



December 18, 2017

ISSUED FOR USE
FILE: 704-ENW.VENW03140-01

School District 68 (Nanaimo-Ladysmith)

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

395 Wakesiah Road Nanaimo, BC V9R 3K6

Attention: Mr. Brian Hackwood, Maintenance Manager

Subject: Domestic Water Testing (Lead) Inventory – Forest Park 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 Forest Park 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 Forest Park Elementary on November 20th and December 4th, 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 Forest Park 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. 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 and December 4th, 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

A total of 16 sample locations were identified; two samples were collected at each location (i.e., 0 second sample and 30 second sample). Tetra Tech collected water 0 and 30 second samples from Forest Park Elementary on November 20th, 2017. All 16 pre-flush (0 second) samples were submitted for laboratory analysis of total lead.

Six of the 0 second samples contained concentration of total lead greater than the GCDWQ MAC.

Sample FP01 was collected from the sink in Classroom 102, FP02 was collected from the boy's water closet adjacent to Classroom 103, FP07 was collected from a sink in the gymnasium kitchen, FP11 was collected from the boy's water closet adjacent to Classroom A103, FP12 was collected from a sink in the Special Education room, and FP14 was collected from a sink in the Staff Room. The 30 second sample for all these locations was submitted for laboratory analysis of total lead.

The 30 second sample at FP11 contained concentrations of total lead greater than the GCDWQ MAC.

Tetra Tech collected 2 minute and 5 minute flush samples from FP11 on December 4th and submitted it for laboratory analysis of total lead.

Both the 2 minute and 5 minute samples at FP11 contained total lead concentrations less than the GCDWQ MAC.





Sampling locations are shown on Figure 1. Laboratory testing results for Forest Park 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	
FP01-0s	11/27/2017		110
FP02-0s	11/27/2017		34.9
FP03-0s	11/27/2017		2.77
FP04-0s	11/27/2017		1.60
FP05-0s	11/27/2017		0.53
FP06-0s	11/27/2017		5.48
FP07-0s	11/27/2017		15.7
FP08-0s	11/27/2017	10.00//	1.43
FP09-0s	11/27/2017	10 μg/L	3.42
FP10-0s	11/27/2017		1.42
FP11-0s	11/27/2017		16.8
FP12-0s	11/27/2017		16.5
FP13-0s	11/27/2017		4.27
FP14-0s	11/27/2017		21.4
FP15-0s	11/27/2017		1.62
FP16-0s	11/27/2017		3.45
	30 Second	l Samples	
FP01-30s	11/27/2017		8.48
FP02-30s	11/27/2017		7.59
FP07-30s	11/27/2017	40	6.91
FP11-30s	11/27/2017	10 μg/L	13.5
FP12-30s	11/27/2017		1.11
FP14-30s	11/27/2017		4.17
	2 Minute	Sample	
FP11-2m	12/04/2017	10 μg/L	5.98
	5 Minute	Sample	
FP11-5m	12/04/2017	10 μg/L	6.26
Notes:	Grey Fill	Exc	eeds 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, 2 and 5 minute flush samples (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.

Six of the 16 pre-flush (0 second) samples collected at Forest Park Elementary contained concentrations of lead greater than the GCDWQ MAC. Lead concentrations at sample locations FP01, FP02, FP07, FP12 and FP14 exceeded the MAC for the 0 second samples but were below the guideline for the 30 second samples. Lead concentrations at FP11 exceeded the MAC for both 0 and 30 second samples (16.8 and 13.5 μ g/L, respectively) but were below in the guideline for the 2 and 5 minute samples.

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 locations FP01, FP02, FP07, FP12 and FP14 exceeded the MAC for the 0 second sample but not for the 30 second sample, there is potentially a lead source in the fixture. At FP11, the plumbing behind the fixture may also be a contributing source.

Flushing is adequate to lower the lead concentrations at all sample points in Forest Park Elementary. Signage 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" should be maintained throughout the facility at each point where drinking water could be consumed.

6.0 SUMMARY AND CONCLUSIONS

Six pre-flush (0 second) samples (FP01, FP02, FP07, FP11, FP12 and FP14) collected at Forest Park Elementary contained concentrations of total lead greater than the GCDWQ MAC of 10µg/L (0.010 mg/L). Of those six locations, five had concentrations of lead below the MAC in the corresponding 30 second samples. Sample FP11 had a concentration of lead exceeding the GCDWQ for both the 0 second and 30 second samples. However, sample FP11 was below for the 2 minute and 5 minute 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. Signage 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" should be maintained at all water consumption points.





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.

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/dr

Attachments: Figure 1 - Forest Park Elementary Sample Locations

Appendix A - Limitations on the Use of this Document

Appendix B - Laboratory Report

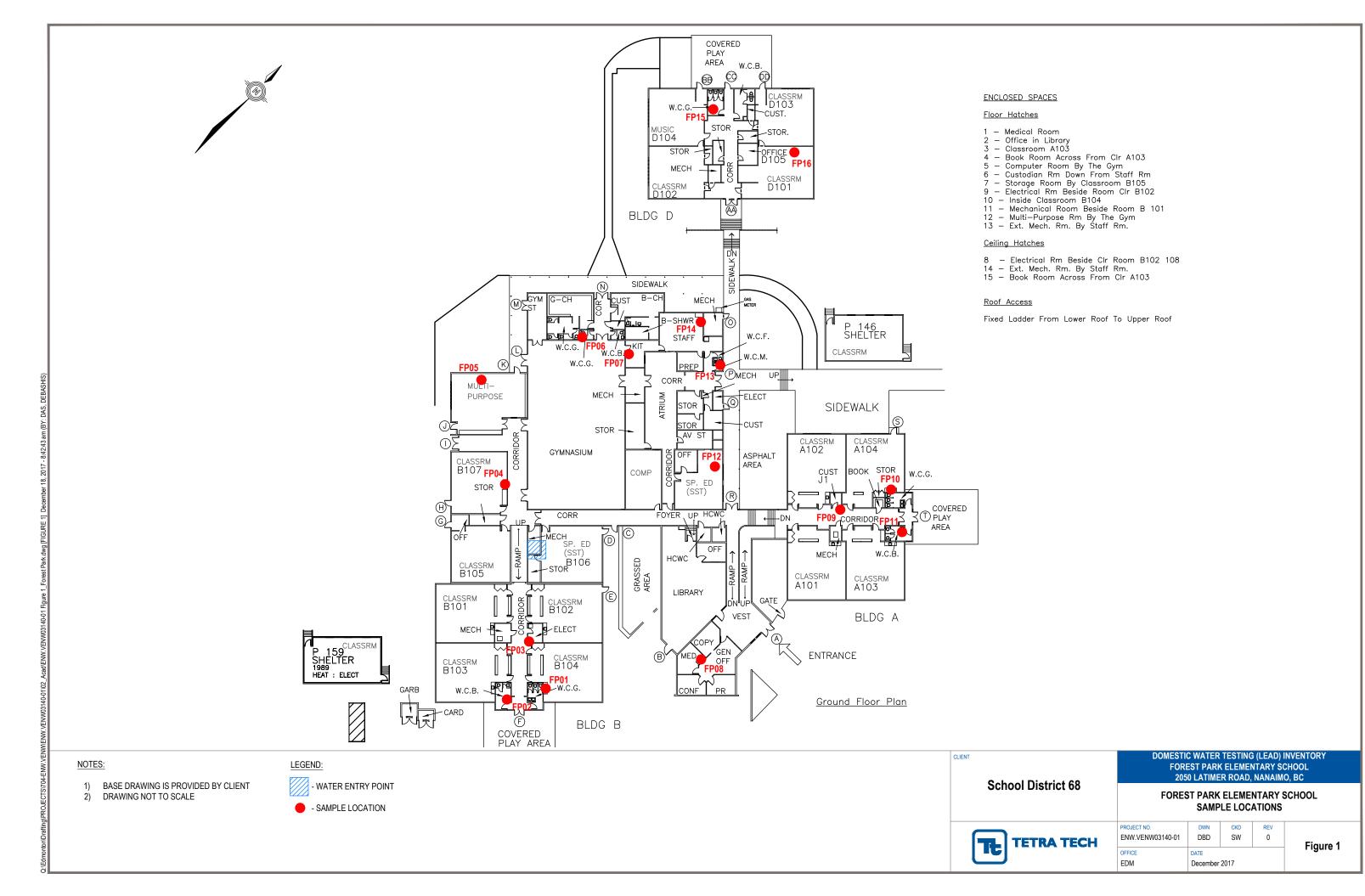




FIGURES

Figure 1 Forest Park Elementary Sample Locations







APPENDIX A

LIMITATIONS ON THE USE OF THIS DOCUMENT



LIMITATIONS ON USE OF THIS DOCUMENT

GEOENVIRONMENTAL

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

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Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

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. #: 540796-13-01

Attention:Shawneen Walker

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

Report Date: 2017/12/08

Report #: R2488619 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A7778 Received: 2017/12/05, 09:00

Sample Matrix: Water # Samples Received: 6

	Date	Date		
Analyses	Quantity Extracted	Analyzed	Laboratory Method	Analytical Method
Elements by CRC ICPMS (total)	6 2017/12/0	6 2017/12/0	7 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

Sampler Initials: SW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID			SP7520	SP7521	SP7522	SP7523	SP7524	SP7525		
Sampling Date			2017/12/04 05:00	2017/12/04 05:00	2017/12/04 05:00	2017/12/04 05:00	2017/12/04 06:00	2017/12/04 06:00		
COC Number			540796-13-01	540796-13-01	540796-13-01	540796-13-01	540796-13-01	540796-13-01		
	UNITS	MAC	SV04-2M	SV04-5M	SV12-2M	SV12-5M	FP11-2M	FP11-5M	RDL	QC Batch
Total Metals by ICPMS										
Total Lead (Pb)	ug/L	10	3.86	2.75	4.27	4.88	5.98	6.26	0.20	8853766
No Fill	No Excee	dance								
Grey	Exceeds 2	L criter	ia policy/level							
Black	Exceeds b	ooth cr	iteria/levels							
RDL = Reportable Detectio	n Limit									



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

Sampler Initials: SW

GENERAL COMMENTS

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

Package 1	5.7°C

Samples received with incomplete Chain of Custody. Sampling times not provided. Logged sampling times as per sample labels.
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.

Results relate only to the items tested.



QUALITY ASSURANCE REPORT

TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

Sampler Initials: SW

			Matrix	Spike	Spiked	Blank	Method B	lank	RPE)
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8853766	Total Lead (Pb)	2017/12/07	92	80 - 120	97	80 - 120	<0.20	ug/L	5.0	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.



TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

Sampler Initials: SW

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.

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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	Quantit	y Extracted	Analyzed	Laboratory Method	Analytical Method
Elements by CRC ICPMS (total)	20	N/A	2017/11/3	0 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.

st 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 Fill No Exceedance										
Grey	Exceeds 1 criteria policy/level										
Black	Exceeds both criteria/levels										
RDL = Reportable Detect	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 Exceedance									
Grey	Exceeds 1	criter	ia policy/level							
Black	Exceeds b	oth cr	iteria/levels							
RDL = Reportable Detection	n 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 ICPMS								
Total Lead (Pb)	ug/L	10	13.5	1.11	4.17	0.20	8847865	
No Fill	No Exceed	dance						
Grey	Exceeds 1	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels							
RDL = Reportable	table 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 I	nformat	tion				Project	Information	_	ШЖ		Page 1ly
eny Name #1433 T	ETRA TECH CANADA INC.	1 1 1 2 1	Company Na	ne				12.00		Quotation#	B71611				5946_COC	Bottle Order
ct Name Shawnee	n Walker		Contact Nam	OL	n Walker		0.5			P.O.#			_		240_000	
23	BOBAN DRIVE		Address			30		7. 1	20	Project #	ENW.VI	NW03140-01		1		541404
NANAIM	O BC V9T 6A7			Shaw	neen	NO	ver	otete	tooka	Dact Name					Chain Of Custody Record	Project Mana
(250) 756			Phone	2.141			Fac	250 (BUL)		Site #						Letitia Prefont
smwalke	@eba.ca; EBA.Labdata@tetratech.c	com	Email	smwalker	@sha.ca;	EBA.L	.abdata	@tetratech.	com	Sampled By					C#541404-01-01	Centra Presiden
ulatory Criteria			Specia	Instructions					ANALYSIS RE	QUESTED (PLE	ASE BE SPECIFIC)			Turnaround Time (TA	T) Required:
CSR		100							1						Please provide advance notice	e for rush projects
														Regula	(Standard) TAT:	
CCME								1 1		1 1		16		(will be	applied if Rush TAT is not specified):	
BO Water Double						Î		1 1						Standar	d TAT = 5-7 Working days for most tests	
BC Water Quality						X		1 1						Please	note. Standard TAT for certain tests such	as BOD and Dioxins/Furan
Other						N/A) CPS	Water	1 1				10		200200-00	ontact your Project Manager for details.	
						_ ie	01	1 1						Job Sp	pecific Rush TAT (if applies to entire s	ubmission)
						12	nkin	1 1						1 DAY	2 Day 3 Day Dat	a Required LC
C41171 FG 111107	PE VEDT 0001 / - 400 / FD01 7011 0F 05					Fig	Drinkin	1 1						Rush (Confirmation Number:	
SAMPLES MUST	BE KEPT COOL (< 10°C) FROM TIME OF SA	MPLING UNII	LUELWERT	J MAXXAM		Sign	b	1 1					1	# of Bot		(call lab for #)
Sample Barcode Lab	si Sample (Location) Identification	Date	Sampled	Time Sampled	Matrix	Me	Lead							• m bot	las Con	imerits
	GMV0-30x	17/	IIII		Mata		1							1		
	au as	177	11/20		Water		X							1		
	SUDI- 300	1 1			1 (1						18	1		
	340, 303	_	-		++	-		-	-		_		-	+		
	SV02-305				1.1											
	51102 20	-			11				-		1		1	+		
	12102-30				1 1											
8156	51011-300						П									
	2000				1		1	-		V	_		1			
	51106-300				1											
SULTE TY	0100 003	7.7	1		+ +		+	-	-	100000			-	-	-	
	10108-305					8										
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	SV12-02/															
	20100 000	-	1			-								1		
	12013-300	1	4		V	8	V							V		
RELINQUISHED BY:		ite: (YY/MM/DD			REC	EIVED B	Y; (Signat	ure/Print)		Date: (YY/MM/D	D) Time	# jars used and	1	-	Lab Use Only	
main	17/	11/28	13:0		V-AUD	ERN	HUG	HNOU		17/11/29	03:00	not submitted	Time Ser	sitive		custody Seal Intact on Coole
					1	-				-		N/A		0	NA NA	Yes No

Company Name Contact Name Address #1 - 4376 BOBAN DRIVE #1 - 4376 BOBAN DR			INVOICE TO:			Report Info	rmation		2386 www.maxxa	1	Project In	formation	S ()	W.		Only Page of
Shawneen Walker #1 - 4376 BOBAN DRIVE NANAIMO BC V9T 6A7 (250) 756-256 x Fax (250) 756-2686 x will similar the state of t	neary Name	#1433 TETR	A TECH CANADA INC.	Community	lama		1110-000-			0.11		22117/22	В	7A59	46 COC	Bottle Order #:
## 1 - 4376 BOBAN DRIVE NANAIMO BC V9T 6A7 ## (250) 756-2266 X ## Fax: (250) 756-2268 X ## Smwalker@eba.ca; EBA Labdata@tetratech.com ## Special instructions ## AMALYSIS REQUESTED (PLEASE BE SPECIFIC) ## Regular (Standard) TAT: ## (will be applied if Rush TAT if a not specified): ## Sampled By TaT is not specified): ## Standard TAT is Substituted and the specified of instructions ## AMALYSIS REQUESTED (PLEASE BE SPECIFIC) ## Regular (Standard) TAT: ## CCME ## COME ## Display Graph TAT is not specified): ## Standard TAT is Substituted and the specified of instructions ## AMALYSIS REQUESTED (PLEASE BE SPECIFIC) ## Regular (Standard) TAT: ## Standard TAT is not specified): ## Standard					OL .	en Walker				223.500					.0_000	111111111111111111111111111111111111111
NANAIMO BC V9T 6A7 (250) 756-2256 x		#1 - 4376 BOE	BAN DRIVE	7.64		27.20.711111	7.10				ENW.VE	WW03140-01	-	- 1		541404
Sample Barcode Label Sample Barcode Label Sample (Location) Identification Oate Sampled Time Sampled Matrix Fex Site # Sampled By Special Instructions Special Instructions Special Instructions Special Instructions ANALYSIS REQUESTED (PLEASE BE SPECIFIC) Turnaround Time (TAT) Required Please provide extence notice for rush pri Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Job Specific Rush TAT (if applies to entire submission), 1 DAY		NANAIMO BC	V9T 6A7		ul de la comp					COSTATION					Chain Of Custody Record	Project Manager
Smwalker@eba.ca; EBA_Labdata@tetratech.com guistory Criteria: Special Instructions	2			X — Phone	ERY.	_				The state of the s						Letitia Prefontaine
CSR CCME BC Water Quality Other Disperied in Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for your project Manager for details. Job Specific Rush TAT (if applies to entire authorisation) DAY		smwalker@eb	oa.ca; EBA.Labdata@tetratech.com	Email	smwalke	r@eba.ca; EB	A Labda	ata@tetra	tech.com	Sampled By		2.51.6				Editor Colorian
Regular (Standard TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOO and days - conflact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission), 1 DAY 2 Day 3 Day Date Required. SAMPLES MUST BE REPT COOL (<10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM Sample Barcode Label Sample (Location) Identification Date Sampled Matrix Regular (Standard TAT: (will be applied if Rush TAT is not specified): Standard TAT is not specified): Standard TAT is not specified): Standard TAT for certain tests such as BOO and days - conflact your Project Manager for details. Job Specific Rush TAT (if applies to entire submission), 1 DAY 2 Day 3 Day Date Required. Rush Confirmation Number. (call label) Sample Barcode Label Sample (Location) Identification Date Sampled Matrix	guiatory C	iteria		Spec	dal Instructions				ANALYS	IS REQUESTED (PLE	ASE BE SPECIFIC)			75.0	22322344223112323112323	
SAMPLES MUST BE KEPT COOL (<10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM Sample Barcode Label Sample (Location) Identification Date Sampled Time Sampled Matrix Delivery To Maxxam (coll label Sample (Location) Identification Date Sampled Time Sampled Matrix	CCME BC Wat	er Quality	×				(Y/N)		-					(will be a Standar Please a	(Standard) TAT: applied if Rush TAT is not specified): d TAT = 5-7 Working days for most tests, note: Standard TAT for ortain tests such as	
	SA		NAME OF THE OWNERS WATER	18231 Lawy - April			Pield Filter	- Drinking						1 DAY	2 Day 3 Day Date Re	quired Dec 1/17 (call lab for #)
5V15-30s 6R02-30s 6R11-30s FP02-30s FP07-30s FP11-30s FP12-30s	Sampa	a Barcode Laber	SUILL-200	570738-130760	Time Sampled	-	V	_	+	++				1		
5V15-30s BRO2-30s BRO1-30s FP01-30s FP07-30s FP11-30s FP12-30s				111 11 21	10:00 - 00:00	I YUL	1						HITZ.	1	VI	722 387
BRO2-30s BRII-30s FPOI-30s FPO7-30s FPII-30s FPI2-30s			20	1 100										1.4		
B211-30s FP01-30s FP07-30s FP11-30s FP12-30s			SV15-30s	1		1	1							1		
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FP01-30s FP07-30s FP11-30s FP12-30s			5415-30s 6202-30s				\pm									
FP01-30s FP02-30s FP07-30s FP12-30s			5V15-30s BRO2-30s BRU-30s				$\downarrow \downarrow$							-		
FP02-30s FP07-30s FP11-30s FP12-30s			5V15-30s 6RO2-30s 6R11-30s													
FP07-30s FP11-30s FP12-30s			5V15-30s 6LO2-30s 6211-30s FPOI-30s													
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FP11-30s FP12-30s			5V15-30s 6LO2-30s 6211-30s FPO1-30s FPO2-30s													
PP12-30s			5V15-30s 6202-30s 6211-30s FP02-30s FP07-30s													
FP12-30s			5V15-30s 6202-30s 6211-30s FP02-30s FP07-30s													
10 m 303			5V15-30s BRO2-30s BRO1-30s FP01-30s FP07-30s FP07-30s													
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* RELINQUISHED BY: (Signature/Print) Date: (YY/MM/DD) Time RECEIVED BY: (Signature/Print) Date: (YY/MM/DD) Time #jars used and Lab Use Only			5V15-30s BRO2-30s BRO2-30s FPO1-30s FPO7-30s FPI1-30s FPI2-30s FPI2-30s													
OWN AND THE BUSINESS THE BUSINESS TO SEND THE BUSINESS TO THE				V/MM/DD) Tim			ED BY: (Sig	gnature/Print							Lab Use Only	



Your Project #: ENW.VENW03140-01

Attention:Shawneen Walker

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

Your C.O.C. #: 540307-06-01, 540307-07-01, 540307-08-01, 540307-09-01, 540307-10-01, 540307-11-01

Report Date: 2017/11/27 Report #: R2483087

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A3413 Received: 2017/11/21, 08:23

Sample Matrix: DRINKING WATER

Samples Received: 45

		Date	Date		
Analyses	Quantity	y Extracted	Analyzed	Laboratory Method	Analytical Method
Elements by CRC ICPMS (total)	45	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.

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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

Attention:Shawneen Walker

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

Your C.O.C. #: 540307-06-01, 540307-07-01, 540307-08-01, 540307-09-01, 540307-10-01, 540307-11-01

Report Date: 2017/11/27 Report #: R2483087

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7A3413 Received: 2017/11/21, 08:23

Encryption Key

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

Sampler Initials: SW

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID			SN2867	SN2868	SN2869	SN2870	SN2871	SN2872			
Sampling Date			2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20			
COC Number			540307-06-01	540307-06-01	540307-06-01	540307-06-01	540307-06-01	540307-06-01			
	SV05-OS	SV06-OS	RDL	QC Batch							
Total Metals by ICPMS											
Total Lead (Pb)	ug/L	10	10.6	10.3	14.5	49.9	9.14	18.2	0.20	8837811	
No Fill	No Excee	dance							-		
Grey	Grey Exceeds 1 criteria policy/level										
Black Exceeds both criteria/levels											
RDL = Reportable Detection Limit											

Maxxam ID			SN2873	SN2874	SN2875	SN2876		SN2895			
Sampling Date			2017/11/20	2017/11/20	2017/11/20	2017/11/20		2017/11/20			
COC Number			540307-06-01	540307-06-01	540307-06-01	540307-06-01		540307-07-01			
	UNITS	MAC	SV07-OS	SV08-OS	SV09-OS	SV10-OS	QC Batch	SV11-OS	RDL	QC Batch	
Total Metals by ICPMS											
Total Lead (Pb)	ug/L	10	6.10	21.2	8.51	13.0	8837811	8.86	0.20	8837830	
No Fill	No Exceed	dance									
Grey	Grey Exceeds 1 criteria policy/level										
Black Exceeds both criteria/levels											
DL = Reportable Detection Limit											

Maxxam ID			SN2896	SN2897	SN2898	SN2899	SN2900	SN2901				
Sampling Date			2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20				
COC Number			540307-07-01	540307-07-01	540307-07-01	540307-07-01	540307-07-01	540307-08-01				
	UNITS	MAC	SV12-OS	SV13-OS	SV14-OS	SV15-OS	DUP3-OS	BR01-OS	RDL	QC Batch		
otal Metals by ICPMS												
Total Lead (Pb)	ug/L	10	67.2	25.2	24.1	21.4	3.80	1.22	0.20	8837830		
No Fill	No Excee	dance										
Grey	Exceeds 1 criteria policy/level											
Black	Black Exceeds both criteria/levels											
RDL = Reportable Detection Limit												

Maxxam ID			SN2902	SN2903	SN2904	SN2905	SN2906	SN2907			
Sampling Date			2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20			
COC Number			540307-08-01	540307-08-01	540307-08-01	540307-08-01	540307-08-01	540307-08-01			
	UNITS	MAC	BR02-OS	BR03-OS	BR04-OS	BR05-OS	BR06-OS	BR07-OS	RDL	QC Batch	
Total Metals by ICPMS			•	•	•		•		-	·	
Total Lead (Pb)	ug/L	10	10.5	9.09	1.72	1.00	6.34	0.23	0.20	8837830	
No Fill	No Excee	dance									
Grey Exceeds 1 criteria policy/level											
Black	Exceeds l	oth cr	iteria/levels								

RDL = Reportable Detection Limit



TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

Sampler Initials: SW

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID			SN2908	SN2909	SN2910	SN2911	SN2912	SN2914		
Sampling Date			2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20		
COC Number			540307-08-01	540307-08-01	540307-08-01	540307-09-01	540307-09-01	540307-10-01		
	UNITS	MAC	BR08-OS	BR09-OS	BR10-OS	BR11-OS	DUP4-OS	FP01-OS	RDL	QC Batch
Total Metals by ICPMS										
Total Lead (Pb)	ug/L	10	1.24	4.24	2.38	73.2	0.32	110	0.20	8837830
No Fill	No Excee	dance								
Grey	Exceeds 1	criter	ia policy/level							
Black Exceeds both criteria/levels										
RDL = Reportable Detection Limit										



TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

Sampler Initials: SW

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID			SN2915	SN2916	SN2917	SN2918	SN2919	SN2920		
Sampling Date			2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20		
COC Number			540307-10-01	540307-10-01	540307-10-01	540307-10-01	540307-10-01	540307-10-01		
	UNITS	MAC	FP02-OS	FP03-OS	FP04-OS	FP05-OS	FP06-OS	FP07-OS	RDL	QC Batch
Total Metals by ICPMS										
Total Lead (Pb)	ug/L	10	34.9	2.77	1.60	0.53	5.48	15.7	0.20	8837846
No Fill	No Excee	dance								
Grey	Exceeds 1	criter	ia policy/level							
Black Exceeds both criteria/levels										
RDL = Reportable Detection Limit										

Maxxam ID			SN2921	SN2922	SN2923	SN2928	SN2929	SN2930		
Sampling Date			2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20		
COC Number			540307-10-01	540307-10-01	540307-10-01	540307-11-01	540307-11-01	540307-11-01		
	UNITS	MAC	FP08-OS	FP09-OS	FP10-OS	FP11-OS	FP12-OS	FP13-OS	RDL	QC Batch
Total Metals by ICPMS										
Total Lead (Pb)	ug/l	10	1.43	3.42	1.42	16.8	16.5	4.27	0.20	8837846

No Fill

No Exceedance

Grey

Exceeds 1 criteria policy/level

Black

Exceeds both criteria/levels

RDL = Reportable Detection Limit

Maxxam ID				SN2931	SN2932	SN2933	SN2934		
Sampling Date				2017/11/20	2017/11/20	2017/11/20	2017/11/20		
COC Number				540307-11-01	540307-11-01	540307-11-01	540307-11-01		
		UNITS	MAC	FP14-OS	FP15-OS	FP16-OS	DUP5-OS	RDL	QC Batch
Total Metals by ICPN	VIS								
Total Lead (Pb)		ug/L	10	21.4	1.62	3.45	0.93	0.20	8837846
No Fill	No Exce	eedance	è						
Grey	Exceed	s 1 crite	ria pol	icy/level					
Black Exceeds both criter				/levels					
RDL = Reportable De	tection L	imit							



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

Sampler Initials: SW

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

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

Sample SV08-OS: Received with incorrect label. Sample received labelled SV08-3OS as indicated on the sample bottle. Inspected as per COC. Sample DUP6-OS: Received with incorrect label. Sample received labelled DUP5-OS as indicated on the sample bottle. Inspected as per sample bottle label.

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.

Results relate only to the items tested.



QUALITY ASSURANCE REPORT

TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

Sampler Initials: SW

			Matrix	Spike	Spiked	Blank	Method B	lank	RPE)
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8837811	Total Lead (Pb)	2017/11/22	98	80 - 120	103	80 - 120	<0.20	ug/L	1.0	20
8837830	Total Lead (Pb)	2017/11/22	102	80 - 120	102	80 - 120	<0.20	ug/L	0.19	20
8837846	Total Lead (Pb)	2017/11/22	NC	80 - 120	99	80 - 120	<0.20	ug/L	0.83	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 (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)



TETRA TECH CANADA INC.

Client Project #: ENW.VENW03140-01

Sampler Initials: SW

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

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	Inform	ation		1.57	-		Project Info	rmation		83	DIE BITTATIA NAS	CHARLES BUT III	Page IIII
y rearrie	RA TECH CANADA INC.		mpany Name	NAME OF THE POST O					Quotation #		B71611			-20	MA A A	A STATE	tie Orde
Name Shawneen W	- Commission of the Commission		THE PERSON NAMED IN	Shawneen Walker					P.O.#				172		B7A3413_C		IIII IIIIII
#1 - 4376 BC NANAIMO B		- Ad	dress	nwneen.	اماء	kom	talvat	2012	roject #		ENW.VEN	W03140-01		-8	D/A3413_C	<i>J</i> C	540307 ect Man
(250) 756-22		6 x pr	one Oi	Chancestin	ACXI	Fax	IC TICAL		¶roject Name Site#			23 ii					- Elizabet
smwalker@c	tra:ca; EBA.Labdata@tetratech.com		naid	sr nwalker@eba.e e	EBA.	Labdata	tetratech.c	1	Sampled By		5.W	lker			C#540307-0		Letitia Prefon
atory Criteria:			Special Instr	uctions	4			ANALYSIS RE	QUESTED (PL	EASE E	BE SPECIFIC)		_			nd Time (TAT) Requ	
CSR	i i							1						Damulas	(Standard) TAT:	advance notice for rus	h projects
CCME														375000	sppled if Rush TAT is not :	specified):	
BC Water Quality					î				1 1						d TAT = 5-7 Working days		
					N/A) 6 PB	ater									note: Standard TAT for cert ontact your Project Manage		and Dioxins/Fura
Other					ered	N S	1 1		1			- 1		Job Sp	ecific Rush TAT (if applic	es to entire submissi	on)
					E P	Drinking Water						- 1		1 DAY	2 Day 3 D	ay Date Requir	ed
SAMPLES MUST BE	KEPT COOL (< 10°C) FROM TIME OF SAMPL	ING UNTIL DE	LIVERY TO MA	XXAM	als Fie							- 1		Rush C	onfirmation Number:	(ca	(lab for #)
Sample Barcode Label	Sample (Location) Identification	Date Sar	npled Tim	ne Sampled Matrix	T to	Lead								# of Bott	ies	Comments	
	SVOI-OS	17/20	Y120	wate	er	X								1			
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	5V03-0s				T												
	SV04-05					11						\vdash					
		+			+	+						_		+	+		
	5105-05	+			+	+			-		-		+	+			
	SV00-05	4 4		-+	-	4						_		1			
	SV07-05	V														4.1	1284
	5V08-0s		\														
	SV09-05																
	SV10-05		V	V	1	V								V			
RELINQUISHED BY: (Sign		YY/MM/DD)	Time			BY: (Signati			Date: (YY/MM/	_	Time	# jars used an	-		Lab	Use Only	
EYAN MA	210 10/2/10V 11/2	0/11	01.00	Evalylina	EVF	FSYR	DVA	- 1	2017/11/2	21	08.23		Time Sensi	Te	emperature (°C) on Receip	4 4 4	es No
ESS OTHERWISE AGREED	TO IN WRITING, WORK SUBMITTED ON THIS CHA	UN OF CUSTOR	Y IS SUBJECT T	O MAXXAM'S STANDARD	TERMS	AND COND	TIONS. SIGNING	OF THIS CHAIN	OF CUSTODY E	росим	ENT IS ACKNOW	L LEDGMENT AND	ACCEPTANC	E OF OU	3,4,6 R TERMS WHICH ARE AVA	111	
VIEWING AT WWW.MAXXA THE RESPONSIBILITY OF 1	M.CA/TERMS. HE RELINQUISHER TO ENSURE THE ACCURACY	OF THE CHAIR	OF CUSTODY F	RECORD. AN INCOMPLETE	E CHAIN	OF CUSTO	Y MAY RESULT	N ANALYTICAL 1	TAT DELAYS.							NORTH A	
															11,11,11	ICE-PRI	~~ - 1

		INVOICE TO:			Report Info	ormatio	n:				Project In	formation	_		\$115,71407 ON 50140,804	Bottle Order		
pany Name		A TECH CANADA INC.	Compa	y Name				15	Quotation#		B71611							
tact Name	Shawneen Wa		Contact	Name Shar	wneen Walker				P.O. #					B7A	3413_COC			
955	#1 - 4376 BOI		Addres	_			_		Project #		ENW.VE	NW03140-01	1.7-		Ommor Common.	540307 Project Mana		
	(250) 756-225		6 x	-			nedict.		Project Name		2	1610	307	VII 9		1		
•		pa.ca; EBA Labdata@tetratech.com	D X Phone	-SAY	ralker@ebo.sa; El	BA.Lal	Faxbdata@tetra	atech.com	Site # Sampled By		SIN	aller	District.		C#540307-07-01	Letitia Prefoni		
gulatory Cr	Manager			pecial Instruction		П			REQUESTED (P	PLEASE E					Turnaround Time (TA	T) Required:		
		1				1 1					T				Please provide advance notice	ce for rush projects		
CSR							- 3		1 1		\$ I			Regular (S	Standard) TAT:	1115		
CCME						Ш	1				1 1			(will be app	plied if Rush TAT is not specified):			
DC West	er Quality					Î									TAT = 5-7 Working days for most tests			
DC VVIII	or squarry	1				3	5	1 1			1 1			Please not days - com	te: Standard TAT for certain tests suc tact your Project Manager for details.	h as BOD and Dioxins/Furan.		
Other						ed ? (Y / N)	Drinking Water				1 1			Job Spec	ific Rush TAT (if applies to entire s	ubmission)		
				-		iller	g g	1 1						1 DAY		te Required		
- 55						용	Ě				1 1			TRINKS SA	nfirmation Number:			
SA	MPLES MUST BE K	EPT COOL (< 10°C) FROM TIME OF SAMPL	ING UNTIL DELIVE	RY TO MAXXAM	N	Metais Field	. 1				1 1					(call lab for #)		
Sample	Barcode Label	Sample (Location) Identification	Date Samples	Time Sar	mpled Matrix	Meta	ead							# of Bottles	Con	rments		
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	QUISHED BY: (Signal		YY/MWDD)	Time	RECEIV		(Signature/Prin	tl	Date: (YY/M)		Time	# jars used and not submitted		ettern I	Lab Use Only	Custody Seal Intect on Coole		
WINY	neendy	11/1	1/20 0	7:00 &	a sylina EV	11 3	(FOEA		2017/11/	121	08:23	A CONTRACTOR OF THE PARTY OF TH	The Sen	Ten	nperature (°C) on Receipt			

11/11, 11 ICE-PRESENT IN I COOLER (WITH TEMPERATURES

3,4,6)

		INVOICE TO:				Report Inform	nation				Project Info	ormation		111 115	MERCHEN MANAGEMENT	HALL SULMA	N
y Name	#1433 TETR	A TECH CANADA INC.		Company Name	e				Qu	otation#	B71611					-0.00SHII	Bottle Order
Name	Shawneen Wa	- Historian		Contact Name	Shawneen	Walker			P.0		-				3413_COC		HIHLIER
7.2	#1 - 4376 BOI NANAIMO BO			Address	=1001	2001011	MALL	20010	Pro	ject#	ENW.VEN	W03140-01		D/A	7415_000		540307 Project Manag
- 62	(250) 756-225		0) 756-2686 x		ALIM	ICT I'V		MO TO	tratect		-			300		omerce	Project manag
		66 x Fax (25) ba.ca; EBA.Labdata@tet		Phone Email	smwalker	gebales; EB/	Labdata	@tetratech.co	om Sa	mpled By	S.NO	Nor		1 111	C#540307-08-01	1000000	Lettia Prefonta
tory Criter	ria			Special I	nstructions			/A'======		JESTED (PLEASE				4	Turnaround T	ime (TAT) Requ	ired:
SR															Please provide adva	ince notice for rust	h projects
an													Re	gular (Star	ndard) TAT:	20000	
CME							233						5.09		d if Rush TAT is not speci		
C Water	Quality					13	Z						1.88		= 5-7 Working days for n Standard TAT for certain (and Dissing Europe
lther						2	Water						day	s - contact	your Project Manager for	r details.	and Goldins Felana
trier						1	2 2			- 1	1		Jo	b Specific	Rush TAT (if applies to	entire submissio	an)
						i	Drinking				1 1		1	DAY	2 Day 3 Day	Date Requir	ed
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SAMP	LES MUST BE KI	EPT COOL(TIPE) FROM TIM	NE OF SAMPLING UN	IIIL DELIVERT TO	BINANAIR		Metals Lead -				1 1		a of	Bottles		Comments	l lab for #)
Sample B	larcode Label	Sample (Location) Iden	ification D	ate Sampled	Time Sampled	Matrix 3	2 2				+	_	- 1			10,000,000	
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		N WRITING, WORK SUBMITTED	ON THIS CHAIN OF C	USTODY IS SUBJEC	T TO MAXXAM'S	STANDARD TERM	S AND CON	NTIONS, SIGNING	OF THIS CHAIN O	CUSTODY DOCU	MENT IS ACKNOW	VLEDGMENT AND A	CCEPTANCE O		-46	LE White:M	axxam Yallow
	T WWW.MAXXAM.	CAITERMS. E RELINQUISHER TO ENSURE TH	HE ACCURACY OF THE	CHAIN OF CUSTOD	DY RECORD. AN IN	COMPLETE CHAI	N OF CUSTO	DY MAY RESULT	N ANALYTICAL TA	T DELAYS.					/11,11 II		
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		INVOICE TO:				Report Info	rmation		-		Project Ir	formation			REPORT HE WAS NOT CHARLED		
npany Name	1433 TETR	A TECH CANADA INC.		Company Nar	10					Quotation #	B71611		===40	H K			Bottle Order#:
SHEAT THREE THE	Shawneen Wa	COTT.		Contact Name	Shawne	en Walker				P.O. W				B7A	3413_COC		
659	1 - 4376 BOE NANAIMO BO	THE RESERVE OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COLUMN TW		Address	STOOLS	D=020 IN	alka.	01010	126.000	Project #	ENW.VE	NW03140-01	_	DIA	13415_000		540307 Project Manager
-	250) 756-225		D) 756-2686 x	Phone	TIM	meen.w	CILU	COTONO	THE VICTOR	Project Name Site #			-	-1-			Project manager
	mwalker@eb	a.ca; EBA.Labdata@tetr	atech.com	Email	smwalk	er@eba.ca; EB	A.Labda	sta@tetrated	th.com	Sampled By	S.W	alkour			C#540307-09-01	10.11	Letitia Preforitain
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Sample Ba	arcode Label	Sample (Location) Ident	fication	Date Sampled	Time Sample:	d Matrix	Metals					Vi I		# of Bottles	s c	Comments	
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NLESS OTHER	WISE AGREED TO	IN WRITING, WORK SUBMITTED	ON THIS CHAIN OF	CUSTODY IS SUBJE	T TO MAXXAN	'S STANDARD TER	MS AND CO	NDITIONS, SIG	VING OF THIS CHA	N OF CUSTODY DO	CUMENT IS ACKNO	WLEDGMENT AND A	CCEPTAN	CE OF OUR	TERMS WHICH ARE AVAILABLE	White: Ma	com Yellow Cite
		RELINQUISHER TO ENSURE TH	E ACCURACY OF T	HE CHAIN OF CUSTO	Y RECORD. A	N INCOMPLETE CH	AIN OF CUS	TODY MAY RES	ULT IN ANALYTICA	L TAT DELAYS.							MAGAZINI SANTE ENGLISHE
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		INVOICE TO:				Report Info	rmati	on			Project infe	ormation			川関連がありまからからからいいっちが知道に	
any Name		RA TECH CANADA INC.	3 6	Company Name		10/5				Quotation #	B71611					rittle Order i
ct Name	Shawneen W			Contact Name	Shawneer	n Walker				P.O.#					7A3413_COC	
s	#1 - 4376 BO NANAIMO BI			Address	-1	d- v		TEACOL	al -1-a	Project #	ENW.VEN	W03140-01	_	-	400 Sept. 200	540307
	(250) 756-22	2010-06-00 (100-06-01)	756-2686 x		ANNIN	ACHU.	X	iteret	errane		-			-	Onen or owners	oject Manag
	the state of the s	ba.ca; EBA Labdata@tetrat		Phone Email	smwalkere	@eba-es; EB	BAL	rax abdata@tetrate	ch.com	Site # Sampled By	S.NO	rov		$\overline{}$	CN540307-10-01	Letitia Prefontal
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CSR															Please provide advance notice to	rrush projects
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CCME			1			- 1				1 1				(will be a	opplied if Rush TAT is not specified):	
BC Water	r Quality					- 1	ê	- 1						Standard	d TAT = 5-7 Working days for most tests	Marine street, and a second
1500						- 1	N/A) & PR	5							note: Standard TAT for certain tests such as protect your Project Manager for details.	BOD and Dioxins/Furans
Other			1			1	Pd 2	- Drinking Water							ecific Rush TAT (if applies to entire subm	ission)
							iller.	5						1 DAY	2 Day 3 Day Date Re	
							Pie	ž.		1 1				I CONTRACT	onfirmation Number:	
SAN	PLES MUST BE K	EPT COOL (< 10°C) FROM TIME (OF SAMPLING UNTIL	DELIVERY TO A	MAXXAN		8 5	÷						rider Ci		(call lab for #)
Sample	Barcode Label	Sample (Location) Identifica	ation Date	Sampled T	ime Sampled	Matrix	Metz	Lead						# of Bottle	es Commer	nts
		FP01-05	17/1	1/20		water		X						1		
		FP0a-05	1			1	T	1						ı		
		FP03-05					T									
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		FROG- OS	-				1							T		
		FPC6-OC												\top		
		FPOD-OS					1			+				+		
		E008-05					+				+ +			+		
		FPCQ-OS				+	1							+		
		EDIN-OS				1/	-	.,		1				1		(24-1)
RELINO	JISHED BY: (Signat	ture/Print)	Date: (YY/MM/DD)	Time	_	RECEIVE	DRY	(Signature/Print)		Date: (YY/MM/DD)	Time	# jars used and		Ψ	Lab Use Only	
	neen V		17/11/20	07:00	En 81		risk innertic	YFORA		2017/4/21	08:23	not submitted	Time Sen	live To		dy Seal Intact on Cooler
/	MODE	2/		7,00	1					141421	- 6.25	1				Yes No

11,11,11 ICE-PRESENTINI
LOOLER (WITH TEMPERATURE
3,14,6)

		INVOICE TO:	==:	F-0		Report Infor	mation			Project	Information			Mark Mark	AND MARKET	111
pany Name	#1433 TETF	RA TECH CANADA INC.		Company Nan	net .	4000			Quotation #	B71611				100	W-WW	ittle Order
act Name	Shawneen W			Contact Name	Shawnee	n Walker			P.O. #	PERLAMENTAL	MANGE AND COLUMN		B	7A3413_CO		" HUHO
95	#1 - 4376 BO	Particular and Control of the Contro		Address					Project #		ENW03140-01		-	1115415_00	٠.	540307
	NANAIMO BO				2 Daw	neen.w	plbe	re tetrate	20 Labour 1980	1			- B	witam or wasses, .		. oject Mana
9	(250) 756-225	I dA.		Phone			Fax:		Site #						HOUSEN I	Letitia Prefont
	smwalker@el	ba.ca; EBA.Labdata@tetratech.c	om	Email	- amwalker	@eba.ce; EB/	\.Labdata	@tetratech.com	Sampled By	Z.W	alter			C#540307-11-0		Letina Pretont
guiatory Cr	teria			Special	Instructions			ANALY	SIS REQUESTED (PLEA	SE BE SPECIFI	C)			Turnaround	Time (TAT) Requ	uired:
CSR	*1													Please provide ad	vance notice for rus	h projects
Cars			1			1							Regular ((Standard) TAT:		
CCME			1			No.	4	1 1	1 1				1783 F 37537	oplied if Rush TAT is not spi	offed):	
anne e	1872(1972)					- 1:	-						175 N. S. A. D. L. H. C. C.	TAT = 5-7 Working days for		
BC Wat	er Quality		,				g Water		1 1				Please no	ote: Standard TAT for certain	n tests such as BOD	and Dioxins/Furan
Other							ate	1 1 1					days - co	ntact your Project Manager	for details	337177529717517777
SHORRAGE							8 8						Job Spe	cific Rush TAT (if applies	to entire submissi	on)
							E 5	1 1 1					1 DAY	2 Day 3 Day	Date Requir	ed;
				_			Drinking Water		1 1				Rush Co	infirmation Number:		
SAI	APLES MUST BE K	EPT COOL (< 10°C) FROM TIME OF SAM	IPLING UNTIL	DELIVERY TO	MAXXAM		0 1	1 1 1					1,00,00	The state of the s	(cal	Viab for #)
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	UISHED BY: (Signat	ture/Print) Date	e: (YY/MM/DD)	Time	100	RECEIVED	BY: (Signate	re/Print)	Date: (YY/MM/DI) Time	# jars used and			1.60	se Only	
RELING			11/20		O Sua Su		SYLON		2017/11/2			Time Sens	sitive	mperature (*C) on Receipt		Seal Intact on Coole
	THE PARTY							er i	1 - 01 //11/2	110000			1 160	reperature ("Li on Receipt		

11,11,11 ICE-PRESENT IN 1 COOLER
CWITH TEMPERATURES
314,6)

Maxxam Analytics International Corporation o/a Maxxam Analytics