parameters					
Ammonia, Total (as N)	< 0.050	0.050	mg/L	2023-09-07	
BOD, 5-day Carbonaceous	2.8	2.0	mg/L	2023-09-12	
Chemical Oxygen Demand	27	20	mg/L	2023-09-07	
pH	7.51	0.10	pH units	2023-09-07	HT2
Phosphorus, Total (as P)	0.228	0.0050	mg/L	2023-09-08	
Solids, Total Suspended	2.4	2.0	mg/L	2023-09-08	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.



TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Comp.- PE11652

WORK ORDER REPORTED 2311605
2023-09-19 16:45

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Comp (2311605-01) | Matrix: Wastewater | Sampled: 2023-09-13 07:20

General Parameters

BOD, 5-day Carbonaceous	< 6.3	2.0	mg/L	2023-09-19	
Chemical Oxygen Demand	40	20	mg/L	2023-09-17	
pH	7.87	0.10	pH units	2023-09-15	HT2
Solids, Total Suspended	2.0	2.0	mg/L	2023-09-15	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Comp.- PE11652

WORK ORDER REPORTED 23K0210
2023-11-08 12:08

Analyte	Result	RL	Units	Analyzed	Qualifier
OUTFALL comp, E104954 (23K0210-01) Matrix: Wastewater Sampled: 2023-11-01 08:05					
Anions					
Nitrate (as N)	5.92	0.010	mg/L	2023-11-03	
Nitrite (as N)	0.230	0.010	mg/L	2023-11-03	
Phosphate (as P)	0.0610	0.0050	mg/L	2023-11-03	
Calculated Parameters					
Nitrate+Nitrite (as N)	6.15	0.0100	mg/L	N/A	
General Parameters					
Ammonia, Total (as N)	0.375	0.050	mg/L	2023-11-03	
BOD, 5-day Carbonaceous	1.1	2.0	mg/L	2023-11-07	
Chemical Oxygen Demand	39	20	mg/L	2023-11-04	
Phosphorus, Total (as P)	0.177	0.0050	mg/L	2023-11-03	
Solids, Total Suspended	< 1.0	2.0	mg/L	2023-11-03	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Comp.- PE11652

WORK ORDER REPORTED 23K1219
2023-11-15 14:55

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Comp E104954 (23K1219-01) Matrix: Wastewater Sampled: 2023-11-08 07:30					
<i>General Parameters</i>					
BOD, 5-day Carbonaceous	1.8	2.0	mg/L	2023-11-15	
Chemical Oxygen Demand	41	20	mg/L	2023-11-15	
Nitrogen, Total Kjeldahl	2.67	0.050	mg/L	2023-11-14	
pH	7.80	0.10	pH units	2023-11-15	HT2
Solids, Total Suspended	< 2.0	2.0	mg/L	2023-11-14	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Comp.- PE11652

WORK ORDER REPORTED 23G1745
2023-07-20 16:12

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Comp (23G1745-01) Matrix: Wastewater Sampled: 2023-07-12 08:10					
Calculated Parameters					
Hardness, Total (as CaCO3)	114	0.500	mg/L	N/A	
Total Metals					
Aluminum, total	0.258	0.0050	mg/L	2023-07-18	
Antimony, total	0.00043	0.00020	mg/L	2023-07-18	
Arsenic, total	< 0.00050	0.00050	mg/L	2023-07-18	
Barium, total	< 0.0050	0.0050	mg/L	2023-07-18	
Beryllium, total	< 0.00010	0.00010	mg/L	2023-07-18	
Bismuth, total	0.00016	0.00010	mg/L	2023-07-18	
Boron, total	0.259	0.0500	mg/L	2023-07-18	
Cadmium, total	0.000065	0.000010	mg/L	2023-07-18	
Calcium, total	31.5	0.20	mg/L	2023-07-18	
Chromium, total	0.00051	0.00050	mg/L	2023-07-18	
Cobalt, total	0.00033	0.00010	mg/L	2023-07-18	
Copper, total	0.00689	0.00040	mg/L	2023-07-18	
Iron, total	0.038	0.010	mg/L	2023-07-18	
Lead, total	0.00032	0.00020	mg/L	2023-07-18	
Lithium, total	0.00450	0.00010	mg/L	2023-07-18	
Magnesium, total	8.57	0.010	mg/L	2023-07-18	
Manganese, total	0.0294	0.00020	mg/L	2023-07-18	
Mercury, total	< 0.000010	0.000010	mg/L	2023-07-19	
Molybdenum, total	0.00530	0.00010	mg/L	2023-07-18	
Nickel, total	0.00223	0.00040	mg/L	2023-07-18	
Phosphorus, total	0.922	0.050	mg/L	2023-07-18	
Potassium, total	18.0	0.10	mg/L	2023-07-18	
Selenium, total	< 0.00050	0.00050	mg/L	2023-07-18	
Silicon, total	5.3	1.0	mg/L	2023-07-18	
Silver, total	< 0.000050	0.000050	mg/L	2023-07-18	
Sodium, total	53.4	0.10	mg/L	2023-07-18	
Strontium, total	0.193	0.0010	mg/L	2023-07-18	
Sulfur, total	18.1	3.0	mg/L	2023-07-18	
Tellurium, total	< 0.00050	0.00050	mg/L	2023-07-18	
Thallium, total	< 0.000020	0.000020	mg/L	2023-07-18	
Thorium, total	< 0.00010	0.00010	mg/L	2023-07-18	
Tin, total	0.00044	0.00020	mg/L	2023-07-18	
Titanium, total	< 0.0050	0.0050	mg/L	2023-07-18	
Tungsten, total	< 0.0010	0.0010	mg/L	2023-07-18	
Uranium, total	0.000248	0.000020	mg/L	2023-07-18	
Vanadium, total	< 0.0050	0.0050	mg/L	2023-07-18	
Zinc, total	0.0561	0.0040	mg/L	2023-07-18	
Zirconium, total	0.00018	0.00010	mg/L	2023-07-18	



TEST RESULTS

REPORTED TO PROJECT		Regional District of Central Okanagan WRWTP - Toxicity			WORK ORDER REPORTED		23F0734 2023-06-21 08:19	
Analyte		Result	Guideline	RL	Units	Analyzed	Qualifier	
Outfall Grab (23F0734-01) Matrix: Water Sampled: 2023-06-05								
Oncorhynchus mykiss Bioassay								
LC50, 96 h Trout		>100	N/A	0.0001	% v/v	2023-06-12	TOX	
Sample Qualifiers:								
TOX	Please refer to the Appendix for the full Toxicity Report							

Trout MD Bioassay Final Report

Work Order: 23F0734-01

Client: Regional District of Central Okanagan
Project: WRWTP - Toxicity
Attention: Angela Lambrecht

1. SAMPLE INFORMATION

Sample Origin: Regional District of Central Okanagan
KELOWNA, BC
Sample Type: Effluent
Sample Description: Outfall Grab
Sampling Date & Time: June 5, 2023 @ 0:00
Sampling Method: Grab
Sampled by: Client

2. TEST INFORMATION

Laboratory Name: CARO Analytical Services
Address: 17225 109 Avenue NW
Edmonton, AB T5S 1H7

Test Organism: *Oncorhynchus mykiss*
Test Description: Acute, 96-Hour, Static, Multi-concentration
Test Method: CE-TM-027
Reference Method: Biological Test Method : Reference Method for Determining Acute
Lethality of Effluents to Rainbow Trout, 2000. Environment Canada,
EPS 1/RM/13, 2nd Ed., (Including May 2007 amendments)

Analyst Name: Travis Briggeman
Start of Test Date: June 8, 2023

Dilution Water: Dechlorinated City of Edmonton tap water, acclimated to test conditions
Test Container: 25 L, Disposable Polyethylene Liner
Test Volume (L): 20
Test Depth: 33 cm
Test Organisms per Container: 10
Aeration of Test Solutions: 6.5 ± 1 mL/min per L
pH Adjustment: The sample was not filtered or pH adjusted
Lighting: Full Spectrum Fluorescent Lights; 100-500 lux at the surface
Photoperiod: 16 Hours Light : 8 Hours Dark
Deviations from Reference Method: None

CARO Edmonton

Trout MD Bioassay Final Report

Work Order: 23F0734-01

3. RECEIPT CONDITION

Container Description:	20 L HDPE carboy	Qty:	2	Volume (L):	40
Receipt Date & Time:	June 7, 2023	@	9:00		
Transit Irregularities:	None				

Observations:

Colour:	Yellow Brown
Odour:	Slight
Turbidity:	Low
Settleable Solids:	Low

Measured Parameters:

			Meter AINs	Probe AINs
Temperature:	18	°C	CE-187	CE-323
pH:	6.6		CE-001	CE-212
Conductivity:	568	µmhos/cm	CE-319	CE-320
Dissolved Oxygen:	7.4	mg/L	CE-187	CE-323
Dissolved Oxygen:	84	%Sat	CE-187	CE-323
Hardness:	n/a	mg/L CaCO ₃	n/a	n/a

4. PRE-AERATION

Duration at 6.5 ± 1 mL/min/L:	30	mins		
Test Concentration (V/V):	100%		0%	
Before Pre-Aeration:				
Dissolved Oxygen:	7.4	mg/L	7.9	mg/L
Air Saturation:	84	%	85	%
After Pre-Aeration:				
Dissolved Oxygen:	8.5	mg/L	8.8	mg/L
Air Saturation:	92	%	94	%

5. TEST ORGANISM DATA

Lot Number:	230524
Weekly Mortality:	0.07
Organism/Container:	10
Loading Density:	0.22
Average Wet Weight (g)	0.45
StDev Wet Weight (g)	0.13
Average Fork Length (cm)	3.8
StDev Fork Length (cm)	0.3

Fish #	Wet Weight (g)	Fork Length (cm)
1	0.50	3.9
2	0.41	3.7
3	0.60	4.1
4	0.29	3.5
5	0.43	3.7
6	0.48	3.9
7	0.39	3.6
8	0.50	4.0
9	0.21	3.1
10	0.64	4.3

6. TEST DATA

Sample Concentration (% V/V)	100	50	25	12.5	6.25	0
------------------------------	-----	----	----	------	------	---

0 Hours **Time:** 13:54 **Analyst:** TJB

Temperature (°C)	16	15	15	15	15	15
pH	7.0	7.3	7.4	7.5	7.6	7.6
Conductivity (µmhos/cm)	569	467	423	404	386	367
Dissolved Oxygen (mg/L)	8.5	8.6	8.8	8.7	8.8	8.8

24 Hours **Time:** 13:22 **Analyst:** TJB

Stressed (Qty)	0	0	0	0	0	0
Mortality (Qty)	0	0	0	0	0	0

48 Hours **Time:** 13:10 **Analyst:** MS

Stressed (Qty)	0	0	0	0	0	0
Mortality (Qty)	0	0	0	0	0	0

72 Hours **Time:** 12:55 **Analyst:** SLM

Stressed (Qty)	0	0	0	0	0	0
Mortality (Qty)	1	0	0	0	0	0

96 Hours **Time:** 14:22 **Analyst:** TJB

Stressed (Qty)	0	0	0	0	0	0
Mortality (Qty)	1	0	0	0	0	0
Temperature (°C)	15	15	15	15	15	15
pH	7.8	7.9	7.9	7.9	7.9	7.9
Conductivity (µmhos/cm)	563	468	422	396	381	366
Dissolved Oxygen (mg/L)	9.4	9.4	9.4	9.3	9.3	9.3

7. SUBLETHAL BIOLOGICAL EFFECTS

Sample Concentration (%)	Time Observed (Hours)	Effect(s) Observed
		None

8. OBSERVATIONS & COMMENTS

None

CARO Edmonton
Trout MD Bioassay Final Report

Work Order: 23F0734-01

9. RESULTS

96- Hour LC ₅₀ V/V (%):	>100	%
95% Lower Confidence Interval:	N/A	%
95% Upper Confidence Interval:	N/A	%
Method of Calculation:	Linear Interpolation (ICPIN)	
Confirmed by Graph:	Yes	

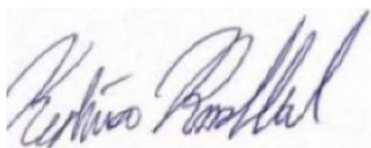
10. REFERENCE TOXICANT DATA

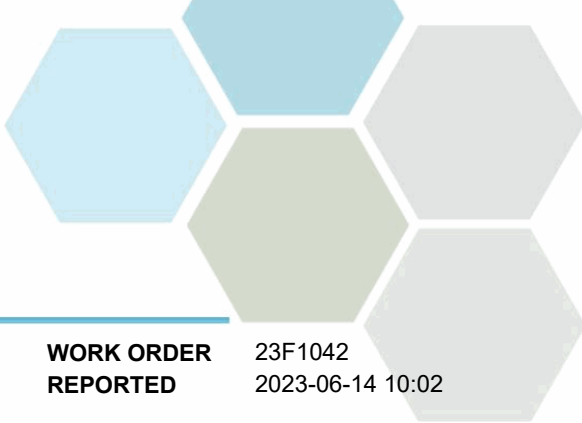
Toxicant:	Phenol
Test Starting Date:	June 8, 2023
96 Hour LC ₅₀ (mg/L):	10.31
95% Lower Confidence Interval:	9.72
95% Upper Confidence Interval:	10.93
Method of Calculation:	Untrimmed Spearman-Kärber
Confirmed by Graph:	Yes
Historical Mean LC ₅₀ (mg/L):	9.52
95% Lower Confidence Interval:	7.74
95% Upper Confidence Interval:	11.70

Data Reviewed by: Keshia Roodbol

Date: June 21, 2023

Signature:





TEST RESULTS

REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652	WORK ORDER REPORTED	23F1042 2023-06-14 10:02
----------------------------	---	----------------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Grab (23F1042-01) | Matrix: Wastewater | Sampled: 2023-06-07 07:00

General Parameters

Nitrogen, Total Kjeldahl	1.49	0.050	mg/L	2023-06-13	
--------------------------	------	-------	------	------------	--

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	2	1	MPN/100 mL	2023-06-08	HT1
E. coli (Q-Tray)	1	1	MPN/100 mL	2023-06-08	HT1

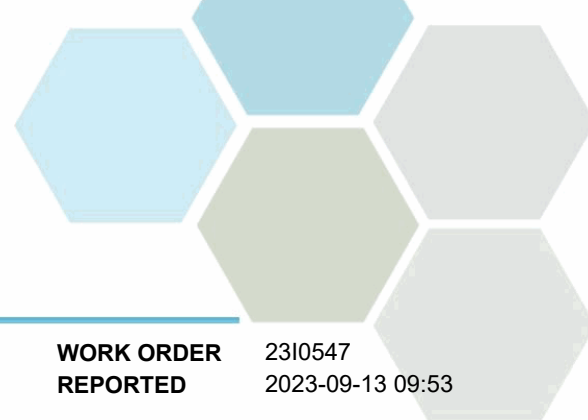
Outfall Grab (23F1042-02) | Matrix: Wastewater | Sampled: 2023-06-06 14:20

General Parameters

Nitrogen, Total Kjeldahl	1.96	0.050	mg/L	2023-06-13	
--------------------------	------	-------	------	------------	--

Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.

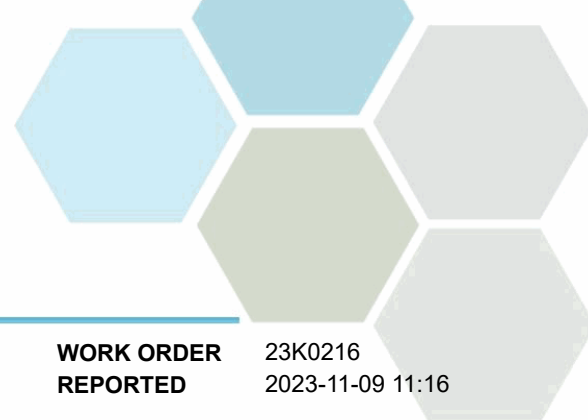


TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Grab- PE11652

WORK ORDER REPORTED 23I0547
2023-09-13 09:53

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Grab E104954 (23I0547-01) Matrix: Wastewater Sampled: 2023-09-06 08:05					
<i>General Parameters</i>					
Nitrogen, Total Kjeldahl	1.53	0.050	mg/L	2023-09-12	
<i>Microbiological Parameters</i>					
Coliforms, Fecal (Q-Tray)	1	1	MPN/100 mL	2023-09-07	
E. coli (Q-Tray)	1	1	MPN/100 mL	2023-09-07	

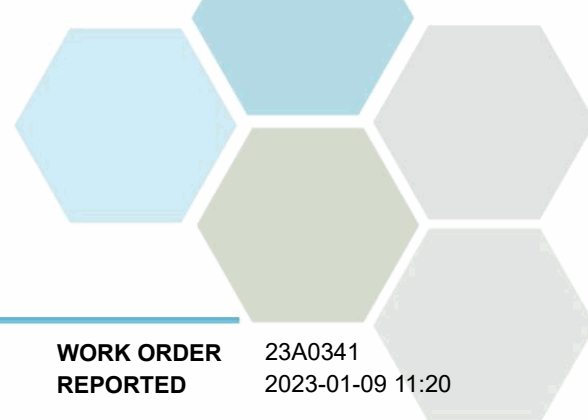


TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Grab- PE11652

WORK ORDER REPORTED 23K0216
2023-11-09 11:16

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Grab E104954 (23K0216-01) Matrix: Wastewater Sampled: 2023-11-01 08:10					
<i>General Parameters</i>					
Nitrogen, Total Kjeldahl	1.69	0.050	mg/L	2023-11-06	
<i>Microbiological Parameters</i>					
Coliforms, Fecal (Q-Tray)	1	1	MPN/100 mL	2023-11-02	
E. coli (Q-Tray)	1	1	MPN/100 mL	2023-11-02	

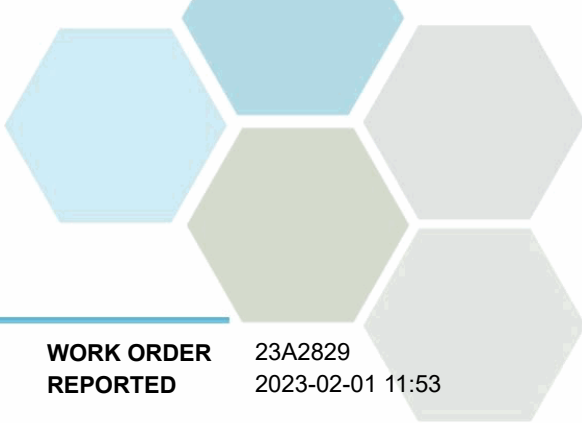


TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Grab- PE11652

WORK ORDER REPORTED 23A0341
2023-01-09 11:20

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Grab #1 (23A0341-01) Matrix: Wastewater Sampled: 2022-12-21 07:39					
<i>General Parameters</i>					
Nitrogen, Total Kjeldahl	1.93	0.050	mg/L	2023-01-09	
Outfall Grab #2 (23A0341-02) Matrix: Wastewater Sampled: 2022-12-31 11:00					
<i>General Parameters</i>					
Nitrogen, Total Kjeldahl	3.45	0.050	mg/L	2023-01-09	
Outfall Grab #3 (23A0341-03) Matrix: Wastewater Sampled: 2023-01-03 10:10					
<i>General Parameters</i>					
Nitrogen, Total Kjeldahl	2.19	0.050	mg/L	2023-01-09	



TEST RESULTS

REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652	WORK ORDER REPORTED	23A2829 2023-02-01 11:53
---------------------	---	---------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Grab #1 (23A2829-01) Matrix: Wastewater Sampled: 2023-01-25 10:08					
General Parameters					
Nitrogen, Total Kjeldahl	1.80	0.050	mg/L	2023-02-01	
Outfall Grab #2 (23A2829-02) Matrix: Wastewater Sampled: 2023-01-26 11:30					
General Parameters					
Nitrogen, Total Kjeldahl	1.85	0.050	mg/L	2023-02-01	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Grab- PE11652

WORK ORDER REPORTED 23C2626
2023-03-28 09:58

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Grab (23C2626-01) | Matrix: Wastewater | Sampled: 2023-03-22 13:30

General Parameters

Nitrogen, Total Kjeldahl	2.01	0.050	mg/L	2023-03-28	
--------------------------	------	-------	------	------------	--

Raw Influent Grab (23C2626-02) | Matrix: Water | Sampled: 2023-03-22 15:00

Calculated Parameters

Hardness, Total (as CaCO3)	134	0.500	mg/L	N/A	
----------------------------	-----	-------	------	-----	--

Total Metals

Aluminum, total	0.792	0.0050	mg/L	2023-03-26	
Antimony, total	0.00083	0.00020	mg/L	2023-03-26	
Arsenic, total	0.00096	0.00050	mg/L	2023-03-26	
Barium, total	0.0520	0.0050	mg/L	2023-03-26	
Beryllium, total	< 0.00010	0.00010	mg/L	2023-03-26	
Bismuth, total	0.00470	0.00010	mg/L	2023-03-26	
Boron, total	0.311	0.0500	mg/L	2023-03-26	
Cadmium, total	0.000334	0.000010	mg/L	2023-03-26	
Calcium, total	37.1	0.20	mg/L	2023-03-26	
Chromium, total	0.00439	0.00050	mg/L	2023-03-26	
Cobalt, total	0.00100	0.00010	mg/L	2023-03-26	
Copper, total	0.115	0.00040	mg/L	2023-03-26	
Iron, total	1.09	0.010	mg/L	2023-03-26	
Lead, total	0.00230	0.00020	mg/L	2023-03-26	
Lithium, total	0.00543	0.00010	mg/L	2023-03-26	
Magnesium, total	9.99	0.010	mg/L	2023-03-26	
Manganese, total	0.0675	0.00020	mg/L	2023-03-26	
Molybdenum, total	0.00554	0.00010	mg/L	2023-03-26	
Nickel, total	0.00399	0.00040	mg/L	2023-03-26	
Phosphorus, total	7.98	0.050	mg/L	2023-03-26	
Potassium, total	22.9	0.10	mg/L	2023-03-26	
Selenium, total	0.00076	0.00050	mg/L	2023-03-26	
Silicon, total	6.4	1.0	mg/L	2023-03-26	
Silver, total	0.000253	0.000050	mg/L	2023-03-26	
Sodium, total	44.1	0.10	mg/L	2023-03-26	
Strontium, total	0.224	0.0010	mg/L	2023-03-26	
Sulfur, total	12.2	3.0	mg/L	2023-03-26	
Tellurium, total	< 0.00050	0.00050	mg/L	2023-03-26	
Thallium, total	< 0.000020	0.000020	mg/L	2023-03-26	
Thorium, total	0.00012	0.00010	mg/L	2023-03-26	
Tin, total	0.00286	0.00020	mg/L	2023-03-26	
Titanium, total	0.0439	0.0050	mg/L	2023-03-26	
Tungsten, total	< 0.0010	0.0010	mg/L	2023-03-26	
Uranium, total	0.00167	0.000020	mg/L	2023-03-26	
Vanadium, total	< 0.0050	0.0050	mg/L	2023-03-26	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Grab- PE11652

WORK ORDER REPORTED 23C2626
2023-03-28 09:58

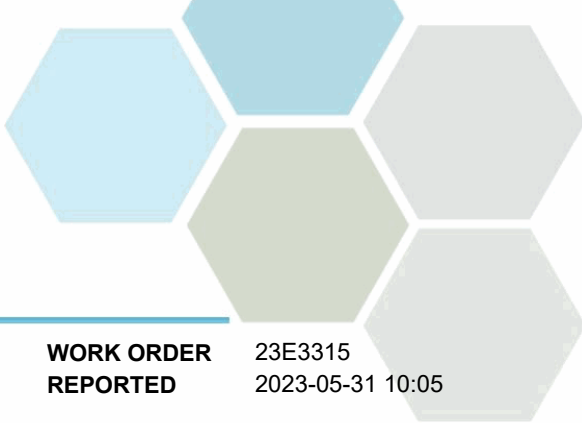
Analyte	Result	RL	Units	Analyzed	Qualifier
Raw Influent Grab (23C2626-02) Matrix: Water Sampled: 2023-03-22 15:00, Continued					
<i>Total Metals, Continued</i>					
Zinc, total	0.176	0.0040	mg/L	2023-03-26	
Zirconium, total	0.00247	0.00010	mg/L	2023-03-26	



TEST RESULTS

REPORTED TO PROJECT	Regional District of Central Okanagan RDCO WRWWTP	WORK ORDER REPORTED	23D3101 2023-05-02 11:21
---------------------	--	---------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Grab (23D3101-01) Matrix: Wastewater Sampled: 2023-04-19 13:30					
General Parameters					
Nitrogen, Total Kjeldahl	3.24	0.050	mg/L	2023-05-02	
Outfall Grab (23D3101-02) Matrix: Wastewater Sampled: 2023-04-26 14:00					
General Parameters					
Nitrogen, Total Kjeldahl	2.58	0.050	mg/L	2023-05-02	



TEST RESULTS

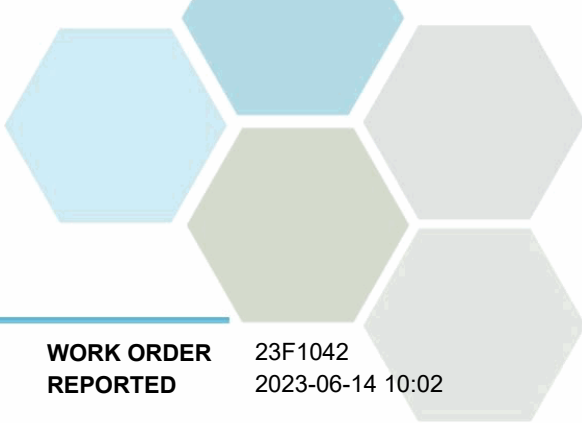
REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652	WORK ORDER REPORTED	23E3315 2023-05-31 10:05
---------------------	---	---------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Grab (23E3315-01) | Matrix: Wastewater | Sampled: 2023-05-25 09:15

General Parameters

Nitrogen, Total Kjeldahl	1.67	0.050	mg/L	2023-05-31	
--------------------------	------	-------	------	------------	--



TEST RESULTS

REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652	WORK ORDER REPORTED	23F1042 2023-06-14 10:02
----------------------------	---	----------------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Grab (23F1042-01) | Matrix: Wastewater | Sampled: 2023-06-07 07:00

General Parameters

Nitrogen, Total Kjeldahl	1.49	0.050	mg/L	2023-06-13	
--------------------------	------	-------	------	------------	--

Microbiological Parameters

Coliforms, Fecal (Q-Tray)	2	1	MPN/100 mL	2023-06-08	HT1
E. coli (Q-Tray)	1	1	MPN/100 mL	2023-06-08	HT1

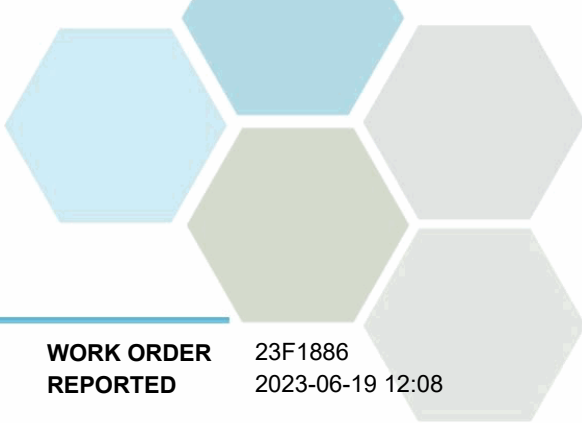
Outfall Grab (23F1042-02) | Matrix: Wastewater | Sampled: 2023-06-06 14:20

General Parameters

Nitrogen, Total Kjeldahl	1.96	0.050	mg/L	2023-06-13	
--------------------------	------	-------	------	------------	--

Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.



TEST RESULTS

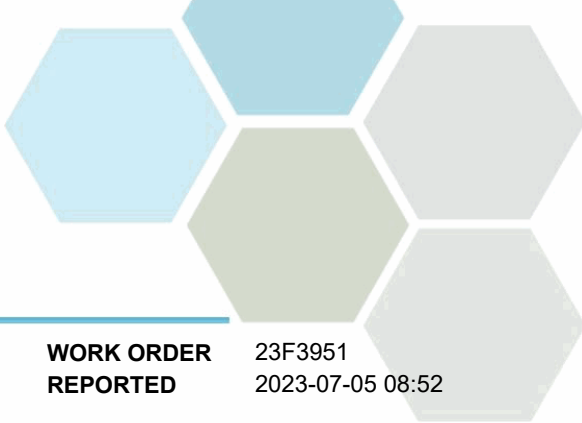
REPORTED TO PROJECT		Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652		WORK ORDER REPORTED		23F1886 2023-06-19 12:08	
Analyte		Result		RL	Units	Analyzed	Qualifier
Outfall Grab (23F1886-01) Matrix: Wastewater Sampled: 2023-06-14 08:35							
General Parameters							
Nitrogen, Total Kjeldahl		1.85		0.050	mg/L	2023-06-19	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Grab- PE11652

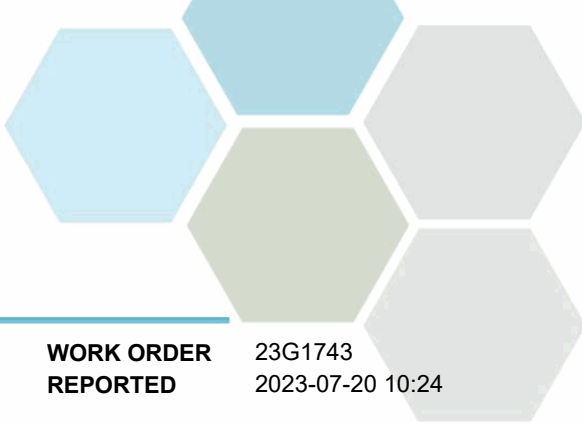
WORK ORDER REPORTED 23F3052
2023-06-26 11:21

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Grab (23F3052-01) Matrix: Wastewater Sampled: 2023-06-19 12:30					
<i>General Parameters</i>					
Nitrogen, Total Kjeldahl	1.92	0.050	mg/L	2023-06-26	



TEST RESULTS

REPORTED TO PROJECT		Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652		WORK ORDER REPORTED		23F3951 2023-07-05 08:52	
Analyte		Result		RL	Units	Analyzed	Qualifier
Outfall Grab (23F3951-01) Matrix: Wastewater Sampled: 2023-06-28 08:00							
General Parameters							
Nitrogen, Total Kjeldahl		2.17		0.050	mg/L	2023-07-05	



TEST RESULTS

REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652	WORK ORDER REPORTED	23G1743 2023-07-20 10:24
---------------------	---	---------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Grab (23G1743-01) | Matrix: Wastewater | Sampled: 2023-07-12 08:15

General Parameters

Nitrogen, Total Kjeldahl	6.44	0.050	mg/L	2023-07-19	RE2
--------------------------	------	-------	------	------------	-----

Sample Qualifiers:

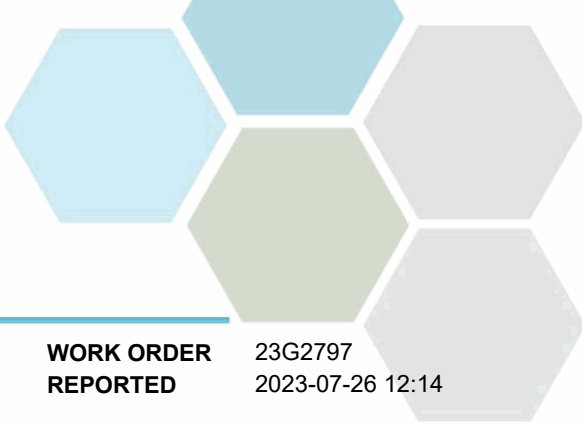
RE2 Result was confirmed by re-analysis prior to reporting.

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Grab- PE11652

WORK ORDER REPORTED 23G2547
2023-07-26 12:12

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Grab (23G2547-01) Matrix: Wastewater Sampled: 2023-07-19 07:10					
<i>General Parameters</i>					
Nitrogen, Total Kjeldahl	2.67	0.050	mg/L	2023-07-26	



TEST RESULTS

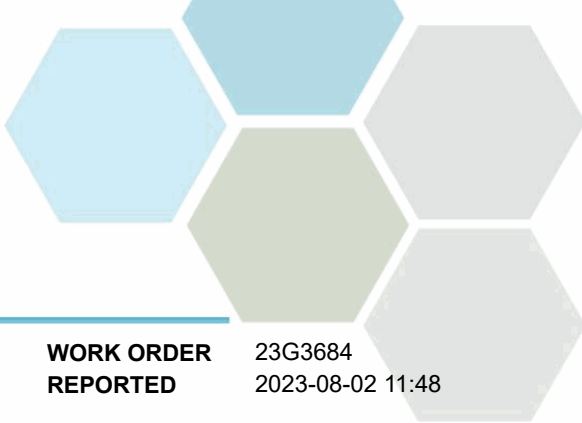
REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652	WORK ORDER REPORTED	23G2797 2023-07-26 12:14
---------------------	---	---------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Grab E104954 (23G2797-01) | Matrix: Wastewater | Sampled: 2023-07-20 07:45

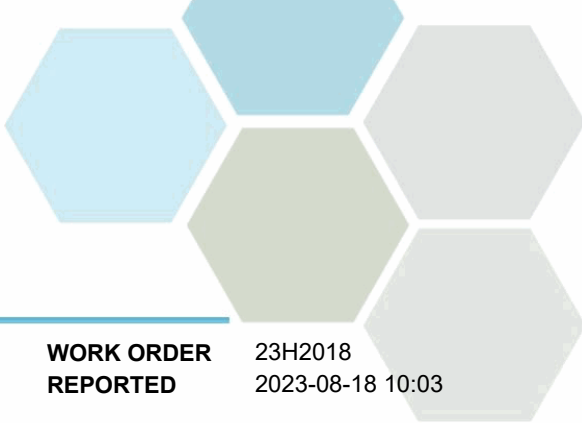
General Parameters

Nitrogen, Total Kjeldahl	2.04	0.050	mg/L	2023-07-26	
--------------------------	------	-------	------	------------	--



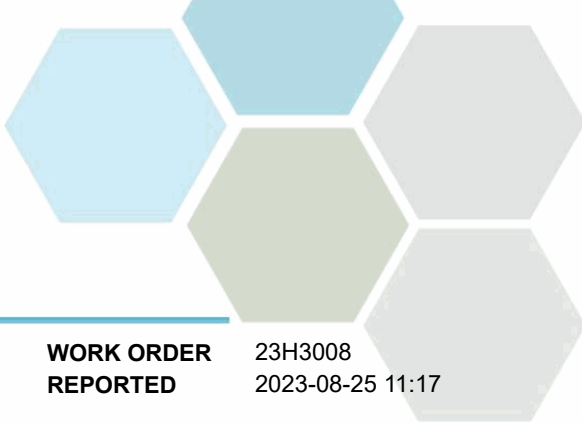
TEST RESULTS

REPORTED TO PROJECT		Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652		WORK ORDER REPORTED		23G3684 2023-08-02 11:48	
Analyte		Result		RL	Units	Analyzed	Qualifier
Outfall Grab (23G3684-01) Matrix: Wastewater Sampled: 2023-07-25 14:20							
General Parameters							
Nitrogen, Total Kjeldahl		2.13		0.050	mg/L	2023-08-02	



TEST RESULTS

REPORTED TO PROJECT		Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652		WORK ORDER REPORTED		23H2018 2023-08-18 10:03	
Analyte		Result		RL	Units	Analyzed	Qualifier
Outfall Grab (23H2018-01) Matrix: Wastewater Sampled: 2023-08-15 12:15							
General Parameters							
Nitrogen, Total Kjeldahl		1.85		0.050	mg/L	2023-08-18	



TEST RESULTS

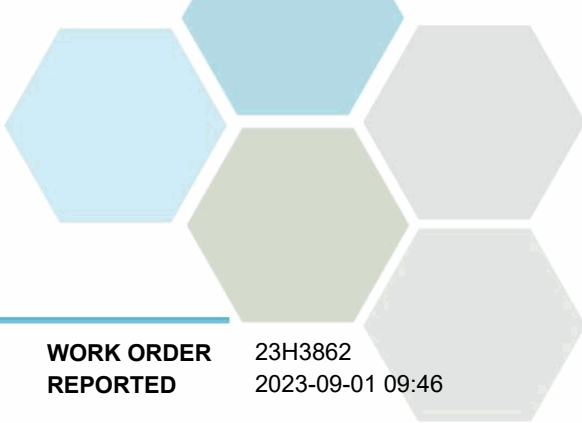
REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652	WORK ORDER REPORTED	23H3008 2023-08-25 11:17
---------------------	---	---------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Grab (23H3008-01) | Matrix: Wastewater | Sampled: 2023-08-23 08:55

General Parameters

Nitrogen, Total Kjeldahl	1.21	0.050	mg/L	2023-08-25	
--------------------------	------	-------	------	------------	--



TEST RESULTS

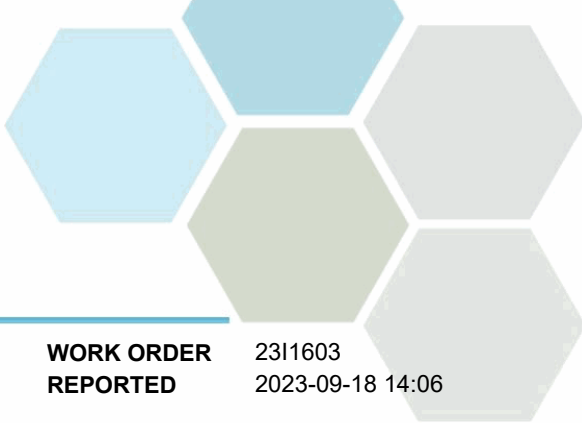
REPORTED TO PROJECT		Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652		WORK ORDER REPORTED		23H3862 2023-09-01 09:46	
Analyte		Result		RL	Units	Analyzed	Qualifier
Outfall Grab (23H3862-01) Matrix: Wastewater Sampled: 2023-08-29 06:30							
General Parameters							
Nitrogen, Total Kjeldahl		1.41		0.050	mg/L	2023-09-01	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Grab- PE11652

WORK ORDER REPORTED 23I0547
2023-09-13 09:53

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Grab E104954 (23I0547-01) Matrix: Wastewater Sampled: 2023-09-06 08:05					
<i>General Parameters</i>					
Nitrogen, Total Kjeldahl	1.53	0.050	mg/L	2023-09-12	
<i>Microbiological Parameters</i>					
Coliforms, Fecal (Q-Tray)	1	1	MPN/100 mL	2023-09-07	
E. coli (Q-Tray)	1	1	MPN/100 mL	2023-09-07	



TEST RESULTS

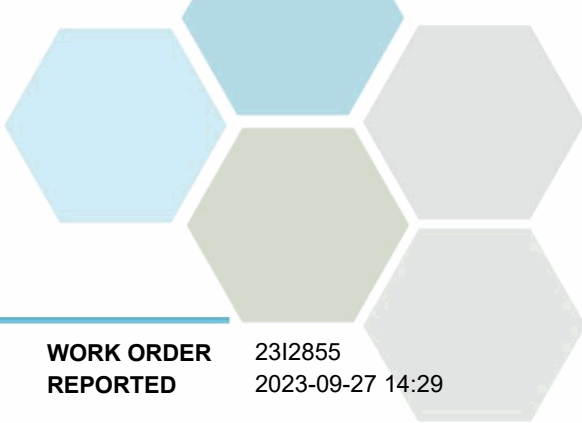
REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652	WORK ORDER REPORTED	2311603 2023-09-18 14:06
---------------------	---	---------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Grab (2311603-01) | Matrix: Wastewater | Sampled: 2023-09-13 07:15

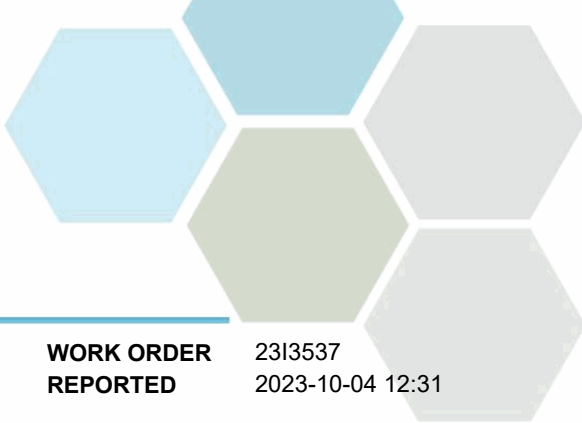
General Parameters

Nitrogen, Total Kjeldahl	1.77	0.050	mg/L	2023-09-18	
--------------------------	------	-------	------	------------	--



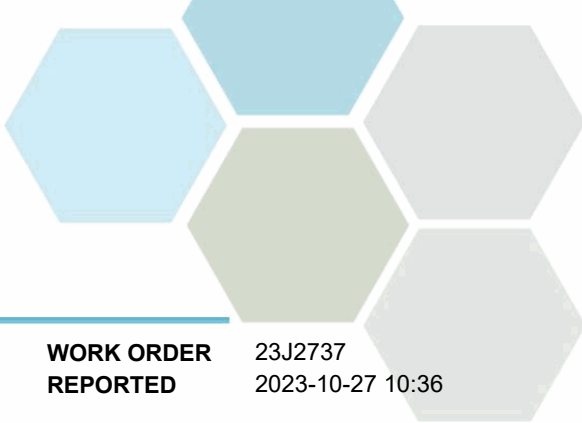
TEST RESULTS

REPORTED TO PROJECT		Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652		WORK ORDER REPORTED		2312855 2023-09-27 14:29	
Analyte		Result		RL	Units	Analyzed	Qualifier
Outfall Grab (2312855-01) Matrix: Wastewater Sampled: 2023-09-20 08:00							
General Parameters							
Nitrogen, Total Kjeldahl		1.54		0.050	mg/L	2023-09-27	



TEST RESULTS

REPORTED TO PROJECT		Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652		WORK ORDER REPORTED		23I3537 2023-10-04 12:31	
Analyte		Result		RL	Units	Analyzed	Qualifier
Outfall Grab (23I3537-01) Matrix: Wastewater Sampled: 2023-09-27 07:20							
General Parameters							
Nitrogen, Total Kjeldahl		1.93		0.050	mg/L	2023-10-03	



TEST RESULTS

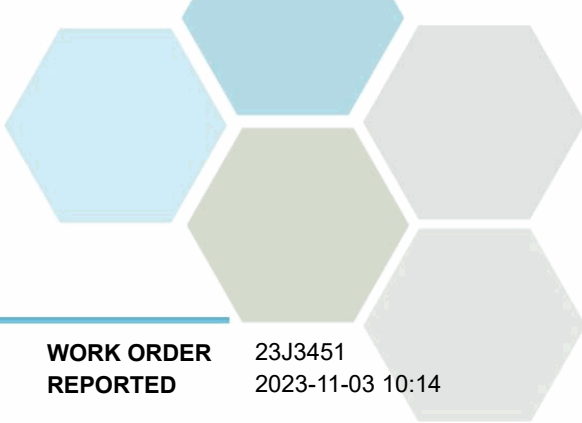
REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652	WORK ORDER REPORTED	23J2737 2023-10-27 10:36
---------------------	---	---------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Grfab (23J2737-01) | Matrix: Wastewater | Sampled: 2023-10-18 08:00

General Parameters

Nitrogen, Total Kjeldahl	1.67	0.050	mg/L	2023-10-27	
--------------------------	------	-------	------	------------	--



TEST RESULTS

REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652	WORK ORDER REPORTED	23J3451 2023-11-03 10:14
---------------------	---	---------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Grab (23J3451-01) | Matrix: Wastewater | Sampled: 2023-10-25 07:10

General Parameters

Nitrogen, Total Kjeldahl	1.63	0.050	mg/L	2023-11-03	
--------------------------	------	-------	------	------------	--

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Grab- PE11652

WORK ORDER REPORTED 23K0216
2023-11-09 11:16

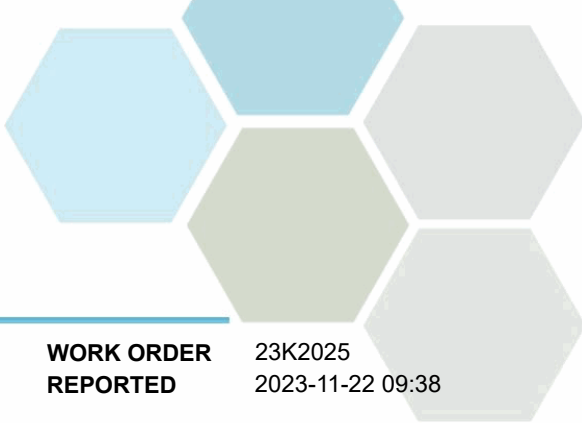
Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Grab E104954 (23K0216-01) Matrix: Wastewater Sampled: 2023-11-01 08:10					
<i>General Parameters</i>					
Nitrogen, Total Kjeldahl	1.69	0.050	mg/L	2023-11-06	
<i>Microbiological Parameters</i>					
Coliforms, Fecal (Q-Tray)	1	1	MPN/100 mL	2023-11-02	
E. coli (Q-Tray)	1	1	MPN/100 mL	2023-11-02	

TEST RESULTS

REPORTED TO PROJECT Regional District of Central Okanagan
Westside STP - Outfall Grab- PE11652

WORK ORDER REPORTED 23K1220
2023-11-14 10:09

Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Grab E104954 (23K1220-01) Matrix: Wastewater Sampled: 2023-11-08 07:35					
<i>General Parameters</i>					
Nitrogen, Total Kjeldahl	1.96	0.050	mg/L	2023-11-14	



TEST RESULTS

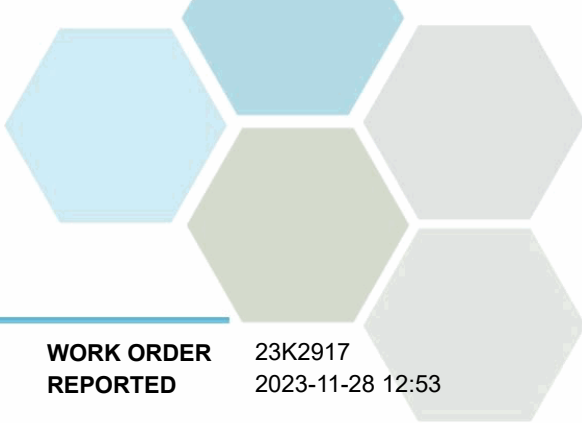
REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652	WORK ORDER REPORTED	23K2025 2023-11-22 09:38
---------------------	---	---------------------	-----------------------------

Analyte	Result	RL	Units	Analyzed	Qualifier
---------	--------	----	-------	----------	-----------

Outfall Grab (23K2025-01) | Matrix: Wastewater | Sampled: 2023-11-15 07:50

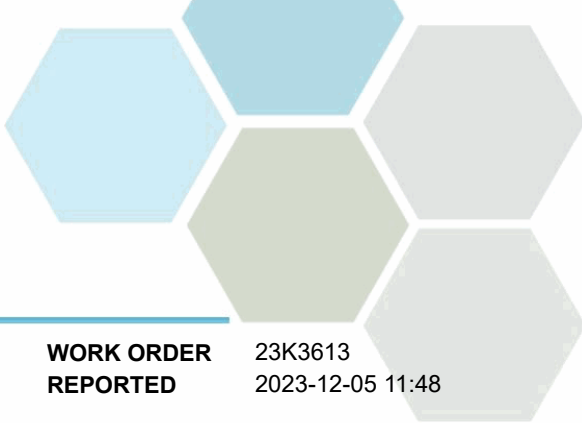
General Parameters

Nitrogen, Total Kjeldahl	2.24	0.050	mg/L	2023-11-21	
--------------------------	------	-------	------	------------	--



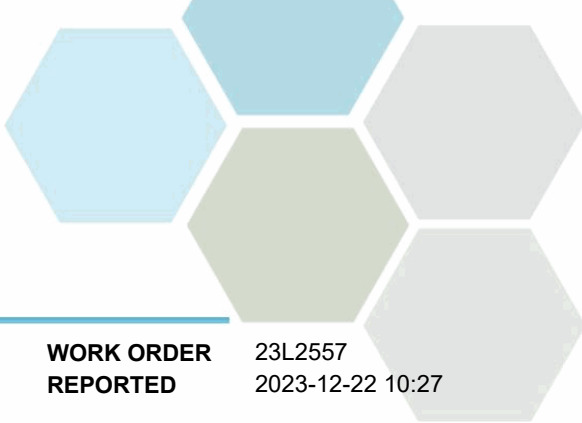
TEST RESULTS

REPORTED TO PROJECT		Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652		WORK ORDER REPORTED		23K2917 2023-11-28 12:53	
Analyte		Result		RL	Units	Analyzed	Qualifier
Outfall Grab (23K2917-01) Matrix: Wastewater Sampled: 2023-11-21 11:15							
General Parameters							
Nitrogen, Total Kjeldahl		2.00		0.050	mg/L	2023-11-28	



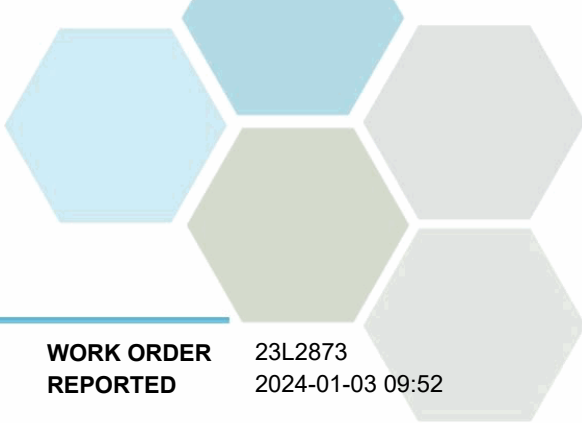
TEST RESULTS

REPORTED TO PROJECT		Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652		WORK ORDER REPORTED		23K3613 2023-12-05 11:48	
Analyte		Result		RL	Units	Analyzed	Qualifier
Outfall Grab (23K3613-01) Matrix: Wastewater Sampled: 2023-11-29 08:40							
General Parameters							
Nitrogen, Total Kjeldahl		2.38		0.050	mg/L	2023-12-04	



TEST RESULTS

REPORTED TO PROJECT		Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652		WORK ORDER REPORTED		23L2557 2023-12-22 10:27	
Analyte		Result		RL	Units	Analyzed	Qualifier
Outfall Grab (23L2557-01) Matrix: Wastewater Sampled: 2023-12-19 12:20							
General Parameters							
Nitrogen, Total Kjeldahl		2.40		0.050	mg/L	2023-12-22	



TEST RESULTS

REPORTED TO PROJECT	Regional District of Central Okanagan Westside STP - Outfall Grab- PE11652	WORK ORDER REPORTED	23L2873 2024-01-03 09:52
---------------------	---	---------------------	-----------------------------

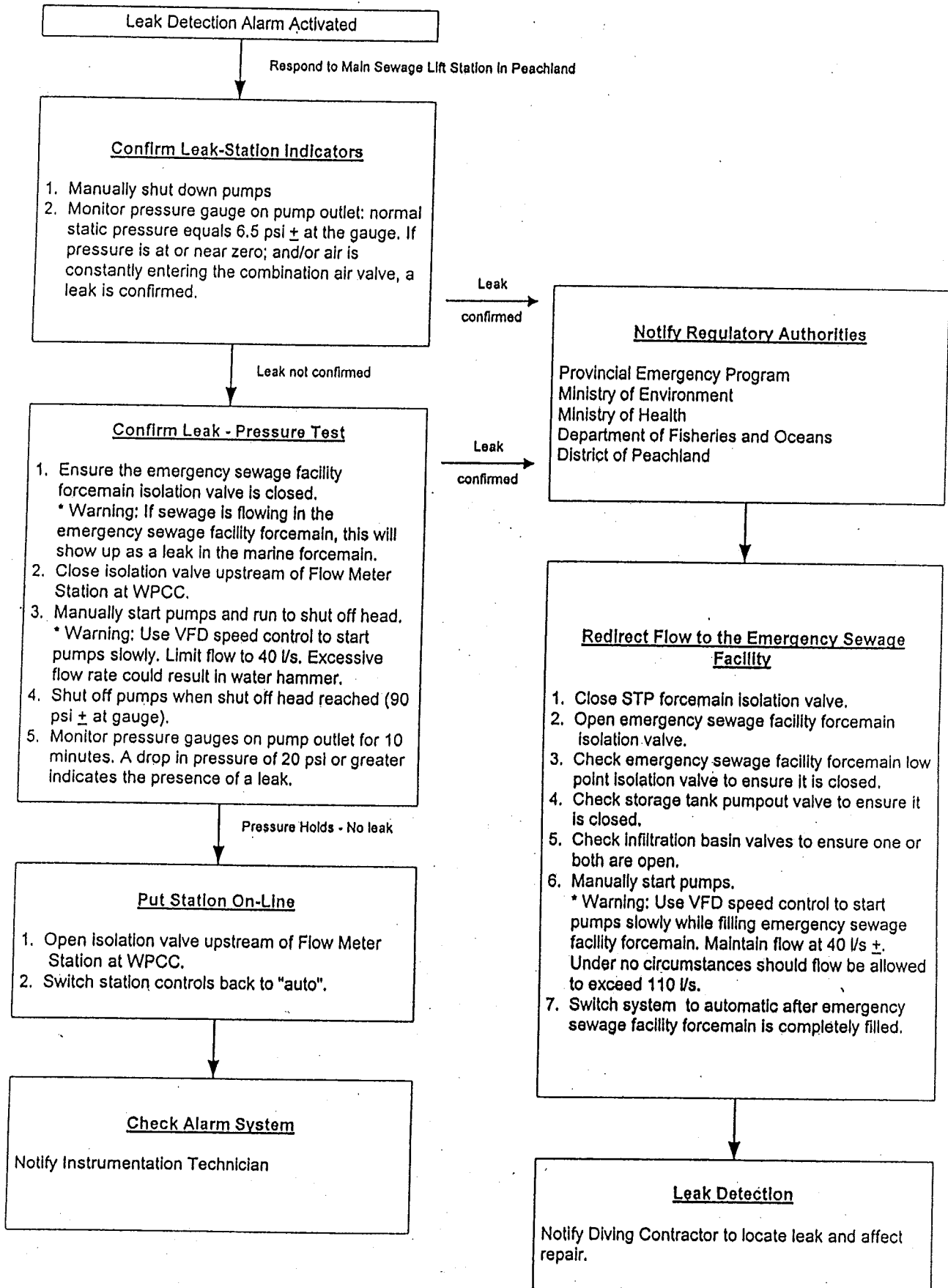
Analyte	Result	RL	Units	Analyzed	Qualifier
Outfall Grab (23L2873-01) Matrix: Wastewater Sampled: 2023-12-27 08:00					
General Parameters					
Nitrogen, Total Kjeldahl	4.37	0.050	mg/L	2023-12-29	RE2

Sample Qualifiers:					
RE2	Result was confirmed by re-analysis prior to reporting.				

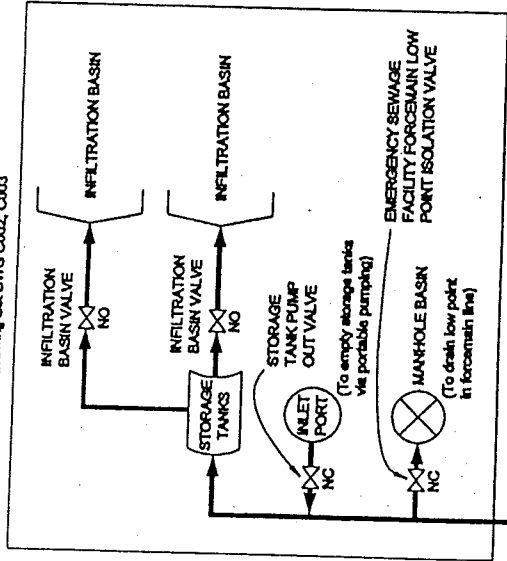
Appendix B

Peachland Leak Preparedness Plan

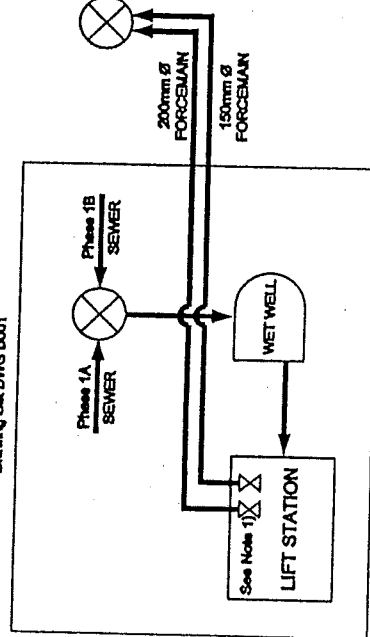
**Peachland Main Lift Station
Marine Forcemain
Emergency Response Plan Flow Chart**



EMERGENCY SEWAGE FACILITY See Emergency Sewage Facility and Forcemain Drawing Set DWG C002, C003

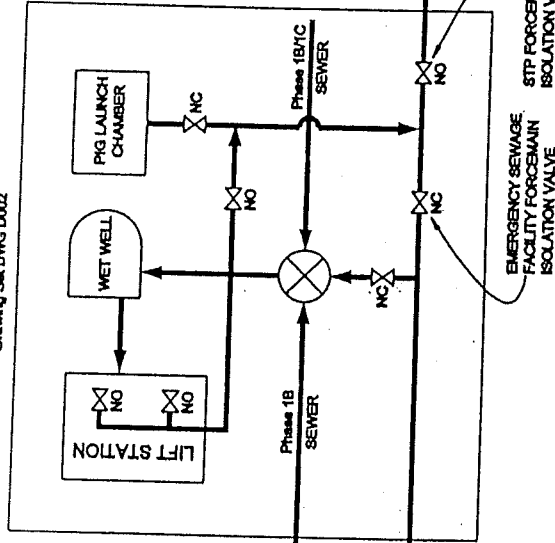


6th STREET LIFT STATION See Lift Station Drawing Set DWG D001

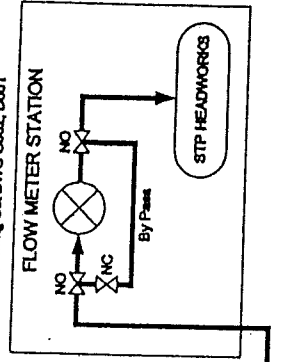


1) Valve Positions Based on
Selected Forcemain

MAIN LIFT STATION See Lift Station Drawing Set DWG D002



WESTBANK SEWAGE TREATMENT PLANT CONNECTION PIPING See Westbank STP Forcemain and Connection Drawing Set DWG C002, D001



KEY	
NC	= NORMALLY CLOSED
NO	= NORMALLY OPEN
⊗	= ISOLATION VALVE
⊙	= MANHOLE
○	= STAND PIPE
—	= GRAVITY LINE
—	= FORCEMAIN

PEACHLAND SANITARY SEWER SYSTEM SCHEMATIC PLAN

SEPTEMBER 1998

URBANSYSTEMS

File No. 1.0655.64.3

Appendix C

RDCO Sewer Bylaw 1315

**REGIONAL DISTRICT OF CENTRAL OKANAGAN
WESTSIDE SEWER SYSTEMS
BYLAW NO. 1315**

A bylaw to establish regulations under which sanitary sewer trunk collection and treatment will be provided and to establish fees and charges for the service, within the service area boundary of the Westside Regional Wastewater Treatment Plant

TABLE OF CONTENTS

SECTION 1	TITLE	2
SECTION 2	PURPOSE.....	2
SECTION 3	APPLICATION	3
SECTION 4	INTERPRETATION	3
4.1	Severability.....	3
4.2	Masculine / Singular	3
4.3	Schedules / Appendices	3
4.4	Headings	3
4.5	Other Legislated Requirements	3
SECTION 5	DEFINITIONS	4
SECTION 6	GENERAL TERMS AND CONDITIONS	6
6.1	Compliance with Bylaw.....	6
6.2	Ownership of the System	7
6.3	Duty of Care and Cause of Action	7
6.4	Limitation of Liability	7
6.5	Indemnification	7
6.6	Owner's Liability	7
SECTION 7	SANITARY SEWER CONNECTIONS	8
7.1	Applications and Permits	8
7.2	Non-Domestic Connections.....	8
SECTION 8	FEES & CHARGES	8
SECTION 9	PROHIBITIONS, RESTRICTIONS AND INTERRUPTION OF SERVICE	8
SECTION 10	TERMS AND CONDITIONS OF USE.....	8
10.1	Interference with the Sanitary Sewer System	8
10.2	Accidental Discharges	9
10.3	Non Compliance	9
10.4	Wastewater Drainage System	9
10.5	Inspection Chambers and Manholes	10

10.6	Septic Tanks / Portable Holding Tanks	10
10.7	Pre-treatment	10
10.8	Interceptors	11
10.9	Volume Control.....	12
10.10	Sampling and Analysis	12
SECTION 11	ADMINISTRATION AND ENFORCEMENT	12
11.1	Authority of the Manager of Public Works.....	12
11.2	Right of Entry	12
11.3	Cease and Desist Order	13
11.4	Violation	13
SECTION 12	REPEAL OF PREVIOUS BYLAW	13
SECTION 13	FORCE AND EFFECT	14
SCHEDULE A	- FEES & CHARGES.....	15
SCHEDULE B	- PROHIBITIONS & RESTRICTIONS.....	16
APPENDIX I	- FORMS.....	21
Form 1	- Non-Domestic Wastewater Information Report	21

WHEREAS it is deemed necessary to establish regulations and fees and charges for the administration, sustainability, operation, and maintenance of the Westside sewer systems and the terms and conditions upon which sewer will be provided;

NOW THEREFORE, THE REGIONAL BOARD OF THE REGIONAL DISTRICT OF CENTRAL OKANAGAN, IN OPEN MEETING ASSEMBLED, ENACTS AS FOLLOWS:

SECTION 1 TITLE

- 1.1 This bylaw may be cited as the “Regional District of Central Okanagan Westside Sewer Systems Bylaw No. 1315, 2012”.

SECTION 2 PURPOSE

- 2.1 The purpose of this Bylaw is to establish regulations, fees and charges for the administration, operation and maintenance of the Westside Regional Wastewater Treatment Plant and Regional District Trunks Sewer Collection System. The intent and objective of this Bylaw is to:
- (a) Protect the sewer collection system from corrosion, other damage and obstruction,
 - (b) Protect the wastewater treatment process from upset,
 - (c) Protect the public, Regional District workers, and property from hazardous conditions,
 - (d) Assist optimum wastewater system efficiency by preventing uncontaminated water from entering the system,

- (e) Protect wastewater sludge quality,
- (f) Protect the environment from contaminants that are not removed by the public treatment system(s),
- (g) Assist the Regional District in maintaining compliance with the operating conditions established by the Province of British Columbia.

SECTION 3 APPLICATION

- 3.1 This bylaw shall apply to all service recipients of the Westside Regional Wastewater Treatment Plant.

SECTION 4 INTERPRETATION

4.1 Severability

- 4.1.1 If any section, subsection, sentence, clause or phrase of this bylaw is deemed to be invalid by the decision of any court of competent jurisdiction, the invalid portion shall be severed and the decision that it is invalid shall not affect the validity of the remainder of the bylaw.

4.2 Masculine / Singular

- 4.2.1 Wherever the masculine is used throughout this bylaw, it shall also mean the feminine, and wherever the singular is used throughout this bylaw, it shall also mean the plural.

4.3 Schedules / Appendices

- 4.3.1 SCHEDULES A and B and APPENDIX I are attached to and form part of this bylaw.

4.4 Headings

- 4.4.1 Headings are for reference purposes and shall not affect in any way the meaning or interpretation of the provisions of this bylaw.

4.5 Other Legislated Requirements

- 4.5.1 No person shall enter into or work upon the sanitary sewer system without meeting the applicable confined space entry, street regulations, or other safety requirements, required by the Workers' Compensation Act.
- 4.5.2 Nothing in this bylaw relieves any person or organization from complying with any provision of any Federal or Provincial legislation, or any other bylaw of the Regional District. Where there is a conflict of regulations, the more stringent shall apply.

SECTION 5 DEFINITIONS

5.1 In this bylaw:

“*B.O.D.*” stands for “biochemical oxygen demand” and means the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory conditions in five (5) days at 20° C, expressed in milligrams per liter as determined by the appropriate procedure in Standard Methods.

“*C.O.D.*” stands for “chemical oxygen demand” and means the measure of the oxygen consuming capacity of inorganic and organic matter present in domestic or industrial wastewater as determined by the appropriate procedure described in Standard Methods.

“*community sewer system*” means any sewerage works or appurtenances thereto which are owned and operated by the local governing authority.

“*cooling water*” means untreated water originating from heat exchangers or similar type units.

“*design flow*” means the sewage flow as calculated, in accordance with the Health Act, by the Owner’s consultant and as approved by the Regional District.

“*domestic wastewater*” means the wastewater resulting from normal human living processes and not from commercial or industrial activities.

“*engineer*” means a person who is registered, or duly licensed as such, under the Engineers and Geoscientists Act of British Columbia.

“*extraneous flows*” means water originating from rainwater, snow melt, ground water, roof drain water, foundation drain water, subsurface drainage, surface water, single pass cooling water, condensate, or storm water.

“*flammable liquid*” means any liquid having a flash point below 38 ° C and having a vapour pressure not exceeding 280 kPa at 38 ° C.

“*garbage*” means solid wastes from domestic or commercial preparation, cooking, and dispensing of food, and from the handling, storage, and sale of produce.

“*grab sample*” means a single sample of a wastewater stream or discharge that represents the composition of the wastewater at the particular time and location at which the sample was collected.

“*grease*” means an organic substance recoverable by procedures set forth in Standard Methods and includes but is not limited to hydrocarbons, esters, fats, oils, waxes, and high molecular weight carboxylic acids.

“*industrial wastewater*” means any wastewater except domestic wastewater.

“*Manager*” means the *Regional District’s* Manager of Public Works, or designate, who oversee the day-to-day operation of the sanitary sewer system, and administer this bylaw.

“offal” means waste portions of food, animals, fowl, or fish.

“one day composite sample” means a composite sample comprised of flow proportioned samples collected at one hour intervals over the duration of one operating day.

“Owner” shall be interpreted as defined in the Local Government Act as amended from time to time.

“parcel” means any lot, block, or other area in which land is held or into which land is subdivided but does not include a highway.

“premises” means any residence, building, or structure located on a property.

“pesticide” means an organism or material that is represented, sold, used, or intended to be used, to prevent, destroy, repel, or mitigate a pest and includes:

- (a) a plant growth regulator, plant defoliator, or plant desiccant; and
- (b) a control product, other than a device that is a control product under the Pest Control Products Act (Canada).

“pH” means logarithm, to the base 10, of the reciprocal of the concentration of Hydrogen ions in moles per liter of solution.

“Plumbing Code” means any regulation made by the Lieutenant Governor of the Province of British Columbia, in accordance with the Local Government Act.

“pre-treatment” means the use of any physical and/or chemical process to ensure the composition of the effluent conforms to the minimum requirements of this bylaw.

“Regional Board” means the elected Board of the Regional District of Central Okanagan.

“Regional District” means the Regional District of Central Okanagan as described in Letters Patent and amendments thereto.

“sanitary sewer system” means any sewerage works or appurtenances thereto which are owned and operated by the Regional District.

“septic tank” means any device or structure designed for the temporary storage of wastewater.

“service connection” means the pipe which is located at the property line of a parcel, or at the edge of a statutory right of way, and is provided to connect the wastewater drainage system to the sanitary sewer system.

“sewage treatment plant” means any arrangement of devices and structures used for treating wastewater.

“Special Waste” means a substance that is defined as Special Waste as interpreted by the Waste Management Act.

“Standard Methods” means the Standard Methods of Water and Wastewater Analysis (most current edition) as published by the American Public Health Association, the American Water Works Association, the Canadian Standards Association, and the Water Pollution Control Federation.

“Subdivision Bylaw” means a bylaw adopted by the Regional District under Section 938 of the Local Government Act.

“suspended solids” means the solid matter according to particle size, expressed in milligrams per liter, in a liquid as determined according to Standard Methods.

“two hour composite sample” means a composite sample consisting of equal portions of 8 Grab Samples collected at 15 minute intervals.

“uncontaminated wastewater” means water such as spent cooling water, de-chlorinated water discharged from a swimming pool, and water used in street cleaning.

“user fee” means a fee imposed for the use of the sanitary sewage system.

“wastewater” means the water-borne wastes of the Regional District derived from human or industrial sources including domestic wastewater and industrial wastewater, but does not include storm water and uncontaminated wastewater.

“wastewater drainage system” means an assembly of pipes, fittings, fixtures, traps, and appurtenances, not owned by the Regional District, that is used to convey wastewater to a service connection.

“watercourse” means:

- (a) the bed and shore of a river, stream, lake, creek, lagoon, swamp, marsh or other natural body of water; or
- (b) a channel, ditch, reservoir or other man-made surface feature, whether containing or conveying water continuously or intermittently.

5.2 Unless otherwise defined herein, all words or expressions used in this bylaw shall have the same meaning assigned to them as like words or expressions contained in the Local Government Act, Interpretation Act, Building Bylaw, Zoning Bylaw, Subdivision Bylaw, Water Systems Bylaw, and the Plumbing Code.

SECTION 6 GENERAL TERMS AND CONDITIONS

6.1 Compliance with Bylaw

6.1.1 Except in accordance with the provisions of this bylaw, no person shall:

- (a) connect a wastewater drainage system to the sanitary sewer system, or
- (b) permit any direct or indirect discharge of any wastewater into the sanitary sewer system.

- 6.1.2 Should any person contravene the provisions of this bylaw, and in such contravention causes or may cause damage to the sanitary sewer system, the Regional District shall make any repairs and take whatever remedial action necessary to limit the extent of the damage and shall recover the cost from the owner pursuant to this bylaw.

6.2 Ownership of the System

- 6.2.1 The sanitary sewer system, its operation, maintenance, repair and replacement shall be under the direction and control of the Manager.
- 6.2.2 All sewer pipes, connections, appurtenances, or facilities required to operate the sanitary sewer system servicing more than one community sewer system shall be owned by the Regional District. This includes but is not limited to, all works that are located within a highway or a statutory right of way, regardless whether the works were constructed at the expense of the Owner or the Regional District.

6.3 Duty of Care and Cause of Action

- 6.3.1 This bylaw does not create any duty at law on the part of the Regional District, its Board, officers, employees, or other representatives concerning anything contained in this bylaw. All works, services, improvements, and all matters required pursuant to this bylaw are the responsibility of the Owner and Applicant and all persons acting on their behalf. No approval of any kind, certificate, permit, review, inspection, or other act or omission by the Regional District or any of its representatives, including any enforcement or lack of enforcement of the provisions of this bylaw, shall relieve the Owner and Applicant and all persons acting on their behalf from this duty pursuant to this bylaw and shall not create any cause of action in favour of any person.

6.4 Limitation of Liability

- 6.4.1 Sanitary sewer service is provided on the condition that the Owner make no claim against the Regional District, its Board or its officers, agents, and employees acting within the scope of their employment. It is further a condition that the Owner shall make no claim for any indirect, incidental, or consequential damage.

6.5 Indemnification

- 6.5.1 Sanitary sewer service is provided on the condition that the Owner indemnify and save harmless the Regional District, its Board or its officers, agents, and employees in respect of all claims arising from the provision of the sanitary sewer service.

6.6 Owner's Liability

- 6.6.1 The Owner shall ensure that the terms and conditions, under which connection to the sanitary sewer system is provided, are not breached. The Owner shall be liable:
- (a) to pay all costs, rates, charges, fees, and penalties that may be imposed pursuant to this bylaw; and
 - (b) for any breach of this bylaw arising on the parcel to which sanitary sewer service is provided, whether the breach is actually committed by the Owner or by a third party renting, leasing, or having access to the property.

SECTION 7 SANITARY SEWER CONNECTIONS

7.1 Applications and Permits

- 7.1.1 No Person shall construct or install any manner of connection, whether on a permanent or temporary basis, to any part of the sanitary sewer system without first having obtained a permit to connect from the Local Government office serving their community.

7.2 Non-Domestic Connections

- 7.2.1 The Owner or Occupier of a commercial or industrial place of business where Non-Domestic waste may be discharged into the sanitary sewer system must supply to the Regional District information regarding his type of business and the characteristics of wastewater produced, using Form 1 - Non-Domestic Wastewater Information Report (APPENDIX I).

SECTION 8 FEES & CHARGES

- 8.1 Every owner or occupier of all parcels located within a sanitary sewer system service area or the owner or occupier of all parcels connected to a community sewer system within the service area boundary of the Westside Regional Wastewater Treatment Plant shall pay to their local government office the rates and charges as prescribed by that jurisdiction. The fees and charges established in this Bylaw shall apply to the owners and operators of the community sewer systems serviced by the Regional District, as prescribed in SCHEDULE A.

SECTION 9 PROHIBITIONS, RESTRICTIONS AND INTERRUPTION OF SERVICE

- 9.1 No person shall release, or permit the release of, any prohibited substance or any restricted substance which exceeds the respective concentrations listed in SCHEDULE B of this bylaw.
- 9.2 Sewer service may be limited, interrupted, terminated, or refused:
- (a) in circumstances where the discharge of wastewater may interfere with works being undertaken on the sanitary sewer system; or
 - (b) where a person contravenes the provisions of this bylaw.

SECTION 10 TERMS AND CONDITIONS OF USE

10.1 Interference with the Sanitary Sewer System

- 10.1.1 The sanitary sewer system, its operation, maintenance, repair, and replacement shall be under the direction and control of the Manager. No person other than the

Manager, a Regional District employee acting in the course of his duties or a contractor authorized by the Regional District shall:

- (a) enter into or work upon the sanitary sewer system;
- (b) make or terminate a service connection to the sanitary sewer system;
- (c) uncover or tamper with the sanitary sewer system; or
- (d) attach or detach any line, pipe, or other appurtenance to the sanitary sewer system.

10.2 Accidental Discharges

- 10.2.1 Any person responsible for, or aware of, the accidental discharge of restricted or prohibited substances into the sanitary sewer system shall report the same forthwith to the Regional District in order that the necessary precautions can be taken to minimize the deleterious effects of the discharge.

10.3 Non Compliance

- 10.3.1 Should any person contravene the provisions of this bylaw, and such contravention causes or may cause damage to the sanitary sewer system, the Regional District may make any repairs and take whatever remedial action necessary to limit the extent of the damage and shall recover the cost pursuant to this bylaw.
- 10.3.2 Should testing indicate that the components of the wastewater are not in compliance with the provisions of this bylaw, the Regional District shall notify the Owner, in writing, to cease and desist the discharge of wastewater.
- 10.3.3 The cease and desist order shall remain in effect until such time as:
- (a) the Owner complies with all requirements of this bylaw, and
 - (b) the Regional District notifies the Owner, in writing, indicating that the Owner has complied with this bylaw and authorizing the Owner to resume the discharge of wastewater.

10.4 Wastewater Drainage System

- 10.4.1 Every wastewater drainage system connected to a regional trunk shall be constructed in accordance with the standards contained in the Subdivision Bylaw, the British Columbia Plumbing Code and the Building Bylaw.
- 10.4.2 The Owner shall ensure that the wastewater drainage system is installed such that it meets the elevation of the service connection. The Regional District is not obligated to meet the elevation of, nor connect to, any wastewater drainage system installed prior to the installation of the service connection.
- 10.4.3 The Owner must:
- (a) maintain the wastewater drainage system and sanitary service connection in a state of good repair;
 - (b) protect the wastewater drainage system and sanitary service connection from freezing or damage of any other sort; and

- (c) ensure that the plumbing fixtures, wastewater drainage system and sanitary service connection do not leak.

10.4.4 Notwithstanding subsection 10.4.3, the Regional District may construct, inspect, maintain or repair the wastewater drainage system and sanitary service connection. All costs associated with the referenced construction, inspection, maintenance or repair shall be at the expense of the Owner.

10.5 Inspection Chambers and Manholes

10.5.1 All wastewater must pass through an inspection chamber or a suitable manhole installed and maintained in good repair to allow observation and sampling and flow measurement of the sewage.

10.5.2 Inspection chambers and manholes must be:

- (a) constructed and installed in accordance with the Subdivision Bylaw,
- (b) located on the property of the owner, as close to the property line as possible, or at an alternate location approved by the Manager,
- (c) accessible to the Manager at all times;
- (d) constructed, installed, and maintained at the expense of the Owner.

10.5.3 Where there is more than one building on a parcel discharging non-domestic wastewater, each building must have a separate inspection chamber installed 1.0 meter outside the wall of the building where the building drain connects to the building sewer.

10.6 Septic Tanks / Portable Holding Tanks

10.6.1 No person shall permit any sludge, deposit, or material contained in, or originating from, any septic tanks, portable holding tanks, or recreational vehicles to enter into the sanitary sewer system.

10.6.2 Where a sewer connection is made to a parcel where a septic tank or tanks exist, the owner shall remove any sludge, deposit, or material contained in the existing septic tanks.

10.6.3 All sludge, deposit, or material originating from a septic tank, portable holding tank, or recreational vehicle must be deposited at the Regional District's disposal facility.

10.7 Pre-treatment

10.7.1 Pre-treatment is required where wastewater, or any component of the wastewater:

- (a) does not meet the provisions of this bylaw;
- (b) may damage or increase maintenance costs on the sanitary sewer system; or
- (c) may detrimentally affect the operation of the sewage treatment plant.

- 10.7.2 The owner or operator shall ensure the design, operation and maintenance of the pre-treatment facility achieves the treatment objectives and is in accordance with the manufacturer's recommendations.
- 10.7.3 The owner or operator shall ensure any waste products from the pre-treatment facility are disposed of in a safe manner.
- 10.7.4 The maintenance records and waste disposal records shall be available to the Manager upon request.
- 10.7.5 The owner or operator shall keep documentation pertaining to the pre-treatment facility and waste disposal for three years. The Owner shall make these records available for examination by the Manager at his request.

10.8 Interceptors

- 10.8.1 The Owner of every parcel shall be required to provide an interceptor if the wastewater being discharged from the parcel contains, or will contain, grease, oil, grit, flammable liquids or gases, or other components which may interfere with or damage the sanitary sewer system. This includes but is not limited to:
 - (a) service stations, vehicle repair garages, and automobile wash bays
 - (b) dry-cleaning establishments
 - (c) milk plants, and creameries
 - (d) laboratories
 - (e) commercial kitchens
 - (f) concrete plants, and aggregate washing plants
- 10.8.2 All interceptors shall be:
 - (a) of sufficient capacity to perform the purpose for which it is intended,
 - (b) designed by an engineer or a pre-manufactured package designed for the specific purpose of trapping the deleterious components,
 - (c) located as to be readily and easily accessible for cleaning and inspection.
- 10.8.3 In support of the interceptor design, the Owner shall be required to submit detailed design drawings and calculations from the engineer or manufacturer's specifications and manuals to the Manager for approval prior to construction. In addition the Owner must submit operation and maintenance manuals.
- 10.8.4 No construction shall take place on the interceptor until such time as the Manager has reviewed the above information and approved construction. Approval to construct the interceptor by the Manager does not imply that the quality of the wastewater discharged after passing through the interceptor will meet the requirements of this bylaw. It is the Owner's responsibility to ensure that all the components of the wastewater will comply with the provisions of the bylaw after passing through the interceptor.

10.8.5 The design, construction, operation, and maintenance of the interceptor shall be the responsibility of the Owner and at the Owner's expense. The Owner shall maintain written records of all cleaning, repair, calibration, and maintenance and shall store said records at the place of business for a minimum of three (3) years. The Owner shall make these records available for examination by the Manager upon his request.

10.9 Volume Control

10.9.1 Where wastewater is discharged into the sanitary sewer system in volumes which may exceed the available downstream system capacity, the Manager may require the Owner or occupier of the premises to take measures to equalize the discharge volumes and strengths.

10.9.2 Equipment necessary to comply with this section shall be provided, maintained, and operated by the Owner or occupier of such premises in a manner satisfactory to the Manager.

10.10 Sampling and Analysis

10.10.1 Where sampling is required for the purposes of determining the concentration of constituents in the wastewater the sample may:

- (a) be collected manually or by using an automatic sampling device; and
- (b) contain additives for its preservation.

10.10.2 For the purpose of determining compliance with Schedule B, discrete wastewater streams within premises may be sampled, at the discretion of the Manager.

10.10.3 Any single grab sample may be used to determine compliance with Schedule B.

10.10.4 All tests, measurements, analyses and examinations of wastewater, its characteristics or contents pursuant to this Bylaw shall be carried out in accordance with "Standard Methods" and be performed by a laboratory accredited for analysis of the particular substance(s) using a method which is within the laboratory's scope of accreditation or to the satisfaction of the Manager as agreed in writing prior to sample analysis.

SECTION 11 ADMINISTRATION AND ENFORCEMENT

11.1 Authority of the Manager of Public Works

11.1.1 The Manager may:

- (a) Place limits and restrictions on the quantity, composition, frequency and nature of the waste permitted to be discharged;
- (b) Require the Owner to repair, alter, remove, or add to works or construct new works; and
- (c) Shut down all non-compliant releases.

11.2 Right of Entry

11.2.1 Regional District officers, or their designates, are authorized to enter upon any property or premises at any reasonable time to inspect any building or premises to ensure compliance with, or prevent violation of, the provisions of this bylaw.

11.2.2 The Owner or occupant shall permit the Regional District officers or their designates to perform all actions required including inspection, observation, measurement, testing, and sampling in order to determine compliance with this bylaw.

11.3 Cease and Desist Order

11.3.1 Regional District officers may order the Owner or occupant who contravenes this bylaw to comply with the bylaw within a specified time. Where an Owner does not comply with a cease and desist order within the specified time, the Regional District officer may order the action contained in the order to be performed by Regional District employees, or others, at the expense of the Owner. All costs incurred as a result of such action shall be recovered pursuant to this bylaw.

11.4 Violation

11.4.1 Any person who:

- (a) violates the provisions of this bylaw;
- (b) causes or permits any act in contravention or violation of the provisions of this bylaw;
- (c) neglects or omits bylaw requirements;
- (d) tampers with, interferes with, or damages the sanitary sewer system;
- (e) interferes with the operation or maintenance of the sanitary sewer system;
- (f) fails to comply with bylaw orders, directions, or notices;
- (g) prevents, obstructs or attempts to prevent or obstruct the authorized entry of any officer authorized under this bylaw;

will be guilty upon summary conviction of an offence under this bylaw. Each day's continuance of an offence under this section will constitute a new and distinct offence.

11.4.2 Any person who violates bylaw provisions may, on summary conviction, be liable to the maximum penalty under the Offence Act, plus the cost of prosecution, for each offence. The penalties imposed under this section are a supplement and not a substitute for any other remedy to an infraction of this bylaw.

SECTION 12 REPEAL OF PREVIOUS BYLAW

12.1 The Regional District of Central Okanagan Sewer Systems Bylaw No. 1171, 2006, as amended by Bylaw Nos. 1208-2007, 1226-2007, 1231-2008 and 1267-2009, 1281-2010, is hereby repealed.

SECTION 13 FORCE AND EFFECT

13.1 This bylaw comes into effect upon adoption.

READ A FIRST TIME THIS 26th DAY OF November 2012.

READ A SECOND TIME THIS 26th DAY OF November 2012.

READ A THIRD TIME THIS 26th DAY OF November 2012.

RECONSIDERED AND ADOPTED THIS 26th DAY OF November 2012.

CHAIR

DIRECTOR OF CORPORATE SERVICES

I hereby certify the foregoing to be a true and correct copy of Bylaw No.1315 cited as the "Regional District of Central Okanagan Westside Sewer Systems Bylaw No. 1315, 201", as read a third time and adopted by the Regional Board on the 26th day of November, 2012.

Dated at Kelowna, B.C.
this 28th day of November 2012

DIRECTOR OF CORPORATE SERVICES

SCHEDULE A - FEES & CHARGES

1. User fees for the Westside Regional Sewer System shall be charged based on wastewater flows to recover costs and contributions to capital / reserves, as follows:
 - (1) District of West Kelowna
 - (a) Wastewater Treatment Plant
 - (b) Major collection trunks and lift stations
 - (c) 30% Capital Recovery Rate
 - (2) Westbank First Nation
 - (a) Wastewater Treatment Plant
 - (b) Major collection trunks and lift stations
 - (c) 30% Capital Recovery Rate
 - (3) District of Peachland
 - (a) Wastewater Treatment Plant
 - (b) Lake Force Main
 - (c) 30% Capital Recovery Rate

SCHEDULE B - PROHIBITIONS & RESTRICTIONS

PROHIBITIONS – GENERAL

1. Hauled Wastewater

- (1) No person shall discharge hauled wastewater to the wastewater works unless:
 - (a) The carrier of the hauled wastewater operating as a waste management system has a certificate of approval issued by the Manager, and
 - (b) The carrier meets all conditions for discharge that are or may be set from time to time with respect to the haulage of wastewater by the Regional District.
- (2) No person shall discharge or permit the discharge of hauled wastewater:
 - (a) At a location other than a hauled wastewater discharge location approved by the Regional District.
 - (b) Without a manifest, in a form approved by the Manager, completed and signed by the carrier and deposited in an approved location at the time of discharge.
 - (c) Without the use of a discharge hose placed securely in the discharge portal at the approved location.

2. Hauled Waste

- (1) No person shall discharge hauled waste to the wastewater works unless:
 - (a) The carrier of the hauled waste operating as a waste management system has a certificate of approval issued by the Manager, and
 - (b) Hauled waste meets all conditions for discharge that are set out in this Schedule, as amended from time to time;
- (2) No person shall discharge or allow or cause hauled waste to be discharged into a Sewer, except at sites designated by the Manager.

3. Non-Contact Cooling Water

- (1) The discharge of non-contact cooling water or uncontaminated water to a sanitary sewer from any residential property is prohibited.

4. Water Originating from a Source Other than the Community Water Supply

- (1) The discharge of water originating from a source other than the community water supply, including storm water or groundwater, directly or indirectly to a sanitary sewer works is prohibited, unless:
 - (a) The discharge is in accordance with a Waste Discharge Permit; and
 - (b) The discharge does not exceed the limits set out under this Schedule, with respect to biochemical oxygen demand, total phosphorus or total suspended solids; or
 - (c) In the event the discharge does exceed the limits set out under this Schedule, with respect to any of biochemical oxygen demand, total phosphorus or total suspended solids, the discharge has been approved in writing by the Manager.

5. Prohibition of Dilution

- (1) No person shall discharge directly or indirectly, or permit the discharge or deposit of wastewater into a sanitary sewer works where water has been added to the discharge for the purposes of dilution to achieve compliance with this Schedule.

PROHIBITED WASTES

- A. No person shall discharge directly or indirectly or deposit or cause or permit the discharge or deposit of wastewater into a sanitary sewer or private sewer connection to any sanitary sewer works in circumstances where:

- (1) To do so may cause or result in:

- (a) A health or safety hazard to a person authorized by the Regional District to inspect, operate, maintain, repair or otherwise work on a wastewater works;
- (b) An offence under the Environmental Management Act, as amended from time to time, or any regulation made thereunder from time to time;
- (c) Wastewater sludge from the wastewater treatment facility works to which either wastewater discharges, directly or indirectly, to fail to meet the objectives and criteria as listed in the Liquid Waste Management Act, as amended from time to time;
- (d) Interference with the operation or maintenance of a wastewater works, or which may impair or interfere with any wastewater treatment process;
- (e) A hazard to any person, animal, property or vegetation;
- (f) An offensive odour to emanate from wastewater works, and without limiting the generality of the foregoing, wastewater containing hydrogen sulphide, carbon disulphide, other reduced sulphur compounds, amines or ammonia in such quantity as may cause an offensive odour;
- (g) Damage to wastewater works;
- (h) An obstruction or restriction to the flow in wastewater works.

- (2) The wastewater has two or more separate liquid layers.

- (3) The wastewater contains:

- (a) Hazardous substances;
- (b) Combustible liquid; Biomedical waste, including any of the following categories: human anatomical waste, animal waste, untreated microbiological waste, waste sharps and untreated human blood and body fluids known to contain viruses and agents listed in "Risk Group 4" as defined in "Laboratory Biosafety Guidelines" published by Health Canada, dated, 2004, as amended.
- (c) Specified risk material for bovine spongiform encephalopathy as defined in the federal Fertilizers Regulations (C.R.C., c. 666), as amended from time to time, including material from the skull, brain, trigeminal ganglia, eyes, tonsils, spinal cord and dorsal root ganglia of cattle aged 30 months or older, or material from the distal ileum of cattle of all ages.
- (d) Dyes or coloring materials which may or could pass through a wastewater works and discolor the wastewater works effluent;
- (e) Fuel;
- (f) Ignitable waste.
- (g) Pathological waste.
- (h) PCBs.
- (i) Pesticides, insecticides, herbicides or fungicides.

- (j) Reactive material – except within such limits as are permitted by license issued by the Atomic Energy Control Board of Canada.
- (k) Toxic substances which are not otherwise regulated in this Bylaw.
- (l) Waste radioactive substances in excess of concentrations greater than those specified for release to the environment under the Nuclear Safety and Control Act and Regulations or amended versions thereof.
- (m) Solid or viscous substances in quantities or of such size to be capable of causing obstruction to the flow in a sewer, including but not limited to ashes, bones, cinders, sand, mud, soil, straw, shaving, metal, glass, rags, feathers, tar, plastics, wood, un-ground garbage, animal parts or tissues, and paunch manure.
- (n) Any garbage that has been ground, comminuted or shredded by a garbage disposal unit.
- (o) The wastewater contains a concentration, expressed in milligrams per litre, in excess of any one or more of the limits in Restricted Wastes section of this Schedule, unless the discharge is authorized in a Code of Practice approved by the Regional District.

STANDARDS FOR RESTRICTED WASTES

A. No person shall discharge directly or indirectly or deposit or cause or permit the discharge or deposit of wastewater into a sanitary sewer or private sewer connection to any sanitary sewer works in circumstances where:

- (1) any non-domestic wastewater as analysed in the specified sample type which exceeds the limits for the following parameters, expressed in the total form as milligrams per litre and as shown in the following table:

Table A - CONVENTIONAL CONTAMINANTS and PHYSICAL PARAMETERS

Parameter	Concentration in Milligrams per Litre (mg/L)		
	One Day Composite Sample	Two Hour Composite Sample	Grab Sample
Biochemical Oxygen Demand (B.O.D.)	500	1000	2000
Chemical Oxygen Demand (C.O.D.)	750	1500	3000
Total Suspended Solids (TSS)	600	1200	2400
Oil and Grease (non petroleum)	150	300	600
Oil and Grease (petroleum source)	15	30	60
pH (non-domestic waste)	>6 and <9.5	>5 and <11	>5.5 and <10.5

- (2) any non-domestic waste which, at the point of discharge into a sewer, contains any substance, in a combined or un-combined form, with a concentration in excess of the levels set out in the following tables. All concentrations are expressed as total concentrations, which include both the dissolved and un-dissolved substances.

Table B - ORGANIC CONTAMINANTS

Substance	Concentration Limit [mg/L, except as noted]
Benzene	0.01
Chloroform	0.04
Dichlorobenzene (1,2-)	0.05
Dichlorobenzene (1,4)	0.08
Ethylbenzene	0.06
Hexachlorobenzene	0.0001
**Methylene chloride (dichloromethane)	0.09
PCBs (chlorobiphenyls)	0.004
**Phenols, Total (or Phenolic compounds)	0.1
**Tetrachloroethane (1,1,2,2 -)	0.06
**Tetrachloroethylene	0.06
Toluene	0.02
Trichloroethylene	0.05
Xylenes, total	0.3

Table C - INORGANIC CONTAMINANTS

Substance	Abbreviation	Concentration in Milligrams per Litre		
		One day composite sample	Two hour composite sample	Grab sample
Aluminum	Al	50.0	100.0	200.0
Arsenic	As	0.5	1.0	2.0
Boron	B	50.0	100.0	200.0
Cadmium	Cd	0.2	0.4	0.8
Chromium	Cr	2.0	4.0	8.0
Cobalt	Co	5.0	10.0	20.0
Copper	Cu	2.0	4.0	8.0
Cyanide	Cn	0.5	1.0	2.0
Iron	Fe	10.0	20.0	40.0
Lead	Pb	1.0	2.0	4.0
Manganese	Mn	5.0	10.0	20.0
Mercury	Hg	0.025	0.05	0.1
Molybdenum	Mo	1.0	2.0	4.0
Nickel	Ni	2.0	4.0	8.0
Phenols	-	1.0	2.0	4.0
Phosphorus	P	12.5	25.0	50.0
Silver	Ag	1.0	2.0	4.0
Sulphate	SO ⁴	1500.0	3000.0	6000.0
Sulphide	S	1.0	2.0	4.0
Tin	Sn	5.0	10.0	20.0
Zinc	Zn	3.0	6.0	12.0

Note:

More restrictive guidelines may be required if the Manager considers there to be a detrimental effect on the sewage treatment plant, the sanitary sewer system, or the workers.

- (3) any water or waste containing substances in such concentrations that are not amenable to treatment or reduction by the sewage treatment process employed, or are amenable to treatment only to such a degree that the sewage treatment plant effluent cannot, during normal operation, meet the requirement of any other agency having jurisdiction over discharges to the receiving waters.

- (4) any material or substance (e.g. enzymes and/or bacteria) that alters the structure of the waste(s) but does not reduce the loading (C.O.D.).
- (5) any water or wastewater contained in, but not limited to, a swimming pool, hot-tub, or artificial pond.

APPENDIX I - FORMS

Form 1 - Non-Domestic Wastewater Information Report

- A. This Form is required where an Owner or occupier proposes to:
- (a) make application to connect an industrial or commercial activity to the sanitary sewer system; or
 - (b) expand or change an industrial or commercial activity in such a way that it may affect the quality or quantity of the wastewater being discharged into the sanitary sewer system.
- B. This form is to be filed with the Manager of Public Works at the Regional District of Central Okanagan, located at 1450 KLO Road, Kelowna BC, V1W 3Z4, immediately or within **90 days Prior** to the date to either connect, expand on, or change the industrial or commercial activity.

(1) This Application is: ☐ New Connection ☐ to Expand or Change Existing Connection

PART 1 – COMPANY / INDUSTRY INFORMATION

(2) Business Information:

Company Name:

Civic Address:

Telephone:

Fax:

Legal Description:

Lot:

Plan:

DL:

Primary Contact Person:

Mobile Phone:

Email Address:

(3) Hours & Days of Operation: Hours/day _____ Days/week _____

(4) Activity (type of):

Pharmacy ☐

Dental / Health Services ☐

Greenhouses / Nurseries ☐

Laundromat ☐

Funeral Establishments ☐

Light Manufacturing ☐

Beauty Salons ☐

Restaurant / Food Preparation ☐

Heavy Manufacturing ☐

Winery / Cidery ☐

Pet Grooming / Kennels ☐

Painting ☐

Service Station ☐

Veterinary ☐

Printing / Publishing ☐

☐ OTHER _____

Abattoir ☐

Package House ☐

PART 2 – WASTEWATER CHARACTERISTICS

(5) Flow: Is the Discharge > 300 m³ in a 30 day period? ☐ Yes ☐ No ☐ Don't Know

Is the Discharge > 10 m³ in a 24 hour period? ☐ Yes ☐ No ☐ Don't Know

(6) Volumes: Maximum discharge flow rate: _____ m³/day
Average daily discharge flow rate: _____ m³/day
Method of flow rate determination: ☐ measured ☐ estimated

NOTE:
1 m³ = 220 imp gal
1 m³ = 264 US gal

(7) Temperature: _____ °C

(8) Acidity (pH) Min. _____ Max. _____

(9) Description: *Provide a brief description of waste generating process:*

(10) Special Waste:

Does any process within the plant produce special waste as defined under the Special Waste Regulation of the Waste Management Act BC? ☐ Yes ☐ No ☐ Don't Know

(11) Quality: *Indicate whether any of the following types of wastes are discharged:*

Flammable or explosive waste	☐ Yes	☐ No		
Obstructive waste	☐ Yes	☐ No	Biomedical waste	☐ Yes ☐ No
Air contaminant waste	☐ Yes	☐ No	Corrosive waste	☐ Yes ☐ No
High temperature waste	☐ Yes	☐ No	Food waste	☐ Yes ☐ No
Radioactive waste	☐ Yes	☐ No	Seawater	☐ Yes ☐ No

(12) Contaminants and Physical Parameters

In the space provided below, check the appropriate box for each wastewater contaminant to dictate whether the contaminant listed is "known to be present", "suspected to be present", "suspected to be absent", or "known to be absent" in the wastewater discharge.

If a contaminant is "known to be present" or "suspected to be present", estimate the expected average and maximum daily contaminant concentrations in the spaces provided.

If the wastewater discharges have been sample and analyzed in the past, please attach examples of sampling data.

CONTAMINANTS	ABSENT		PRESENT		Expected Concentration (mg/L (ppm))	
	known	suspected	known	suspected	Ave.	Max.
Biochemical Oxygen Demand (B.O.D.)	☐	☐	☐	☐	_____	_____
Chemical Oxygen Demand (C.O.D.)	☐	☐	☐	☐	_____	_____
Total Suspended Solids (TSS)	☐	☐	☐	☐	_____	_____
Oil and Grease (non petroleum)	☐	☐	☐	☐	_____	_____
Oil and Grease (petroleum source)	☐	☐	☐	☐	_____	_____
Phenols, Total	☐	☐	☐	☐	_____	_____
Phenols, Chlorinated	☐	☐	☐	☐	_____	_____

Polynuclear Aromatic Hydrocarbons	☐	☐	☐	☐	_____	_____
PCBs	☐	☐	☐	☐	_____	_____
Pesticides	☐	☐	☐	☐	_____	_____
Tetrachloroethylene	☐	☐	☐	☐	_____	_____
Benzene	☐	☐	☐	☐	_____	_____
Ethylbenzene	☐	☐	☐	☐	_____	_____
Toluene	☐	☐	☐	☐	_____	_____
Xylenes	☐	☐	☐	☐	_____	_____
Solvents, <i>Specify</i> :						
_____	☐	☐	☐	☐	_____	_____
Aluminum	☐	☐	☐	☐	_____	_____
Arsenic	☐	☐	☐	☐	_____	_____
Boron	☐	☐	☐	☐	_____	_____
Cadmium	☐	☐	☐	☐	_____	_____
Chromium	☐	☐	☐	☐	_____	_____
Cobalt	☐	☐	☐	☐	_____	_____
Copper	☐	☐	☐	☐	_____	_____
Cyanide	☐	☐	☐	☐	_____	_____
Iron	☐	☐	☐	☐	_____	_____
Lead	☐	☐	☐	☐	_____	_____
Manganese	☐	☐	☐	☐	_____	_____
Mercury	☐	☐	☐	☐	_____	_____
Molybdenum	☐	☐	☐	☐	_____	_____
Nickel	☐	☐	☐	☐	_____	_____
Phenols	☐	☐	☐	☐	_____	_____
Phosphorus	☐	☐	☐	☐	_____	_____
Silver	☐	☐	☐	☐	_____	_____
Sulphate	☐	☐	☐	☐	_____	_____
Sulphide	☐	☐	☐	☐	_____	_____
Tin	☐	☐	☐	☐	_____	_____
Zinc	☐	☐	☐	☐	_____	_____

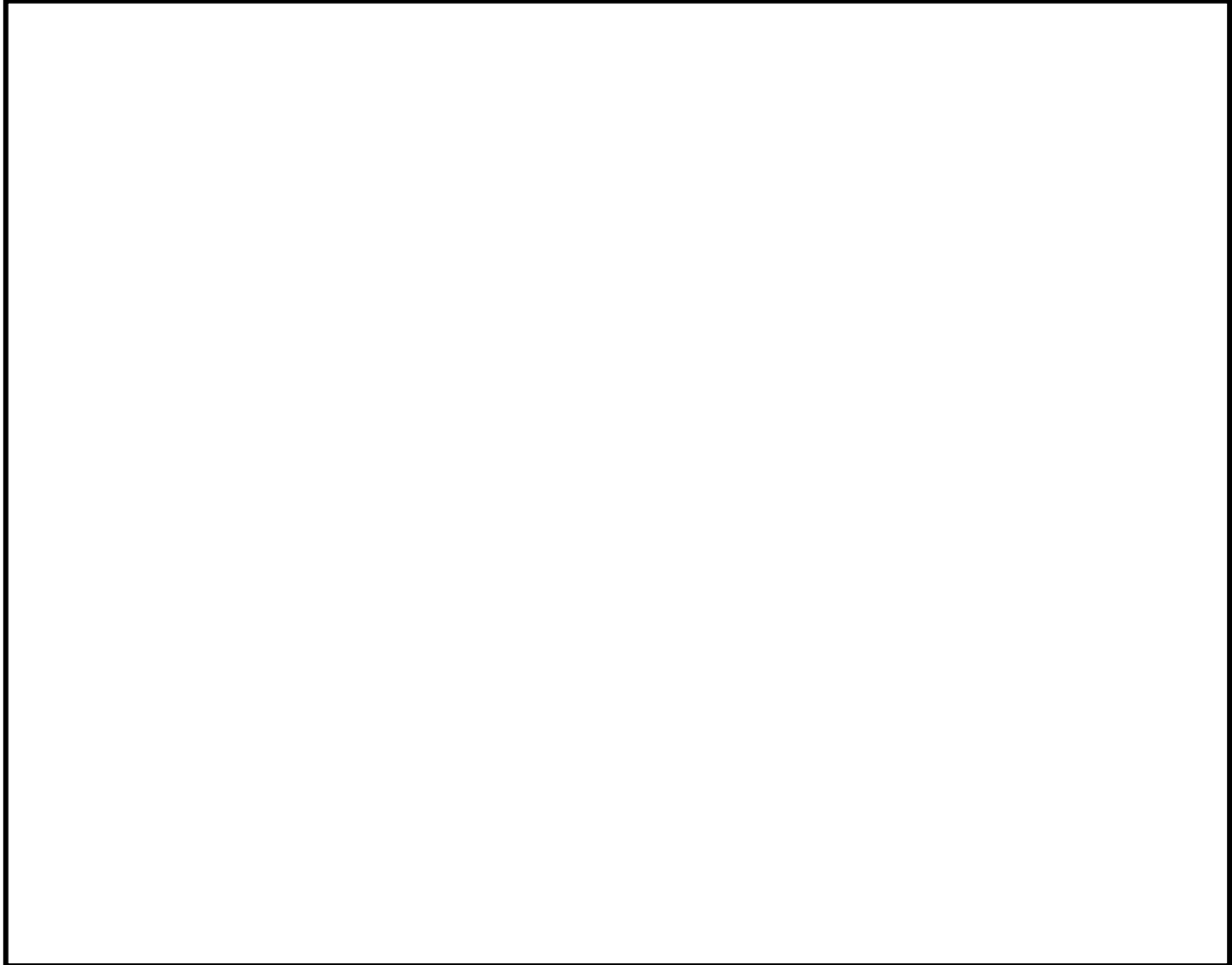
PART 4 – ATTACHMENTS

The Owner or occupant must provide any and all documentation for packaged pre-treatment systems, interceptors, control, monitoring, or sampling equipment.

PART 3 – SITE PLAN

The Owner or occupant must sketch a site plan in the area provided below (or attach a site plan to the application). The plan shall be dimensioned and must include:

- | | |
|--|--|
| (1) property lines, buildings, streets | (4) flow equalizing facilities, or other control works |
| (2) the location of sampling manhole, | (5) the monitoring points, |
| (3) pre-treatment works, | (6) sanitary & storm sewer lines and connections, |



PART 5 – DECLARATION

I, _____, declare that the information given on this form is correct to the best of my knowledge.

Signature

Date