

TECHNICAL MEMORANDUM

Date: July 21, 2017
To: Dorie Sutton, City of Vancouver
Copy to: Rob Zisette, Herrera Environmental Consultants
From: Jess Brown, Herrera Environmental Consultants
Subject: Burnt Bridge Creek 2017 Water Quality Sampling Interim Memorandum #1

INTRODUCTION

This interim update provides a summary of the field and laboratory procedures and results associated with monitoring activities conducted on June 19, 2017 for the Burnt Bridge Creek 2017 Trend Analysis Project. Monitoring and laboratory analysis were conducted in accordance with the project *Quality Assurance Project Plan* (QAPP; Herrera 2014) and modifications for 2015, 2016 and 2017 (Herrera 2015; 2016; 2017). A quality assurance review of the data collected was conducted and is summarized below. The laboratory data reports, monitoring forms containing field data, data quality review worksheet, and continuous temperature data are attached.

FIELD ACTIVITIES

Herrera conducted field measurements and water quality sampling at 11 monitoring sites on June 19, 2017, for Event 1 of the Burnt Bridge Creek 2017 Water Quality Monitoring Project. The field sampling team consisted of Jess Brown and Rayna Gleason (Herrera). Samples and *in situ* water quality measurements were collected from each of the 11 sites without incident and according to QAPP procedures.

A YSI ProDSS multimeter was used to collect *in situ* data. Data were downloaded from temperature probes located at each of the eight temperature monitoring sites. The temperature probes were installed on June 6, 2017. Backup probes were installed at BBC8.4, BBC2.6 and BBC1.6. The backup probe at BBC2.6 was not found during Event 1. A new backup probe was installed in a different location. Data from the backup probe BBC8.4B were downloaded because the probe enclosure for BBC8.4A was completely covered in grass clippings. The probe enclosure at BBC8.8 was also covered, but data were downloaded because there is no backup probe at this site. The temperature data were checked for completeness and proper function. Anomalously high values recorded on sampling dates when loggers were out of the water to download data were deleted from the records.



DATA QUALITY SUMMARY

For fecal coliform analysis, the laboratory neglected to follow project specific procedures. One dilution volume of 100 mL was used instead of 2 mL and 20 mL requested on the Chain of Custody (COC). The larger dilution volume resulted in three sample results that were too numerous to count (TNTC); the laboratory did not charge for analysis of these samples. A laboratory duplicate was not performed. Corrective actions include review of dilution volume and laboratory duplicate requirements with laboratory personnel, highlighting of procedures on the COC, and attachment of the bench sheet to the COC. In addition, field personnel will remind the laboratory of procedures upon delivery of samples.

In general, procedures described and quality control criteria defined in the QAPP were met, resulting in no data qualification or corrective action with the following exceptions:

- One fecal coliform result (sample BBC8.4) qualified as estimated (J) based on the field duplicate RPD (74 percent versus the objective of ≤ 35 percent).
- Eleven fecal coliform results qualified as estimated (J) based on colony counts falling outside of ideal range of 20 to 60.
- Three fecal coliform results were qualified as greater than (>) because they were reported as too numerous to count (TNTC) at greater than the maximum count value of 300 due to a laboratory oversight regarding dilution volumes.

Fecal coliform results were calculated using colony count data by the data reviewer according to QAPP procedures (Herrera 2014). Fecal coliform results reported by the laboratory and validated by the reviewer are shown in Table 1 along with data qualifiers.

Sample ID	Date Sampled	Laboratory Result (CFU/100 mL)	Validated Result (CFU/100 mL)	Qualifier
BBC1.6	6/19/17	304	304	J
COL0.0	6/19/17	232	232	J
BBC2.6	6/19/17	272	272	J
BBC5.2	6/19/17	>300, TNTC ^b	300	>J
BBC5.9	6/19/17	178	178	J
BBC7.0	6/19/17	>300, TNTC	300	>J
BBC8.4	6/19/17	188	188	J
BUR0.0	6/19/17	276	276	J
PET0.0	6/19/17	61	61	J
BBC8.8	6/19/17	>300, TNTC	300	>J
BBC10.4	6/19/17	53	53	
DUPE ^a	6/19/17	74	74	J

^a Field duplicate of BBC8.4

^b TNTC = too numerous to count.

REFERENCES

Herrera. 2014. Burnt Bridge Creek Ambient Water Quality Monitoring Project – Quality Assurance Project Plan: 2014 Ambient Monitoring. Prepared for the City of Vancouver, Washington by Herrera Environmental Consultants, Inc., Seattle, Washington. July 3, 2014.

Herrera 2015. Burnt Bridge Creek 2015 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington by Herrera Environmental Consultants, Inc., Seattle, Washington. June 15, 2015.

Herrera 2016. Burnt Bridge Creek 2016 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington by Herrera Environmental Consultants, Inc., Seattle, Washington. May 25, 2016.

Herrera 2017. Burnt Bridge Creek 2017 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington by Herrera Environmental Consultants, Inc., Seattle, Washington. May 17, 2017.

ATTACHMENTS



IEH ANALYTICAL LABORATORIES
LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	HER080-41	PAGE 1
REPORT DATE:	07/08/17	
DATE SAMPLED:	06/19/17	DATE RECEIVED: 06/21/17
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM HERRERA ENVIRONMENTAL		

CASE NARRATIVE

Twelve water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-N (mg/L)	TOTAL-P (mg/L)	SRP (mg/L)	N03+N02 (mg/L)	TSS (mg/L)	TURBIDITY (NTU)
BBC10.4-20170619	3.02	0.089	0.046	2.26	7.0	2.3
BBC8.8-20170619	2.86	0.086	0.045	2.15	5.0	2.4
PET0.0-20170619	1.78	0.142	0.106	1.72	4.0	1.2
BBC8.4-20170619	2.37	0.100	0.060	2.08	4.3	1.8
BUR0.0-20170619	2.73	0.064	0.046	2.27	0.60	1.1
BBC7.0-20170619	2.01	0.127	0.069	0.907	11	3.6
BBC5.9-20170619	2.04	0.124	0.070	1.79	11	3.0
BBC5.2-20170619	2.25	0.132	0.071	1.85	10	3.2
BBC2.6-20170619	2.03	0.123	0.073	1.87	8.7	3.2
COL0.0-20170619	1.56	0.094	0.052	1.47	8.3	3.3
BBC1.6-20170619	1.86	0.121	0.069	1.73	10	3.5
DUPE-20170619	2.53	0.101	0.061	2.02	4.6	2.0



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CASE FILE NUMBER:	HER080-41	PAGE 2
REPORT DATE:	07/08/17	
DATE SAMPLED:	06/19/17	DATE RECEIVED: 06/21/17
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM HERRERA ENVIRONMENTAL		

QA/QC DATA WATER

QC PARAMETER	TOTAL-N (mg/l)	TOTAL-P (mg/L)	SRP (mg/L)	N03+N02 (mg/L)	TSS (mg/L)	TURBIDITY (NTU)
METHOD	SM20 4500NC	EPA 365.1	EPA 365.1	SM18 4500N03F	SM18 2540D	EPA 180.1
DATE ANALYZED	06/29/17	06/29/17	06/21/17	06/21/17	06/21/17	06/21/17
DETECTION LIMIT	0.050	0.002	0.001	0.010	0.50	0.10
DUPLICATE						
SAMPLE ID	DUPE-20170619	DUPE-20170619	DUPE-20170619	BATCH	BATCH	BATCH
ORIGINAL	2.53	0.101	0.061	0.239	52	20
DUPLICATE	2.50	0.101	0.061	0.245	52	21
RPD	1.07%	0.01%	0.75%	2.71%	0.00%	4.88%
SPIKE SAMPLE						
SAMPLE ID	DUPE-20170619	DUPE-20170619	DUPE-20170619	BATCH		
ORIGINAL	2.53	0.101	0.061	0.239		
SPIKED SAMPLE	3.50	0.153	0.080	0.437		
SPIKE ADDED	1.00	0.050	0.020	0.200		
% RECOVERY	97.51%	103.56%	98.46%	99.20%	NA	NA
QC CHECK						
FOUND	0.506	0.096	0.039	0.399	10	8.1
TRUE	0.490	0.094	0.039	0.408	10	8.0
% RECOVERY	103.27%	102.13%	100.00%	97.79%	100.00%	101.25%
BLANK						
	<0.050	<0.002	<0.001	<0.010	<0.50	NA

RPD = RELATIVE PERCENT DIFFERENCE.
 NA = NOT APPLICABLE OR NOT AVAILABLE.
 NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
 OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
 Project Manager



CHAIN-OF-CUSTODY RECORD

CLIENT: Herrera Environmental
 SAMPLING DATE: 06-19-2017
 SAMPLERS: Jess Brown, Rayna Jackson

SHEET 1 OF 1
 PROJECT ID: 14-05818-003
 CASE FILE NO.: _____
 DATA RECORDED BY: _____

SAMPLE INFORMATION

PARAMETERS

SAMPLE ID	DATE/TIME COLLECTED	PARAMETERS											BOTT #	NOTES					
		Turbidity	TSS	NO ₃ +NO ₂	TN	Ortho P	TP												
BBC10.4-20170613 20170619	6/13/17 6/19/17	X	X	X	X	X	X										2	9:50	
BBC8.8-20170613 20170619	6/13/17 6/19/17	X	X	X	X	X	X											2	10:20
PET0.0-20170613 20170619	6/13/17 6/19/17	X	X	X	X	X	X											2	10:35
BBC8.4-20170613 20170619	6/13/17 6/19/17	X	X	X	X	X	X											2	11:05
BUR0.0-20170613 20170619	6/13/17 6/19/17	X	X	X	X	X	X											2	11:30
BBC7.0-20170613 20170619	6/13/17 6/19/17	X	X	X	X	X	X											2	12:15
BBC5.9-20170613 20170619	6/13/17 6/19/17	X	X	X	X	X	X											2	12:35
BBC5.2-20170613 20170619	6/13/17 6/19/17	X	X	X	X	X	X											2	1:35 PM
BBC2.6-20170613 20170619	6/13/17 6/19/17	X	X	X	X	X	X											2	1:50 PM
COL0.0-20170613 20170619	6/13/17 6/19/17	X	X	X	X	X	X											2	2:45 PM
BBC1.6-20170613 20170619	6/13/17 6/19/17	X	X	X	X	X	X											2	2:50 PM
DUPE-20170613 20170619	6/13/17 6/19/17	X	X	X	X	X	X											2	11:10

Printed Name	Relinquished By <u>Jess Brown</u>	Date/Time <u>6/19/17</u>	Received By	Date/Time
Signature	<u>[Signature]</u>	<u>4:00 PM</u>		
Affiliation	<u>Herrera</u>			

Printed Name	Relinquished By	Date/Time	Received By	Date/Time
Signature			<u>[Signature]</u>	<u>06/21/17 10AM</u>
Affiliation			<u>(12) samples (24) bottles</u>	<u>11.5°C</u>

Miscellaneous Notes (Hazardous Materials, Quick turn-around time, etc.): _____

PIXIS Labs

Accurate. Reliable. On Time.

Pixis Labs

12423 NE Whitaker Way

Portland, OR 97230

503-254-1794

Job Number: 7061929
Report Date: 06/21/2017
ORELAP #: OR100028
Project Name: 14-05818-003
Project No: Burnt Bridge Creek Monitoring 2017

Cover Letter

Jess Brown
Herrera Environmental Consultants, Inc.
24 NW 2nd Ave., Suite 204
PORTLAND, OR 97209

Dear Jess Brown,

Enclosed please find Pixis Labs analytical report for samples received as order number 7061929 on 06/19/2017. Should you have any questions about this report or any other matter, please do not hesitate to contact us. We are here to help you.

Test results relate only to the parameters tested and to the samples as received by the laboratory. Test results meet all requirements of NELAP and the Pixis quality assurance plan unless otherwise noted. This report shall not be reproduced, except in full, without the written consent of this laboratory. Samples will be kept a maximum of 15 days from the report date unless prior arrangements have been made.

Thank you for allowing Pixis to be of service to you, we appreciate your business.

Sincerely,

Signed
Richard Reid
Project Manager

Sample Results

Sample: BBC10.4 20170619							Collected: 06/19/17 09:50	Temp: 15 C	Matrix: General Water
Lab ID: 136423							Received: 06/19/17 15:35	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	53.0	/100 mL	1.00	1	31925-3	06/19/17 17:00	06/20/17 17:00		
Sample: BBC8.8 20170619							Collected: 06/19/17 10:20	Temp: 15 C	Matrix: General Water
Lab ID: 136424							Received: 06/19/17 15:35	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	TNTC	/100 mL	1.00	1	31925-4	06/19/17 17:00	06/20/17 17:00		
Sample: PET0.0 20170619							Collected: 06/19/17 10:35	Temp: 15 C	Matrix: General Water
Lab ID: 136425							Received: 06/19/17 15:35	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	61.0	/100 mL	1.00	1	31925-5	06/19/17 17:00	06/20/17 17:00		
Sample: BBC8.4 20170619							Collected: 06/19/17 11:05	Temp: 15 C	Matrix: General Water
Lab ID: 136426							Received: 06/19/17 15:35	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	188	/100 mL	1.00	1	31925-6	06/19/17 17:00	06/20/17 17:00		
Sample: BUR0.0 20170619							Collected: 06/19/17 11:30	Temp: 15 C	Matrix: General Water
Lab ID: 136427							Received: 06/19/17 15:35	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	276	/100 mL	1.00	1	31925-7	06/19/17 17:00	06/20/17 17:00		
Sample: BBC7.0 20170619							Collected: 06/19/17 12:15	Temp: 15 C	Matrix: General Water
Lab ID: 136428							Received: 06/19/17 15:35	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	TNTC	/100 mL	1.00	1	31925-8	06/19/17 17:00	06/20/17 17:00		

Sample: BBC5.9 20170619							Collected: 06/19/17 12:35	Temp: 15 C	Matrix: General Water
Lab ID: 136429							Received: 06/19/17 15:35	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	178	/100 mL	1.00	1	31925-9	06/19/17 17:00	06/20/17 17:00		
Sample: BBC5.2 20170619							Collected: 06/19/17 13:35	Temp: 15 C	Matrix: General Water
Lab ID: 136430							Received: 06/19/17 15:35	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	TNTC	/100 mL	1.00	1	31925-10	06/19/17 17:00	06/20/17 17:00		
Sample: BBC2.6 20170619							Collected: 06/19/17 13:50	Temp: 15 C	Matrix: General Water
Lab ID: 136431							Received: 06/19/17 15:35	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	272	/100 mL	1.00	1	31925-11	06/19/17 17:00	06/20/17 17:00		
Sample: COL0.0 20170619							Collected: 06/19/17 14:45	Temp: 15 C	Matrix: General Water
Lab ID: 136432							Received: 06/19/17 15:35	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	232	/100 mL	1.00	1	31925-12	06/19/17 17:00	06/20/17 17:00		
Sample: BBC1.6 20170619							Collected: 06/19/17 14:50	Temp: 15 C	Matrix: General Water
Lab ID: 136433							Received: 06/19/17 15:35	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	304	/100 mL	1.00	1	31925-13	06/19/17 17:00	06/20/17 17:00		
Sample: DUPE 20170619							Collected: 06/19/17 11:10	Temp: 15 C	Matrix: General Water
Lab ID: 136434							Received: 06/19/17 15:35	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	74.0	/100 mL	1.00	1	31925-14	06/19/17 17:00	06/20/17 17:00		

Abbreviations

MRL Method Reporting Limit
 ND None Detected at or above the MRL

Units of Measure:

/100 mL Per 100 mL



2200 Sixth Avenue | Suite 1100
Seattle, Washington | 98121
p 206 441 9080 | f 206 441 9108

HERRERAENV 7061929



Herrera Environmental Consultants, Inc.

Chain of Custody Record

Project Name:		Project Number:		Client:			Number of Containers	Analyses Requested										Lab ID No.				
Burnt Bridge Creek Monitoring 2017		14-05818-003		City of Vancouver				Fecal Coliform - SM 9222D														
Report To:			Copy To:																			
Jess Brown, jbrown@herrerainc.com			RGleason@herrerainc.com																			
Sampled By:			Delivery Method:																			
Jess Brown																						
Laboratory:		Requested Completion Date:		Total No. of Containers:																		
PIXIS Labs				12																		
Lab Use:		Sample ID	Date	Time	Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)															
		BBC10.4-20170613	20170619	6/19/17	9:50am	G	Y	SW	1	✓												
		BBC8.8-20170613	20170619	6/19/17	10:20am	G	Y	SW	1	✓												
		PET0.0-20170613	20170619	6/19/17	10:35am	G	Y	SW	1	✓												
		BBC8.4-20170613	20170619	6/19/17	11:05am	G	Y	SW	1	✓												
		BUR0.0-20170613	20170619	6/19/17	11:30am	G	Y	SW	1	✓												
		BBC7.0-20170613	20170619	6/19/17	12:15pm	G	Y	SW	1	✓												
		BBC5.9-20170613	20170619	6/19/17	12:35pm	G	Y	SW	1	✓												
		BBC5.2-20170613	20170619	6/19/17	1:35pm	G	Y	SW	1	✓												
		BBC2.6-20170613	20170619	6/19/17	1:50pm	G	Y	SW	1	✓												
		COL0.0-20170613	20170619	6/19/17	2:45pm	G	Y	SW	1	✓												
		BBC1.6-20170613	20170619	6/19/17	2:50pm	G	Y	SW	1	✓												
		DUPE-20170613	20170619	6/19/17	11:10am	G	Y	SW	1	✓												

Comments/Special Instructions:
Please use two dilution volumes for the analysis: 2 mL and 20 mL

Relinquished by (Name/CO)	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Jess Brown/Herrera		6/19/17 3:30pm	Stefanie		6/19/17 3:35pm
Relinquished by (Name/CO)	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time

Sample Type: G=Grab C=Composite Matrix Codes: A=Air GW=Groundwater SE=Sediment SO=Soil SW=Surface Water W=Water (blanks) M=Material O=Other (specify)

7061929

15°C

3:35pm

Fecal Analysis Bench Sheet

Sample ID	Volume (mL)	Colonies counted	Result* (CPN/100 mL)	Herrera Check
BBC10.4 20170619	100	53	53 ✓	53
BBC8.8 20170619	100	TNTC, >300	TNTC, >300	>300 J
PET0.0 20170619	100	61	61 ✓	61 J
BBC8.4 20170619	100	188	188 ✓	188 J
BUR0.0 20170619	100	276	276 ✓	276 J
BBC7.0 20170619	100	TNTC, >300	TNTC, >300	>300 J
BBC5.9 20170619	100	178	178 ✓	178 J
BBC5.2 20170619	100	TNTC, >300	TNTC, >300	>300 J
BBC2.6 20170619	100	272	272 ✓	272 J
COL0.0 20170619	100	232	232 ✓	232 J
BBC1.6 20170619	100	304	304 ✓	304 J
DUPE 20170619	100	74	74 ✓	74 J
Lab Duplicate-	-	-		
Negative Control	100	<1	<1	OK
Positive Control	100	TNTC	TNTC	OK

***Calculation of Results**

Density: use if only one count is within ideal range (20-60 colonies)

$$\frac{\text{Colonies}}{100\text{mL}} = \frac{\text{Colonies counted}}{\text{mL Sample Filtered}} \times 100$$

Average Density: use if all counts are outside of ideal range (20-60 colonies) excluding counts greater than 200 or if more than one count is within ideal range

$$\frac{\text{Colonies}}{100\text{mL}} = \frac{\sum \text{Colonies counted}}{\sum \text{mL sample filtered}} \times 100$$

If all >200 colonies calculate density of value closest to 200 and add greater than to result (e.g. >1000)

Checked 7/3/17

Jess Brown 



Data Quality Assurance Worksheet

Project Name/No./Client: Burnt Bridge Creek / 14-05818-003 / City of Vancouver, Washington

Laboratory/Parameters: IEH-Aquatic Research / nitrogen, phosphorus, SRP, nitrate-nitrite, TSS, turbidity
PIXIS Labs/ Fecal Coliform

Sample Date/Sample ID: 6/19/17 / Event 1 (11 stations plus field duplicate)

By J. Brown

Date 7/10/17 Page 2 of 2

Checked: initials RZ

date 7/17/17

Parameter	Completeness/ Methodology	Holding Times (days)		Blanks/ Reporting Limit	Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Field Duplicates RPD (%)		Instrument Calibration/ Performance	ACTION
		Reported	Goal		Reported	Goal	Reported	Goal	Reported	Goal ¹	Reported	Goal ¹		
Total Nitrogen	OK / SM4500N-C	10	<28	<0.050 / 0.050 mg/L	98	90-110	103	90-110	1	<20	7	<20	OK	
Total Phosphorus	OK / EPA 365.1	10	<28	<0.002 / 0.002 mg/L	104	90-110	102	90-110	0.01	<20	1	<20	OK	
SRP	OK / EPA 365.1	<48 hours	<48 hours ²	<0.001 / 0.001 mg/L	98	90-110	100	90-110	1	<20	2	<20	OK	
Nitrate + Nitrite	OK / EPA 353.2	2	<28	<0.010 / 0.010 mg/L	99	90-110	98	90-110	3	<20	3	<20	OK	
TSS	OK / EPA 160.2	2	<7	<0.5 / 0.5 mg/L	NA	NA	100	90-110	Batch 0	<20	7	<20	OK	
Turbidity	OK / SM2130-B	<48 hours	<48 hours	<0.1 / 0.1 NTU	NA	NA	101.25	90-110	Batch 5	<20	11	<20	OK	
Fecal coliform	OK / SM9222-D	2-7 hours	<24 hours	<5 / 5 CFU/100mL	NA	NA	NA	NA	NA	<35	87	<35	OK	Flag BBC8.4 J due to field duplicate RPD exceedance. See NOTE A for additional flags.

¹ If the sample or duplicate value is less than five times the reporting limit, then the difference (D) is calculated rather than the RPD and the QA objective is that the difference shall not exceed 2 times the reporting limit instead of the number indicated in the objective column.

² Less than 24 hours from collection to filtration.



Data Quality Assurance Worksheet

Project Name/No./Client: Burnt Bridge Creek / 14-05818-003 / City of Vancouver, Washington

Laboratory/Parameters: IEH-Aquatic Research / nitrogen, phosphorus, SRP, nitrate-nitrite, TSS, turbidity
PIXIS Labs/ Fecal Coliform

Sample Date/Sample ID: 6/19/17 / Event 1 (11 stations plus field duplicate)

By J. Brown

Date 7/10/17 Page 2 of 2

Checked: initials RZ
 date 7/17/17

Parameter	Completeness/ Methodology	Holding Times (days)		Blanks/ Reporting Limit	Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Field Duplicates RPD (%)		Instrument Calibration/ Performance	ACTION
		Reported	Goal		Reported	Goal	Reported	Goal	Reported	Goal ¹	Reported	Goal ¹		
Temperature	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	<20	OK	None
Dissolved Oxygen	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.3	<20	OK	None
pH	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	<20	OK	None
Conductivity	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	<20	OK	None

NOTE A: .Flag all fecal coliform results as estimated (J) except for sample BBC10.4 due to high colony counts (>60). Flag fecal coliform results for samples BBC5.2, BBC7.0, and BBC8.8 as greater than (>) the reported maximum possible count of 300 because they were reported as too numerous to count at >300.

NA – not applicable or not available
 RPD- relative percent difference

NC – not calculable due to one or more values below the detection limit
 SRP –soluble reactive phosphorus

NS – field duplicate not sampled
 TSS – total suspended solids

¹ If the sample or duplicate value is less than five times the reporting limit, then the difference (D) is calculated rather than the RPD and the QA objective is that the difference shall not exceed 2 times the reporting limit instead of the number indicated in the objective column.

² Less than 24 hours from collection to filtration.



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Jess B. Reyna G

SITE ID: BBC 10.4 DATE: 6/19/17 TIME: 9:50

WEATHER: Sunny

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE? YES: <input checked="" type="checkbox"/> NO: <input type="checkbox"/>	
TEMPERATURE:	<u>14.7 °C</u>	<u>14.7 °C</u>	
DISSOLVED OXYGEN:	<u>68% 6.90 mg/L</u>	<u>67.8% 6.88 mg/L</u>	
PH:	<u>6.44 6.48</u>	<u>6.55</u>	
CONDUCTIVITY:	<u>169.4</u>	<u>169.4</u>	

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC10.4-20170619</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Jess Brown, Rayna Gleason

SITE ID: BBC 8.8 DATE: 2017-06-19 TIME: 10:20 AM

WEATHER: Sunny, 60s

NOTES: Probe covered in algae/veg

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>16.3 °C</u>			
DISSOLVED OXYGEN:	<u>100.5% 9.85 mg/L</u>			
PH:	<u>6.96</u>			
CONDUCTIVITY:	<u>169.0</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 8.8-20170619</u>
250 ML UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 ML FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 ML UNPRESERVED BOTTLE:		
100 ML FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Jess Brown, Rayna Gleason

SITE ID: PET 0.0 DATE: 2017-06-19 TIME: 10:35 AM

WEATHER: Sunny, 60C

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>17.3 °C</u>			
DISSOLVED OXYGEN:	<u>91.6%</u> <u>8.8 mg/L</u>			
PH:	<u>7.0</u>			
CONDUCTIVITY:	<u>231.7</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		

DUPLICATE COLLECTED? YES: _____ NO: ↑

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>PET 0.0-20170619</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Jess + Rayna

SITE ID: BBC 8.4 DATE: 6/19/17 TIME: 11:05 am

WEATHER: Sunny

NOTES: downstream probe covered in veg, used upstream probe instead 8.4B

YSI 556 METER MEASUREMENTS		DUPLICATE? YES: _____ NO: _____	
TEMPERATURE:	<u>17.1°C</u>		
DISSOLVED OXYGEN:	<u>99.2%</u> <u>9.58 mg/L</u>		
PH:	<u>7.35</u>		
CONDUCTIVITY:	<u>185.8</u>		

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 8.4-20170619</u>
250 ML UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 ML FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>DUPE-20170619 11:10am</u>
250 ML UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 ML FECAL BOTTLE:	<input checked="" type="checkbox"/>	



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Jess + Rayna

SITE ID: BUR 0.0 DATE: 6/19/17 TIME: 11:30 AM

WEATHER: Sunny

NOTES: near culvert

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>14.7</u>			
DISSOLVED OXYGEN:	<u>91.4%</u> <u>9.29 mg/L</u>			
PH:	<u>7.55</u>			
CONDUCTIVITY:	<u>182.3</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		BUR 0.0-2 BUR 0.0-20170617
250 ML UNPRESERVED BOTTLE:		
100 ML FECAL BOTTLE:		

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 ML UNPRESERVED BOTTLE:		
100 ML FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J Brown, R Gleason

SITE ID: BBC7.0 DATE: 6/19/17 TIME: 12:15 pm

WEATHER: Sunny

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>19.6 °C</u>			
DISSOLVED OXYGEN:	<u>95.8%</u> <u>8.77 mg/L</u>			
PH:	<u>7.45</u>			
CONDUCTIVITY:	<u>184.4</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC7.0-20170619</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Jess + Rayna

SITE ID: BBC 5.9 DATE: 6/19/17 TIME: 12:35

WEATHER: Sunny

NOTES: could not find probe BBC 5.9 B, installed backup 1 at same location as previous year backup
↳ actually for site 3 to BBC 2.6

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES:	NO:
TEMPERATURE:	<u>18.6 °C</u>			<input checked="" type="checkbox"/>
DISSOLVED OXYGEN:	<u>87.6% 8.17 mg/L</u>			
PH:	<u>7.44</u>			
CONDUCTIVITY:	<u>182.9</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 5.9-20170619</u>
250 ML UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 ML FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 ML UNPRESERVED BOTTLE:		
100 ML FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J. Brown, R. Gleason

SITE ID: BBC 5.2 DATE: 6/19/17 TIME: 1:35 PM

WEATHER: _____

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>19.1 °C</u>			
DISSOLVED OXYGEN:	<u>97.7% 904 mg/L</u>			
PH:	<u>7.60</u>			
CONDUCTIVITY:	<u>183.4</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC5.2-20170619</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J. Brown, R. Gleason

SITE ID: BBC 2.6 DATE: 6/19/17 TIME: 13:58

WEATHER: Sunny

NOTES: Lost probe BBC 2.6 B, installed backup 2 probe in same place as backup probe last year Downstream of where BBC 2.6 B was previously.

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES:	NO:
TEMPERATURE:	<u>19.0 °C</u>			<input checked="" type="checkbox"/>
DISSOLVED OXYGEN:	<u>102.4% 9.49 mg/L</u>			
PH:	<u>8.02</u>			
CONDUCTIVITY:	<u>184.5</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 2.6-20170619</u>
250 ML UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 ML FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input type="checkbox"/>	
250 ML UNPRESERVED BOTTLE:	<input type="checkbox"/>	
100 ML FECAL BOTTLE:	<input type="checkbox"/>	



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J. Brown, R. Gleason

SITE ID: COLO.0 DATE: 6/19/17 TIME: 14:45

WEATHER: sunny

NOTES: _____

YSI 556 METER MEASUREMENTS	DUPLICATE?	YES:	NO:
TEMPERATURE: <u>16.3°C</u>			<input checked="" type="checkbox"/>
DISSOLVED OXYGEN: <u>166.5% 9.85 mg/L</u>			
PH: <u>8.08</u>			
CONDUCTIVITY: <u>222.2</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>COLO.0-20170619</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J. Brown, R. Gleason

SITE ID: BBC1.6 DATE: 6/19/17 TIME: 14:50

WEATHER: Sunny

NOTES: BBC1.6 B located ✓ (probe)

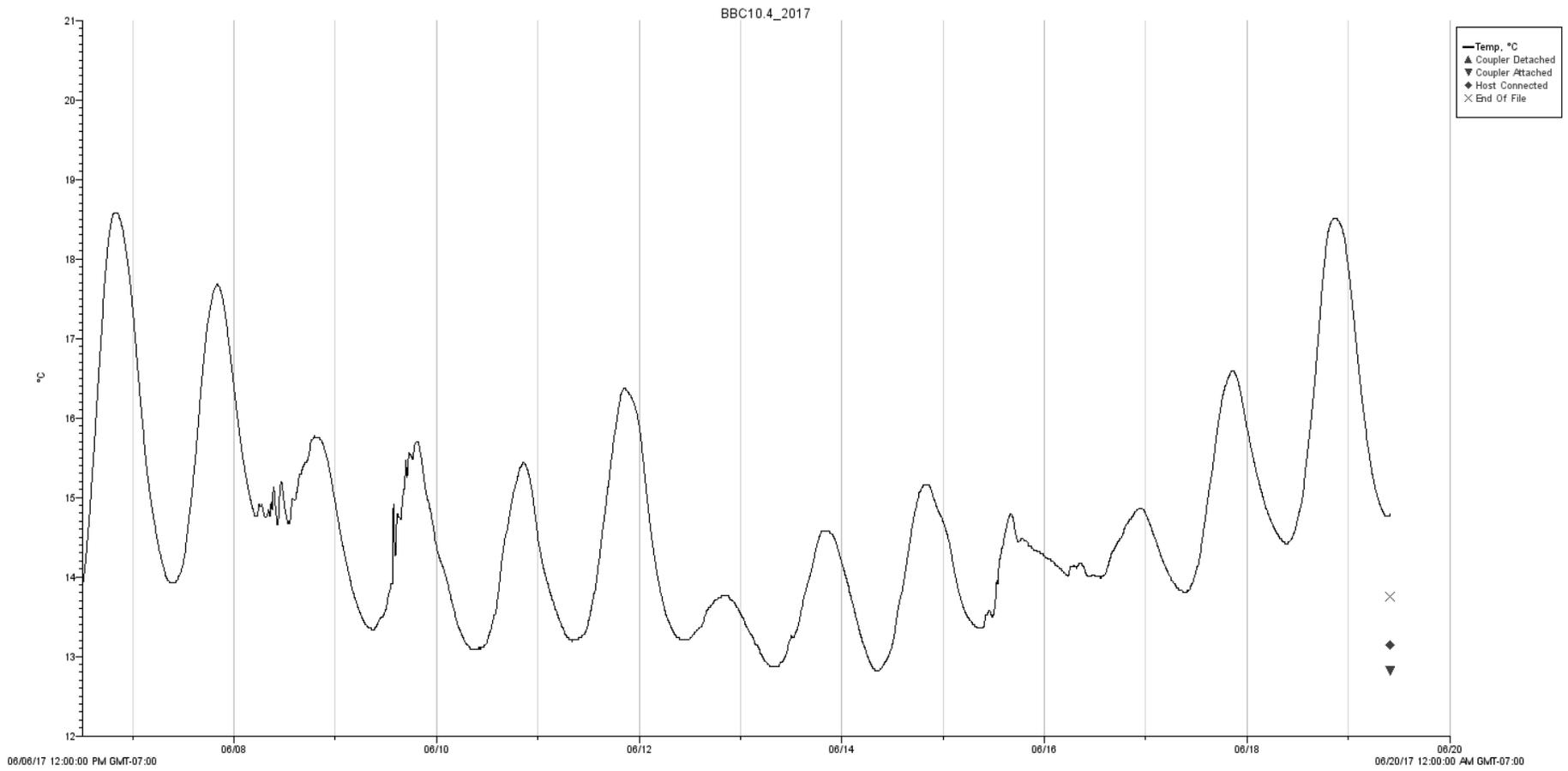
YSI 556 METER MEASUREMENTS	DUPLICATE?	YES:	NO:
TEMPERATURE: <u>19.4</u>			<input checked="" type="checkbox"/>
DISSOLVED OXYGEN: <u>101.7% 9.36 mg/L</u>			
PH: <u>8.01</u>			
CONDUCTIVITY: <u>187.8</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC1.6-20170619</u>
250 ML UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 ML FECAL BOTTLE:	<input checked="" type="checkbox"/>	

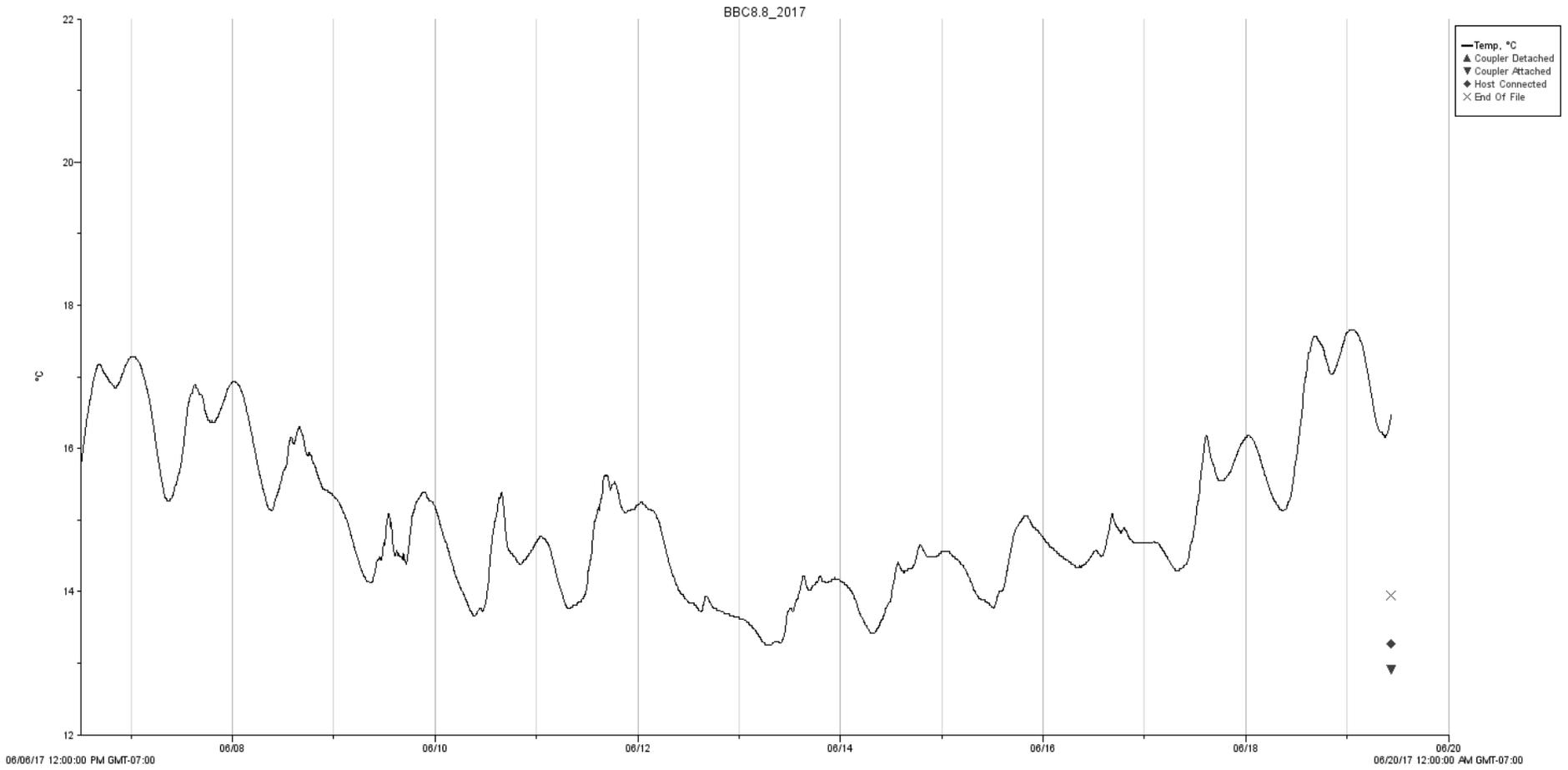
DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 ML UNPRESERVED BOTTLE:		
100 ML FECAL BOTTLE:		

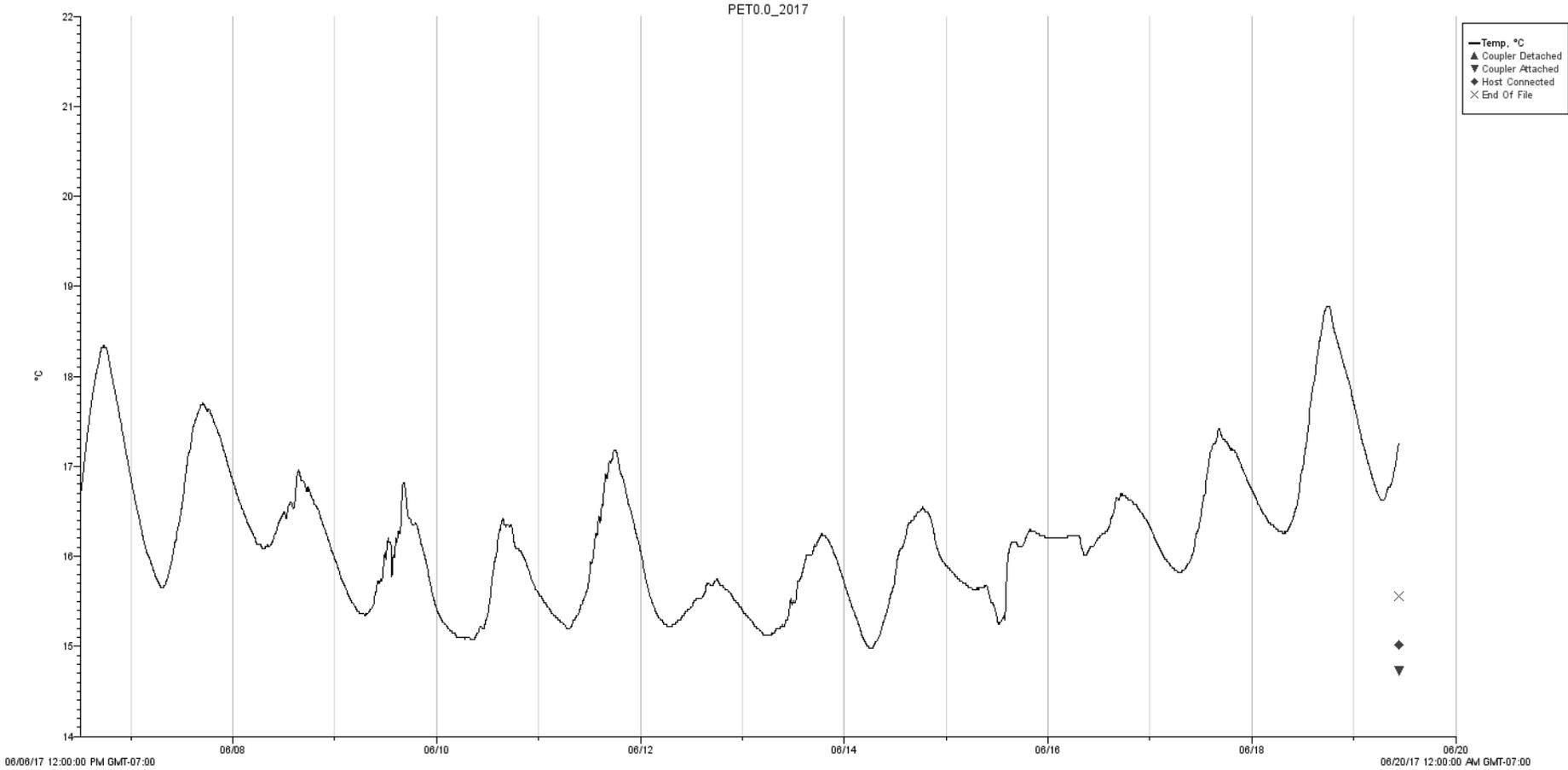
Continuous Temperature Plots



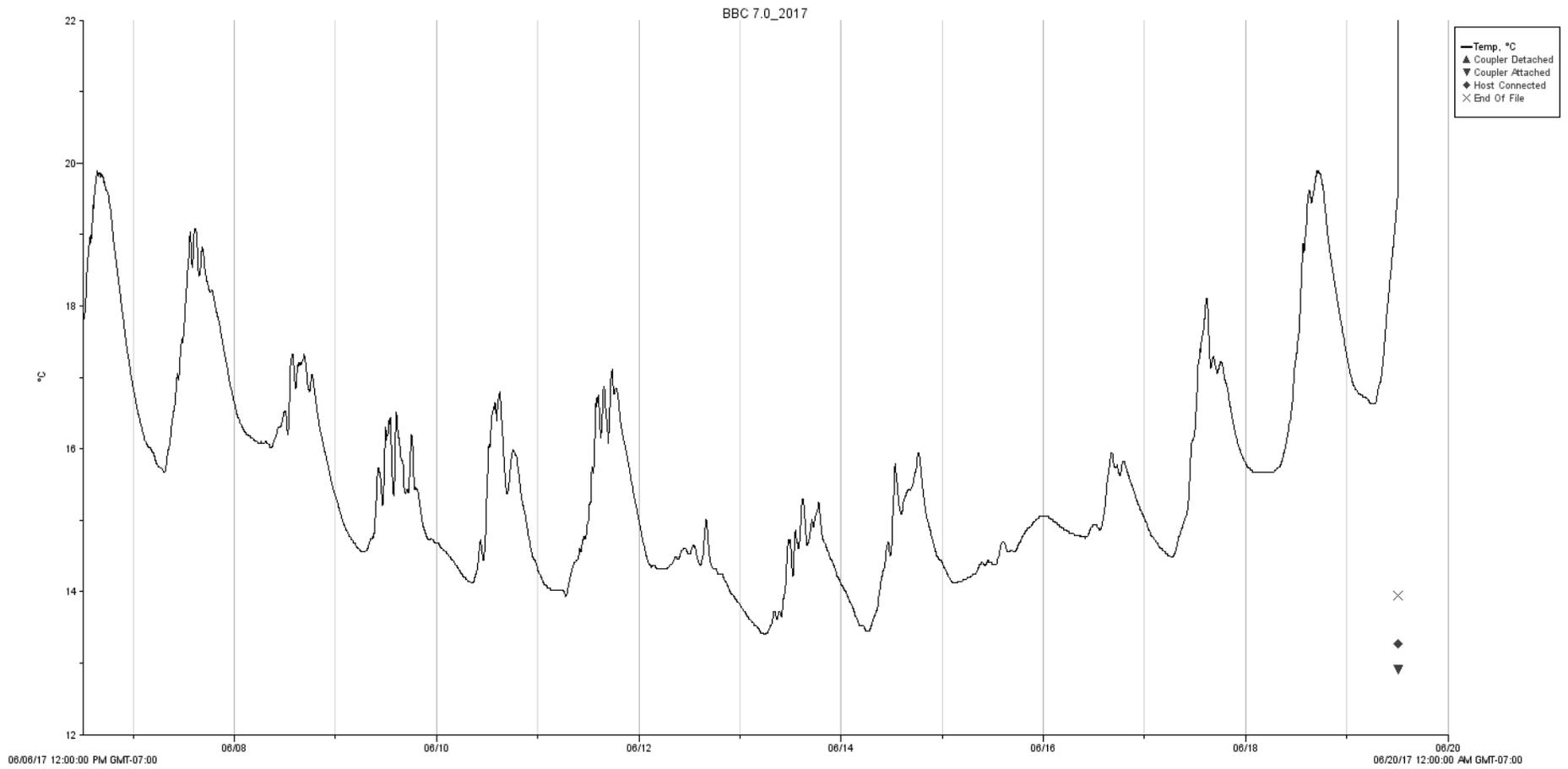
Continuous Temperature Plots



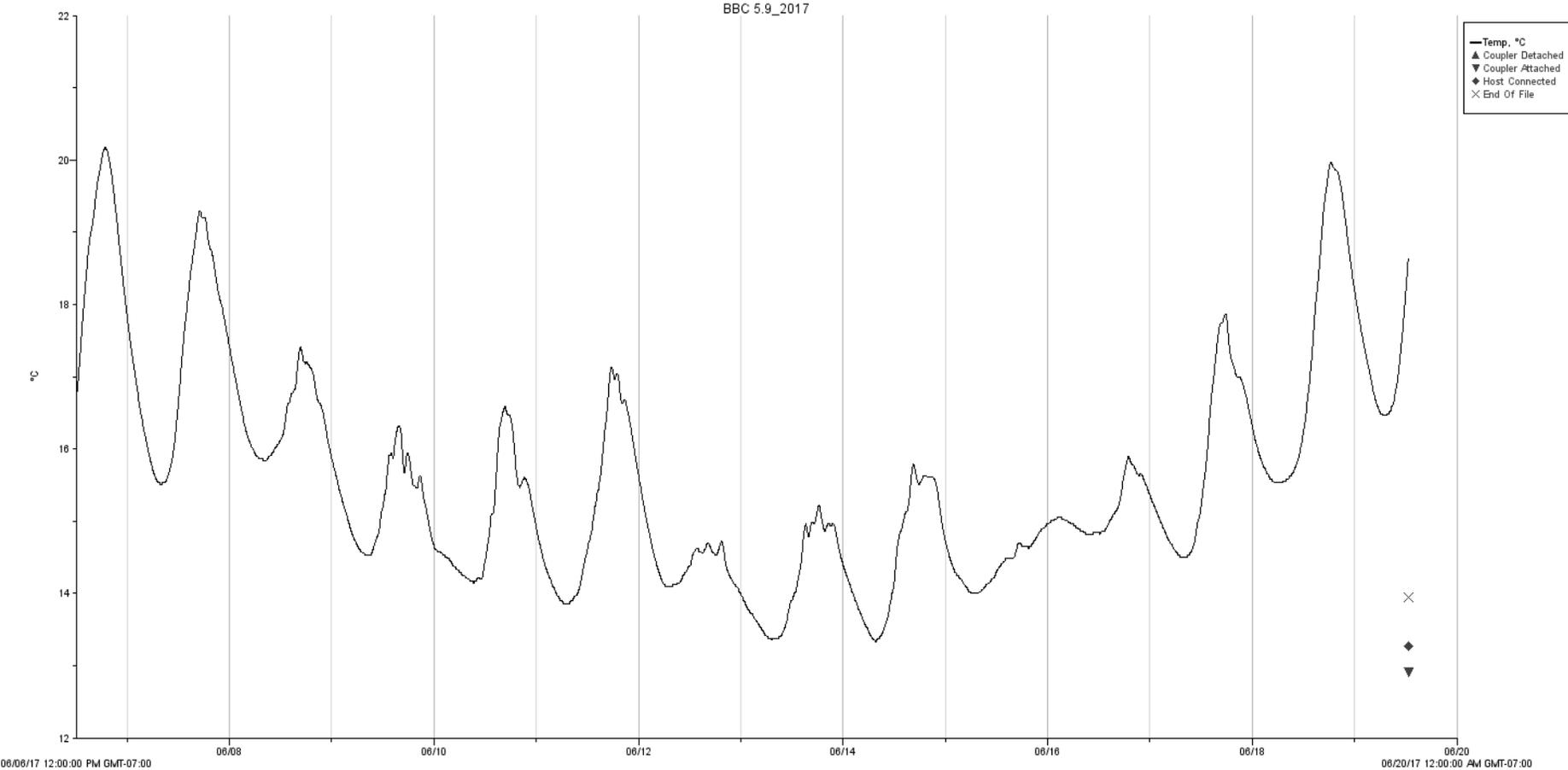
Continuous Temperature Plots



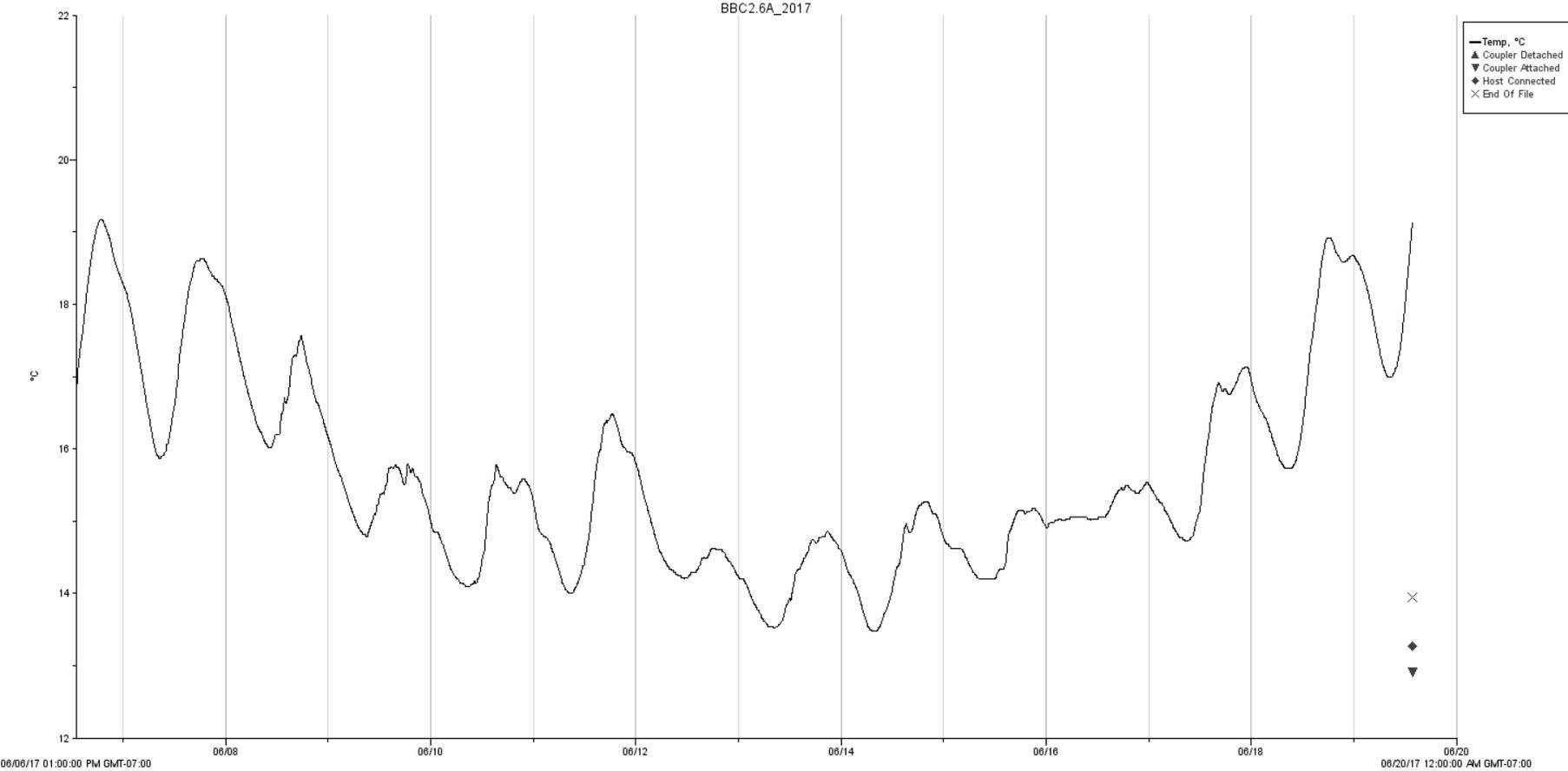
Continuous Temperature Plots



Continuous Temperature Plots



Continuous Temperature Plots



TECHNICAL MEMORANDUM

Date: August 10, 2017
To: Dorie Sutton, City of Vancouver
Copy to: Rob Zisette, Herrera Environmental Consultants
From: Jess Brown, Herrera Environmental Consultants
Subject: Burnt Bridge Creek 2017 Water Quality Sampling Interim Memorandum #2

INTRODUCTION

This interim update provides a summary of the field and laboratory procedures and results associated with monitoring activities conducted on July 11, 2017, for the Burnt Bridge Creek 2017 Trend Analysis Project. Monitoring and laboratory analysis were conducted in accordance with the project *Quality Assurance Project Plan* (QAPP; Herrera 2014) and modifications for 2015, 2016, and 2017 (Herrera 2015, 2016, 2017). A quality assurance review of the data collected was conducted and is summarized below. The laboratory data reports, monitoring forms containing field data, data quality review worksheet, and continuous temperature data are attached.

FIELD ACTIVITIES

Herrera conducted field measurements and water quality sampling at 11 monitoring sites on July 11, 2017, for Event 2 of the Burnt Bridge Creek 2017 Water Quality Monitoring Project. The field sampling team consisted of Jess Brown (Herrera) and Dorie Sutton (City of Vancouver). Samples and *in situ* water quality measurements were collected from each of the 11 sites without incident and according to QAPP procedures.

A YSI ProDSS multimeter was used to collect *in situ* data. The primary backup temperature probe was installed at the BBC2.6 site to replace a secondary backup temperature probe that was installed at a separate location during Event 1 when the primary backup temperature probe could not be located. The missing primary backup probe (BBC2.6B) was recovered from a citizen between Events 1 and 2, and reinstalled during Event 2. Data were downloaded from temperature probes located at each of the eight temperature monitoring sites. The temperature data were checked for completeness and proper function. Anomalously high values recorded on sampling dates when loggers were out of the water to download data were deleted from the records.



DATA QUALITY SUMMARY

In general, procedures described and quality control criteria defined in the QAPP were met, resulting in no data qualification or corrective action with the following exceptions:

- One fecal coliform result (sample PET0.0) qualified as estimated (J) based on the field duplicate RPD (101 percent versus the objective of ≤ 35 percent).
- One fecal coliform result (sample BBC10.4) qualified as estimated (J) based on the laboratory duplicate RPD (39 percent versus the objective of ≤ 35 percent).
- Seven fecal coliform results qualified as estimated (J) based on colony counts falling outside of ideal range of 20 to 60.

Fecal coliform results were calculated using colony count data by the data reviewer according to QAPP procedures (Herrera 2014). Fecal coliform results reported by the laboratory and validated by the reviewer are shown in Table 1 along with data qualifiers.

Sample ID	Date Sampled	Laboratory Result (CFU/100 mL)	Validated Result (CFU/100 mL)	Qualifier
BBC1.6	7/11/17	135	135	
COL0.0	7/11/17	100	100	
BBC2.6	7/11/17	165	165	
BBC5.2	7/11/17	59	59	J
BBC5.9	7/11/17	135	135	
BBC7.0	7/11/17	45	45	J
BBC8.4	7/11/17	27	27	J
BUR0.0	7/11/17	140	140	
PET0.0	7/11/17	55	55	J
BBC8.8	7/11/17	18	18	J
BBC10.4	7/11/17	55	55	J
DUPE ^a	7/11/17	18	18	J

^a Field duplicate of PET0.0

REFERENCES

Herrera. 2014. Burnt Bridge Creek Ambient Water Quality Monitoring Project – Quality Assurance Project Plan: 2014 Ambient Monitoring. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. July 3.

Herrera 2015. Burnt Bridge Creek 2015 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. June 15.

Herrera 2016. Burnt Bridge Creek 2016 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. May 25.

Herrera 2017. Burnt Bridge Creek 2017 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. May 17.

ATTACHMENTS



IEH ANALYTICAL LABORATORIES
LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	HER080-42	PAGE 1
REPORT DATE:	07/26/17	
DATE SAMPLED:	07/11/17	DATE RECEIVED: 07/12/17
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM HERRERA ENVIRONMENTAL		

CASE NARRATIVE

Twelve water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-N (mg/L)	TOTAL-P (mg/L)	SRP (mg/L)	N03+N02 (mg/L)	TSS (mg/L)	TURBIDITY (NTU)
BBC10.4-20170711	3.08	0.068	0.040	2.54	4.2	2.3
BBC8.8-20170711	2.96	0.066	0.042	2.34	4.5	2.0
PET0.0-20170711	1.88	0.138	0.104	1.66	3.6	1.6
BBC8.4-20170711	2.56	0.094	0.063	1.99	4.4	2.2
BUR0.0-20170711	2.91	0.068	0.050	2.46	1.4	1.2
BBC7.0-20170711	2.27	0.115	0.066	1.74	24	5.2
BBC5.9-20170711	2.08	0.104	0.069	1.76	0.75	3.5
BBC5.2-20170711	2.22	0.102	0.067	1.89	7.3	3.3
BBC2.6-20170711	2.15	0.109	0.073	1.86	8.3	3.9
COL0.0-20170711	1.73	0.090	0.058	1.53	4.8	3.3
BBC1.6-20170711	2.17	0.109	0.072	1.77	6.8	3.5
DUPE-20170711	1.88	0.135	0.107	1.66	3.2	1.5



IEH ANALYTICAL LABORATORIES
LABORATORY & CONSULTING SERVICES
 3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
 PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	HER080-42	PAGE 2
REPORT DATE:	07/26/17	
DATE SAMPLED:	07/11/17	DATE RECEIVED: 07/12/17
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM HERRERA ENVIRONMENTAL		

QA/QC DATA WATER

QC PARAMETER	TOTAL-N (mg/l)	TOTAL-P (mg/L)	SRP (mg/L)	N03+N02 (mg/L)	TSS (mg/L)	TURBIDITY (NTU)
METHOD	SM20 4500NC	EPA 365.1	EPA 365.1	SM18 4500N03F	SM18 2540D	EPA 180.1
DATE ANALYZED	07/25/17	07/20/17	07/12/17	07/13/17	07/13/17	07/13/17
DETECTION LIMIT	0.050	0.002	0.001	0.010	0.50	0.10
DUPLICATE						
SAMPLE ID	DUPE-20170711	DUPE-20170711	DUPE-20170711	BATCH	BATCH	BBC10.4-20170711
ORIGINAL	1.88	0.135	0.107	0.208	21	2.3
DUPLICATE	1.96	0.135	0.107	0.210	22	2.1
RPD	4.36%	0.19%	0.30%	1.29%	4.65%	9.09%
SPIKE SAMPLE						
SAMPLE ID	DUPE-20170711	DUPE-20170711	DUPE-20170711	BATCH		
ORIGINAL	1.88	0.135	0.107	0.208		
SPIKED SAMPLE	2.44	0.187	0.127	0.402		
SPIKE ADDED	0.500	0.050	0.020	0.200		
% RECOVERY	113.25%	103.29%	96.63%	96.97%	NA	NA
QC CHECK						
FOUND	0.506	0.092	0.041	0.413	10	8.1
TRUE	0.490	0.094	0.039	0.408	10	8.0
% RECOVERY	103.27%	97.87%	105.13%	101.23%	100.00%	101.25%
BLANK						
	<0.050	<0.002	<0.001	<0.010	<0.50	NA

RPD = RELATIVE PERCENT DIFFERENCE.
 NA = NOT APPLICABLE OR NOT AVAILABLE.
 NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
 OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
 Project Manager



CHAIN-OF-CUSTODY RECORD

CLIENT: Herrera
 SAMPLING DATE: 7-11-17
 SAMPLERS: J. Brown, D. Sutton

SHEET 1 OF 1
 PROJECT ID: 14-05818-003
 CASE FILE NO.: _____
 DATA RECORDED BY: _____

SAMPLE INFORMATION

PARAMETERS

SAMPLE ID	DATE/TIME COLLECTED	PARAMETERS													BOTT #	NOTES		
		Turbidity	TSS	NO ₂ +NO ₃	TN	Ortho P	TP											
BBC10.4-20170711	7/11/17 8:40	x	x	x	x	x	x											2
BBC8.8-20170711	7/11/17 9:10	x	x	x	x	x	x											2
PET0.0-20170711	7/11/17 9:20	x	x	x	x	x	x											2
BBC8.4-20170711	7/11/17 9:55	x	x	x	x	x	x											2
BUR0.0-20170711	7/11/17 9:40	x	x	x	x	x	x											2
BBC7.0-20170711	7/11/17 10:20	x	x	x	x	x	x											2
BBC5.9-20170711	7/11/17 10:40	x	x	x	x	x	x											2
BBC5.2-20170711	7/11/17 10:45	x	x	x	x	x	x											2
BBC2.6-20170711	7/11/17 11:10	x	x	x	x	x	x											2
COL0.0-20170711	7/11/17 11:30	x	x	x	x	x	x											2
BBC1.6-20170711	7/11/17 11:45	x	x	x	x	x	x											2
DUPE-20170711	7/11/17	x	x	x	x	x	x											2

Printed Name	Relinquished By	Date/Time	Received By	Date/Time
	Jess Brown	7-11-17		
Signature	<i>[Signature]</i>	13:45		
Affiliation	Herrera			

Printed Name	Relinquished By	Date/Time	Received By	Date/Time
			<i>[Signature]</i>	07/12/17 1000
Signature			(12) samples (24) bottles	6.4°C
Affiliation				

Miscellaneous Notes (Hazardous Materials, Quick turn-around time, etc.): _____

PIXIS Labs

Accurate. Reliable. On Time.

Pixis Labs

12423 NE Whitaker Way

Portland, OR 97230

503-254-1794

Job Number: 7071118
Report Date: 07/17/2017
ORELAP #: OR100028
Project Name: 14-05818-003
Project No: Burnt Bridge Creek Monitoring 2017

Cover Letter

Jess Brown
Herrera Environmental Consultants, Inc.
24 NW 2nd Ave., Suite 204
PORTLAND, OR 97209

Dear Jess Brown,

Enclosed please find Pixis Labs analytical report for samples received as order number 7071118 on 07/11/2017. Should you have any questions about this report or any other matter, please do not hesitate to contact us. We are here to help you.

Test results relate only to the parameters tested and to the samples as received by the laboratory. Test results meet all requirements of NELAP and the Pixis quality assurance plan unless otherwise noted. This report shall not be reproduced, except in full, without the written consent of this laboratory. Samples will be kept a maximum of 15 days from the report date unless prior arrangements have been made.

Thank you for allowing Pixis to be of service to you, we appreciate your business.

Sincerely,

Signed
Mark Leed
Client Services

Sample Results

Sample: BBC10.4-20170711							Collected: 07/11/17 08:40	Temp: 2 C	Matrix: General Water
Lab ID: 137402							Received: 07/11/17 13:18	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	55.0	/100 mL	20.0	20	32128-4	07/11/17 17:30	07/12/17 17:30		
Sample: BBC8.8-20170711							Collected: 07/11/17 09:10	Temp: 2 C	Matrix: General Water
Lab ID: 137403							Received: 07/11/17 13:18	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	18.0	/100 mL	20.0	20	32128-5	07/11/17 17:30	07/12/17 17:30		
Sample: PET0.0-20170711							Collected: 07/11/17 09:20	Temp: 2 C	Matrix: General Water
Lab ID: 137404							Received: 07/11/17 13:18	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	55.0	/100 mL	20.0	20	32128-6	07/11/17 17:30	07/12/17 17:30		
Sample: BBC8.4-20170711							Collected: 07/11/17 09:55	Temp: 2 C	Matrix: General Water
Lab ID: 137405							Received: 07/11/17 13:18	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	27.0	/100 mL	20.0	20	32128-7	07/11/17 17:30	07/12/17 17:30		
Sample: BUR0.0-20170711							Collected: 07/11/17 09:40	Temp: 2 C	Matrix: General Water
Lab ID: 137406							Received: 07/11/17 13:18	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	140	/100 mL	20.0	20	32128-8	07/11/17 17:30	07/12/17 17:30		
Sample: BBC7.0-20170711							Collected: 07/11/17 10:20	Temp: 2 C	Matrix: General Water
Lab ID: 137407							Received: 07/11/17 13:18	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	45.0	/100 mL	20.0	20	32128-9	07/11/17 17:30	07/12/17 17:30		

Sample: BBC5.9-20170711		Collected: 07/11/17 10:40		Temp: 2 C		Matrix: General Water		
Lab ID: 137408		Received: 07/11/17 13:18		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	135	/100 mL	20.0	20	32128-10	07/11/17 17:30	07/12/17 17:30	

Sample: BBC5.2-20170711		Collected: 07/11/17 10:45		Temp: 2 C		Matrix: General Water		
Lab ID: 137409		Received: 07/11/17 13:18		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	59.0	/100 mL	20.0	20	32128-11	07/11/17 17:30	07/12/17 17:30	

Sample: BBC2.6-20170711		Collected: 07/11/17 11:10		Temp: 2 C		Matrix: General Water		
Lab ID: 137410		Received: 07/11/17 13:18		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	165	/100 mL	20.0	20	32128-12	07/11/17 17:30	07/12/17 17:30	

Sample: COL0.0-20170711		Collected: 07/11/17 11:30		Temp: 2 C		Matrix: General Water		
Lab ID: 137411		Received: 07/11/17 13:18		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	100	/100 mL	20.0	20	32128-13	07/11/17 17:30	07/12/17 17:30	

Sample: BBC1.6-20170711		Collected: 07/11/17 11:45		Temp: 2 C		Matrix: General Water		
Lab ID: 137412		Received: 07/11/17 13:18		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	135	/100 mL	20.0	20	32128-14	07/11/17 17:30	07/12/17 17:30	

Sample: DUPE-20170711		Collected: 07/11/17		Temp: 2 C		Matrix: General Water		
Lab ID: 137413		Received: 07/11/17 13:18		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	18.0	/100 mL	20.0	20	32128-15	07/11/17 17:30	07/12/17 17:30	

Laboratory Quality Control Results

SM 9222-D

QC - FC NEGATIVE -							Batch ID: 32128-1			
Analyte	Result		Spike	Units	Recovery	Limits	RPD	Limit	Notes	
Fecal Coliform	<1	Absent		/100 mL	0 %	-	---	---		
QC - FC POSITIVE -							Batch ID: 32128-2			
Analyte	Result		Spike	Units	Recovery	Limits	RPD	Limit	Notes	
Fecal Coliform	TNTC	Present		/100 mL	0 %	-	---	---		

Abbreviations

MRL Method Reporting Limit
ND None Detected at or above the MRL
RPD Relative Percent Difference

Units of Measure:

/100 mL Per 100 mL



2200 Sixth Avenue | Suite 1100
Seattle, Washington | 98121
p 206 441 9080 | f 206 441 9108

HERRERAENV 7071118



Herrera Environmental Consultants, Inc.

Chain of Custody Record

Project Name: Burnt Bridge Creek Monitoring 2017		Project Number: 14-05818-003		Client: City of Vancouver			Number of Containers	Analyses Requested										Lab ID No.				
Report To: Jess Brown, jbrown@herrerainc.com				Copy To: RGleason@herrerainc.com				Fecal Coliform- SM 9222D														
Sampled By: Jess Brown				Delivery Method:																		
Laboratory: PIXIS Labs		Requested Completion Date:		Total No. of Containers: 12																		
Lab Use:				Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)																
Sample ID	Date	Time																				
BBC10.4-20170711	7/11/17	8:40	HMOLO	G	Y	SW	1															
BBC8.8-20170711	7/11/17	9:10	↓	G	Y	SW	1															
PET0.0-20170711	7/11/17	9:20		G	Y	SW	1															
BBC8.4-20170711	7/11/17	9:55		G	Y	SW	1															
BUR0.0-20170711	7/11/17	9:40		G	Y	SW	1															
BBC7.0-20170711	7/11/17	10:20		G	Y	SW	1															
BBC5.9-20170711	7/11/17	10:46		G	Y	SW	1															
BBC5.2-20170711	7/11/17	10:45		G	Y	SW	1															
BBC2.6-20170711	7/11/17	11:10		G	Y	SW	1															
COL0.0-20170711	7/11/17	11:30		G	Y	SW	1															
BBC1.6-20170711	7/11/17	11:45		G	Y	SW	1															
DUPE-20170711	7/11/17			G	Y	SW	1															

Comments/Special Instructions:
IMPORTANT: Please use two dilution volumes for the analysis: 2 mL and 20 mL. Include a laboratory duplicate. Please complete and return attached bench sheet.

Relinquished by (Name/CO) Jess Brown / Herrera	Signature 	Date/Time 7-11-17 13:18	Received By (Name/CO) Mark W Lead	Signature 	Date/Time 7/11/17 13:18
---------------------------------------------------	---------------	----------------------------	--------------------------------------	---------------	----------------------------

Sample Type: G=Grab C=Composite Matrix Codes: A=Air GW=Groundwater SE=Sediment SO=Soil SW=Surface Water W=Water (blanks) M=Material O=Other (specify)

2°C on ice

Fecal Analysis Bench Sheet

Sample ID	Volume (mL)	Colonies counted	Result* (CPN/100 mL)	Herrera Check
BBC10.4-20170711 (01)	2	0	55 ✓	55 J
	20	12		
BBC8.8-20170711 (02)	2	0	18 ✓	18 J
	20	4		
PET0.0-20170711 (03)	2	1	55 ✓	55 J
	20	11		
BBC8.4-20170711 (04)	2	0	27 ✓	27 J
	20	6		
BUR0.0-20170711 (05)	2	5	140 ✓	140
	20	28		
BBC7.0-20170711 (06)	2	1	45 ✓	45 J
	20	9		
BBC5.9-20170711 (07)	2	3	135 ✓	135
	20	27		
BBC5.2-20170711 (08)	2	3	59 ✓	59 J
	20	10		
BBC2.6-20170711 (09)	2	5	165 ✓	165
	20	33		
COL0.0-20170711 (10)	2	2	100 ✓	100
	20	20		
BBC1.6-20170711 (11)	2	2	135 ✓	135
	20	27		
DUPE-20170711 (12)	2	1	18 ✓	18 J
	20	3		
Lab Duplicate-BBC10.4-20170711	2	2	82 ✓	82 J
	20	16		
Negative Control	100	0	<1	OK
Positive Control	100	TNTC	TNTC	OK

***Calculation of Results**

Density: use if only one count is within ideal range (20-60 colonies)

$$\frac{\text{Colonies}}{100\text{mL}} = \frac{\text{Colonies counted}}{\text{mL Sample Filtered}} \times 100$$

Average Density: use if all counts are outside of ideal range (20-60 colonies) excluding counts greater than 200 or if more than one count is within ideal range

$$\frac{\text{Colonies}}{100\text{mL}} = \frac{\sum \text{Colonies counted}}{\sum \text{mL sample filtered}} \times 100$$

If all >200 colonies calculate density of value closest to 200 and add greater than to result (e.g. >1000)

Reviewed 7/18/17
by Jess Brown





Data Quality Assurance Worksheet

Project Name/No./Client: Burnt Bridge Creek / 14-05818-000 / City of Vancouver, Washington

Laboratory/Parameters: IEH-Aquatic Research / nitrogen, phosphorus, SRP, nitrate-nitrite, TSS, turbidity
PIXIS Labs/ Fecal Coliform

Sample Date/Sample ID: 7/11/17 / Event 2 (11 stations plus field duplicate of PET0.0)

By J. Brown, updated 12/27/17

Date: 8/9/17 Page 1 of 1

Checked: initials RZ

date 8/10/17

Parameter	Completeness/ Methodology	Holding Times (days)		Blanks/ Reporting Limit	Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Field Duplicates RPD (%)		Instrument Calibration/ Performance	ACTION
		Reported	Goal		Reported	Goal	Reported	Goal	Reported	Goal ¹	Reported	Goal ¹		
Total Nitrogen	OK / SM4500N-C	14	<28	<0.050 / 0.050 mg/L	113	90-110	103	90-110	4	<20	0	<20	OK	Slight MS exceedance, no flag. Other QA ok.
Total Phosphorus	OK / EPA 365.1	9	<28	<0.002 / 0.002 mg/L	103	90-110	98	90-110	<1	<20	2	<20	OK	None
SRP	OK / EPA 365.1	1 day	<48 hours ²	<0.001 / 0.001 mg/L	97	90-110	105	90-110	<1	<20	3	<20	OK	None
Nitrate + Nitrite	OK / EPA 353.2	2	<28	<0.010 / 0.010 mg/L	97	90-110	101	90-110	1	<20	0	<20	OK	None
TSS	OK / EPA 160.2	2	<7	<0.5 / 0.5 mg/L	NA	NA	100	90-110	5	<20	12	<20	OK	None
Turbidity	OK / SM2130-B	<48 hours	<48	<0.1 / 0.1 NTU	NA	NA	101	90-110	9	<20	6	<20	OK	None
Fecal coliform	OK / SM9222-D	6-9 hours	<24	<5 / 5 CFU/ 100mL	NA	NA	NA	NA	39	<35	101	<35	OK	See NOTE A for flags

¹ If the sample or duplicate value is less than five times the reporting limit, then the difference (D) is calculated rather than the RPD and the QA objective is that the difference shall not exceed 2 times the reporting limit instead of the number indicated in the objective column.

² Less than 24 hours from collection to filtration.



Data Quality Assurance Worksheet

Project Name/No./Client: Burnt Bridge Creek / 14-05818-000 / City of Vancouver, Washington

Laboratory/Parameters: IEH-Aquatic Research / nitrogen, phosphorus, SRP, nitrate-nitrite, TSS, turbidity
PIXIS Labs/ Fecal Coliform

Sample Date/Sample ID: 7/11/17 / Event 2 (11 stations plus field duplicate of PET0.0)

By J. Brown, updated 12/27/17

Date: 8/9/17 Page 1 of 1

Checked: initials RZ

date 8/10/17

Parameter	Completeness/ Methodology	Holding Times (days)		Blanks/ Reporting Limit	Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Field Duplicates RPD (%)		Instrument Calibration/ Performance	ACTION
		Reported	Goal		Reported	Goal	Reported	Goal	Reported	Goal ¹	Reported	Goal ¹		
Temperature	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	<20	OK	None
Dissolved Oxygen	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.1	<20	Post event check 7% greater than standard	Instrument calibration check slightly exceeded criteria of <5%. No flag, minor exceedance.
pH	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	<20	OK	None
Conductivity	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	<20	OK	None

NOTE A: Flag fecal coliform results for BBC10.4 and PET0.0 for lab and field duplicate RPD exceedance, respectively. Flag fecal coliform results estimated (J) for BBC10.4, BBC8.8, PET0.0, BBC8.4, BBC7.0, BBC5.2 and DUPE due to colony counts of range (<20).

NA – not applicable or not available
 RPD- relative percent difference

NC – not calculable due to one or more values below the detection limit
 SRP –soluble reactive phosphorus

NS – field duplicate not sampled
 TSS – total suspended solids

¹ If the sample or duplicate value is less than five times the reporting limit, then the difference (D) is calculated rather than the RPD and the QA objective is that the difference shall not exceed 2 times the reporting limit instead of the number indicated in the objective column.

² Less than 24 hours from collection to filtration.



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J. Brown D. Sutton

SITE ID: BBC 10.4 DATE: 7/11/17 TIME: 8:40

WEATHER: SUNNY + CLEAR

NOTES: _____

YSI 556 METER MEASUREMENTS	DUPLICATE?	YES:	NO:
TEMPERATURE: <u>13.9°</u>			<input checked="" type="checkbox"/>
DISSOLVED OXYGEN: <u>72.6% 7.48</u>			
PH: <u>6.46^{DS} 6.56 STABLE</u>			
CONDUCTIVITY: <u>174.5</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 10.4-20170711</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J. Brown D. Sutton

SITE ID: BBC 8.8 DATE: 7/11/17 TIME: 9:10

WEATHER: _____

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: _____
TEMPERATURE:	<u>15.5°</u>			
DISSOLVED OXYGEN:	<u>101.3%</u> <u>10.10</u>			
pH:	<u>7.58</u>			
CONDUCTIVITY:	<u>174</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 8.8 - 20170711</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J BROWN D SUTTON

SITE ID: PET 0.0 DATE: 7/11/17 TIME: 9:20

WEATHER: _____

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: _____
TEMPERATURE:	<u>16.0°</u>			
DISSOLVED OXYGEN:	<u>97.4% 9.60</u>			
PH:	<u>7.58</u>			
CONDUCTIVITY:	<u>237.0</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>PET0.0 - 20170711</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>DUPE - 2017711</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J. BROWN D. SUTTON

SITE ID: BUR 0.0 DATE: 7/11/17 TIME: 9:40

WEATHER: _____

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: _____
TEMPERATURE:	<u>13.7°</u>			
DISSOLVED OXYGEN:	<u>99.0% 10.26</u>			
pH:	<u>7.50</u>			
CONDUCTIVITY:	<u>181.6</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BUR 0.0 - 20170711</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J. Brown A. Sutton

SITE ID: BBC 8.4 DATE: 7/11/17 TIME: 9:55
~~9:58~~

WEATHER: _____

NOTES: _____

YSI 556 METER MEASUREMENTS	DUPLICATE?	YES: _____	NO: _____
TEMPERATURE: <u>16.0°</u>			
DISSOLVED OXYGEN: <u>100.7%</u> <u>9.95</u>			
pH: <u>7.64</u>			
CONDUCTIVITY: <u>195.7</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 8.4- 20170711</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J. Brown A. Sutton

SITE ID: BBC 7.0 DATE: 7/11/17 TIME: 10:20

WEATHER: _____

NOTES: _____

YSI 556 METER MEASUREMENTS	DUPLICATE? YES: _____ NO: _____
TEMPERATURE: <u>17.0°</u>	
DISSOLVED OXYGEN: <u>102.4 9.8.9</u>	
pH: <u>7.75</u>	
CONDUCTIVITY: <u>195.3</u>	

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 7.0-20170711</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J. BROWN & SUTTON

SITE ID: BBC 5.9 DATE: 7/11/17 TIME: 10:40

WEATHER: _____

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE? YES: <input checked="" type="checkbox"/> NO: <input type="checkbox"/>	
TEMPERATURE:	<u>15.7°</u>	<u>15.7°</u>	
DISSOLVED OXYGEN:	<u>88.9% 8.83</u>	<u>89.0% 8.82</u>	
pH:	<u>7.57</u>	<u>7.50</u>	
CONDUCTIVITY:	<u>195.9</u>	<u>195.9</u>	

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		<u>BBC 5.9-20170711</u>
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		

DUPLICATE COLLECTED? YES: NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J Brown & Sutton

SITE ID: BBC 5.2 DATE: 7/11/17 TIME: 10:45

WEATHER: _____

NOTES: _____

YSI 556 METER MEASUREMENTS	DUPLICATE? YES: _____ NO: _____
TEMPERATURE: <u>16.0</u>	
DISSOLVED OXYGEN: <u>10.3, 10.2</u>	
PH: <u>7.92</u>	
CONDUCTIVITY: <u>196.0</u>	

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 5.2 - 20170711</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J. BROWN D. SUTTON

SITE ID: BBC 2.6 DATE: 7/11/17 TIME: 11:10

WEATHER: _____

NOTES: REPLACED BACKUP TEMP PROBE WITH BBC 2.6 B

YSI 556 METER MEASUREMENTS	DUPLICATE?	YES:	NO:
TEMPERATURE: <u>16.4°</u>			
DISSOLVED OXYGEN: <u>107.7 %</u> <u>10.53</u>			
PH: <u>8.11</u>			
CONDUCTIVITY: <u>199.0</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		<u>BBC 2.6 - 20170711</u>
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J BROWN A SUTTON

SITE ID: COL 0.0 DATE: 7/11/17 TIME: 11:30

WEATHER: _____

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: _____
TEMPERATURE:	<u>13.9°</u>			
DISSOLVED OXYGEN:	<u>108.2% 11.18</u>			
pH:	<u>8.23</u>			
CONDUCTIVITY:	<u>238.0</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>COL 0.0 - 20170711</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: J BROWN & SUTTON

SITE ID: BBC 1.6 DATE: 7/11/17 TIME: 11:45

WEATHER: _____

NOTES: _____

YSI 556 METER MEASUREMENTS	DUPLICATE? YES: _____ NO: _____
TEMPERATURE: <u>16.3 g</u>	
DISSOLVED OXYGEN: <u>10.3</u> <u>10.41</u>	
PH: <u>8.14</u>	
CONDUCTIVITY: <u>203.0</u>	

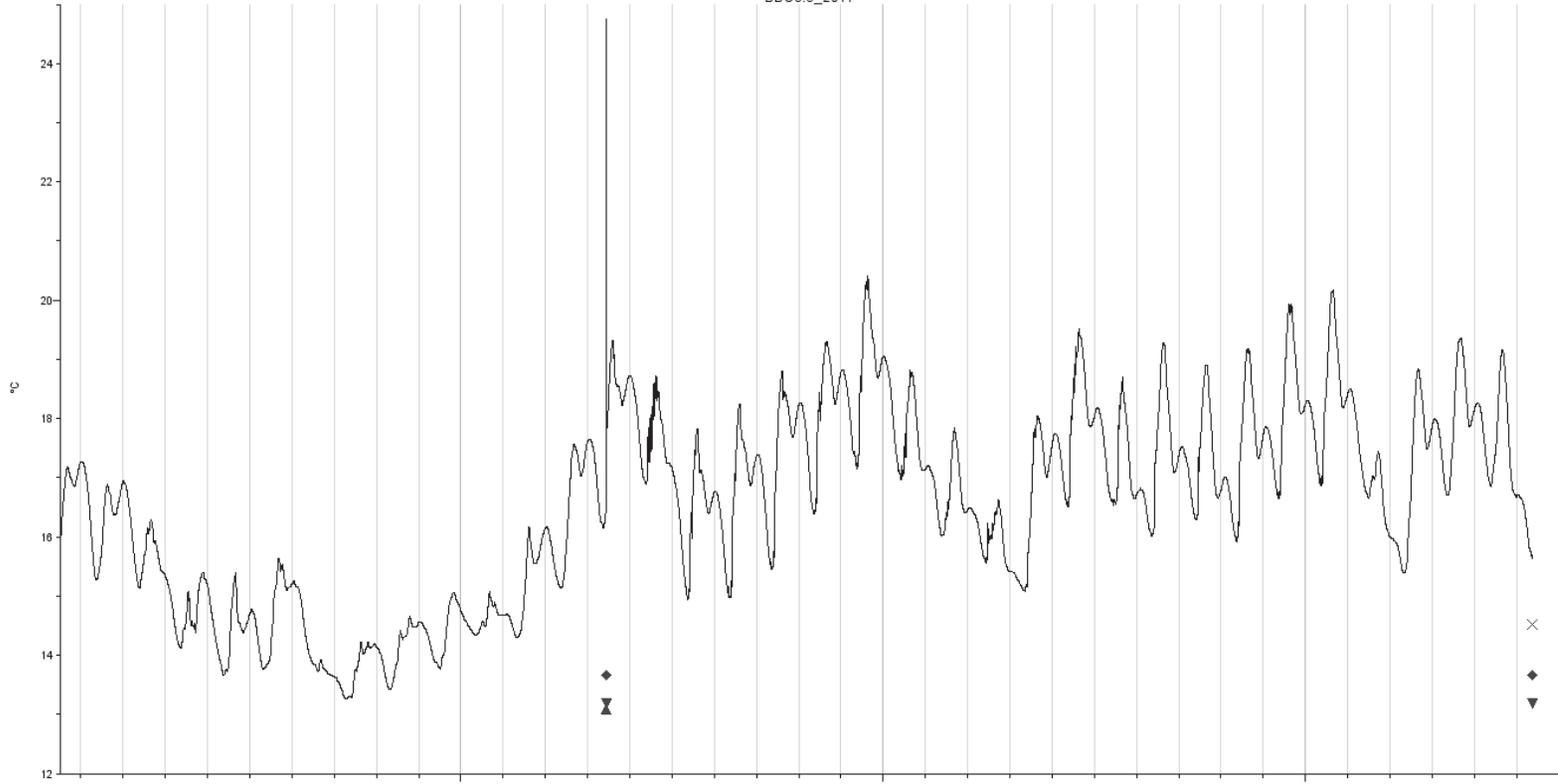
SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 1.6-20170711</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		

BBC8.8_2017

- Temp. °C
- ▲ Coupler Detached
- ▼ Coupler Attached
- ◆ Host Connected
- × End Of File



06/06/17 12:00:00 PM GMT-07:00

06/16/17

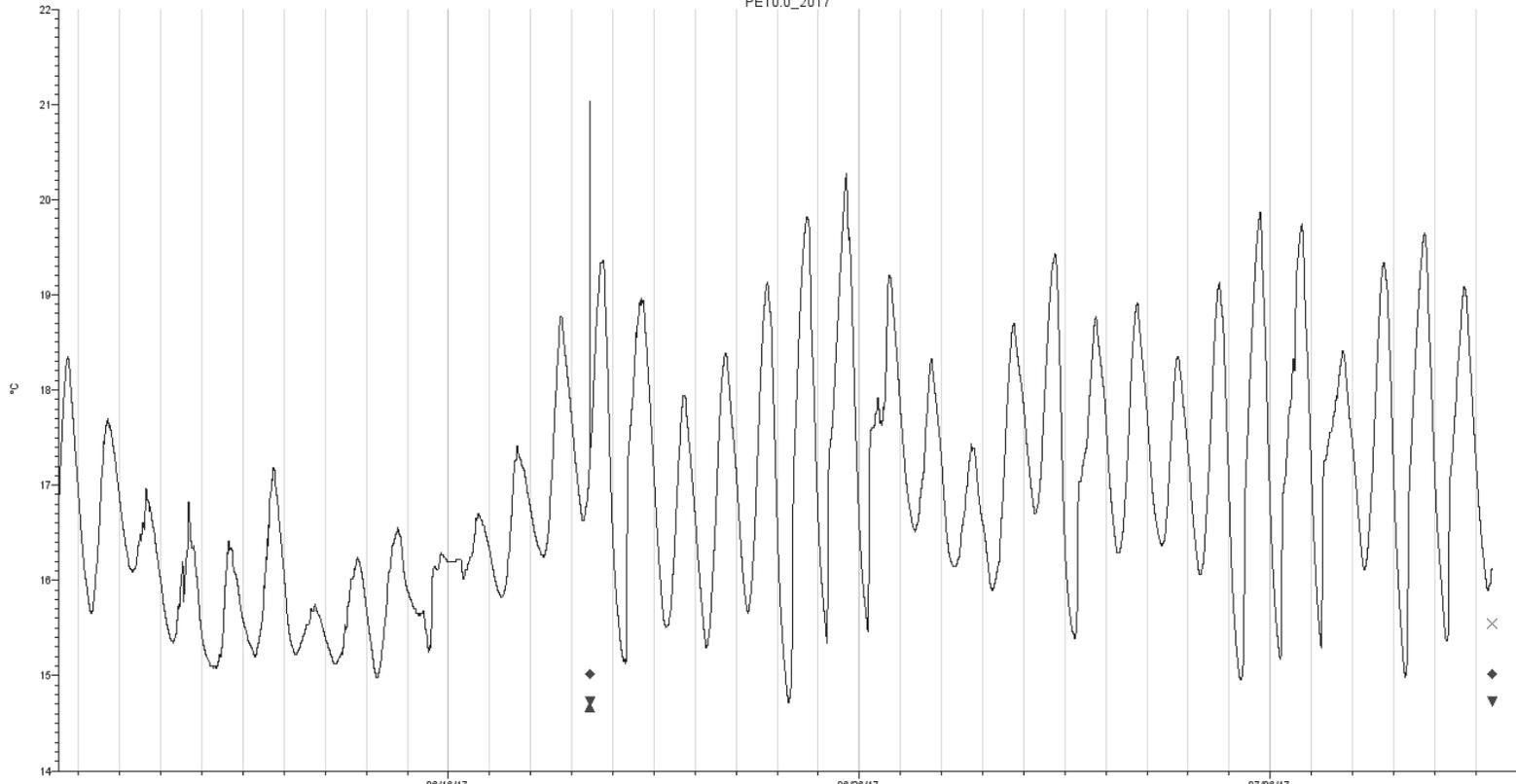
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07/06/17

07/12/17 12:00:00 AM GMT-07:00

PET0.0_2017

- Temp. °C
- ▲ Coupler Detached
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- ◆ Host Connected
- × End Of File



06/06/17 12:00:00 PM GMT-07:00

06/16/17

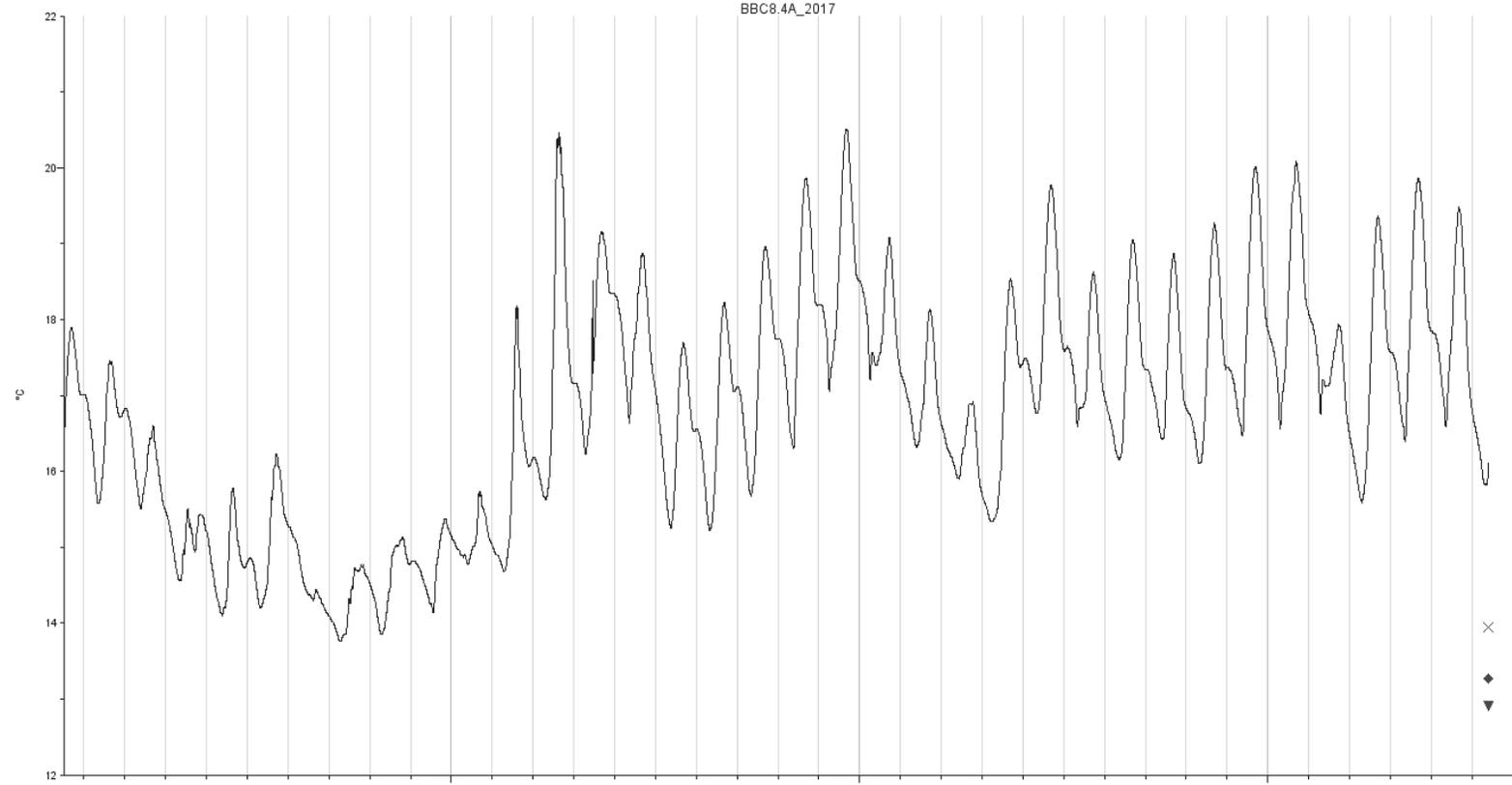
06/26/17

07/06/17

07/12/17 12:00:00 AM GMT-07:00

BBC8.4A_2017

- Temp. °C
- ▲ Coupler Detached
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- ◆ Host Connected
- × End Of File



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06/16/17

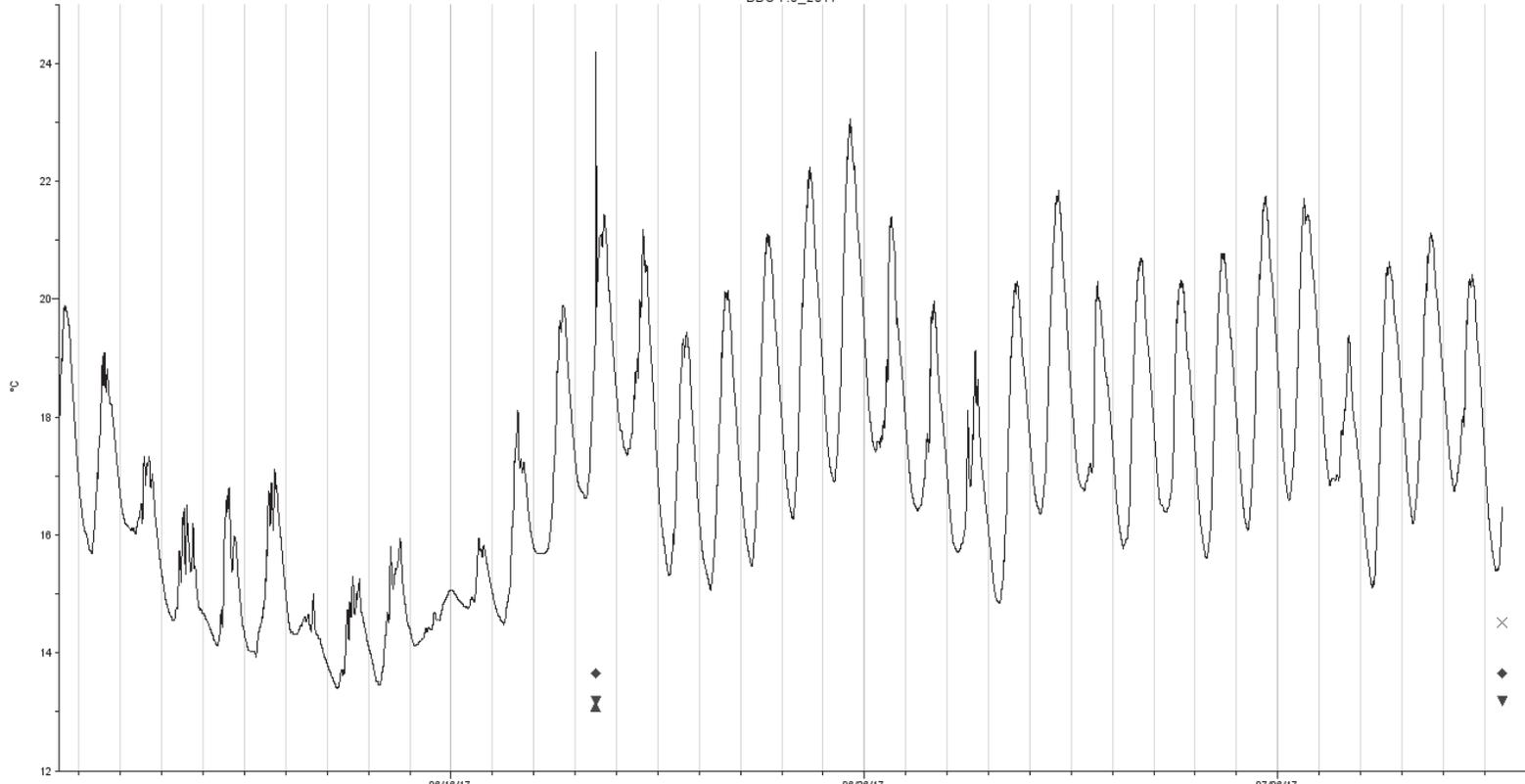
06/26/17

07/06/17

07/12/17 12:00:00 AM GMT-07:00

BBC 7.0_2017

- Temp. °C
- ▲ Coupler Detached
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- ◆ Host Connected
- × End Of File



06/06/17 12:00:00 PM GMT-07:00

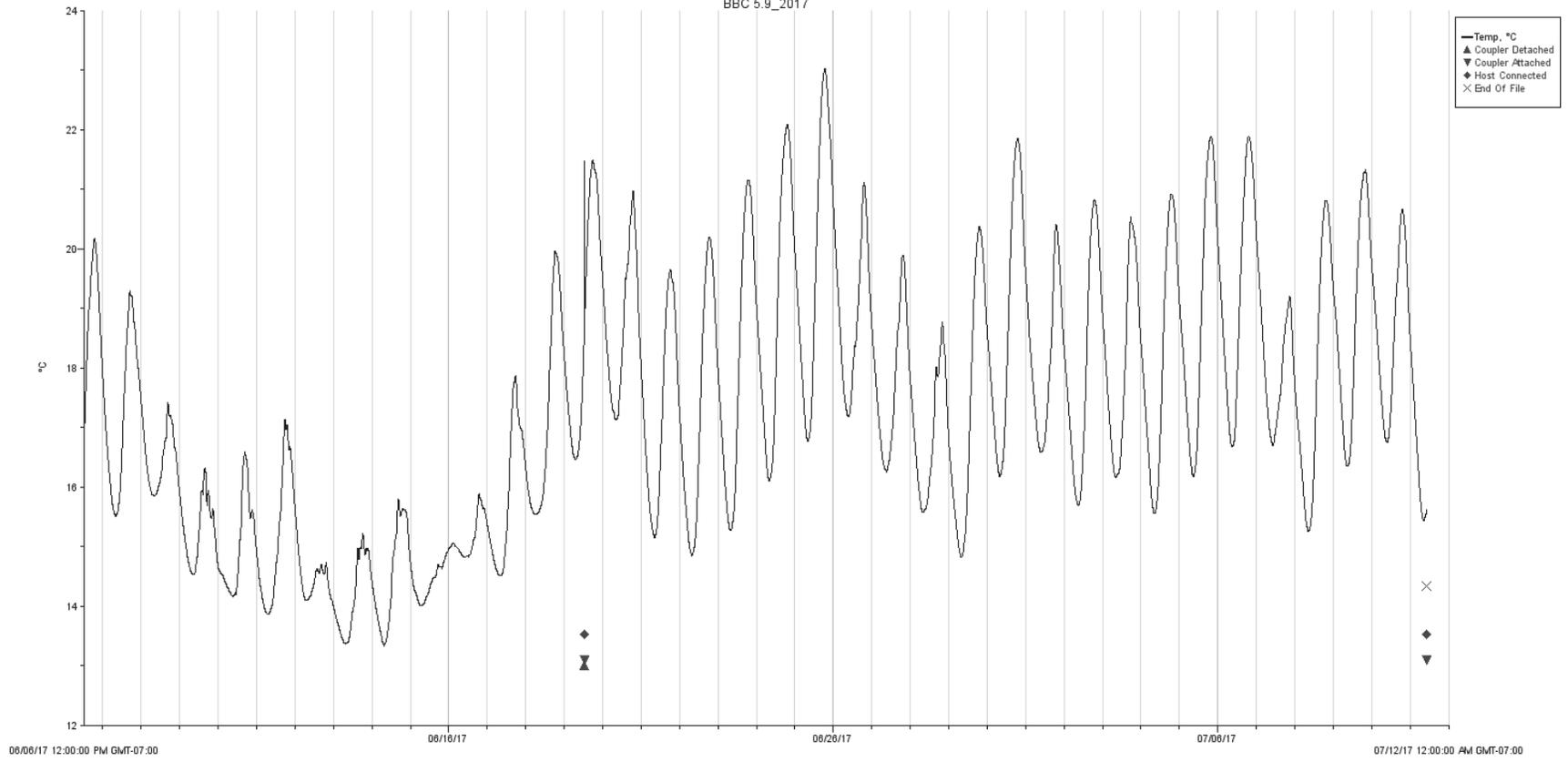
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06/26/17

07/06/17

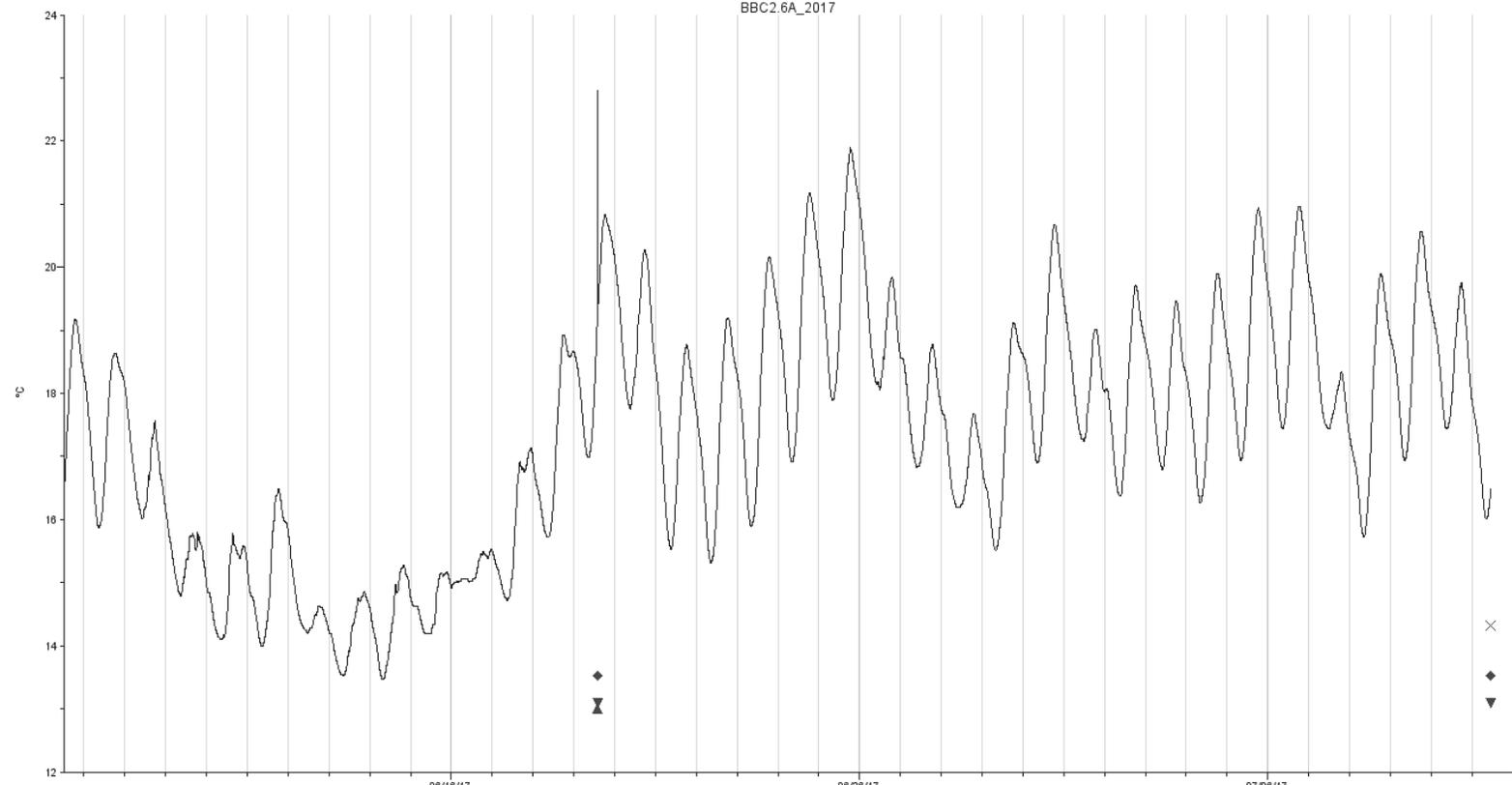
07/12/17 12:00:00 AM GMT-07:00

BBC 5.9_2017



BBC2.6A_2017

- Temp. °C
- ▲ Coupler Detached
- ▼ Coupler Attached
- ◆ Host Connected
- × End Of File



06/06/17 12:00:00 PM GMT-07:00

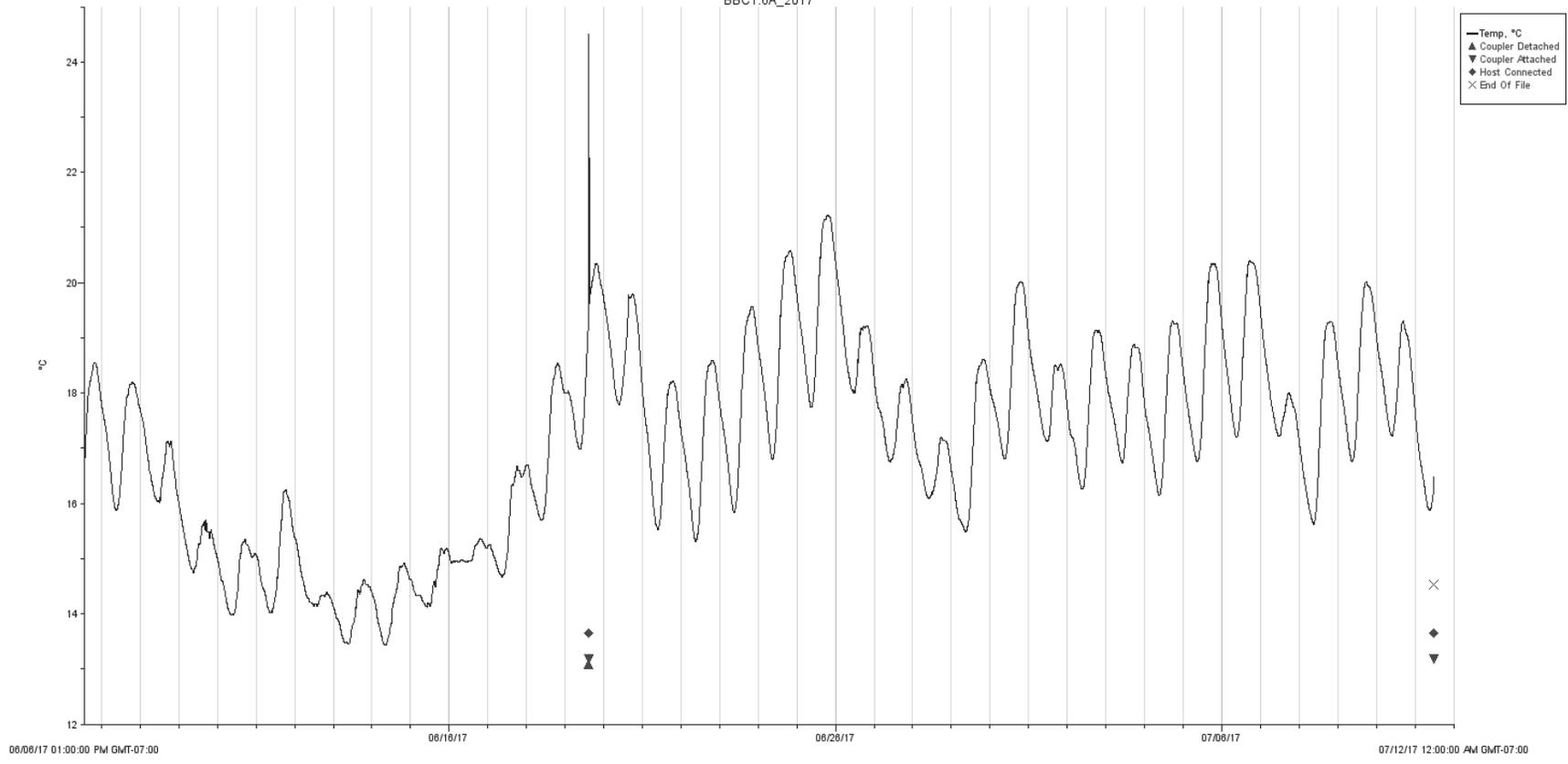
06/16/17

06/26/17

07/06/17

07/12/17 12:00:00 AM GMT-07:00

BBC1.6A_2017



TECHNICAL MEMORANDUM

Date: August 22, 2017
To: Dorie Sutton, City of Vancouver
Copy to: Rob Zisette, Herrera Environmental Consultants
From: Jess Brown, Herrera Environmental Consultants
Subject: Burnt Bridge Creek 2017 Water Quality Sampling Interim Memorandum #3

INTRODUCTION

This interim update provides a summary of the field and laboratory procedures and results associated with monitoring activities conducted on August 2, 2017, for Event 3 of the Burnt Bridge Creek 2017 Trend Analysis Project. Monitoring and laboratory analysis were conducted in accordance with the project *Quality Assurance Project Plan* (QAPP; Herrera 2014) and modifications for 2015, 2016, and 2017 (Herrera 2015, 2016, 2017). A quality assurance review of the data collected was conducted and is summarized below. The laboratory data reports, monitoring forms containing field data, data quality review worksheet, and continuous temperature data are attached.

FIELD ACTIVITIES

Herrera conducted field measurements and water quality sampling at 11 monitoring sites on August 2, 2017, for Event 3 of the Burnt Bridge Creek 2017 Water Quality Monitoring Project. The field sampling team consisted of Rayna Gleason (Herrera) and Dorie Sutton (City of Vancouver) assisted by Perri Piller (intern). Samples and *in situ* water quality measurements were collected from each of the 11 sites without incident and according to QAPP procedures.

A YSI ProDSS multimeter was used to collect *in situ* data. Data were downloaded from temperature probes located at each of the eight temperature monitoring sites. The temperature data were checked for completeness and proper function. Anomalously high values recorded on sampling dates when loggers were out of the water to download data were deleted from the records.



DATA QUALITY SUMMARY

In general, procedures described and quality control criteria defined in the QAPP were met, resulting in no data qualification or corrective action with the following exceptions:

- One nitrate+nitrite result (sample BUR0.0) slightly exceeded field duplicate RPD criteria (22 percent versus the objective of <20 percent), but was not flagged because all other quality assurance indicators (matrix spike, laboratory control sample, and laboratory duplicate) met criteria.
- One fecal coliform result (sample BUR0.0) qualified as estimated (J) based on the field duplicate difference (78 CFU/100 mL versus the objective of <10 CFU/100 mL).
- Ten fecal coliform results qualified as estimated (J) based on colony counts falling outside of ideal range of 20 to 60.

Fecal coliform results were calculated using colony count data by the data reviewer according to QAPP procedures (Herrera 2014). Fecal coliform results reported by the laboratory and validated by the reviewer are shown in Table 1 along with data qualifiers. Since most fecal coliform results had colony counts falling below the ideal range, dilution volumes will be increased from 2 mL and 20 mL to 5 mL and 50 mL.

Sample ID	Date Sampled	Laboratory Result (CFU/100 mL)	Validated Result (CFU/100 mL)	Qualifier
BBC10.4	8/2/17	27	27	J
BBC8.8	8/2/17	5	5	J
PET0.0	8/2/17	445	445	J
BBC8.4	8/2/17	45	45	J
BUR0.0	8/2/17	96	95	J
BBC7.0	8/2/17	105	105	
BBC5.9	8/2/17	59	59	J
BBC5.2	8/2/17	27	27	J
BBC2.6	8/2/17	125	125	
COL0.0	8/2/17	59	59	J
BBC1.6	8/2/17	32	32	J
DUPE ^a	8/2/17	18	18	J

^a Field duplicate of BUR0.0.

REFERENCES

Herrera. 2014. Burnt Bridge Creek Ambient Water Quality Monitoring Project – Quality Assurance Project Plan: 2014 Ambient Monitoring. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. July 3.

Herrera 2015. Burnt Bridge Creek 2015 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. June 15.

Herrera 2016. Burnt Bridge Creek 2016 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. May 25.

Herrera 2017. Burnt Bridge Creek 2017 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. May 17.

ATTACHMENTS



IEH ANALYTICAL LABORATORIES
LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	HER080-43	PAGE 1
REPORT DATE:	08/17/17	
DATE SAMPLED:	08/02/17	DATE RECEIVED: 08/03/17
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM HERRERA ENVIRONMENTAL		

CASE NARRATIVE

Twelve water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-N (mg/L)	TOTAL-P (mg/L)	SRP (mg/L)	N03+N02 (mg/L)	TSS (mg/L)	TURBIDITY (NTU)
BBC10.4-20170802	2.77	0.082	0.053	2.48	3.2	1.6
BBC8.8-20170802	2.68	0.107	0.048	2.20	19	4.5
PET0.0-20170802	1.73	0.154	0.124	1.36	5.5	1.5
BBC8.4-20170802	2.09	0.113	0.079	1.75	11	2.6
BUR0.0-20170802	1.57	0.072	0.067	1.08	0.86	0.65
BBC7.0-20170802	2.74	0.099	0.064	1.89	11	2.6
BBC5.9-20170802	2.47	0.103	0.073	1.81	5.2	2.0
BBC5.2-20170802	2.26	0.105	0.077	1.84	6.8	2.1
BBC2.6-20170802	2.19	0.110	0.085	1.68	8.5	2.5
COL0.0-20170802	1.78	0.097	0.072	1.52	7.8	3.1
BBC1.6-20170802	2.03	0.111	0.085	1.62	5.2	2.3
DUPE-20170802	1.61	0.074	0.065	1.35	1.1	0.68



IEH ANALYTICAL LABORATORIES
LABORATORY & CONSULTING SERVICES
 3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
 PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	HER080-43	PAGE 2
REPORT DATE:	08/17/17	
DATE SAMPLED:	08/02/17	DATE RECEIVED: 08/03/17
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM HERRERA ENVIRONMENTAL		

QA/QC DATA WATER

QC PARAMETER	TOTAL-N (mg/l)	TOTAL-P (mg/L)	SRP (mg/L)	N03+N02 (mg/L)	TSS (mg/L)	TURBIDITY (NTU)
METHOD	SM20 4500NC	EPA 365.1	EPA 365.1	SM18 4500N03F	SM18 2540D	EPA 180.1
DATE ANALYZED	08/14/17	08/10/17	08/04/17	08/04/17	08/08/17	08/04/17
DETECTION LIMIT	0.050	0.002	0.001	0.010	0.50	0.10
DUPLICATE						
SAMPLE ID	DUPE-20170802	DUPE-20170802	DUPE-20170802	DUPE-20170802	BATCH	BBC10.4-20170802
ORIGINAL	1.61	0.074	0.065	1.35	4.8	1.6
DUPLICATE	1.70	0.072	0.065	1.35	5.5	1.6
RPD	5.62%	2.60%	0.08%	0.11%	14.63%	0.00%
SPIKE SAMPLE						
SAMPLE ID	DUPE-20170802	DUPE-20170802	DUPE-20170802	DUPE-20170802		
ORIGINAL	1.61	0.074	0.065	1.35		
SPIKED SAMPLE	2.75	0.123	0.085	1.53		
SPIKE ADDED	1.00	0.050	0.020	0.200		
% RECOVERY	114.02%	98.36%	98.47%	88.88%	NA	NA
QC CHECK						
FOUND	0.492	0.099	0.041	0.421	10	8.1
TRUE	0.490	0.094	0.039	0.408	10	8.0
% RECOVERY	100.41%	105.32%	105.13%	103.19%	100.00%	101.25%
BLANK	<0.050	<0.002	<0.001	<0.010	<0.50	NA

RPD = RELATIVE PERCENT DIFFERENCE.
 NA = NOT APPLICABLE OR NOT AVAILABLE.
 NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
 OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
 Project Manager



CHAIN-OF-CUSTODY RECORD

SHEET 1 OF 1
PROJECT ID: 16-04 881-006
CASE FILE NO.: _____
DATA RECORDED BY: _____

CLIENT: HERREZA
SAMPLING DATE: 08-02-17
SAMPLERS: Rayna Gleason (Herrez), Dorie Sutton, Pern Miller,

SAMPLE INFORMATION

City of Vancouver

PARAMETERS

SAMPLE ID	DATE/TIME COLLECTED	PARAMETERS										BOTT #	NOTES		
		Turbidity	TSS	NO ₃ +NO ₂	TN	Ortho P	TP								
BBC10.4-20170802	8/2/17 8:40	x	x	x	x	x	x							2	
BBC8.8-20170802	8/2/17 9:10	x	x	x	x	x	x							2	
PET0.0-20170802	8/2/17 9:20	x	x	x	x	x	x							2	
BBC8.4-20170802	8/2/17 10:00	x	x	x	x	x	x							2	
BUR0.0-20170802	8/2/17 9:40	x	x	x	x	x	x							2	
BBC7.0-20170802	8/2/17 10:20	x	x	x	x	x	x							2	
BBC5.9-20170802	8/2/17 10:37	x	x	x	x	x	x							2	
BBC5.2-20170802	8/2/17 10:55	x	x	x	x	x	x							2	
BBC2.6-20170802	8/2/17 11:15	x	x	x	x	x	x							2	
COL0.0-20170802	8/2/17 11:40	x	x	x	x	x	x							2	
BBC1.6-20170802	8/2/17 11:50	x	x	x	x	x	x							2	
DUPE-20170802	8/2/17 -	x	x	x	x	x	x							2	

Printed Name	Relinquished By <u>RAYNA GLEASON</u>	Date/Time <u>08-02-17</u>	Received By	Date/Time
Signature	<u>Rayna Gleason</u>	<u>2:00pm</u>		
Affiliation	<u>Herrez Employee</u>			

Printed Name	Relinquished By	Date/Time	Received By	Date/Time
Signature			<u>Herrez</u>	<u>08/03/17 0900</u>
Affiliation			<u>(12) samples (24) bottles</u>	<u>3.2°C</u>

Miscellaneous Notes (Hazardous Materials, Quick turn-around time, etc.): _____

PIXIS Labs

Accurate. Reliable. On Time.

Pixis Labs

12423 NE Whitaker Way

Portland, OR 97230

503-254-1794

Job Number: 7080221
Report Date: 08/15/2017
ORELAP #: OR100028
Project Name: 14-05818-003
Project No: Burnt Bridge Creek Monitoring 2017

Cover Letter

Jess Brown
Herrera Environmental Consultants, Inc.
24 NW 2nd Ave., Suite 204
PORTLAND, OR 97209

Dear Jess Brown,

Enclosed please find Pixis Labs analytical report for samples received as order number 7080221 on 08/02/2017. Should you have any questions about this report or any other matter, please do not hesitate to contact us. We are here to help you.

Test results relate only to the parameters tested and to the samples as received by the laboratory. Test results meet all requirements of NELAP and the Pixis quality assurance plan unless otherwise noted. This report shall not be reproduced, except in full, without the written consent of this laboratory. Samples will be kept a maximum of 15 days from the report date unless prior arrangements have been made.

Thank you for allowing Pixis to be of service to you, we appreciate your business.

Sincerely,

Signed
Mark Leed
Client Services

Sample Results

Sample: BBC10.4-20170802		Collected: 08/02/17 08:40		Temp: 10 C		Matrix: General Water	
Lab ID: 138245		Received: 08/02/17 12:34		Evidence of Cooling:Y			

Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	27.0	/100 mL	5.00	5	32336-3	08/02/17 18:00	08/03/17 18:15	

Sample: BBC8.8-20170802		Collected: 08/02/17 09:10		Temp: 10 C		Matrix: General Water	
Lab ID: 138246		Received: 08/02/17 12:34		Evidence of Cooling:Y			

Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	5.00	/100 mL	5.00	5	32336-4	08/02/17 18:00	08/03/17 18:15	

Sample: PET0.0-20170802		Collected: 08/02/17 09:20		Temp: 10 C		Matrix: General Water	
Lab ID: 138247		Received: 08/02/17 12:34		Evidence of Cooling:Y			

Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	445	/100 mL	5.00	5	32336-5	08/02/17 18:00	08/03/17 18:15	

Sample: BBC8.4-20170802		Collected: 08/02/17 10:00		Temp: 10 C		Matrix: General Water	
Lab ID: 138248		Received: 08/02/17 12:34		Evidence of Cooling:Y			

Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	45.0	/100 mL	5.00	5	32336-6	08/02/17 18:00	08/03/17 18:15	

Sample: BUR0.0-20170802		Collected: 08/02/17 09:40		Temp: 10 C		Matrix: General Water	
Lab ID: 138249		Received: 08/02/17 12:34		Evidence of Cooling:Y			

Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	96.0	/100 mL	5.00	5	32336-7	08/02/17 18:00	08/03/17 18:15	

Sample: BBC7.0-20170802		Collected: 08/02/17 10:20		Temp: 10 C		Matrix: General Water	
Lab ID: 138250		Received: 08/02/17 12:34		Evidence of Cooling:Y			

Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	105	/100 mL	5.00	5	32336-8	08/02/17 18:00	08/03/17 18:15	

Sample: BBC5.9-20170802		Collected: 08/02/17 10:37		Temp: 10 C		Matrix: General Water		
Lab ID: 138251		Received: 08/02/17 12:34		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	59.0	/100 mL	5.00	5	32336-9	08/02/17 18:00	08/03/17 18:15	
Sample: BBC5.2-20170802		Collected: 08/02/17 10:55		Temp: 10 C		Matrix: General Water		
Lab ID: 138252		Received: 08/02/17 12:34		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	27.0	/100 mL	5.00	5	32336-10	08/02/17 18:00	08/03/17 18:15	
Sample: BBC2.6-20170802		Collected: 08/02/17 11:15		Temp: 10 C		Matrix: General Water		
Lab ID: 138253		Received: 08/02/17 12:34		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	125	/100 mL	5.00	5	32336-11	08/02/17 18:00	08/03/17 18:15	
Sample: COL0.0-20170802		Collected: 08/02/17 11:40		Temp: 10 C		Matrix: General Water		
Lab ID: 138254		Received: 08/02/17 12:34		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	59.0	/100 mL	5.00	5	32336-12	08/02/17 18:00	08/03/17 18:15	
Sample: BBC1.6-20170802		Collected: 08/02/17 11:50		Temp: 10 C		Matrix: General Water		
Lab ID: 138255		Received: 08/02/17 12:34		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	32.0	/100 mL	5.00	5	32336-13	08/02/17 18:00	08/03/17 18:15	
Sample: DUPE-20170802		Collected: 08/02/17		Temp: 10 C		Matrix: General Water		
Lab ID: 138256		Received: 08/02/17 12:34		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	18.0	/100 mL	5.00	5	32336-14	08/02/17 18:00	08/03/17 18:15	

Abbreviations

MRL Method Reporting Limit
 ND None Detected at or above the MRL

Units of Measure:

/100 mL Per 100 mL



Herrera Environmental Consultants, Inc.

Chain of Custody Record



2200 Sixth Avenue | Suite 1100
Seattle, Washington | 98121
p 206 441 9080 | f 206 441 9108

Project Name: Burnt Bridge Creek Monitoring 2017			Project Number: 14-05818-003			Client: City of Vancouver			Number of Containers	Analyses Requested										Lab ID No.						
Report To: Jess Brown, jbrown@herrerainc.com						Copy To: RGleason@herrerainc.com						Fecal Coliform- SM 9222D														
Sampled By: Rayna Gleason						Delivery Method:																				
Laboratory: PIXIS Labs				Requested Completion Date:			Total No. of Containers: 12																			
Lab Use:			Sample ID	Date	Time	Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)																		
	BBC10.4-20170802	8/2/17	8:40	G	Y	SW	1	✓																		
	BBC8.8-20170802	8/2/17	9:10	G	Y	SW	1	✗																		
	PET0.0-20170802	8/2/17	9:20	G	Y	SW	1	✗																		
	BBC8.4-20170802	8/2/17	10:00	G	Y	SW	1	✗																		
	BUR0.0-20170802	8/2/17	9:40	G	Y	SW	1	✓																		
	BBC7.0-20170802	8/2/17	10:20	G	Y	SW	1	✓																		
	BBC5.9-20170802	8/2/17	10:37	G	Y	SW	1	✓																		
	BBC5.2-20170802	8/2/17	10:55	G	Y	SW	1	✗																		
	BBC2.6-20170802	8/2/17	11:15	G	Y	SW	1	✓																		
	COL0.0-20170802	8/2/17	11:40	G	Y	SW	1	✗																		
	BBC1.6-20170802	8/2/17	11:50	G	Y	SW	1	✗																		
	DUPE-20170802	8/2/17	-	G	Y	SW	1	✗																		

Comments/Special Instructions:
IMPORTANT: Please use two dilution volumes for the analysis: 2 mL and 20 mL. Include a laboratory duplicate. Please complete and return attached bench sheet.

Relinquished by (Name/CO) Rayna Gleason, Herrera	Signature <i>Rayna Gleason</i>	Date/Time 8/2/17 12:35	Received By (Name/CO) Stefanie Nack	Signature <i>Stefanie Nack</i>	Date/Time 8/2/17 12:34
Relinquished by (Name/CO)	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time

10°C
cooling
on ice

Sample Type: G=Grab C=Composite Matrix Codes: A=Air GW=Groundwater SE=Sediment SO=Soil SW=Surface Water W=Water (blanks) M=Material O=Other (specify)

Alias Vancouver
Order# 7080221

Fecal Analysis Bench Sheet

Sample ID	Volume (mL)	Colonies counted	Result* (CPN/100 mL)	Herrera Check
BBC10.4-20170802 (01)	2	1	27 ✓	27 J
	20	5		
BBC8.8-20170802 (02)	2	0	5 ✓	5 J
	20	1		
PET0.0-20170802 (03)	2	6	445 ✓	445 J
	20	92		
BBC8.4-20170802 (04)	2	1	45 ✓	45 J
	20	9		
BUR0.0-20170802 (05)	2	4	96	95 J round down from 95.45
	20	17		
BBC7.0-20170802 (06)	2	5	105 ✓	105
	20	21		
BBC5.9-20170802 (07)	2	2	59 ✓	59 J
	20	11		
BBC5.2-20170802 (08)	2	1	27 ✓	27 J
	20	5		
BBC2.6-20170802 (09)	2	3	125 ✓	125
	20	25		
COLO.0-20170802 (10)	2	1	59 ✓	59 J
	20	12		
BBC1.6-20170802 (11)	2	1	32 ✓	32 J
	20	6		
DUPE-20170802 (12)	2	0	18 ✓	18 J
	20	4		
Lab Duplicate-BBC8.8-20170802	2	0	14 ✓	14 J
	20	3		
Negative Control	100	0	<1	✓
Positive Control	100	TNTC	TNTC	✓

***Calculation of Results**

Density: use if only one count is within ideal range (20-60 colonies)

$$\frac{\text{Colonies}}{100\text{mL}} = \frac{\text{Colonies counted}}{\text{mL Sample Filtered}} \times 100$$

Average Density: use if all counts are outside of ideal range (20-60 colonies) excluding counts greater than 200 or if more than one count is within ideal range

$$\frac{\text{Colonies}}{100\text{mL}} = \frac{\sum \text{Colonies counted}}{\sum \text{mL sample filtered}} \times 100$$

If all >200 colonies calculate density of value closest to 200 and add greater than to result (e.g. >1000)

Reviewed 8/16/17
by Jess Brown





Data Quality Assurance Worksheet

Project Name/No./Client: Burnt Bridge Creek / 14-05818-003 / City of Vancouver, Washington

Laboratory/Parameters: IEH-Aquatic Research / nitrogen, phosphorus, SRP, nitrate-nitrite, TSS, turbidity
PIXIS Labs/ Fecal Coliform

Sample Date/Sample ID: 8/2/17 / Event 3 (11 stations plus field sample duplicate of BUR0.0)

By J. Brown, updated 12/27/17

Date: 8/17/17 Page 1 of 1

Checked: initials RZ

date 8/21/17

Parameter	Completeness/ Methodology	Holding Times (days)		Blanks/ Reporting Limit	Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Field Duplicates RPD (%)		Instrument Calibration/ Performance	ACTION
		Reported	Goal		Reported	Goal	Reported	Goal	Reported	Goal ¹	Reported	Goal ¹		
Total Nitrogen	OK / SM4500N-C	12	<28	<0.050 / 0.050 mg/L	114	90-110	100	90-110	6	<20	3	<20	OK	Slight MS exceedance. No flag, all other QA ok.
Total Phosphorus	OK / EPA 365.1	8	<28	<0.002 / 0.002 mg/L	98	90-110	105	90-110	3	<20	3	<20	OK	
SRP	OK / EPA 365.1	<48 hours	<48 hours ²	<0.001 / 0.001 mg/L	98	90-110	105	90-110	0.1	<20	3	<20	OK	
Nitrate + Nitrite	OK / EPA 353.2	2	<28	<0.010 / 0.010 mg/L	89	90-110	103	90-110	0.1	<20	22	<20	OK	Slight field dupe exceedance. No flag, all other QA ok.
TSS	OK / EPA 160.2	6	<7	<0.5 / 0.5 mg/L	NA	NA	100	90-110	15	<20	D=0.3	<20	OK	
Turbidity	OK / SM2130-B	<48 hours	<48	<0.1 / 0.1 NTU	NA	NA	101	90-110	0	<20	5	<20	OK	
Fecal coliform	OK / SM9222-D	6-9 hours	<24	<5 / 5 CFU/ 100mL	NA	NA	NA	NA	D=9	<35	D=77	<35	OK	See NOTE A for flags.

¹ If the sample or duplicate value is less than five times the reporting limit, then the difference (D) is calculated rather than the RPD and the QA objective is that the difference shall not exceed 2 times the reporting limit instead of the number indicated in the objective column.

² Less than 24 hours from collection to filtration.



Data Quality Assurance Worksheet

Project Name/No./Client: Burnt Bridge Creek / 14-05818-003 / City of Vancouver, Washington
 Laboratory/Parameters: IEH-Aquatic Research / nitrogen, phosphorus, SRP, nitrate-nitrite, TSS, turbidity
PIXIS Labs/ Fecal Coliform
 Sample Date/Sample ID: 8/2/17 / Event 3 (11 stations plus field sample duplicate of BUR0.0)

By J. Brown, updated 12/27/17
 Date: 8/17/17 Page 1 of 1
 Checked: initials RZ
 date 8/21/17

Parameter	Completeness/ Methodology	Holding Times (days)		Blanks/ Reporting Limit	Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Field Duplicates RPD (%)		Instrument Calibration/ Performance	ACTION
		Reported	Goal		Reported	Goal	Reported	Goal	Reported	Goal ¹	Reported	Goal ¹		
Temperature	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	<20	OK	None
Dissolved Oxygen	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	<20	OK	None
pH	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	<20	OK	None
Conductivity	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.1	<20	OK	None

NOTE A: Flag all fecal coliform results except BBC7.0 and BBC2.6 due to colony counts of range (<20 or >60). Flag BUR0.0 due to field duplicate difference exceedance of greater than 2 times the reporting limit.

NA – not applicable or not available
 RPD- relative percent difference

NC – not calculable due to one or more values below the detection limit
 SRP –soluble reactive phosphorus

NS – field duplicate not sampled
 TSS – total suspended solids

¹ If the sample or duplicate value is less than five times the reporting limit, then the difference (D) is calculated rather than the RPD and the QA objective is that the difference shall not exceed 2 times the reporting limit instead of the number indicated in the objective column.

² Less than 24 hours from collection to filtration.



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003
 CLIENT: City of Vancouver
 FIELD PERSONNEL: RAYNA GLEASON JORIE SUTTON PERKI PUUN
 SITE ID: BBC 10.4 DATE: 8/2/2017 TIME: 8:40
 WEATHER: _____
 NOTES: CLEAR & WARM

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>15.9 °</u>			
DISSOLVED OXYGEN:	<u>63.9 %</u> <u>6.30</u>			
PH:	<u>6.57</u>			
CONDUCTIVITY:	<u>181.2</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>20170802</u> <u>BBC 10.4 - 2070208</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003
 CLIENT: City of Vancouver
 FIELD PERSONNEL: RAYNA Perri Dorie.
 SITE ID: BBC 8.8 DATE: 8/2/17 TIME: 9:10
 WEATHER: Clear Warm
 NOTES: _____

YSI 556 METER MEASUREMENTS	DUPLICATE? YES: _____ NO: _____
TEMPERATURE: <u>18.1 °C</u>	
DISSOLVED OXYGEN: <u>94.3%</u> <u>8.85</u>	
PH: <u>7.33</u>	
CONDUCTIVITY: <u>180.3</u>	

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	✓	BBC 8.8 - 20170802
250 mL UNPRESERVED BOTTLE:	✓	
100 mL FECAL BOTTLE:	✓	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003
 CLIENT: City of Vancouver
 FIELD PERSONNEL: Rayna Perri Dorie.
 SITE ID: PET 0.0 DATE: 8/2/17 TIME: 9:10
 WEATHER: Clear + Warm
 NOTES: _____

YSI 556 METER MEASUREMENTS	DUPLICATE? YES: _____ NO: _____
TEMPERATURE: <u>18.5°C</u>	
DISSOLVED OXYGEN: <u>87.9% 8.22</u>	
PH: <u>7.24</u>	
CONDUCTIVITY: <u>255.3</u>	

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	✓	<u>PET0.020170802</u>
250 mL UNPRESERVED BOTTLE:	✓	
100 mL FECAL BOTTLE:	✓	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003
 CLIENT: City of Vancouver
 FIELD PERSONNEL: Reyna Perri Dorie
 SITE ID: BBC 8.4 DATE: 8/2/17 TIME: 10:00
 WEATHER: Warm + Clear.
 NOTES: _____

YSI 556 METER MEASUREMENTS	DUPLICATE?	YES:	NO:
TEMPERATURE: <u>18.6°C</u>			
DISSOLVED OXYGEN: <u>90.4%</u> <u>8.44</u>			
PH: <u>7.33</u>			
CONDUCTIVITY: <u>211.8</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 8.4 20170802</u>
250 ML UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 ML FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ No:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 ML UNPRESERVED BOTTLE:		
100 ML FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Reyna Perri Doris

SITE ID: BUR0.0 DATE: 8/2/17 TIME: 9:40

WEATHER: Clear Warm

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: <input checked="" type="checkbox"/>	NO: <input type="checkbox"/>
TEMPERATURE:	<u>15.3 °C</u>			
DISSOLVED OXYGEN:	<u>9.17</u> <u>9.63</u>			
PH:	<u>7.35</u>			
CONDUCTIVITY:	<u>157.4</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BUR0.0 20170802</u>
250 ML UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 ML FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BUR0.0 20170802</u>
250 ML UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 ML FECAL BOTTLE:	<input checked="" type="checkbox"/>	



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Reyna Perri Dorie

SITE ID: BB C 7.0 DATE: 8/2/17 TIME: 10:20

WEATHER: Clear + Warm

NOTES: _____

YSI 556 METER MEASUREMENTS	TEMPERATURE: <u>19.1°C</u>	DUPLICATE? YES: _____ NO: _____
DISSOLVED OXYGEN:	<u>89.2% 8.25</u>	
PH:	<u>7.27</u>	
CONDUCTIVITY:	<u>193.9</u>	

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BB C 7.0 20170802</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Reyna Perri Dorie

SITE ID: BBC5.9 DATE: 8/2/17 TIME: 10:37

WEATHER: Clear + Warm.

NOTES: _____

YSI 556 METER MEASUREMENTS	DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE: <u>18.2 °C</u>			
DISSOLVED OXYGEN: <u>75.7% 7.11</u>			
PH: <u>7.21</u>			
CONDUCTIVITY: <u>196.0</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC5.9201708:02</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003
 CLIENT: City of Vancouver
 FIELD PERSONNEL: Reyna Perri Dorie
 SITE ID: BBC5.2 DATE: 8/2/17 TIME: 10:55
 WEATHER: Clear + Warm
 NOTES: _____

YSI 556 METER MEASUREMENTS	DUPLICATE?	YES: <input checked="" type="checkbox"/>	NO: <input type="checkbox"/>
TEMPERATURE: <u>17.8°C</u>	<u>18.8</u>		
DISSOLVED OXYGEN: <u>96.21 8.95</u>	<u>95.6</u>	<u>8.90</u>	
PH: <u>7.5</u>	<u>7.43</u>		
CONDUCTIVITY: <u>198.1</u>	<u>198.0</u>		

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC5.220170802</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input type="checkbox"/>	



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Regina GLEASON Perri Dorie

SITE ID: BBC2.6 DATE: 8/2/17 TIME: 1:15

WEATHER: Clear + Warm

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: _____
TEMPERATURE:	<u>19.4° C</u>			
DISSOLVED OXYGEN:	<u>99.0% 9.10</u>			
PH:	<u>7.75</u>			
CONDUCTIVITY:	<u>210.6</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC2.6 20170802</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Rayna Perri Dorrie

SITE ID: COLO.0 DATE: 8/2/17 TIME: 11:40

WEATHER: _____

NOTES: _____

YSI 556 METER MEASUREMENTS	DUPLICATE?	YES: _____	NO: _____
TEMPERATURE: <u>15.8°C</u>			
DISSOLVED OXYGEN: <u>98.6%</u> <u>9.79</u>			
PH: <u>7.85</u>			
CONDUCTIVITY: <u>51.8</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>COLO.0 2017 0802</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Rayna Perri Dorrie

SITE ID: BBC1.6 DATE: 8/2/17 TIME: 11:50

WEATHER: Clear + Warm

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: _____
TEMPERATURE:	<u>19.2 °C</u>			
DISSOLVED OXYGEN:	<u>99.1% 9.15</u>			
PH:	<u>7.77</u>			
CONDUCTIVITY:	<u>214.8</u>			

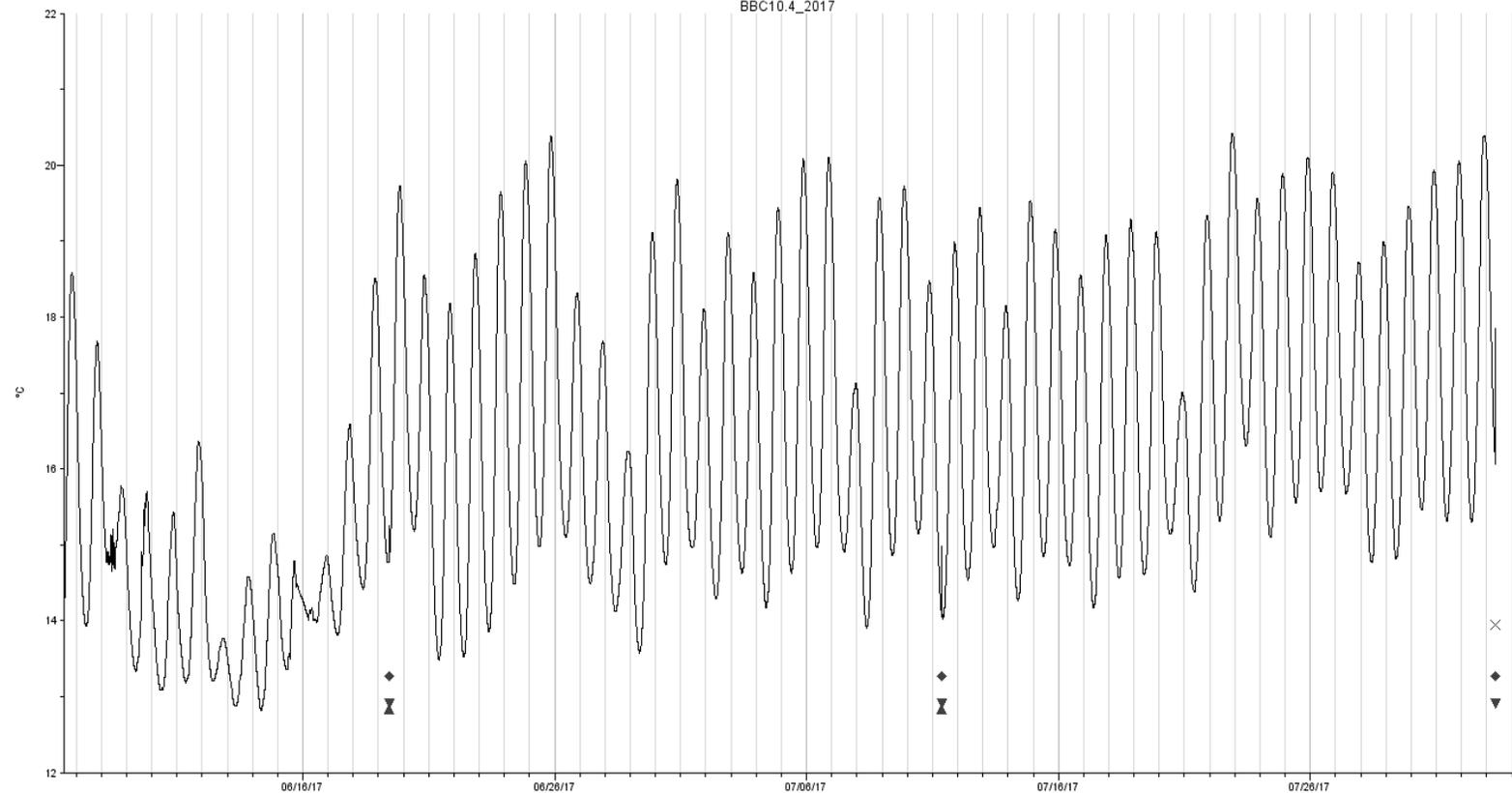
SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC1.6 20170802</u>
250 ML UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 ML FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 ML UNPRESERVED BOTTLE:		
100 ML FECAL BOTTLE:		

BBC10.4_2017

- Temp. °C
- ▲ Coupler Detached
- ▼ Coupler Attached
- ◆ Host Connected
- × End Of File



06/06/17 12:00:00 PM GMT-07:00

06/16/17

06/28/17

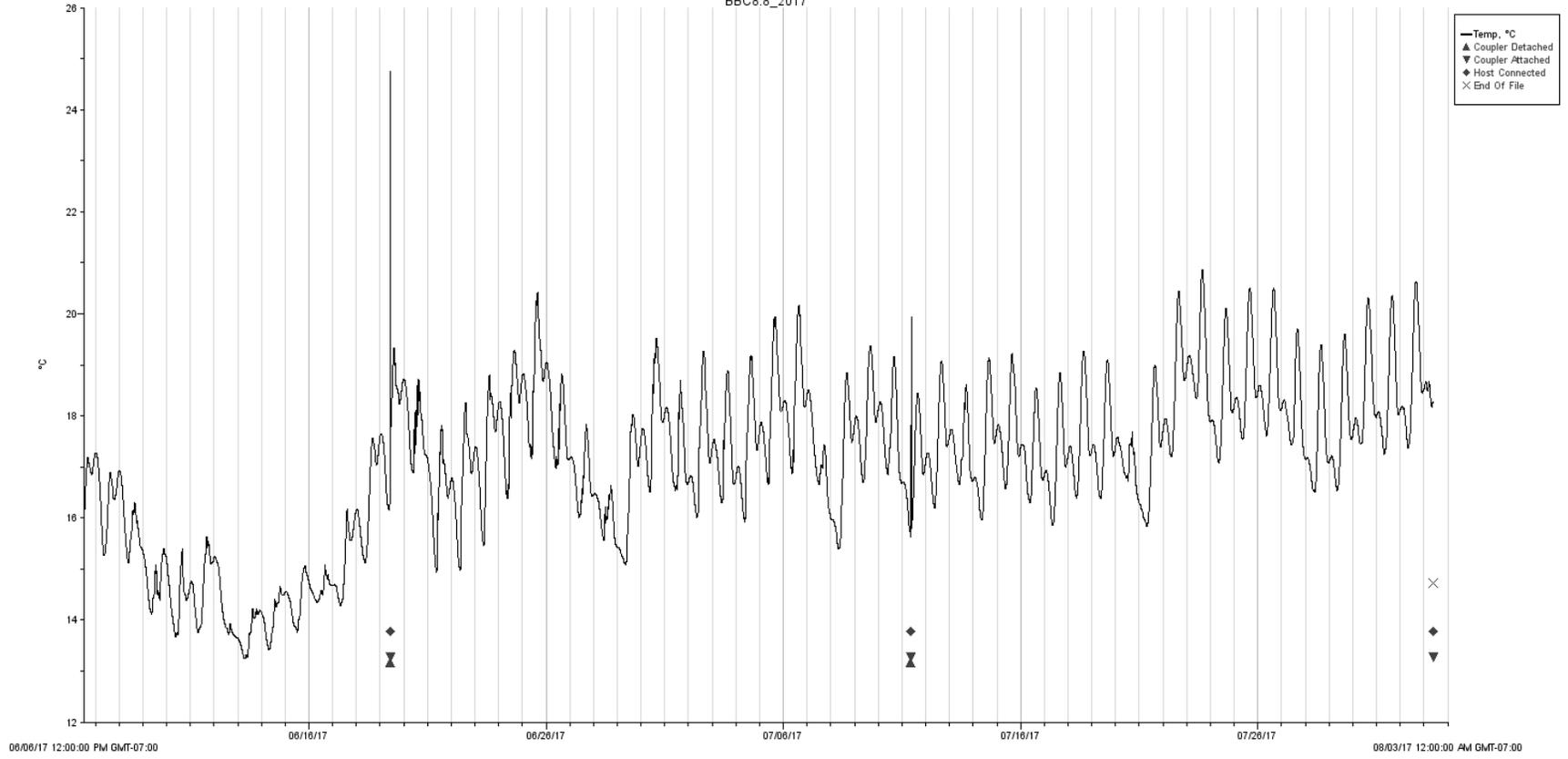
07/08/17

07/18/17

07/28/17

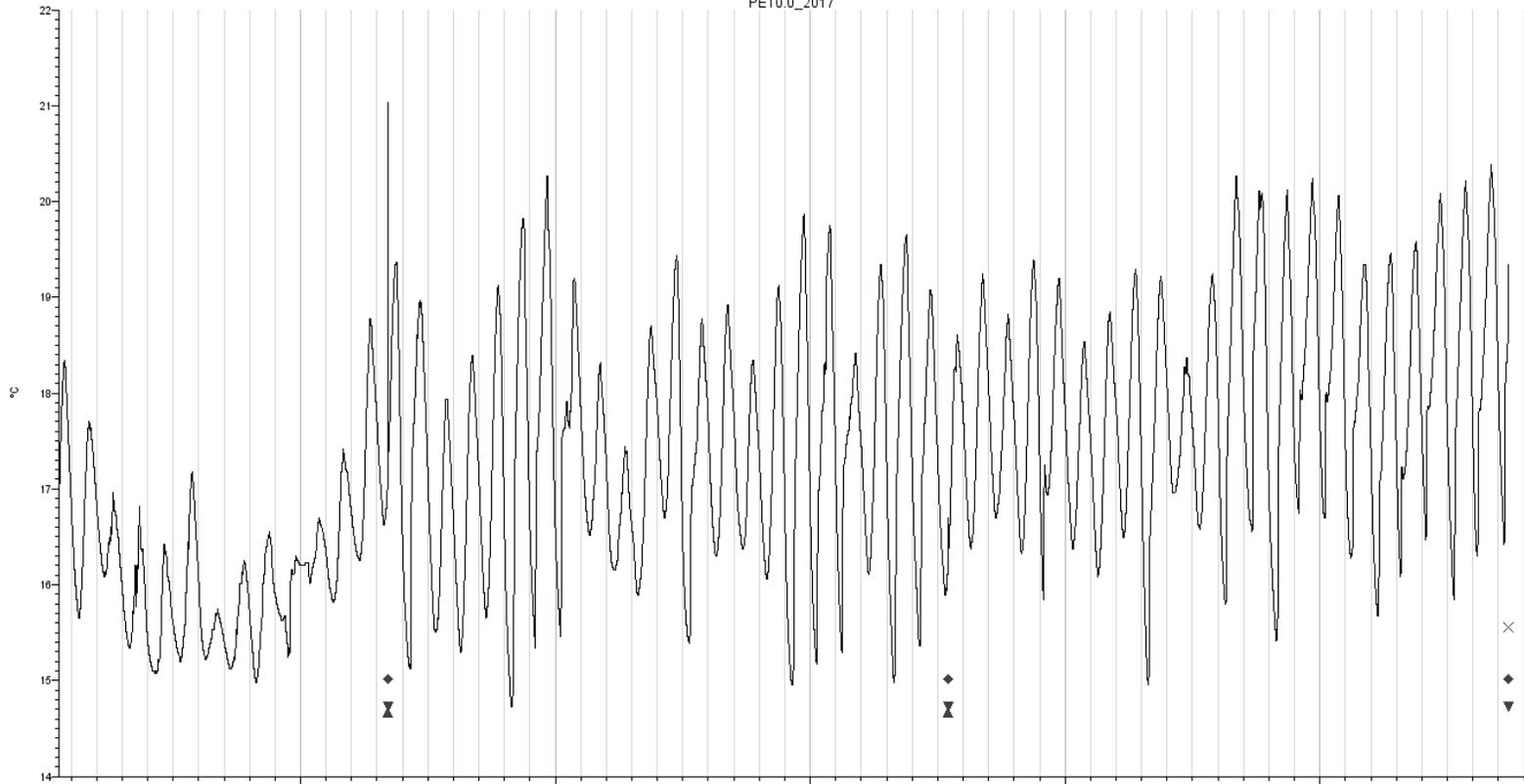
08/03/17 12:00:00 AM GMT-07:00

BBC8.8_2017



PET0.0_2017

- Temp, °C
- ▲ Coupler Detached
- ▼ Coupler Attached
- ◆ Host Connected
- × End Of File



06/08/17 12:00:00 PM GMT-07:00

06/16/17

06/28/17

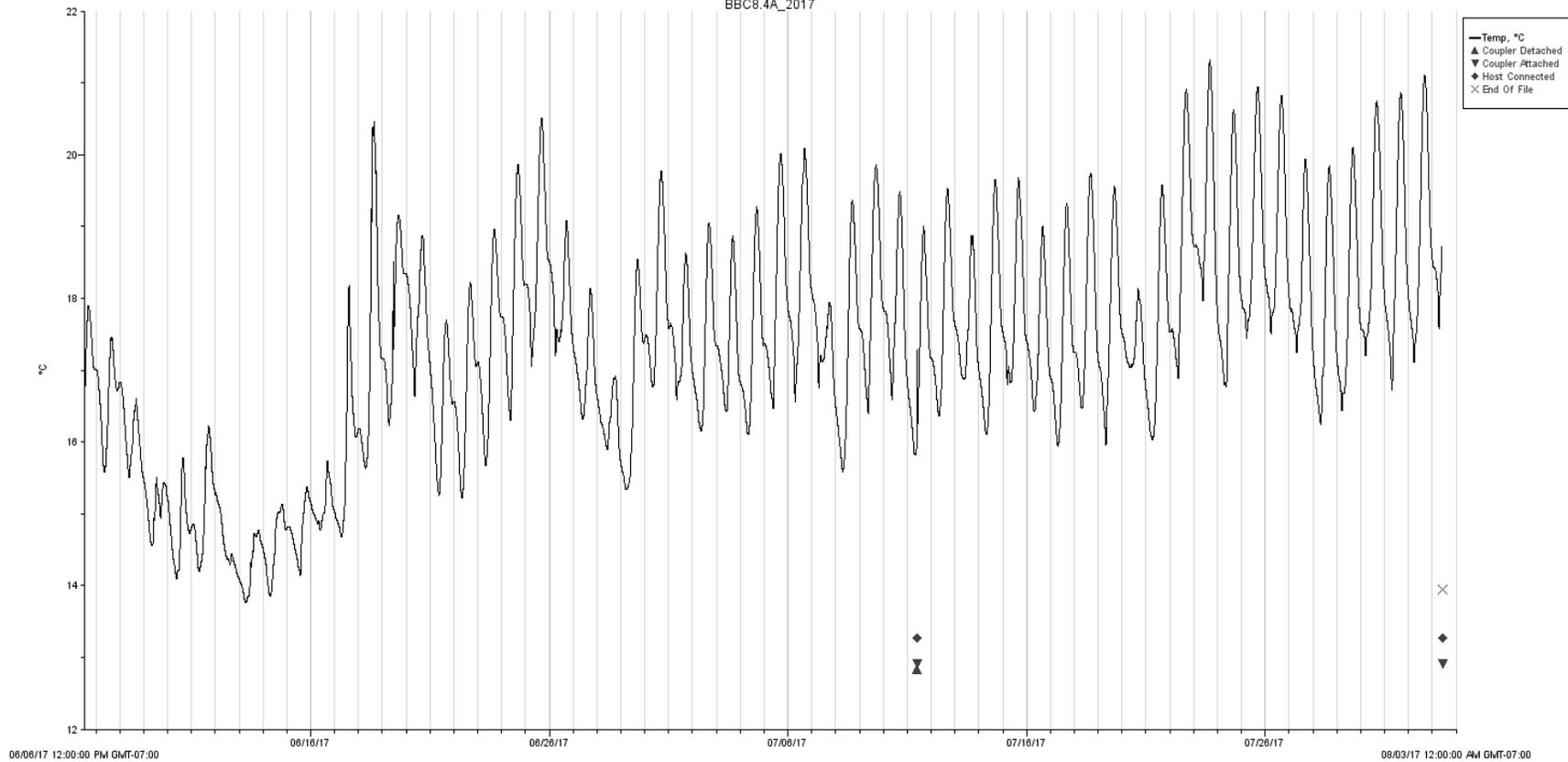
07/06/17

07/18/17

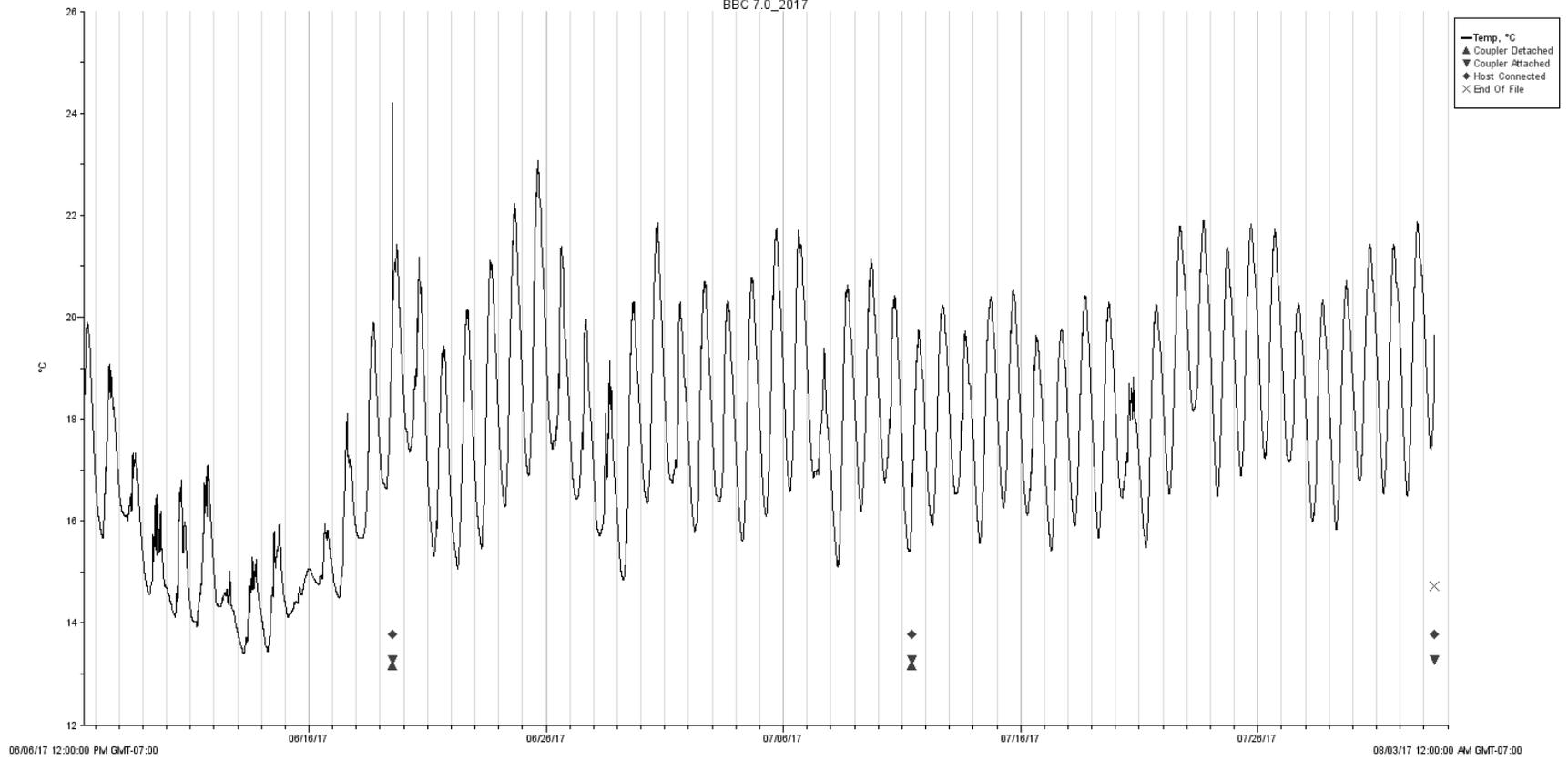
07/26/17

08/03/17 12:00:00 AM GMT-07:00

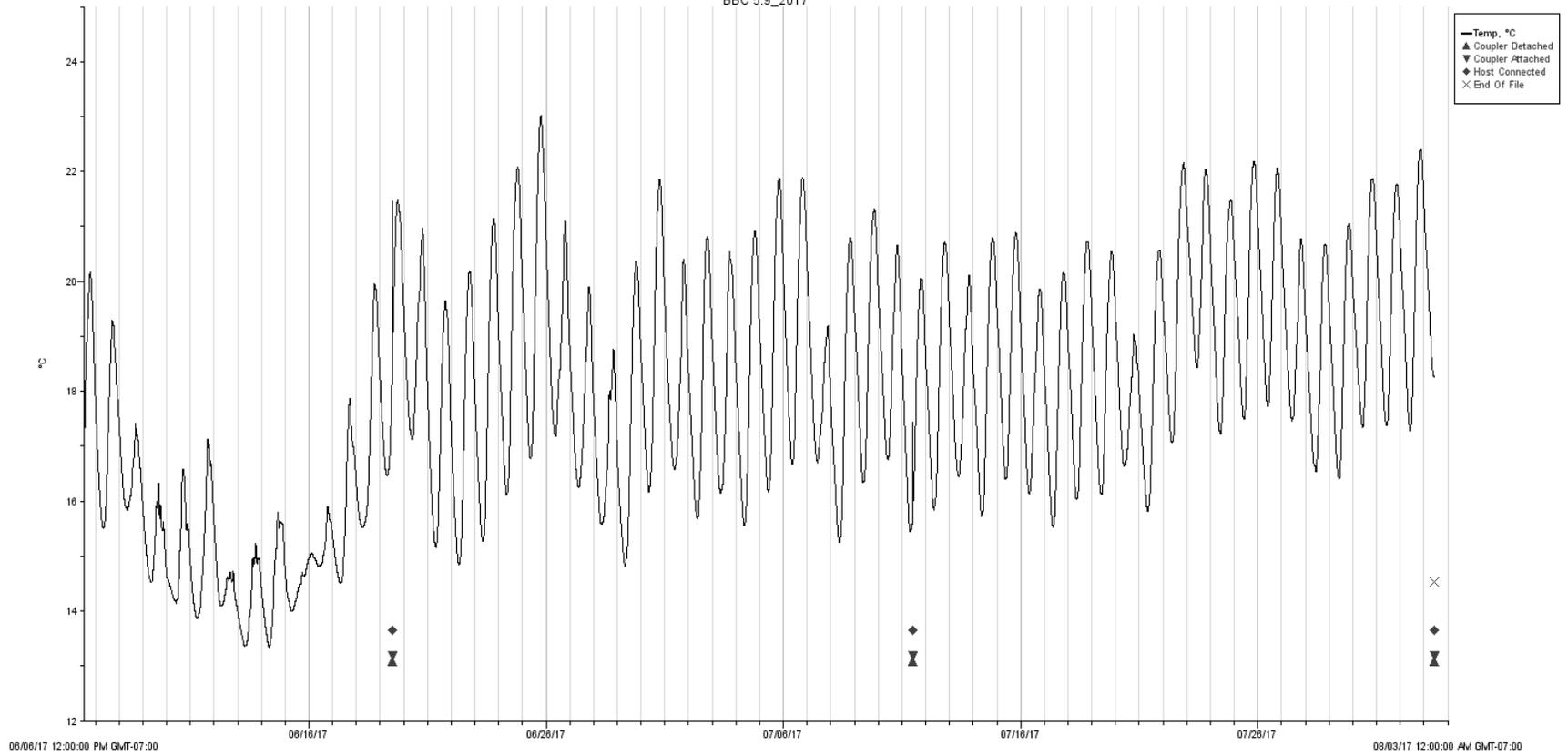
BBC8.4A_2017



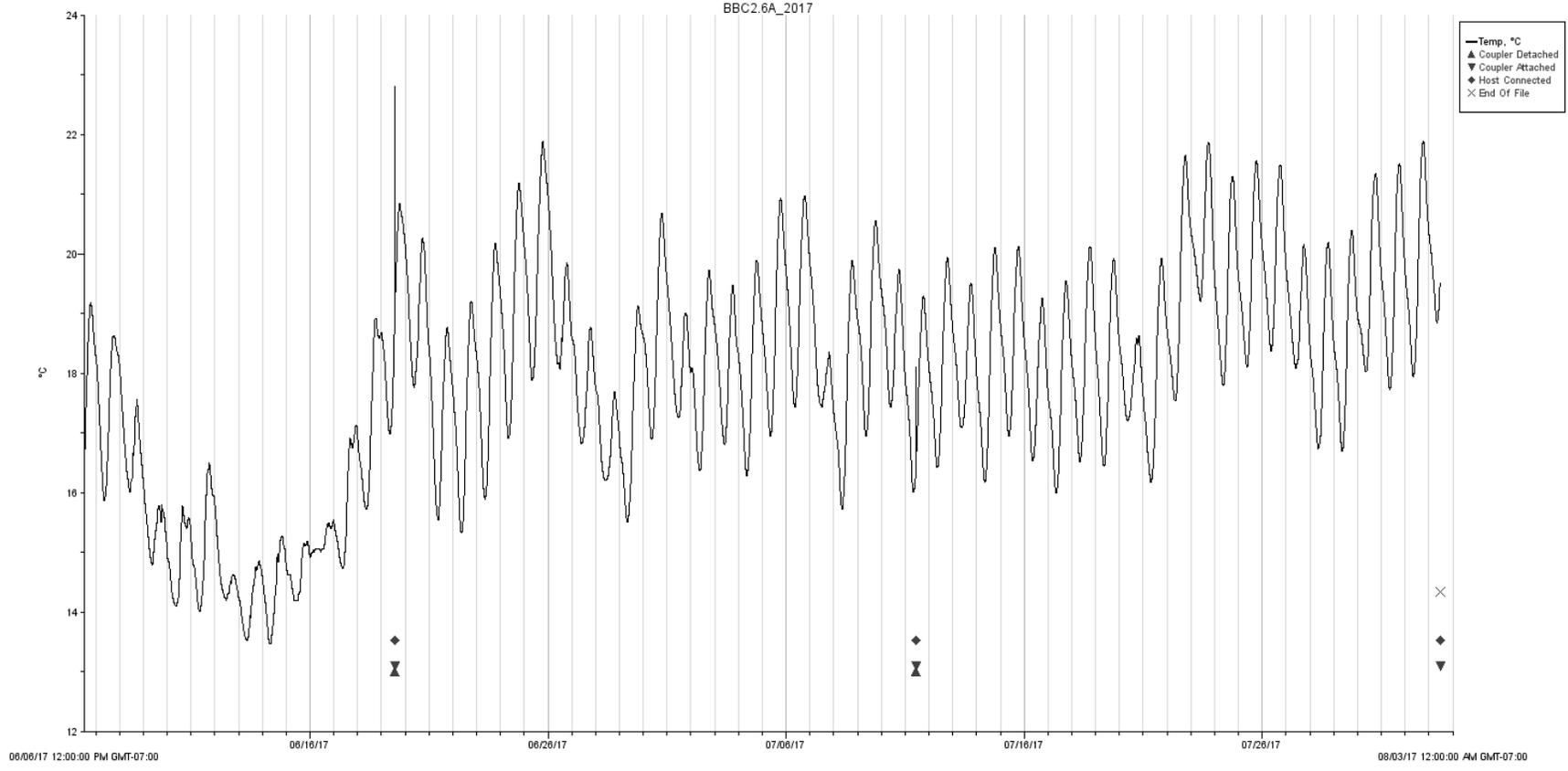
BBC 7.0_2017



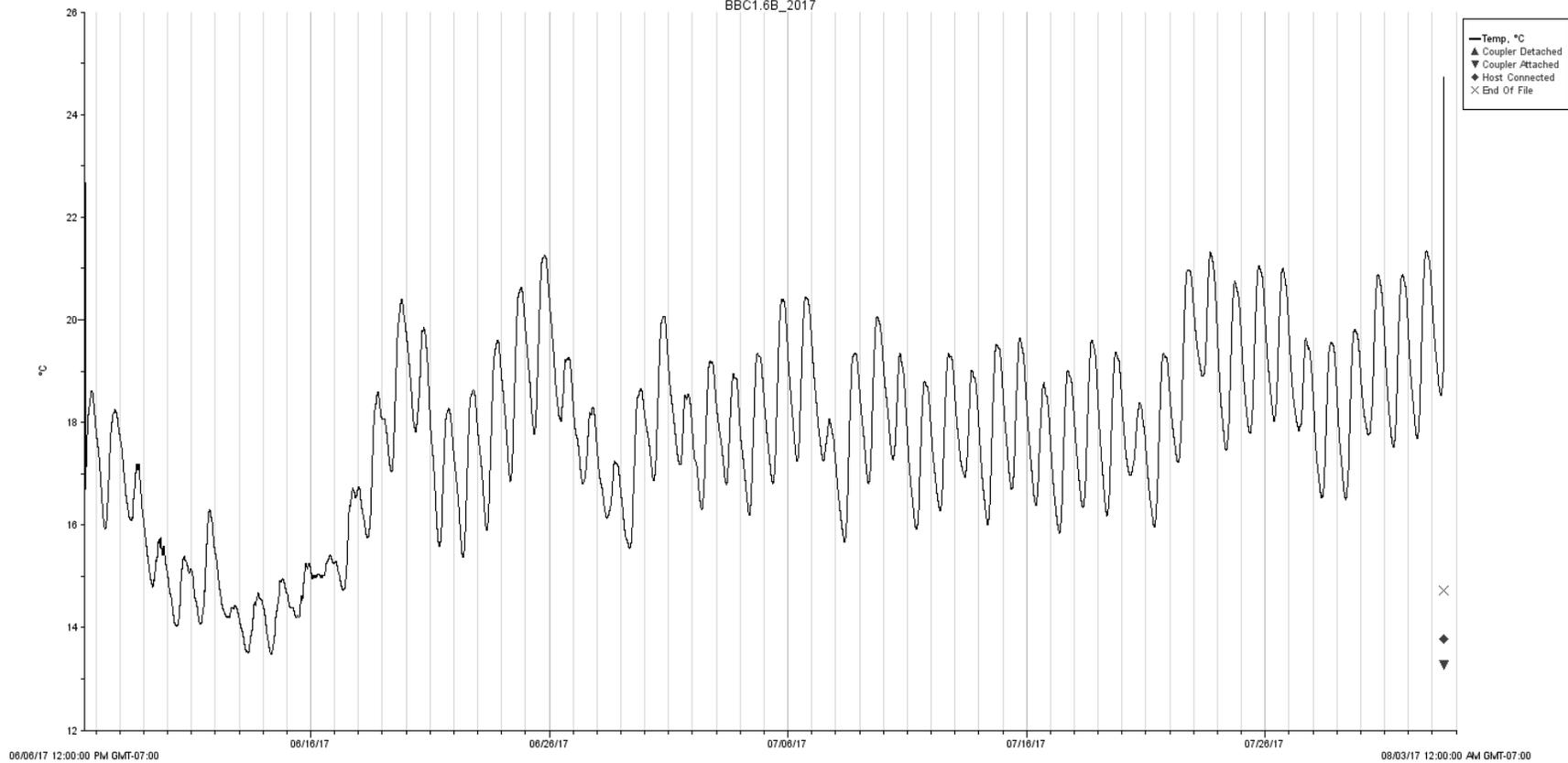
BBC 5.9_2017



BBC2.6A_2017



BBC1.6B_2017



TECHNICAL MEMORANDUM

Date: October 9, 2017
To: Dorie Sutton, City of Vancouver
Copy to: Rob Zisette, Herrera Environmental Consultants
From: Jess Brown, Herrera Environmental Consultants
Subject: Burnt Bridge Creek 2017 Water Quality Sampling Interim Memorandum #4

INTRODUCTION

This interim update provides a summary of the field and laboratory procedures and results associated with monitoring activities conducted on August 30, 2017, for Event 4 of the Burnt Bridge Creek 2017 Trend Analysis Project. Monitoring and laboratory analysis were conducted in accordance with the project *Quality Assurance Project Plan* (QAPP; Herrera 2014) and modifications for 2015, 2016, and 2017 (Herrera 2015, 2016, 2017). A quality assurance review of the data collected was conducted and is summarized below. The laboratory data reports, monitoring forms containing field data, data quality review worksheet, and continuous temperature data are attached.

FIELD ACTIVITIES

Herrera conducted field measurements and water quality sampling at 11 monitoring sites on August 30, 2017, for Event 4 of the Burnt Bridge Creek 2017 Water Quality Monitoring Project. The field sampling team consisted of Rayna Gleason (Herrera) and Dorie Sutton (City of Vancouver) assisted by Linley Mescher (intern). Samples and *in situ* water quality measurements were collected from each of the 11 sites without incident and according to QAPP procedures.

A YSI ProDSS multimeter was used to collect *in situ* data. Data were downloaded from temperature probes located at seven of the eight temperature monitoring sites. The temperature probe at BBC8.8 was replaced with a new probe, Backup 1, because the original probe could not be located. At BBC7.0, it was noted that crayfish appeared to be living in the PVC probe enclosure and that feathers, debris, and sediment were present in the water. The temperature data were checked for completeness and proper function. Anomalously high values recorded on sampling dates when loggers were out of the water to download data were deleted from the records.



DATA QUALITY SUMMARY

In general, procedures described and quality control criteria defined in the QAPP were met, resulting in no data qualification or corrective action with the following exceptions:

- Six fecal coliform results qualified as estimated (J) based on colony counts falling outside of ideal range of 20 to 60.

Fecal coliform results were calculated using colony count data by the data reviewer according to QAPP procedures (Herrera 2014). Fecal coliform results reported by the laboratory and validated by the reviewer are shown in Table 1 along with data qualifiers. For this monitoring event, the laboratory was requested to increase fecal coliform filtration volumes from 2 and 20 milliliters (mL) to 5 and 50 mL to increase the colony counts and reduce the number of qualified data. The increase in filtration volume did reduce the number of qualified data and will be continued for the remaining sampling events in 2017. Note that the 2 and 20 mL dilution volumes reported in the laboratory report were mislabeled; the laboratory used 5 and 50 mL volumes as documented on the bench sheet.

Sample ID	Date Sampled	Laboratory Result (CFU/100 mL)	Validated Result (CFU/100 mL)	Qualifier
BBC10.4	8/30/17	44	44	
BBC8.8	8/30/17	118	118	
PET0.0	8/30/17	720	720	
BBC8.4	8/30/17	540	540	
BUR0.0	8/30/17	120	120	J
BBC7.0	8/30/17	100	100	J
BBC5.9	8/30/17	116	116	
BBC5.2	8/30/17	127	127	J
BBC2.6	8/30/17	112	112	
COL0.0	8/30/17	202	202	J
BBC1.6	8/30/17	255	255	J
DUPE ^a	8/30/17	202	202	J

^a Field duplicate of COL0.0

REFERENCES

Herrera. 2014. Burnt Bridge Creek Ambient Water Quality Monitoring Project – Quality Assurance Project Plan: 2014 Ambient Monitoring. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. July 3.

Herrera 2015. Burnt Bridge Creek 2015 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. June 15.

Herrera 2016. Burnt Bridge Creek 2016 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. May 25.

Herrera 2017. Burnt Bridge Creek 2017 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. May 17.

ATTACHMENTS



IEH ANALYTICAL LABORATORIES
LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	HER080-44	PAGE 1
REPORT DATE:	09/08/17	
DATE SAMPLED:	08/30/17	DATE RECEIVED: 08/31/17
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM HERRERA ENVIRONMENTAL		

CASE NARRATIVE

Twelve water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-N (mg/L)	TOTAL-P (mg/L)	SRP (mg/L)	N03+N02 (mg/L)	TSS (mg/L)	TURBIDITY (NTU)
BBC10.4-20170830	2.48	0.081	0.057	2.42	4.3	2.2
BBC8.8-20170830	2.49	0.085	0.045	2.26	12	2.9
PET0.0-20170830	1.16	0.163	0.124	1.07	5.5	1.5
BBC8.4-20170830	1.83	0.114	0.075	1.73	8.3	4.3
BUR0.0-20170830	3.53	0.059	0.051	2.53	14	2.3
BBC7.0-20170830	2.04	0.114	0.063	1.91	16	3.4
BBC5.9-20170830	1.60	0.099	0.072	1.56	3.7	1.8
BBC5.2-20170830	1.77	0.096	0.073	1.57	4.8	1.7
BBC2.6-20170830	1.65	0.098	0.076	1.45	2.5	2.7
COL0.0-20170830	1.54	0.099	0.075	1.52	3.4	3.4
BBC1.6-20170830	1.55	0.098	0.076	1.46	4.0	1.5
DUPE-20170830	1.59	0.096	0.074	1.50	4.0	2.9



IEH ANALYTICAL LABORATORIES
LABORATORY & CONSULTING SERVICES
 3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
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CASE FILE NUMBER:	HER080-44	PAGE 2
REPORT DATE:	09/08/17	
DATE SAMPLED:	08/30/17	DATE RECEIVED: 08/31/17
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM HERRERA ENVIRONMENTAL		

QA/QC DATA WATER

QC PARAMETER	TOTAL-N (mg/l)	TOTAL-P (mg/L)	SRP (mg/L)	N03+N02 (mg/L)	TSS (mg/L)	TURBIDITY (NTU)
METHOD	SM20 4500NC	EPA 365.1	EPA 365.1	SM18 4500N03F	SM18 2540D	EPA 180.1
DATE ANALYZED	09/08/17	09/06/17	09/01/17	09/01/17	09/01/17	08/31/17
DETECTION LIMIT	0.050	0.002	0.001	0.010	0.50	0.10
DUPLICATE						
SAMPLE ID	BATCH	DUPE-20170830	DUPE-20170830	DUPE-20170830	BBC8.4-20170830	BBC10.4-20170830
ORIGINAL	0.292	0.096	0.074	1.50	8.3	2.2
DUPLICATE	0.305	0.097	0.075	1.49	7.8	2.0
RPD	4.44%	0.87%	0.86%	0.43%	6.25%	9.52%
SPIKE SAMPLE						
SAMPLE ID	BATCH	DUPE-20170830	DUPE-20170830	DUPE-20170830		
ORIGINAL	0.292	0.096	0.074	1.50		
SPIKED SAMPLE	1.27	0.146	0.094	1.68		
SPIKE ADDED	1.00	0.050	0.020	0.200		
% RECOVERY	97.52%	99.71%	96.83%	92.02%	NA	NA
QC CHECK						
FOUND	0.496	0.094	0.041	0.403	10	8.0
TRUE	0.490	0.094	0.039	0.408	10	8.0
% RECOVERY	101.22%	100.00%	105.13%	98.77%	100.00%	100.00%
BLANK						
	<0.050	<0.002	<0.001	<0.010	<0.50	NA

RPD = RELATIVE PERCENT DIFFERENCE.
 NA = NOT APPLICABLE OR NOT AVAILABLE.
 NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
 OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
 Project Manager



Aquatic Research Incorporated

3927 Aurora Ave. N / Seattle, WA 98103 / (206) 632-2715

HER080-44

CHAIN-OF-CUSTODY RECORD

CLIENT: HERRERA
 SAMPLING DATE: 08.30.17
 SAMPLERS: Rayna Gleason, Doree Sutton, Lindy Mescher

SHEET 1 OF 1
 PROJECT ID: BBC
 CASE FILE NO.: _____
 DATA RECORDED BY: _____

SAMPLE INFORMATION

PARAMETERS

SAMPLE ID	DATE/TIME COLLECTED	AM-PM	Turbidity	TSS	NO ₂ +NO ₃	TN	Ortho P	TP												BOTT #	NOTES		
BBC10.4-20170802	8/30/17	8:30	x	x	x	x	x	x													2		
BBC8.8-20170802	8/30/17	8:55	x	x	x	x	x	x														2	
PET0.0-20170802	8/30/17	9:10	x	x	x	x	x	x														2	
BBC8.4-20170802	8/30/17	10:10	x	x	x	x	x	x														2	
BUR0.0-20170802	8/30/17	9:45	x	x	x	x	x	x														2	
BBC7.0-20170802	8/30/17	10:45	x	x	x	x	x	x														2	
BBC5.9-20170802	8/30/17	11:10	x	x	x	x	x	x														2	
BBC5.2-20170802	8/30/17	11:35	x	x	x	x	x	x														2	
BBC2.6-20170802	8/30/17	12:50	x	x	x	x	x	x														2	
COL0.0-20170802	8/30/17	1:10	x	x	x	x	x	x														2	
BBC1.6-20170802	8/30/17	1:25	x	x	x	x	x	x														2	
DUPE-20170802	8/30/17	-	x	x	x	x	x	x														2	

Printed Name	Relinquished By	Date/Time	Received By	Date/Time
	<u>RAYNA GLEASON</u>	<u>8/30/17 2:50pm</u>		
Signature	<u>[Signature]</u>			
Affiliation	<u>HERRERA</u>			

Printed Name	Relinquished By	Date/Time	Received By	Date/Time
			<u>[Signature]</u>	<u>08/31/17 1000</u>
Signature			<u>(12) samples (24) bottles</u>	<u>2.3°C</u>
Affiliation				

Miscellaneous Notes (Hazardous Materials, Quick turn-around time, etc.): _____

PIXIS Labs

Accurate. Reliable. On Time.

Pixis Labs

12423 NE Whitaker Way

Portland, OR 97230

503-254-1794

Job Number: 7083013
Report Date: 09/12/2017
ORELAP #: OR100028
Project Name: 14-05818-003
Project No: Burnt Bridge Creek Monitoring 2017

Cover Letter

Jess Brown
Herrera Environmental Consultants, Inc.
24 NW 2nd Ave., Suite 204
PORTLAND, OR 97209

Dear Jess Brown,

Enclosed please find Pixis Labs analytical report for samples received as order number 7083013 on 08/30/2017. Should you have any questions about this report or any other matter, please do not hesitate to contact us. We are here to help you.

Test results relate only to the parameters tested and to the samples as received by the laboratory. Test results meet all requirements of NELAP and the Pixis quality assurance plan unless otherwise noted. This report shall not be reproduced, except in full, without the written consent of this laboratory. Samples will be kept a maximum of 15 days from the report date unless prior arrangements have been made.

Thank you for allowing Pixis to be of service to you, we appreciate your business.

Sincerely,

Signed
Mark Leed
Client Services

Sample Results

Sample: BBC10.4-20170802							Collected: 08/30/17 08:30	Temp: 15 C	Matrix: General Water
Lab ID: 139536							Received: 08/30/17 14:10	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	44.0	/100 mL	2.00	2	32600-3	08/30/17 17:00	08/31/17 17:00		
Sample: BBC8.8-20170802							Collected: 08/30/17 08:55	Temp: 15 C	Matrix: General Water
Lab ID: 139537							Received: 08/30/17 14:10	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	118	/100 mL	2.00	2	32600-4	08/30/17 17:00	08/31/17 17:00		
Sample: PET0.0-20170802							Collected: 08/30/17 09:10	Temp: 15 C	Matrix: General Water
Lab ID: 139538							Received: 08/30/17 14:10	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	720	/100 mL	2.00	2	32600-5	08/30/17 17:00	08/31/17 17:00		
Sample: BBC8.4-20170802							Collected: 08/30/17 10:10	Temp: 15 C	Matrix: General Water
Lab ID: 139539							Received: 08/30/17 14:10	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	540	/100 mL	20.0	20	32600-6	08/30/17 17:00	08/31/17 17:00		
Sample: BUR0.0-20170802							Collected: 08/30/17 09:45	Temp: 15 C	Matrix: General Water
Lab ID: 139540							Received: 08/30/17 14:10	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	120	/100 mL	2.00	2	32600-7	08/30/17 17:00	08/31/17 17:00		
Sample: BBC7.0-20170802							Collected: 08/30/17 10:45	Temp: 15 C	Matrix: General Water
Lab ID: 139542							Received: 08/30/17 14:10	Evidence of Cooling:Y	
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes	
Method: SM 9222-D									
Fecal Coliform	100	/100 mL	2.00	2	32600-8	08/30/17 17:00	08/31/17 17:00		

Sample: BBC5.9-20170802		Collected: 08/30/17 11:10		Temp: 15 C		Matrix: General Water		
Lab ID: 139544		Received: 08/30/17 14:10		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	116	/100 mL	2.00	2	32600-9	08/30/17 17:00	08/31/17 17:00	

Sample: BBC5.2-20170802		Collected: 08/30/17 11:35		Temp: 15 C		Matrix: General Water		
Lab ID: 139545		Received: 08/30/17 14:10		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	127	/100 mL	20.0	20	32600-10	08/30/17 17:00	08/31/17 17:00	

Sample: BBC2.6-20170802		Collected: 08/30/17 12:50		Temp: 15 C		Matrix: General Water		
Lab ID: 139546		Received: 08/30/17 14:10		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	112	/100 mL	2.00	2	32600-11	08/30/17 17:00	08/31/17 17:00	

Sample: COL0.0-20170802		Collected: 08/30/17 13:10		Temp: 15 C		Matrix: General Water		
Lab ID: 139547		Received: 08/30/17 14:10		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	202	/100 mL	20.0	20	32600-12	08/30/17 17:00	08/31/17 17:00	

Sample: BBC1.6-20170802		Collected: 08/30/17 13:25		Temp: 15 C		Matrix: General Water		
Lab ID: 139548		Received: 08/30/17 14:10		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	255	/100 mL	20.0	20	32600-13	08/30/17 17:00	08/31/17 17:00	

Sample: DUPE-20170802		Collected: 08/30/17		Temp: 15 C		Matrix: General Water		
Lab ID: 139549		Received: 08/30/17 14:10		Evidence of Cooling:Y				
Analyte	Result	Units	MRL	Dil.	Batch	Start/Extract	Analyzed	Notes
Method: SM 9222-D								
Fecal Coliform	202	/100 mL	20.0	20	32600-14	08/30/17 17:00	08/31/17 17:00	

Laboratory Quality Control Results

SM 9222-D

QC - FC NEGATIVE -							Batch ID: 32600-1			
Analyte	Result		Spike	Units	Recovery	Limits	RPD	Limit	Notes	
Fecal Coliform	<1	Absent		/100 mL	0 %	-	---	---		
QC - FC POSITIVE -							Batch ID: 32600-2			
Analyte	Result		Spike	Units	Recovery	Limits	RPD	Limit	Notes	
Fecal Coliform	TNTC	Present		/100 mL	0 %	-	---	---		

Abbreviations

MRL Method Reporting Limit
ND None Detected at or above the MRL
RPD Relative Percent Difference

Units of Measure:

/100 mL Per 100 mL



Herrera Environmental Consultants, Inc



2200 Sixth Avenue | Suite 1100
Seattle, Washington | 98121
p 206 441 9080 | f 206 441 9108

Chain of Custody Record

Project Name: Burnt Bridge Creek Monitoring 2017		Project Number: 14-05818-003		Client: City of Vancouver			Number of Containers Fecal Coliform- SM 9222D	Analyses Requested										Lab ID No.				
Report To: Jess Brown, jbrown@herrerainc.com				Copy To: RGleason@herrerainc.com																		
Sampled By: Rayna Gleason				Delivery Method:																		
Laboratory: PIXIS Labs		Requested Completion Date:		Total No. of Containers: 12																		
Lab Use:				Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)																
Sample ID	Date	Time (Am)																				
BBC10.4-20170802	BNO21	8/30/17	8:30 am	G	Y	SW	1	✓														
BBC8.8-20170802	BNO21	8/30/17	8:55	G	Y	SW	1	✓														
PET0.0-20170802	"	8/30/17	9:10	G	Y	SW	1	✓														
BBC8.4-20170802	BNO21	8/30/17	10:10	G	Y	SW	1	✓														
BUR0.0-20170802	CM013	8/30/17	9:45	G	Y	SW	1	✓														
BBC7.0-20170802	BNO21	8/30/17	10:45	G	Y	SW	1	✓														
BBC5.9-20170802	"	8/30/17	11:10	G	Y	SW	1	✓														
BBC5.2-20170802	BNO21	8/30/17	11:35	G	Y	SW	1	✓														
BBC2.6-20170802	"	8/30/17	12:50 pm	G	Y	SW	1	✓														
COLO.0-20170802	BNO21	8/30/17	1:10 pm	G	Y	SW	1	✓														
BBC1.6-20170802	"	8/30/17	1:25 pm	G	Y	SW	1	✓														
DUPE-20170802	BNO21	8/30/17	-	G	Y	SW	1	✓														

Comments/Special Instructions:

IMPORTANT: Please use two dilution volumes for the analysis: 5 mL and 50 mL. Include a laboratory duplicate. Please complete and return attached bench sheet.

15.3

Relinquished by (Name/CO) RAYNA GLEASON	Signature <i>Rayna Gleason</i>	Date/Time 2:06	Received By (Name/CO) <i>Judy</i>	Signature <i>Judy</i>	Date/Time 8/30/17 14:10
Relinquished by (Name/CO)	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time

Sample Type: G=Grab C=Composite Matrix Codes: A=Air GW=Groundwater SE=Sediment SO=Soil SW=Surface Water W=Water (blanks) M=Material O=Other (specify)

Fecal Analysis Bench Sheet

Sample ID	Volume (mL)	Colonies counted	Result* (CPN/100 mL)	Herrera Check
BBC10.4-20170830 (01)	5	0	44 ✓	44
	50	22		
BBC8.8-20170830 (02)	5	0	118 ✓	118
	50	59		
PET0.0-20170830 (03)	5	36	720 ✓	720
	50	142		
BBC8.4-20170830 (04)	5	27	540 ✓	540
	50	91		
BUR0.0-20170830 (05)	5	5	120 ✓	120 J
	50	61		
BBC7.0-20170830 (06)	5	5	100 ✓	100 J
	50	TNTC		
BBC5.9-20170830 (07)	5	6	116 ✓	116
	50	58		
BBC5.2-20170830 (08)	5	4	127 ✓	127 J
	50	66		
BBC2.6-2017083030 (09)	5	3	112 ✓	112
	50	56		
COLO.0-20170830 (10)	5	13	202 ✓	202 J
	50	98		
BBC1.6-20170830 (11)	5	8	255 ✓	255 J
	50	132		
DUPE-20170830 (12)	5	17	202 ✓	202 J
	50	94		
Lab Duplicate-BBC8.8-20170830	5	7	110 ✓	100
	50	55		
Negative Control	100	0	<1 ✓	OK
Positive Control	100	TNTC	TNTC ✓	OK

***Calculation of Results**

Density: use if only one count is within ideal range (20-60 colonies)

$$\frac{\text{Colonies}}{100 \text{ mL}} = \frac{\text{Colonies counted}}{\text{mL Sample Filtered}} \times 100$$

Average Density: use if all counts are outside of ideal range (20-60 colonies) excluding counts greater than 200 or if more than one count is within ideal range

$$\frac{\text{Colonies}}{100 \text{ mL}} = \frac{\sum \text{Colonies counted}}{\sum \text{mL sample filtered}} \times 100$$

If all >200 colonies calculate density of value closest to 200 and add greater than to result (e.g. >1000)

checked 9/13/17
by Jess Brown




Data Quality Assurance Worksheet

Project Name/No./Client: Burnt Bridge Creek / 14-05818-003 / City of Vancouver, Washington

Laboratory/Parameters: IEH-Aquatic Research / nitrogen, phosphorus, SRP, nitrate-nitrite, TSS, turbidity
PIXIS Labs/ Fecal Coliform

Sample Date/Sample ID: 8/30/17 / Event 4 (11 stations plus field duplicate of COL0.0)

By J. Brown

Date 9/13/17 Page 1 of 1

Checked: initials RZ

date 9/25/17

Parameter	Completeness/ Methodology	Holding Times (days)		Blanks/ Reporting Limit	Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Field Duplicates RPD (%)		Instrument Calibration/ Performance	ACTION
		Reported	Goal		Reported	Goal	Reported	Goal	Reported	Goal ¹	Reported	Goal ¹		
Total Nitrogen	OK / SM4500N-C	9	<28	<0.050 / 0.050 mg/L	98	90-110	101	90-110	Batch 4	<20	3	<20	OK	
Total Phosphorus	OK / EPA 365.1	7	<28	<0.002 / 0.002 mg/L	100	90-110	100	90-110	1	<20	3	<20	OK	
SRP	OK / EPA 365.1	<48 hours	<48 hours ²	<0.001 / 0.001 mg/L	97	90-110	105	90-110	1	<20	1	<20	OK	
Nitrate + Nitrite	OK / EPA 353.2	2	<28	<0.010 / 0.010 mg/L	92	90-110	99	90-110	1	<20	1	<20	OK	
TSS	OK / EPA 160.2	2	<7	<0.5 / 0.5 mg/L	NA	NA	100	90-110	6	<20	16	<20	OK	
Turbidity	OK / SM2130-B	24 hours	<48	<0.1 / 0.1 NTU	NA	NA	100	90-110	10	<20	16	<20	OK	
Fecal coliform	OK / SM9222-D	4-9 hours	<24	<5 / 5 CFU/ 100mL	NA	NA	NA	NA	17	<35	0	<35	OK	See NOTE A for flags.

¹ If the sample or duplicate value is less than five times the reporting limit, then the difference (D) is calculated rather than the RPD and the QA objective is that the difference shall not exceed 2 times the reporting limit instead of the number indicated in the objective column.

² Less than 24 hours from collection to filtration.



Data Quality Assurance Worksheet

Project Name/No./Client: Burnt Bridge Creek / 14-05818-003 / City of Vancouver, Washington

Laboratory/Parameters: IEH-Aquatic Research / nitrogen, phosphorus, SRP, nitrate-nitrite, TSS, turbidity
PIXIS Labs/ Fecal Coliform

Sample Date/Sample ID: 8/30/17 / Event 4 (11 stations plus field duplicate of COL0.0)

By J. Brown

Date 9/13/17 Page 1 of 1

Checked: initials RZ

date 9/25/17

Parameter	Completeness/ Methodology	Holding Times (days)		Blanks/ Reporting Limit	Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Field Duplicates RPD (%)		Instrument Calibration/ Performance	ACTION
		Reported	Goal		Reported	Goal	Reported	Goal	Reported	Goal ¹	Reported	Goal ¹		
Temperature	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	<20	OK	None
Dissolved Oxygen	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5	<20	OK	None
pH	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.4	<20	OK	None
Conductivity	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.1	<20	OK	None

NOTE A: Flag fecal coliform results for BUR0.0, BBC7.0, BBC5.2, COL0.0, BBC1.6, and DUPE due to colony counts of range (<20 or >60).

NA – not applicable or not available
 RPD- relative percent difference

NC – not calculable due to one or more values below the detection limit
 SRP –soluble reactive phosphorus

NS – field duplicate not sampled
 TSS – total suspended solids

¹ If the sample or duplicate value is less than five times the reporting limit, then the difference (D) is calculated rather than the RPD and the QA objective is that the difference shall not exceed 2 times the reporting limit instead of the number indicated in the objective column.

² Less than 24 hours from collection to filtration.



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003
 CLIENT: City of Vancouver
 FIELD PERSONNEL: RAYNA GLEASON DORIE SCITON LINDY MESSNER
 SITE ID: BBC 10.4 DATE: 8/30/17 TIME: 8:30
 WEATHER: COOL OVERCAST
 NOTES: WATER CLEAR VEGETATION HEAVY TRASH

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES:	NO:
TEMPERATURE:	<u>15.4°</u>			<input checked="" type="checkbox"/>
DISSOLVED OXYGEN:	<u>6.44 % 6.43</u>			
PH:	<u>6.31</u>			
CONDUCTIVITY:	<u>180.1</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC10.4-20170830</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		

Calibration pre-event
 Conductivity: 913 μ S/cm \rightarrow 1000
 PH: 6.82 \rightarrow 7.00, 3.56 \rightarrow 4.01, 9.95 \rightarrow 10.01
 DO: 99.9% \rightarrow 99.5%



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: ~~BBC 8.8~~ Gleason, Sutton, Meschen

SITE ID: BBC 8.8 DATE: 8/30/2017 TIME: 8:55

WEATHER: overcast

NOTES: changed temp. probe at 9:20am, probe was missing

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: <input type="checkbox"/>	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>16.9 °C</u>			
DISSOLVED OXYGEN:	<u>89.0% 8.62 mg/L</u>			
PH:	<u>7.24</u>			
CONDUCTIVITY:	<u>178.8</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 8.8- 20170830</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input type="checkbox"/>	
250 mL UNPRESERVED BOTTLE:	<input type="checkbox"/>	
100 mL FECAL BOTTLE:	<input type="checkbox"/>	



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Sutton, Mescher

SITE ID: PET 0.0 DATE: 8/30/17 TIME: 9:10

WEATHER: overcast, low 70s

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>17.7 °C</u>			
DISSOLVED OXYGEN:	<u>84.7%</u> <u>8.07mg/L</u>			
PH:	<u>7.26</u>			
CONDUCTIVITY:	<u>264.1</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	BBG PET 0.0 - 20170830
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Sutton, Mescher

SITE ID: BBC 8.4 DATE: 08/30/2017 TIME: 10:10

WEATHER: overcast

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE? YES: _____ NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>17.1 °C</u>	
DISSOLVED OXYGEN:	<u>84.9 %</u> <u>8.18 mg/L</u>	
PH:	<u>7.29</u>	
CONDUCTIVITY:	<u>213.5</u>	

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 8.4 - 20170830</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: BURO.0 - Gleason, Sutton, Mescher

SITE ID: BURO.0 DATE: 8/30/2017 TIME: 9:45

WEATHER: overcast

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>15.1 °C</u>			
DISSOLVED OXYGEN:	<u>97.7 %</u> <u>8.81 mg/L</u>			
PH:	<u>7.22</u>			
CONDUCTIVITY:	<u>188.7</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BURO.0 - 20170830</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Sutton, Mescher

SITE ID: BBC 1.0 DATE: 08.30.17 TIME: 10:45

WEATHER: overcast

NOTES: feathers, debris, sediment in water, ~~hermit crab~~ ^{crayfish} has been living in probe PVC sheath

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: <input checked="" type="checkbox"/>	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>16.6 °C</u>		<u>16.6 °C</u>	
DISSOLVED OXYGEN:	<u>78.7% 7.65 mg/L</u>		<u>78.2% 7.61 mg/L</u>	
PH:	<u>7.12</u>		<u>7.15</u>	
CONDUCTIVITY:	<u>194.3</u>		<u>194.5</u>	

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 7.0 - 20170830</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input type="checkbox"/>	
250 mL UNPRESERVED BOTTLE:	<input type="checkbox"/>	
100 mL FECAL BOTTLE:	<input type="checkbox"/>	



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Sutton, Mescher

SITE ID: BBC 5.9 DATE: 08.31.17 TIME: 11:10

WEATHER: _____

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>17.20C</u>			
DISSOLVED OXYGEN:	<u>71.5% 6.86 mg/L</u>			
PH:	<u>7.18</u>			
CONDUCTIVITY:	<u>202.0</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC5.9-20170830</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Sutton, Mescher

SITE ID: BBC 5.2 DATE: 08.30.17 TIME: 11:35

WEATHER: overcast

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>17.4 °C</u>			
DISSOLVED OXYGEN:	<u>95.4% 9.11 mg/L</u>			
PH:	<u>7.54</u>			
CONDUCTIVITY:	<u>203.0</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC5.2 - 20170830</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Sutton, Mescher

SITE ID: BBC 2.6 DATE: 08.30.17 TIME: 12:50

WEATHER: partly cloudy

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>17.8 °C</u>			
DISSOLVED OXYGEN:	<u>99.2% 9.43 mg/L</u>			
pH:	<u>7.82</u>			
CONDUCTIVITY:	<u>210.7</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 2.6 - 20170830</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: ~~Glendon~~ Gleason, Sutton, Mescher

SITE ID: COL 0.0 DATE: 08.30.17 TIME: 1:10

WEATHER: sunny

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>14.6°C</u>			
DISSOLVED OXYGEN:	<u>98.3%</u> <u>9.99mg/L</u>			
PH:	<u>7.95</u>			
CONDUCTIVITY:	<u>257.8</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	BBC COL 0.0 - 20170830
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	BBC - DUPE
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Sutton, Mescher

SITE ID: BBC 1.6 DATE: 08.30.17 TIME: 1:25

WEATHER: Sunny High ~80°F

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>17.7°C</u>			
DISSOLVED OXYGEN:	<u>9.8.1%</u> <u>9.34 mg/L</u>			
PH:	<u>7.85</u>			
CONDUCTIVITY:	<u>216.3</u>			

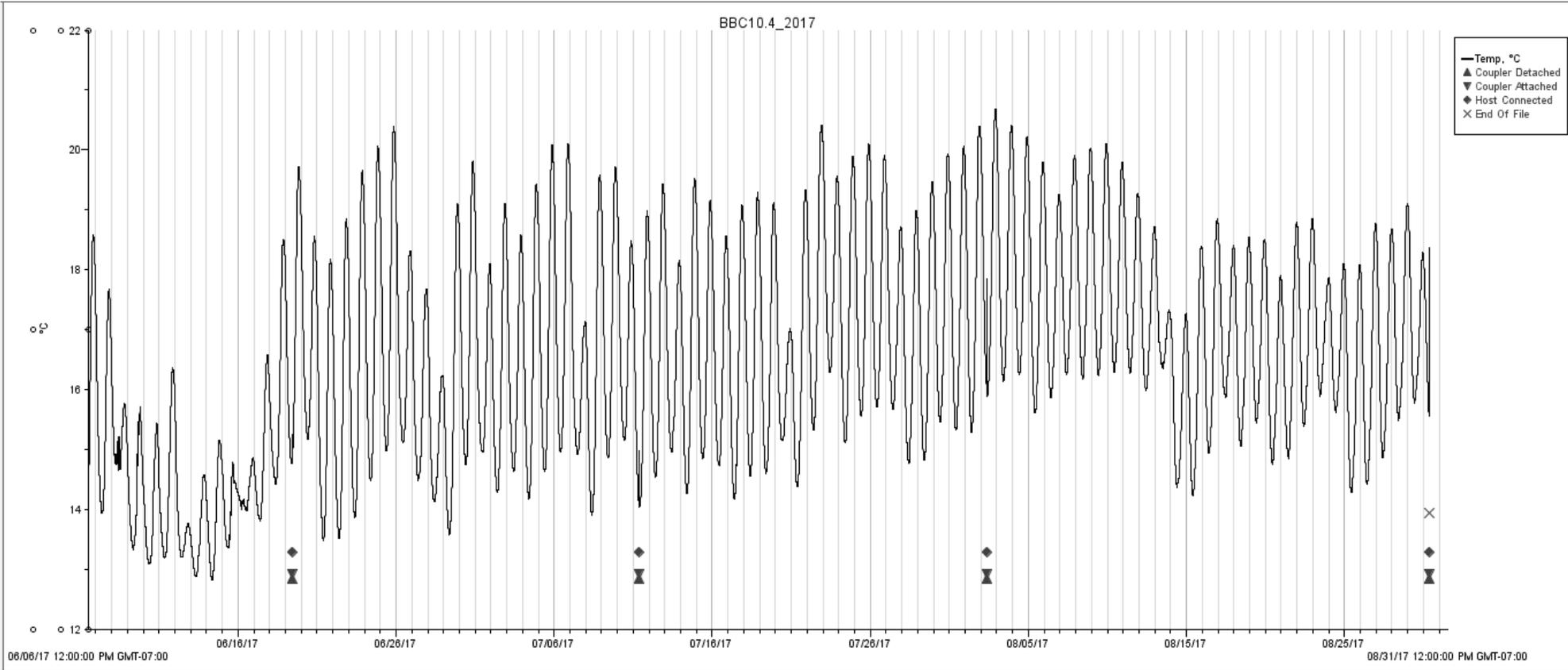
SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 1.6-20170930</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

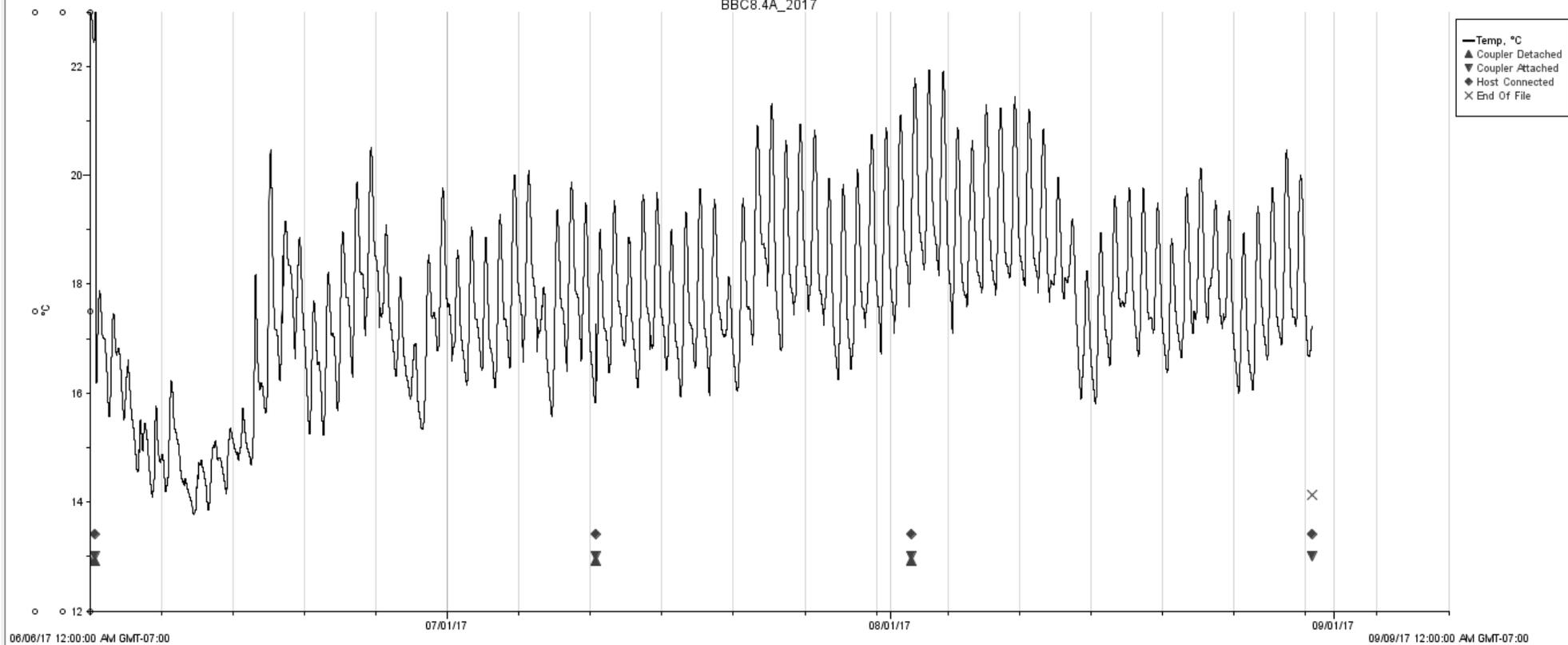
DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		

Calibration post event:
 Conductivity: 988 → 1060 μ S/cm
 PH: 6.86 → 7.00, 3.52 → 4.01, 9.95 → 10.01
 DO: 99.6% → 100%

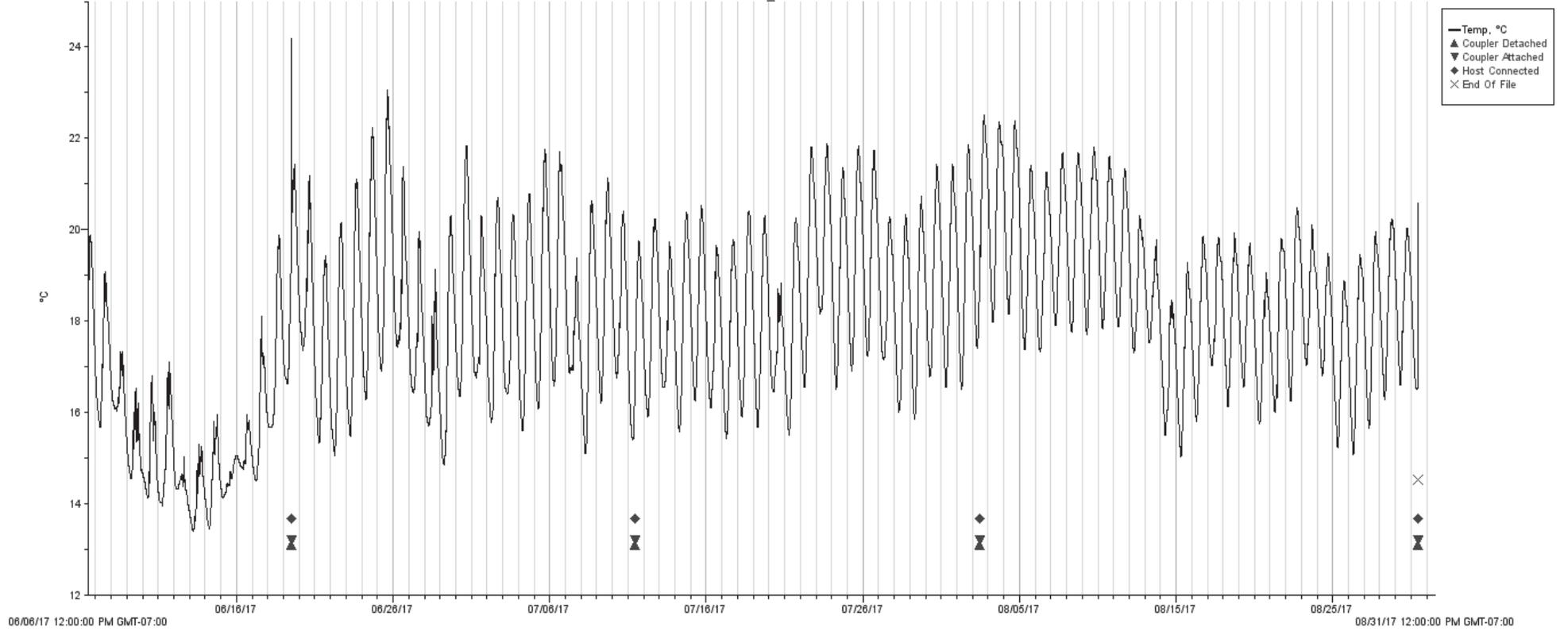
BBC10.4_2017



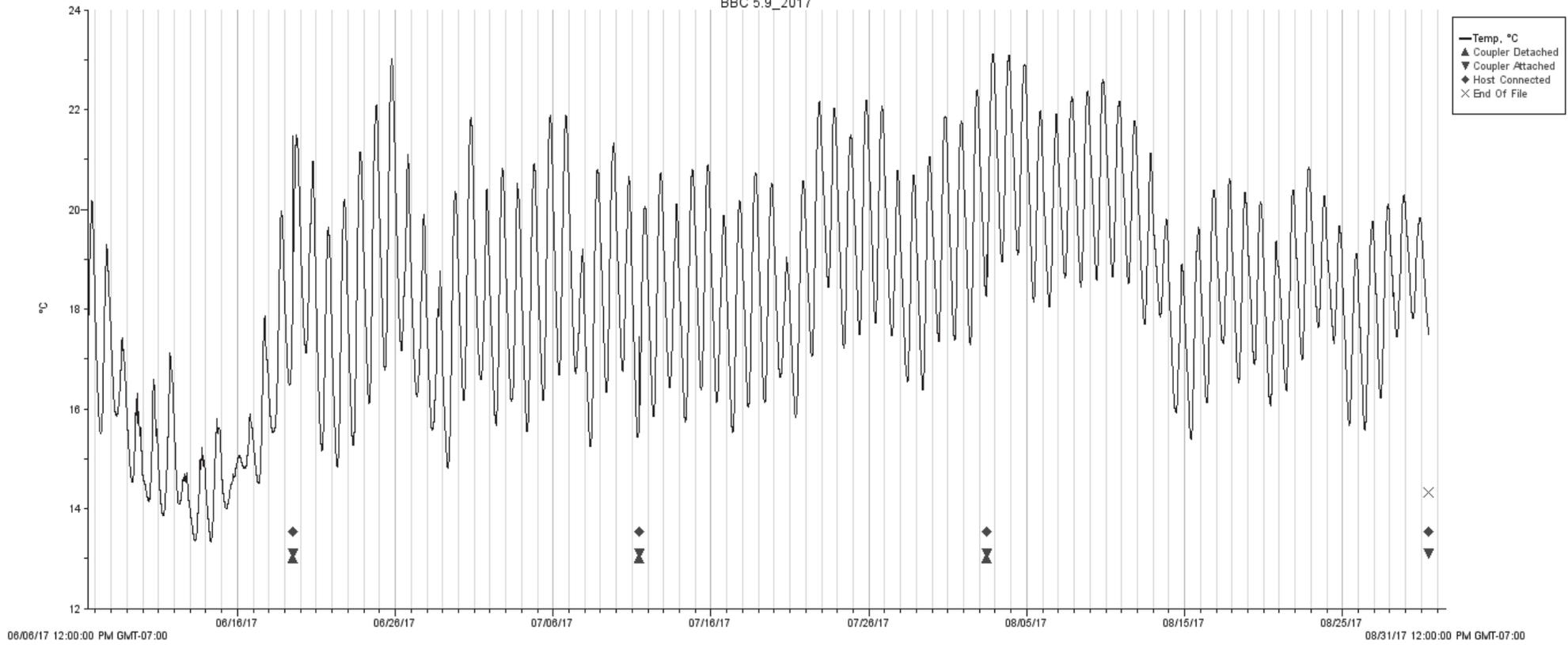
BBC8.4A_2017



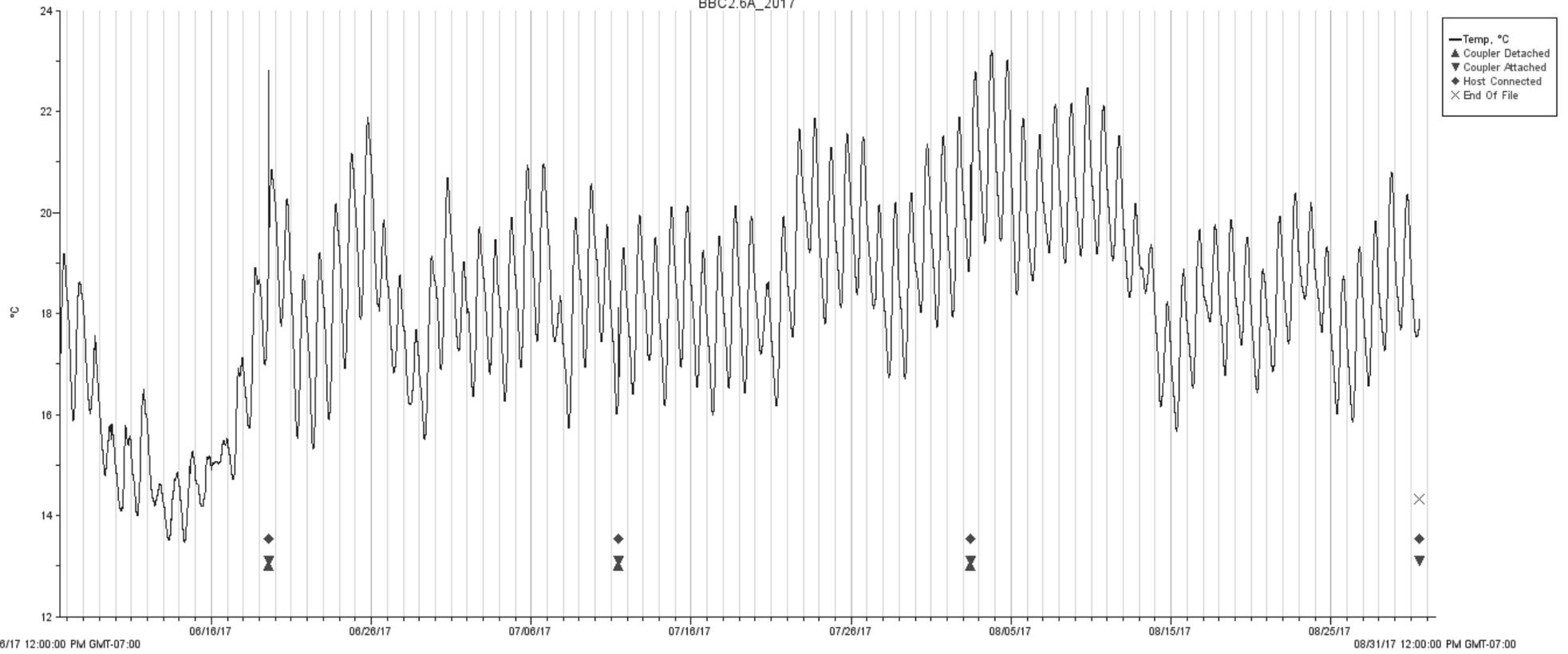
BBC 7.0_2017



BBC 5.9_2017



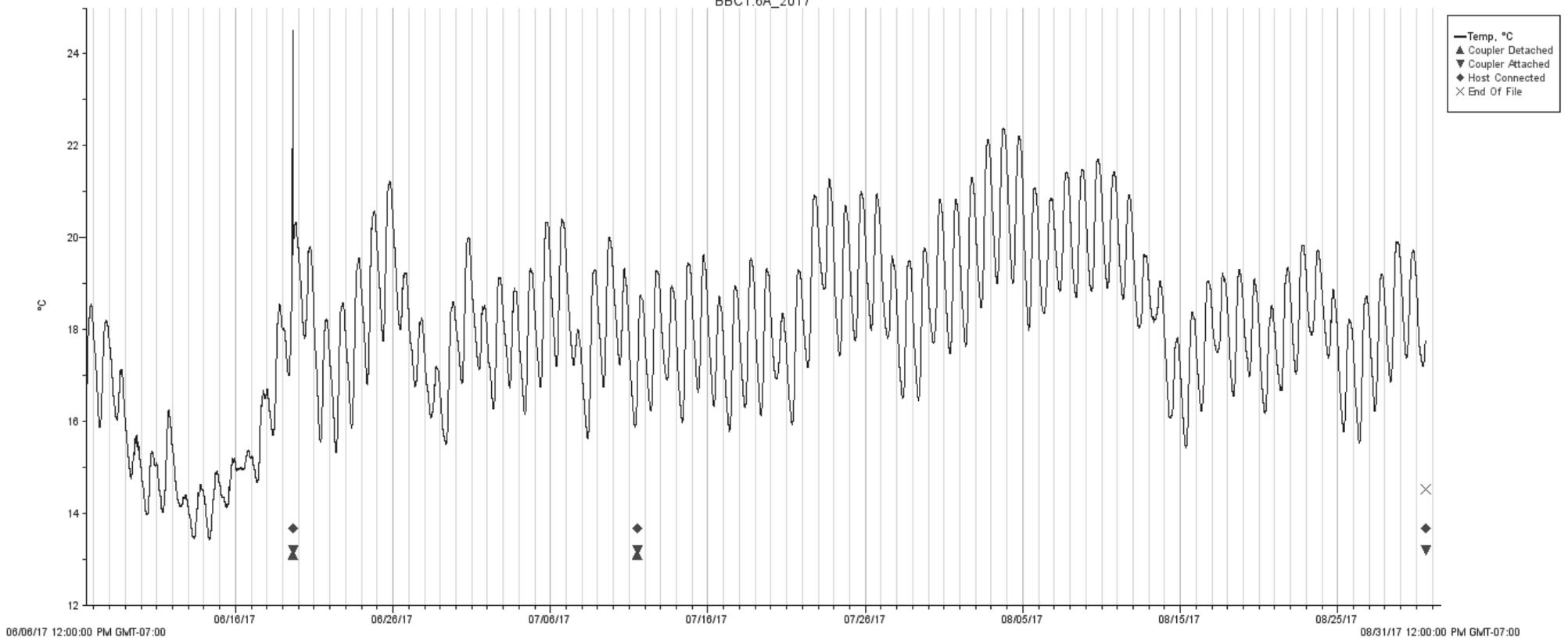
BBC2.6A_2017



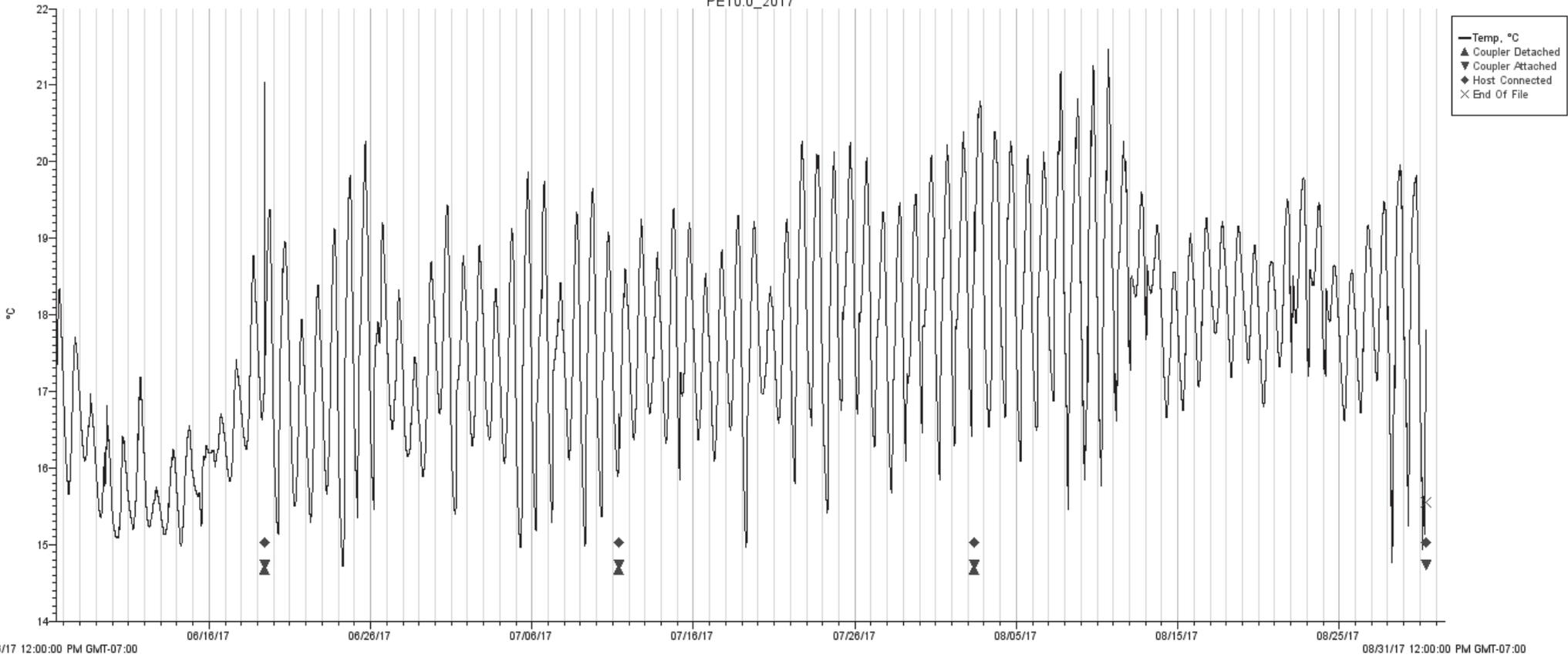
06/08/17 12:00:00 PM GMT-07:00

08/31/17 12:00:00 PM GMT-07:00

BBC1.6A_2017



PET0.0_2017



TECHNICAL MEMORANDUM

Date: November 1, 2017
To: Dorie Sutton, City of Vancouver
Copy to: Rob Zisette, Herrera Environmental Consultants
From: Jess Brown, Herrera Environmental Consultants
Subject: Burnt Bridge Creek 2017 Water Quality Sampling Interim Memorandum #5

INTRODUCTION

This interim update provides a summary of the field and laboratory procedures and results associated with monitoring activities conducted on September 26, 2017, for Event 5 of the Burnt Bridge Creek 2017 Trend Analysis Project. Monitoring and laboratory analysis were conducted in accordance with the project *Quality Assurance Project Plan* (QAPP; Herrera 2014) and modifications for 2015, 2016, and 2017 (Herrera 2015, 2016, 2017). A quality assurance review of the data collected was conducted and is summarized below. The laboratory data reports, monitoring forms containing field data, data quality review worksheet, and continuous temperature data are attached.

FIELD ACTIVITIES

Herrera conducted field measurements and water quality sampling at 11 monitoring sites on September 26, 2017, for Event 5 of the Burnt Bridge Creek 2017 Water Quality Monitoring Project. The field sampling team consisted of Rayna Gleason (Herrera) assisted by Linley Mescher (intern for the City of Vancouver). Samples and *in situ* water quality measurements were collected from each of the 11 sites without incident and according to QAPP procedures.

A YSI ProDSS multimeter was used to collect *in situ* data. Data were downloaded from seven of eight temperature probes located at each of the eight temperature monitoring sites. At BBC1.6, data from the backup probe was downloaded because the main probe was missing. The main probe was replaced with a backup probe (Backup 2). At BBC8.4, the main probe was not found; and data from the backup probe could not be downloaded due to a malfunction. The probe was placed back in the stream without downloading data because there were no other backup probes available. Two newly purchased probes were installed at BBC8.4 on October 3, 2017. The malfunctioning probe was retrieved; and its data was successfully downloaded after troubleshooting, providing a complete set of temperature data.



The temperature data were checked for completeness and proper function. Anomalously high values recorded on sampling dates when loggers were out of the water to download data were deleted from the records.

DATA QUALITY SUMMARY

In general, procedures described and quality control criteria defined in the QAPP were met, resulting in no data qualification or corrective action with the following exceptions:

- One turbidity result (sample BBC1.6) qualified as estimated (J) based on the field duplicate RPD (59 percent versus the objective of ≤ 20 percent).
- One TSS result (sample BBC1.6) qualified as estimated (J) based on the field duplicate RPD (29 percent versus the objective of ≤ 20 percent).
- Eight fecal coliform results qualified as estimated (J) based on colony counts falling outside of ideal range of 20 to 60.

Fecal coliform results were calculated using colony count data by the data reviewer according to QAPP procedures (Herrera 2014). Fecal coliform results reported by the laboratory and validated by the reviewer are shown in Table 1 along with data qualifiers. For this event, PIXIS laboratory subcontracted the fecal coliform analysis to another laboratory, BSK Associates, located in Vancouver, Washington. The subcontracted laboratory did not follow procedures on the chain-of-custody form submitted to PIXIS, which requested a laboratory duplicate and two dilution volumes (5 and 50 mL) per sample, because PIXIS did not convey those requests on a separate chain-of-custody form that was submitted to the subcontracted laboratory. The laboratory did not analyze a laboratory duplicate and used either a 5 or 50 mL dilution volume for each sample. PIXIS laboratory was reminded of project specific procedures (i.e., laboratory duplicate and two dilution volumes per sample) for future fecal coliform analysis.

Table 1. Fecal Coliform Bacteria Results and Associated Qualifiers.				
Sample ID	Date Sampled	Laboratory Result (CFU/100 mL)	Validated Result (CFU/100 mL)	Qualifier
BBC10.4	9/26/17	66	66	
BBC8.8	9/26/17	96	96	
PET0.0	9/26/17	140	140	J
BBC8.4	9/26/17	240	240	J
BUR0.0	9/26/17	220	216	J
BBC7.0	9/26/17	180	180	J
BBC5.9	9/26/17	140	140	J
BBC5.2	9/26/17	240	240	J
BBC2.6	9/26/17	210	212	J
COL0.0	9/26/17	200	200	J
BBC1.6	9/26/17	400	400	
DUPE ^a	9/26/17	440	440	

^a Field duplicate of BBC1.6

REFERENCES

Herrera. 2014. Burnt Bridge Creek Ambient Water Quality Monitoring Project – Quality Assurance Project Plan: 2014 Ambient Monitoring. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. July 3.

Herrera 2015. Burnt Bridge Creek 2015 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. June 15.

Herrera 2016. Burnt Bridge Creek 2016 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. May 25.

Herrera 2017. Burnt Bridge Creek 2017 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. May 17.

ATTACHMENTS



IEH ANALYTICAL LABORATORIES
LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	HER080-45	PAGE 1
REPORT DATE:	10/11/17	
DATE SAMPLED:	09/26/17	DATE RECEIVED: 09/27/17
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM HERRERA ENVIRONMENTAL		

CASE NARRATIVE

Twelve water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-N (mg/L)	TOTAL-P (mg/L)	SRP (mg/L)	N03+N02 (mg/L)	TSS (mg/L)	TURBIDITY (NTU)
BBC10.4-20170926	3.08	0.101	0.063	2.20	6.5	3.0
BBC8.8-20170926	2.94	0.098	0.060	2.10	5.5	2.1
PET0.0-20170926	1.81	0.168	0.128	1.34	2.2	0.95
BBC8.4-20170926	2.96	0.124	0.087	1.77	7.2	2.4
BUR0.0-20170926	2.04	0.075	0.060	1.81	<0.50	0.90
BBC7.0-20170926	1.85	0.129	0.084	1.46	11	3.1
BBC5.9-20170926	2.41	0.127	0.089	1.42	4.8	1.9
BBC5.2-20170926	2.39	0.125	0.087	1.43	5.4	2.0
BBC2.6-20170926	2.52	0.125	0.087	1.43	3.8	2.9
COL0.0-20170926	1.76	0.116	0.079	1.40	7.2	3.5
BBC1.6-20170926	2.25	0.122	0.088	1.50	11	4.0
DUPE-20170926	2.14	0.127	0.088	1.38	6.0	3.0



IEH ANALYTICAL LABORATORIES
LABORATORY & CONSULTING SERVICES
 3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
 PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER: HER080-45 **PAGE 2**
REPORT DATE: 10/11/17
DATE SAMPLED: 09/26/17 **DATE RECEIVED:** 09/27/17
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER
SAMPLES FROM HERRERA ENVIRONMENTAL

QA/QC DATA WATER

QC PARAMETER	TOTAL-N (mg/l)	TOTAL-P (mg/L)	SRP (mg/L)	N03+N02 (mg/L)	TSS (mg/L)	TURBIDITY (NTU)
METHOD	SM20 4500NC	EPA 365.1	EPA 365.1	SM18 4500N03F	SM18 2540D	EPA 180.1
DATE ANALYZED	10/10/17	10/09/17	09/28/17	09/28/17	10/03/17	09/28/17
DETECTION LIMIT	0.050	0.002	0.001	0.010	0.50	0.10
DUPLICATE						
SAMPLE ID	DUPE-20170926	DUPE-20170926	BATCH	BATCH	BATCH	BATCH
ORIGINAL	2.14	0.127	0.005	0.151	1.6	4.5
DUPLICATE	2.16	0.125	0.005	0.143	1.8	4.4
RPD	0.68%	1.46%	2.20%	5.34%	13.33%	2.25%
SPIKE SAMPLE						
SAMPLE ID	DUPE-20170926	DUPE-20170926	BATCH	BATCH		
ORIGINAL	2.14	0.127	0.005	0.151		
SPIKED SAMPLE	3.23	0.177	0.025	0.344		
SPIKE ADDED	1.00	0.050	0.020	0.200		
% RECOVERY	108.94%	100.23%	104.00%	96.59%	NA	NA
QC CHECK						
FOUND	0.490	0.096	0.041	0.438	10	8.0
TRUE	0.490	0.094	0.039	0.408	10	8.0
% RECOVERY	100.00%	102.13%	105.13%	107.35%	100.00%	100.00%
BLANK						
	<0.050	<0.002	<0.001	<0.010	<0.50	NA

RPD = RELATIVE PERCENT DIFFERENCE.
 NA = NOT APPLICABLE OR NOT AVAILABLE.
 NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
 OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
 Project Manager



Aquatic Research Incorporated

3927 Aurora Ave. N / Seattle, WA 98103 / (206) 632-2715

HER080-45

CHAIN-OF-CUSTODY RECORD

CLIENT: Havera Environmental
 SAMPLING DATE: 9/26/17
 SAMPLERS: Rayna Gleason

SHEET 1 OF 1
 PROJECT ID: BBC
 CASE FILE NO.: _____
 DATA RECORDED BY: _____

SAMPLE INFORMATION

PARAMETERS

SAMPLE ID	DATE/TIME COLLECTED	PARAMETERS														BOTT #	NOTES		
		Turbidity	TSS	NO ₂ +NO ₃	TN	Ortho P	TP												
BBC10.4-20170926	9/26/17 2:40	X	X	X	X	X	X											2	
BBC8.8-20170926	9/26/17 2:15	X	X	X	X	X	X											2	
PET0.0-20170926	9/26/17 2:10	X	X	X	X	X	X											2	
BBC8.4-20170926	9/26/17 12:10	X	X	X	X	X	X											2	
BUR0.0-20170926	9/26/17 2:00	X	X	X	X	X	X											2	
BBC7.0-20170926	9/26/17 11:50	X	X	X	X	X	X											2	
BBC5.9-20170926	9/26/17 11:30	X	X	X	X	X	X											2	
BBC5.2-20170926	9/26/17 11:10	X	X	X	X	X	X											2	
BBC2.6-20170926	9/26/17 10:50	X	X	X	X	X	X											2	
COL0.0-20170926	9/26/17 10:35	X	X	X	X	X	X											2	
BBC1.6-20170926	9/26/17 9:50	X	X	X	X	X	X											2	
DUPE-20170926	9/26/17 NA	X	X	X	X	X	X											2	

Printed Name	Relinquished By <u>RAYNA GLEASON</u>	Date/Time <u>9/26/17 4:21pm</u>	Received By	Date/Time
Signature	<u>[Signature]</u>			
Affiliation	<u>Havera</u>			

Printed Name	Relinquished By	Date/Time	Received By <u>[Signature]</u>	Date/Time <u>09/27/17 1030</u>
Signature				
Affiliation			<u>(12) samples (24) bottles 3.9°C</u>	

Miscellaneous Notes (Hazardous Materials, Quick turn-around time, etc.): _____

Job Number: 7092627
 Report Date: October 4, 2017
 ORELAP #: OR100028
 Project: 14-05818-003
 Burnt Bridge Creek
 Monitoring 2017

Jess Brown
 Herrera Environmental Consultants, Inc.
 24 NW 2nd Ave., Suite 204
 Portland, OR 97209

Dear Jess Brown,

Enclosed please find Pixis Labs analytical report for samples received as order number 7092627 on 09/26/17 at 15:44. Should you have any questions about this report or any other matter, please do not hesitate to contact us. We are here to help you.

The samples listed below were received in good condition, cooled at 9°C.

Laboratory Sample ID	Field Identification	Matrix	Collection Date	Collection Time
7092627-1	BBC10.4-20170926	Water	09/26/17	1440
7092627-2	BBC8.8-20170926	Water	09/26/17	1415
7092627-3	PET0.0-20170926	Water	09/26/17	1410
7092627-4	BBC8.4-20170926	Water	09/26/17	1210
7092627-5	BUR0.0-20170926	Water	09/26/17	1400
7092627-6	BBC7.0-20170926	Water	09/26/17	1150
7092627-7	BBC5.9-20170926	Water	09/26/17	1130
7092627-8	BBC5.2-20170926	Water	09/26/17	1110
7092627-9	BBC2.6-20170926	Water	09/26/17	1050
7092627-10	COL0.0-20170926	Water	09/26/17	1035
7092627-11	BBC1.6-20170926	Water	09/26/17	0856
7092627-12	DUPE-20170926	Water	09/26/17	---

Herrera Environmental Consultants, Inc.

Job Number: 7092627
Report Date: October 4, 2017
ORELAP #: OR100028

Test results relate only to the parameters tested and to the samples as received by the laboratory. Test results meet all requirements of NELAP unless otherwise noted. This report shall not be reproduced, except in full, without the written consent of this laboratory. Samples will be kept a maximum of 15 days from the report date unless prior arrangements have been made.

NOTE: This analysis was subcontracted to BSK Associates in Vancouver, WA. BSK Associates is an ORELAP accredited laboratory.

Sample(s) were analyzed 9/27/17 at 16:05pm.

Thank you for allowing Pixis to be of service to you, we appreciate your business.

Sincerely,



Mark Leed
Client Services



BSK Associates Vancouver
2517 E. Evergreen Blvd.
Vancouver, WA 98661
360-750-0055 (Main)
360-750-0057 (FAX)

V710515
9/29/2017
Invoice: V703260

Melissa Hubbard
Pixis Laboratories
12423 NE Whitaker Way
Portland, OR 97230

RE: Report for V710515 Micro

Dear Melissa Hubbard,

Thank you for using BSK Associates for your analytical testing needs. In the following pages, you will find the test results for the samples submitted to our laboratory on 9/26/2017. The results have been approved for release by our Laboratory Director as indicated by the authorizing signature below.

The samples were analyzed for the test(s) indicated on the Chain of Custody (see attached) and the results relate only to the samples analyzed. BSK certifies that the testing was performed in accordance with the quality system requirements specified in the 2009 TNI Standard. Any deviations from this standard or from the method requirements for each test procedure performed will be annotated alongside the analytical result or noted in the Case Narrative. Unless otherwise noted, the sample results are reported on an "as received" basis.

If additional clarification of any information is required, please contact your Project Manager, Debra Karlsson , at (360) 750-0055.

Thanks again for using BSK Associates. We value your business and appreciate your loyalty.

Sincerely,

Renea Rangell, Laboratory Director - Vancouver



Accredited in Accordance with NELAP
ORELAP #4021



Case Narrative

Project and Report Details Invoice Details

Client: Pixis Laboratories
Report To: Melissa Hubbard
Project #: 7092627
Received: 9/26/2017 - 16:15
Report Due: 9/29/2017

Invoice To: Pixis Laboratories
Invoice Attn: Melissa Hubbard
Project PO#: -

Sample Receipt Conditions

Cooler: Default Cooler
Temperature on Receipt °C: 10.6

Containers Intact
COC/Labels Agree
Received On Blue Ice
Sample(s) arrived at lab on same day sampled.
Packing Material - Other
Sample(s) were received in temperature range.
Initial receipt at BSK-VAL

Data Qualifiers

The following qualifiers have been applied to one or more analytical results:

HT1.0 Holding time exceeded. Sample was received at the lab past holding time.

Report Distribution

Table with 3 columns: Recipient(s), Report Format, CC. Row 1: Melissa Hubbard, FINAL.RPT, mleed@pixislabs.com;rreid@pixislabs.com



V710515

Micro

7092627

Certificate of Analysis

Sample ID: V710515-01
Sampled By: Client
Sample Description: BBC10.4 - 20170926

Sample Date - Time: 09/26/17 - 14:40
Matrix: Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
<u>Fecal Coliform Count by Membrane Filtration</u>						
Fecal Coliform	SM 9222D	66	1 CFU/100 ml	V701132	09/26/17 17:30	



V710515

Micro
7092627

Certificate of Analysis

Sample ID: V710515-02
Sampled By: Client
Sample Description: BBC8.8 - 20170926

Sample Date - Time: 09/26/17 - 14:15
Matrix: Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	96	1 CFU/100 ml	V701132	09/26/17 17:30	



V710515

Micro

7092627

Certificate of Analysis

Sample ID: V710515-03
Sampled By: Client
Sample Description: PET0.0 - 20170926

Sample Date - Time: 09/26/17 - 14:10
Matrix: Water
Sample Type: Other

BSK Associates Vancouver Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	140	1 CFU/100 ml	V701132	09/26/17 17:30 ↴	



V7I0515

Micro
7092627

Certificate of Analysis

Sample ID: V7I0515-04
Sampled By: Client
Sample Description: BBC8.4 - 20170926

Sample Date - Time: 09/26/17 - 12:10
Matrix: Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	240	1 CFU/100 ml	V701132	09/26/17 17:30 ↓	



V710515

Micro
7092627

Certificate of Analysis

Sample ID: V710515-05
Sampled By: Client
Sample Description: BUR0.0 - 20170926

Sample Date - Time: 09/26/17 - 14:00
Matrix: Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	220	1 CFU/100 ml	V701132	09/26/17 17:30	



V7I0515

Micro
7092627

Certificate of Analysis

Sample ID: V7I0515-06
Sampled By: Client
Sample Description: BBC7.0 - 20170926

Sample Date - Time: 09/26/17 - 11:50
Matrix: Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	180	1 CFU/100 ml	V701132	09/26/17 17:30	*



V710515

Micro

7092627

Certificate of Analysis

Sample ID: V710515-07

Sampled By: Client

Sample Description: BBC5.9 - 20170926

Sample Date - Time: 09/26/17 - 11:30

Matrix: Water

Sample Type: Other

BSK Associates Vancouver

Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	140	1 CFU/100 ml	V701132	09/26/17 17:30	↓



V7I0515

Micro

7092627

Certificate of Analysis

Sample ID: V7I0515-08
Sampled By: Client
Sample Description: BBC5.2 - 20170926

Sample Date - Time: 09/26/17 - 11:10
Matrix: Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	240	1 CFU/100 ml	V701132	09/26/17 17:30	



V7I0515

Micro
7092627

Certificate of Analysis

Sample ID: V7I0515-09
Sampled By: Client
Sample Description: BBC2.6 - 20170926

Sample Date - Time: 09/26/17 - 10:50
Matrix: Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	210	1 CFU/100 ml	V701132	09/26/17 17:30	✶



V710515

Micro
7092627

Certificate of Analysis

Sample ID: V710515-10
Sampled By: Client
Sample Description: COL0.0 - 20170926

Sample Date - Time: 09/26/17 - 10:35
Matrix: Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	200	1 CFU/100 ml	V701132	09/26/17 17:30	



V710515

Micro

7092627

Certificate of Analysis

Sample ID: V710515-11
Sampled By: Client
Sample Description: BBC1.6 - 20170926

Sample Date - Time: 09/26/17 - 08:50
Matrix: Water
Sample Type: Other

BSK Associates Vancouver Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	400	1 CFU/100 ml	V701132	09/26/17 17:30 *	HT1.0



V7I0515

Micro
7092627

Certificate of Analysis

Sample ID: V7I0515-12
Sampled By: Client
Sample Description: DUPE - 20170926

Sample Date - Time: 09/26/17 - 00:00
Matrix: Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	440	1 CFU/100 ml	V701132	09/26/17 17:30	HT1.0

Certificate of Analysis
Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of according to BSK's sample retention policy unless other arrangements are made in advance.
- All positive results for EPA Methods 504.1 and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.
- Due to the subjective nature of the Threshold Odor Method, all characterizations of the detected odor are the opinion of the panel of analysts. The characterizations can be found in Standard Methods 2170B Figure 2170:1.
- The MCLs provided in this report (if applicable) represent the primary MCLs for that analyte.

Definitions

mg/L:	Milligrams/Liter (ppm)	MDL:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit: DL x Dilution	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)	ND:	None Detected at RL	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	pCi/L:	Picocuries per Liter	Absent:	Less than 1 CFU/100mLs
%:	Percent Recovered (surrogates)	RL Mult:	RL Multiplier	Present:	1 or more CFU/100mLs
NR:	Non-Reportable	MCL:	Maximum Contaminant Limit		

Please see the individual Subcontract Lab's report for applicable certifications.

BSK is not accredited under the NELAP program for the following parameters:

Certifications: Please refer to our website for a copy of our Accredited Fields of Testing under each certification.

Fresno

State of California - ELAP	1180	State of Hawaii	4021
State of Nevada	CA000792018-1	State of Oregon - NELAP	4021-009
EPA - UCMR4	CA00079	State of Washington	C997-17B
State of New York	12073		

Sacramento

State of California - ELAP 2435

San Bernardino

State of California - ELAP 2993 State of Oregon - NELAP 4119-002

Vancouver

State of Oregon - NELAP WA100008-010 State of Washington C824-17

B-K ASSOCIATES
 2517 E. Evergreen Blvd.
 Vancouver, WA 98661
 P 360.750.0055
 F 360.750.0057
 www.bkassociates.com

Turnaround Time Request
 Standard - 10 business days
 Rush (Surcharges may apply)
 Date needed:

V710515
 Pix1s1794
 09/26/2017
 3



Company/Client Name: **Miss Labs**
 Report Attention: **Miss Labs**
 Additional ccs:
 PO#: **10.0c #49**
 Invoice To:
 Phone:
 Fax:

Address: **Miss Labs**
 City: **Miss Labs**
 State: **Miss Labs**
 Zip: **Miss Labs**
 Project: **7092627**
 Project Name (Printed/Signature):
 Reporting Options: Trace (J-Fbg) E-Mail Fax Mail

Compliance? Yes No
 State: WA OR
 System/PWS ID:
 DOH Source/Source ID:
 County:
 Water System Name:
 Sample Composition: Single Source Blended Composite Distribution Sample
 Sample Taken: Before Treatment After Treatment No Treatment
 Matrix Types: SW=Surface Water BW=Boiled Water GW=Ground Water WW=Waste Water STW=Storm Water DW=Drinking Water SO=Solid

#	Sample Description/location*	Sampled* Date	Time	Matrix*	Comments	# of cont.	Receipt Conditions in Vancouver:	
							Temp:	Received Via:
	BRC10.4-20170926	10/4	1415	Water				
	BRC8.8-20170926	10/4	1410	Water				
	FE10.0-20170926	10/4	1410	Water				
	BRC8.1-20170926	10/4	1210	Water				
	BUR0.0-20170926	10/4	1400	Water				
	BRC7.0-20170926	10/4	1120	Water				
	BRC5.9-20170926	10/4	1130	Water				
	BRC5.7-20170926	10/4	1110	Water				
	BRC2.6-20170926	10/4	1050	Water				
	COT0.0-20170926	10/4	1030	Water				

Requested by: (Signature and Printed Name)
 Date: _____ Time: _____
 Company: _____
 Requested by: (Signature and Printed Name)
 Date: _____ Time: _____
 Company: _____
 Requested by: (Signature and Printed Name)
 Date: _____ Time: _____
 Company: _____
 Received Via: UPS WALK-IN FED EX Courier:
 Amount: _____
 Date: _____
 Check # _____ Cash _____
 Shipping Method: ONTRAC UPS GSO WALK-IN
 Payment Received at Delivery: Cash
 Cooking Method: Wet
 Shipping Method: ONTRAC UPS GSO WALK-IN
 Payment for services rendered as noted herein are due in full within 30 days from the date invoice. If not so paid, account balances are deemed delinquent. Delinquent balances are subject to monthly service charges and interest specified in BSK's current Standard Terms and Conditions for Laboratory Services. The amount shown on this invoice is the net amount due. BSK's current Standard Terms and Conditions for Laboratory Services are available on the BSK website. BSK's current Standard Terms and Conditions for Laboratory Services are available on the BSK website. BSK's current Standard Terms and Conditions for Laboratory Services are available on the BSK website.

Date: 9/26/2017

BSK Associates Vancouver

Batch: V701132

Prepared By: EMB

V-Fecal Coliform Count by MF SM 9222D Water

Page 18 of 18

Media	Incubate		Date & Time In		Init	Date & Time Out		Init
m-Fc Broth	44.5°C	22-26 hours	9/26/17	17:30	EMB	9-27-17	1605	grd

	Sample ID	Receipt Temp °C	Dilution 1 _____ mL	Dilution 2 _____ mL	Dilution 3 _____ mL	Result Fecal Coliforms/100mL	Notes
1	V710515-01	10.6	50	5		66	Before 0
13	V710515-02	10.6	48			96	After 0
25	V710515-03	10.6	70			140	
37	V710515-04	10.6		12		240	
49	V710515-05	10.6	108			216	
61	V710515-06	10.6	90			180	
73	V710515-07	10.6	70			140	
85	V710515-08	10.6		12		240	
97	V710515-09	10.6	106			212	
109	V710515-10	10.6		10		200	
121	V710515-11	10.6		20		400	
133	V710515-12	10.6		22		440	

-Best readable plate is the one that contains 20-60 colonies.

Reviewed by: EMB Date: 9/26/17

-Fecal Coliform per 100mL = $\frac{\text{Fecal Coliform Colonies counted}}{\text{mLs Sample Filtered}} \times 100$

-If the count exceeds 200 per membrane, then report Too Numerous to Count (TNTC).

WM-FL-0075-00

SAMPDATA

CLIENT	PROJECT	PROJECTNUM	LabName	SAMPLENAME
Pixis Laboratories	Micro - Compliance	7092627	BSK Associates Vancouver	BBC10.4 - 20170926
Pixis Laboratories	Micro - Compliance	7092627	BSK Associates Vancouver	BBC8.8 - 20170926
Pixis Laboratories	Micro - Compliance	7092627	BSK Associates Vancouver	PET0.0 - 20170926
Pixis Laboratories	Micro - Compliance	7092627	BSK Associates Vancouver	BBC8.4 - 20170926
Pixis Laboratories	Micro - Compliance	7092627	BSK Associates Vancouver	BUR0.0 - 20170926
Pixis Laboratories	Micro - Compliance	7092627	BSK Associates Vancouver	BBC7.0 - 20170926
Pixis Laboratories	Micro - Compliance	7092627	BSK Associates Vancouver	BBC5.9 - 20170926
Pixis Laboratories	Micro - Compliance	7092627	BSK Associates Vancouver	BBC5.2 - 20170926
Pixis Laboratories	Micro - Compliance	7092627	BSK Associates Vancouver	BBC2.6 - 20170926
Pixis Laboratories	Micro - Compliance	7092627	BSK Associates Vancouver	COL0.0 - 20170926
Pixis Laboratories	Micro - Compliance	7092627	BSK Associates Vancouver	BBC1.6 - 20170926
Pixis Laboratories	Micro - Compliance	7092627	BSK Associates Vancouver	DUPE - 20170926
LABSAMPID	MATRIX	RPTMATRIX	SAMPDATE	PREPDATE
V710515-01	Water	Water	09/26/2017 14:40:00	09/26/2017 17:30:00
V710515-02	Water	Water	09/26/2017 14:15:00	09/26/2017 17:30:00
V710515-03	Water	Water	09/26/2017 14:10:00	09/26/2017 17:30:00
V710515-04	Water	Water	09/26/2017 12:10:00	09/26/2017 17:30:00
V710515-05	Water	Water	09/26/2017 14:00:00	09/26/2017 17:30:00
V710515-06	Water	Water	09/26/2017 11:50:00	09/26/2017 17:30:00
V710515-07	Water	Water	09/26/2017 11:30:00	09/26/2017 17:30:00
V710515-08	Water	Water	09/26/2017 11:10:00	09/26/2017 17:30:00
V710515-09	Water	Water	09/26/2017 10:50:00	09/26/2017 17:30:00
V710515-10	Water	Water	09/26/2017 10:35:00	09/26/2017 17:30:00
V710515-11	Water	Water	09/26/2017 08:50:00	09/26/2017 17:30:00
V710515-12	Water	Water	09/26/2017 00:00:00	09/26/2017 17:30:00
ANADATE	BATCH	METHODCODE	METHODNAME	ANALYTE
09/27/2017 16:05:00	V701132	V-Fecal Coliform Co	SM 9222D	Fecal Coliform
09/27/2017 16:05:00	V701132	V-Fecal Coliform Co	SM 9222D	Fecal Coliform
09/27/2017 16:05:00	V701132	V-Fecal Coliform Co	SM 9222D	Fecal Coliform
09/27/2017 16:05:00	V701132	V-Fecal Coliform Co	SM 9222D	Fecal Coliform
09/27/2017 16:05:00	V701132	V-Fecal Coliform Co	SM 9222D	Fecal Coliform
09/27/2017 16:05:00	V701132	V-Fecal Coliform Co	SM 9222D	Fecal Coliform
09/27/2017 16:05:00	V701132	V-Fecal Coliform Co	SM 9222D	Fecal Coliform
09/27/2017 16:05:00	V701132	V-Fecal Coliform Co	SM 9222D	Fecal Coliform



HERRERA

2200 Sixth Avenue | Suite 1100
Seattle, Washington | 98121
p 206 441 9080 | f 206 441 9108

HERRERAENV 7092627



Chain of Custody Record

Project Name:		Project Number:		Client:			Number of Containers	Analyses Requested										Lab ID No.				
Burnt Bridge Creek Monitoring 2017		14-05818-003		City of Vancouver				Fecal Coliform- SM 9222D														
Report To:		Copy To:																				
Jess Brown, jbrown@herrerainc.com		RGleason@herrerainc.com																				
Sampled By:		Delivery Method:																				
Rayna Gleason																						
Laboratory:		Requested Completion Date:		Total No. of Containers:																		
PIXIS Labs				12																		
Lab Use:																						
Sample ID	Date	Time	Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)																	
BBC10.4-20170926	BNO21	9/26/17	2:40	G	Y	SW	1															
BBC8.8-20170926	"	9/26/17	2:15	G	Y	SW	1															
PET0.0-20170926	BNO21	9/26/17	2:10	G	Y	SW	1															
BBC8.4-20170926	"	9/26/17	12:10	G	Y	SW	1															
BUR0.0-20170926	MJO10	9/26/17	2:00	G	Y	SW	1															
BBC7.0-20170926	BNO21	9/26/17	11:50	G	Y	SW	1															
BBC5.9-20170926	MJO10	9/26/17	11:30	G	Y	SW	1															
BBC5.2-20170926	"	9/26/17	11:10	G	Y	SW	1															
BBC2.6-20170926	MJO10	9/26/17	10:50	G	Y	SW	1															
COL0.0-20170926	BNO21	9/26/17	10:35	G	Y	SW	1															
BBC1.6-20170926	BNO21	9/26/17	8:50	G	Y	SW	1															
DUPE-201700926	"	9/26/17	NA	G	Y	SW	1															

Comments/Special Instructions:

IMPORTANT: Please use two dilution volumes for the analysis: 5 mL and 50 mL. Include a laboratory duplicate. Please complete and return attached bench sheet.

Relinquished by (Name/CO) Rayna Gleason	Signature <i>Rayna Gleason</i>	Date/Time 9-26-17 3:40	Received By (Name/CO) <i>Stefanie</i>	Signature <i>Stefanie Nack</i>	Date/Time 9/26/17 15:44
Relinquished by (Name/CO)	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time

Sample Type: G=Grab C=Composite Matrix Codes: A=Air GW=Groundwater SE=Sediment SO=Soil SW=Surface Water W=Water (blanks) M=Material O=Other (specify)

Date: 9/26/2017
 V-Fecal Coliform Count by MF 3M 9222D Water

BSK Associates Vancouver

Batch: V701132

Prepared By: EMB

Media	Incubate	Date & Time In	Init	Date & Time Out	Init
m-Fc Broth	44.5°C	22-26 hours	9/26/17 17:30 EMB	9-27-17 1605	gpd

Sample ID	Receipt Temp °C	Dilution 1 50 mL	Dilution 2 5 mL	Dilution 3 mL	Result Fecal Coliforms/100mL	Notes
1 V710515-01	10.6	33			✓ 66	Before 0
13 V710515-02	10.6	48			✓ 96	AFTER 0
25 V710515-03	10.6	70			✓ 140 J	
37 V710515-04	10.6		12		✓ 240 J	
49 V710515-05	10.6	108			✓ 216 J	
61 V710515-08	10.6	90			✓ 180 J	
73 V710515-07	10.6	70			✓ 140 J	
85 V710515-08	10.6		12		✓ 240 J	
97 V710515-09	10.6	106			✓ 212 J	
109 V710515-10	10.6		10		✓ 200 J	
121 V710515-11	10.6		20		✓ 400	
133 V710515-12	10.6		22		✓ 440	

3BC10.4
 BBL8.8
 PET0.0
 BBL8.4
 BUR0.0
 3BC7.0
 BBL5.9
 BBL3.2
 BBL2.6
 COL0.0
 BBL1.6
 DUPE

- Best readable plate is the one that contains 20-80 colonies.
- Fecal Coliform per 100mL = $\frac{\text{Fecal Coliform Colonies counted}}{\text{mLs Sample Filtered}} \times 100$
- If the count exceeds 200 per membrane, then report Too Numerous to Count (TNTC).

Reviewed by: EMB Date: 9/26/17
 Herrera check
 Herrera qualifier

WM-FL-0075-00

Reviewed 10/5/17
 by Jess Brown

Batch: V701132



Data Quality Assurance Worksheet

Project Name/No./Client: Burnt Bridge Creek / 14-05818-003 / City of Vancouver, Washington

Laboratory/Parameters: IEH-Aquatic Research / nitrogen, phosphorus, SRP, nitrate-nitrite, TSS, turbidity
PIXIS Labs/ Fecal Coliform

Sample Date/Sample ID: 9/26/17 Event 5 (11 stations plus field duplicate of BBC1.6)

By J. Brown

Date 10/13/17 Page 1 of 1

Checked: initials RZ

date 10/23/17

Parameter	Completeness/ Methodology	Holding Times (days)		Blanks/ Reporting Limit	Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Field Duplicates RPD (%)		Instrument Calibration/ Performance	ACTION
		Reported	Goal		Reported	Goal	Reported	Goal	Reported	Goal ¹	Reported	Goal ¹		
Total Nitrogen	OK / SM4500N-C	14	<28	<0.050 / 0.050 mg/L	109	90-110	100	90-110	1	<20	5	<20	OK	
Total Phosphorus	OK / EPA 365.1	13	<28	<0.002 / 0.002 mg/L	100	90-110	102	90-110	2	<20	4	<20	OK	
SRP	OK / EPA 365.1	<48 hours	<48 hours ²	<0.001 / 0.001 mg/L	104	90-110	105	90-110	Batch 0	<20	0	<20	OK	
Nitrate + Nitrite	OK / EPA 353.2	2	<28	<0.010 / 0.010 mg/L	97	90-110	107	90-110	Batch 5	<20	8	<20	OK	
TSS	OK / EPA 160.2	<7	<7	<0.5 / 0.5 mg/L	NA	NA	100	90-110	Batch D=0.2	<20	59	<20	OK	Flag BBC1.6 due to field duplicate RPD
Turbidity	OK / SM2130-B	<48 hours	<48	<0.1 / 0.1 NTU	NA	NA	100	90-110	Batch 2	<20	29	<20	OK	Flag BBC1.6 due to field duplicate RPD
Fecal coliform	OK / SM9222-D	3-9 hours	<24	<5 / 5 CFU/ 100mL	NA	NA	NA	NA	NA	<35	10	<35	OK	See NOTE A for flags.

¹ If the sample or duplicate value is less than five times the reporting limit, then the difference (D) is calculated rather than the RPD and the QA objective is that the difference shall not exceed 2 times the reporting limit instead of the number indicated in the objective column.

² Less than 24 hours from collection to filtration.



Data Quality Assurance Worksheet

Project Name/No./Client: Burnt Bridge Creek / 14-05818-003 / City of Vancouver, Washington

Laboratory/Parameters: IEH-Aquatic Research / nitrogen, phosphorus, SRP, nitrate-nitrite, TSS, turbidity
PIXIS Labs/ Fecal Coliform

Sample Date/Sample ID: 9/26/17 Event 5 (11 stations plus field duplicate of BBC1.6)

By J. Brown

Date 10/13/17 Page 1 of 1

Checked: initials RZ
 date 10/23/17

Parameter	Completeness/ Methodology	Holding Times (days)		Blanks/ Reporting Limit	Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Field Duplicates RPD (%)		Instrument Calibration/ Performance	ACTION
		Reported	Goal		Reported	Goal	Reported	Goal	Reported	Goal ¹	Reported	Goal ¹		
Temperature	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	<20	OK	None
Dissolved Oxygen	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	<20	OK	None
pH	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.4	<20	OK	None
Conductivity	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05	<20	OK	None

NOTE A: Flag fecal coliform results for all except BBC10.4, BBC8.8, BBC1.6 and DUPE due to colony counts of range (<20 or >60). Laboratory neglected to perform laboratory duplicate and reported that they did not perform two dilutions per sample.

NA – not applicable or not available
 RPD- relative percent difference

NC – not calculable due to one or more values below the detection limit
 SRP –soluble reactive phosphorus

NS – field duplicate not sampled
 TSS – total suspended solids

¹ If the sample or duplicate value is less than five times the reporting limit, then the difference (D) is calculated rather than the RPD and the QA objective is that the difference shall not exceed 2 times the reporting limit instead of the number indicated in the objective column.

² Less than 24 hours from collection to filtration.



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Linley, Payna

SITE ID: BBC 1.6 DATE: 9/26/17 TIME: 8:50

WEATHER: Sunny cool

NOTES: main sensor missing, replaced with Backup #2, data collected from backup probe

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: <input checked="" type="checkbox"/>	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>14.5 °C</u>			
DISSOLVED OXYGEN:	<u>95.9 %</u> <u>9.78 mg/L</u>			
PH:	7.65 <u>7.65</u>			
CONDUCTIVITY:	<u>215.4</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC1.6-2017092617</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC - DUPE</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

CALIBRATION (PRE-EVENT):

CONDUCTIVITY: 970 → 1000

PH: -6.80 → 7.00, 3.49 → 4.01, 10.07 → 10.01

DO%: 100.3% → 100%



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003
 CLIENT: City of Vancouver
 FIELD PERSONNEL: Linky, Rayna
 SITE ID: COL 0.0 DATE: 9/26/17 TIME: 10:35
 WEATHER: Sunny
 NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>13.1°C</u>			
DISSOLVED OXYGEN:	<u>99.1% 10.40 mg/L</u>			
PH:	<u>7.96</u>			
CONDUCTIVITY:	<u>259.6</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>B COL0.0-20170926</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

HERRERA

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Rayna, Linley

SITE ID: BBC 2.6 DATE: 9/26/17 TIME: 10:50

WEATHER: Sunny

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: <input checked="" type="checkbox"/>	NO: <input type="checkbox"/>
TEMPERATURE:	<u>14.9°C</u>			<u>14.9°C</u>
DISSOLVED OXYGEN:	<u>97.6% 9.86 mg/L</u>			<u>97.6% 9.86 mg/L</u>
PH:	<u>7.88 (conductivity)</u>			<u>7.85 (conductivity)</u>
CONDUCTIVITY:	<u>211.9 (pH)</u>			<u>211.9 (pH)</u>

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 2.6 - 20170926</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Raym, Linky

SITE ID: BBC 5.2 DATE: 9/26/17 TIME: 11:10

WEATHER: Sunny

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>15.3°C</u>			
DISSOLVED OXYGEN:	<u>94.5 %</u> <u>1.46 mg/L</u>			
PH:	<u>7.72</u>			
CONDUCTIVITY:	<u>211.7</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 5.2 - 20170926</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Rayna, Linley

SITE ID: BBC 5.9 DATE: 9/24/17 TIME: 11:30

WEATHER: sunny

NOTES:

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	15.0°C			
DISSOLVED OXYGEN:	77.0% 7.72 mg/L			
PH:	7.39			
CONDUCTIVITY:	212.6			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	BBC5.9 - 20170926
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? Yes: _____ No: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Linley, Rayna

SITE ID: BBC 7.0 DATE: 9/26/17 TIME: 11:50

WEATHER: Sunny, Cool

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>15.8°C</u>			
DISSOLVED OXYGEN:	<u>77.0% 7.61 mg/L</u>			
PH:	<u>7.33</u>			
CONDUCTIVITY:	<u>212.3</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 7.0 - 20170926</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003
 CLIENT: City of Vancouver
 FIELD PERSONNEL: Rayna, Linley
 SITE ID: BUR-0.0 DATE: 9/26/17 TIME: 2:00
 WEATHER: _____
 NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>15.2 °C</u>			
DISSOLVED OXYGEN:	<u>90.4% 9.05 mg/L</u>			
PH:	<u>7.42</u>			
CONDUCTIVITY:	<u>182.0</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BUR0.0 - 20170926</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Rayna, Linley

SITE ID: BBC 8.4 DATE: 9/26/17 TIME: 12:10

WEATHER: Sunny

NOTES: Main probe's data wouldn't download on computer and backup probe was missing. No additional backup probes in gear kit were working. Replaced main probe in creek without downloading the data.

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES:	NO:
TEMPERATURE:	<u>16.7°C</u>			<input checked="" type="checkbox"/>
DISSOLVED OXYGEN:	<u>93.7% 9.10mg/L</u>			
PH:	<u>7.54</u>			
CONDUCTIVITY:	<u>213.7</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 8.4 - 20170926</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Rayna, Unley

SITE ID: PET 0.0 DATE: 9/26/17 TIME: 2:10

WEATHER: Sunny

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>17.9°C</u>			
DISSOLVED OXYGEN:	<u>89.4%</u> <u>8.48 mg/L</u>			
PH:	<u>7.47</u>			
CONDUCTIVITY:	<u>258.7</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>PET 0.0 - 20170926</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Rayna, Linley

SITE ID: BBC 8.8 DATE: 9/26/17 TIME: 2:15

WEATHER: Sunny

NOTES: _____

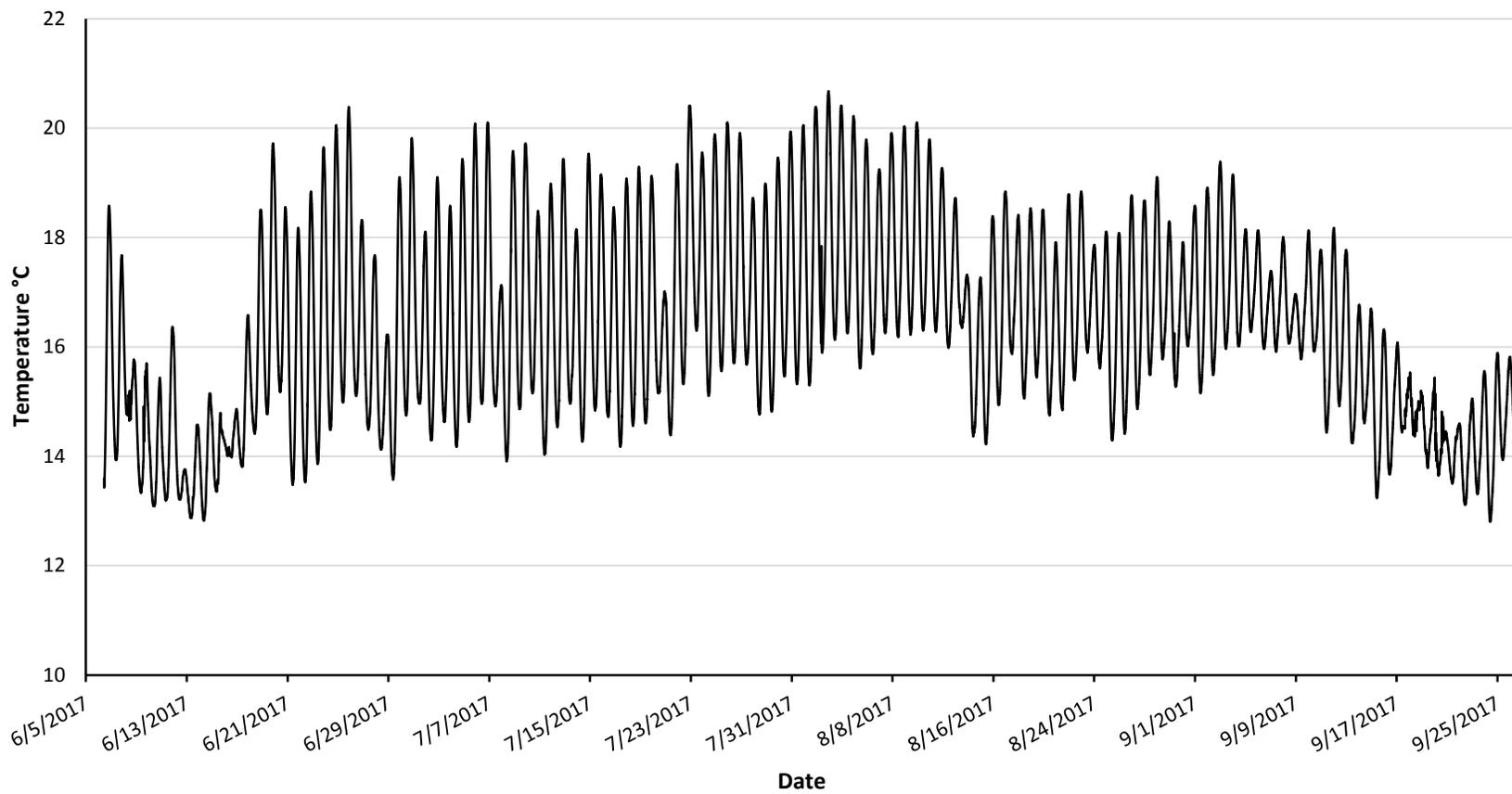
YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>16.8 °C</u>			
DISSOLVED OXYGEN:	<u>102.9 %</u> <u>9.99 mg/L</u>			
PH:	<u>7.64</u>			
CONDUCTIVITY:	<u>187.5</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>BBC 8.8 - 20170926</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

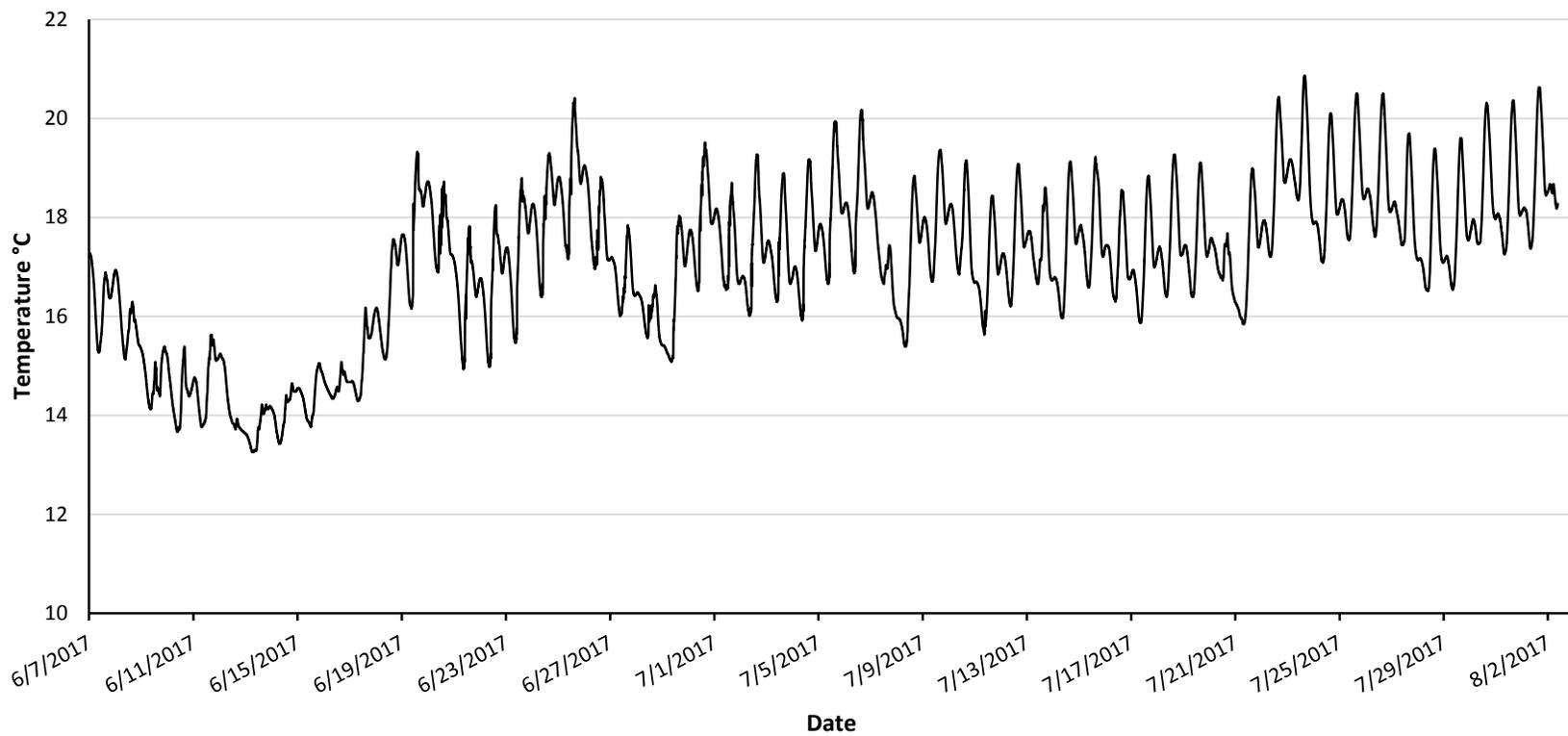
DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		

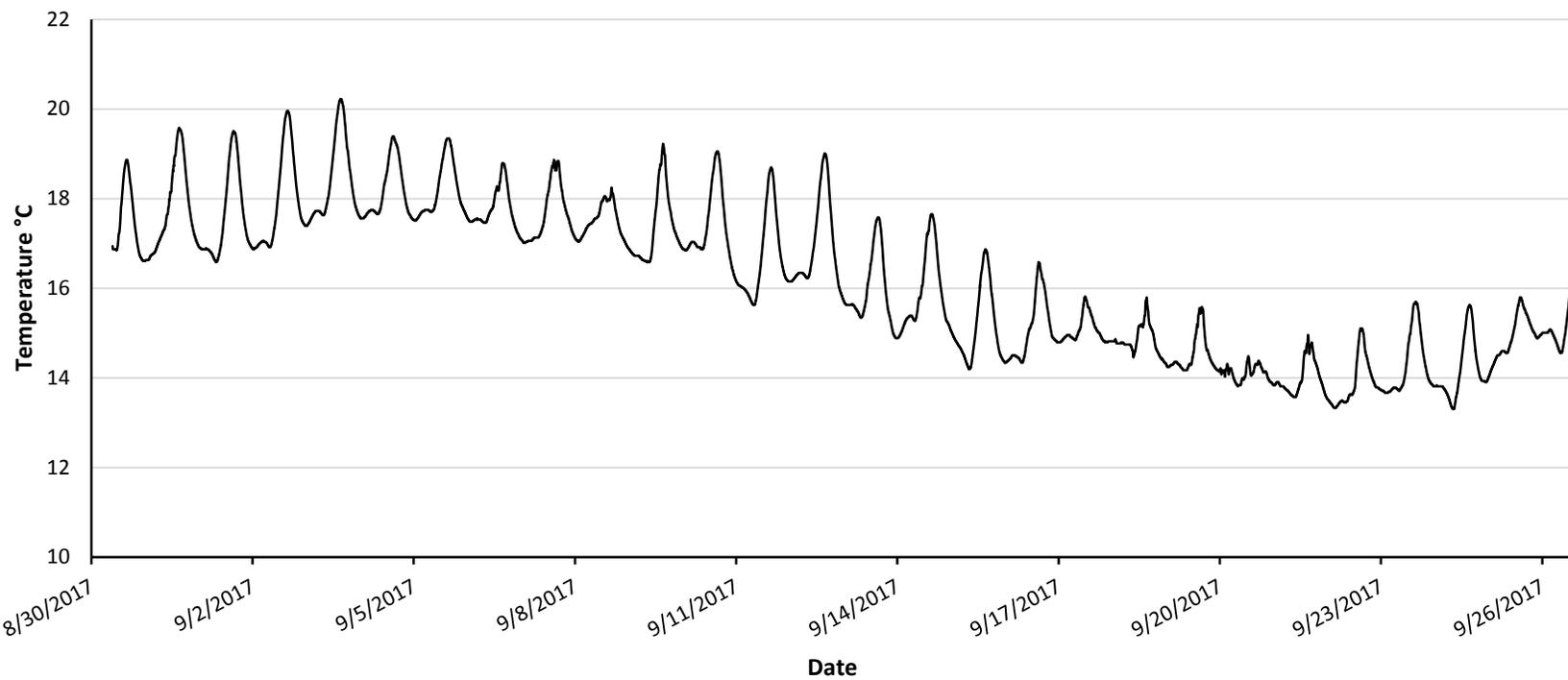
BBC10.4 Continuous Temperature Plot



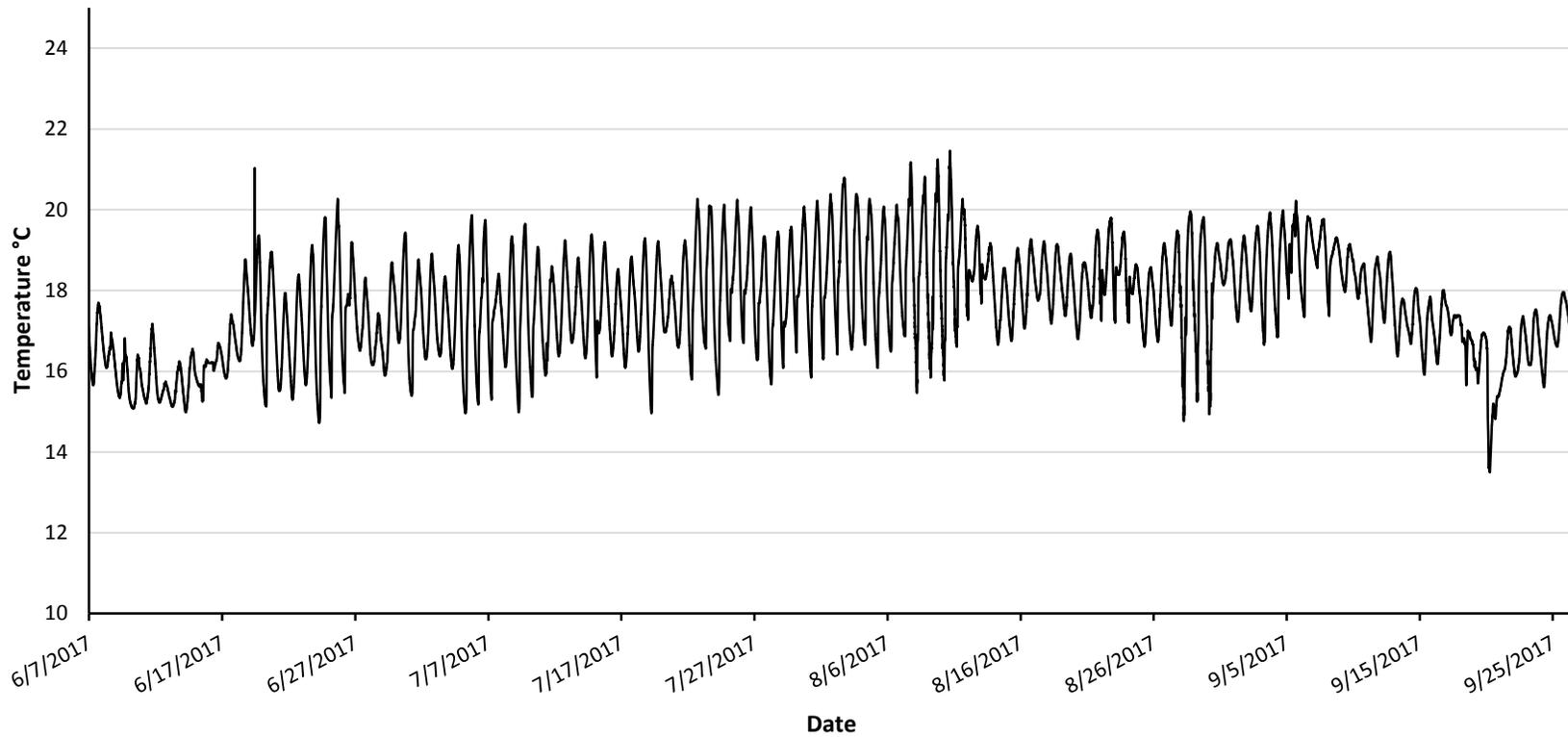
BBC8.8 Continuous Temperature Plot for Events 1-3



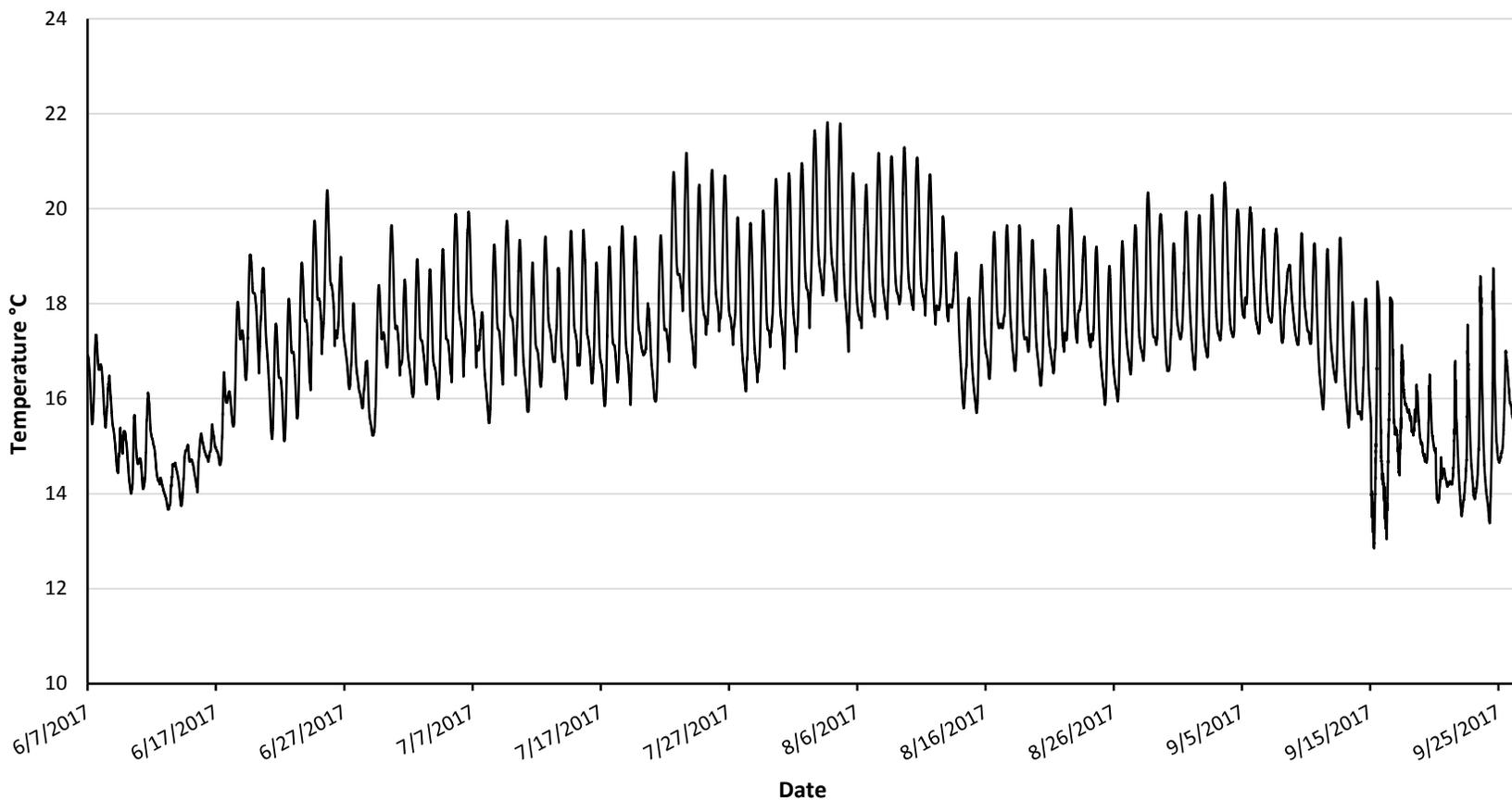
BBC8.8 Continuous Temperature Plot for Events 4-5



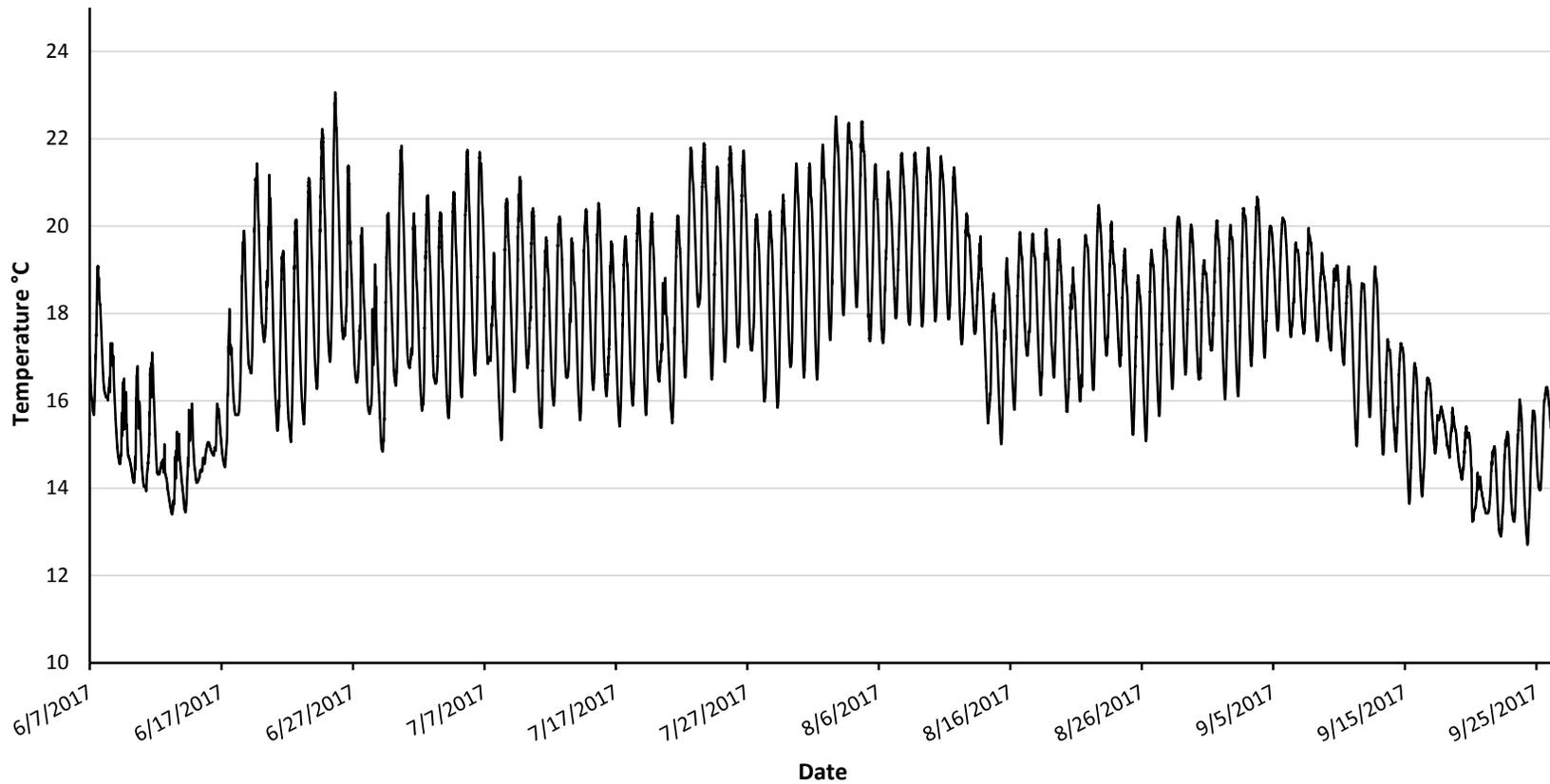
PET0.0 Continuous Temperature Plot



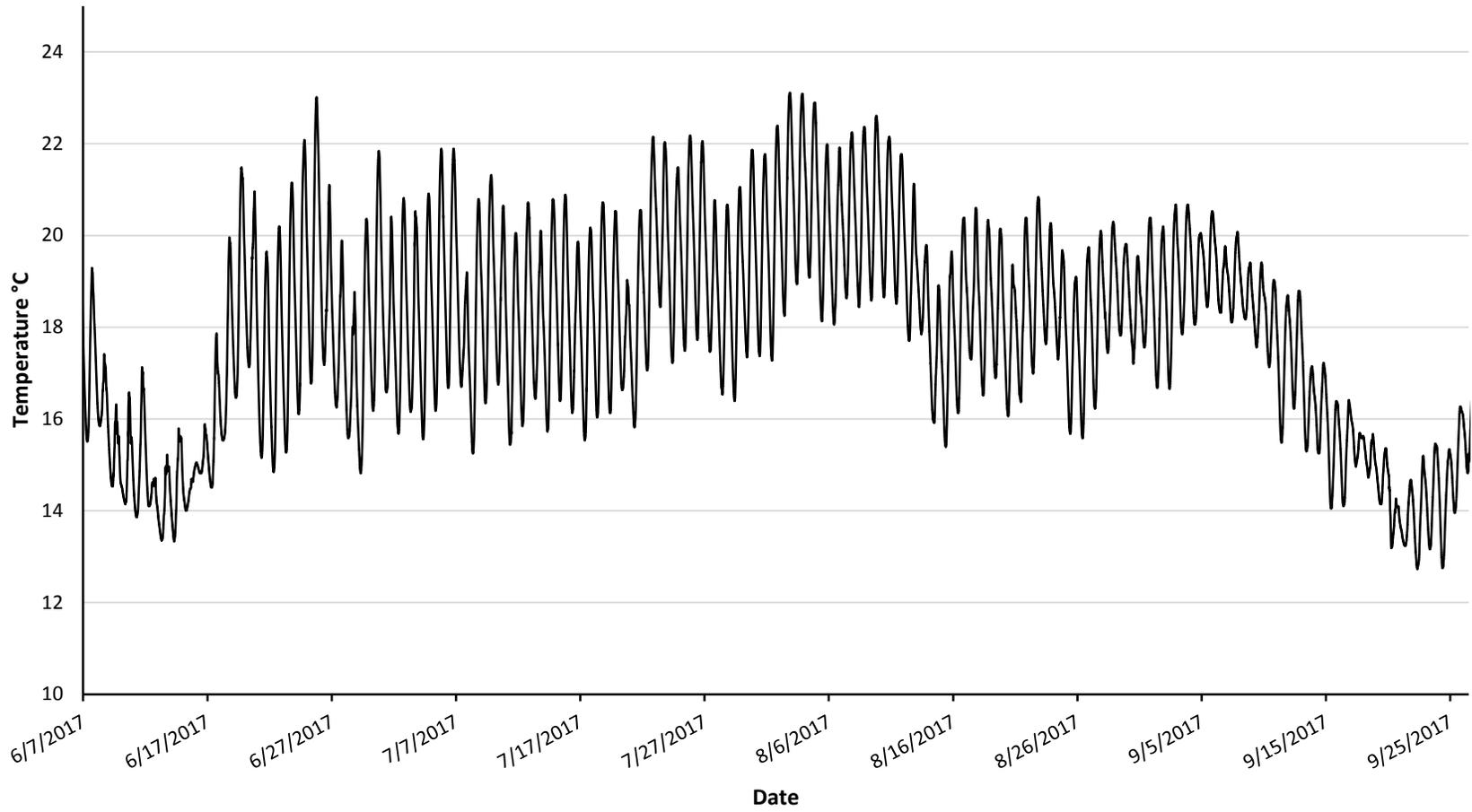
BBC8.4 Continuous Temperature Plot



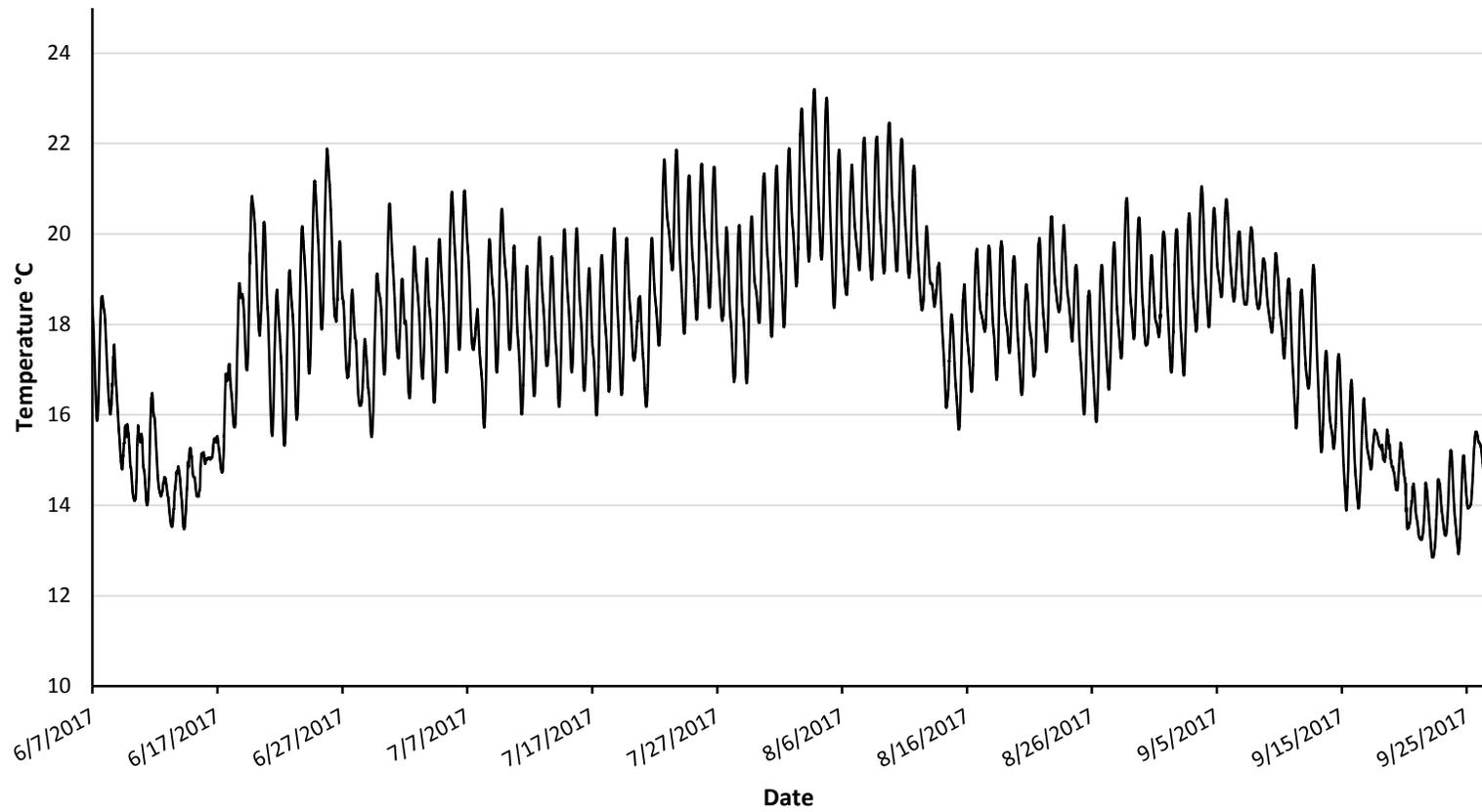
BBC7.0 Continuous Temperature Plot



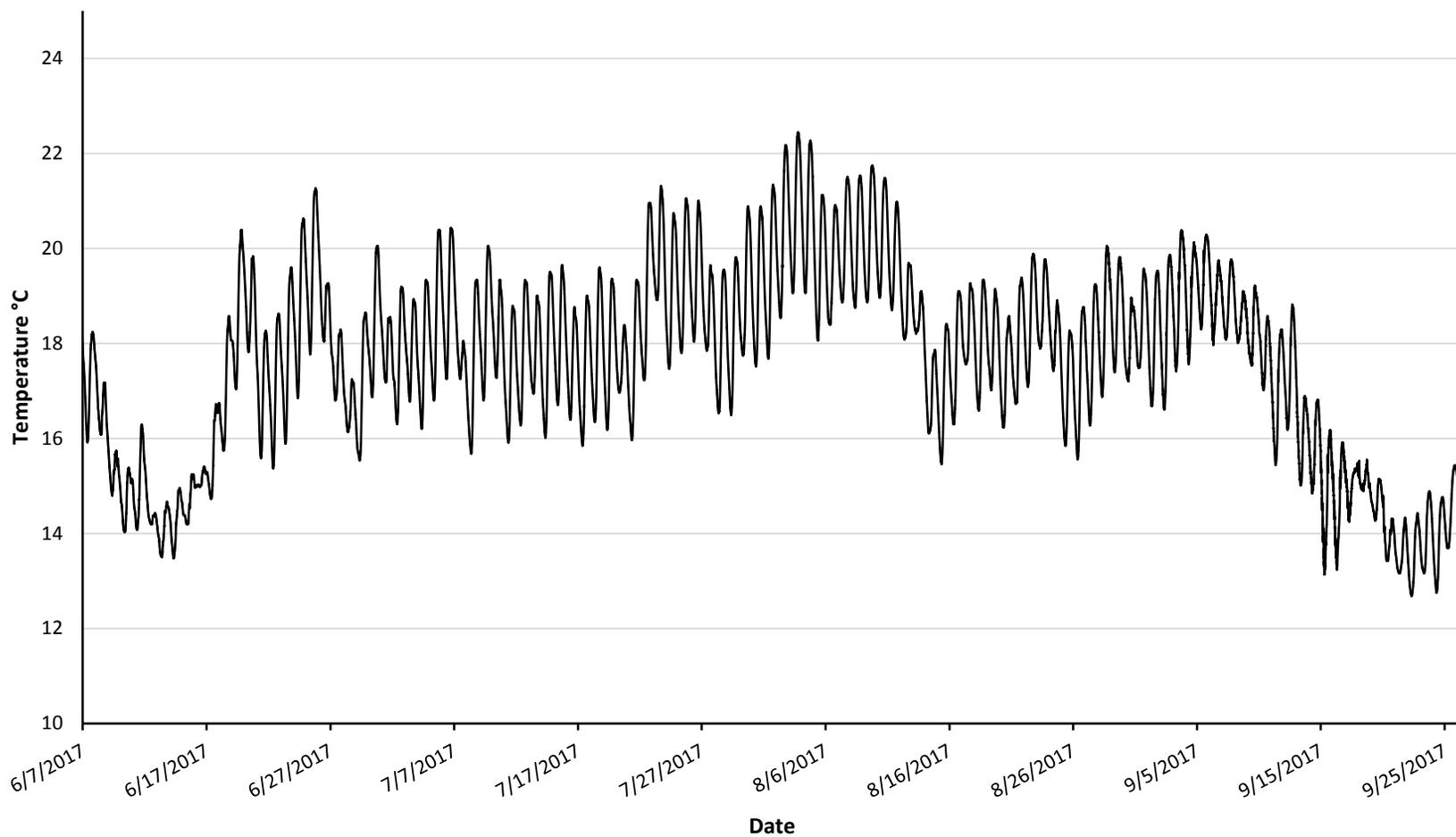
BBC5.9 Continuous Temperature Plot



BBC2.6 Continuous Temperature Plot



BBC1.6 Continuous Temperature Plot



TECHNICAL MEMORANDUM

Date: November 1, 2017
To: Dorie Sutton, City of Vancouver
Copy to: Rob Zisette, Herrera Environmental Consultants
From: Jess Brown, Herrera Environmental Consultants
Subject: Burnt Bridge Creek 2017 Water Quality Sampling Interim Memorandum #6

INTRODUCTION

This interim update provides a summary of the field and laboratory procedures and results associated with monitoring activities conducted on October 10, 2017, for Event 6 of the Burnt Bridge Creek 2017 Trend Analysis Project. Monitoring and laboratory analysis were conducted in accordance with the project *Quality Assurance Project Plan* (QAPP; Herrera 2014) and modifications for 2015, 2016, and 2017 (Herrera 2015, 2016, 2017). A quality assurance review of the data collected was conducted and is summarized below. The laboratory data reports, monitoring forms containing field data, data quality review worksheet, and continuous temperature data are attached.

FIELD ACTIVITIES

Herrera conducted field measurements and water quality sampling at 11 monitoring sites on October 10, 2017, for Event 6 of the Burnt Bridge Creek 2017 Water Quality Monitoring Project. The field sampling team consisted of Rayna Gleason (Herrera) assisted by Linley Mescher (intern for the City of Vancouver). Samples and *in situ* water quality measurements were collected from each of the 11 sites without incident and according to QAPP procedures.

A YSI ProDSS multimeter was used to collect *in situ* data. Data were downloaded from temperature probes located at each of the eight temperature monitoring sites. The temperature data were checked for completeness and proper function. Anomalously high values recorded on sampling dates when loggers were out of the water to download data were deleted from the records.



DATA QUALITY SUMMARY

In general, procedures described and quality control criteria defined in the QAPP were met, resulting in no data qualification or corrective action with the following exceptions:

- One nitrate+nitrite nitrogen result (sample BBC8.8) qualified as estimated (J) based on the field duplicate RPD (38 percent versus the objective of ≤ 20 percent).
- One turbidity result (sample BBC8.8) qualified as estimated (J) based on the field duplicate RPD (38 percent versus the objective of ≤ 20 percent).
- One fecal coliform result (sample BBC8.8) qualified as estimated (J) based on the field duplicate RPD (63 percent versus the objective of ≤ 35 percent).
- Eight fecal coliform results qualified as estimated (J) based on colony counts falling outside of ideal range of 20 to 60.

Fecal coliform results were calculated using colony count data by the data reviewer according to QAPP procedures (Herrera 2014). Fecal coliform results reported by the laboratory and validated by the reviewer are shown in Table 1 along with data qualifiers.

Sample ID	Date Sampled	Laboratory Result ^b (CFU/100 mL)	Validated Result (CFU/100 mL)	Qualifier
BBC10.4	10/10/17	40, 36	36	J
BBC8.8	10/10/17	20, 48	48	J
PET0.0	10/10/17	220, 210	214	J
BBC8.4	10/10/17	60, 130	124	J
BUR0.0	10/10/17	20, 26	25	J
BBC7.0	10/10/17	200, 140	144	J
BBC5.9	10/10/17	120, 100	100	
BBC5.2	10/10/17	40, 110	108	
BBC2.6	10/10/17	140, 200	196	J
COL0.0	10/10/17	100, 86	86	
BBC1.6	10/10/17	180, 190	193	J
DUPE ^a	10/10/17	<20, 28	25	J

^a Field duplicate of BBC8.8.

^b The laboratory reported separate results for each dilution volume. Results are reported for 5 and 50 mL dilution volumes, respectively.

REFERENCES

Herrera. 2014. Burnt Bridge Creek Ambient Water Quality Monitoring Project – Quality Assurance Project Plan: 2014 Ambient Monitoring. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. July 3.

Herrera 2015. Burnt Bridge Creek 2015 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. June 15.

Herrera 2016. Burnt Bridge Creek 2016 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. May 25.

Herrera 2017. Burnt Bridge Creek 2017 Monitoring – Modifications to QAPP Technical Memorandum. Prepared for the City of Vancouver, Washington, by Herrera Environmental Consultants, Inc., Seattle, Washington. May 17.

ATTACHMENTS



IEH ANALYTICAL LABORATORIES
LABORATORY & CONSULTING SERVICES
3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	HER080-46	PAGE 1	
REPORT DATE:	10/21/17		
DATE SAMPLED:	10/10/17	DATE RECEIVED:	10/11/17
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER			
SAMPLES FROM HERRERA ENVIRONMENTAL			

CASE NARRATIVE

Twelve water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Sample data follows while QA/QC data is contained on subsequent pages.

SAMPLE DATA

SAMPLE ID	TOTAL-N (mg/L)	TOTAL-P (mg/L)	SRP (mg/L)	N03+N02 (mg/L)	TSS (mg/L)	TURBIDITY (NTU)
BBC10.4-20171010	2.94	0.076	0.057	2.65	4.0	1.9
BBC8.8-20171010	2.66	0.070	0.049	2.48	3.4	1.9
PET0.0-20171010	1.20	0.112	0.093	1.09	3.2	1.4
BBC8.4-20171010	1.89	0.087	0.066	1.75	4.2	1.8
BUR0.0-20171010	2.04	0.063	0.063	1.92	0.57	0.48
BBC7.0-20171010	2.17	0.154	0.067	1.65	54	9.8
BBC5.9-20171010	2.07	0.098	0.079	1.78	5.0	2.2
BBC5.2-20171010	2.25	0.098	0.079	1.80	5.6	2.1
BBC2.6-20171010	2.07	0.093	0.081	1.78	2.5	1.8
COL0.0-20171010	2.14	0.093	0.081	1.74	2.5	1.9
BBC1.6-20171010	1.95	0.093	0.077	1.75	9.5	2.2
DUPE-20171010	2.30	0.060	0.045	1.68	3.7	2.8



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CASE FILE NUMBER:	HER080-46	PAGE 2
REPORT DATE:	10/21/17	
DATE SAMPLED:	10/10/17	DATE RECEIVED: 10/11/17
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM HERRERA ENVIRONMENTAL		

QA/QC DATA WATER

QC PARAMETER	TOTAL-N (mg/l)	TOTAL-P (mg/L)	SRP (mg/L)	N03+N02 (mg/L)	TSS (mg/L)	TURBIDITY (NTU)
METHOD	SM20 4500NC	EPA 365.1	EPA 365.1	SM18 4500N03F	SM18 2540D	EPA 180.1
DATE ANALYZED	10/18/17	10/19/17	10/11/17	10/11/17	10/12/17	10/11/17
DETECTION LIMIT	0.050	0.002	0.001	0.010	0.50	0.10
DUPLICATE						
SAMPLE ID	DUPE-20171010	DUPE-20171010	DUPE-20171010	BATCH	BATCH	DUPE-20171010
ORIGINAL	2.30	0.060	0.045	1.68	1.9	2.8
DUPLICATE	2.29	0.059	0.044	1.71	1.9	2.7
RPD	0.44%	1.53%	2.00%	1.55%	0.00%	3.64%
SPIKE SAMPLE						
SAMPLE ID	DUPE-20171010	DUPE-20171010	DUPE-20171010	BATCH		
ORIGINAL	2.30	0.060	0.045	1.68		
SPIKED SAMPLE	3.39	0.107	0.065	1.87		
SPIKE ADDED	1.00	0.050	0.020	0.200		
% RECOVERY	108.74%	94.39%	102.14%	95.84%	NA	NA
QC CHECK						
FOUND	0.480	0.095	0.040	0.422	10	8.2
TRUE	0.490	0.094	0.039	0.408	10	8.0
% RECOVERY	97.96%	101.06%	102.56%	103.43%	100.00%	102.50%
BLANK						
	<0.050	<0.002	<0.001	<0.010	<0.50	NA

RPD = RELATIVE PERCENT DIFFERENCE.
 NA = NOT APPLICABLE OR NOT AVAILABLE.
 NC = NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
 OR = RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Damien Gadomski
 Project Manager

Job Number: 7101010
 Report Date: October 13, 2017
 ORELAP #: OR100028
 Project #: 14-05818-003
 Project: Burnt Bridge Creek
 Monitoring 2017

Jess Brown
 Herrera Environmental Consultants, Inc.
 24 NW 2nd Ave., Suite 204
 Portland, OR 97209

Dear Jess Brown,

Enclosed please find Pixis Labs analytical report for samples received as order number 7101010 on 10/10/17 at 13:30. Should you have any questions about this report or any other matter, please do not hesitate to contact us. We are here to help you.

The samples listed below were received in good condition, cooled at 8°C.

Laboratory Sample ID	Field Identification	Matrix	Collection Date	Collection Time
7101010-1	BBC10.4-20171010	Water	10/10/17	0850
7101010-2	BBC8.8-20171010	Water	10/10/17	0915
7101010-3	PET0.0-20171010	Water	10/10/17	0925
7101010-4	BBC8.4-20171010	Water	10/10/17	0945
7101010-5	BUR0.0-20171010	Water	10/10/17	1005
7101010-6	BBC7.0-20171010	Water	10/10/17	1020
7101010-7	BBC5.9-20171010	Water	10/10/17	1045
7101010-8	BBC5.2-20171010	Water	10/10/17	1105
7101010-9	BBC2.6-20171010	Water	10/10/17	1125
7101010-10	COL0.0-20171010	Water	10/10/17	1225
7101010-11	BBC1.6-20171010	Water	10/10/17	1235
7101010-12	DUPE-20171010	Water	10/10/17	---

Herrera Environmental Consultants, Inc.

Job Number: 7101010
Report Date: October 13, 2017
ORELAP #: OR100028

Test results relate only to the parameters tested and to the samples as received by the laboratory. Test results meet all requirements of NELAP unless otherwise noted. This report shall not be reproduced, except in full, without the written consent of this laboratory. Samples will be kept a maximum of 15 days from the report date unless prior arrangements have been made.

NOTE: This analysis was subcontracted to BSK Associates in Vancouver, WA. BSK Associates is an ORELAP accredited laboratory.

*Sample(s) were analyzed 10/11/17 at 15:20.

Thank you for allowing Pixis to be of service to you, we appreciate your business.

Sincerely,

Mark Leed
Client Services



BSK Associates Vancouver
 2517 E. Evergreen Blvd.
 Vancouver, WA 98661
 360-750-0055 (Main)
 360-750-0057 (FAX)

V7J0284

10/13/2017

Invoice: V703618

Melissa Hubbard
 Pixis Laboratories
 12423 NE Whitaker Way
 Portland, OR 97230

RE: Report for V7J0284 Micro - Non Compliance

Dear Melissa Hubbard,

Thank you for using BSK Associates for your analytical testing needs. In the following pages, you will find the test results for the samples submitted to our laboratory on 10/10/2017. The results have been approved for release by our Laboratory Director as indicated by the authorizing signature below.

The samples were analyzed for the test(s) indicated on the Chain of Custody (see attached) and the results relate only to the samples analyzed. BSK certifies that the testing was performed in accordance with the quality system requirements specified in the 2009 TNI Standard. Any deviations from this standard or from the method requirements for each test procedure performed will be annotated alongside the analytical result or noted in the Case Narrative. Unless otherwise noted, the sample results are reported on an "as received" basis.

If additional clarification of any information is required, please contact your Project Manager, Debra Karlsson, at (360) 750-0055.

Thanks again for using BSK Associates. We value your business and appreciate your loyalty.

Sincerely,

Renea Rangell, Laboratory Director - Vancouver



Accredited in Accordance with NELAP
 ORELAP #4021

Case Narrative

Project and Report Details

Client: Pixis Laboratories
Report To: Melissa Hubbard
Project #: 7101010
Received: 10/10/2017 - 15:09
Report Due: 10/13/2017

Invoice Details

Invoice To: Pixis Laboratories
Invoice Attn: Melissa Hubbard
Project PO#: -

Sample Receipt Conditions

Cooler: Default Cooler
Temperature on Receipt °C: 8.4

Containers Intact
COC/Labels Agree
Received On Blue Ice
Sample(s) arrived at lab on same day sampled.
Packing Material - Other
Initial receipt at BSK-VAL

Data Qualifiers

The following qualifiers have been applied to one or more analytical results:

HT1.0 Holding time exceeded. Sample was received at the lab past holding time.

Report Distribution

Recipient(s)	Report Format	CC:
Melissa Hubbard	FINAL.RPT	mleed@pixislabs.com;rreid@pixislabs.com



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-01
Sampled By: Client
Sample Description: BBC10.4 - 20171010 (5 ML)

Sample Date - Time: 10/10/17 - 08:50
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL	Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration							
Fecal Coliform	SM 9222D	40	1	CFU/100 ml	V701215	10/10/17 16:43	✎



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-02
Sampled By: Client
Sample Description: BBC10.4 - 20171010 (50 ML)

Sample Date - Time: 10/10/17 - 08:50
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL	Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration							
Fecal Coliform	SM 9222D	36	1	CFU/100 ml	V701215	10/10/17 16:43	



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-03
Sampled By: Client
Sample Description: BBC8.8 20171010 (5 ML)

Sample Date - Time: 10/10/17 - 09:15
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL	Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration							
Fecal Coliform	SM 9222D	20	1	CFU/100 ml	V701215	10/10/17 16:43 ✖	



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-04
Sampled By: Client
Sample Description: BBC8.8 20171010 (50 ML)

Sample Date - Time: 10/10/17 - 09:15
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	48	1 CFU/100 ml	V701215	10/10/17 16:43	↓



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-05
Sampled By: Client
Sample Description: PET 0.0 20171010 (5 ML)

Sample Date - Time: 10/10/17 - 09:25
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	220	1 CFU/100 ml	V701215	10/10/17 16:43	*



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-06
Sampled By: Client
Sample Description: PET 0.0 20171010 (50ML)

Sample Date - Time: 10/10/17 - 09:25
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
<u>Fecal Coliform Count by Membrane Filtration</u>						
Fecal Coliform	SM 9222D	210	1 CFU/100 ml	V701215	10/10/17 16:43	★



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-07

Sampled By: Client

Sample Description: BBC8.4 - 20171010 (5 ML)

Sample Date - Time: 10/10/17 - 09:45

Matrix: Waste Water

Sample Type: Other

BSK Associates Vancouver

Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	60	1 CFU/100 ml	V701215	10/10/17 16:43	✘



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-08

Sampled By: Client

Sample Description: BBC8.4 - 20171010 (50ML)

Sample Date - Time: 10/10/17 - 09:45

Matrix: Waste Water

Sample Type: Other

BSK Associates Vancouver Microbiology

Analyte	Method	Result	RL	Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration							
Fecal Coliform	SM 9222D	130	1	CFU/100 ml	V701215	10/10/17 16:43 *	



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-09
Sampled By: Client
Sample Description: BUR0.0 - 20171010 (5 ML)

Sample Date - Time: 10/10/17 - 10:05
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Table with 7 columns: Analyte, Method, Result, RL Units, Batch, Prepared, Qual. Row 1: Fecal Coliform Count by Membrane Filtration, SM 9222D, 20, 1 CFU/100 ml, V701215, 10/10/17 16:43, [symbol]



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-10
Sampled By: Client
Sample Description: BUR0.0 - 20171010 (50 ML)

Sample Date - Time: 10/10/17 - 10:05
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Table with 7 columns: Analyte, Method, Result, RL Units, Batch, Prepared, Qual. Row 1: Fecal Coliform Count by Membrane Filtration, SM 9222D, 26, 1 CFU/100 ml, V701215, 10/10/17 16:43, ↓



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-11
Sampled By: Client
Sample Description: BBC7.0 - 20171010 (5 ML)

Sample Date - Time: 10/10/17 - 10:20
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	200	1 CFU/100 ml	V701215	10/10/17 16:43	*



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-12
Sampled By: Client
Sample Description: BBC7.0 - 20171010 (50 ML)

Sample Date - Time: 10/10/17 - 10:20
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	140	1 CFU/100 ml	V701215	10/10/17 16:43	*



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-13
Sampled By: Client
Sample Description: BBC5.9 - 20171010 (5 ML)

Sample Date - Time: 10/10/17 - 10:45
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL	Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration							
Fecal Coliform	SM 9222D	120	1	CFU/100 ml	V701215	10/10/17 16:43 ✖	



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-14
Sampled By: Client
Sample Description: BBC5.9 - 20171010 (50 ML)

Sample Date - Time: 10/10/17 - 10:45
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	100	1 CFU/100 ml	V701215	10/10/17 16:43 *	



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-15
Sampled By: Client
Sample Description: BBC5.2 - 20171010 (5 ML)

Sample Date - Time: 10/10/17 - 11:05
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	40	1 CFU/100 ml	V701215	10/10/17 16:43	★



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-16
Sampled By: Client
Sample Description: BBC5.2 - 20171010 (50 ML)

Sample Date - Time: 10/10/17 - 11:05
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	110	1 CFU/100 ml	V701215	10/10/17 16:43	



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-17
Sampled By: Client
Sample Description: BBC2.6 - 20171010 (5 ML)

Sample Date - Time: 10/10/17 - 11:25
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Table with 7 columns: Analyte, Method, Result, RL Units, Batch, Prepared, Qual. Row 1: Fecal Coliform Count by Membrane Filtration, SM 9222D, 140, 1 CFU/100 ml, V701215, 10/10/17 16:43, *



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-18
Sampled By: Client
Sample Description: BBC2.6 - 20171010 (50 ML)

Sample Date - Time: 10/10/17 - 11:25
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	200	1 CFU/100 ml	V701215	10/10/17 16:43	*



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-19
Sampled By: Client
Sample Description: COL0.0 - 20171010 (5 ML)

Sample Date - Time: 10/10/17 - 12:25
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	100	1 CFU/100 ml	V701215	10/10/17 16:43	★



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-20
Sampled By: Client
Sample Description: COL0.0 - 20171010 (50 ML)

Sample Date - Time: 10/10/17 - 12:25
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	86	1 CFU/100 ml	V701215	10/10/17 16:43	★



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-21
Sampled By: Client
Sample Description: BBC1.6 - 20171010 (5 ML)

Sample Date - Time: 10/10/17 - 12:35
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	180	1 CFU/100 ml	V701215	10/10/17 16:43	*



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-22

Sampled By: Client

Sample Description: BBC1.6 - 20171010 (50 ML)

Sample Date - Time: 10/10/17 - 12:35

Matrix: Waste Water

Sample Type: Other

BSK Associates Vancouver Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	190	1 CFU/100 ml	V701215	10/10/17 16:43	★



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-23
Sampled By: Client
Sample Description: DUPE - 20171010 (5 ML)

Sample Date - Time: 10/10/17 - 00:00
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Table with 7 columns: Analyte, Method, Result, RL Units, Batch, Prepared, Qual. Row 1: Fecal Coliform Count by Membrane Filtration, SM 9222D, <20, 1 CFU/100 ml, V701215, 10/10/17 16:43, HT1.0



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-24
Sampled By: Client
Sample Description: DUPE - 20171010 (50 ML)

Sample Date - Time: 10/10/17 - 00:00
Matrix: Waste Water
Sample Type: Other

BSK Associates Vancouver
Microbiology

Table with 7 columns: Analyte, Method, Result, RL Units, Batch, Prepared, Qual. Row 1: Fecal Coliform Count by Membrane Filtration, SM 9222D, 28, 1 CFU/100 ml, V701215, 10/10/17 16:43, HT1.0



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-25

Sampled By: Client

Sample Description: DUPE BBC5.9 - 20171010 (5ML)

Sample Date - Time: 10/10/17 - 10:45

Matrix: Waste Water

Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	100	1 CFU/100 ml	V701215	10/10/17 16:43	*



V7J0284

Micro - Non Compliance

7101010

Certificate of Analysis

Sample ID: V7J0284-26

Sampled By: Client

Sample Description: DUPE BBC5.9 - 20171010 (50ML)

Sample Date - Time: 10/10/17 - 10:45

Matrix: Waste Water

Sample Type: Other

BSK Associates Vancouver
Microbiology

Analyte	Method	Result	RL Units	Batch	Prepared	Qual
Fecal Coliform Count by Membrane Filtration						
Fecal Coliform	SM 9222D	120	1 CFU/100 ml	V701215	10/10/17 16:43	*

Certificate of Analysis

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of according to BSK's sample retention policy unless other arrangements are made in advance.
- All positive results for EPA Methods 504.1 and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.
- Due to the subjective nature of the Threshold Odor Method, all characterizations of the detected odor are the opinion of the panel of analysts. The characterizations can be found in Standard Methods 2170B Figure 2170:1.
- The MCLs provided in this report (if applicable) represent the primary MCLs for that analyte.

Definitions

mg/L:	Milligrams/Liter (ppm)	MDL:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit: DL x Dilution	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)	ND:	None Detected at RL	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	pCi/L:	Picocuries per Liter	Absent:	Less than 1 CFU/100mLs
%:	Percent Recovered (surrogates)	RL Mult:	RL Multiplier	Present:	1 or more CFU/100mLs
NR:	Non-Reportable	MCL:	Maximum Contaminant Limit		

Please see the individual Subcontract Lab's report for applicable certifications.

BSK is not accredited under the NELAP program for the following parameters:

Certifications: Please refer to our website for a copy of our Accredited Fields of Testing under each certification.

Fresno

State of California - ELAP	1180	State of Hawaii	4021
State of Nevada	CA000792018-1	State of Oregon - NELAP	4021-009
EPA - UCMR4	CA00079	State of Washington	C997-17B
State of New York	12073		

Sacramento

State of California - ELAP 2435

San Bernardino

State of California - ELAP 2993 State of Oregon - NELAP 4119-002

Vancouver

State of Oregon - NELAP WA100008-010 State of Washington C824-17



2517 E. Evergreen Blvd.
Vancouver, WA 98661
P 360.750.0055
F 360.750.0057
www.bskassociates.com

Page 1 of 2

Turnaround Time Request
Standard - 10 business days

Rush (Surcharge may apply)
Date needed:

V7J0284
Pixis1794

10/10/2017
3



Y

*Required Fields

Temp: 8.4#13

Company/Client Name*: Pixis Labs Report Attention*: _____ Invoice To*: _____ Phone*: _____
Address*: _____ City*: _____ State*: _____ Zip*: _____ Fax*: _____
Project: _____ Project #: 7101010 Reporting Options: Trace (J-Flag)
Sampler Name (Printed/Signature)*: _____ E-Mail Swamp
 Fax EDD Type:
 Mail

Compliance? Yes No State: WA OR System/PWS ID: _____ DOH Source/Source ID: _____
Water System Name: _____ County: _____
Sample Composition: Single Source **Blended **Composite Distribution Sample
**List sources in Source ID field
Sample Taken: Before Treatment After Treatment No Treatment Group (WA only): A B
Matrix Types: SW=Surface Water BW=Bottled Water GW=Ground Water WW=Waste Water STW=Storm Water DW=Drinking Water SO=Solid

#	Sample Description/Location*	Sampled*		Matrix*	Comments	# of cont.
		Date	Time			
	BBC10.4-20171010	10/10/17	0850	WW		1
	BBC8.8-20171010		0915			1
	FET0.0-20171010		0925			1
	BBC8.4-20171010		0945			1
	BUR0.0-20171010		1005			1
	BBC7.0-20171010		1020			1
	BBC5.9-20171010		1045			1
	BBC5.2-20171010		1205			1
	BBC2.6-20171010		1125			1
	COL0.0-20171010	✓	1225	✓		1

Petal California

Receipt Conditions in Vancouver: _____ Temp: _____ Received Via: UPS WALK-IN FED EX Courier: _____

Relinquished by: (Signature and Printed Name) [Signature] Company PL Date 10/10 Time 1507 Received by: (Signature and Printed Name) _____ Company _____

Relinquished by: (Signature and Printed Name) _____ Company _____ Date _____ Time _____ Received by: (Signature and Printed Name) _____ Company _____

Relinquished by: (Signature and Printed Name) _____ Company _____ Date 10/10/17 Time 1029 Received for Lab by: (Signature and Printed Name) [Signature] BSK

Payment Received at Delivery: Check / Cash Debit: _____ Amount: _____ PIA#: _____

Shipping Method: ONTRAC UPS GSO WALK-IN FED EX Alaskan Airlines Courier: _____

Cooling Method: Wet Blue None Custody Seal: YAN

Payment for services rendered as noted hereon is due in full within 30 days from the date invoiced. If not so paid, account balances are deemed delinquent. Delinquent balances are subject to monthly service charges and interest specified in BSK's current Standard Terms and Conditions for Laboratory. The Client/Company acknowledges that they are either the Client or an authorized agent to the Client, that the Client agrees to be responsible for payment for the services on this Chain of Custody, and agrees to BSK's terms and conditions for laboratory services unless contractually bound otherwise. BSK's current terms and conditions can be found at www.bskassociates.com/BSKLabTermsConditions.pdf



Raw Data Scan Cover Page



Method: V-Fecal Coliform Count by MF

Instrument: V_Micro_None



Sequence: VA01189



Analyst: JRD



Bacti Run Date: 10/10/2017

Department: Bacti



Archive:

Print Date: 10/10/2017

Notes:



Sequence: **VA01189**

<u>Analysis Order</u>	<u>LabNumber</u>	<u>Container</u>	<u>Description</u>	<u>Comments</u>
1	V7J0284-01	A	BBC10.4 - 20171010 (5 ML)	
2	V7J0284-02	A	BBC10.4 - 20171010 (50 MLO	
3	V7J0284-03	A	BBC8,8 20171010 (5 ML)	
4	V7J0284-04	A	BBC8,8 20171010 (50 ML)	
5	V7J0284-05	A	PET 0.0 20171010 (5 ML)	
6	V7J0284-06	A	PET 0.0 20171010 (50ML)	
7	V7J0284-07	A	BBC8.4 - 20171010 (5 ML)	
8	V7J0284-08	A	BBC8.4 - 20171010 (50ML)	
9	V7J0284-09	A	BUR0.0 - 20171010 (5 ML)	
10	V7J0284-10	A	BUR0.0 - 20171010 (50 ML)	
11	V7J0284-11	A	BBC7.0 - 20171010 (5 ML)	
12	V7J0284-12	A	BBC7.0 - 20171010 (50 ML)	
13	V7J0284-13	A	BBC5.9 - 20171010 (5 ML)	
14	V7J0284-14	A	BBC5.9 - 20171010 (50 ML)	
15	V7J0284-15	A	BBC5.2 - 20171010 (5 ML)	
16	V7J0284-16	A	BBC5.2 - 20171010 (50 ML)	
17	V7J0284-17	A	BBC2.6 - 20171010 (5 ML)	
18	V7J0284-18	A	BBC2.6 - 20171010 (50 ML)	
19	V7J0284-19	A	COL0.0 - 20171010 (5 ML)	
20	V7J0284-20	A	COL0.0 - 20171010 (50 ML)	
21	V7J0284-21	A	BBC1.6 - 20171010 (5 ML)	
22	V7J0284-22	A	BBC1.6 - 20171010 (50 ML)	
23	V7J0284-23	A	DUPE - 20171010 (5 ML)	
24	V7J0284-24	A	DUPE - 20171010 (50 ML)	
25	V7J0284-25	A	DUPE BBC5.9 - 20171010 (5ML)	
26	V7J0284-26	A	DUPE BBC5.9 - 20171010 (50ML)	

V-Fecal Collform Count by MF SM 9222D Water

Media	Incubate		Date & Time In	Init	Date & Time Out	Init
m-Fc Broth	44.5°C	22-26 hours	10-10-2017 16:43	GMB	10/11/17 15:28	GMB

data entry 10-11-17
JED

	Sample ID	Receipt Temp °C	Dilution 1 mL	Dilution 2 mL	Dilution 3 mL	Result Fecal Coliforms/100mL	Notes	
1	V7J0284-01	8.4	2			40	Before: 0	
27	V7J0284-02	↓		18		36	After: 0	
53	V7J0284-03		1			20	DUP # 25 + 26	
79	V7J0284-04				24		48	
105	V7J0284-05			11			220	
131	V7J0284-06				107		214	
157	V7J0284-07			3			60	
183	V7J0284-08				65		130	
209	V7J0284-09			1			20	
235	V7J0284-10				13		26	
261	V7J0284-11			10			200	
287	V7J0284-12				69		138	
313	V7J0284-13			6			120	
339	V7J0284-14				50		100	
365	V7J0284-15			2			40	
391	V7J0284-16				54		108	
417	V7J0284-17			7			140	
443	V7J0284-18				101		202	
469	V7J0284-19			5			100	
495	V7J0284-20				43		86	
521	V7J0284-21			9			180	
547	V7J0284-22				97		194	
573	V7J0284-23			0			<20	

		3 mL	30 mL			
599	V7J0284-24	8.4		14		28
625	V7J0284-25	↓	5			100
651	V7J0284-26	↓		58		116

-Best readable plate is the one that contains 20-60 colonies.

Reviewed by: WRS Date: 10/12/17
In element

-Fecal Coliform per 100mL = $\frac{\text{Fecal Coliform Colonies counted}}{\text{mLs Sample Filtered}} \times 100$

-If the count exceeds 200 per membrane, then report Too Numerous to Count (TNTC).

WM-FL-0075-00

SAMPDATA

CLIENT	PROJECT	PROJECTNUM	LabName	SAMPLENAME
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC10.4 - 20171010 (5 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC10.4 - 20171010 (50
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC8.8 20171010 (5 ML
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC8.8 20171010 (50 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	PET 0.0 20171010 (5 ML
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	PET 0.0 20171010 (50ML
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC8.4 - 20171010 (5 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC8.4 - 20171010 (50M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BUR0.0 - 20171010 (5 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BUR0.0 - 20171010 (50 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC7.0 - 20171010 (5 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC7.0 - 20171010 (50 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC5.9 - 20171010 (5 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC5.9 - 20171010 (50 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC5.2 - 20171010 (5 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC5.2 - 20171010 (50 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC2.6 - 20171010 (5 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC2.6 - 20171010 (50 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	COL0.0 - 20171010 (5 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	COL0.0 - 20171010 (50 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC1.6 - 20171010 (5 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	BBC1.6 - 20171010 (50 M
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	DUPE - 20171010 (5 ML)
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	DUPE - 20171010 (50 ML
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	DUPE BBC5.9 - 2017101
Pixis Laboratories	Micro - Non Compliance	7101010	BSK Associates Vancouv	DUPE BBC5.9 - 2017101
LABSAMPID	MATRIX	RPTMATRIX	SAMPDATE	PREPDATE
V7J0284-01	Water	Waste Water	10/10/2017 08:50:00	10/10/2017 16:43:00
V7J0284-02	Water	Waste Water	10/10/2017 08:50:00	10/10/2017 16:43:00
V7J0284-03	Water	Waste Water	10/10/2017 09:15:00	10/10/2017 16:43:00
V7J0284-04	Water	Waste Water	10/10/2017 09:15:00	10/10/2017 16:43:00
V7J0284-05	Water	Waste Water	10/10/2017 09:25:00	10/10/2017 16:43:00
V7J0284-06	Water	Waste Water	10/10/2017 09:25:00	10/10/2017 16:43:00
V7J0284-07	Water	Waste Water	10/10/2017 09:45:00	10/10/2017 16:43:00
V7J0284-08	Water	Waste Water	10/10/2017 09:45:00	10/10/2017 16:43:00

SAMPDATA

10/11/2017 15:20:00	V701215	V-Fecal Coliform Count b	SM 9222D	Fecal Coliform
10/11/2017 15:20:00	V701215	V-Fecal Coliform Count b	SM 9222D	Fecal Coliform
10/11/2017 15:20:00	V701215	V-Fecal Coliform Count b	SM 9222D	Fecal Coliform
10/11/2017 15:20:00	V701215	V-Fecal Coliform Count b	SM 9222D	Fecal Coliform
10/11/2017 15:20:00	V701215	V-Fecal Coliform Count b	SM 9222D	Fecal Coliform
10/11/2017 15:20:00	V701215	V-Fecal Coliform Count b	SM 9222D	Fecal Coliform
10/11/2017 15:20:00	V701215	V-Fecal Coliform Count b	SM 9222D	Fecal Coliform
10/11/2017 15:20:00	V701215	V-Fecal Coliform Count b	SM 9222D	Fecal Coliform
10/11/2017 15:20:00	V701215	V-Fecal Coliform Count b	SM 9222D	Fecal Coliform



Herrera Environmental Consultants, Inc.

Chain of Custody Record

*HerreraENV
7101010*



2200 Sixth Avenue | Suite 1100
Seattle, Washington | 98121
p 206 441 9080 | f 206 441 9108

Project Name:		Project Number:		Client:			Number of Containers	Analyses Requested										Lab ID No.				
Burnt Bridge Creek Monitoring 2017		14-05818-003		City of Vancouver				Fecal Coliform- SM 9222D														
Report To:		Copy To:																				
Jess Brown, jbrown@herrerainc.com		Rgleason@herrerainc.com																				
Sampled By:		Delivery Method:																				
Rayna Gleason																						
Laboratory:		Requested Completion Date:		Total No. of Containers:																		
PIXIS Labs				12																		
Lab Use:																						
Sample ID	Date	Time	Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)																	
BBC10.4-20171010	10/10/17	8:50 a	G	Y	SW	1														B0021		
BBC8.8-20171010	10/10/17	9:15 a	G	Y	SW	1																
PET0.0-20171010	10/10/17	9:25 a	G	Y	SW	1																
BBC8.4-20171010	10/10/17	9:45 a	G	Y	SW	1																
BUR0.0-20171010	10/10/17	10:05 a	G	Y	SW	1																
BBC7.0-20171010	10/10/17	10:20 a	G	Y	SW	1																
BBC5.9-20171010	10/10/17	10:45 a	G	Y	SW	1																
BBC5.2-20171010	10/10/17	11:05 a	G	Y	SW	1																
BBC2.6-20171010	10/10/17	11:25 a	G	Y	SW	1																
COL0.0-20171010	10/10/17	12:25 p	G	Y	SW	1																
BBC1.6-20171010	10/10/17	12:35 p	G	Y	SW	1																
DUPE-20171010	10/10/17	NA	G	Y	SW	1																

Comments/Special Instructions:

IMPORTANT: Please use two dilution volumes for the analysis: 5 mL and 50 mL. Include a laboratory duplicate. Please complete and return attached bench sheet.

Relinquished by (Name/CO)	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Rayna Gleason - Herrera	<i>Rayna Gleason</i>	10/10/17 1:30 pm	<i>M. W. [unclear]</i>	10/10/17 1:30	
Relinquished by (Name/CO)	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
			<i>M. W. [unclear]</i>		

Sample Type: G=Grab C=Composite Matrix Codes: A=Air GW=Groundwater SE=Sediment SO=Soil SW=Surface Water W=Water (blanks) M=Material O=Other (specify)

goc



V-Fecal Coliform Count by MF SM 9222D Water

Media	Incubate		Date & Time In		Init	Date & Time Out		Init
m-Fc Broth	44.5°C	22-26 hours	10-10-2017	16:43	GWB	10/11/17	15:28	GWB

data entry 10-11-17
gpo

B9C10.4
B9C8.8
E10.0
B9C8.4
JUP
B9L7.0
B9L5.9
B9L5.2
B9L2.6
JLO.0
B9C1.6
JUP

Sample ID	Receipt Temp °C	Dilution 1 5 mL	Dilution 2 50 mL	Dilution 3 mL	Result Facal Coliforms/100mL	Notes	Herrera check
1 V7J0284-01	8.4	2			40	Before: 0	J 36J
27 V7J0284-02			18		36	After: 0	
53 V7J0284-03		1			20	DUP # 25 + 26	48
79 V7J0284-04			24		48		
105 V7J0284-05		11			220		T 214J
131 V7J0284-06			107		214		
157 V7J0284-07		3			60		T 124J
183 V7J0284-08			65		130		
209 V7J0284-09		1			20		T 25J
235 V7J0284-10			13		26		
261 V7J0284-11		10			200		T 144J
287 V7J0284-12			69		138		
313 V7J0284-13		6			120		100
339 V7J0284-14			50		100		
365 V7J0284-15		2			40		108
391 V7J0284-16			54		108		
417 V7J0284-17		7			140		T 196J
443 V7J0284-18			101		202		
469 V7J0284-19		5			100		86
495 V7J0284-20			43		86		
521 V7J0284-21		9			180		T 193J
547 V7J0284-22			97		194		
573 V7J0284-23		0			<20		

checked by
Jess Brown
10/16/17

Jess Brown

Page 34 of 36

DUPE

Lab
Dupl of
BAC 5.9

		3 mL	30 mL			
599	V7J0284-24	8.4		14		28
625	V7J0284-25	↓	5			100
651	V7J0284-26	↓		58		116

J 25J
116

Reviewed by: EWS Date: 10/12/17
In element

- Best readable plate is the one that contains 20-60 colonies.
- Fecal Coliform per 100mL = $\frac{\text{Fecal Coliform Colonies counted}}{\text{mLs Sample Filtered}} \times 100$
- if the count exceeds 200 per membrane, then report Too Numerous to Count (TNTC).

WM-FL-0075-00



Data Quality Assurance Worksheet

Project Name/No./Client: Burnt Bridge Creek / 14-05818-003 / City of Vancouver, Washington

Laboratory/Parameters: IEH-Aquatic Research / nitrogen, phosphorus, SRP, nitrate-nitrite, TSS, turbidity
PIXIS Labs/ Fecal Coliform

Sample Date/Sample ID: 10/10/17 / Event 6 (11 stations plus field duplicate of BBC8.8)

By J. Brown

Date 10/23/17 Page 1 of 1

Checked: initials RZ

date 10/23/17

Parameter	Completeness/ Methodology	Holding Times (days)		Blanks/ Reporting Limit	Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Field Duplicates RPD (%)		Instrument Calibration/ Performance	ACTION
		Reported	Goal		Reported	Goal	Reported	Goal	Reported	Goal ¹	Reported	Goal ¹		
Total Nitrogen	OK / SM4500N-C	8	<28	<0.050 / 0.050 mg/L	109	90-110	98	90-110	0.4	<20	15	<20	OK	
Total Phosphorus	OK / EPA 365.1	9	<28	<0.002 / 0.002 mg/L	94	90-110	101	90-110	2	<20	15	<20	OK	
SRP	OK / EPA 365.1	<48 hours	<48 hours ²	<0.001 / 0.001 mg/L	102	90-110	103	90-110	2	<20	9	<20	OK	
Nitrate + Nitrite	OK / EPA 353.2	1	<28	<0.010 / 0.010 mg/L	96	90-110	103	90-110	2	<20	38	<20	OK	Flag BBC8.8 due to field dupe RPD
TSS	OK / EPA 160.2	2	<7	<0.5 / 0.5 mg/L	NA	NA	100	90-110	D=0	<20	8	<20	OK	
Turbidity	OK / SM2130-B	<48 hours	<48	<0.1 / 0.1 NTU	NA	NA	103	90-110	4	<20	38	<20	OK	Flag BBC8.8 due to field dupe RPD
Fecal coliform	OK / SM9222-D	4-8 hours	<24	<5 / 5 CFU/100mL	NA	NA	NA	NA	15	<35	63	<35	OK	See NOTE A for flags.

¹ If the sample or duplicate value is less than five times the reporting limit, then the difference (D) is calculated rather than the RPD and the QA objective is that the difference shall not exceed 2 times the reporting limit instead of the number indicated in the objective column.

² Less than 24 hours from collection to filtration.



Data Quality Assurance Worksheet

Project Name/No./Client: Burnt Bridge Creek / 14-05818-003 / City of Vancouver, Washington
 Laboratory/Parameters: IEH-Aquatic Research / nitrogen, phosphorus, SRP, nitrate-nitrite, TSS, turbidity
PIXIS Labs/ Fecal Coliform
 Sample Date/Sample ID: 10/10/17 / Event 6 (11 stations plus field duplicate of BBC8.8)

By J. Brown
 Date 10/23/17 Page 1 of 1
 Checked: initials RZ
 date 10/23/17

Parameter	Completeness/ Methodology	Holding Times (days)		Blanks/ Reporting Limit	Matrix Spikes/ Surrogate Recovery (%)		Lab Control Samples Recovery (%)		Lab Duplicates RPD (%)		Field Duplicates RPD (%)		Instrument Calibration/ Performance	ACTION
		Reported	Goal		Reported	Goal	Reported	Goal	Reported	Goal ¹	Reported	Goal ¹		
Temperature	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	<20	OK	None
Dissolved Oxygen	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.2	<20	OK	None
pH	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.1	<20	OK	None
Conductivity	YSI 556 Meter	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05	<20	OK	None

NOTE A: Flag fecal coliform results for BBC10.4, PET0.0, BBC8.4, BUR0.0, BBC7.0, BBC2.6, BBC1.6 and DUPE due to colony counts of range (<20 or >60); flag BBC8.8 for field duplicate RPD exceedance.

NA – not applicable or not available
 RPD- relative percent difference

NC – not calculable due to one or more values below the detection limit
 SRP –soluble reactive phosphorus

NS – field duplicate not sampled
 TSS – total suspended solids

¹ If the sample or duplicate value is less than five times the reporting limit, then the difference (D) is calculated rather than the RPD and the QA objective is that the difference shall not exceed 2 times the reporting limit instead of the number indicated in the objective column.

² Less than 24 hours from collection to filtration.



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Mescher

SITE ID: BBC 10.4 DATE: 10-10-17 TIME: 8:50am

WEATHER: overcast + chilly

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>11°C</u>			
DISSOLVED OXYGEN:	<u>74.7 %</u> <u>8.24 mg/L</u>			
PH:	<u>6.67</u>			
CONDUCTIVITY:	<u>183.0</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>20171010 - BBC10.4</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? Yes: _____ No: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		

PRE-EVENT CALIBRATION: 1013
~~1000~~ → 1000 — CONDUCT.
PH 7.21 → 7.00, 4.15 → 4.01, 10.17 → 10.01
DO 99.7 → 99.9%



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Mescher

SITE ID: BBC 8.8 DATE: 10-10-17 TIME: 9:15

WEATHER: overcast and chilly

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>11.3°C</u>			
DISSOLVED OXYGEN:	<u>82.6%</u> <u>8.90mg/L</u>			
pH:	<u>7.44</u>			
CONDUCTIVITY:	<u>182.4</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>20171010 - BBC 8.8</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>DUPE</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Mescher

SITE ID: PET 0.0 DATE: 10-10-17 TIME: 9:25am

WEATHER: overcast and chilly

NOTES: water felt significantly warmer than BBC

YSI 556 METER MEASUREMENTS		DUPLICATE? YES: <input checked="" type="checkbox"/> NO: <input type="checkbox"/>	
TEMPERATURE:	<u>15.2°C</u>	<u>15.2°C</u>	
DISSOLVED OXYGEN:	<u>85.5% 8.59mg/L</u>	<u>85.3% 8.57mg/L</u>	
pH:	<u>7.22</u>	<u>7.21</u>	
CONDUCTIVITY:	<u>206.1</u>	<u>206.2</u>	

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>20171010 - PET 0.0</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input type="checkbox"/>	
250 mL UNPRESERVED BOTTLE:	<input type="checkbox"/>	
100 mL FECAL BOTTLE:	<input type="checkbox"/>	



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Mescher

SITE ID: BBC 8.4 DATE: 10/10/17 TIME: 9:45

WEATHER: overcast + chilly

NOTES: could not remove probe stands

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: <input type="checkbox"/>	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>12.6°C</u>			
DISSOLVED OXYGEN:	<u>90.0% 9.55 mg/L</u>			
PH:	<u>7.42</u>			
CONDUCTIVITY:	<u>187.9</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>20171010-BBC8.4</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: No:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input type="checkbox"/>	
250 mL UNPRESERVED BOTTLE:	<input type="checkbox"/>	
100 mL FECAL BOTTLE:	<input type="checkbox"/>	



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003
 CLIENT: City of Vancouver
 FIELD PERSONNEL: Gleason, Mescher
 SITE ID: BUR 00 DATE: 10/10/17 TIME: 10:05
 WEATHER: overcast + chilly
 NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES:	NO:
TEMPERATURE:	<u>11.6°C</u>			<input checked="" type="checkbox"/>
DISSOLVED OXYGEN:	<u>89.3% 9.72 mg/L</u>			
PH:	<u>7.35</u>			
CONDUCTIVITY:	<u>185.3</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>20171010-BUR0.0</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Mescher

SITE ID: BBC 7.0 DATE: 10/10/17 TIME: 10:20

WEATHER: chilly + partly sunny

NOTES: very dirty, lots of sediment, could not remove probe stand

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>11.1°C</u>			
DISSOLVED OXYGEN:	<u>81.9%</u> <u>9.01 mg/L</u>			
PH:	<u>7.28</u>			
CONDUCTIVITY:	<u>203.6</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>20171010 - BBC 7.0</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003
 CLIENT: City of Vancouver
 FIELD PERSONNEL: Glason, Linley
 SITE ID: BBC 5.9 DATE: 10/10/17 TIME: 10:45
 WEATHER: chilly + sunny
 NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>10.5 °C</u>			
DISSOLVED OXYGEN:	<u>82.1% 9.14 mg/L</u>			
PH:	<u>7.31</u>			
CONDUCTIVITY:	<u>203.7</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>20171010-BBC5.9</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Mascher

SITE ID: BBC 5.2 DATE: 10/10/17 TIME: 11:05

WEATHER: chilly + sunny

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE? YES: _____ NO: <input checked="" type="checkbox"/>	
TEMPERATURE:	<u>11.1°C</u>		
DISSOLVED OXYGEN:	<u>96.2%</u> <u>10.59mg/L</u>		
PH:	<u>7.60</u>		
CONDUCTIVITY:	<u>203.7</u>		

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>20171010 - BBC5.2</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT No.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Meschen

SITE ID: BBC 2.6 DATE: 10/10/17 TIME: 11:25

WEATHER: chilly + overcast

NOTES: backup probe missing, only one probe stand back

YSI 556 METER MEASUREMENTS		DUPLICATE? YES: <input type="checkbox"/> NO: <input checked="" type="checkbox"/>	
TEMPERATURE:	<u>10.7°C</u>		
DISSOLVED OXYGEN:	<u>98.4% 10.93mg/L</u>		
PH:	<u>7.80</u>		
CONDUCTIVITY:	<u>204.7</u>		

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>2017-10/10 - BBC 2.6</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: NO:

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



HERRERA

BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: Gleason, Mescher

SITE ID: COL0.0 DATE: 10/10/17 TIME: 12:25

WEATHER: rainy - light drizzle

NOTES: _____

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>11.1°C</u>			
DISSOLVED OXYGEN:	<u>98.2%</u> <u>10.78mg/L</u>			
PH:	<u>7.94</u>			
CONDUCTIVITY:	<u>265.4</u>			

SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>20171010 - COL0.0</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		



BURNT BRIDGE CREEK MONITORING FORM

PROJECT: BURNT BRIDGE CREEK MONITORING PROJECT NO.: 14-05818-003

CLIENT: City of Vancouver

FIELD PERSONNEL: _____

SITE ID: BBC1.6 DATE: 10/10/17 TIME: 12:35

WEATHER: cloudy

NOTES: could not get probe stand for back up

YSI 556 METER MEASUREMENTS		DUPLICATE?	YES: _____	NO: <input checked="" type="checkbox"/>
TEMPERATURE:	<u>10.5°C</u>			
DISSOLVED OXYGEN:	<u>97.2% 10.83mg/L</u>			
PH:	<u>7.81</u>			
CONDUCTIVITY:	<u>210.8</u>			

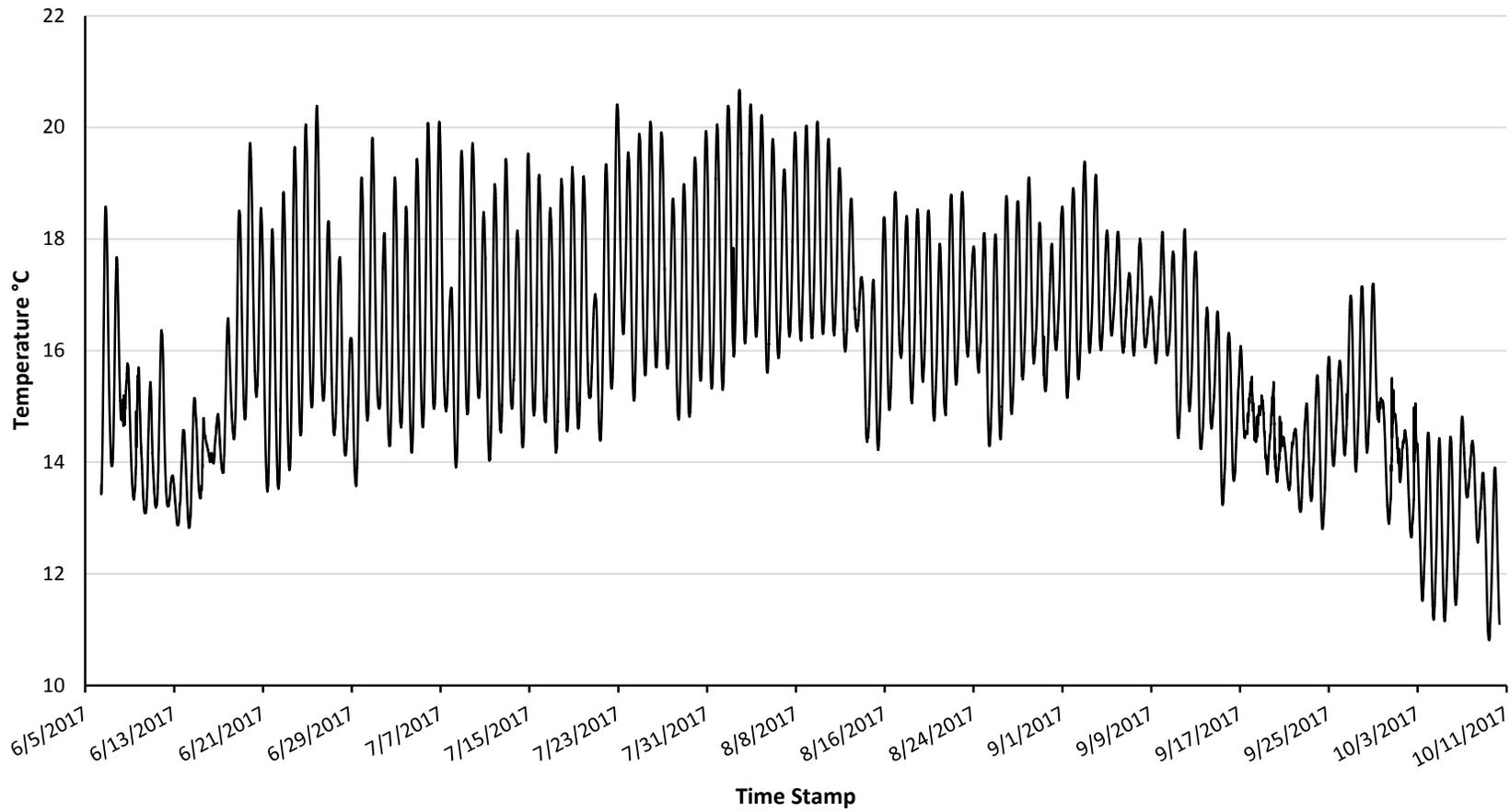
SAMPLES	Collected	SAMPLE ID
1L BOTTLE:	<input checked="" type="checkbox"/>	<u>20171010 - BBC1.6</u>
250 mL UNPRESERVED BOTTLE:	<input checked="" type="checkbox"/>	
100 mL FECAL BOTTLE:	<input checked="" type="checkbox"/>	

DUPLICATE COLLECTED? YES: _____ NO: _____

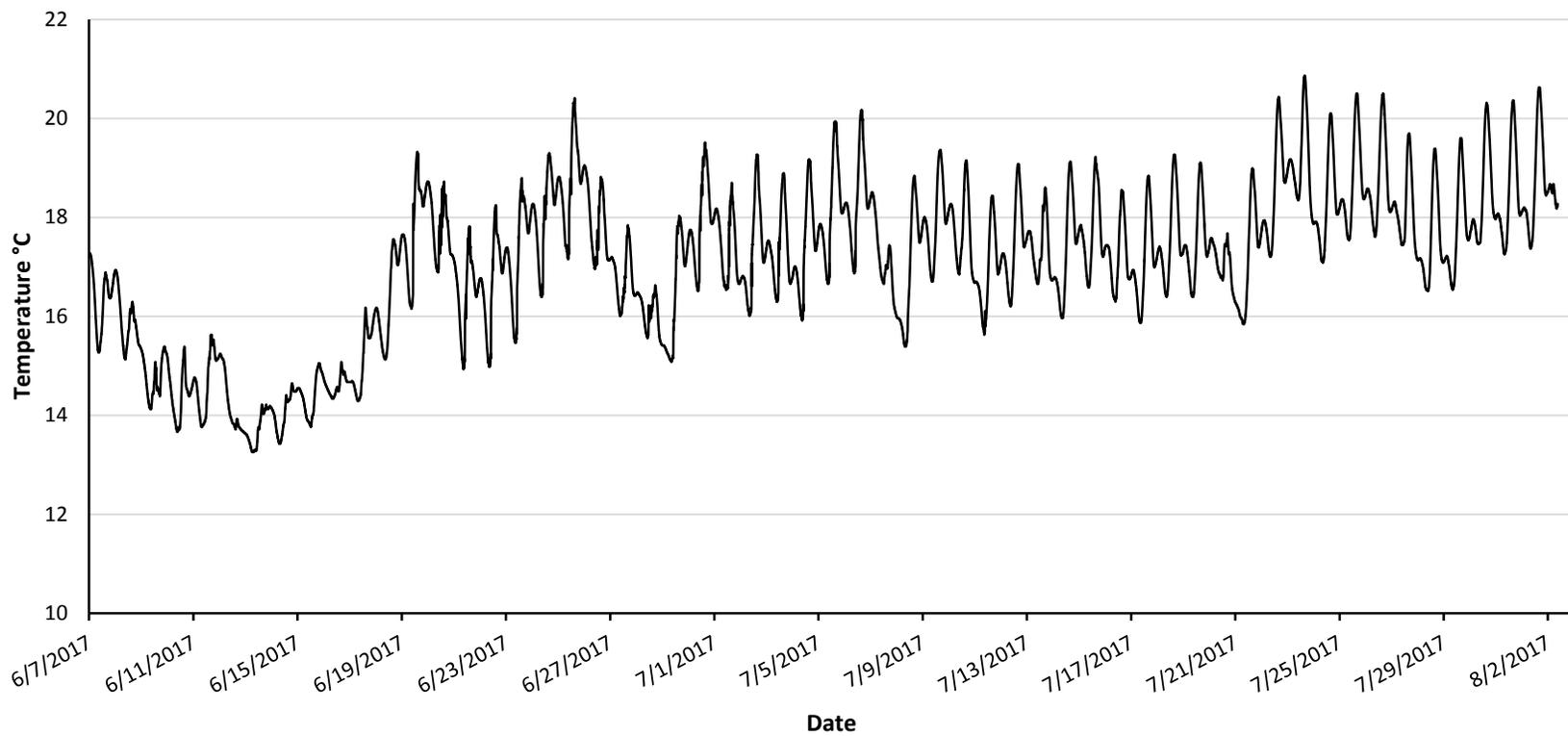
DUPLICATE SAMPLES	Collected	SAMPLE ID
1L BOTTLE:		
250 mL UNPRESERVED BOTTLE:		
100 mL FECAL BOTTLE:		

CONDUCT.
 POST-EVENT CALIBRATION: λ 971 \rightarrow 1000
 PH - 6.91 \rightarrow 7.00, 3.82 \rightarrow 4.01, 9.87 \rightarrow 10.0
 DO 100.6% \rightarrow 100%

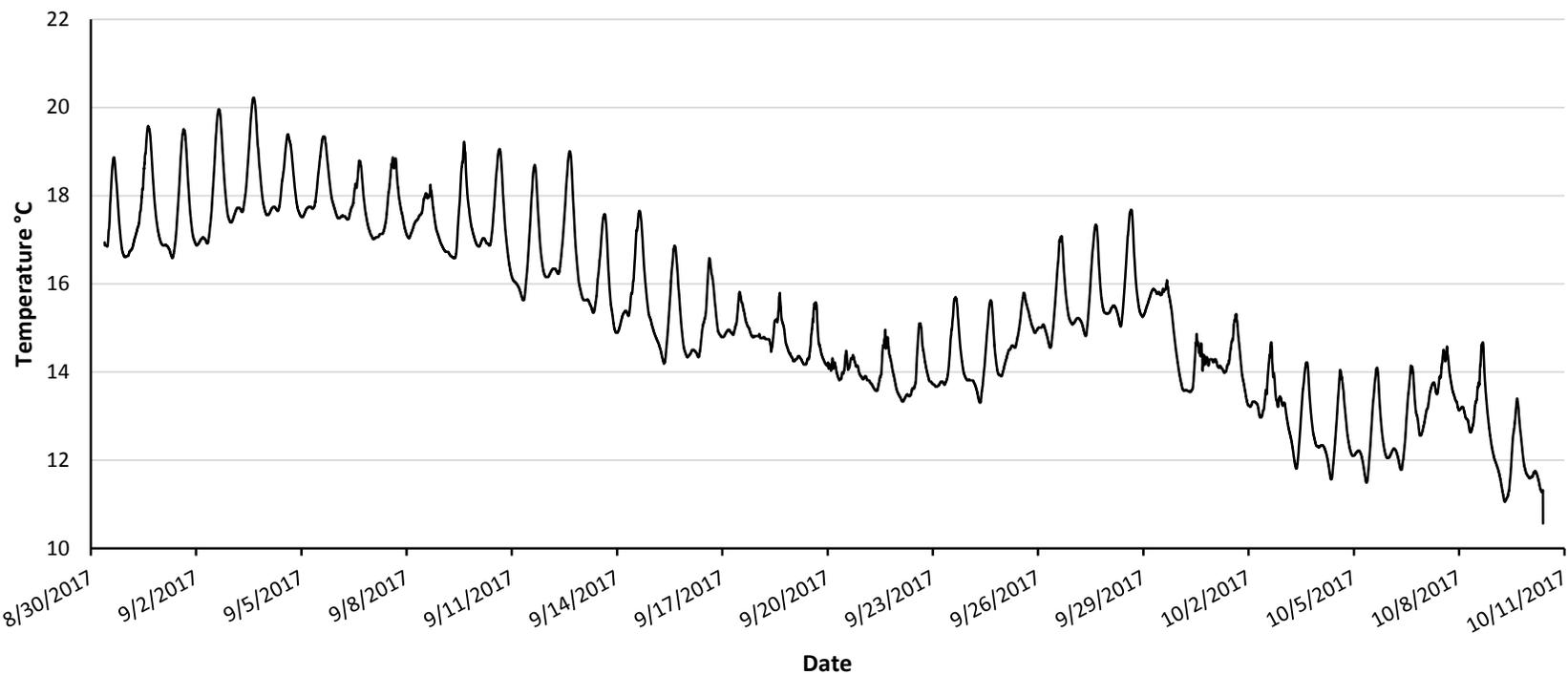
BBC10.4 Continuous Temperature Plot



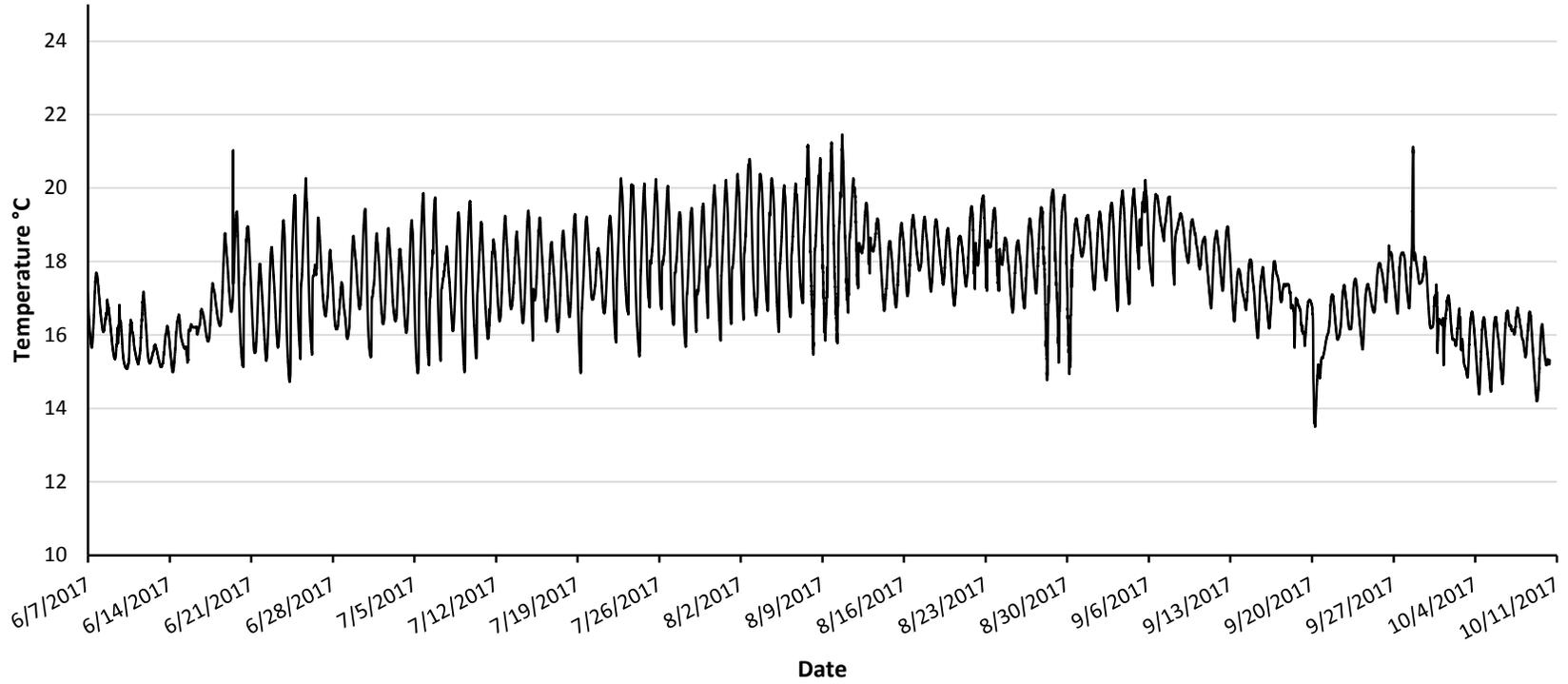
BBC8.8 Continuous Temperature Plot for Events 1-3



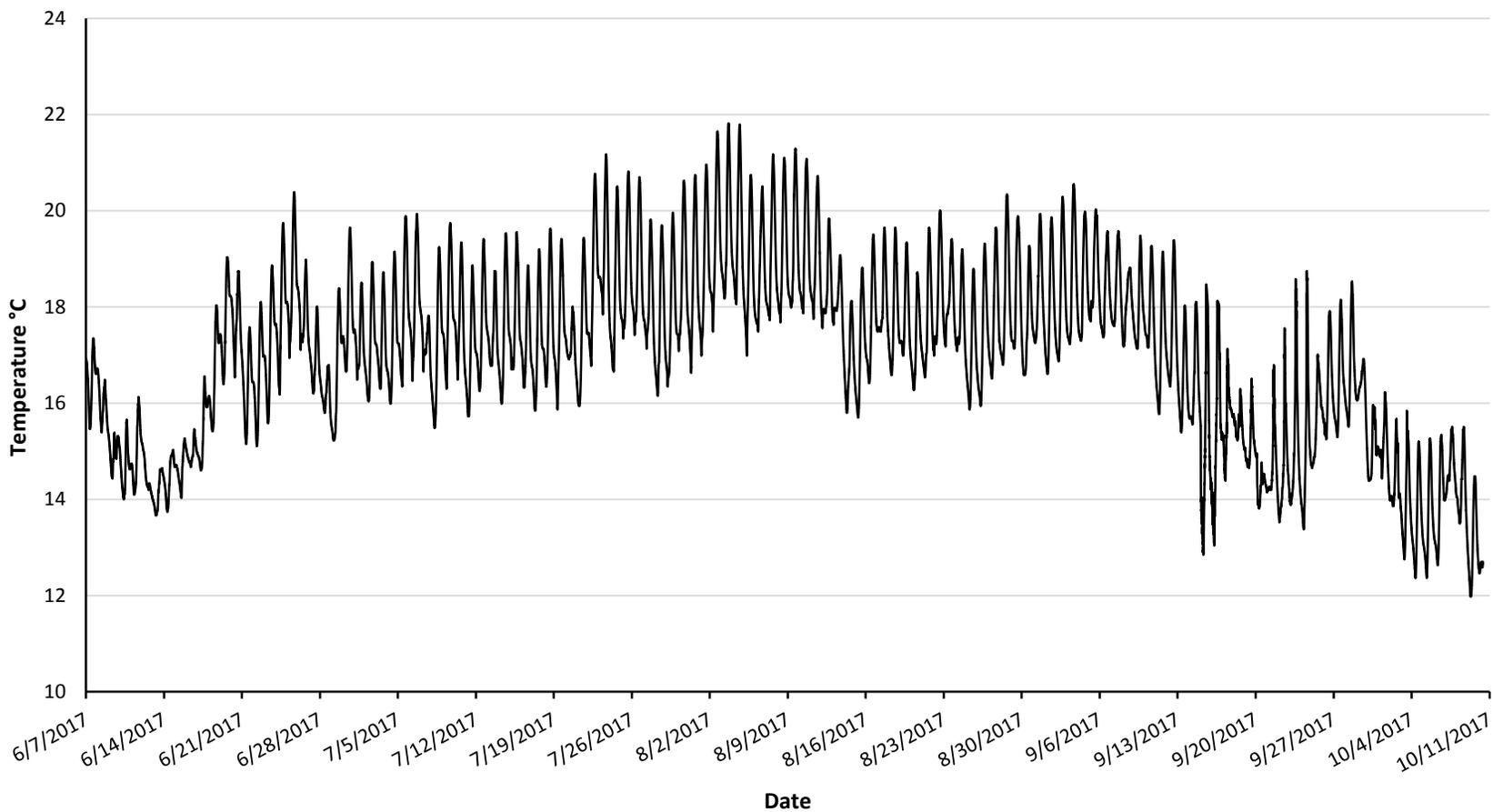
BBC8.8 Continuous Temperature Plot for Events 4-6



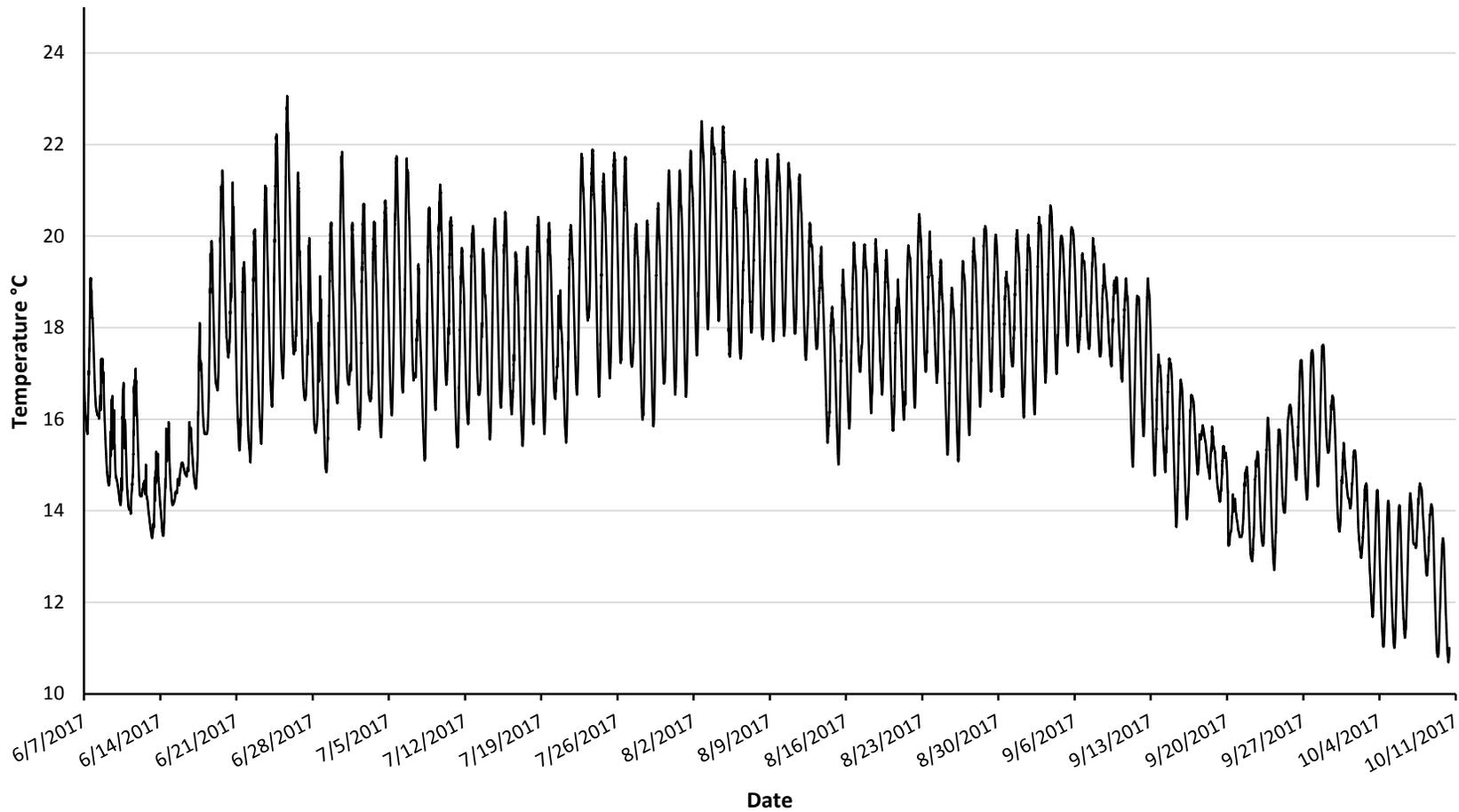
PET0.0 Continuous Temperature Plot



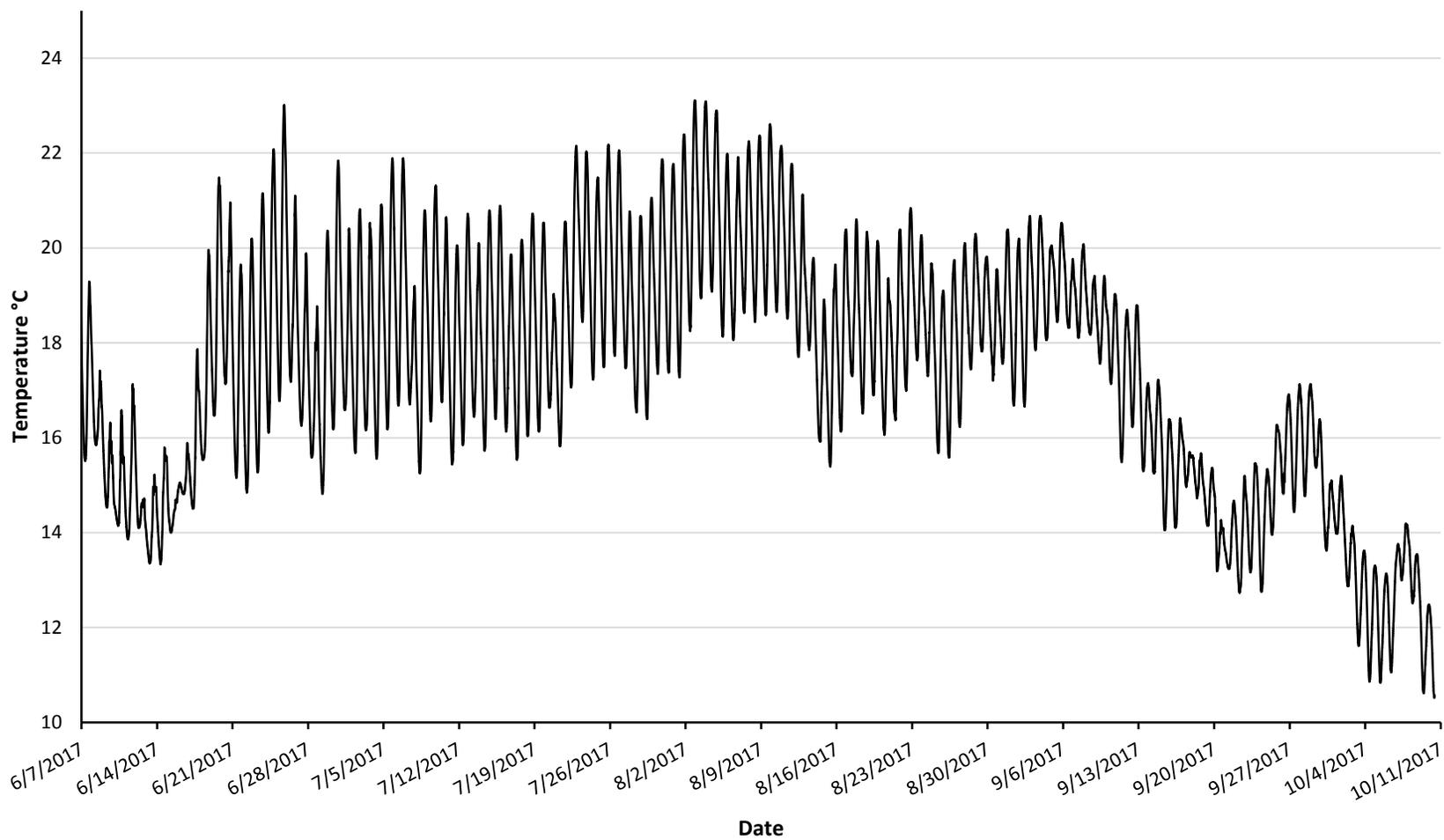
BBC8.4 Continuous Temperature Plot



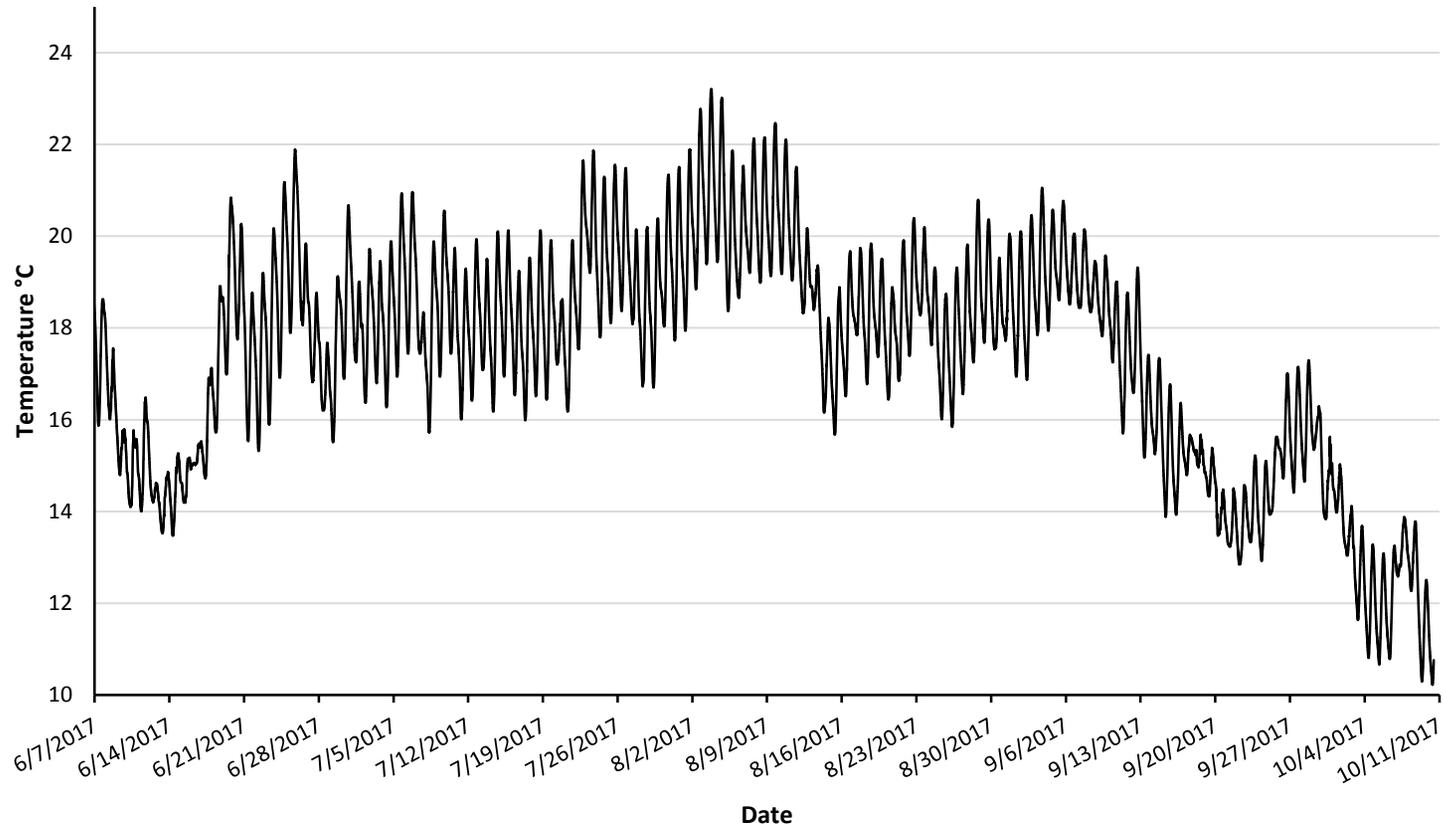
BBC7.0 Continuous Temperature Plot



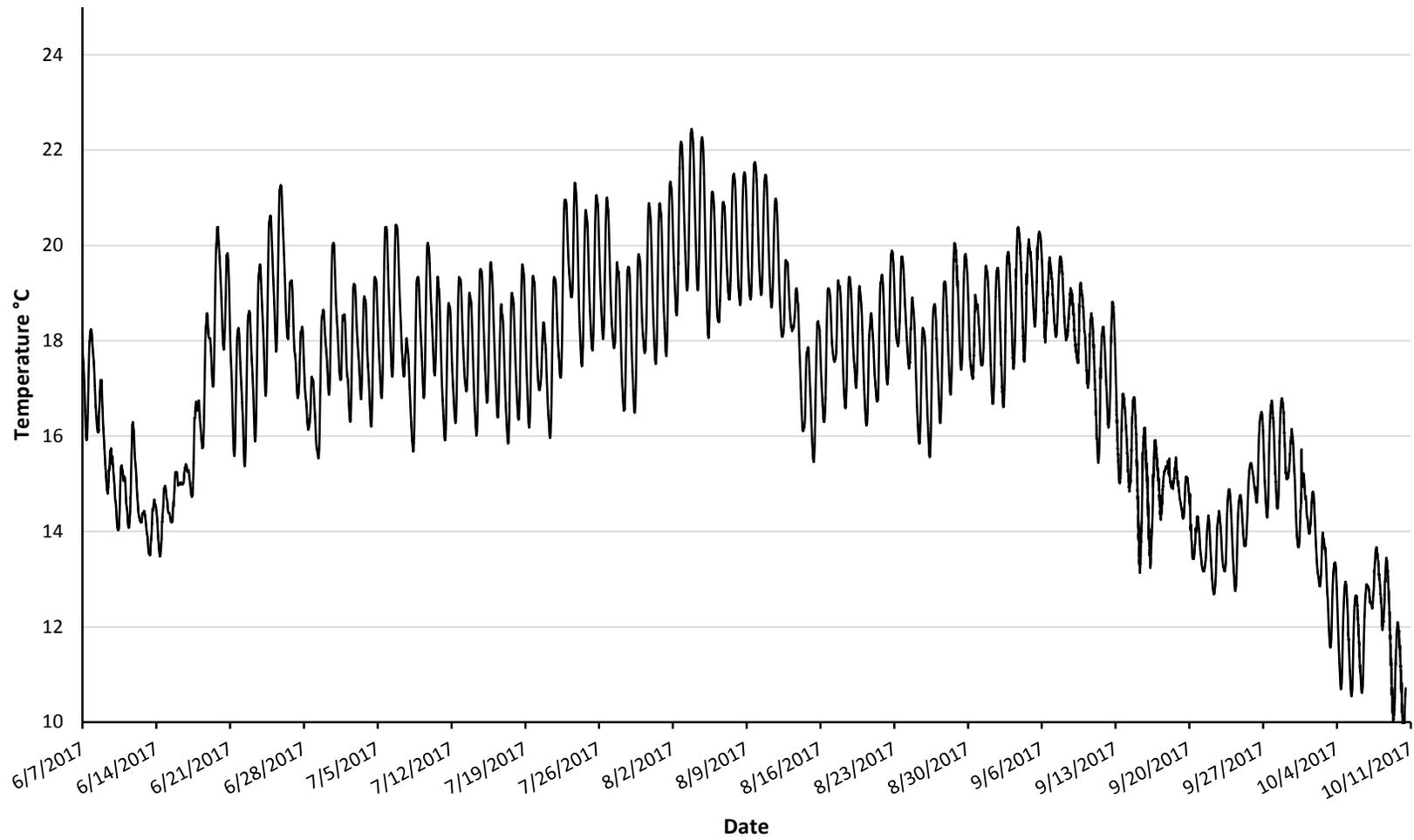
BBC5.9 Continuous Temperature Plot



BBC2.6 Continuous Temperature Plot



BBC1.6 Continuous Temperature Plot



APPENDIX B

Temperature Accuracy Check Data

Table B-1. Continuous Temperature Probe Accuracy Check (BBC 10.4).

<i>Probe Serial #</i>		42216011		10872816			
<i>Probe Name</i>		NIST Standard Thermometer		BBC 10.4			
<i>Temperature</i>		Room Temperature (°C)	Ice Bath (°C)	Room Temperature (°C)		Ice Bath (°C)	
Room Temperature Time Stamp	Ice Bath Time Stamp	Reading	Reading	Reading	Absolute Value Difference	Reading	Absolute Value Difference
5/25/2017 14:45	5/25/2017 15:25	22.4	0.2	22.4	0.1	0.3	0.1
5/25/2017 14:46	5/25/2017 15:26	22.4	0.2	22.5	0.1	0.2	0.0
5/25/2017 14:47	5/25/2017 15:27	22.4	0.2	22.5	0.1	0.2	0.0
5/25/2017 14:48	5/25/2017 15:28	22.4	0.2	22.5	0.1	0.2	0.0
5/25/2017 14:49	5/25/2017 15:29	22.5	0.2	22.5	0.0	0.2	0.1
5/25/2017 14:50	5/25/2017 15:30	22.5	0.2	22.5	0.0	0.1	0.1
5/25/2017 14:51	5/25/2017 15:31	22.5	0.2	22.5	0.0	0.1	0.1
5/25/2017 14:52	5/25/2017 15:32	22.5	0.2	22.5	0.0	0.1	0.1
5/25/2017 14:53	5/25/2017 15:33	22.5	0.2	22.5	0.0	0.1	0.0
5/25/2017 14:54	5/25/2017 15:34	22.5	0.2	22.6	0.1	0.1	0.0
5/25/2017 14:55	5/25/2017 15:35	22.5	0.2	22.6	0.1	0.1	0.0
5/25/2017 14:56	5/25/2017 15:36	22.5	0.2	22.6	0.1	0.1	0.0
5/25/2017 14:57	5/25/2017 15:37	22.5	0.2	22.5	0.0	0.1	0.0
5/25/2017 14:58	5/25/2017 15:38	22.5	0.2	22.5	0.0	0.1	0.0
5/25/2017 14:59	5/25/2017 15:39	22.5	0.2	22.5	0.0	0.1	0.1
5/25/2017 15:00	5/25/2017 15:40	22.5	0.2	22.5	0.0	0.1	0.1
5/25/2017 15:01	5/25/2017 15:41	22.5	0.2	22.5	0.0	0.1	0.1
5/25/2017 15:02	5/25/2017 15:42	22.5	0.2	22.5	0.0	0.1	0.1
5/25/2017 15:03	5/25/2017 15:43	22.5	0.2	22.5	0.0	0.1	0.0
5/25/2017 15:04	5/25/2017 15:44	22.5	0.2	22.5	0.0	0.1	0.0
Mean Absolute Value					0.0		0.0

Table B-2. Continuous Temperature Probe Accuracy Check (BBC 8.8).

<i>Probe Serial #</i>		42216011		10872814			
<i>Probe Name</i>		NIST Standard Thermometer		BBC 8.8			
<i>Temperature</i>		Room Temperature (°C)	Ice Bath (°C)	Room Temperature (°C)		Ice Bath (°C)	
Room Temperature Time Stamp	Ice Bath Time Stamp	Reading	Reading	Reading	Absolute Value Difference	Reading	Absolute Value Difference
5/25/2017 14:45	5/25/2017 15:25	22.4	0.2	22.3	0.0	0.5	0.3
5/25/2017 14:46	5/25/2017 15:26	22.4	0.2	22.3	0.1	0.5	0.2
5/25/2017 14:47	5/25/2017 15:27	22.4	0.2	22.3	0.1	0.4	0.2
5/25/2017 14:48	5/25/2017 15:28	22.4	0.2	22.3	0.1	0.4	0.2
5/25/2017 14:49	5/25/2017 15:29	22.5	0.2	22.3	0.2	0.4	0.2
5/25/2017 14:50	5/25/2017 15:30	22.5	0.2	22.3	0.2	0.4	0.2
5/25/2017 14:51	5/25/2017 15:31	22.5	0.2	22.3	0.2	0.4	0.1
5/25/2017 14:52	5/25/2017 15:32	22.5	0.2	22.3	0.2	0.4	0.1
5/25/2017 14:53	5/25/2017 15:33	22.5	0.2	22.3	0.2	0.3	0.2
5/25/2017 14:54	5/25/2017 15:34	22.5	0.2	22.4	0.1	0.3	0.2
5/25/2017 14:55	5/25/2017 15:35	22.5	0.2	22.4	0.1	0.3	0.2
5/25/2017 14:56	5/25/2017 15:36	22.5	0.2	22.4	0.1	0.3	0.2
5/25/2017 14:57	5/25/2017 15:37	22.5	0.2	22.4	0.1	0.3	0.2
5/25/2017 14:58	5/25/2017 15:38	22.5	0.2	22.4	0.1	0.3	0.2
5/25/2017 14:59	5/25/2017 15:39	22.5	0.2	22.4	0.1	0.3	0.1
5/25/2017 15:00	5/25/2017 15:40	22.5	0.2	22.4	0.1	0.3	0.1
5/25/2017 15:01	5/25/2017 15:41	22.5	0.2	22.4	0.1	0.3	0.1
5/25/2017 15:02	5/25/2017 15:42	22.5	0.2	22.4	0.1	0.3	0.1
5/25/2017 15:03	5/25/2017 15:43	22.5	0.2	22.4	0.1	0.3	0.1
5/25/2017 15:04	5/25/2017 15:44	22.5	0.2	22.4	0.1	0.3	0.1
Mean Absolute Value					0.1		0.2

Table B-3. Continuous Temperature Probe Accuracy Check (Backup 1).

<i>Probe Serial #</i>		42216011		10872816			
<i>Probe Name</i>		NIST Standard Thermometer		Backup 1 ^a			
<i>Temperature</i>		Room Temperature (°C)	Ice Bath (°C)	Room Temperature (°C)	Ice Bath (°C)		
Room Temperature Time Stamp	Ice Bath Time Stamp	Reading	Reading	Reading	Absolute Value Difference	Reading	Absolute Value Difference
5/25/2017 14:45	5/25/2017 15:25	22.4	0.2	22.1	0.3	0.1	0.1
5/25/2017 14:46	5/25/2017 15:26	22.4	0.2	22.1	0.3	0.1	0.1
5/25/2017 14:47	5/25/2017 15:27	22.4	0.2	22.1	0.3	0.1	0.1
5/25/2017 14:48	5/25/2017 15:28	22.4	0.2	22.1	0.3	0.1	0.2
5/25/2017 14:49	5/25/2017 15:29	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 14:50	5/25/2017 15:30	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 14:51	5/25/2017 15:31	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 14:52	5/25/2017 15:32	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 14:53	5/25/2017 15:33	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 14:54	5/25/2017 15:34	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 14:55	5/25/2017 15:35	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 14:56	5/25/2017 15:36	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 14:57	5/25/2017 15:37	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 14:58	5/25/2017 15:38	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 14:59	5/25/2017 15:39	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 15:00	5/25/2017 15:40	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 15:01	5/25/2017 15:41	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 15:02	5/25/2017 15:42	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 15:03	5/25/2017 15:43	22.5	0.2	22.1	0.4	0.0	0.2
5/25/2017 15:04	5/25/2017 15:44	22.5	0.2	22.1	0.4	0.0	0.2
Mean Absolute Value					0.4		0.2

^a Backup 1 was used at BBC 8.8 between Events 4 and 6. Data was corrected using linear interpolation.

Table B-4. Continuous Temperature Probe Accuracy Check (PET 0.0).

<i>Probe Serial #</i>		42216011		10872834			
<i>Probe Name</i>		NIST Standard Thermometer		PET 0.0			
<i>Temperature</i>		Room Temperature (°C)	Ice Bath (°C)	Room Temperature (°C)		Ice Bath (°C)	
Room Temperature Time Stamp	Ice Bath Time Stamp	Reading	Reading	Reading	Absolute Value Difference	Reading	Absolute Value Difference
5/25/2017 14:45	5/25/2017 15:25	22.4	0.2	22.4	0.0	0.4	0.2
5/25/2017 14:46	5/25/2017 15:26	22.4	0.2	22.4	0.0	0.3	0.1
5/25/2017 14:47	5/25/2017 15:27	22.4	0.2	22.5	0.1	0.3	0.1
5/25/2017 14:48	5/25/2017 15:28	22.4	0.2	22.5	0.1	0.3	0.1
5/25/2017 14:49	5/25/2017 15:29	22.5	0.2	22.6	0.1	0.3	0.1
5/25/2017 14:50	5/25/2017 15:30	22.5	0.2	22.6	0.1	0.3	0.1
5/25/2017 14:51	5/25/2017 15:31	22.5	0.2	22.7	0.2	0.3	0.1
5/25/2017 14:52	5/25/2017 15:32	22.5	0.2	22.7	0.2	0.3	0.1
5/25/2017 14:53	5/25/2017 15:33	22.5	0.2	22.7	0.2	0.3	0.1
5/25/2017 14:54	5/25/2017 15:34	22.5	0.2	22.8	0.3	0.2	0.1
5/25/2017 14:55	5/25/2017 15:35	22.5	0.2	22.8	0.3	0.2	0.1
5/25/2017 14:56	5/25/2017 15:36	22.5	0.2	22.8	0.3	0.2	0.1
5/25/2017 14:57	5/25/2017 15:37	22.5	0.2	22.8	0.3	0.2	0.1
5/25/2017 14:58	5/25/2017 15:38	22.5	0.2	22.7	0.2	0.2	0.1
5/25/2017 14:59	5/25/2017 15:39	22.5	0.2	22.7	0.2	0.2	0.1
5/25/2017 15:00	5/25/2017 15:40	22.5	0.2	22.7	0.2	0.2	0.1
5/25/2017 15:01	5/25/2017 15:41	22.5	0.2	22.7	0.2	0.2	0.1
5/25/2017 15:02	5/25/2017 15:42	22.5	0.2	22.7	0.2	0.2	0.1
5/25/2017 15:03	5/25/2017 15:43	22.5	0.2	22.7	0.2	0.2	0.1
5/25/2017 15:04	5/25/2017 15:44	22.5	0.2	22.8	0.3	0.2	0.1
Mean Absolute Value					0.2		0.1

Table B-5. Continuous Temperature Probe Accuracy Check (BBC 8.4A).

<i>Probe Serial #</i>		42216011		10872819					
<i>Probe Name</i>		NIST Standard Thermometer		BBC 8.4A					
<i>Temperature</i>		Room Temperature (°C)		Ice Bath (°C)		Room Temperature (°C)		Ice Bath (°C)	
Room Temperature Time Stamp	Ice Bath Time Stamp	Reading	Reading	Reading	Absolute Value Difference	Reading	Absolute Value Difference	Reading	Absolute Value Difference
5/25/2017 14:45	5/25/2017 15:25	22.4	0.2	22.5	0.1	0.5	0.3		
5/25/2017 14:46	5/25/2017 15:26	22.4	0.2	22.5	0.1	0.4	0.2		
5/25/2017 14:47	5/25/2017 15:27	22.4	0.2	22.5	0.1	0.4	0.2		
5/25/2017 14:48	5/25/2017 15:28	22.4	0.2	22.5	0.1	0.4	0.1		
5/25/2017 14:49	5/25/2017 15:29	22.5	0.2	22.5	0.0	0.3	0.1		
5/25/2017 14:50	5/25/2017 15:30	22.5	0.2	22.5	0.0	0.2	0.0		
5/25/2017 14:51	5/25/2017 15:31	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:52	5/25/2017 15:32	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:53	5/25/2017 15:33	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:54	5/25/2017 15:34	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:55	5/25/2017 15:35	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:56	5/25/2017 15:36	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:57	5/25/2017 15:37	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:58	5/25/2017 15:38	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:59	5/25/2017 15:39	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 15:00	5/25/2017 15:40	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 15:01	5/25/2017 15:41	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 15:02	5/25/2017 15:42	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 15:03	5/25/2017 15:43	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 15:04	5/25/2017 15:44	22.5	0.2	22.6	0.1	0.2	0.0		
Mean Absolute Value					0.1			0.1	

Table B-6. Continuous Temperature Probe Accuracy Check (BBC 8.4B).

<i>Probe Serial #</i>		42216011		9946937			
<i>Probe Name</i>		NIST Standard Thermometer		BBC 8.4B			
<i>Temperature</i>		Room Temperature (°C)	Ice Bath (°C)	Room Temperature (°C)	Ice Bath (°C)		
Room Temperature Time Stamp	Ice Bath Time Stamp	Reading	Reading	Reading	Absolute Value Difference	Reading	Absolute Value Difference
5/25/2017 14:45	5/25/2017 15:25	22.4	0.2	22.3	0.1	0.2	0.0
5/25/2017 14:46	5/25/2017 15:26	22.4	0.2	22.4	0.0	0.2	0.0
5/25/2017 14:47	5/25/2017 15:27	22.4	0.2	22.4	0.0	0.2	0.1
5/25/2017 14:48	5/25/2017 15:28	22.4	0.2	22.5	0.1	0.1	0.1
5/25/2017 14:49	5/25/2017 15:29	22.5	0.2	22.5	0.0	0.1	0.1
5/25/2017 14:50	5/25/2017 15:30	22.5	0.2	22.6	0.1	0.1	0.1
5/25/2017 14:51	5/25/2017 15:31	22.5	0.2	22.6	0.1	0.1	0.1
5/25/2017 14:52	5/25/2017 15:32	22.5	0.2	22.6	0.1	0.1	0.1
5/25/2017 14:53	5/25/2017 15:33	22.5	0.2	22.7	0.2	0.1	0.0
5/25/2017 14:54	5/25/2017 15:34	22.5	0.2	22.7	0.2	0.1	0.0
5/25/2017 14:55	5/25/2017 15:35	22.5	0.2	22.8	0.3	0.1	0.0
5/25/2017 14:56	5/25/2017 15:36	22.5	0.2	22.8	0.3	0.1	0.0
5/25/2017 14:57	5/25/2017 15:37	22.5	0.2	22.8	0.3	0.1	0.0
5/25/2017 14:58	5/25/2017 15:38	22.5	0.2	22.8	0.3	0.1	0.0
5/25/2017 14:59	5/25/2017 15:39	22.5	0.2	22.8	0.3	0.1	0.0
5/25/2017 15:00	5/25/2017 15:40	22.5	0.2	22.8	0.3	0.1	0.0
5/25/2017 15:01	5/25/2017 15:41	22.5	0.2	22.8	0.3	0.1	0.0
5/25/2017 15:02	5/25/2017 15:42	22.5	0.2	22.8	0.3	0.1	0.0
5/25/2017 15:03	5/25/2017 15:43	22.5	0.2	22.8	0.3	0.1	0.0
5/25/2017 15:04	5/25/2017 15:44	22.5	0.2	22.9	0.4	0.1	0.1
Mean Absolute Value					0.2		0.0

Table B-7. Continuous Temperature Probe Accuracy Check (BBC 7.0).

<i>Probe Serial #</i>		42216011		9946310			
<i>Probe Name</i>		NIST Standard Thermometer		BBC 7.0			
<i>Temperature</i>		Room Temperature (°C)	Ice Bath (°C)	Room Temperature (°C)		Ice Bath (°C)	
Room Temperature Time Stamp	Ice Bath Time Stamp	Reading	Reading	Reading	Absolute Value Difference	Reading	Absolute Value Difference
5/25/2017 14:45	5/25/2017 15:25	22.4	0.2	22.1	0.3	0.1	0.1
5/25/2017 14:46	5/25/2017 15:26	22.4	0.2	22.2	0.2	0.1	0.1
5/25/2017 14:47	5/25/2017 15:27	22.4	0.2	22.2	0.2	0.1	0.1
5/25/2017 14:48	5/25/2017 15:28	22.4	0.2	22.2	0.2	0.1	0.1
5/25/2017 14:49	5/25/2017 15:29	22.5	0.2	22.3	0.3	0.1	0.1
5/25/2017 14:50	5/25/2017 15:30	22.5	0.2	22.3	0.3	0.1	0.1
5/25/2017 14:51	5/25/2017 15:31	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 14:52	5/25/2017 15:32	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 14:53	5/25/2017 15:33	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 14:54	5/25/2017 15:34	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 14:55	5/25/2017 15:35	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 14:56	5/25/2017 15:36	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 14:57	5/25/2017 15:37	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 14:58	5/25/2017 15:38	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 14:59	5/25/2017 15:39	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 15:00	5/25/2017 15:40	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 15:01	5/25/2017 15:41	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 15:02	5/25/2017 15:42	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 15:03	5/25/2017 15:43	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 15:04	5/25/2017 15:44	22.5	0.2	22.3	0.2	0.1	0.1
Mean Absolute Value					0.2		0.1

Table B-8. Continuous Temperature Probe Accuracy Check (BBC 5.9).

<i>Probe Serial #</i>		42216011		9946308			
<i>Probe Name</i>		NIST Standard Thermometer		BBC 5.9			
<i>Temperature</i>		Room Temperature (°C)	Ice Bath (°C)	Room Temperature (°C)	Ice Bath (°C)		
Room Temperature Time Stamp	Ice Bath Time Stamp	Reading	Reading	Reading	Absolute Value Difference	Reading	Absolute Value Difference
5/25/2017 14:45	5/25/2017 15:25	22.4	0.2	22.2	0.2	0.3	0.1
5/25/2017 14:46	5/25/2017 15:26	22.4	0.2	22.2	0.2	0.3	0.1
5/25/2017 14:47	5/25/2017 15:27	22.4	0.2	22.3	0.1	0.2	0.0
5/25/2017 14:48	5/25/2017 15:28	22.4	0.2	22.3	0.1	0.2	0.0
5/25/2017 14:49	5/25/2017 15:29	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 14:50	5/25/2017 15:30	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 14:51	5/25/2017 15:31	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 14:52	5/25/2017 15:32	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 14:53	5/25/2017 15:33	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 14:54	5/25/2017 15:34	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 14:55	5/25/2017 15:35	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 14:56	5/25/2017 15:36	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 14:57	5/25/2017 15:37	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 14:58	5/25/2017 15:38	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 14:59	5/25/2017 15:39	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 15:00	5/25/2017 15:40	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 15:01	5/25/2017 15:41	22.5	0.2	22.3	0.2	0.2	0.0
5/25/2017 15:02	5/25/2017 15:42	22.5	0.2	22.3	0.2	0.1	0.0
5/25/2017 15:03	5/25/2017 15:43	22.5	0.2	22.3	0.2	0.1	0.1
5/25/2017 15:04	5/25/2017 15:44	22.5	0.2	22.3	0.2	0.1	0.0
Mean Absolute Value					0.2		0.0

Table B-9. Continuous Temperature Probe Accuracy Check (BBC 2.6A).

<i>Probe Serial #</i>		42216011		10872835					
<i>Probe Name</i>		NIST Standard Thermometer		BBC2.6A					
<i>Temperature</i>		Room Temperature (°C)		Ice Bath (°C)		Room Temperature (°C)		Ice Bath (°C)	
Room Temperature Time Stamp	Ice Bath Time Stamp	Reading	Reading	Reading	Absolute Value Difference	Reading	Absolute Value Difference	Reading	Absolute Value Difference
5/25/2017 14:45	5/25/2017 15:25	22.4	0.2	22.4	0.0	0.4	0.2		
5/25/2017 14:46	5/25/2017 15:26	22.4	0.2	22.4	0.1	0.3	0.1		
5/25/2017 14:47	5/25/2017 15:27	22.4	0.2	22.4	0.0	0.3	0.1		
5/25/2017 14:48	5/25/2017 15:28	22.4	0.2	22.4	0.1	0.3	0.1		
5/25/2017 14:49	5/25/2017 15:29	22.5	0.2	22.4	0.1	0.3	0.1		
5/25/2017 14:50	5/25/2017 15:30	22.5	0.2	22.5	0.0	0.2	0.0		
5/25/2017 14:51	5/25/2017 15:31	22.5	0.2	22.5	0.0	0.2	0.0		
5/25/2017 14:52	5/25/2017 15:32	22.5	0.2	22.5	0.0	0.2	0.0		
5/25/2017 14:53	5/25/2017 15:33	22.5	0.2	22.6	0.1	0.2	0.1		
5/25/2017 14:54	5/25/2017 15:34	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:55	5/25/2017 15:35	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:56	5/25/2017 15:36	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:57	5/25/2017 15:37	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:58	5/25/2017 15:38	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 14:59	5/25/2017 15:39	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 15:00	5/25/2017 15:40	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 15:01	5/25/2017 15:41	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 15:02	5/25/2017 15:42	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 15:03	5/25/2017 15:43	22.5	0.2	22.6	0.1	0.2	0.0		
5/25/2017 15:04	5/25/2017 15:44	22.5	0.2	22.6	0.1	0.2	0.0		
Mean Absolute Value					0.1			0.0	

Table B-10. Continuous Temperature Probe Accuracy Check (BBC 2.6B).

<i>Probe Serial #</i>		42216011		10872817			
<i>Probe Name</i>		NIST Standard Thermometer		BBC2.6B			
<i>Temperature</i>		Room Temperature (°C)		Ice Bath (°C)		Ice Bath (°C)	
Room Temperature Time Stamp	Ice Bath Time Stamp	Reading	Reading	Reading	Absolute Value Difference	Reading	Absolute Value Difference
5/25/2017 14:45	5/25/2017 15:25	22.4	0.2	22.4	0.0	0.5	0.2
5/25/2017 14:46	5/25/2017 15:26	22.4	0.2	22.4	0.0	0.4	0.2
5/25/2017 14:47	5/25/2017 15:27	22.4	0.2	22.4	0.1	0.4	0.2
5/25/2017 14:48	5/25/2017 15:28	22.4	0.2	22.4	0.1	0.4	0.2
5/25/2017 14:49	5/25/2017 15:29	22.5	0.2	22.5	0.0	0.4	0.1
5/25/2017 14:50	5/25/2017 15:30	22.5	0.2	22.5	0.0	0.3	0.1
5/25/2017 14:51	5/25/2017 15:31	22.5	0.2	22.5	0.0	0.3	0.1
5/25/2017 14:52	5/25/2017 15:32	22.5	0.2	22.5	0.0	0.3	0.1
5/25/2017 14:53	5/25/2017 15:33	22.5	0.2	22.5	0.0	0.3	0.1
5/25/2017 14:54	5/25/2017 15:34	22.5	0.2	22.5	0.0	0.3	0.1
5/25/2017 14:55	5/25/2017 15:35	22.5	0.2	22.5	0.0	0.3	0.1
5/25/2017 14:56	5/25/2017 15:36	22.5	0.2	22.5	0.0	0.3	0.1
5/25/2017 14:57	5/25/2017 15:37	22.5	0.2	22.5	0.0	0.3	0.1
5/25/2017 14:58	5/25/2017 15:38	22.5	0.2	22.5	0.0	0.3	0.1
5/25/2017 14:59	5/25/2017 15:39	22.5	0.2	22.5	0.0	0.3	0.1
5/25/2017 15:00	5/25/2017 15:40	22.5	0.2	22.5	0.0	0.3	0.1
5/25/2017 15:01	5/25/2017 15:41	22.5	0.2	22.5	0.0	0.3	0.1
5/25/2017 15:02	5/25/2017 15:42	22.5	0.2	22.6	0.1	0.3	0.1
5/25/2017 15:03	5/25/2017 15:43	22.5	0.2	22.6	0.1	0.3	0.1
5/25/2017 15:04	5/25/2017 15:44	22.5	0.2	22.6	0.1	0.3	0.1
Mean Absolute Value					0.0		0.1

Table B-11. Continuous Temperature Probe Accuracy Check (BBC 1.6A).

<i>Probe Serial #</i>		42216011		10872838					
<i>Probe Name</i>		NIST Standard Thermometer		BBC 1.6A					
<i>Temperature</i>		Room Temperature (°C)		Ice Bath (°C)		Room Temperature (°C)		Ice Bath (°C)	
Room Temperature Time Stamp	Ice Bath Time Stamp	Reading	Reading	Reading	Absolute Value Difference	Reading	Absolute Value Difference	Reading	Absolute Value Difference
5/25/2017 14:45	5/25/2017 15:25	22.4	0.2	22.4	0.1	0.4	0.2		
5/25/2017 14:46	5/25/2017 15:26	22.4	0.2	22.5	0.1	0.4	0.1		
5/25/2017 14:47	5/25/2017 15:27	22.4	0.2	22.5	0.1	0.3	0.1		
5/25/2017 14:48	5/25/2017 15:28	22.4	0.2	22.5	0.1	0.2	0.0		
5/25/2017 14:49	5/25/2017 15:29	22.5	0.2	22.5	0.0	0.2	0.0		
5/25/2017 14:50	5/25/2017 15:30	22.5	0.2	22.6	0.1	0.2	0.1		
5/25/2017 14:51	5/25/2017 15:31	22.5	0.2	22.6	0.1	0.1	0.1		
5/25/2017 14:52	5/25/2017 15:32	22.5	0.2	22.6	0.1	0.1	0.1		
5/25/2017 14:53	5/25/2017 15:33	22.5	0.2	22.7	0.2	0.1	0.1		
5/25/2017 14:54	5/25/2017 15:34	22.5	0.2	22.7	0.2	0.1	0.1		
5/25/2017 14:55	5/25/2017 15:35	22.5	0.2	22.7	0.2	0.1	0.1		
5/25/2017 14:56	5/25/2017 15:36	22.5	0.2	22.7	0.2	0.1	0.1		
5/25/2017 14:57	5/25/2017 15:37	22.5	0.2	22.7	0.2	0.1	0.1		
5/25/2017 14:58	5/25/2017 15:38	22.5	0.2	22.7	0.2	0.1	0.1		
5/25/2017 14:59	5/25/2017 15:39	22.5	0.2	22.6	0.1	0.1	0.1		
5/25/2017 15:00	5/25/2017 15:40	22.5	0.2	22.6	0.1	0.1	0.1		
5/25/2017 15:01	5/25/2017 15:41	22.5	0.2	22.6	0.1	0.1	0.1		
5/25/2017 15:02	5/25/2017 15:42	22.5	0.2	22.6	0.1	0.1	0.1		
5/25/2017 15:03	5/25/2017 15:43	22.5	0.2	22.6	0.1	0.1	0.1		
5/25/2017 15:04	5/25/2017 15:44	22.5	0.2	22.6	0.1	0.1	0.1		
Mean Absolute Value					0.1			0.1	

Table B-12. Continuous Temperature Probe Accuracy Check (BBC 1.6B).

<i>Probe Serial #</i>		42216011		10872837			
<i>Probe Name</i>		NIST Standard Thermometer		BBC1.6B			
<i>Temperature</i>		Room Temperature (°C)	Ice Bath (°C)	Room Temperature (°C)		Ice Bath (°C)	
Room Temperature Time Stamp	Ice Bath Time Stamp	Reading	Reading	Reading	Absolute Value Difference	Reading	Absolute Value Difference
5/25/2017 14:45	5/25/2017 15:25	22.4	0.2	22.3	0.0	0.6	0.3
5/25/2017 14:46	5/25/2017 15:26	22.4	0.2	22.4	0.0	0.5	0.2
5/25/2017 14:47	5/25/2017 15:27	22.4	0.2	22.4	0.0	0.4	0.2
5/25/2017 14:48	5/25/2017 15:28	22.4	0.2	22.4	0.1	0.4	0.2
5/25/2017 14:49	5/25/2017 15:29	22.5	0.2	22.5	0.0	0.4	0.2
5/25/2017 14:50	5/25/2017 15:30	22.5	0.2	22.5	0.0	0.4	0.2
5/25/2017 14:51	5/25/2017 15:31	22.5	0.2	22.5	0.0	0.4	0.2
5/25/2017 14:52	5/25/2017 15:32	22.5	0.2	22.5	0.0	0.4	0.1
5/25/2017 14:53	5/25/2017 15:33	22.5	0.2	22.5	0.0	0.4	0.2
5/25/2017 14:54	5/25/2017 15:34	22.5	0.2	22.6	0.1	0.4	0.2
5/25/2017 14:55	5/25/2017 15:35	22.5	0.2	22.6	0.1	0.3	0.2
5/25/2017 14:56	5/25/2017 15:36	22.5	0.2	22.6	0.1	0.3	0.2
5/25/2017 14:57	5/25/2017 15:37	22.5	0.2	22.6	0.1	0.3	0.2
5/25/2017 14:58	5/25/2017 15:38	22.5	0.2	22.6	0.1	0.3	0.2
5/25/2017 14:59	5/25/2017 15:39	22.5	0.2	22.5	0.0	0.3	0.2
5/25/2017 15:00	5/25/2017 15:40	22.5	0.2	22.5	0.0	0.3	0.2
5/25/2017 15:01	5/25/2017 15:41	22.5	0.2	22.5	0.0	0.3	0.2
5/25/2017 15:02	5/25/2017 15:42	22.5	0.2	22.5	0.0	0.3	0.2
5/25/2017 15:03	5/25/2017 15:43	22.5	0.2	22.5	0.0	0.4	0.2
5/25/2017 15:04	5/25/2017 15:44	22.5	0.2	22.5	0.0	0.4	0.2
Mean Absolute Value					0.0		0.2

APPENDIX C

Continuous Temperature Data

Tables

Table C-1. Continuous Temperature Correction History (Station BBC 10.4).		
From	To	Comment
6/6/2017 0:00	6/7/2017 0:00	Delete – probe started early
6/19/2017 9:55	6/19/2017 10:05	Delete/interpolate fill (linear) gap – data download
7/11/2017 8:45	7/11/2017 9:00	Delete/interpolate fill (linear) gap – data download
8/2/2017 8:35	8/2/2017 8:50	Delete/interpolate fill (linear) gap – data download
8/30/2017 8:25	8/30/2017 8:40	Delete/interpolate fill (linear) gap – data download
9/26/2017 14:40	9/26/2017 15:00	Delete/interpolate fill (linear) gap – data download
10/10/2017 8:50	10/10/2017 9:00	Delete – probe removed from stream

Table C-2. Continuous Temperature Correction History (Station BBC 8.8).		
From	To	Comment
6/6/2017 0:00	6/7/2017 0:00	Delete – probe started early
6/19/2017 10:25	6/19/2017 10:40	Delete/interpolate fill (linear) gap – data download
7/11/2017 9:15	7/11/2017 9:30	Delete/interpolate fill (linear) gap – data download
9/26/3017 14:15	9/26/3017 14:35	Delete/interpolate fill (linear) gap – data download
10/10/20179:25	10/10/20179:40	Delete – probe removed from stream

Table C-3. Continuous Temperature Correction History (Station BBC 8.4).		
From	To	Comment
6/6/2017 0:00	6/7/2017 0:00	Delete – probe started early
6/19/2017 11:10	6/19/2017 11:25	Delete/interpolate fill (linear) gap – data download
9/15/2017 13:10	9/15/2017 18:30	Delete – probe likely not submerged
9/16/2017 12:15	9/16/2017 19:45	Delete – probe likely not submerged
9/26/2017 12:15	9/26/2017 14:00	Delete/interpolate fill (linear) gap – data download
10/3/2017 13:30	10/3/2017 13:40	Delete/interpolate fill (linear) gap – probe removed for troubleshooting
10/10/20179:50	10/10/201710:00	Delete – probe removed from stream

Table C-4. Continuous Temperature Correction History (Station PET 0.0).		
From	To	Comment
6/6/2017 0:00	6/7/2017 0:00	Delete – probe started early
6/19/2017 10:35	6/19/2017 10:50	Delete/interpolate fill (linear) gap – data download
7/11/2017 9:25	7/11/2017 9:40	Delete/interpolate fill (linear) gap – data download
8/2/2017 9:15	8/2/2017 9:30	Delete/interpolate fill (linear) gap – data download
8/30/2017 9:05	8/30/2017 9:25	Delete/interpolate fill (linear) gap – data download
9/26/2017 14:10	9/26/2017 14:30	Delete/interpolate fill (linear) gap – data download
10/10/2017 9:30	10/10/2017 9:40	Delete – probe removed from stream

Table C-5. Continuous Temperature Correction History (Station BBC 7.0).		
From	To	Comment
6/6/2017 0:00	6/7/2017 0:00	Delete – probe started early
6/19/2017 12:10	6/19/2017 12:25	Delete/interpolate fill (linear) gap – data download
7/11/2017 10:15	7/11/2017 10:25	Delete/interpolate fill (linear) gap – data download
8/2/2017 10:15	8/2/2017 10:25	Delete/interpolate fill (linear) gap – data download
8/30/2017 10:45	8/30/2017 11:00	Delete/interpolate fill (linear) gap – data download
9/26/2017 11:45	9/26/2017 12:00	Delete/interpolate fill (linear) gap – data download

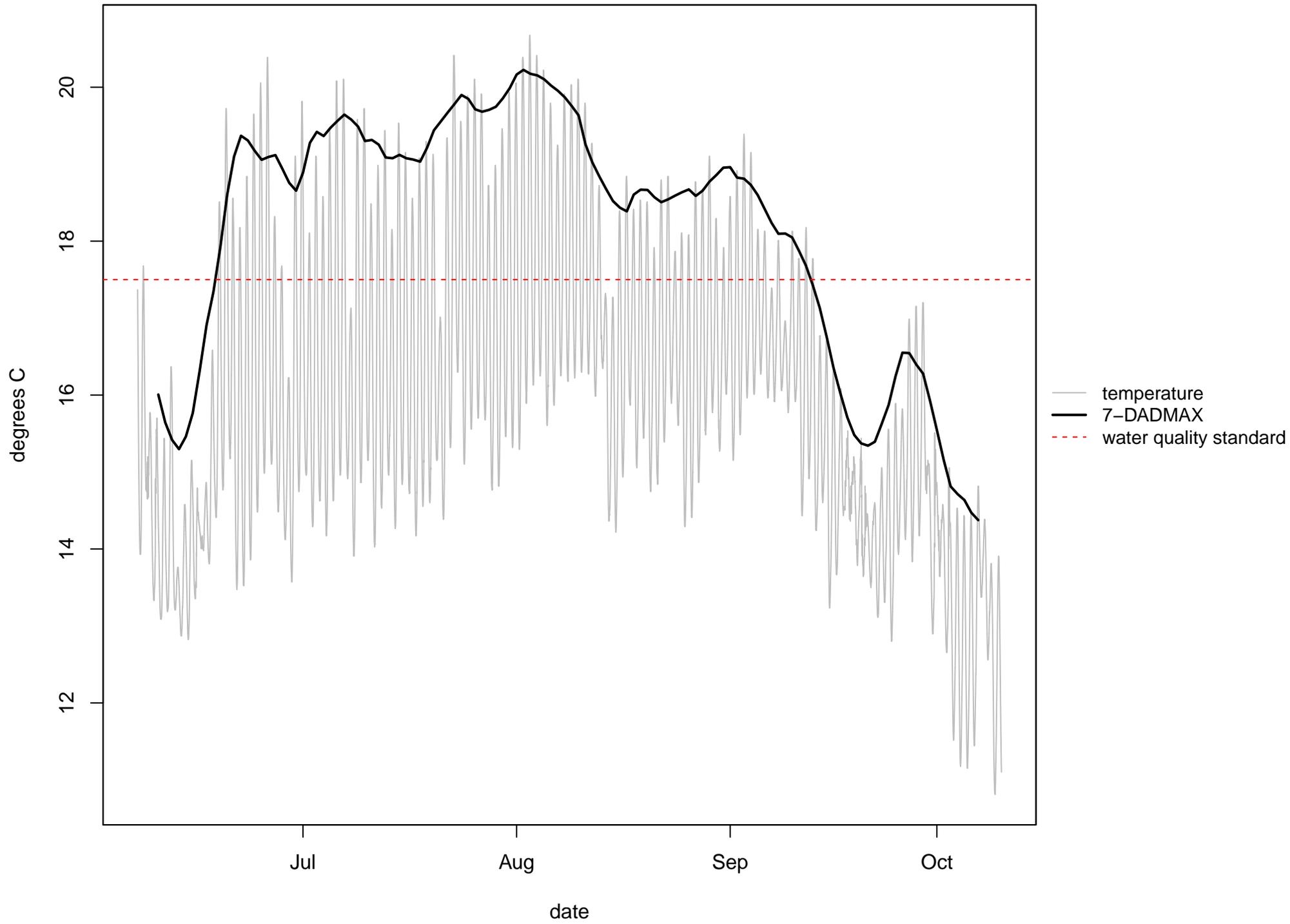
Table C-6. Continuous Temperature Correction History (Station BBC 5.9).		
From	To	Comment
6/6/2017 0:00	6/7/2017 0:00	Delete – probe started early
6/19/2017 12:35	6/19/2017 12:45	Delete/interpolate fill (linear) gap – data download
7/11/2017 10:30	7/11/2017 10:40	Delete/interpolate fill (linear) gap – data download
8/2/2017 10:35	8/2/2017 10:45	Delete/interpolate fill (linear) gap – data download
9/26/2017 11:30	9/26/2017 11:45	Delete/interpolate fill (linear) gap – data download
10/10/2017 10:45	10/10/2017 10:55	Delete – probe removed from stream

Table C-7. Continuous Temperature Correction History (Station BBC 2.6).		
From	To	Comment
6/6/2017 0:00	6/7/2017 0:00	Delete – probe started early
6/19/2017 13:45	6/19/2017 14:00	Delete/interpolate fill (linear) gap – data download
7/11/2017 11:05	7/11/2017 11:15	Delete/interpolate fill (linear) gap – data download
8/2/2017 11:10	8/2/2017 11:25	Delete/interpolate fill (linear) gap – data download
8/30/2017 12:45	8/30/2017 12:55	Delete/interpolate fill (linear) gap – data download
9/26/2017 10:45	9/26/2017 11:00	Delete/interpolate fill (linear) gap – data download

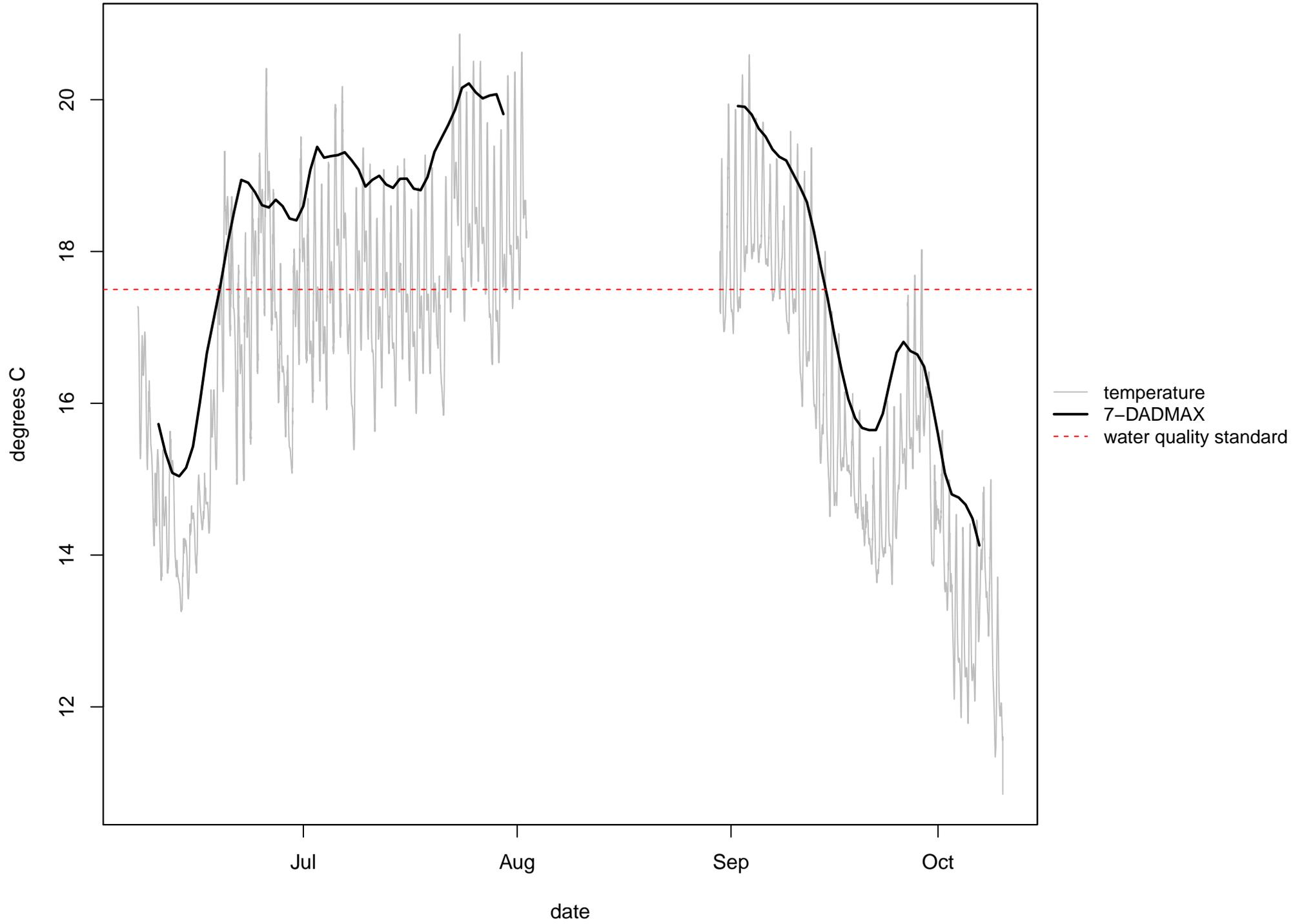
Table C-8. Continuous Temperature Correction History (Station BBC 1.6).		
From	To	Comment
6/6/2017 0:00	6/7/2017 0:00	Delete – probe started early
8/2/2017 11:50	8/2/2017 12:10	Delete/interpolate fill (linear) gap – data download
9/26/2017 10:10	9/26/2017 10:25	Delete/interpolate fill (linear) gap – data download
10/10/2017 12:35	10/10/2017 12:45	Delete – probe removed from stream

Figures

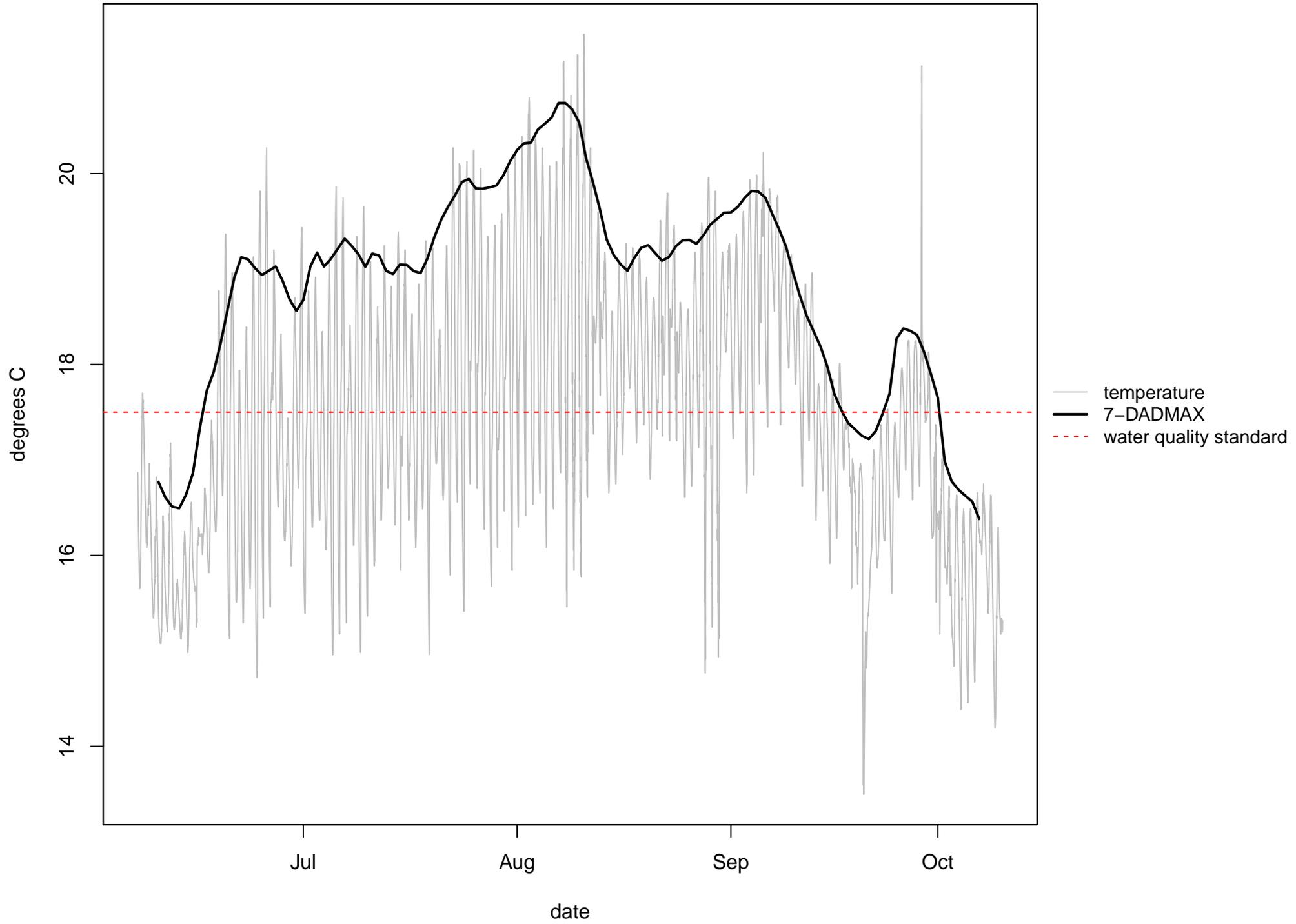
BBC10.4 - 2017



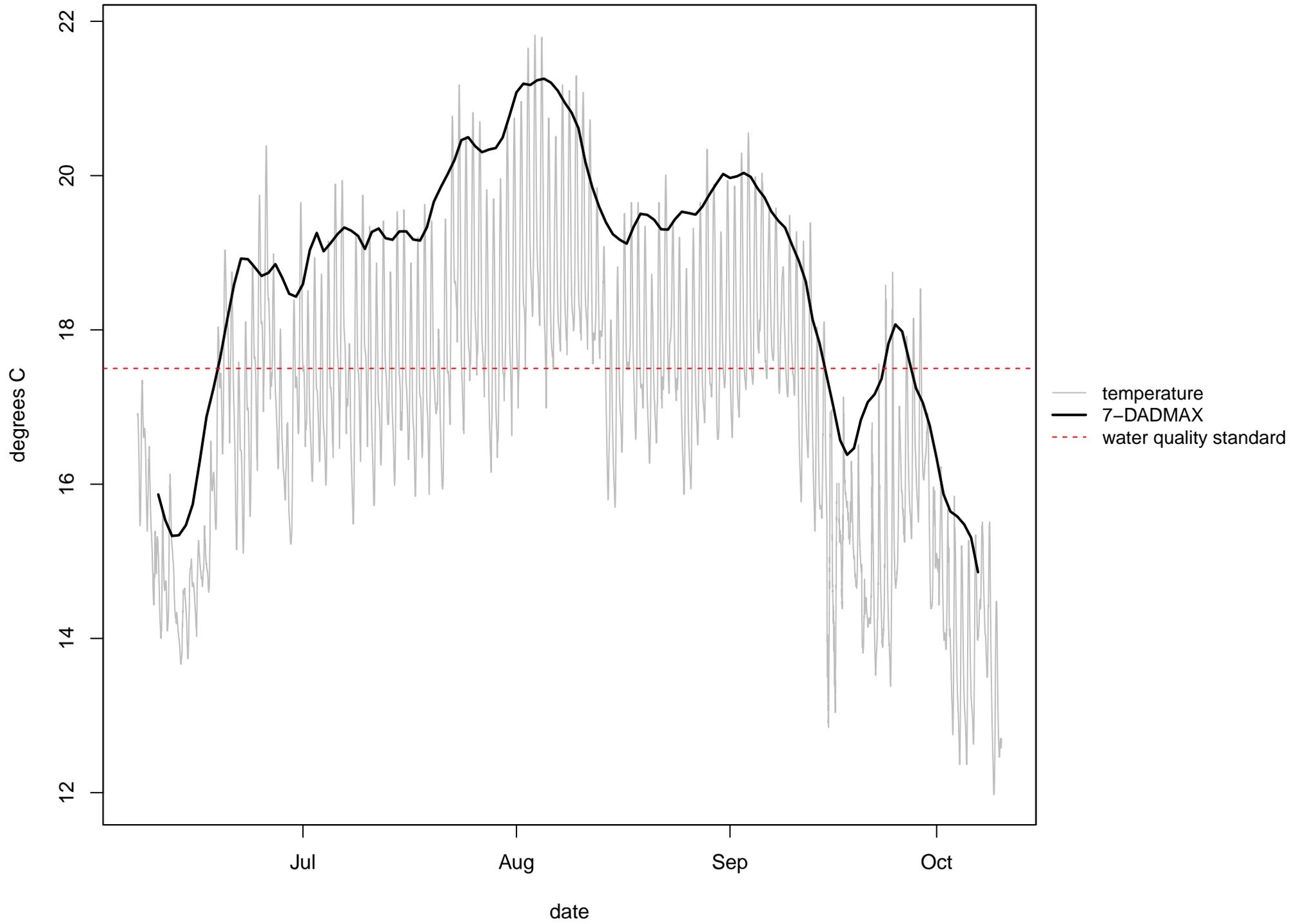
BBC8.8 - 2017



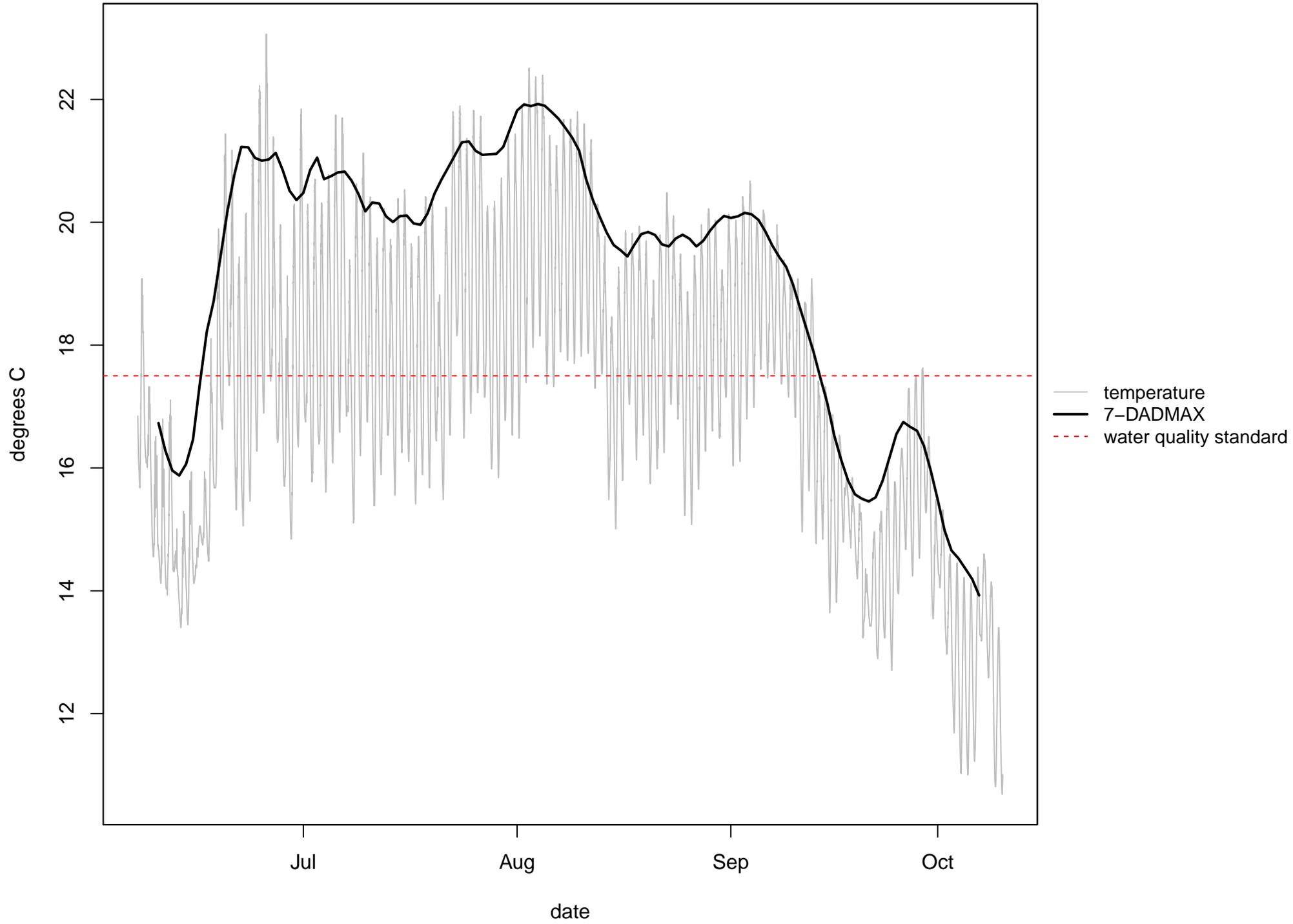
PET0.0 - 2017



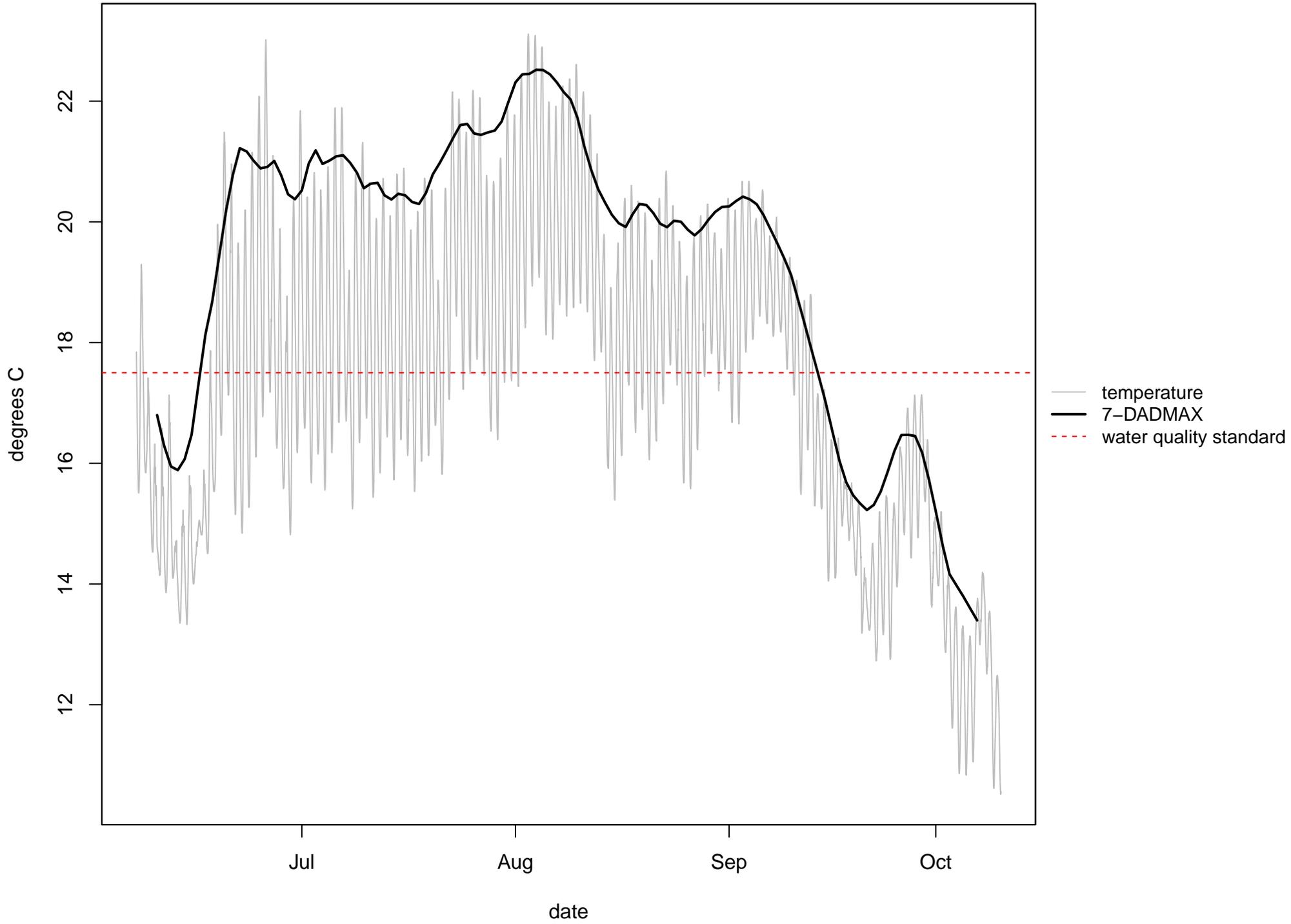
BBC8.4 - 2017



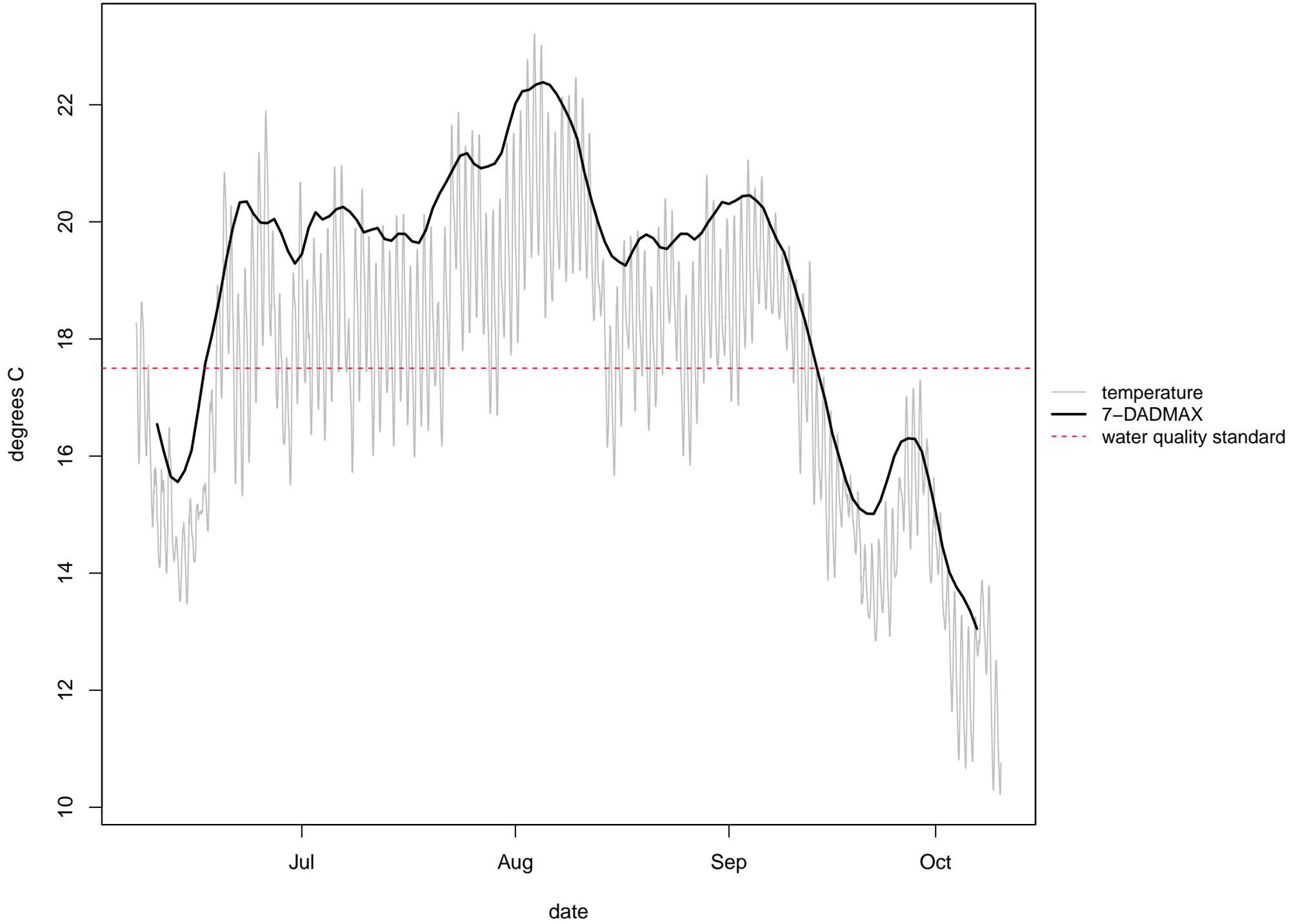
BBC7.0 - 2017



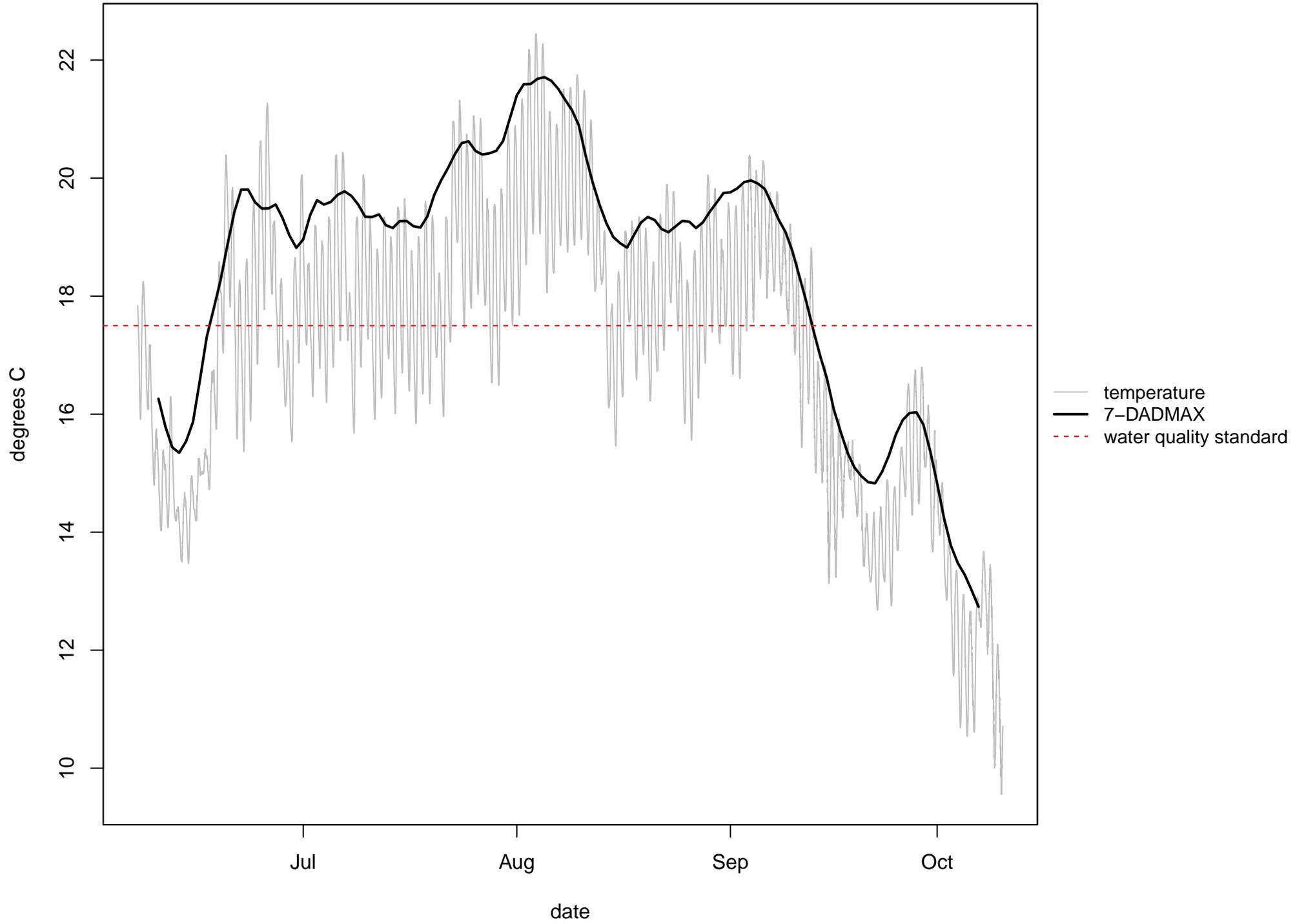
BBC5.9 - 2017



BBC2.6 - 2017



BBC1.6 - 2017



APPENDIX D

Summary of Water Quality Data for Current and Historical Studies of Burnt Bridge Creek

Table D-1. Summary of Water Quality Data for Current and Historical Studies of Burnt Bridge Creek.

	2004–2007 ^a								2011–2017							
	n	Minimum	25th Percentile	Mean	Median	75th Percentile	90th Percentile	Maximum	n	Minimum	25th Percentile	Mean	Median	75th percentile	90th percentile	Maximum
Conductivity (µS/cm)																
BBC10.4	0	–	–	–	–	–	–	–	41	139	168	189	181	190	248	254
BBC8.8	0	–	–	–	–	–	–	–	42	137	167	184	179	187	247	250
PET0.0	12	134	196	203	211	219	225	227	42	172	213	234	230	240	319	342
BBC8.4	12	171	193	197	204	206	208	209	42	149	184	204	195	210	278	288
BUR0.0	0	–	–	–	–	–	–	–	42	134	170	190	182	192	244	265
BBC7.0	12	169	194	199	204	210	211	213	42	151	182	202	194	210	267	286
BBC5.9	12	171	192	197	200	209	214	215	42	156	181	204	196	209	277	288
BBC5.2	0	–	–	–	–	–	–	–	42	150	180	203	195	209	278	290
BBC2.6	0	–	–	–	–	–	–	–	42	153	185	206	199	211	273	288
COL0.0	0	–	–	–	–	–	–	–	42	174	225	255	248	265	353	364
BBC1.6	0	–	–	–	–	–	–	–	42	156	188	210	204	216	278	299
Dissolved Oxygen (mg/L)																
BBC10.4	0	–	–	–	–	–	–	–	41	4.9	5.8	7.1	6.9	7.8	9.2	12.6
BBC8.8	0	–	–	–	–	–	–	–	41	8.2	9.3	10.0	9.9	10.4	11.4	12.7
PET0.0	23	6.5	8.5	8.8	8.8	9.2	9.9	10.5	41	7.5	8.2	8.8	8.7	9.3	9.6	10.0
BBC8.4	23	7.0	8.3	9.1	9.4	10.1	10.3	11.3	41	6.8	7.7	8.5	8.4	9.1	9.9	10.6
BUR0.0	0	–	–	–	–	–	–	–	41	8.1	8.8	9.3	9.3	9.8	10.3	11.0
BBC7.0	23	1.5	6.8	9.0	10.6	11.3	11.7	11.9	41	5.4	8.2	9.0	9.0	9.9	10.6	14.4
BBC5.9	21	1.8	3.8	5.3	5.3	6.7	7.7	8.7	41	4.9	6.5	7.6	7.5	8.8	9.9	11.5
BBC5.2	0	–	–	–	–	–	–	–	41	5.3	8.8	9.2	9.2	9.8	10.5	11.3
BBC2.6	0	–	–	–	–	–	–	–	41	5.0	9.0	9.4	9.5	9.9	10.5	12.1
COL0.0	0	–	–	–	–	–	–	–	41	5.8	9.9	10.2	10.3	10.8	11.2	12.1
BBC1.6	0	–	–	–	–	–	–	–	41	4.9	9.1	9.4	9.5	10.1	10.8	12.2
Fecal Coliform (CFU/100 mL)^b																
BBC10.4	0	–	–	–	–	–	–	–	41	16	64	101	96	175	220	680
BBC8.8	0	–	–	–	–	–	–	–	41	5	55	91	96	140	250	2,550
PET0.0	24	88	188	272	269	389	489	4,000	41	27	77	134	140	210	400	720
BBC8.4	24	89	140	204	168	270	517	2,200	41	27	59	98	91	175	265	700
BUR0.0	0	–	–	–	–	–	–	–	41	23	140	287	275	500	1,180	3,840
BBC7.0	24	29	74	105	90	139	229	2,000	41	45	100	134	125	205	280	459
BBC5.9	24	1	122	136	151	200	337	1,100	41	14	100	166	143	240	532	3,260
BBC5.2	0	–	–	–	–	–	–	–	41	27	108	175	155	280	491	2,650
BBC2.6	0	–	–	–	–	–	–	–	41	73	130	202	192	280	341	2,960
COL0.0	0	–	–	–	–	–	–	–	41	59	200	306	275	523	768	1,100
BBC1.6	0	–	–	–	–	–	–	–	41	32	175	297	255	432	1,050	1,500

Table D-1 (continued). Summary of Water Quality Data for Current and Historical Studies of Burnt Bridge Creek.

	2004–2007 ^a								2011–2017							
	n	Minimum	25th Percentile	Mean	Median	75th Percentile	90th Percentile	Maximum	n	Minimum	25th Percentile	Mean	Median	75th percentile	90th percentile	Maximum
Nitrate+Nitrite (mg/L)																
BBC10.4	0	–	–	–	–	–	–	–	42	1.6	2.3	2.5	2.6	2.7	2.9	3.1
BBC8.8	0	–	–	–	–	–	–	–	42	1.4	2.1	2.3	2.4	2.6	2.7	2.9
PET0.0	24	0.1	0.4	1.0	1.0	1.6	2.1	2.1	42	0.9	1.1	1.3	1.3	1.4	1.7	2.0
BBC8.4	24	0.1	0.3	1.1	1.0	1.9	2.0	2.1	42	0.9	1.7	1.8	1.8	2.1	2.2	2.2
BUR0.0	0	–	–	–	–	–	–	–	42	1.1	2.1	2.3	2.3	2.5	2.8	3.2
BBC7.0	24	0.001	0.2	0.6	0.4	1.2	1.4	1.7	42	0.6	1.3	1.5	1.5	1.7	1.8	1.9
BBC5.9	24	0.001	0.1	0.6	0.4	1.1	1.3	1.7	42	0.7	1.2	1.4	1.4	1.7	1.8	1.9
BBC5.2	0	–	–	–	–	–	–	–	42	0.8	1.3	1.5	1.5	1.7	1.8	2.0
BBC2.6	0	–	–	–	–	–	–	–	42	0.9	1.4	1.5	1.5	1.7	1.8	1.9
COL0.0	0	–	–	–	–	–	–	–	42	1.2	1.5	1.7	1.7	1.8	1.9	2.2
BBC1.6	0	–	–	–	–	–	–	–	42	1.0	1.4	1.5	1.5	1.6	1.7	1.8
pH																
BBC10.4	0	–	–	–	–	–	–	–	41	5.9	6.6	6.9	6.7	7.1	7.5	8.4
BBC8.8	0	–	–	–	–	–	–	–	41	6.9	7.3	7.5	7.5	7.6	7.8	8.1
PET0.0	20	6.7	7.2	7.3	7.4	7.4	7.5	8.0	39	6.9	7.3	7.4	7.4	7.5	7.6	7.7
BBC8.4	20	7.0	7.3	7.5	7.4	7.5	7.8	8.5	39	7.0	7.3	7.4	7.4	7.5	7.5	7.7
BUR0.0	0	–	–	–	–	–	–	–	39	6.9	7.4	7.5	7.5	7.6	7.6	7.9
BBC7.0	20	6.6	6.9	7.3	7.2	7.6	7.9	8.2	39	7.1	7.4	7.5	7.5	7.7	7.8	8.4
BBC5.9	20	6.3	6.8	6.9	7.0	7.1	7.3	7.6	40	7.2	7.3	7.5	7.5	7.6	7.7	7.8
BBC5.2	0	–	–	–	–	–	–	–	40	7.2	7.6	7.7	7.7	7.8	7.9	8.1
BBC2.6	0	–	–	–	–	–	–	–	40	7.6	7.8	7.9	7.9	8.0	8.1	8.2
COL0.0	0	–	–	–	–	–	–	–	40	7.5	7.9	8.0	8.0	8.1	8.2	8.3
BBC1.6	0	–	–	–	–	–	–	–	40	7.3	7.9	7.9	8.0	8.0	8.1	8.3
Soluble Reactive Phosphorus (mg/L)																
BBC10.4	0	–	–	–	–	–	–	–	42	0.04	0.05	0.06	0.06	0.06	0.07	0.09
BBC8.8	0	–	–	–	–	–	–	–	42	0.03	0.05	0.05	0.05	0.06	0.07	0.09
PET0.0	24	0.01	0.04	0.05	0.06	0.07	0.08	0.10	42	0.07	0.11	0.12	0.12	0.13	0.13	0.15
BBC8.4	24	0.01	0.04	0.04	0.05	0.06	0.07	0.08	42	0.05	0.07	0.08	0.08	0.09	0.09	0.10
BUR0.0	0	–	–	–	–	–	–	–	42	0.04	0.05	0.06	0.06	0.06	0.07	0.08
BBC7.0	24	0.01	0.04	0.06	0.05	0.08	0.11	0.12	42	0.06	0.07	0.08	0.08	0.08	0.09	0.10
BBC5.9	24	0.02	0.04	0.06	0.05	0.07	0.09	0.10	42	0.06	0.07	0.08	0.08	0.08	0.10	0.13
BBC5.2	0	–	–	–	–	–	–	–	42	0.06	0.07	0.08	0.08	0.09	0.10	0.13
BBC2.6	0	–	–	–	–	–	–	–	42	0.06	0.07	0.08	0.08	0.09	0.10	0.13
COL0.0	0	–	–	–	–	–	–	–	42	0.05	0.07	0.08	0.08	0.09	0.09	0.11
BBC1.6	0	–	–	–	–	–	–	–	42	0.06	0.07	0.08	0.08	0.09	0.10	0.13

Table D-1 (continued). Summary of Water Quality Data for Current and Historical Studies of Burnt Bridge Creek.

	2004–2007 ^a								2011–2017							
	n	Minimum	25th Percentile	Mean	Median	75th Percentile	90th Percentile	Maximum	n	Minimum	25th Percentile	Mean	Median	75th percentile	90th percentile	Maximum
Temperature (°C)																
BBC10.4	0	–	–	–	–	–	–	–	42	8.9	12.6	13.6	13.9	14.9	15.4	16.4
BBC8.8	0	–	–	–	–	–	–	–	42	8.4	13.6	15.1	15.7	16.7	17.1	19.1
PET0.0	11	14.6	15.9	16.4	16.5	17.0	17.3	18.2	42	11.8	15.1	16.4	16.7	17.7	17.9	19.0
BBC8.4	11	13.2	15.0	15.9	16.4	16.7	17.2	18.4	42	9.3	14.2	15.5	16.0	17.0	17.4	19.4
BUR0.0	0	–	–	–	–	–	–	–	42	7.8	13.0	14.1	14.6	15.2	15.8	17.6
BBC7.0	11	0.0	13.5	15.8	16.9	17.8	18.6	28.3	42	7.6	15.2	16.8	17.1	19.0	20.6	21.6
BBC5.9	11	13.0	14.7	16.4	16.7	18.1	18.9	20.2	42	7.4	14.3	15.7	16.3	17.3	18.6	20.0
BBC5.2	0	–	–	–	–	–	–	–	42	7.5	14.7	15.8	16.5	17.5	19.0	20.5
BBC2.6	0	–	–	–	–	–	–	–	42	7.5	14.4	15.9	16.6	17.7	19.1	20.5
COL0.0	0	–	–	–	–	–	–	–	42	7.5	12.4	13.2	13.5	14.2	14.6	16.3
BBC1.6	0	–	–	–	–	–	–	–	42	7.4	14.0	15.9	16.5	18.0	19.4	20.8
Total Nitrogen (mg/L)																
BBC10.4	0	–	–	–	–	–	–	–	42	2.1	2.9	3.1	3.1	3.3	3.6	3.9
BBC8.8	0	–	–	–	–	–	–	–	42	1.8	2.5	2.8	2.8	3.2	3.5	3.8
PET0.0	24	0.32	0.54	1.27	1.23	1.8	2.2	2.90	42	1.0	1.2	1.5	1.5	1.6	1.9	2.3
BBC8.4	24	0.33	0.57	1.27	1.20	2.1	2.2	2.27	42	1.5	1.9	2.2	2.2	2.5	2.6	3.5
BUR0.0	0	–	–	–	–	–	–	–	42	1.6	2.5	2.8	2.8	3.1	3.6	3.9
BBC7.0	24	0.17	0.50	0.92	0.77	1.5	1.7	1.90	42	0.9	1.5	1.8	1.9	2.0	2.2	2.8
BBC5.9	24	0.18	0.45	0.88	0.73	1.4	1.5	1.84	42	0.8	1.4	1.6	1.6	2.0	2.1	2.7
BBC5.2	0	–	–	–	–	–	–	–	42	0.9	1.5	1.7	1.7	2.0	2.3	2.7
BBC2.6	0	–	–	–	–	–	–	–	42	1.2	1.5	1.8	1.8	2.0	2.1	2.7
COL0.0	0	–	–	–	–	–	–	–	42	1.2	1.7	1.8	1.8	2.0	2.1	2.2
BBC1.6	0	–	–	–	–	–	–	–	42	1.1	1.6	1.7	1.8	1.9	2.0	2.3
Total Phosphorus (mg/L)																
BBC10.4	0	–	–	–	–	–	–	–	42	0.05	0.07	0.07	0.07	0.08	0.09	0.14
BBC8.8	0	–	–	–	–	–	–	–	42	0.06	0.07	0.08	0.08	0.09	0.10	0.13
PET0.0	24	0.02	0.05	0.07	0.07	0.08	0.09	0.10	42	0.11	0.14	0.15	0.15	0.15	0.17	0.18
BBC8.4	22	0.02	0.05	0.06	0.05	0.07	0.09	0.10	42	0.08	0.10	0.11	0.11	0.12	0.13	0.15
BUR0.0	0	–	–	–	–	–	–	–	42	0.05	0.07	0.08	0.07	0.08	0.09	0.15
BBC7.0	23	0.04	0.06	0.09	0.09	0.10	0.13	0.16	42	0.09	0.11	0.12	0.12	0.13	0.14	0.17
BBC5.9	24	0.04	0.06	0.07	0.07	0.08	0.10	0.10	42	0.08	0.09	0.10	0.10	0.11	0.13	0.16
BBC5.2	0	–	–	–	–	–	–	–	42	0.07	0.10	0.11	0.10	0.12	0.13	0.15
BBC2.6	0	–	–	–	–	–	–	–	42	0.08	0.10	0.11	0.10	0.11	0.13	0.17
COL0.0	0	–	–	–	–	–	–	–	42	0.07	0.09	0.10	0.10	0.10	0.11	0.26
BBC1.6	0	–	–	–	–	–	–	–	42	0.08	0.10	0.11	0.11	0.12	0.13	0.24

Table D-1 (continued). Summary of Water Quality Data for Current and Historical Studies of Burnt Bridge Creek.

	2004–2007 ^a								2011–2017							
	n	Minimum	25th Percentile	Mean	Median	75th Percentile	90th Percentile	Maximum	n	Minimum	25th Percentile	Mean	Median	75th percentile	90th percentile	Maximum
Total Suspended Solids (mg/L)																
BBC10.4	0	–	–	–	–	–	–	–	42	0.8	2.0	3.0	2.6	3.4	5.6	7.0
BBC8.8	0	–	–	–	–	–	–	–	42	1.8	4.6	8.3	7.9	11.0	15.7	20.8
PET0.0	12	1.0	2.0	4.2	2.5	4.5	9.6	13.0	42	0.7	2.4	3.9	3.4	5.0	6.2	9.0
BBC8.4	12	0.5	1.0	2.8	3.0	4.0	4.9	7.0	42	2.5	5.5	7.0	6.5	8.2	10.5	13.7
BUR0.0	0	–	–	–	–	–	–	–	42	0.5	0.8	4.2	1.6	3.2	12.0	42.0
BBC7.0	12	2.0	3.0	8.3	6.0	8.0	19.7	30.0	42	0.9	6.5	11.5	10.4	13.6	18.5	54.0
BBC5.9	12	0.5	2.0	2.9	2.0	4.3	5.0	6.0	42	0.8	2.5	4.0	3.8	5.4	6.3	11.0
BBC5.2	0	–	–	–	–	–	–	–	42	1.7	4.1	5.3	5.0	6.8	7.3	10.0
BBC2.6	0	–	–	–	–	–	–	–	42	0.7	2.9	5.2	4.3	7.5	9.2	12.0
COL0.0	0	–	–	–	–	–	–	–	42	0.8	2.2	5.2	3.2	4.8	7.8	46.0
BBC1.6	0	–	–	–	–	–	–	–	42	0.8	3.7	6.6	5.4	9.2	11.0	19.0
Turbidity (NTU)																
BBC10.4	0	–	–	–	–	–	–	–	42	0.5	0.8	1.7	1.4	2.0	3.0	10.0
BBC8.8	0	–	–	–	–	–	–	–	42	0.8	1.8	2.6	2.4	3.0	3.6	14.0
PET0.0	12	0.2	0.5	1.3	0.7	0.9	1.2	7.9	42	0.4	0.7	1.3	1.0	1.5	2.0	8.0
BBC8.4	12	0.4	0.6	0.9	0.8	1.1	1.3	1.5	42	0.6	1.6	2.2	2.0	2.6	3.1	11.0
BUR0.0	0	–	–	–	–	–	–	–	42	0.4	0.7	1.6	0.9	1.9	2.7	9.4
BBC7.0	12	0.8	1.2	1.7	1.3	1.8	2.5	4.7	42	0.8	2.0	3.5	3.0	4.1	5.2	16.0
BBC5.9	12	0.4	0.6	0.8	0.8	0.9	1.0	1.8	42	0.6	1.2	2.1	1.7	2.4	3.5	14.0
BBC5.2	0	–	–	–	–	–	–	–	42	0.5	1.5	2.1	1.9	2.2	3.3	12.0
BBC2.6	0	–	–	–	–	–	–	–	42	0.6	1.3	2.4	1.9	2.7	3.5	17.0
COL0.0	0	–	–	–	–	–	–	–	42	0.4	1.1	3.5	1.7	3.1	3.6	35.0
BBC1.6	0	–	–	–	–	–	–	–	42	0.7	1.7	2.9	2.1	3.5	4.3	20.0

^a Samples collected monthly from June through October (City of Vancouver 2011).

^b Geometric means for fecal coliform bacteria by all studies.

CFU/100 mL = colony forming units per 100 milliliters

µS/cm = microsiemens per centimeter

mg/L = milligrams per liter

NTU = nephelometric turbidity unit

°C = degrees Celsius

APPENDIX E

Statistical Test Results

Table E-1. Kendall's Tau Correlation Results for Water Quality Data.

	BBC10.4		BBC8.8		PET0.0		BBC8.4		BUR0.0		BBC7.0		BBC5.9		BBC5.2		BBC2.6		COL0.0		BBC1.6	
	coef	p-value	coef	p-value	coef	p-value	coef	p-value	coef	p-value	coef	p-value	coef	p-value	coef	p-value	coef	p-value	coef	p-value	coef	p-value
Conductivity	0.13	0.252	0.19	0.079	0.31	0.004	0.26	0.014	0.21	0.055	0.22	0.036	0.25	0.019	0.28	0.010	0.25	0.019	0.33	0.002	0.25	0.022
Dissolved Oxygen	-0.18	0.098	-0.11	0.328	-0.01	0.937	0.05	0.621	0.10	0.380	-0.24	0.027	-0.17	0.124	0.05	0.661	0.14	0.211	0.03	0.796	0.06	0.559
Fecal Coliform	-0.01	0.928	0.01	0.928	0.08	0.486	0.07	0.522	-0.23	0.037	-0.05	0.669	-0.37	<0.001	-0.24	0.026	-0.12	0.257	-0.24	0.027	-0.08	0.445
Nitrate+Nitrite	-0.44	<0.001	-0.42	<0.001	0.27	0.012	-0.28	0.008	-0.31	0.004	-0.19	0.083	-0.12	0.269	-0.12	0.259	-0.14	0.182	0.04	0.696	-0.10	0.340
pH	-0.02	0.839	0.02	0.830	-0.05	0.667	0.17	0.153	0.00	1.000	-0.23	0.046	-0.08	0.478	-0.03	0.822	0.00	0.972	0.02	0.850	0.11	0.329
Soluble Reactive Phosphorus	-0.07	0.501	-0.08	0.460	0.27	0.013	0.04	0.704	0.11	0.302	-0.04	0.712	0.02	0.845	0.05	0.672	0.07	0.501	0.17	0.111	0.07	0.501
Temperature	0.03	0.753	-0.01	0.931	0.00	0.991	0.04	0.720	-0.04	0.696	-0.12	0.259	-0.05	0.633	0.03	0.778	0.04	0.721	0.04	0.680	0.03	0.745
Total Nitrogen	-0.26	0.025	-0.30	0.009	0.33	0.005	-0.20	0.081	-0.14	0.241	-0.24	0.044	-0.36	0.002	-0.34	0.004	-0.28	0.016	0.28	0.018	-0.19	0.099
Total Phosphorus	-0.03	0.769	-0.08	0.448	0.05	0.641	-0.04	0.696	-0.10	0.379	-0.03	0.795	-0.02	0.854	-0.11	0.293	-0.13	0.237	0.08	0.454	-0.16	0.152
Total Suspended Solids	0.29	0.008	-0.13	0.233	-0.28	0.009	-0.16	0.129	-0.15	0.175	0.13	0.220	-0.29	0.006	-0.25	0.021	-0.39	<0.001	-0.01	0.922	-0.25	0.019
Turbidity	0.35	0.001	0.11	0.334	0.21	0.048	0.11	0.313	0.16	0.135	0.18	0.091	0.10	0.373	0.08	0.460	0.02	0.862	0.20	0.065	-0.09	0.409
Percent of record 7-DADMax exceeds 17.5°C	0.33	0.381	0.85	0.012	0.10	0.761	0.49	0.129	-	-	-0.68	0.033	-0.62	0.069	-	-	0.24	0.562	-	-	0.00	1.000

Evaluated using Kendall's Tau correlation test (a = 0.05).

Significant results (p-value <0.05) are bolded.

Coef = Kendall Tau correlation coefficient

Table E-2. Calendar Year Water Quality Index by Station.

Station	Year	FC	Oxygen	pH	TP	TSS	Temp	TN	Turbidity	WQI Score
BBC 10.4	2011	73	53	74	80	100	87	1	99	60
	2012	80	53	83	72	94	89	1	93	66
	2013	72	77	63	78	99	92	1	100	70
	2014	69	48	83	74	95	87	1	95	58
	2015	74	50	83	88	96	86	1	96	64
	2016	72	40	59	88	93	84	1	90	40
	2017	86	61	74	67	88	86	1	93	60
BBC 8.8	2011	72	86	90	62	78	77	1	93	69
	2012	79	89	94	59	77	82	1	92	69
	2013	77	91	97	60	79	83	1	93	69
	2014	74	82	97	65	82	82	1	90	74
	2015	73	91	95	70	81	77	1	92	73
	2016	60	86	91	72	79	74	5	85	66
	2017	75	85	92	60	79	78	1	91	65
PET 0.0	2011	70	79	90	22	85	75	93	100	75
	2012	72	78	94	21	91	79	74	99	67
	2013	65	78	97	23	90	80	77	99	64
	2014	66	75	97	16	89	78	40	95	52
	2015	75	78	99	21	94	79	67	97	58
	2016	74	82	96	24	94	74	49	92	56
	2017	62	81	92	18	90	76	48	97	46
BBC 8.4	2011	74	77	92	45	80	77	6	95	53
	2012	80	73	96	47	85	82	11	93	54
	2013	68	70	96	48	84	81	7	94	46
	2014	74	67	97	32	82	81	7	91	42
	2015	78	74	99	45	83	80	23	95	53
	2016	81	81	99	50	84	72	21	80	60
	2017	67	82	97	44	82	76	4	91	48

Table E-2 (continued). Calendar Year Water Quality Index by Station.

Station	Year	FC	Oxygen	pH	TP	TSS	Temp	TN	Turbidity	WQI Score
BUR 0.0	2011	37	87	90	81	91	84	1	98	57
	2012	57	81	96	74	93	86	1	100	70
	2013	60	82	97	82	91	87	1	99	73
	2014	66	82	96	54	100	87	1	90	62
	2015	44	83	95	54	74	80	1	87	40
	2016	63	87	96	90	88	84	1	92	76
	2017	72	87	96	89	92	88	1	98	83
BBC 7.0	2011	69	82	96	41	79	65	34	94	44
	2012	72	71	96	35	74	75	31	86	39
	2013	68	48	93	42	76	63	34	89	37
	2014	67	73	83	31	78	67	35	87	43
	2015	79	66	97	42	77	62	68	89	49
	2016	74	57	97	42	81	64	39	84	47
	2017	72	76	94	31	65	71	14	84	40
BBC 5.9	2011	51	72	96	47	89	74	43	97	43
	2012	63	57	96	49	85	81	38	91	42
	2013	52	47	96	55	89	72	40	96	36
	2014	71	40	97	32	88	76	48	91	37
	2015	83	44	98	51	96	70	87	98	55
	2016	77	60	99	58	99	70	65	87	53
	2017	75	68	96	43	86	76	14	92	48
BBC 5.2	2011	60	89	96	46	85	79	31	96	49
	2012	69	78	95	49	84	80	40	93	54
	2013	51	47	95	50	86	74	38	95	36
	2014	63	77	96	34	87	74	46	92	44
	2015	74	83	91	49	90	67	85	96	65
	2016	74	84	99	59	93	70	50	87	63
	2017	71	88	95	41	84	74	15	92	48

Table E-2 (continued). Calendar Year Water Quality Index by Station.

Station	Year	FC	Oxygen	pH	TP	TSS	Temp	TN	Turbidity	WQI Score
BBC 2.6	2011	53	88	91	46	80	81	36	94	41
	2012	71	62	88	49	82	78	40	93	52
	2013	61	42	95	51	84	73	37	95	34
	2014	69	79	93	37	90	74	47	90	48
	2015	77	84	91	52	96	67	77	98	59
	2016	69	86	95	53	94	71	44	83	50
	2017	70	89	91	42	83	72	16	90	45
COL 0.0	2011	64	94	91	56	88	91	43	94	57
	2012	50	89	86	57	92	90	45	95	47
	2013	53	54	91	40	84	90	35	86	34
	2014	56	90	88	49	95	91	37	91	46
	2015	55	90	88	53	97	90	35	97	48
	2016	68	92	93	39	78	88	49	71	47
	2017	71	93	88	54	84	84	43	90	60
BBC 1.6	2011	55	89	93	43	77	82	39	88	40
	2012	63	82	86	46	81	77	43	91	47
	2013	44	40	93	49	81	72	42	92	20
	2014	56	81	91	37	86	71	57	90	38
	2015	63	83	88	55	95	66	53	96	49
	2016	66	82	93	36	83	70	49	79	45
	2017	66	89	91	43	80	72	25	89	45

FC = fecal coliform

TP = total phosphorus

TSS = total suspended solids

Temp = temperature

WQI = water quality index

Low Concern WQI = 80–100

Moderate Concern WQI = 40–79

High Concern WQI = 1–39

Table E-3. Mann Whitney U Test Results.

	PET0.0					BBC8.4					BBC7.0					BBC5.9				
	2004–2007		2011–2017		Mann Whitney U Test	2004–2007		2011–2017		Mann Whitney U Test	2004–2007		2011–2017		Mann Whitney U Test	2004–2007		2011–2017		Mann Whitney U Test
	n	Median Value	n	Median Value	p-value	n	Median Value	n	Median Value	p-value	n	Median Value	n	Median Value	p-value	n	Median Value	n	Median Value	p-value
Conductivity (µS/cm)	12	211	42	230	0.016	12	204	42	195	0.662	12	204	42	194	0.382	12	200	42	196	0.560
Dissolved Oxygen (mg/L)	23	8.8	42	8.8	0.951	23	9.4	42	8.4	0.090	23	10.6	42	9.1	0.569	21	5.3	42	7.6	<0.001
Fecal Coliform (CFU/100 mL)	24	269	41	140	0.001	24	167.5	41	91	<0.001	24	90	41	125	0.031	24	151	41	143	0.995
Nitrate+Nitrite (mg/L)	24	0.99	42	1.28	0.160	24	1.00	42	1.81	<0.001	24	0.39	42	1.51	<0.001	24	0.38	42	1.42	<0.001
pH	20	7.4	39	7.4	0.163	20	7.4	39	7.4	0.728	20	7.2	39	7.5	0.013	20	7.0	40	7.5	<0.001
Soluble Reactive Phosphorus (mg/L)	24	0.06	42	0.12	<0.001	24	0.05	42	0.08	<0.001	24	0.05	42	0.08	0.001	24	0.05	42	0.08	<0.001
Temperature (°C)	11	16.5	42	16.7	0.974	11	16.4	42	16.0	0.606	11	16.9	42	17.1	0.423	11	16.7	42	16.3	0.449
Total Nitrogen (mg/L)	24	1.2	42	1.5	0.280	24	1.2	42	2.2	<0.001	24	0.8	42	1.9	<0.001	24	0.7	42	1.6	<0.001
Total Phosphorus (mg/L)	24	0.07	42	0.15	<0.001	22	0.05	42	0.11	<0.001	23	0.09	42	0.12	<0.001	24	0.07	42	0.10	<0.001
Total Suspended Solids (mg/L)	12	2.5	42	3.4	0.460	12	3.0	42	6.5	<0.001	12	6.0	42	10.4	0.028	12	2.0	42	3.8	0.096
Turbidity (NTU)	12	0.68	42	0.99	0.021	12	0.79	42	2.00	<0.001	12	1.30	42	2.95	<0.001	12	0.84	42	1.65	<0.001

Note: 9/13/2016 has a pH sample for BB5.9 but not the other 3 stations. pH was collected for a limited number of stations on that date.

Bolded values indicate significant results (p-value < 0.05).

CFU/100 mL = colony forming units per 100 milliliters

µS/cm = microsiemens per centimeter

mg/L = milligrams per liter

NTU = nephelometric turbidity unit

°C = degrees Celsius

Table E-4. Friedman Test Results.

Parameter	Conductivity		Dissolved Oxygen		Fecal Coliform		Nitrate+Nitrite		pH		Soluble Reactive Phosphorus		Temperature		Total Nitrogen		Total Phosphorus		Total Suspended Solids		Turbidity	
Friedman Statistic	96.4		46.7		19.9		94.0		98.0		108.0		57.4		94.6		90.1		31.9		24.1	
p-value	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	
	Sum of Ranks	Group	Sum of Ranks	Group	Sum of Ranks	Group	Sum of Ranks	Group	Sum of Ranks	Group	Sum of Ranks	Group	Sum of Ranks	Group	Sum of Ranks	Group	Sum of Ranks	Group	Sum of Ranks	Group	Sum of Ranks	Group
BBC10.4	110	e	83.5	g	157	e	449	a	73.5	g	97.0	d	95.0	h	449	a	75.0	g	148	e	175	d
BBC8.8	66.0	f	357	b	138	e	395	b	188	e	65.0	e	218	f	402	b	118	f	354	ab	325	b
PET0.0	403	a	182	f	213	d	124	f	144	f	448	a	352	b	109	f	447	a	177	e	113	e
BBC8.4	253	cd	165	f	151	e	303	c	145	f	280	c	275	de	315	c	309	c	352	b	272	c
BUR0.0	140	e	285	cd	320	ab	402	b	187	e	103	d	148	g	386	b	102	fg	138	e	144	de
BBC7.0	224	d	243	e	207	d	193	de	227	d	262	c	401	a	230	d	370	b	398	a	404	a
BBC5.9	235	d	120	g	233	cd	121	f	179	e	262	c	260	e	134	f	251	e	183	e	241	c
BBC5.2	239	d	263	de	250	cd	193	de	296	c	280	c	306	cd	188	e	263	de	274	cd	247	c
BBC2.6	274	c	296	cd	274	bc	196	de	359	b	352	b	329	bc	194	e	294	cd	258	d	270	c
COL0.0	430	a	405	a	350	a	225	d	406	a	287	c	76.5	h	194	e	234	e	182	e	262	c
BBC1.6	335	b	308	c	351	a	173	e	372	b	338	b	313	cd	175	e	311	c	310	bc	323	b

