



December 11, 2017 ISSUED FOR USE FILE: 704-ENW.VENW03140-01

Via Email: BHackwood@sd68.bc.ca; Chris.Baker@sd68.bc.ca

School District 68 (Nanaimo-Ladysmith) 395 Wakesiah Road Nanaimo, BC V9R 3K6

Attention: Mr. Brian Hackwood, Maintenance Manager

Subject: Domestic Water Testing (Lead) Inventory – Gabriola Elementary

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained School District 68 Nanaimo-Ladysmith (SD 68) to conduct a domestic water testing inventory at Gabriola Elementary located in SD 68. Tetra Tech understands that the BC Ministry of Education has issued a directive to protect drinking water. The directive requires that a systematic investigation of public drinking water supplies at select schools in the District be undertaken. The investigation is based on procedures set forth by the Vancouver Island Health Authority (VIHA), modified per Health Canada guidelines, to ascertain risk and mitigation.

Tetra Tech understands that the sampling schedule, collection, testing and reporting of results needs to be completed by December 22, 2017 in order to allow sufficient time for SD 68 to implement mitigation measures prior to its deadline of March 31, 2018.

Carrie McVeigh, of SD 68, provided Tetra Tech with authorization to proceed with the inventory on October 24, 2017.

2.0 METHODOLOGY

Tetra Tech completed the domestic water testing inventory program at Gabriola Elementary on November 20th, 2017. The 2017 sampling program was conducted as per the protocols established during the 2016 program. The methodologies employed during the field program are detailed in the following subsections.

2.1 Sampling Locations

Tetra Tech reviewed plans for the facility prior to commencing the field work to identify potential sampling locations. The facility was then assessed in the field and sampling locations were selected based on the probability of human consumption at a location. The sampling locations included one point that was closest to the location where the water supply enters the building, one that is the furthest point from where the water supply enters the building and from points where human consumption of water occurred or was reasonably likely to occur. The sampling locations for Gabriola Elementary are shown on the attached Figure 1.

Drinking fountains and kitchen sinks were all considered to have a high probability of human consumption of water and were always sampled. Sinks with visible evidence of human consumption of water, such as water bottles, cups, or electric kettles were also considered to have a high probability of human consumption of water and were sampled. Although classroom sinks were considered to have a moderate probability of human consumption of water, only



representative samples were collected as per the direction of SD 68 Maintenance Manager, Mr. Brian Hackwood. Classroom laboratory and art room sinks, where present, were considered to have a low probability of human consumption of water so only representative samples were collected. Finally, washrooms and utility sinks, unless there was other evidence of human consumption of water (such as an electric kettle) were considered to be a low probability of human consumption of water and only representative samples were collected.

2.2 Drinking Water Sampling

Sampling was conducted in the early hours of Monday, November 20th, 2017 in order collect water samples representative of an approximate worse-case scenario of water that had remained in contact with the school's plumbing over the course of a weekend. Two samples were collected at each sample location; the first collected immediately prior to any water line flushing (0 second sample); the second collected after thirty seconds of water line flushing (30 second sample).

The process for the sequence of analysis for a sample location is as follows:

- Only the pre-flush (0 second) sample is initially submitted for laboratory analysis;
- If the analytical result exceeds the Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Allowable Concentration (MAC), the 30 second sample would be submitted for further analysis; and
- If the 30 second sample analytical result exceeds the GCDWQ MAC, additional samples would be collected
 after flushing with cold water for 2 minutes and 5 minutes at a subsequent sampling event and both samples
 submitted for analysis.

Water samples were collected directly from the sample point into clean, labeled, new laboratory-supplied containers pre-charged with preservative for total lead. Sampling personnel wore new nitrile gloves prior to collecting each sample. Samples were kept in a cooler with ice after collection until being brought back to Tetra Tech's Nanaimo office, where samples not immediately submitted to the laboratory were stored in refrigerated conditions.

2.3 Analytical Testing

Maxxam is a Canadian Association for Laboratory Accreditation (CALA) accredited laboratory that is qualified to analyze the samples using British Columbia Ministry of Environment (MOE)-approved procedures. All water samples submitted were analyzed for total lead.

2.4 Quality Assurance / Quality Control

During the sampling program, Tetra Tech implemented a Quality Assurance/Quality Control (QA/QC) program to ensure the integrity of the sampling methodology and analytical testing. The QA/QC program adhered to Tetra Tech's in-house Quality Management System (QMS), which was designed to generate representative samples, minimize the potential for cross-contamination between sampling locations and samples, and reduce the potential for systematic bias.

The QA/QC program included the following tasks:

- Recording the results of field activities in the field concurrently with the activities;
- Use of clean, new sampling gloves at each sampling location;
- Placing samples into new, labeled laboratory-supplied containers;





- Transporting samples to Maxxam in chilled coolers using chain-of-custody procedures;
- Using a Canadian Association for Laboratory Accreditation (CALA) accredited laboratory that is qualified to analyze the samples using MOE-approved procedures;
- Independently verifying the sample concentrations flagged by Maxxam as being greater than Health Canada guidelines; and
- Conducting a review of this report by a qualified senior Tetra Tech professional to ensure that the report meets
 Tetra Tech technical and reporting requirements.

Laboratory Quality Assurance / Quality Control Program

Water samples were submitted to Maxxam, a CALA accredited laboratory. Laboratory testing was conducted using methods outlined in the British Columbia Environmental Laboratory Manual. Laboratory QA/QC reports are attached to the laboratory reports presented in Appendix B. Samples included in the QA/QC reports consist of laboratory batches and will include random samples from the lab report and potentially other projects to complete a batch.

The Laboratories noted any sample deficiencies, such as unacceptable headspace, broken jars or bottles, etc. As well, the laboratory measured the temperature of samples received by the laboratory in Burnaby.

3.0 ASSESSMENT STANDARDS

As per the guidance from the Vancouver Island Health Authority (VIHA), Tetra Tech compared the sample analytical results to the *Guidelines for Canadian Drinking Water Quality* (GCDWQ) published by Health Canada, February 2017. The guidelines list a Maximum Acceptable Concentration (MAC) for lead of 10 µg/L (0.010 mg/L). The MAC for lead is based on chronic effects and is intended to apply to average concentrations in water consumed for extended periods. No immediately toxic concentration for lead is listed, however exposure to lead should nevertheless be kept to a minimum.

4.0 ANALYTICAL RESULTS

Tetra Tech collected water samples from Gabriola Elementary on November 20th, 2017. A total of 23 sample locations were identified; two samples were collected at each location (i.e., 0 second sample and 30 second sample). Twenty-three pre-flush (0 second) samples were submitted for laboratory analysis of total lead.

Twenty-two of the 0 second samples contained concentration of total lead below the GCDWQ MAC and one 0 second sample was greater than the guideline.

Sample GB06 was collected from a bathroom sink near the east end of the facility. The 30 second sample for this location was submitted for laboratory analysis of total lead.

The 30 second sample contained concentrations of total lead below the GCDWQ MAC.

Sampling locations are shown on Figure 1. Laboratory testing results for Gabriola Elementary are summarized in the table below. The complete laboratory certificate is provided as Appendix B.





Table 1: Laboratory Testing Results

Sample ID	Sample Date	MAC	Total Lead (µg/L)
	0 Second	Samples	
GB01-0s	11/20/2017		9.53
GB02-0s	11/20/2017		3.40
GB03-0s	11/20/2017		1.00
GB04-0s	11/20/2017		6.76
GB05-0s	11/20/2017		8.90
GB06-0s	11/20/2017		14.8
GB07-0s	11/20/2017	7	3.46
GB08-0s	11/20/2017		6.27
GB09-0s	11/20/2017	7	1.89
GB10-0s	11/20/2017	10 μg/L	5.78
GB11-0s	11/20/2017	7	1.64
GB12-0s	11/20/2017		6.2
GB13-0s	11/20/2017	7	5.65
GB14-0s	11/20/2017		2.10
GB15-0s	11/20/2017		2.25
GB16-03	11/20/2017		2.66
GB17-0s	11/20/2017	7	3.10
GB18-0s	11/20/2017		8.40
GB19-0s	11/20/2017		2.36
GB20-0s	11/20/2017		1.90
GB21-0s	11/20/2017		1.39
GB22-0s	11/20/2017		1.75
GB23-0s	11/20/2017		4.29
	30 Second	Samples	
GB06-30s	11/20/2017	10 μg/L	1.80
Notes:	Grey Fill	Exce	eds GCDWQ MAC

5.0 DISCUSSION AND RECOMMENDATIONS

Tetra Tech's sampling program was based upon guidance from the Ministry of Health, found in the document *Guidance on Controlling Corrosion in Drinking Water Distribution Systems* (2009). The rationale is that for each sampling point, if the pre-flush (0 second) sample (Tier 1) contained elevated lead concentrations, it could indicate that the faucet or fittings are the likely be the source of lead. If a subsequent 30 second flush sample (Tier 2) contained elevated lead concentrations, the source of the lead would likely be the piping (plumbing) leading to the faucet; whereas low lead concentrations in the 30 second sample would further indicate that the source was likely the faucet and fittings. Finally, a 5 minute flush sample (if required) should be drawing water directly from the water supply piping within the building and would indicate if flushing is feasible for lowering the lead concentration in water within the building.

The Health Canada guidance recommend that Tier 2 sampling (30 second samples) take place when Tier 1 sampling identifies more than 10% of sites with lead concentrations above the MAC, and then only at the 10% of sampling sites with the highest lead concentration. Rather, Tetra Tech ran every 30 second sample for locations where the 0 second sample was above the MAC to show that flushing was adequate to lower the lead concentration in the drinking water at each point of concern.



The guidance from the Ministry of Health recommended that samples be collected after the sampling points had been stagnant for a minimum of 8 hours but not longer than 24 hours in order to simulate the worst case daily scenario for lead in drinking water consumption. Based on guidance from VIHA, SD 68 directed Tetra Tech to collect samples Monday mornings prior to any staff or students arriving at the facilities in order to simulate a worst-case scenario for stagnant water. As such, lead concentrations reported represent what could be expected following a weekend and would likely be lower on subsequent weekday mornings.

Twenty-two of the 23 pre-flush (0 second) samples collected at Gabriola Elementary contained concentrations of lead below the GCDWQ MAC. Lead concentrations at sample location GB06 exceeded the MAC for the 0 second samples (14.8 µg/L) but was below the guideline for the 30 second sample (1.80 µg/L).

As previously noted, where lead concentrations are elevated in 0 second samples, the contributing source is likely the fixture (i.e., faucet or fittings). Where the 30 second sample is also elevated the source is likely the plumbing immediately behind the fixture. Since lead concentrations at location GB06 exceeded the MAC for the 0 second sample but not for the 30 second sample, there is potentially a lead source in the fixture.

Flushing is adequate to lower the lead concentrations at GB06. During sample collection, Tetra Tech noted signage throughout the facility stating "Water Quality – First thing in the morning... Run the water for two minutes before drinking. Throughout the day... Let the water run until it is cold before drinking." Tetra Tech recommends that this signage be maintained at each point where drinking water could be consumed and that this procedure continues to be followed as it promotes drinking water safety awareness.

6.0 SUMMARY AND CONCLUSIONS

Twenty-two pre-flush (0 second) samples collected at Gabriola contained concentrations of total lead below the GCDWQ MAC of 10µg/L (0.010 mg/L). One sample (BR06) had a concentration of lead exceeding the GCDWQ for the 0 second sample but was below for the 30 second sample.

Tetra Tech recommends that SD 68 continue with its ongoing procedure of conducting a 2 minute flush at each drinking water consumption point each morning; and running taps/faucets until cold prior to consuming water. Tetra Tech noted signage at most drinking water consumption points stating "Water Quality – First thing in the morning... Run the water for two minutes before drinking. Throughout the day... Let the water run until it is cold before drinking."

Tetra Tech recommends that the facility be inspected on a routine basis to ensure that the above noted signage is present and in good condition at each point where drinking water could be consumed. Tetra Tech further recommends that a bulletin be provided to staff summarizing the drinking water quality results at the facility and reminding them of the above procedure. Staff should then instruct students and visitors in the drinking water procedure.



7.0 CLOSURE

This report has been prepared based on the scope of work and for the use of School District 68, which includes distribution as required for the purposes for which this assessment was commissioned. The assessment has been carried out in accordance with generally accepted professional practice. No other warranty is made, either express or implied. Professional judgment has been applied in developing the recommendations in this report.

This report was prepared by personnel with professional experience in investigations of this nature and who specifically conducted the investigations at this Site. Reference should be made to the 'Geoenvironmental Report – Limitations on the Use of this Document' attached in Appendix A that forms a part of this report.

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted, Tetra Tech Canada Inc.

Shawneen Walker, B.Sc., R.P.Bio., P.Biol.

Biologist

Environment Practice

Direct Line: 250.756.3966 x245 Shawneen.Walker@tetratech.com

Malter

Nigel Cavanagh, M.Sc., R.P.Bio., P.Biol.

Senior Aquatic Biologist Environment Practice

Direct Line: 250.756.3966 x240 Nigel.Cavanagh@tetratech.com

/dr

Attachments: Figure 1 - Gabriola Elementary Sample Locations

Appendix A - Limitations on the Use of this Document

Appendix B - Laboratory Report



FIGURES

Figure 1 Gabriola Elementary Sample Locations



ENCLOSED SPACES

<u>Ceiling Hatches</u>

1 - Corridor Outside Library Rm 108
2 - Corridor Outside Storage Rm 103

3 - Corridor Outside Sp. Ed. Rm 106
4 - Corridor Outside Staff Rm 101

5 - Inside H/C W.C. In Rm 204

<u>Floor Hatches</u> — <u>None</u>

CONFINED SPACES

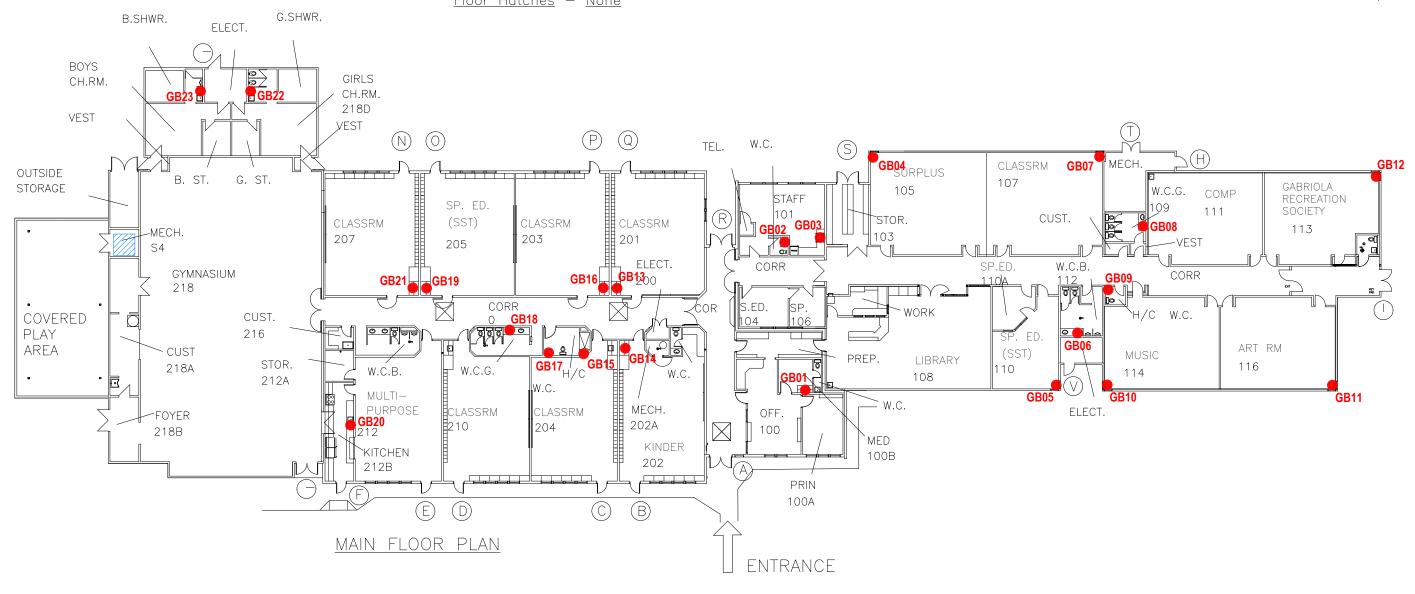
<u>Sewer Digester</u>

19 - Digestor 20 - Digestor

Roof Access

No Fixed Ladder To Access Attic Or Roof





NOTES:

1) BASE DRAWING IS PROVIDED BY CLIENT

2) DRAWING NOT TO SCALE

LEGEND:

- WATER ENTRY POINT

- SAMPLE LOCATION

School District 68

DOMESTIC WATER TESTING (LEAD) INVENTORY
GABRIOLA ELEMENTARY SCHOOL
NORTH ROAD, GABRIOLA ISLAND, BC

GABRIOLA ELEMENTARY SAMPLE LOCATIONS



PROJECT NO. ENW.VENW03140-01	DWN DBD	CKD SW	REV 0
OFFICE	DATE		
EDM	December	2017	

Figure 1



APPENDIX A

LIMITATIONS ON THE USE OF THIS DOCUMENT



LIMITATIONS ON USE OF THIS DOCUMENT

GEOENVIRONMENTAL

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Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner

consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by persons other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this report, at or on the development proposed as of the date of the Professional Document requires a supplementary investigation and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.





APPENDIX B

LABORATORY REPORT





Your Project #: ENW.VENW03140-01 Your C.O.C. #: 541404-01-01, 541404-02-01

Attention:Shawneen Walker

TETRA TECH CANADA INC. #1 - 4376 BOBAN DRIVE NANAIMO, BC Canada V9T 6A7

Report Date: 2017/12/01

Report #: R2485179 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A5946 Received: 2017/11/29, 08:45

Sample Matrix: DRINKING WATER

Samples Received: 20

		Date	Date		
Analyses	Quantity	/ Extracted	Analyzed	Laboratory Method	Analytical Method
Elements by CRC ICPMS (total)	20	N/A	2017/11/30	D BBY7SOP-00003,	BCLM2005,EPA6020bR2m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Letitia Prefontaine, B.Sc., Senior Project Manager

Email: LPrefontaine@maxxam.ca

Phone# (604)639-2616

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



TETRA TECH CANADA INC. Client Project #: ENW.VENW03140-01

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID				SO6588	SO6589	SO6590	SO6591		SO6592		
Sampling Date				2017/11/20	2017/11/20	2017/11/20	2017/11/20		2017/11/20		
COC Number				541404-01-01	541404-01-01	541404-01-01	541404-01-01		541404-01-01		
	UN	NITS	MAC	GB06-30S	SV01-30S	SV02-30S	SV03-30S	RDL	SV04-30S	RDL	QC Batch
Total Metals by ICPMS											
Total Lead (Pb)	ug	g/L	10	1.80	3.15	6.10	4.34	0.20	1100	1.0	8847865
No Fill	No Exce	eeda	nce								
Grey	Grey Exceeds 1 criteria policy/level										
Black Exceeds both criteria/levels											
RDL = Reportable Detection Limit											

Maxxam ID			SO6593	SO6594	SO6595	SO6596	SO6597	SO6612				
Sampling Date			2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20				
COC Number			541404-01-01	541404-01-01	541404-01-01	541404-01-01	541404-01-01	541404-02-01				
	UNITS	MAC	SV06-30S	SV08-30S	SV10-30S	SV12-30S	SV13-30S	SV14-30S	RDL	QC Batch		
Total Metals by ICPMS												
Total Lead (Pb)	ug/L	10	3.41	2.94	2.23	13.1	3.66	3.78	0.20	8847865		
No Fill	No Excee	dance			•	•			•			
Grey	Grey Exceeds 1 criteria policy/level											
Black Exceeds both criteria/levels												
RDL = Reportable Detection Limit												

		SO6613	SO6614	SO6615	SO6616	SO6617	SO6618		
		2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20		
		541404-02-01	541404-02-01	541404-02-01	541404-02-01	541404-02-01	541404-02-01		
UNITS	MAC	SV15-30S	BR02-30S	BR11-30S	FP01-30S	FP02-30S	FP07-30S	RDL	QC Batch
ug/L	10	3.72	1.04	5.97	8.48	7.59	6.91	0.20	8847865
			2017/11/20 541404-02-01 UNITS MAC SV15-30S	2017/11/20 2017/11/20 541404-02-01 541404-02-01 UNITS MAC SV15-30S BR02-30S	2017/11/20 2017/11/20 2017/11/20 541404-02-01 541404-02-01 541404-02-01 UNITS MAC SV15-30S BR02-30S BR11-30S	2017/11/20 2017/11/20 2017/11/20 2017/11/20 541404-02-01 541404-02-01 541404-02-01 541404-02-01 UNITS MAC SV15-30S BR02-30S BR11-30S FP01-30S	2017/11/20 2017/11/20 2017/11/20 2017/11/20 2017/11/20 541404-02-01	2017/11/20 2017/11/20 2017/11/20 2017/11/20 2017/11/20 2017/11/20 2017/11/20 541404-02-01 541	2017/11/20 2017/11/20 2017/11/20 2017/11/20 2017/11/20 2017/11/20 2017/11/20 541404-02-01 541

No Fill Grey

Black

No Exceedance

Exceeds 1 criteria policy/level Exceeds both criteria/levels

RDL = Reportable Detection Limit

Manuary ID				505510	505530	505531				
Maxxam ID				SO6619	SO6620	SO6621				
Sampling Date				2017/11/20	2017/11/20	2017/11/20				
COC Number				541404-02-01	541404-02-01	541404-02-01				
		UNITS	MAC	FP11-30S	FP12-30S	FP17-30S	RDL	QC Batch		
Total Metals by IC	CPMS									
Total Lead (Pb)		ug/L	10	13.5	1.11	4.17	0.20	8847865		
No Fill	No Exceed	dance								
Grey	Exceeds 1	criteria	policy	/level						
Black Exceeds both criteria/levels										
RDL = Reportable Detection Limit										



TETRA TECH CANADA INC. Client Project #: ENW.VENW03140-01

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

9.3°C

Samples received with incomplete Chain of Custody. Sampling times not provided.

FP17-30S received with missing/incorrect labels. Samples on CoC correspond to samples received with the exception to the missing FP17-30S (1x 120mL HNO3) bottle. Instead, we received a bottle labelled FP14-30S with the same sampling dates as FP17-30S. By process of elimination, FP14-30S inspected as FP17-30S.

MAC: The guidelines that have been included in this report have been taken from the Canadian Drinking Water Quality Summary Table, February 2017.

Criteria A = Maximum Acceptable Concentration (MAC) / Criteria B = Aesthetic Objectives (AO) / Criteria C = Operational Guidance Values (OG) It is recommended to consult these guidelines when interpreting your data since there are non-numerical guidelines that are not included on this report.

Turbidity Guidelines:

- 1. Chemically assisted filtration: less than or equal to 0.3 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 1.0 NTU at any time.
- 2. Slow sand / diatomaceous earth filtration: less than or equal to 1.0 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 3.0 NTU at any time.
- 3. Membrane filtration: less than or equal to 0.1 NTU in 99% of the measurements made or at least 99% of the time each calendar month. Shall not exceed 0.3 NTU at any time.

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER) Comments

Sample SO6592 [SV04-30S] Elements by CRC ICPMS (total): Detection limits raised due to dilution to bring analyte within the calibrated range.

Results relate only to the items tested.



QUALITY ASSURANCE REPORT

TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

				Matrix	Spike	Spiked	Blank	Method B	lank	RPD)
Ī	QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
Ī	8847865	Total Lead (Pb)	2017/11/30	93	80 - 120	99	80 - 120	<0.20	ug/L	1.4	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.



TETRA TECH CANADA INC. Client Project #: ENW.VENW03140-01

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Rob Reinert, B.Sc., Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

	INVOICE TO:				Report	Informat	tion				Project i	nformation	_	III W		S a liii	Pegel
eny Name #1433 T	ETRA TECH CANADA INC.	N. Inc.	Company Na	ne				STATE OF		Quotation#	B71611		_		5946_COC		Bottle Order 8
	n Walker		Contact Nam	Ol .	n Walker		U			2.0.#			_		0240_000		1911111111111
23	BOBAN DRIVE		Address					7. 1		Project #	ENW.VE	NW03140-01		1		3	541404
NANAIM	O BC V9T 6A7			Shaw	neen	NO	rer	otete	atecha	Mac Namo	9.33				Chain Of Custody Record	1	Project Manag
(250) 756			Phone	1111			Fac	64 J. On C. S.		Site #						IIII	Letitia Prefontai
smwalke	r@eba.ca; EBA.Labdata@tetratech.c	om	Email	smwalker	r@obo.ca;	EBA.L	.abdata	@tetratech.	com	Sampled By					C#541404-01-01	***************************************	Central Preformati
ulatory Criteria			Specia	Instructions					ANALYSIS RE	QUESTED (PLE	ASE BE SPECIFIC)			Turnaround Time	(TAT) Req	juired:
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CCME								1 1		1 1		6 1	1	(will be	applied if Rush TAT is not specified)	k	
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BC Water Quality						2	-	1 1						Please	note. Standard TAT for certain tests	such as BOI	D and Dioxins/Furans
Other						NIA) CPE	Water	1 1				10		200200-0	contact your Project Manager for det	\$394U1	11-11-11
		1				- Series	Ch .	1 1						Job S	pecific Rush TAT (if applies to ent	ire submissi	ion) An
						2	iki	1 1						1 DAY	2 Day 3 Day	Date Requi	red LCC VIT
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Sample Barcode Lab	el Sample (Location) Identification	Date	Sampled	Time Sampled	Matrix	Me	Lead							* III BO	TINDS	Comments	
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main	17/	11/28	13:0	C	V Au	ERN	HUG	HNOU		17/11/29	09:00	not submitted	Time Ser	sitive	Temperature (°C) on Receipt		Seal Intact on Cooler
00					1	- total					-	NA.		1 6	1,10,9 N	m []	Yes No

		4606 Canada Way, Burnaby, British Col.		(5 Tel:(604) 734 72	Report Info					Project In	formation	-8)	1		Only Page of
party Name	#1433 TETRA	A TECH CANADA INC.	Company t	Name .		III.			0	B71611	200100000	В	7A5	946 COC	Bottle Order #:
act Name	Shawneen Wa		Contact Na	OL.	en Walker				Quotation#					.0_000	1111111111111111
165	#1 - 4376 BOE	BAN DRIVE	Address			3.10		THE R. P. LEWIS CO., LANSING, MICH.	Project #	ENW.VE	NW03140-01	_	- 1		541404
	NANAIMO BC	V9T 6A7	The State of	Mena					Project Name	1				Chain Of Custody Record	Project Manager
2	(250) 756-2256		X Phone	AH2	_	Fax			Site #						Letitia Preforitains
	smwalker@eb	oa.ca; EBA.Labdata@tetratech.com	Email	smwalke	r@eba.ca; EE	A Labda	ta@tetrate		Sampled By					C#541404-02-01	-1517/2007/11 X2001/4400
guiatory Cr	iteria		Spec	cial instructions				ANALYSIS R	EQUESTED (PLEA	ASE BE SPECIFIC)				Turnaround Time (TAT)	V. M. V.
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10.77	WPLES MUST BE KE	EPT COOL (< 10°C) FROM TIME OF SAMPLI	NG UNTIL DELIVERY		Matrix	Metals Field Fittered ? (' Lead - Drinking Water							1 DAY	Confirmation Number:	(call lab for #)
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Sample		SUIL-200	17/11/25		Water	V							1		
Salityk		SV14-805	17/11/20		Water	X						3172	1		
Sample		SV14-80s SV15-30s	17/11/20		Water	X						-177	1		
Sallpa		5V14-805 5V15-305	17/11/20		Water	X							+		
SHITPK		SVI4-805 SVI5-305 BRO2-305	17/11/20		Water	X						-172	1		
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Your Project #: ENW.VENW03140-01

Site Location: SD68 DRINKING WATER PROGRAM

Attention:Shawneen Walker

TETRA TECH CANADA INC. #1 - 4376 BOBAN DRIVE NANAIMO, BC Canada V9T 6A7

Your C.O.C. #: 540796-03-01, 540796-04-01, 540796-05-01

Report Date: 2017/11/27

Report #: R2483094 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A3393 Received: 2017/11/21, 08:23

Sample Matrix: DRINKING WATER

Samples Received: 25

		Date	Date		
Analyses	Quantity	/ Extracted	Analyzed	Laboratory Method	Analytical Method
Elements by CRC ICPMS (total)	25	N/A	2017/11/22	2 BBY7SOP-00003,	BCLM2005,EPA6020bR2m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Your Project #: ENW.VENW03140-01

Site Location: SD68 DRINKING WATER PROGRAM

Attention:Shawneen Walker

TETRA TECH CANADA INC. #1 - 4376 BOBAN DRIVE NANAIMO, BC Canada V9T 6A7

Your C.O.C. #: 540796-03-01, 540796-04-01, 540796-05-01

Report Date: 2017/11/27

Report #: R2483094 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A3393 Received: 2017/11/21, 08:23

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager. Letitia Prefontaine, B.Sc., Senior Project Manager Email: LPrefontaine@maxxam.ca Phone# (604)639-2616

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

Site Location: SD68 DRINKING WATER PROGRAM

Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID			SN2735	SN2736	SN2737	SN2738	SN2739	SN2740							
Sampling Date			2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20							
			07:25	07:30	07:35	07:45	07:50	08:00							
COC Number 540796-03-01															
Total Metals by ICPMS															
Total Lead (Pb)	ug/L	10	9.53	3.40	1.00	6.76	8.90	14.8	0.20	8837797					
No Fill	No Exceedance														
Grey	Exceeds 1	L criter	ia policy/level												
Black	Exceeds b	oth cr	iteria/levels												
RDL = Reportable Detection	n Limit														

Maxxam ID				SN2741	SN2742	SN2743	SN2744	SN2748							
Sampling Date				2017/11/20 08:00	2017/11/20 08:03	2017/11/20 08:05	2017/11/20 08:10	2017/11/20 08:15							
COC Number 540796-03-01 540796-03-01 540796-03-01 540796-03-01 540796-03-01 540796-04-01 SAUTH NOTE OF THE NATIONAL OF THE NATIO															
Total Metals by ICPMS)														
otal Lead (Pb) ug/L 10 3.46 6.27 1.89 5.78 1.64 0.20 88377															
No Fill	No Exceedance														
Grey	Exceed	ds 1 cr	iteria _l	policy/level											
Black	Exceed	ds botl	h crite	ria/levels											
RDL = Reportable Dete	ction Lim	nit													

Maxxam ID			SN2749		SN2750	SN2751	SN2752	SN2753						
Sampling Date			2017/11/20 08:20		2017/11/20 08:25	2017/11/20 08:30	2017/11/20 08:35	2017/11/20 08:40						
COC Number														
	UNI	S MAC	GB12-OS	RDL	GB13-OS	GB14-OS	GB15-OS	GB16-OS	RDL	QC Batch				
Total Metals by ICPMS														
Total Lead (Pb)	ug/	L 10	6.2	1.0	5.65	2.10	2.25	2.66	0.20	8837797				
No Fill	No Excee	dance												
Grey	Exceeds	1 criteri	a policy/level											
Black	Exceeds	ooth cri	eria/levels											
RDL = Reportable Detec	tion Limit													



TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

Site Location: SD68 DRINKING WATER PROGRAM

Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID			SN2754	SN2755	SN2756	SN2757	SN2758	SN2759							
Sampling Date			2017/11/20 08:43	2017/11/20 08:45	2017/11/20 08:50	2017/11/20 08:55	2017/11/20 09:00	2017/11/20 09:05							
COC Number			540796-04-01	540796-04-01	540796-04-01	540796-04-01	540796-05-01	540796-05-01							
	UNITS MAC GB17-OS GB18-OS GB19-OS GB20-OS GB21-OS GB22-OS RDL QC Ba														
Total Metals by ICPMS															
Total Lead (Pb)	ug/L	10	3.10	8.40	2.36	1.90	1.39	1.75	0.20	8837811					
No Fill	, , , , , , , , , , , , , , , , , , , ,														
Grey	Exceeds 1	L criter	ia policy/level												
Black	Exceeds b	oth cr	iteria/levels												
RDL = Reportable Detectio	n Limit														



TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

Site Location: SD68 DRINKING WATER PROGRAM

Sampler Initials: MG

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID	SN2760 SN2761 SN2762													
Sampling Date				2017/11/20 09:10	2017/11/20	2017/11/20								
COC Number				540796-05-01	540796-05-01	540796-05-01								
UNITS MAC GB23-OS GBDUP1-OS GBDUP2-OS RDL QC Batc														
Total Metals by ICPMS														
Total Lead (Pb)	Lead (Pb) ug/L 10 4.29 0.79 0.77 0.20 883781													
No Fill	No Exceed	No Exceedance												
Grey	Exceeds 1	Exceeds 1 criteria policy/level												
Black	Exceeds both criteria/levels													
RDL = Reportable	Detection L	imit												



TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

Site Location: SD68 DRINKING WATER PROGRAM

Sampler Initials: MG

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.3°C
Package 2	11.0°C

MAC: The guidelines that have been included in this report have been taken from the Canadian Drinking Water Quality Summary Table, February 2017.

Criteria A = Maximum Acceptable Concentration (MAC) / Criteria B = Aesthetic Objectives (AO) / Criteria C = Operational Guidance Values (OG) It is recommended to consult these guidelines when interpreting your data since there are non-numerical guidelines that are not included on this report.

Turbidity Guidelines:

- 1. Chemically assisted filtration: less than or equal to 0.3 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 1.0 NTU at any time.
- 2. Slow sand / diatomaceous earth filtration: less than or equal to 1.0 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 3.0 NTU at any time.
- 3. Membrane filtration: less than or equal to 0.1 NTU in 99% of the measurements made or at least 99% of the time each calendar month. Shall not exceed 0.3 NTU at any time.

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER) Comments

Sample SN2749 [GB12-OS] Elements by CRC ICPMS (total): RDL raised due to concentration over linear range, sample dilution required

Results relate only to the items tested.



QUALITY ASSURANCE REPORT

TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

Site Location: SD68 DRINKING WATER PROGRAM

Sampler Initials: MG

			Matrix	Spike	Spiked	Blank	Method B	lank	RPD		
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	
8837797	Total Lead (Pb)	2017/11/22	92	80 - 120	94	80 - 120	<0.20	ug/L	NC	20	
8837811	Total Lead (Pb)	2017/11/22	98	80 - 120	103	80 - 120	<0.20	ug/L	1.0	20	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).



TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

Site Location: SD68 DRINKING WATER PROGRAM

Sampler Initials: MG

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Andy Lu, Ph.D., P.Chem., Scientific Specialist

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	INVOICE	I TO:				Report	Informa	ation					Project Info	rmation			MINDS TO A IN	LD CONSTITUTE	AZBUR BUU	10
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) 756-2256 x		756-2686 x	Phone	- E#		- 55	Fax		45-77-6	Project Name Site #		SNOD !	Drokingla	ter	Toypon			20305-3	100
	wneen.Walker@te	etratech.com; EBA.		Email	Shawnee	n.Walker	@tetra		; EBA.Lab	data@tetrat	Sampled By		Mike (sallo			C#540796-03-		Letitia P	refonta
ulatory Criteria:				Speci	al Instructions					ANALYSIS	REQUESTED (PLEASE E	BE SPECIFIC)				Turnaround	Time (TAT) R	Required:	
CSR																	Please provide as	tvance notice for	rrush projects	
																(8)	Standard) TAT:			
CCME							K									100000000000000000000000000000000000000	iplied if Rush TAT is not sp TAT = 5-7 Working days fo	771 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
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							E P	-		1			1 1			1 DAY	2 Day 3 Day	y Date Re	equired:	
SAMPLES	MUST BE KEPT COOL	(< 10°C) FROM TIME	OF SAMPLING UNTIL	DELIVERY '	MAXXAM OT		S Fig	Loka								Rush Co	nfirmation Number:		(call lab for #)	_
Sample Barco	se Labal Se	smple (Location) Identific	ation Date	Sampled	Time Sampled	Matrix	Meta	12								# of Bottle	1	Commen	-	
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11,11,11 ICE-PRECENT IN

1 COOLER

(WITH TEMPERATURES

3,4,6)

Sharmen Walker Contact Name First State Sharmen Walker Contact Name Contact Name First State Sharmen Walker First State Fi	-		INVOICE TO:	aby, British Columbia Co			Report		- 11 IV			Project	Informa	ition	_	_			PagQoG
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NANAMING SC V9T 667 [269] 756-2569 X Fax: (250) 756-25698 X Shawmeen Walker@tetratech.com; EBA Labdata@tetral Shawmeen Walker@tetratech.com; EBA	#1 -	- 4376 BOE	BAN DRIVE		Address							ENW.V	ENWO	3140-01			B7A3393_C	oc	
Shawneen Walker@letratech.com; EBA Labdata@tetral Special Institutions Special Institutions Special Institutions Special Institutions ANALYSIS RECORDSTED (PLEASE BE SPECIFIC) Trunsround Time (TAT) Required. Regular (Standard) TAT in and specified): Standard TAT if a politic to entire submission of the same along and Dissamplish of sales. Sample Barroots Label Sample (Location) Martinization Date Sample Matrix Sample Barroots Label Sample (Location) Martinization Date Sample Matrix Sample Barroots Label Sample (Location) Martinization Date Sample Matrix GB 13 - Os OB 14 - OS OB 13 - OS OB 14 - OS OB 13 - OS OB 14 - OS OB	The second second	-	and the state of t			4111					10 02	SDES	Sel	was Du	Test	ing		11:	. Manager
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ESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO MAXXAM'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE WHITE MAXXAM'S Yellow C	100		1.Ke Galls	11/1/20	19:00		plina E	N/A	SYKORA		2017/11/2	1 08:2	3 "	ot submitted	Time Sensit	1 5	emperature (°C) on Receipt	Custody Seel	Intact on Cooler?

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-	AIMO BC V9T 6A7							P.1576	Project Name				460			Project Manager
CL-	756-2256 x Fax: (2 vneen.Walker@tetratech.com; E	50) 756-2686		Chaman	- M		Fax:		Site #							Letitia Prefontaine
ICA VA IDANA	vileen.vvalker@lebatech.com, c	DA.Labuata@	-		n.vvaiker@	Tetrai	ecn.com, EE	A.Labdata@tetra	Sampled By			6/1 40	_		C#540798-05-01	0.000
Regulatory Criteria:		_	Spe	ial Instructions		-		ANALYSIS	REQUESTED (P	LEASE E	SE SPECIFIC	3			Turnaround Time (TAT) F	330.00.3200
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_ CCME						A		1				. 1		(All the second	olied if Rush TAT is not specified): TAT = 5-7 Working days for most tests	[8
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J Other GC	DWQ Devol	5000				10 7 (Y 10	9	1 1	1 1		1 1				tact your Project Manager for details.	BOD and Digitals Furains an
K 3000 G	Drinking	Water				peu	8							Job Spec	ific Rush TAT (if applies to entire subm	ission)
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SAMPLES	IUST BE KEPT COOL (< 10°C) FROM T	ME OF SAMPLING	S UNTIL DELIVERY	TO MAXXAM		als	Total				1 1					(call lab for #)
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I I I I KAPA	co life sallo	11111	ou la.	- Ensy	ma c	חע	3110	-M	2017/11/	2	08:	2	711111111111111111111111111111111111111	Tem	perature (°C) on Receipt	of con Limit on Coner.

11, 11, 11 ICE-PRESENT IN

1 COOLER (WITH

EMPERATURES 3,14,6)