

November 2, 2017

Data_17K0043

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BFK0112-BLK1	Blank	13-05605-000	Water			11/03/2017	11/09/2017	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.100	U	mg/L
BFK0112-BS1	LCS	13-05605-000	Water			11/03/2017	11/09/2017	NWTPH-Dx		Diesel Range Organics (C12-C24)	2.91		mg/L
17K0043-01	WUFF-IN	13-05605-000	Water	11/02/2017	11/02/2017	11/03/2017	11/09/2017	NWTPH-Dx		Diesel Range Organics (C12-C24)	1.21		mg/L
17K0043-02	WUFF-OUT	13-05605-000	Water	11/02/2017	11/02/2017	11/03/2017	11/09/2017	NWTPH-Dx		Diesel Range Organics (C12-C24)	1.52		mg/L
BFK0112-BLK1	Blank	13-05605-000	Water			11/03/2017	11/09/2017	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	0.200	U	mg/L
17K0043-01	WUFF-IN	13-05605-000	Water	11/02/2017	11/02/2017	11/03/2017	11/09/2017	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	2.26		mg/L
17K0043-02	WUFF-OUT	13-05605-000	Water	11/02/2017	11/02/2017	11/03/2017	11/09/2017	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	2.69		mg/L
BFK0112-BLK1	Blank	13-05605-000	Water			11/03/2017	11/09/2017	NWTPH-Dx	84-15-1	o-Terphenyl	80.1		%
BFK0112-BS1	LCS	13-05605-000	Water			11/03/2017	11/09/2017	NWTPH-Dx	84-15-1	o-Terphenyl	102		%
17K0043-01	WUFF-IN	13-05605-000	Water	11/02/2017	11/02/2017	11/03/2017	11/09/2017	NWTPH-Dx	84-15-1	o-Terphenyl	94.2		%
17K0043-02	WUFF-OUT	13-05605-000	Water	11/02/2017	11/02/2017	11/03/2017	11/09/2017	NWTPH-Dx	84-15-1	o-Terphenyl	105		%



Analytical Resources, Incorporated
Analytical Chemists and Consultants

15 November 2017

Dylan Ahearn
Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle, WA 98121

RE: Hydro International

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)
17K0043

Associated SDG ID(s)
N/A

Amanda
Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical
Resources, Inc., ou=Client
Services, cn=Amanda
Volgardsen,
email=amandav@arilabs.com
Date: 2017.11.15 13:35:14 -08'00'

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclosed Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



HERRERA

PORTLAND, OR | MISSOULA, MT | OLYMPIA, WA
WINTHROP, WA | GUANGZHOU, CHINA

[illegible]

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)

mm_Hydro upflo CDC Grab Sample.docx

Project Name



Page 1 of 1



Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 17K0043

Project Name: Hydro International Upfio

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Tracking No: _____ (NA)

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES (NO)

Were custody papers included with the cooler? YES (YES) NO

Were custody papers properly filled out (ink, signed, etc.) YES (YES) NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 12.1

Time: 1508

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D002565

Cooler Accepted by: SF Date: 11/2/17 Time: 1508

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES (NO)

What kind of packing material was used? ... Bubble Wrap (Wet Ice) Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? NA YES (NO)

Were all bottles sealed in individual plastic bags? YES (YES) NO

Did all bottles arrive in good condition (unbroken)? YES (YES) NO

Were all bottle labels complete and legible? YES (YES) NO

Did the number of containers listed on COC match with the number of containers received? YES (YES) NO

Did all bottle labels and tags agree with custody papers? YES (YES) NO

Were all bottles used correct for the requested analyses? YES (YES) NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... NA YES (NO)

Were all VOC vials free of air bubbles? NA YES (YES) NO

Was sufficient amount of sample sent in each bottle? NA YES (YES) NO

Date VOC Trip Blank was made at ARI: NA YES (YES) NO

Was Sample Split by ARI: (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: BF Date: 11/2/17 Time: 1743

**** Notify Project Manager of discrepancies or concerns ****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____

Small Air Bubbles - 2mm 	Peabubbles 2-4 mm 	LARGE Air Bubbles > 4 mm 	Small → "sm" (< 2 mm) Peabubbles → "pb" (2 to < 4 mm) Large → "lg" (4 to < 6 mm) Headspace → "hs" (> 6 mm)
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Cooler Temperature Compliance Form

Cooler#:	Temperature(°C): 12.1	
Sample ID	Bottle Count	Bottle Type
Samples received		
Above 60°		

Cooler#:	Temperature(°C):	
Sample ID	Bottle Count	Bottle Type

Cooler#:	Temperature(°C):	
Sample ID	Bottle Count	Bottle Type

Cooler#:	Temperature(°C):	
Sample ID	Bottle Count	Bottle Type

Completed by: SF Date: 11/2/17 Time: 1500



Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
15-Nov-2017 13:33

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	17K0043-01	Water	02-Nov-2017 13:30	02-Nov-2017 15:08
WUFF-OUT	17K0043-02	Water	02-Nov-2017 13:30	02-Nov-2017 15:08



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Case Narrative

Sample receipt

Samples as listed on the preceding page were received November 2, 2017 under ARI workorder 17K0043. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Diesel/Heavy Oil Range Organics - WA-Ecology Method NW-TPHDx

The samples were extracted and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The surrogate percent recoveries were within control limits.

There were no target compounds detected in the method blank.

The LCS percent recoveries were within control limits.



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
15-Nov-2017 13:33

WUFF-IN
17K0043-01 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx
Instrument: FID4

Sampled: 11/02/2017 13:30
Analyzed: 09-Nov-2017 21:56

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BFK0112 Sample Size: 500 mL
Prepared: 03-Nov-2017 Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.100	1.21	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.200	2.26	mg/L	
HC ID: MOTOR OIL						
Surrogate: o-Terphenyl			50-150 %	94.2	%	



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Reported:
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WUFF-OUT
17K0043-02 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx
Instrument: FID4

Sampled: 11/02/2017 13:30
Analyzed: 09-Nov-2017 22:15

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BFK0112 Sample Size: 500 mL
Prepared: 03-Nov-2017 Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.100	1.52	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.200	2.69	mg/L	
HC ID: MOTOR OIL						
Surrogate: o-Terphenyl			50-150 %	105	%	



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Reported:
15-Nov-2017 13:33

Petroleum Hydrocarbons - Quality Control

Batch BFK0112 - EPA 3510C SepF

Instrument: FID4 Analyst: ML

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0112-BLK1) Prepared: 03-Nov-2017 Analyzed: 09-Nov-2017 20:57									
Diesel Range Organics (C12-C24)	ND	0.100	mg/L						U
Motor Oil Range Organics (C24-C38)	ND	0.200	mg/L						U
Surrogate: o-Terphenyl		0.360	mg/L	0.450		80.1	50-150		
LCS (BFK0112-BS1) Prepared: 03-Nov-2017 Analyzed: 09-Nov-2017 21:18									
Diesel Range Organics (C12-C24)	2.91	0.100	mg/L	3.00		97.1	56-120		
Surrogate: o-Terphenyl		0.460	mg/L	0.450		102	50-150		



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Certified Analyses included in this Report

Analyte	Certifications
NWTPH-Dx in Water	
Diesel Range Organics (C12-C24)	DoD-ELAP,NELAP,WADOE
Diesel Range Organics (C10-C25)	DoD-ELAP,NELAP,WADOE
Diesel Range Organics (Tol-C18)	DoD-ELAP,NELAP,WADOE
Diesel Range Organics (C10-24)	DoD-ELAP,NELAP,WADOE
Diesel Range Organics (C10-C28)	DoD-ELAP,NELAP,WADOE
Motor Oil Range Organics (C24-C38)	DoD-ELAP,NELAP,WADOE
Motor Oil Range Organics (C25-C36)	DoD-ELAP,NELAP,WADOE
Motor Oil Range Organics (C24-C40)	DoD-ELAP,NELAP,WADOE
Mineral Spirits Range Organics (Tol-C12)	DoD-ELAP,NELAP,WADOE
Mineral Oil Range Organics (C16-C28)	DoD-ELAP,NELAP,WADOE
Kerosene Range Organics (Tol-C18)	DoD-ELAP,NELAP,WADOE
JP8 Range Organics (C8-C18)	DoD-ELAP,NELAP,WADOE
JP5 Range Organics (C10-C16)	DoD-ELAP,NELAP,WADOE
JP4 Range Organics (Tol-C14)	DoD-ELAP,NELAP,WADOE
Jet-A Range Organics (C10-C18)	DoD-ELAP,NELAP,WADOE
Creosote Range Organics (C12-C22)	DoD-ELAP,NELAP,WADOE
Bunker C Range Organics (C10-C38)	DoD-ELAP,NELAP,WADOE
Stoddard Range Organics (C8-C12)	DoD-ELAP,NELAP,WADOE
Transformer Oil Range Organics (C12-C28)	DoD-ELAP,NELAP,WADOE

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	09/01/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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15-Nov-2017 13:33

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
H	Hold time violation - Hold time was exceeded.
D	The reported value is from a dilution
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

Data_17K0068

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17K0068-01	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/07/2017	11/15/2017	SM 2340 B-97		Hardness	72.1		mg/L
17K0068-02	WUFF-OUT	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/07/2017	11/15/2017	SM 2340 B-97		Hardness	69.3		mg/L
17K0068-01	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/09/2017	11/09/2017	ASTM D3977	SC_>63	> 63 µm	36.01		mg/L
17K0068-02	WUFF-OUT	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/09/2017	11/09/2017	ASTM D3977	SC_>63	> 63 µm	1.72		mg/L
17K0068-01	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/09/2017	11/09/2017	ASTM D3977	SC_<63	< 63 µm	8.20		mg/L
17K0068-02	WUFF-OUT	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/09/2017	11/09/2017	ASTM D3977	SC_<63	< 63 µm	5.26		mg/L
17K0068-01	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/09/2017	11/09/2017	ASTM D3977	SC_TOTAL	Total SSC	44.21		mg/L
17K0068-02	WUFF-OUT	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/09/2017	11/09/2017	ASTM D3977	SC_TOTAL	Total SSC	6.98		mg/L
BFK0122-BLK1	Blank	13-05605-000	Water			11/04/2017	11/04/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFK0122-BS1	LCS	13-05605-000	Water			11/04/2017	11/04/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.153		mg-P/L
17K0068-01	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/04/2017	11/04/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0220		mg-P/L
17K0068-02	WUFF-OUT	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/04/2017	11/04/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0210		mg-P/L
BFK0177-BLK1	Blank	13-05605-000	Water			11/07/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BFK0177-BS1	LCS	13-05605-000	Water			11/07/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	10.2		mg/L
BFK0177-DUP1	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/07/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	18.6		mg/L
BFK0177-MS1	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/07/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	29.5		mg/L
17K0068-01	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/07/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	18.9		mg/L
17K0068-02	WUFF-OUT	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/07/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	18.8		mg/L
BFK0177-BLK1	Blank	13-05605-000	Water			11/07/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BFK0177-BS1	LCS	13-05605-000	Water			11/07/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	11.0		mg/L
BFK0177-DUP1	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/07/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	5.85		mg/L
BFK0177-MS1	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/07/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	17.1		mg/L
17K0068-01	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/07/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	6.02		mg/L
17K0068-02	WUFF-OUT	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/07/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	5.45		mg/L
BFK0234-BLK1	Blank	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0234-BS1	LCS	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	27.2		ug/L
BFK0234-BS2	LCS	13-05605-000	Water			11/09/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	26.1		ug/L
17K0068-01	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	26.8		ug/L
17K0068-02	WUFF-OUT	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	18.9		ug/L
BFK0234-BLK1	Blank	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0234-BS1	LCS	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	27.4		ug/L
BFK0234-BS2	LCS	13-05605-000	Water			11/09/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	26.1		ug/L
BFK0234-BLK1	Blank	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0234-BS2	LCS	13-05605-000	Water			11/09/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	93.2		ug/L
17K0068-01	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/09/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	112		ug/L
17K0068-02	WUFF-OUT	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/09/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	53.2		ug/L
BFK0234-BLK1	Blank	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0234-BS1	LCS	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	93.2		ug/L
BFK0234-BS2	LCS	13-05605-000	Water			11/09/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	89.4		ug/L
BFK0282-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0282-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-50-8	Copper	28.2		ug/L
17K0068-04	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	12.2		ug/L
17K0068-05	WUFF-OUT	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	14.1		ug/L
BFK0282-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0282-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-50-8	Copper	28.4		ug/L
BFK0282-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0282-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	94.7		ug/L
17K0068-04	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	36.5		ug/L
17K0068-05	WUFF-OUT	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	36.2		ug/L

Data_17K0068

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BFK0282-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0282-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	86.6		ug/L
BFK0547-BLK1	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0547-BLK2	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0547-BLK3	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0547-BS1	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.306		mg-P/L
BFK0547-BS2	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.310		mg-P/L
BFK0547-BS3	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.308		mg-P/L
17K0068-02	WUFF-OUT	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0640		mg-P/L
BFK0548-BLK2	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BLK3	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BLK4	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BS2	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.324		mg-P/L
BFK0548-BS3	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.324		mg-P/L
BFK0548-BS4	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.320		mg-P/L
17K0068-01	WUFF-IN	13-05605-000	Stormwater	11/03/2017	11/04/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.188		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

06 December 2017

Dylan Ahearn
Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle, WA 98121

RE: Hydro International

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)
17K0068

Associated SDG ID(s)
N/A

Amanda
Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical
Resources, Inc., ou=Client
Services, cn=Amanda
Volgardsen,
email=amandav@arilabs.com
Date: 2017.12.06 16:41:14 -08'00'

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.





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

17K0062

Chain of Custody Record

[illegible]

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)



Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 17K0068

Preliminary Examination Phase:

Project Name: Hydro International

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Tracking No: _____ NA

Were intact, properly signed and dated custody seals attached to the outside of to cooler? _____

YES NO

Were custody papers included with the cooler? _____

YES NO

Were custody papers properly filled out (ink, signed, etc.) _____

YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time: _____

5.2 5.8 5.9 5.8

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D005206

Cooler Accepted by: VS (AV)

Date: 11/4/17

Time: 755

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? _____

YES NO

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? _____

NA YES NO

Were all bottles sealed in individual plastic bags? _____

YES NO

Did all bottles arrive in good condition (unbroken)? _____

YES NO

Were all bottle labels complete and legible? _____

YES NO

Did the number of containers listed on COC match with the number of containers received? _____

YES NO

Did all bottle labels and tags agree with custody papers? _____

YES NO

Were all bottles used correct for the requested analyses? _____

YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...

NA YES NO

Were all VOC vials free of air bubbles? _____

NA YES NO

Was sufficient amount of sample sent in each bottle? _____

YES NO

Date VOC Trip Blank was made at ARI: _____

NA

Was Sample Split by ARI: YES

Date/Time: 11/4/17 1110

Equipment: Churn

Split by: AV

Samples Logged by: AV

Date: 11/4/17

Time: 1150

**** Notify Project Manager of discrepancies or concerns ****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____

Small Air Bubbles 	Peabubbles 	LARGE Air Bubbles 	Small → "sm" (< 2 mm) Peabubbles → "pb" (2 to < 4 mm) Large → "lg" (4 to < 6 mm) Headspace → "hs" (> 6 mm)
------------------------------	-----------------------	------------------------------	---



WORK ORDER

17K0068

Client: Herrera Environmental Consultants


Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
17K0068-01 A	HDPE NM, 1000 mL	
17K0068-01 B	HDPE NM, 1000 mL	
17K0068-01 C	HDPE NM, 1000 mL	
17K0068-01 D	HDPE NM, 500 mL, 1:1 HNO ₃	PASS
17K0068-01 E	Small OJ, 500 mL	
17K0068-01 F	Small OJ, 500 mL, 9N H ₂ SO ₄	PASS
17K0068-02 A	HDPE NM, 1000 mL	
17K0068-02 B	HDPE NM, 1000 mL	
17K0068-02 C	HDPE NM, 1000 mL	
17K0068-02 D	HDPE NM, 500 mL, 1:1 HNO ₃	PASS
17K0068-02 E	Small OJ, 500 mL	
17K0068-02 F	Small OJ, 500 mL, 9N H ₂ SO ₄	PASS
17K0068-03 A	HDPE NM, 1000 mL	
17K0068-03 B	HDPE NM, 1000 mL	
17K0068-03 C	HDPE NM, 1000 mL	
17K0068-03 D	HDPE NM, 500 mL, 1:1 HNO ₃	PASS
17K0068-03 E	Small OJ, 500 mL	
17K0068-03 F	Small OJ, 500 mL, 9N H ₂ SO ₄	PASS
17K0068-04 A	HDPE NM, 500 mL	Fail
17K0068-05 A	HDPE NM, 500 mL	Fail
17K0068-06 A	HDPE NM, 500 mL	Fail


Preservation Confirmed By


Date

Reviewed By

Date

Page 4 of 6

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17K0068)
Project #: 16T001-035
Client : Analytical Resources, Inc.
Source: Multiple
MTC Sample#: Multiple

Date Received: November 8, 2017
Sampled By: Others
Date Reported: November 30, 2017
Tested By: B. Goble

CASE NARRATIVE

1. Two samples were submitted for sediment concentration by ASTM D3977, Method C.
2. The coarse material was screened over a No. 230 sieve.
3. The suspended solids are reported in mg/L.
4. The data is provided in a summary table.
5. There were no other noted anomalies in this project.

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by: 

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980
Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974
Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17K0068)

Client: Analytical Resources, Inc.

Project #: 16T001-035

Date Received: November 8, 2017

Sampled by: Others

Date Tested: November 9, 2017

Tested by: B. Goble

Suspended Sediment Concentration ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC ($>63\mu\text{m}$) (mg/L)	Fine Fraction SSC ($<63\mu\text{m}$) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	T17-1606	11/3/2017	36.0	8.2	44.2
WUFF-OUT	T17-1607	11/3/2017	1.7	5.3	7.0

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980

Regional Offices: Olympia ~ 360.534.9777

Bellingham ~ 360.647.6111

Silverdale ~ 360.698.6787

Tukwila ~ 206.241.1974

Visit our website: www.mtc-inc.net



ETS

Environmental Technical Services

975 Transport Way, Suite 2
Petaluma, CA 94954
(707) 778-9605/FAX 778-9612
e-mail: entech@pacbell.net

-Soil, Water & Air Testing & Monitoring
-Analytical Labs
-Technical Support

**Serving people and the environment
so that both benefit.**

COMPANY: Analytical Resources, Inc., 4611 S. 134 th Place, Suite 100, Tukwila, WA 98168	ANALYST(S)	SUPERVISOR
ATTN: Amanda Volgardsen	S. Santos	D. Jacobson
JOB: Hydro International Up-Flo Filter	L. Quijano	LAB DIRECTOR
SITE: Oregon-Washington	11/3/2017 11/7/2017 11/15/2017	G.S. Conrad, PhD

PARTICLE SIZE DISTRIBUTION (PSD) ANALYSIS & REPORT – 5 PART

LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	SUSPENDED SOLIDS mg/l @ ≥500 μ	SUSPENDED SOLIDS mg/l @ 125 μ	SUSPENDED SOLIDS mg/l @ 63 μ	SUSPENDED SOLIDS mg/l @ 32 μ	SUSPENDED SOLIDS mg/l @ 4 μ	SUSPENDED SOLIDS mg/l @ 1 μ	SUSPENDED SEDIMENT CONC TSS mg/l
07557-1	HI-31HEC/RW	WUFF-IN	2.5	10.5	11.5		5.1	12.9	40.0
	17K0068-01	A/B	5.9%	24.7%	27.1%		12.0%	30.4%	
						Total SSC by Summation →		42.5	
07557-2	HI-32HEC/RW	WUFF-OUT	0.0	1.0	0.5		0.0	8.5	9.0
	17K0068-02	A/B	0.0%	10.0%	5.0%		0.0%	85.0%	
						Total SSC by Summation →		10.0	
			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
						Total SSC by Summation →		0.0	
			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
						Total SSC by Summation →		0.0	
LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	Water pH -log[H ⁺]	ECw [Spec Cond] μS/cm	COLOR, TRUE PtCo Units	COLOR APPARENT PtCo Units	TOTAL IRON Fe (diss.) mg/l	TOTAL VOLATILE SUSPENDED SOLIDS (TVSS) mg/l	

COMMENTS

The matrix has a very low concentration of TSS particles amounting to only about 40 ppm in the input sample; and the output sample is extremely low at 9-10 ppm. For the -IN & -OUT pair of samples, the overall reduction averaged right at 77% (i.e., TSS by summation vs analytical TSS). The specific fraction reductions going from coarsest to finest sizes are as follows: 100%, 90.5%, 95.7%, 100%, and 34.1%. Note that there was a 100% reduction in the 4-63 μ fraction which is somewhat unusual, although there was a 'dip' in mass in the input sample for this fraction. Notice that the distribution is essentially bi-modal with a mode in the mid-range and the other, slightly greater, mode was at the finest fraction (i.e., 1-4 μ class). This sort of distribution seems to be very unusual. The RPDs are essentially excellent as follows: ±3.0%, and ±5.3%.

\\ NOTES: Tests were done according to methodology as per Association of Testing Materials (ASTM): Suspended Sediment Concentration – Modified ASTM D3977 (Practice for Determining Suspended-Sediment Concentration in Water Samples). Standard Methods is followed for the other tests: Color - 2120 C; Spec Cond. (ECw) - 2510 B; Iron - 3500-Fe B; pH - 4500-H+ B; TRPH - 5520 C.



Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	17K0068-01	Water	03-Nov-2017 16:20	04-Nov-2017 07:55
WUFF-OUT	17K0068-02	Water	03-Nov-2017 16:20	04-Nov-2017 07:55
WUFF-IN QA	17K0068-03	Water	03-Nov-2017 16:20	04-Nov-2017 07:55
WUFF-IN	17K0068-04	Water	03-Nov-2017 16:20	04-Nov-2017 07:55
WUFF-OUT	17K0068-05	Water	03-Nov-2017 16:20	04-Nov-2017 07:55



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

Case Narrative

Sample receipt

Samples as listed on the preceding page were received November 4, 2017 under ARI workorder 17K0068. For details regarding sample receipt, please refer to the Cooler Receipt Form. The TSS, TVSS and PSD analysis were subcontracted to ETS Labs. The SSC analysis was subcontracted to MTC Labs.

Total Hardness - EPA Method 6010C

The samples were digested and analyzed within the recommended holding times.

The method blank was clean at the reporting limits.

The LCS percent recoveries were within control limits.

A matrix spike and duplicate were prepared in conjunction with sample WUFF-IN. The matrix spike percent recoveries and duplicate RPD were within QC limits.

Total and Dissolved Metals - EPA Method 200.8

The samples were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.

Wet Chemistry (O-Phos, T-Phos)

The samples were prepared and analyzed within the recommended holding times.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.



Herrera Environmental Consultants
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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

WUFF-IN
17K0068-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 11/03/2017 16:20

Instrument: ICPMS2

Analyzed: 16-Nov-2017 21:05

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0234 Sample Size: 25 mL
Prepared: 09-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	26.8	ug/L	
Zinc	7440-66-6	1	4.00	112	ug/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

WUFF-IN
17K0068-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/03/2017 16:20
Analyzed: 15-Nov-2017 18:17

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0177 Sample Size: 25 mL
Prepared: 07-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	18.9	mg/L	
Magnesium	7439-95-4	1	0.0500	6.02	mg/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

WUFF-IN
17K0068-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-2

Sampled: 11/03/2017 16:20
Analyzed: 04-Nov-2017 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFK0122 Sample Size: 50 mL
Prepared: 04-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0220	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFK0548 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.188	mg-P/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

WUFF-IN
17K0068-01 (Water)

Calculation

Method: SM 2340 B-97
Instrument: [CALC]

Sampled: 11/03/2017 16:20
Analyzed: 15-Nov-2017 18:17

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 07-Nov-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	72.1	mg/L	



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Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

Analysis by: Materials Testing & Consulting, Inc. (Tukwila)

WUFF-IN

17K0068-01 (Water)

*** DEFAULT GENERAL METHOD ***

Method: ASTM D3977

Sampled: 11/03/2017 16:20

Instrument: MT&C

Analyzed: 09-Nov-2017 00:00

Sample Preparation: Preparation Method: No Prep Geo
Preparation Batch: B110917
Prepared: 09-Nov-2017

Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
> 63 μm	SC_>63	1	0.1	36.01	mg/L	
< 63 μm	SC_<63	1	0.1	8.20	mg/L	
Total SSC	SC_TOTAL	1	0.1	44.21	mg/L	



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2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

Analysis by: Materials Testing & Consulting, Inc. (Tukwila)

WUFF-OUT

17K0068-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 11/03/2017 16:20

Instrument: ICPMS2

Analyzed: 16-Nov-2017 21:10

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFK0234 Sample Size: 25 mL
Prepared: 09-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	18.9	ug/L	
Zinc	7440-66-6	1	4.00	53.2	ug/L	



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Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

WUFF-OUT
17K0068-02 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/03/2017 16:20
Analyzed: 15-Nov-2017 17:53

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0177 Sample Size: 25 mL
Prepared: 07-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	18.8	mg/L	
Magnesium	7439-95-4	1	0.0500	5.45	mg/L	



Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

WUFF-OUT
17K0068-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-2

Sampled: 11/03/2017 16:20
Analyzed: 04-Nov-2017 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFK0122 Sample Size: 50 mL
Prepared: 04-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0210	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-5 Persulfate
Preparation Batch: BFK0547 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0640	mg-P/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

WUFF-OUT
17K0068-02 (Water)

Calculation

Method: SM 2340 B-97
Instrument: [CALC]

Sampled: 11/03/2017 16:20
Analyzed: 15-Nov-2017 17:53

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 07-Nov-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	69.3	mg/L	



Herrera Environmental Consultants
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Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

Analysis by: Materials Testing & Consulting, Inc. (Tukwila)

WUFF-OUT

17K0068-02 (Water)

*** DEFAULT GENERAL METHOD ***

Method: ASTM D3977

Sampled: 11/03/2017 16:20

Instrument: MT&C

Analyzed: 09-Nov-2017 00:00

Sample Preparation: Preparation Method: No Prep Geo
Preparation Batch: B110917
Prepared: 09-Nov-2017

Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
> 63 µm	SC_>63	1	0.1	1.72	mg/L	
< 63 µm	SC_<63	1	0.1	5.26	mg/L	
Total SSC	SC_TOTAL	1	0.1	6.98	mg/L	



Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

Analysis by: Materials Testing & Consulting, Inc. (Tukwila)

WUFF-IN

17K0068-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 11/03/2017 16:20

Instrument: ICPMS2

Analyzed: 15-Nov-2017 02:14

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFK0282 Sample Size: 25 mL
Prepared: 10-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	12.2	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	36.5	ug/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
06-Dec-2017 16:38

WUFF-OUT
17K0068-05 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/03/2017 16:20
Analyzed: 15-Nov-2017 02:19

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0282 Sample Size: 25 mL
Prepared: 10-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	14.1	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	36.2	ug/L	



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Reported:
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Metals and Metallic Compounds - Quality Control

Batch BFK0177 - TWC EPA 3010A

Instrument: ICP2 Analyst: TCH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0177-BLK1)		Prepared: 07-Nov-2017 Analyzed: 15-Nov-2017 17:49								
Calcium	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
LCS (BFK0177-BS1)		Prepared: 07-Nov-2017 Analyzed: 15-Nov-2017 18:25								
Calcium	10.2	0.0500	mg/L	10.0		102	80-120			
Magnesium	11.0	0.0500	mg/L	10.0		110	80-120			
Duplicate (BFK0177-DUP1)		Source: 17K0068-01		Prepared: 07-Nov-2017 Analyzed: 15-Nov-2017 18:13						
Calcium	18.6	0.0500	mg/L		18.9			1.62	20	
Magnesium	5.85	0.0500	mg/L		6.02			2.83	20	
Matrix Spike (BFK0177-MS1)		Source: 17K0068-01		Prepared: 07-Nov-2017 Analyzed: 15-Nov-2017 18:21						
Calcium	29.5	0.0500	mg/L	10.0	18.9	106	75-125			
Magnesium	17.1	0.0500	mg/L	10.0	6.02	111	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.



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Reported:
06-Dec-2017 16:38

Metals and Metallic Compounds - Quality Control

Batch BFK0234 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0234-BLK1)			Prepared: 09-Nov-2017 Analyzed: 16-Nov-2017 20:23								
Copper	63	ND	0.500	ug/L							U
Copper	65	ND	0.500	ug/L							U
Zinc	66	ND	4.00	ug/L							U
Zinc	67	ND	4.00	ug/L							U
LCS (BFK0234-BS1)			Prepared: 09-Nov-2017 Analyzed: 16-Nov-2017 20:44								
Copper	63	27.2	0.500	ug/L	25.0		109	80-120			
Copper	65	27.4	0.500	ug/L	25.0		110	80-120			
Zinc	67	93.2	4.00	ug/L	80.0		117	80-120			
LCS (BFK0234-BS2)			Prepared: 09-Nov-2017 Analyzed: 17-Nov-2017 16:44								
Copper	63	26.1	0.500	ug/L	25.0		104	80-120			
Copper	65	26.1	0.500	ug/L	25.0		104	80-120			
Zinc	66	93.2	4.00	ug/L	80.0		116	80-120			
Zinc	67	89.4	4.00	ug/L	80.0		112	80-120			



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Reported:
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Metals and Metallic Compounds (dissolved) - Quality Control

Batch BFK0282 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0282-BLK1)			Prepared: 10-Nov-2017 Analyzed: 10-Nov-2017 19:51								
Copper, Dissolved	63	ND	0.500	ug/L							U
Copper, Dissolved	65	ND	0.500	ug/L							U
Zinc, Dissolved	66	ND	4.00	ug/L							U
Zinc, Dissolved	67	ND	4.00	ug/L							U
LCS (BFK0282-BS1)			Prepared: 10-Nov-2017 Analyzed: 10-Nov-2017 20:11								
Copper, Dissolved	63	28.2	0.500	ug/L	25.0		113	80-120			
Copper, Dissolved	65	28.4	0.500	ug/L	25.0		114	80-120			
Zinc, Dissolved	66	94.7	4.00	ug/L	80.0		118	80-120			
Zinc, Dissolved	67	86.6	4.00	ug/L	80.0		108	80-120			



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Reported:
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Wet Chemistry - Quality Control

Batch BFK0122 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0122-BLK1)									
					Prepared: 04-Nov-2017 Analyzed: 04-Nov-2017 14:28				
Orthophosphorus	ND	0.0040	mg-P/L						U
LCS (BFK0122-BS1)									
					Prepared: 04-Nov-2017 Analyzed: 04-Nov-2017 14:29				
Orthophosphorus	0.153	0.0040	mg-P/L	0.150		102 90-110			



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Reported:
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Wet Chemistry - Quality Control

Batch BFK0547 - SM 4500-P B-5 Persulfate

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0547-BLK1) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:25										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0547-BLK2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:34										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0547-BLK3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:52										
Total Phosphorus	ND	0.0080	mg-P/L							U
LCS (BFK0547-BS1) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:26										
Total Phosphorus	0.306	0.0080	mg-P/L	0.300		102	90-110			
DL (BFK0547-BS2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:34										
Total Phosphorus	0.310	0.0080	mg-P/L	0.300		103	90-110			
LCS (BFK0547-BS3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:52										
Total Phosphorus	0.308	0.0080	mg-P/L	0.300		103	90-110			



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Reported:
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Wet Chemistry - Quality Control

Batch BFK0548 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0548-BLK2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 16:50										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0548-BLK3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:08										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0548-BLK4) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:22										
Total Phosphorus	ND	0.0080	mg-P/L							U
DL (BFK0548-BS2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 16:52										
Total Phosphorus	0.324	0.0080	mg-P/L	0.300		108	90-110			
LCS (BFK0548-BS3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:10										
Total Phosphorus	0.324	0.0080	mg-P/L	0.300		108	90-110			
LCS (BFK0548-BS4) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:22										
Total Phosphorus	0.320	0.0080	mg-P/L	0.300		107	90-110			



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Reported:
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Certified Analyses included in this Report

Analyte	Certifications
EPA 200.8 in Water	
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
EPA 6010C in Water	
Calcium	WADOE,NELAP,DoD-ELAP
Magnesium	WADOE,NELAP,DoD-ELAP
SM 4500-P E-99 in Water	
Orthophosphorus	WADOE,NELAP
Total Phosphorus	WADOE,NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/11/2018
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
J	Estimated concentration value detected below the reporting limit.
D	The reported value is from a dilution
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

November 4, 2017

Data_17K0089

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17K0089-01	WUFF-IN	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/07/2017	11/15/2017	SM 2340 B-97		Hardness	51.8		mg/L
17K0089-02	WUFF-IN DUP	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/07/2017	11/15/2017	SM 2340 B-97		Hardness	50.4		mg/L
17K0089-03	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/07/2017	11/15/2017	SM 2340 B-97		Hardness	49.8		mg/L
17K0089-01	WUFF-IN	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/09/2017	ASTM D3977	SC_>63	> 63 µm	13.55		mg/L
17K0089-02	WUFF-IN DUP	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/09/2017	ASTM D3977	SC_>63	> 63 µm	8.16		mg/L
17K0089-03	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/09/2017	ASTM D3977	SC_>63	> 63 µm	0.43		mg/L
17K0089-01	WUFF-IN	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/09/2017	ASTM D3977	SC_<63	< 63 µm	6.95		mg/L
17K0089-02	WUFF-IN DUP	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/09/2017	ASTM D3977	SC_<63	< 63 µm	7.80		mg/L
17K0089-03	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/09/2017	ASTM D3977	SC_<63	< 63 µm	2.70		mg/L
17K0089-01	WUFF-IN	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/09/2017	ASTM D3977	SC_TOTAL	Total SSC	20.5		mg/L
17K0089-02	WUFF-IN DUP	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/09/2017	ASTM D3977	SC_TOTAL	Total SSC	15.96		mg/L
17K0089-03	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/09/2017	ASTM D3977	SC_TOTAL	Total SSC	3.13		mg/L
BFK0161-BLK1	Blank	13-05605-000	Water			11/06/2017	11/06/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFK0161-BS1	LCS	13-05605-000	Water			11/06/2017	11/06/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.155		mg-P/L
BFK0161-DUP1	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/06/2017	11/06/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0150		mg-P/L
BFK0161-MS1	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/06/2017	11/06/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.220		mg-P/L
17K0089-01	WUFF-IN	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/06/2017	11/06/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0250		mg-P/L
17K0089-02	WUFF-IN DUP	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/06/2017	11/06/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0200		mg-P/L
17K0089-03	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/06/2017	11/06/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0130		mg-P/L
BFK0177-BLK1	Blank	13-05605-000	Water			11/07/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BFK0177-BS1	LCS	13-05605-000	Water			11/07/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	10.2		mg/L
17K0089-01	WUFF-IN	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/07/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	14.0		mg/L
17K0089-02	WUFF-IN DUP	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/07/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	13.6		mg/L
17K0089-03	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/07/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	13.6		mg/L
BFK0177-BLK1	Blank	13-05605-000	Water			11/07/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BFK0177-BS1	LCS	13-05605-000	Water			11/07/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	11.0		mg/L
17K0089-01	WUFF-IN	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/07/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	4.08		mg/L
17K0089-02	WUFF-IN DUP	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/07/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	3.99		mg/L
17K0089-03	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/07/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	3.87		mg/L
BFK0234-BLK1	Blank	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0234-BS1	LCS	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	27.2		ug/L
BFK0234-BS2	LCS	13-05605-000	Water			11/09/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	26.1		ug/L
17K0089-01	WUFF-IN	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	16.3		ug/L
17K0089-02	WUFF-IN DUP	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	16.5		ug/L
17K0089-03	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	11.2		ug/L
BFK0234-BLK1	Blank	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0234-BS1	LCS	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	27.4		ug/L
BFK0234-BS2	LCS	13-05605-000	Water			11/09/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	26.1		ug/L
BFK0234-BLK1	Blank	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0234-BS2	LCS	13-05605-000	Water			11/09/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	93.2		ug/L
17K0089-01	WUFF-IN	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	57.3		ug/L
17K0089-02	WUFF-IN DUP	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	57.8		ug/L
17K0089-03	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/09/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	36.5		ug/L
BFK0234-BLK1	Blank	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0234-BS1	LCS	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	93.2		ug/L
BFK0234-BS2	LCS	13-05605-000	Water			11/09/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	89.4		ug/L
BFK0282-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0282-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-50-8	Copper	28.2		ug/L
17K0089-04	WUFF-IN	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	8.47		ug/L

Data_17K0089

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17K0089-05	WUFF-IN DUP	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	8.14		ug/L
17K0089-06	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	8.79		ug/L
BFK0282-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0282-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-50-8	Copper	28.4		ug/L
BFK0282-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0282-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	94.7		ug/L
17K0089-04	WUFF-IN	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	25.7		ug/L
17K0089-05	WUFF-IN DUP	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	25.1		ug/L
17K0089-06	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	27.2		ug/L
BFK0282-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0282-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	86.6		ug/L
BFK0547-BLK1	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0547-BLK2	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0547-BLK3	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0547-BS1	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.306		mg-P/L
BFK0547-BS2	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.310		mg-P/L
BFK0547-BS3	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.308		mg-P/L
17K0089-03	WUFF-OUT	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0280		mg-P/L
BFK0548-BLK2	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BLK3	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BLK4	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BS2	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.324		mg-P/L
BFK0548-BS3	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.324		mg-P/L
BFK0548-BS4	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.320		mg-P/L
17K0089-01	WUFF-IN	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0440		mg-P/L
17K0089-02	WUFF-IN DUP	13-05605-000	Surface Water	11/06/2017	11/06/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0540		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

30 November 2017

Dylan Ahearn
Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle, WA 98121

RE: Hydro International

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)
17K0089

Associated SDG ID(s)
N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.





17K0089

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

Chain of Custody Record

Project Name: Hydro International Up-flo Filter			Project Number: 13-05605-000			Client: Herrera Environmental			Analyses Requested										Lab ID No.
Report To: Dylan Ahearn			Copy To:			Total Suspended Solids - SM 2540D	Suspended Sediment Concentration - SMD3977	Total volatile Suspended solids - SM2540-E	Particle size Distribution - ASTM 3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Hardness as CaCO3-SM 2340B	Copper, dissolved - EPA 200.8	Copper, total - EPA 200.8	Zinc, dissolved - EPA 200.8	Zinc, total - EPA 200.8			
Sampled By: M Mullen, K Wingrove			Delivery Method: ice cooler, hand delivered																
Laboratory: Analytical Resources Inc.			Requested Completion Date:														Total No. of Containers: 2		
Lab Use:			Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)														
Sample ID			Date	Time															
WUFF-IN			11-6-17	9:30	C	N	SW	x	X	x	X	X	X	X	X	X	X		
WUFF-OUT			11-6-17	9:30	C	N	SW	x	X	X	X	X	X	X	X	X	X		
Comments/Special Instructions: Send 1 liter to ETS, Inc 975 Transport Way, Suite 2, Petaluma, CA for PSD, TSS, and TVSS. PSD to be run for >500, 500-125, 125-62.5, 62.5-4, <4.																			
Relinquished by (Name/CO/) Meghan Mullen/Herrera			Signature Meghan Mullen			Date/Time 11-6-17 11:25			Received By (Name/CO) Brandon Fisk/ARI			Signature Brandon Fisk			Date/Time 11/6/17 11:25				
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)



WORK ORDER

17K0089

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: [none]

Preservation Confirmation

Container ID	Container Type	pH
17K0089-01 A	Large OJ, 1000 mL	
17K0089-01 B	Large OJ, 1000 mL	
17K0089-01 C	Large OJ, 1000 mL	
17K0089-01 D	Small OJ, 500 mL, 9N H ₂ SO ₄	< 2 pass
17K0089-01 E	Small OJ, 500 mL	
17K0089-01 F	HDPE NM, 500 mL, 1:1 HNO ₃	< 2 pass
17K0089-02 A	Large OJ, 1000 mL	
17K0089-02 B	Large OJ, 1000 mL	
17K0089-02 C	Large OJ, 1000 mL	
17K0089-02 D	Small OJ, 500 mL, 9N H ₂ SO ₄	< 2 pass
17K0089-02 E	Small OJ, 500 mL	
17K0089-02 F	HDPE NM, 500 mL, 1:1 HNO ₃	< 2 pass
17K0089-03 A	Large OJ, 1000 mL	
17K0089-03 B	Large OJ, 1000 mL	
17K0089-03 C	Large OJ, 1000 mL	
17K0089-03 D	Small OJ, 500 mL, 9N H ₂ SO ₄	< 2 pass
17K0089-03 E	Small OJ, 500 mL	
17K0089-03 F	HDPE NM, 500 mL, 1:1 HNO ₃	< 2 pass
17K0089-04 A	HDPE NM, 500 mL	> 2 fail
17K0089-05 A	HDPE NM, 500 mL	> 2 fail
17K0089-06 A	HDPE NM, 500 mL	> 2 fail

BF
Preservation Confirmed By

11/3/17
Date



Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 17K0089

Preliminary Examination Phase:

Project Name: Hydro International

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Tracking No: _____ NA

Were intact, properly signed and dated custody seals attached to the outside of to cooler? _____

YES ☒ NO ☒

Were custody papers included with the cooler? _____

YES ☒ NO ☐

Were custody papers properly filled out (ink, signed, etc.) _____

YES ☒ NO ☐

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time: _____

6.8

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 0005206

Cooler Accepted by: BF

Date: 11/6/17

Time: 1125

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? _____

YES ☐ NO ☒

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? _____

NA ☒ YES ☒ NO ☐

Were all bottles sealed in individual plastic bags? _____

YES ☒ NO ☒

Did all bottles arrive in good condition (unbroken)? _____

YES ☒ NO ☐

Were all bottle labels complete and legible? _____

YES ☒ NO ☐

Did the number of containers listed on COC match with the number of containers received? _____

YES ☒ NO ☐

Did all bottle labels and tags agree with custody papers? _____

YES ☒ NO ☐

Were all bottles used correct for the requested analyses? _____

YES ☒ NO ☐

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...

NA ☒ YES ☒ NO ☐

Were all VOC vials free of air bubbles? _____

NA ☒ YES ☒ NO ☐

Was sufficient amount of sample sent in each bottle? _____

YES ☒ NO ☐

Date VOC Trip Blank was made at ARI: _____

NA ☒

Was Sample Split by ARI: NA ☒

Date/Time: 1515 11/6/17

Equipment: churn-splitter

Split by: BF

Samples Logged by: BF

Date: 11/6/17

Time: 1517

**** Notify Project Manager of discrepancies or concerns ****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____

Small Air Bubbles <small>< 2mm</small> 	Peabubbles <small>2-4 mm</small> 	LARGE Air Bubbles <small>> 4 mm</small> 	Small → "sm" (< 2 mm) Peabubbles → "pb" (2 to < 4 mm) Large → "lg" (4 to < 6 mm) Headspace → "hs" (> 6 mm)
---	--	--	---



17K0089

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

Chain of Custody Record

Project Name: Hydro International Up-flo Filter		Project Number: 13-05605-000		Client: Herrera Environmental		Analyses Requested											
Report To: Dylan Ahearn				Copy To:		Total Suspended Solids - SM 2540D	Suspended Sediment Concentration - SMD3977	Total volatile Suspended solids - SM2540-E	Particle size Distribution - ASTM 3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Hardness as CaCO3-SM 2340B	Copper, dissolved - EPA 200.8	Copper, total - EPA 200.8	Zinc, dissolved - EPA 200.8	Zinc, total - EPA 200.8	Lab ID No.
Sampled By: M Mullen, K Wingrove				Delivery Method: ice cooler, hand delivered													
Laboratory: Analytical Resources Inc.		Requested Completion Date:		Total No. of Containers: 2													
Lab Use:		Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)													
Sample ID	Date	Time															
WUFF-IN	11.6.17	9:30	C	N	SW	x	x	x	x	x	x	x	x	x	x	x	
WUFF-OUT	11.6.17	9:30	C	N	SW	x	x	x	x	x	x	x	x	x	x	x	
WUFF-IN DUP	11/6/17	930	C	N	SW	x	x	x	y	x	x	x	y	x	x	x	
Comments/Special Instructions: Send 1 liter to ETS, Inc 975 Transport Way, Suite 2, Petaluma, CA for PSD, TSS, and TVSS. PSD to be run for >500, 500-125, 125-62.5, 62.5-4, <4.																	
Relinquished by (Name/CO/ Meghan Mullen/Herrera		Signature Meghan Mullen		Date/Time 11.6.17 11:25		Received By (Name/CO) Braydon Fisk/ARI		Signature Braydon Fisk		Date/Time 11/6/17 11:25							
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)



Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 17K0089

Preliminary Examination Phase:

Project Name: Hydro International

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Tracking No: _____ NA

Were intact, properly signed and dated custody seals attached to the outside of to cooler?

YES ☐ NO ☒

Were custody papers included with the cooler?

YES ☒ NO ☐

Were custody papers properly filled out (ink, signed, etc.)

YES ☒ NO ☐

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time: _____

6.8

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 0005206

Cooler Accepted by: BF

Date: 11/6/17

Time: 1125

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?

YES ☐ NO ☒

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)?

NA ☒ YES ☐ NO ☐

Were all bottles sealed in individual plastic bags?

YES ☒ NO ☐

Did all bottles arrive in good condition (unbroken)?

YES ☒ NO ☐

Were all bottle labels complete and legible?

YES ☒ NO ☐

Did the number of containers listed on COC match with the number of containers received?

YES ☒ NO ☐

Did all bottle labels and tags agree with custody papers?

YES ☒ NO ☐

Were all bottles used correct for the requested analyses?

YES ☒ NO ☐

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...

NA ☒ YES ☐ NO ☐

Were all VOC vials free of air bubbles?

NA ☒ YES ☐ NO ☐

Was sufficient amount of sample sent in each bottle?

YES ☒ NO ☐

Date VOC Trip Blank was made at ARI:

NA ☒

Was Sample Split by ARI: NA ☒

Date/Time: 1515 11/6/17

Equipment: churn-splitter

Split by: BF

Samples Logged by: BF

Date: 11/6/17

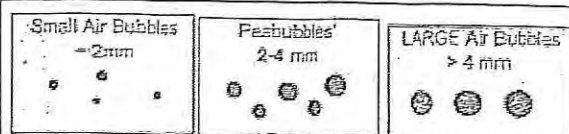
Time: 1517

**** Notify Project Manager of discrepancies or concerns ****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____



Small → "sm" (<2 mm)

Peabubbles → "pb" (2 to <4 mm)

Large → "lg" (4 to <6 mm)

Headspace → "hs" (>6 mm)



ETS

Environmental Technical Services

-Soil, Water & Air Testing & Monitoring
-Analytical Labs
-Technical Support

975 Transport Way, Suite 2
Petaluma, CA 94954
(707) 778-9605/FAX 778-9612
e-mail: entech@pacbell.net

**Serving people and the environment
so that both benefit.**

COMPANY: Analytical Resources, Inc., 4611 S. 134 th Place, Suite 100, Tukwila, WA 98168						ANALYST(S) S. Santos L. Quijano	SUPERVISOR D. Jacobson LAB DIRECTOR G. Conrad, PhD
ATTN: Amanda Volgardsen			DATE COLLECTED	DATE RECEIVED	DATE COMPLETED		
JOB: Hydro International Up-Flo Filter			11/6/2017	11/8/2017	11/20/2017		
SITE: Oregon-Washington							

PARTICLE SIZE DISTRIBUTION (PSD) ANALYSIS & REPORT – 5 PART

LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	SUSPENDED SOLIDS mg/l @ ≥500 μ	SUSPENDED SOLIDS mg/l @ 125 μ	SUSPENDED SOLIDS mg/l @ 63 μ	SUSPENDED SOLIDS mg/l @ 32 μ	SUSPENDED SOLIDS mg/l @ 4 μ	SUSPENDED SOLIDS mg/l @ 1 μ	SUSPENDED SEDIMENT CONC TSS mg/l
07559-1	HI-33HEC/RW	WUFF-IN	3.0	2.5	1.5		9.2	2.3	17.0
	17K0089-01 A/B		16.2%	13.5%	8.1%		49.7%	12.4%	
						Total SSC by Summation →		18.5	
07559-2	HI-34HEC/RW	WUFF-IN Dup	2.5	3.0	1.0		9.8	1.2	17.0
	17K0089-02 A/B		14.3%	17.1%	5.7%		56.0%	6.9%	
						Total SSC by Summation →		17.5	
07559-3	HI-35HEC/RW	WUFF-OUT	0.0	0.0	0.0		1.1	1.1	2.0
	17K0089-03 A/B		0.0%	0.0%	0.0%		#DIV/0!	50.0%	
						Total SSC by Summation →		2.2	
			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
						Total SSC by Summation →		0.0	
LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	Water pH -log[H ⁺]	ECw [Spec Cond] μS/cm	COLOR, TRUE PtCo Units	COLOR APPARENT PtCo Units	TOTAL IRON Fe (diss.) mg/l	TOTAL VOLATILE SUSPENDED SOLIDS (TVSS) mg/l	

COMMENTS

The matrix has a very low concentration of TSS particles amounting to only <20 ppm in the input samples; and the output sample is extremely low at just 2 ppm. For the -IN & -OUT pairs of samples, overall reductions averaged just over 88% in both (i.e., TSS by summation vs analytical TSS). The specific fraction reductions going from coarsest to finest sizes are as follows: 100%, 100%, 100%, 88.0%, and 52.2%. The specific reductions using the duplicate input vary in the last two size fractions as follows: 88.8% and 8.3%. So, while the 4-63 μ class is not much different, there is a very significant difference in the 1-4 μ class. While it may be best to take the average of these two data, i.e., 30.25%, as the actual reduction, this may or may not be the best approach in this case. Regardless of how this particular fraction reduction is viewed, the absolute numerical difference in mass is very small. Also, overall reductions for the two, i.e., original and duplicate, are almost identical varying by only about 0.1% (88.1% vs 88.2%)! Notice that the distribution is uni-modal in this case with the mode at the 4-63 μ fraction. The RPDs are all excellent as follows: ±4.3%, ±1.5%, and ±4.8%.

\\ NOTES: Tests were done according to methodology as per Association of Testing Materials (ASTM): Suspended Sediment Concentration – Modified ASTM D3977 (Practice for Determining Suspended-Sediment Concentration in Water Samples). Standard Methods is followed for the other tests: Color - 2120 C; Spec Cond. (ECw) - 2510 B; Iron - 3500-Fe B; pH - 4500-H+ B; TRPH - 5520 C.

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17K0089)
Project #: 16T001-035
Client : Analytical Resources, Inc.
Source: Multiple
MTC Sample#: Multiple

Date Received: November 8, 2017
Sampled By: Others
Date Reported: November 30, 2017
Tested By: B. Goble

CASE NARRATIVE

1. Three samples were submitted for sediment concentration by ASTM D3977, Method C.
2. The coarse material was screened over a No. 230 sieve.
3. The suspended solids are reported in mg/L.
4. The data is provided in a summary table.
5. There were no other noted anomalies in this project.

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by: 

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980
Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6061 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974
Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17K0089)

Client: Analytical Resources, Inc.

Project #: 16T001-035

Date Received: November 8, 2017

Sampled by: Others

Date Tested: November 9, 2017

Tested by: B. Goble

Suspended Sediment Concentration ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC ($>63\mu\text{m}$) (mg/L)	FineFraction SSC ($<63\mu\text{m}$) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	T17-1603	11/6/2017	13.6	7.0	20.5
WUFF-IN DUP	T17-1604	11/6/2017	8.2	7.8	16.0
WUFF-OUT	T17-1605	11/6/2017	0.4	2.7	3.1

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by: 

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980

Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6061 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974
Visit our website: www.mtc-inc.net



Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
30-Nov-2017 15:53

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	17K0089-01	Water	06-Nov-2017 09:30	06-Nov-2017 11:25
WUFF-IN DUP	17K0089-02	Water	06-Nov-2017 09:30	06-Nov-2017 11:25
WUFF-OUT	17K0089-03	Water	06-Nov-2017 09:30	06-Nov-2017 11:25
WUFF-IN	17K0089-04	Water	06-Nov-2017 09:30	06-Nov-2017 11:25
WUFF-IN DUP	17K0089-05	Water	06-Nov-2017 09:30	06-Nov-2017 11:25
WUFF-OUT	17K0089-06	Water	06-Nov-2017 09:30	06-Nov-2017 11:25



Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
30-Nov-2017 15:53

Case Narrative

Sample receipt

Samples as listed on the preceding page were received November 06, 2017 under ARI workorder 17K0089. For details regarding sample receipt, please refer to the Cooler Receipt Form. The TSS, TVSS and PSD analysis were subcontracted to ETS Labs. The SSC analysis was subcontracted to MTC Labs.

Total Hardness - EPA Method 6010C

The samples were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank was clean at the reporting limits.

The LCS percent recoveries were within control limits.

Total and Dissolved Metals - EPA Method 200.8

The samples were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.

Wet Chemistry (O-Phos, T-Phos)

The samples were prepared and analyzed within the recommended holding times.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.

An O-Phos matrix spike and duplicate were prepared in conjunction with sample WUFF-OUT. The matrix spike percent recovery and duplicate RPD were within QC limits.



Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
30-Nov-2017 15:53

WUFF-IN
17K0089-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/06/2017 09:30
Analyzed: 17-Nov-2017 17:02

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0234 Sample Size: 25 mL
Prepared: 09-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	16.3	ug/L	
Zinc	7440-66-6	1	4.00	57.3	ug/L	



Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
30-Nov-2017 15:53

WUFF-IN
17K0089-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/06/2017 09:30
Analyzed: 15-Nov-2017 18:01

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0177 Sample Size: 25 mL
Prepared: 07-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	14.0	mg/L	
Magnesium	7439-95-4	1	0.0500	4.08	mg/L	



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WUFF-IN
17K0089-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-2

Sampled: 11/06/2017 09:30
Analyzed: 06-Nov-2017 17:44

Sample Preparation: Preparation Method: SM 5310 A-00, 0.45um filtration
Preparation Batch: BFK0161 Sample Size: 50 mL
Prepared: 06-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0250	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFK0548 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0440	mg-P/L	



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WUFF-IN
17K0089-01 (Water)

Calculation

Method: SM 2340 B-97
Instrument: [CALC]

Sampled: 11/06/2017 09:30
Analyzed: 15-Nov-2017 18:01

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 07-Nov-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	51.8	mg/L	



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Project Manager: Dylan Ahearn

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Analysis by: Materials Testing & Consulting, Inc. (Tukwila)

WUFF-IN

17K0089-01 (Water)

*** DEFAULT GENERAL METHOD ***

Method: ASTM D3977

Sampled: 11/06/2017 09:30

Instrument: MT&C

Analyzed: 09-Nov-2017 00:00

Sample Preparation: Preparation Method: No Prep Geo
Preparation Batch: B110917
Prepared: 09-Nov-2017

Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
> 63 μm	SC_>63	1	0.1	13.55	mg/L	
< 63 μm	SC_<63	1	0.1	6.95	mg/L	
Total SSC	SC_TOTAL	1	0.1	20.5	mg/L	



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Analysis by: Materials Testing & Consulting, Inc. (Tukwila)

WUFF-IN DUP
17K0089-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/06/2017 09:30
Analyzed: 17-Nov-2017 17:07

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFK0234 Sample Size: 25 mL
Prepared: 09-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	16.5	ug/L	
Zinc	7440-66-6	1	4.00	57.8	ug/L	



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WUFF-IN DUP
17K0089-02 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/06/2017 09:30
Analyzed: 15-Nov-2017 18:05

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0177 Sample Size: 25 mL
Prepared: 07-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	13.6	mg/L	
Magnesium	7439-95-4	1	0.0500	3.99	mg/L	



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WUFF-IN DUP
17K0089-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-2

Sampled: 11/06/2017 09:30
Analyzed: 06-Nov-2017 17:44

Sample Preparation: Preparation Method: SM 5310 A-00, 0.45um filtration
Preparation Batch: BFK0161 Sample Size: 50 mL
Prepared: 06-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0200	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFK0548 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0540	mg-P/L	



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WUFF-IN DUP
17K0089-02 (Water)

Calculation

Method: SM 2340 B-97
Instrument: [CALC]

Sampled: 11/06/2017 09:30
Analyzed: 15-Nov-2017 18:05

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 07-Nov-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	50.4	mg/L	



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Analysis by: Materials Testing & Consulting, Inc. (Tukwila)

WUFF-IN DUP

17K0089-02 (Water)

*** DEFAULT GENERAL METHOD ***

Method: ASTM D3977

Sampled: 11/06/2017 09:30

Instrument: MT&C

Analyzed: 09-Nov-2017 00:00

Sample Preparation: Preparation Method: No Prep Geo
Preparation Batch: B110917
Prepared: 09-Nov-2017

Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
> 63 μm	SC_>63	1	0.1	8.16	mg/L	
< 63 μm	SC_<63	1	0.1	7.80	mg/L	
Total SSC	SC_TOTAL	1	0.1	15.96	mg/L	



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Analysis by: Materials Testing & Consulting, Inc. (Tukwila)

WUFF-OUT

17K0089-03 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 11/06/2017 09:30

Instrument: ICPMS2

Analyzed: 17-Nov-2017 17:12

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFK0234 Sample Size: 25 mL
Prepared: 09-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	11.2	ug/L	
Zinc	7440-66-6	1	4.00	36.5	ug/L	



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WUFF-OUT
17K0089-03 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/06/2017 09:30
Analyzed: 15-Nov-2017 18:09

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0177 Sample Size: 25 mL
Prepared: 07-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	13.6	mg/L	
Magnesium	7439-95-4	1	0.0500	3.87	mg/L	



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WUFF-OUT
17K0089-03 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-2

Sampled: 11/06/2017 09:30
Analyzed: 06-Nov-2017 17:45

Sample Preparation: Preparation Method: SM 5310 A-00, 0.45um filtration
Preparation Batch: BFK0161 Sample Size: 50 mL
Prepared: 06-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0130	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-5 Persulfate
Preparation Batch: BFK0547 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0280	mg-P/L	



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WUFF-OUT
17K0089-03 (Water)

Calculation

Method: SM 2340 B-97
Instrument: [CALC]

Sampled: 11/06/2017 09:30
Analyzed: 15-Nov-2017 18:09

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 07-Nov-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	49.8	mg/L	



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Analysis by: Materials Testing & Consulting, Inc. (Tukwila)

WUFF-OUT

17K0089-03 (Water)

*** DEFAULT GENERAL METHOD ***

Method: ASTM D3977

Sampled: 11/06/2017 09:30

Instrument: MT&C

Analyzed: 09-Nov-2017 00:00

Sample Preparation: Preparation Method: No Prep Geo
Preparation Batch: B110917
Prepared: 09-Nov-2017

Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
> 63 µm	SC_>63	1	0.1	0.43	mg/L	
< 63 µm	SC_<63	1	0.1	2.70	mg/L	
Total SSC	SC_TOTAL	1	0.1	3.13	mg/L	



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Analysis by: Materials Testing & Consulting, Inc. (Tukwila)

WUFF-IN

17K0089-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 11/06/2017 09:30

Instrument: ICPMS2

Analyzed: 15-Nov-2017 02:24

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFK0282 Sample Size: 25 mL
Prepared: 10-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	8.47	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	25.7	ug/L	



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WUFF-IN DUP
17K0089-05 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 11/06/2017 09:30

Instrument: ICPMS2

Analyzed: 15-Nov-2017 02:29

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0282 Sample Size: 25 mL
Prepared: 10-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	8.14	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	25.1	ug/L	



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Reported:
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WUFF-OUT
17K0089-06 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/06/2017 09:30
Analyzed: 15-Nov-2017 02:34

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0282 Sample Size: 25 mL
Prepared: 10-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	8.79	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	27.2	ug/L	



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Reported:
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Metals and Metallic Compounds - Quality Control

Batch BFK0177 - TWC EPA 3010A

Instrument: ICP2 Analyst: TCH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0177-BLK1)										
					Prepared: 07-Nov-2017 Analyzed: 15-Nov-2017 17:49					
Calcium	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
LCS (BFK0177-BS1)										
					Prepared: 07-Nov-2017 Analyzed: 15-Nov-2017 18:25					
Calcium	10.2	0.0500	mg/L	10.0		102	80-120			
Magnesium	11.0	0.0500	mg/L	10.0		110	80-120			



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Metals and Metallic Compounds - Quality Control

Batch BFK0234 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0234-BLK1)			Prepared: 09-Nov-2017 Analyzed: 16-Nov-2017 20:23								
Copper	63	ND	0.500	ug/L							U
Copper	65	ND	0.500	ug/L							U
Zinc	66	ND	4.00	ug/L							U
Zinc	67	ND	4.00	ug/L							U
LCS (BFK0234-BS1)			Prepared: 09-Nov-2017 Analyzed: 16-Nov-2017 20:44								
Copper	63	27.2	0.500	ug/L	25.0		109	80-120			
Copper	65	27.4	0.500	ug/L	25.0		110	80-120			
Zinc	67	93.2	4.00	ug/L	80.0		117	80-120			
LCS (BFK0234-BS2)			Prepared: 09-Nov-2017 Analyzed: 17-Nov-2017 16:44								
Copper	63	26.1	0.500	ug/L	25.0		104	80-120			
Copper	65	26.1	0.500	ug/L	25.0		104	80-120			
Zinc	66	93.2	4.00	ug/L	80.0		116	80-120			
Zinc	67	89.4	4.00	ug/L	80.0		112	80-120			



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Reported:
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Metals and Metallic Compounds (dissolved) - Quality Control

Batch BFK0282 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0282-BLK1)			Prepared: 10-Nov-2017 Analyzed: 10-Nov-2017 19:51								
Copper, Dissolved	63	ND	0.500	ug/L							U
Copper, Dissolved	65	ND	0.500	ug/L							U
Zinc, Dissolved	66	ND	4.00	ug/L							U
Zinc, Dissolved	67	ND	4.00	ug/L							U
LCS (BFK0282-BS1)			Prepared: 10-Nov-2017 Analyzed: 10-Nov-2017 20:11								
Copper, Dissolved	63	28.2	0.500	ug/L	25.0		113	80-120			
Copper, Dissolved	65	28.4	0.500	ug/L	25.0		114	80-120			
Zinc, Dissolved	66	94.7	4.00	ug/L	80.0		118	80-120			
Zinc, Dissolved	67	86.6	4.00	ug/L	80.0		108	80-120			



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Wet Chemistry - Quality Control

Batch BFK0161 - SM 5310 A-00, 0.45um filtration

Instrument: UV1800-2 Analyst: CDE

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0161-BLK1) Prepared: 06-Nov-2017 Analyzed: 06-Nov-2017 17:43										
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BFK0161-BS1) Prepared: 06-Nov-2017 Analyzed: 06-Nov-2017 17:44										
Orthophosphorus	0.155	0.0040	mg-P/L	0.150		103	90-110			
Duplicate (BFK0161-DUP1) Source: 17K0089-03 Prepared: 06-Nov-2017 Analyzed: 06-Nov-2017 17:45										
Orthophosphorus	0.0150	0.0040	mg-P/L		0.0130			14.30	20	
Matrix Spike (BFK0161-MS1) Source: 17K0089-03 Prepared: 06-Nov-2017 Analyzed: 06-Nov-2017 17:45										
Orthophosphorus	0.220	0.0040	mg-P/L	0.200	0.0130	104	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.



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Reported:
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Wet Chemistry - Quality Control

Batch BFK0547 - SM 4500-P B-5 Persulfate

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0547-BLK1) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:25										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0547-BLK2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:34										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0547-BLK3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:52										
Total Phosphorus	ND	0.0080	mg-P/L							U
LCS (BFK0547-BS1) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:26										
Total Phosphorus	0.306	0.0080	mg-P/L	0.300		102	90-110			
DL (BFK0547-BS2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:34										
Total Phosphorus	0.310	0.0080	mg-P/L	0.300		103	90-110			
LCS (BFK0547-BS3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:52										
Total Phosphorus	0.308	0.0080	mg-P/L	0.300		103	90-110			



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Wet Chemistry - Quality Control

Batch BFK0548 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0548-BLK2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 16:50										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0548-BLK3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:08										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0548-BLK4) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:22										
Total Phosphorus	ND	0.0080	mg-P/L							U
DL (BFK0548-BS2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 16:52										
Total Phosphorus	0.324	0.0080	mg-P/L	0.300		108	90-110			
LCS (BFK0548-BS3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:10										
Total Phosphorus	0.324	0.0080	mg-P/L	0.300		108	90-110			
LCS (BFK0548-BS4) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:22										
Total Phosphorus	0.320	0.0080	mg-P/L	0.300		107	90-110			



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Certified Analyses included in this Report

Analyte	Certifications
EPA 200.8 in Water	
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
EPA 6010C in Water	
Calcium	WADOE,NELAP,DoD-ELAP
Magnesium	WADOE,NELAP,DoD-ELAP
SM 4500-P E-99 in Water	
Orthophosphorus	WADOE,NELAP
Total Phosphorus	WADOE,NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/11/2018
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
J	Estimated concentration value detected below the reporting limit.
D	The reported value is from a dilution
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

**November 6, 2017 –
Rinsate Blank 2**

Data_17K0092

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BFK0161-BLK1	Blank	13-05605-000	Water			11/06/2017	11/06/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFK0161-BS1	LCS	13-05605-000	Water			11/06/2017	11/06/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.155		mg-P/L
17K0092-03	WUFF-CHURN BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/06/2017	11/06/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
17K0092-01	WUFF-IN BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/06/2017	11/06/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
17K0092-02	WUFF-OUT BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/06/2017	11/06/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFK0234-BLK1	Blank	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0234-BS1	LCS	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	27.2		ug/L
BFK0234-BS2	LCS	13-05605-000	Water			11/09/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	26.1		ug/L
17K0092-03	WUFF-CHURN BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/09/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
17K0092-01	WUFF-IN BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/09/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	1.00		ug/L
17K0092-02	WUFF-OUT BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/09/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	0.741		ug/L
BFK0234-BLK1	Blank	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0234-BS1	LCS	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	27.4		ug/L
BFK0234-BS2	LCS	13-05605-000	Water			11/09/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	26.1		ug/L
BFK0234-BLK1	Blank	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0234-BS2	LCS	13-05605-000	Water			11/09/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	93.2		ug/L
17K0092-03	WUFF-CHURN BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/09/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
17K0092-01	WUFF-IN BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/09/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
17K0092-02	WUFF-OUT BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/09/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0234-BLK1	Blank	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0234-BS1	LCS	13-05605-000	Water			11/09/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	93.2		ug/L
BFK0234-BS2	LCS	13-05605-000	Water			11/09/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	89.4		ug/L
BFK0282-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0282-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-50-8	Copper	28.2		ug/L
17K0092-06	WUFF-CHURN BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
17K0092-04	WUFF-IN BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
17K0092-05	WUFF-OUT BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0282-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0282-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-50-8	Copper	28.4		ug/L
BFK0282-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0282-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	94.7		ug/L
17K0092-06	WUFF-CHURN BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
17K0092-04	WUFF-IN BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
17K0092-05	WUFF-OUT BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/10/2017	11/15/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0282-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0282-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	86.6		ug/L
BFK0547-BLK1	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0547-BLK2	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0547-BLK3	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0547-BS1	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.306		mg-P/L
BFK0547-BS2	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.310		mg-P/L
BFK0547-BS3	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.308		mg-P/L
17K0092-03	WUFF-CHURN BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
17K0092-01	WUFF-IN BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
17K0092-02RE1	WUFF-OUT BLANK	13-05605-000	Water	11/06/2017	11/06/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

27 November 2017

Dylan Ahearn
Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle, WA 98121

RE: Hydro International

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)
17K0092

Associated SDG ID(s)
N/A

Amanda
Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical
Resources, Inc., ou=Client
Services, cn=Amanda
Volgardsen,
email=amandav@arilabs.com
Date: 2017.11.27 12:17:11 -08'00'

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.





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

Chain of Custody Record

Project Name:		Project Number:		Client:	
Hydro International Up-flo Filter		13-05605-000		Herrera Environmental	
Report To:				Copy To:	
Dylan Ahearn					
Sampled By:		Delivery Method:			
K. Wingrove M Mullen		ice cooler - hand delivered			
Laboratory:	Requested Completion Date:		Total No. of Containers:		
Analytical Resources Inc.			3		
Lab Use:			Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)
Sample ID	Date	Time			
WUFF-IN BLANK	11-6-17	10:00	C	N	W
WUFF-OUT BLANK	11-6-17	10:00	C	N	W
WUFF-CHURN BLANK	11-6-17	10:00	C	N	W
Comments/Special Instructions:					
Relinquished by (Name/CO/	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Meghan Muller / Herrera	[Signature]	11-6-17 11:25	Brandon Fisk / ARI	[Signature]	11-25 11/6/17
Relinquished by (Name/CO/	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time

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

Project Name





Cooler Receipt Form

ARI Client: Hemera

COC No(s): _____ NA

Assigned ARI Job No: 17K0092

Project Name: Hydra International

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? _____

YES ☐ NO ☒

Were custody papers included with the cooler? _____

YES ☒ NO ☐

Were custody papers properly filled out (ink, signed, etc.) _____

YES ☒ NO ☐

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time: _____

5.8

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 2005206

Cooler Accepted by: BF

Date: 11/6/17

Time: 1125

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? _____

YES ☐ NO ☒

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? _____

NA ☒ YES ☐ NO ☐

Were all bottles sealed in individual plastic bags? _____

YES ☒ NO ☐

Did all bottles arrive in good condition (unbroken)? _____

YES ☒ NO ☐

Were all bottle labels complete and legible? _____

YES ☒ NO ☐

Did the number of containers listed on COC match with the number of containers received? _____

YES ☒ NO ☐

Did all bottle labels and tags agree with custody papers? _____

YES ☒ NO ☐

Were all bottles used correct for the requested analyses? _____

YES ☒ NO ☐

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...

NA ☒ YES ☐ NO ☐

Were all VOC vials free of air bubbles? _____

NA ☒ YES ☐ NO ☐

Was sufficient amount of sample sent in each bottle? _____

YES ☒ NO ☐

Date VOC Trip Blank was made at ARI: _____

NA ☒

Was Sample Split by ARI: NA ☒

Date/Time: 13:38 11/6/17

Equipment: chem splitter

Split by: BF & SF

Samples Logged by: BF

Date: 11/6/17

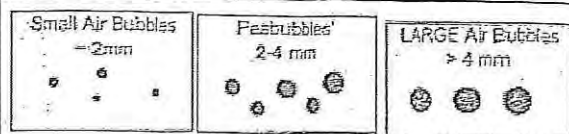
Time: 16:18

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____



Small → "sm" (< 2 mm)

Peabubbles → "pb" (2 to < 4 mm)

Large → "lg" (4 to < 6 mm)

Headspace → "hs" (> 6 mm)



Herrera Environmental Consultants
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Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
27-Nov-2017 12:15

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN BLANK	17K0092-01	Water	06-Nov-2017 10:00	06-Nov-2017 11:25
WUFF-OUT BLANK	17K0092-02	Water	06-Nov-2017 10:00	06-Nov-2017 11:25
WUFF-CHURN BLANK	17K0092-03	Water	06-Nov-2017 10:00	06-Nov-2017 11:25
WUFF-IN BLANK	17K0092-04	Water	06-Nov-2017 10:00	06-Nov-2017 11:25
WUFF-OUT BLANK	17K0092-05	Water	06-Nov-2017 10:00	06-Nov-2017 11:25
WUFF-CHURN BLANK	17K0092-06	Water	06-Nov-2017 10:00	06-Nov-2017 11:25



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Project Manager: Dylan Ahearn

Reported:
27-Nov-2017 12:15

Case Narrative

Sample receipt

Samples as listed on the preceding page were received November 6, 2017 under ARI workorder 17K0092. For details regarding sample receipt, please refer to the Cooler Receipt Form. The samples were split by sample receiving prior to analysis.

Total and Dissolved Metals - EPA Method 200.8

The samples were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.

Wet Chemistry (O-Phos, T-Phos)

The samples were prepared and analyzed within the recommended holding times.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
27-Nov-2017 12:15

WUFF-IN BLANK
17K0092-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 11/06/2017 10:00

Instrument: ICPMS2

Analyzed: 17-Nov-2017 17:33

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0234 Sample Size: 25 mL
Prepared: 09-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	1.00	ug/L	
Zinc	7440-66-6	1	4.00	ND	ug/L	U



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Project: Hydro International
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Reported:
27-Nov-2017 12:15

WUFF-IN BLANK
17K0092-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-2

Sampled: 11/06/2017 10:00
Analyzed: 06-Nov-2017 17:48

Sample Preparation: Preparation Method: SM 5310 A-00, 0.45um filtration
Preparation Batch: BFK0161 Sample Size: 50 mL
Prepared: 06-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	ND	mg-P/L	U

Sample Preparation: Preparation Method: SM 4500-P B-5 Persulfate
Preparation Batch: BFK0547 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	ND	mg-P/L	U



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
27-Nov-2017 12:15

WUFF-OUT BLANK
17K0092-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/06/2017 10:00
Analyzed: 17-Nov-2017 17:37

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0234 Sample Size: 25 mL
Prepared: 09-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	0.741	ug/L	
Zinc	7440-66-6	1	4.00	ND	ug/L	U



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Project: Hydro International
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Project Manager: Dylan Ahearn

Reported:
27-Nov-2017 12:15

WUFF-OUT BLANK
17K0092-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-2

Sampled: 11/06/2017 10:00
Analyzed: 06-Nov-2017 17:48

Sample Preparation: Preparation Method: SM 5310 A-00, 0.45um filtration
Preparation Batch: BFK0161 Sample Size: 50 mL
Prepared: 06-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	ND	mg-P/L	U



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
27-Nov-2017 12:15

WUFF-OUT BLANK
17K0092-02RE1 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-2

Sampled: 11/06/2017 10:00
Analyzed: 21-Nov-2017 15:51

Sample Preparation: Preparation Method: SM 4500-P B-5 Persulfate
Preparation Batch: BFK0547 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	ND	mg-P/L	U



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Project Manager: Dylan Ahearn

Reported:
27-Nov-2017 12:15

WUFF-CHURN BLANK
17K0092-03 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/06/2017 10:00
Analyzed: 17-Nov-2017 17:42

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0234 Sample Size: 25 mL
Prepared: 09-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	ND	ug/L	U
Zinc	7440-66-6	1	4.00	ND	ug/L	U



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
27-Nov-2017 12:15

WUFF-CHURN BLANK
17K0092-03 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-2

Sampled: 11/06/2017 10:00
Analyzed: 06-Nov-2017 17:49

Sample Preparation: Preparation Method: SM 5310 A-00, 0.45um filtration
Preparation Batch: BFK0161 Sample Size: 50 mL
Prepared: 06-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	ND	mg-P/L	U

Sample Preparation: Preparation Method: SM 4500-P B-5 Persulfate
Preparation Batch: BFK0547 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	ND	mg-P/L	U



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
27-Nov-2017 12:15

WUFF-IN BLANK
17K0092-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/06/2017 10:00
Analyzed: 15-Nov-2017 20:10

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0282 Sample Size: 25 mL
Prepared: 10-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	ND	ug/L	U
Zinc, Dissolved	7440-66-6	1	4.00	ND	ug/L	U



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
27-Nov-2017 12:15

WUFF-OUT BLANK
17K0092-05 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/06/2017 10:00
Analyzed: 15-Nov-2017 20:15

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0282 Sample Size: 25 mL
Prepared: 10-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	ND	ug/L	U
Zinc, Dissolved	7440-66-6	1	4.00	ND	ug/L	U



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Reported:
27-Nov-2017 12:15

WUFF-CHURN BLANK
17K0092-06 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/06/2017 10:00
Analyzed: 15-Nov-2017 20:20

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0282 Sample Size: 25 mL
Prepared: 10-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	ND	ug/L	U
Zinc, Dissolved	7440-66-6	1	4.00	ND	ug/L	U



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Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
27-Nov-2017 12:15

Metals and Metallic Compounds - Quality Control

Batch BFK0234 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0234-BLK1)			Prepared: 09-Nov-2017 Analyzed: 16-Nov-2017 20:23								
Copper	63	ND	0.500	ug/L							U
Copper	65	ND	0.500	ug/L							U
Zinc	66	ND	4.00	ug/L							U
Zinc	67	ND	4.00	ug/L							U
LCS (BFK0234-BS1)			Prepared: 09-Nov-2017 Analyzed: 16-Nov-2017 20:44								
Copper	63	27.2	0.500	ug/L	25.0		109	80-120			
Copper	65	27.4	0.500	ug/L	25.0		110	80-120			
Zinc	67	93.2	4.00	ug/L	80.0		117	80-120			
LCS (BFK0234-BS2)			Prepared: 09-Nov-2017 Analyzed: 17-Nov-2017 16:44								
Copper	63	26.1	0.500	ug/L	25.0		104	80-120			
Copper	65	26.1	0.500	ug/L	25.0		104	80-120			
Zinc	66	93.2	4.00	ug/L	80.0		116	80-120			
Zinc	67	89.4	4.00	ug/L	80.0		112	80-120			



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
27-Nov-2017 12:15

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BFK0282 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BKF0282-BLK1)			Prepared: 10-Nov-2017 Analyzed: 10-Nov-2017 19:51								
Copper, Dissolved	63	ND	0.500	ug/L							U
Copper, Dissolved	65	ND	0.500	ug/L							U
Zinc, Dissolved	66	ND	4.00	ug/L							U
Zinc, Dissolved	67	ND	4.00	ug/L							U
LCS (BKF0282-BS1)			Prepared: 10-Nov-2017 Analyzed: 10-Nov-2017 20:11								
Copper, Dissolved	63	28.2	0.500	ug/L	25.0		113	80-120			
Copper, Dissolved	65	28.4	0.500	ug/L	25.0		114	80-120			
Zinc, Dissolved	66	94.7	4.00	ug/L	80.0		118	80-120			
Zinc, Dissolved	67	86.6	4.00	ug/L	80.0		108	80-120			



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Project: Hydro International
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Reported:
27-Nov-2017 12:15

Wet Chemistry - Quality Control

Batch BFK0161 - SM 5310 A-00, 0.45um filtration

Instrument: UV1800-2 Analyst: CDE

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0161-BLK1)									
					Prepared: 06-Nov-2017 Analyzed: 06-Nov-2017 17:43				
Orthophosphorus	ND	0.0040	mg-P/L						U
LCS (BFK0161-BS1)									
					Prepared: 06-Nov-2017 Analyzed: 06-Nov-2017 17:44				
Orthophosphorus	0.155	0.0040	mg-P/L	0.150		103 90-110			



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Reported:
27-Nov-2017 12:15

Wet Chemistry - Quality Control

Batch BFK0547 - SM 4500-P B-5 Persulfate

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0547-BLK1) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:25										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0547-BLK2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:34										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0547-BLK3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:52										
Total Phosphorus	ND	0.0080	mg-P/L							U
LCS (BFK0547-BS1) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:26										
Total Phosphorus	0.306	0.0080	mg-P/L	0.300		102	90-110			
DL (BFK0547-BS2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:34										
Total Phosphorus	0.310	0.0080	mg-P/L	0.300		103	90-110			
LCS (BFK0547-BS3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:52										
Total Phosphorus	0.308	0.0080	mg-P/L	0.300		103	90-110			



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Reported:
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Certified Analyses included in this Report

Analyte	Certifications
EPA 200.8 in Water	
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
SM 4500-P E-99 in Water	
Orthophosphorus	WADOE,NELAP
Total Phosphorus	WADOE,NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/11/2018
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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Reported:
27-Nov-2017 12:15

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
J	Estimated concentration value detected below the reporting limit.
D	The reported value is from a dilution
B	This analyte was detected in the method blank.
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

November 8, 2017

Data_17K0170

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17K0170-01	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/14/2017	SM 2340 B-97		Hardness	78.5		mg/L
17K0170-02	WUFF-IN DUP	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/15/2017	SM 2340 B-97		Hardness	68.3		mg/L
17K0170-03	WUFF-OUT	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/15/2017	SM 2340 B-97		Hardness	96.4		mg/L
BFK0321-BLK1	Blank	13-05605-000	Water			11/10/2017	11/10/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFK0321-BS1	LCS	13-05605-000	Water			11/10/2017	11/10/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.152		mg-P/L
BFK0321-DUP1	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/10/2017	11/10/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0140	L	mg-P/L
BFK0321-MS1	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/10/2017	11/10/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.112		mg-P/L
17K0170-01	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/10/2017	11/10/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0100		mg-P/L
17K0170-02	WUFF-IN DUP	13-05605-000	Water	11/10/2017	11/10/2017	11/10/2017	11/10/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0100		mg-P/L
17K0170-03	WUFF-OUT	13-05605-000	Water	11/10/2017	11/10/2017	11/10/2017	11/10/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0070		mg-P/L
BFK0327-BLK1	Blank	13-05605-000	Water			11/13/2017	11/18/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0327-BS1	LCS	13-05605-000	Water			11/13/2017	11/18/2017	EPA 200.8	7440-50-8	Copper	29.0		ug/L
17K0170-01	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/18/2017	EPA 200.8	7440-50-8	Copper	26.9		ug/L
17K0170-02	WUFF-IN DUP	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/18/2017	EPA 200.8	7440-50-8	Copper	25.5		ug/L
17K0170-03	WUFF-OUT	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/18/2017	EPA 200.8	7440-50-8	Copper	17.0		ug/L
BFK0327-BLK1	Blank	13-05605-000	Water			11/13/2017	11/18/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0327-BS1	LCS	13-05605-000	Water			11/13/2017	11/18/2017	EPA 200.8	7440-50-8	Copper	28.8		ug/L
BFK0327-BLK1	Blank	13-05605-000	Water			11/13/2017	11/18/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0327-BS3	LCS	13-05605-000	Water			11/13/2017	11/21/2017	EPA 200.8	7440-66-6	Zinc	92.2		ug/L
17K0170-01	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/18/2017	EPA 200.8	7440-66-6	Zinc	88.6		ug/L
17K0170-02	WUFF-IN DUP	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/18/2017	EPA 200.8	7440-66-6	Zinc	82.5		ug/L
17K0170-03	WUFF-OUT	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/18/2017	EPA 200.8	7440-66-6	Zinc	51.8		ug/L
BFK0327-BLK1	Blank	13-05605-000	Water			11/13/2017	11/18/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0327-BS1	LCS	13-05605-000	Water			11/13/2017	11/18/2017	EPA 200.8	7440-66-6	Zinc	95.0		ug/L
BFK0327-BS3	LCS	13-05605-000	Water			11/13/2017	11/21/2017	EPA 200.8	7440-66-6	Zinc	89.1		ug/L
BFK0328-BLK1	Blank	13-05605-000	Water			11/13/2017	11/14/2017	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BFK0328-BS1	LCS	13-05605-000	Water			11/13/2017	11/14/2017	EPA 6010C	7440-70-2	Calcium	10.5		mg/L
BFK0328-DUP1	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/14/2017	EPA 6010C	7440-70-2	Calcium	23.6		mg/L
BFK0328-MS1	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/14/2017	EPA 6010C	7440-70-2	Calcium	34.5	*	mg/L
17K0170-01	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/14/2017	EPA 6010C	7440-70-2	Calcium	21.5		mg/L
17K0170-02	WUFF-IN DUP	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	18.5		mg/L
17K0170-03	WUFF-OUT	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/15/2017	EPA 6010C	7440-70-2	Calcium	26.1		mg/L
BFK0328-BLK1	Blank	13-05605-000	Water			11/13/2017	11/14/2017	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BFK0328-BS1	LCS	13-05605-000	Water			11/13/2017	11/14/2017	EPA 6010C	7439-95-4	Magnesium	11.0		mg/L
BFK0328-DUP1	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/14/2017	EPA 6010C	7439-95-4	Magnesium	6.65		mg/L
BFK0328-MS1	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/14/2017	EPA 6010C	7439-95-4	Magnesium	17.5		mg/L
17K0170-01	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/14/2017	EPA 6010C	7439-95-4	Magnesium	6.04		mg/L
17K0170-02	WUFF-IN DUP	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	5.38		mg/L
17K0170-03	WUFF-OUT	13-05605-000	Water	11/10/2017	11/10/2017	11/13/2017	11/15/2017	EPA 6010C	7439-95-4	Magnesium	7.61		mg/L
BFK0406-BLK1	Blank	13-05605-000	Water			11/15/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0406-BS1	LCS	13-05605-000	Water			11/15/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	25.8		ug/L
BFK0406-DUP1	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/15/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	12.1		ug/L
BFK0406-MS1	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/15/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	37.9		ug/L
17K0170-04	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/15/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	12.3		ug/L
BFK0406-BLK1	Blank	13-05605-000	Water			11/15/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0406-BS1	LCS	13-05605-000	Water			11/15/2017	11/15/2017	EPA 200.8-Dissolved	7440-50-8	Copper	26.5		ug/L
BFK0447-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0447-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	29.5		ug/L
17K0170-05	WUFF-IN DUP	13-05605-000	Water	11/10/2017	11/10/2017	11/16/2017	11/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	12.8		ug/L

Data_17K0170

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17K0170-06	WUFF-OUT	13-05605-000	Water	11/10/2017	11/10/2017	11/16/2017	11/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	11.0		ug/L
BFK0447-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0447-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	29.3		ug/L
BFK0447-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0447-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	95.8		ug/L
17K0170-04RE1	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/16/2017	11/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	40.6		ug/L
17K0170-05	WUFF-IN DUP	13-05605-000	Water	11/10/2017	11/10/2017	11/16/2017	11/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	44.9		ug/L
17K0170-06	WUFF-OUT	13-05605-000	Water	11/10/2017	11/10/2017	11/16/2017	11/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	34.8		ug/L
BFK0447-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0447-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	89.2		ug/L
BFK0547-BLK1	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0547-BLK2	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0547-BLK3	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0547-BS1	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.306		mg-P/L
BFK0547-BS2	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.310		mg-P/L
BFK0547-BS3	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.308		mg-P/L
BFK0547-DUP1	WUFF-OUT	13-05605-000	Water	11/10/2017	11/10/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0340		mg-P/L
BFK0547-MS1	WUFF-OUT	13-05605-000	Water	11/10/2017	11/10/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.234		mg-P/L
17K0170-03	WUFF-OUT	13-05605-000	Water	11/10/2017	11/10/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0380		mg-P/L
BFK0548-BLK2	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BLK3	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BLK4	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BS2	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.324		mg-P/L
BFK0548-BS3	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.324		mg-P/L
BFK0548-BS4	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.320		mg-P/L
17K0170-01	WUFF-IN	13-05605-000	Water	11/10/2017	11/10/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0820		mg-P/L
17K0170-02	WUFF-IN DUP	13-05605-000	Water	11/10/2017	11/10/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0800		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

01 December 2017

Dylan Ahearn
Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle, WA 98121

RE: Hydro International

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)
17K0170

Associated SDG ID(s)
N/A

Amanda
Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical
Resources, Inc., ou=Client
Services, cn=Amanda Volgardsen,
email=amandav@arilabs.com
Date: 2017.12.01 11:04:47 -08'00'

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclosed Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.





p 206 441 9080 | f 206 441 9108

Chain of Custody Record

Project Name: Hydro International Up-flo Filter		Project Number: 13-05605-000		Client: Herrera Environmental		Total Suspended Solids - SM 2540D		Analyses Requested									
Report To: Dylan Ahearn				Copy To:				Suspended Sediment Concentration - SMD3977	Total volatile Suspended solids - SM2540-E	Particle size Distribution - ASTM 3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Hardness as CaCO3-SM 2340B	Copper, dissolved - EPA 200.8	Copper, total - EPA 200.8	Zinc, dissolved - EPA 200.8	Zinc, total - EPA 200.8
Sampled By: M Mullen				Delivery Method: ice cooler hand delivered													
Laboratory: Analytical Resources Inc.		Requested Completion Date:		Total No. of Containers: 2													
Lab Use:				Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)											
Sample ID		Date		Time													
WUFF-IN		11.10.17		10:00		C	N	SW	x	x	x	x	x	x	x	x	x
WUFF-OUT		11.10.17		10:00		C	N	SW	x	x	x	x	x	x	x	x	x
WUFF-IN DUP		11.10.17		10:00		C	N	SW	x	x	x	x	x	x	x	x	x
Comments/Special Instructions: Send 1 liter to ETS, Inc 975 Transport Way, Suite 2, Petaluma, CA for PSD, TSS, and TVSS. PSD to be run for >500, 500-125, 125-62.5, 62.5-4, <4.																	
Relinquished by (Name/CO/ Meghan Mullen / Herrera		Signature [Signature]		Date/Time 11-10-17 11:00		Received By (Name/CO) Brandon Fisk ARI		Signature [Signature]		Date/Time 11/10/17 11:00							
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)



WORK ORDER

17K0170

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
17K0170-01 A	Large OJ, 1000 mL	
17K0170-01 B	Large OJ, 1000 mL	
17K0170-01 C	Large OJ, 1000 mL	
17K0170-01 D	Small OJ, 500 mL, 9N H2SO4	<2 pass
17K0170-01 E	Small OJ, 500 mL	
17K0170-01 F	HDPE NM, 500 mL, 1:1 HNO3	<2 pass
17K0170-02 A	Large OJ, 1000 mL	
17K0170-02 B	Large OJ, 1000 mL	
17K0170-02 C	Large OJ, 1000 mL	
17K0170-02 D	Small OJ, 500 mL, 9N H2SO4	<2 pass
17K0170-02 E	Small OJ, 500 mL	
17K0170-02 F	HDPE NM, 500 mL, 1:1 HNO3	<2 pass
17K0170-03 A	Large OJ, 1000 mL	
17K0170-03 B	Large OJ, 1000 mL	
17K0170-03 C	Large OJ, 1000 mL	
17K0170-03 D	Small OJ, 500 mL, 9N H2SO4	<2 pass
17K0170-03 E	Small OJ, 500 mL	
17K0170-03 F	HDPE NM, 500 mL, 1:1 HNO3	<2 pass
17K0170-04 A	HDPE NM, 500 mL	>2 fail
17K0170-05 A	HDPE NM, 500 mL	>2 fail
17K0170-06 A	HDPE NM, 500 mL	>2 fail

SF

Preservation Confirmed By

11/10/17

Date



Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 17K0170

Project Name: _____

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? _____

YES ☐ NO ☒

Were custody papers included with the cooler? _____

YES ☒ NO ☐

Were custody papers properly filled out (ink, signed, etc.) _____

YES ☒ NO ☐

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time: 6.3

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 17005 R002565

Cooler Accepted by: BF Date: 11/10/17 Time: 1100

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? _____

YES ☐ NO ☒

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? _____

NA YES ☐ NO ☒

Were all bottles sealed in individual plastic bags? _____

YES ☐ NO ☒

Did all bottles arrive in good condition (unbroken)? _____

YES ☒ NO ☐

Were all bottle labels complete and legible? _____

YES ☒ NO ☐

Did the number of containers listed on COC match with the number of containers received? _____

YES ☒ NO ☐

Did all bottle labels and tags agree with custody papers? _____

YES ☒ NO ☐

Were all bottles used correct for the requested analyses? _____

YES ☒ NO ☐

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...

NA YES ☒ NO ☐

Were all VOC vials free of air bubbles? _____

NA YES ☒ NO ☐

Was sufficient amount of sample sent in each bottle? _____

NA YES ☒ NO ☐

Date VOC Trip Blank was made at ARI: _____

NA YES ☒ NO ☐

Was Sample Split by ARI : NA YES ☒ Date/Time: 11/10/17 Equipment: Churn split Split by: SF

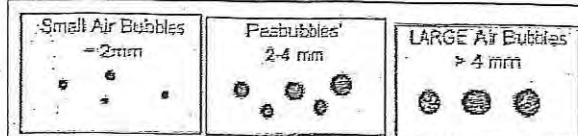
Samples Logged by: SF Date: 11/10/17 Time: 1244

**** Notify Project Manager of discrepancies or concerns ****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____



Small → "sm" (< 2 mm)

Peabubbles → "pb" (2 to < 4 mm)

Large → "lg" (4 to < 6 mm)

Headspace → "hs" (> 6 mm)



WORK ORDER

17K0170

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
17K0170-01 A	Large OJ, 1000 mL	
17K0170-01 B	Large OJ, 1000 mL	
17K0170-01 C	Large OJ, 1000 mL	
17K0170-01 D	Small OJ, 500 mL, 9N H ₂ SO ₄	<2 pass
17K0170-01 E	Small OJ, 500 mL	
17K0170-01 F	HDPE NM, 500 mL, 1:1 HNO ₃	<2 pass
17K0170-02 A	Large OJ, 1000 mL	
17K0170-02 B	Large OJ, 1000 mL	
17K0170-02 C	Large OJ, 1000 mL	
17K0170-02 D	Small OJ, 500 mL, 9N H ₂ SO ₄	<2 pass
17K0170-02 E	Small OJ, 500 mL	
17K0170-02 F	HDPE NM, 500 mL, 1:1 HNO ₃	<2 pass
17K0170-03 A	Large OJ, 1000 mL	
17K0170-03 B	Large OJ, 1000 mL	
17K0170-03 C	Large OJ, 1000 mL	
17K0170-03 D	Small OJ, 500 mL, 9N H ₂ SO ₄	<2 pass
17K0170-03 E	Small OJ, 500 mL	
17K0170-03 F	HDPE NM, 500 mL, 1:1 HNO ₃	<2 pass
17K0170-04 A	HDPE NM, 500 mL	>2 fail
17K0170-05 A	HDPE NM, 500 mL	>2 fail
17K0170-06 A	HDPE NM, 500 mL	>2 fail

Preservation Confirmed By

SF

Date

11/10/17

Filtered + preserved
11/15/17 DP



ETS

Environmental Technical Services

-Soil, Water & Air Testing & Monitoring
-Analytical Labs
-Technical Support

975 Transport Way, Suite 2
Petaluma, CA 94954
(707) 778-9605/FAX 778-9612
e-mail: entech@pacbell.net

**Serving people and the environment
so that both benefit.**

COMPANY: Analytical Resources, Inc., 4611 S. 134 th Place, Suite 100, Tukwila, WA 98168						ANALYST(S) S. Santos L. Quijano	SUPERVISOR D. Jacobson LAB DIRECTOR G. Conrad, PhD
ATTN: Amanda Volgardsen			DATE COLLECTED	DATE RECEIVED	DATE COMPLETED		
JOB: Hydro International Up-Flo Filter			11/10/2017	11/15/2017	11/27/2017		
SITE: Oregon-Washington							

PARTICLE SIZE DISTRIBUTION (PSD) ANALYSIS & REPORT – 5 PART

LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	SUSPENDED SOLIDS mg/l @ ≥500 μ	SUSPENDED SOLIDS mg/l @ 125 μ	SUSPENDED SOLIDS mg/l @ 63 μ	SUSPENDED SOLIDS mg/l @ 32 μ	SUSPENDED SOLIDS mg/l @ 4 μ	SUSPENDED SOLIDS mg/l @ 1 μ	SUSPENDED SEDIMENT CONC TSS mg/l
07568-1	HI-36HEC/RW	WUFF-IN	1.5	2.5	3.0		8.7	3.7	21.0
	17K0170-01		7.7%	12.9%	15.5%		44.8%	19.1%	
						Total SSC by Summation →		19.4	
07568-2	HI-37HEC/RW	WUFF-IN Dup	1.5	3.0	3.5		9.0	3.3	24.0
	17K0170-02		7.4%	14.8%	17.2%		44.3%	16.3%	
						Total SSC by Summation →		20.3	
07568-3	HI-38HEC/RW	WUFF-OUT	0.0	0.5	2.0		4.6	1.1	7.0
	17K0170-03		0.0%	6.1%	24.4%		#DIV/0!	56.1%	13.4%
						Total SSC by Summation →		8.2	
			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
						Total SSC by Summation →		0.0	

LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	Water pH -log[H ⁺]	ECw [Spec Cond] μS/cm	COLOR, TRUE PtCo Units	COLOR APPARENT PtCo Units	TOTAL IRON Fe (diss.) mg/l	TOTAL VOLATILE SUSPENDED SOLIDS (TVSS) mg/l

COMMENTS

The matrix has a very low concentration of TSS particles amounting to only ~20 ppm in the input samples; and the output sample is extremely low at <10 ppm. Considering all samples, overall average reductions are in the range of 60%-65% (i.e., TSS by summation vs analytical TSS). The specific fraction reductions going from coarsest to finest sizes taking into account both input samples is as follows: 100%/100%, 80.0%/83.3%, 33.3%/42.9%, 47.1%/48.9%, and 66.7%/57.7%. So while not perfect, there is reasonable agreement between the two input samples when comparing to the output sample. The agreement is reasonable considering the extremely low levels of TSS in total and, especially, in the various fractions. Regardless of how the particular fraction reductions are viewed (total range is 57.7% to 70.8%), the absolute numerical difference in mass is extremely small. The distribution is uni-modal, again, with the mode at the 4-63 μ fraction. The RPDs in this case are excellent to very good as follows: ±4.0%, ±8.4%, and ±7.9%.

\\ NOTES: Tests were done according to methodology as per Association of Testing Materials (ASTM): Suspended Sediment Concentration – Modified ASTM D3977 (Practice for Determining Suspended-Sediment Concentration in Water Samples). Standard Methods is followed for the other tests: Color - 2120 C; Spec Cond. (ECw) - 2510 B; Iron - 3500-Fe B; pH - 4500-H+ B; TRPH - 5520 C.

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17K0170)
Project #: 16T001-035
Client : Analytical Resources, Inc.
Source: Multiple
MTC Sample#: Multiple

Date Received: November 14, 2017
Sampled By: Others
Date Reported: November 29, 2017
Tested By: B. Goble

CASE NARRATIVE

1. Three samples were submitted for sediment concentration by ASTM D3977, Method C.
2. The coarse material was screened over a No. 230 sieve.
3. The suspended solids are reported in mg/L.
4. The data is provided in a summary table.
5. There were no other noted anomalies in this project.

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by: 

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980
Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6061 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974
Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17K0170)

Client: Analytical Resources, Inc.

Project #: 16T001-035

Date Received: November 14, 2017

Sampled by: Others

Date Tested: November 15, 2017

Tested by: B. Goble

Suspended Sediment Concentration ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC ($>63\mu\text{m}$) (mg/L)	FineFraction SSC ($<63\mu\text{m}$) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	T17-1646	11/10/2017	11.2	13.6	24.9
WUFF-IN DUP	T17-1647	11/10/2017	11.4	12.5	23.8
WUFF-OUT	T17-1648	11/10/2017	0.9	4.7	5.5

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Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:01

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	17K0170-01	Water	10-Nov-2017 10:00	10-Nov-2017 11:00
WUFF-IN DUP	17K0170-02	Water	10-Nov-2017 10:00	10-Nov-2017 11:00
WUFF-OUT	17K0170-03	Water	10-Nov-2017 10:00	10-Nov-2017 11:00
WUFF-IN	17K0170-04	Water	10-Nov-2017 10:00	10-Nov-2017 11:00
WUFF-IN DUP	17K0170-05	Water	10-Nov-2017 10:00	10-Nov-2017 11:00
WUFF-OUT	17K0170-06	Water	10-Nov-2017 10:00	10-Nov-2017 11:00



Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:01

Case Narrative

Sample receipt

Samples as listed on the preceding page were received November 10, 2017 under ARI workorder 17K0170. For details regarding sample receipt, please refer to the Cooler Receipt Form. The TSS, TVSS and PSD analysis were subcontracted to ETS Labs. The SSC analysis was subcontracted to MTC Labs.

Total and Dissolved Metals - EPA Method 200.8

The samples were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.

A dissolved Copper matrix spike and duplicate were prepared in conjunction with sample WUFF-IN. The matrix spike percent recovery and duplicate RPD were within QC limits.

Total Hardness - EPA Method 6010C

The samples were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank was clean at the reporting limits.

The LCS percent recoveries were within control limits.

A matrix spike and duplicate were prepared in conjunction with sample WUFF-IN. The duplicate RPD was within QC limits. The matrix spike has high spike recovery for Calcium. The results are advisory. No corrective action was taken.

Wet Chemistry (O-Phos, T-Phos)

The samples were prepared and analyzed within the recommended holding times.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.

A O-Phos matrix spike and duplicate were prepared in conjunction with sample WUFF-IN. The matrix spike percent recovery was within QC limits. The duplicate has a concentration ≤ 5 times the reporting limits, and the replicate control limit defaults to \pm the reporting limit instead of 20% of the RPD. The O-Phos has been flagged with an "L" qualifier on the duplicate.



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A T-Phos matrix spike and duplicate were prepared in conjunction with sample WUFF-OUT. The matrix spike percent recovery and duplicate RPD were within QC limits.



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:01

WUFF-IN
17K0170-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 11/10/2017 10:00

Instrument: ICPMS2

Analyzed: 18-Nov-2017 19:47

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0327 Sample Size: 25 mL
Prepared: 13-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	26.9	ug/L	
Zinc	7440-66-6	1	4.00	88.6	ug/L	



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Reported:
01-Dec-2017 11:01

WUFF-IN
17K0170-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/10/2017 10:00
Analyzed: 14-Nov-2017 13:27

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0328 Sample Size: 25 mL
Prepared: 13-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	21.5	mg/L	
Magnesium	7439-95-4	1	0.0500	6.04	mg/L	



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Reported:
01-Dec-2017 11:01

WUFF-IN
17K0170-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-2

Sampled: 11/10/2017 10:00
Analyzed: 10-Nov-2017 17:20

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFK0321 Sample Size: 50 mL
Prepared: 10-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0100	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFK0548 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0820	mg-P/L	



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Reported:
01-Dec-2017 11:01

WUFF-IN
17K0170-01 (Water)

Calculation

Method: SM 2340 B-97
Instrument: [CALC]

Sampled: 11/10/2017 10:00
Analyzed: 14-Nov-2017 13:27

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 13-Nov-2017 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	78.5	mg/L	



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Reported:
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WUFF-IN DUP
17K0170-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 11/10/2017 10:00

Instrument: ICPMS2

Analyzed: 18-Nov-2017 21:39

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0327 Sample Size: 25 mL
Prepared: 13-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	25.5	ug/L	
Zinc	7440-66-6	1	4.00	82.5	ug/L	



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Reported:
01-Dec-2017 11:01

WUFF-IN DUP
17K0170-02 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/10/2017 10:00
Analyzed: 15-Nov-2017 19:03

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0328
Prepared: 13-Nov-2017

Sample Size: 25 mL
Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	18.5	mg/L	
Magnesium	7439-95-4	1	0.0500	5.38	mg/L	



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Project: Hydro International
Project Number: 13-05605-000
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Reported:
01-Dec-2017 11:01

WUFF-IN DUP
17K0170-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-2

Sampled: 11/10/2017 10:00
Analyzed: 10-Nov-2017 17:22

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFK0321 Sample Size: 50 mL
Prepared: 10-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0100	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFK0548 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0800	mg-P/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:01

WUFF-IN DUP
17K0170-02 (Water)

Calculation

Method: SM 2340 B-97
Instrument: [CALC]

Sampled: 11/10/2017 10:00
Analyzed: 15-Nov-2017 19:03

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 13-Nov-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	68.3	mg/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:01

WUFF-OUT
17K0170-03 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 11/10/2017 10:00

Instrument: ICPMS2

Analyzed: 18-Nov-2017 21:44

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0327 Sample Size: 25 mL
Prepared: 13-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	17.0	ug/L	
Zinc	7440-66-6	1	4.00	51.8	ug/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:01

WUFF-OUT
17K0170-03 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/10/2017 10:00
Analyzed: 15-Nov-2017 19:07

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0328
Prepared: 13-Nov-2017

Sample Size: 25 mL
Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	26.1	mg/L	
Magnesium	7439-95-4	1	0.0500	7.61	mg/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:01

WUFF-OUT
17K0170-03 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-2

Sampled: 11/10/2017 10:00
Analyzed: 10-Nov-2017 17:22

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFK0321 Sample Size: 50 mL
Prepared: 10-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0070	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-5 Persulfate
Preparation Batch: BFK0547 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0380	mg-P/L	



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Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:01

WUFF-OUT
17K0170-03 (Water)

Calculation

Method: SM 2340 B-97
Instrument: [CALC]

Sampled: 11/10/2017 10:00
Analyzed: 15-Nov-2017 19:07

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 13-Nov-2017 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	96.4	mg/L	



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Reported:
01-Dec-2017 11:01

WUFF-IN
17K0170-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/10/2017 10:00
Analyzed: 15-Nov-2017 14:32

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0406 Sample Size: 25 mL
Prepared: 15-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	12.3	ug/L	



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Reported:
01-Dec-2017 11:01

WUFF-IN
17K0170-04RE1 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/10/2017 10:00
Analyzed: 17-Nov-2017 18:11

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0447 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Zinc, Dissolved	7440-66-6	1	4.00	40.6	ug/L	



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Reported:
01-Dec-2017 11:01

WUFF-IN DUP
17K0170-05 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/10/2017 10:00
Analyzed: 17-Nov-2017 18:15

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0447 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	12.8	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	44.9	ug/L	



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Reported:
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WUFF-OUT
17K0170-06 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/10/2017 10:00
Analyzed: 17-Nov-2017 18:20

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0447 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	11.0	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	34.8	ug/L	



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Reported:
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Metals and Metallic Compounds - Quality Control

Batch BFK0327 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: TCH

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0327-BLK1)			Prepared: 13-Nov-2017 Analyzed: 18-Nov-2017 19:28								
Copper	63	ND	0.500	ug/L							U
Copper	65	ND	0.500	ug/L							U
Zinc	66	ND	4.00	ug/L							U
Zinc	67	ND	4.00	ug/L							U
LCS (BFK0327-BS1)			Prepared: 13-Nov-2017 Analyzed: 18-Nov-2017 20:12								
Copper	63	29.0	0.500	ug/L	25.0		116	80-120			
Copper	65	28.8	0.500	ug/L	25.0		115	80-120			
Zinc	67	95.0	4.00	ug/L	80.0		119	80-120			
LCS (BFK0327-BS3)			Prepared: 13-Nov-2017 Analyzed: 21-Nov-2017 14:42								
Zinc	66	92.2	4.00	ug/L	80.0		115	80-120			
Zinc	67	89.1	4.00	ug/L	80.0		111	80-120			



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Project: Hydro International
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Reported:
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Metals and Metallic Compounds - Quality Control

Batch BFK0328 - TWC EPA 3010A

Instrument: ICP2 Analyst: TCH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0328-BLK1)		Prepared: 13-Nov-2017 Analyzed: 14-Nov-2017 13:05								
Calcium	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
LCS (BFK0328-BS1)		Prepared: 13-Nov-2017 Analyzed: 14-Nov-2017 13:36								
Calcium	10.5	0.0500	mg/L	10.0		105	80-120			
Magnesium	11.0	0.0500	mg/L	10.0		110	80-120			
Duplicate (BFK0328-DUP1)		Source: 17K0170-01		Prepared: 13-Nov-2017 Analyzed: 14-Nov-2017 13:23						
Calcium	23.6	0.0500	mg/L		21.5			9.22	20	
Magnesium	6.65	0.0500	mg/L		6.04			9.60	20	
Matrix Spike (BFK0328-MS1)		Source: 17K0170-01		Prepared: 13-Nov-2017 Analyzed: 14-Nov-2017 13:31						
Calcium	34.5	0.0500	mg/L	10.0	21.5	130	75-125			*
Magnesium	17.5	0.0500	mg/L	10.0	6.04	115	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.



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Reported:
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Metals and Metallic Compounds (dissolved) - Quality Control

Batch BFK0406 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0406-BLK1)			Prepared: 15-Nov-2017 Analyzed: 15-Nov-2017 14:22								
Copper, Dissolved	63	ND	0.500	ug/L							U
Copper, Dissolved	65	ND	0.500	ug/L							U
LCS (BFK0406-BS1)			Prepared: 15-Nov-2017 Analyzed: 15-Nov-2017 14:42								
Copper, Dissolved	63	25.8	0.500	ug/L	25.0		103	80-120			
Copper, Dissolved	65	26.5	0.500	ug/L	25.0		106	80-120			
Duplicate (BFK0406-DUP1)			Source: 17K0170-04		Prepared: 15-Nov-2017 Analyzed: 15-Nov-2017 14:27						
Copper, Dissolved	63	12.1	0.500	ug/L		12.3			1.88	20	
Matrix Spike (BFK0406-MS1)			Source: 17K0170-04		Prepared: 15-Nov-2017 Analyzed: 15-Nov-2017 14:36						
Copper, Dissolved	63	37.9	0.500	ug/L	25.0	12.3	102	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.



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Reported:
01-Dec-2017 11:01

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BFK0447 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0447-BLK1)			Prepared: 16-Nov-2017 Analyzed: 16-Nov-2017 14:33								
Copper, Dissolved	63	ND	0.500	ug/L							U
Copper, Dissolved	65	ND	0.500	ug/L							U
Zinc, Dissolved	66	ND	4.00	ug/L							U
Zinc, Dissolved	67	ND	4.00	ug/L							U
LCS (BFK0447-BS1)			Prepared: 16-Nov-2017 Analyzed: 16-Nov-2017 15:20								
Copper, Dissolved	63	29.5	0.500	ug/L	25.0		118	80-120			
Copper, Dissolved	65	29.3	0.500	ug/L	25.0		117	80-120			
Zinc, Dissolved	66	95.8	4.00	ug/L	80.0		120	80-120			
Zinc, Dissolved	67	89.2	4.00	ug/L	80.0		111	80-120			



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Reported:
01-Dec-2017 11:01

Wet Chemistry - Quality Control

Batch BFK0321 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0321-BLK1) Prepared: 10-Nov-2017 Analyzed: 10-Nov-2017 17:19										
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BFK0321-BS1) Prepared: 10-Nov-2017 Analyzed: 10-Nov-2017 17:19										
Orthophosphorus	0.152	0.0040	mg-P/L	0.150		101	90-110			
Duplicate (BFK0321-DUP1) Source: 17K0170-01 Prepared: 10-Nov-2017 Analyzed: 10-Nov-2017 17:21										
Orthophosphorus	0.0140	0.0040	mg-P/L		0.0100			33.30	20	L
Matrix Spike (BFK0321-MS1) Source: 17K0170-01 Prepared: 10-Nov-2017 Analyzed: 10-Nov-2017 17:21										
Orthophosphorus	0.112	0.0040	mg-P/L	0.0999	0.0100	102	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.



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Reported:
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Wet Chemistry - Quality Control

Batch BFK0547 - SM 4500-P B-5 Persulfate

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0547-BLK1) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:25										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0547-BLK2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:34										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0547-BLK3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:52										
Total Phosphorus	ND	0.0080	mg-P/L							U
LCS (BFK0547-BS1) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:26										
Total Phosphorus	0.306	0.0080	mg-P/L	0.300		102	90-110			
DL (BFK0547-BS2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:34										
Total Phosphorus	0.310	0.0080	mg-P/L	0.300		103	90-110			
LCS (BFK0547-BS3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:52										
Total Phosphorus	0.308	0.0080	mg-P/L	0.300		103	90-110			
Duplicate (BFK0547-DUP1) Source: 17K0170-03 Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:28										
Total Phosphorus	0.0340	0.0080	mg-P/L		0.0380			11.10	20	
Matrix Spike (BFK0547-MS1) Source: 17K0170-03 Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 15:28										
Total Phosphorus	0.234	0.0080	mg-P/L	0.200	0.0380	98.1	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.



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Reported:
01-Dec-2017 11:01

Wet Chemistry - Quality Control

Batch BFK0548 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0548-BLK2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 16:50										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0548-BLK3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:08										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0548-BLK4) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:22										
Total Phosphorus	ND	0.0080	mg-P/L							U
DL (BFK0548-BS2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 16:52										
Total Phosphorus	0.324	0.0080	mg-P/L	0.300		108	90-110			
LCS (BFK0548-BS3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:10										
Total Phosphorus	0.324	0.0080	mg-P/L	0.300		108	90-110			
LCS (BFK0548-BS4) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:22										
Total Phosphorus	0.320	0.0080	mg-P/L	0.300		107	90-110			



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Reported:
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Certified Analyses included in this Report

Analyte	Certifications
EPA 200.8 in Water	
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
EPA 6010C in Water	
Calcium	WADOE,NELAP,DoD-ELAP
Magnesium	WADOE,NELAP,DoD-ELAP
SM 4500-P E-99 in Water	
Orthophosphorus	WADOE,NELAP
Total Phosphorus	WADOE,NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/11/2018
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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Reported:
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Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
L	Analyte concentration is ≤ 5 times the reporting limit and the replicate control limit defaults to \pm RL instead of 20% RPD
J	Estimated concentration value detected below the reporting limit.
D	The reported value is from a dilution
B	This analyte was detected in the method blank.
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

November 12, 2017

Data_17K0197

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17K0197-01	WUFF-IN	13-05605-000	Water	11/13/2017	11/13/2017	11/16/2017	11/17/2017	SM 2340 B-97		Hardness	37.0		mg/L
17K0197-02	WUFF-OUT	13-05605-000	Water	11/13/2017	11/13/2017	11/16/2017	11/17/2017	SM 2340 B-97		Hardness	40.2		mg/L
BFK0365-BLK1	Blank	13-05605-000	Water			11/14/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0365-BS1	LCS	13-05605-000	Water			11/14/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	25.8		ug/L
17K0197-01	WUFF-IN	13-05605-000	Water	11/13/2017	11/13/2017	11/14/2017	11/18/2017	EPA 200.8	7440-50-8	Copper	22.0		ug/L
17K0197-02	WUFF-OUT	13-05605-000	Water	11/13/2017	11/13/2017	11/14/2017	11/18/2017	EPA 200.8	7440-50-8	Copper	18.1		ug/L
BFK0365-BLK1	Blank	13-05605-000	Water			11/14/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0365-BS1	LCS	13-05605-000	Water			11/14/2017	11/17/2017	EPA 200.8	7440-50-8	Copper	26.1		ug/L
BFK0365-BLK1	Blank	13-05605-000	Water			11/14/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0365-BS1	LCS	13-05605-000	Water			11/14/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	90.7		ug/L
17K0197-01	WUFF-IN	13-05605-000	Water	11/13/2017	11/13/2017	11/14/2017	11/18/2017	EPA 200.8	7440-66-6	Zinc	71.7		ug/L
17K0197-02	WUFF-OUT	13-05605-000	Water	11/13/2017	11/13/2017	11/14/2017	11/18/2017	EPA 200.8	7440-66-6	Zinc	62.9		ug/L
BFK0365-BLK1	Blank	13-05605-000	Water			11/14/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0365-BS1	LCS	13-05605-000	Water			11/14/2017	11/17/2017	EPA 200.8	7440-66-6	Zinc	87.4		ug/L
BFK0378-BLK1	Blank	13-05605-000	Water			11/14/2017	11/14/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFK0378-BS1	LCS	13-05605-000	Water			11/14/2017	11/14/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.147		mg-P/L
17K0197-01	WUFF-IN	13-05605-000	Water	11/13/2017	11/13/2017	11/14/2017	11/14/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0090		mg-P/L
17K0197-02	WUFF-OUT	13-05605-000	Water	11/13/2017	11/13/2017	11/14/2017	11/14/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0070		mg-P/L
BFK0447-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0447-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	29.5		ug/L
17K0197-03	WUFF-IN	13-05605-000	Water	11/13/2017	11/13/2017	11/16/2017	11/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	7.14		ug/L
17K0197-04	WUFF-OUT	13-05605-000	Water	11/13/2017	11/13/2017	11/16/2017	11/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	7.18		ug/L
BFK0447-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0447-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	29.3		ug/L
BFK0447-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0447-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	95.8		ug/L
17K0197-03	WUFF-IN	13-05605-000	Water	11/13/2017	11/13/2017	11/16/2017	11/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	24.2		ug/L
17K0197-04	WUFF-OUT	13-05605-000	Water	11/13/2017	11/13/2017	11/16/2017	11/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	24.6		ug/L
BFK0447-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0447-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	89.2		ug/L
BFK0454-BLK1	Blank	13-05605-000	Water			11/16/2017	11/17/2017	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BFK0454-BS1	LCS	13-05605-000	Water			11/16/2017	11/17/2017	EPA 6010C	7440-70-2	Calcium	10.2		mg/L
17K0197-01	WUFF-IN	13-05605-000	Water	11/13/2017	11/13/2017	11/16/2017	11/17/2017	EPA 6010C	7440-70-2	Calcium	10.5		mg/L
17K0197-02	WUFF-OUT	13-05605-000	Water	11/13/2017	11/13/2017	11/16/2017	11/17/2017	EPA 6010C	7440-70-2	Calcium	11.3		mg/L
BFK0454-BLK1	Blank	13-05605-000	Water			11/16/2017	11/17/2017	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BFK0454-BS1	LCS	13-05605-000	Water			11/16/2017	11/17/2017	EPA 6010C	7439-95-4	Magnesium	10.9		mg/L
17K0197-01	WUFF-IN	13-05605-000	Water	11/13/2017	11/13/2017	11/16/2017	11/17/2017	EPA 6010C	7439-95-4	Magnesium	2.58		mg/L
17K0197-02	WUFF-OUT	13-05605-000	Water	11/13/2017	11/13/2017	11/16/2017	11/17/2017	EPA 6010C	7439-95-4	Magnesium	2.90		mg/L
BFK0548-BLK2	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BLK3	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BLK4	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BS2	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.324		mg-P/L
BFK0548-BS3	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.324		mg-P/L
BFK0548-BS4	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.320		mg-P/L
17K0197-01	WUFF-IN	13-05605-000	Water	11/13/2017	11/13/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0700		mg-P/L
17K0197-02	WUFF-OUT	13-05605-000	Water	11/13/2017	11/13/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0420		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

01 December 2017

Dylan Ahearn
Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle, WA 98121

RE: Hydro International

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)
17K0197

Associated SDG ID(s)
N/A

Amanda
Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical
Resources, Inc., ou=Client
Services, cn=Amanda
Volgardsen,
email=amandav@arilabs.com
Date: 2017.12.01 11:34:52 -08'00'

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.





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

Chain of Custody Record

Project Name: Hydro International Up-flo Filter		Project Number: 13-05605-000		Client: Herrera Environmental		Analyses Requested											
Report To: Dylan Ahearn				Copy To:		Total Suspended Solids - SM 2540D	Suspended Sediment Concentration - SMD3977	Total volatile Suspended solids - SM2540-E	Particle size Distribution - ASTM-3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Hardness as CaCO3-SM 2340B	Copper, dissolved - EPA 200.8	Copper, total - EPA 200.8	Zinc, dissolved - EPA 200.8	Zinc, total - EPA 200.8	Lab ID No.
Sampled By: Meghan Miller		Delivery Method: ice cooled hand delivered															
Laboratory: Analytical Resources Inc.		Requested Completion Date:		Total No. of Containers: 2													
Lab Use:		Sample ID	Date	Time	Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)										
		WUFF-IN	11-13-17	13:00	C	N	SW	x	X	x	X	X	X	X	X	X	
		WUFF-OUT	11-13-17	13:00	C	N	SW	x	X	X	X	X	X	X	X	X	
Comments/Special Instructions: Send 1 liter to ETS, Inc 975 Transport Way, Suite 2, Petaluma, CA for PSD, TSS, and TVSS. PSD to be run for >500, 500-125, 125-62.5, 62.5-4, <4.																	
Relinquished by (Name/CO/ Meghan Miller/Herrera		Signature Meghan Miller		Date/Time 11.13.17 2:06		Received By (Name/CO) Brandon Fok/ARI		Signature Brandon Fok		Date/Time 11/13/17 16:06							
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)



WORK ORDER

17K0197

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: [none]

Preservation Confirmation

Container ID	Container Type	pH
17K0197-01 A	Large OJ, 1000 mL	
17K0197-01 B	Large OJ, 1000 mL	
17K0197-01 C	Small OJ, 500 mL, 9N H2SO4	L2 pass
17K0197-01 D	Small OJ, 500 mL	
17K0197-01 E	HDPE NM, 500 mL, 1:1 HNO3	L2 pass
17K0197-02 A	Large OJ, 1000 mL	
17K0197-02 B	Large OJ, 1000 mL	
17K0197-02 C	Small OJ, 500 mL, 9N H2SO4	L2 pass
17K0197-02 D	Small OJ, 500 mL	
17K0197-02 E	HDPE NM, 500 mL, 1:1 HNO3	L2 pass
17K0197-03 A	HDPE NM, 500 mL	22 fail
17K0197-04 A	HDPE NM, 500 mL	22 fail

SF

Preservation Confirmed By

11/13/17

Date



Cooler Receipt Form

ARI Client: 4400000

Project Name: _____

COC No(s): _____ NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: 17K0197

Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? _____

YES ☐ NO ☒

Were custody papers included with the cooler? _____

YES ☒ NO ☐

Were custody papers properly filled out (ink, signed, etc.) _____

YES ☒ NO ☐

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time: _____

5.4

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: P003565

Cooler Accepted by: BF

Date: 11/13/17

Time: 1406

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? _____

YES ☐ NO ☒

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: None

Was sufficient ice used (if appropriate)? _____

NA ☒ YES ☐ NO ☐

Were all bottles sealed in individual plastic bags? _____

YES ☒ NO ☐

Did all bottles arrive in good condition (unbroken)? _____

YES ☒ NO ☐

Were all bottle labels complete and legible? _____

YES ☒ NO ☐

Did the number of containers listed on COC match with the number of containers received? _____

YES ☒ NO ☐

Did all bottle labels and tags agree with custody papers? _____

YES ☒ NO ☐

Were all bottles used correct for the requested analyses? _____

YES ☒ NO ☐

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...

NA ☒ YES ☐ NO ☐

Were all VOC vials free of air bubbles? _____

NA ☒ YES ☐ NO ☐

Was sufficient amount of sample sent in each bottle? _____

YES ☒ NO ☐

Date VOC Trip Blank was made at ARI: _____

Was Sample Split by ARI: NA ☒ YES ☐

Date/Time: 11/13/17

Equipment: Churn Split

Split by: SF

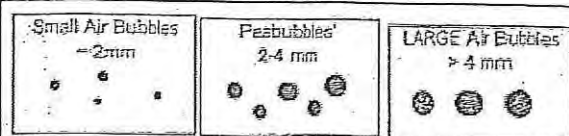
Samples Logged by: _____ Date: _____ Time: 1622

**** Notify Project Manager of discrepancies or concerns ****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____



Small → "sm" (< 2 mm)

Peabubbles → "pb" (2 to < 4 mm)

Large → "lg" (4 to < 6 mm)

Headspace → "hs" (> 6 mm)



ETS

Environmental Technical Services

- Soil, Water & Air Testing & Monitoring
- Analytical Labs
- Technical Support

975 Transport Way, Suite 2
Petaluma, CA 94954
(707) 778-9605/FAX 778-9612
e-mail: entech@pacbell.net

**Serving people and the environment
so that both benefit.**

COMPANY: Analytical Resources, Inc., 4611 S. 134 th Place, Suite 100, Tukwila, WA 98168	ANALYST(S)	SUPERVISOR
ATTN: Amanda Volgardsen	S. Santos	D. Jacobson
JOB: Hydro International Up-Flo Filter	L. Quijano	LAB DIRECTOR
SITE: Oregon-Washington	11/10/2017 11/15/2017 11/27/2017	G.S. Conrad, PhD

PARTICLE SIZE DISTRIBUTION (PSD) ANALYSIS & REPORT – 5 PART

LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	SUSPENDED SOLIDS mg/l @ ≥500 μ	SUSPENDED SOLIDS mg/l @ 125 μ	SUSPENDED SOLIDS mg/l @ 63 μ	SUSPENDED SOLIDS mg/l @ 32 μ	SUSPENDED SOLIDS mg/l @ 4 μ	SUSPENDED SOLIDS mg/l @ 1 μ	SUSPENDED SEDIMENT CONC TSS mg/l
07568-4	HI-39HEC/RW	WUFF-IN	1.5	3.0	5.0		14.5	2.4	28.0
	17K0197-01		5.7%	11.4%	18.9%		54.9%	9.1%	
						Total SSC by Summation →		26.4	
07568-5	HI-40HEC/RW	WUFF-OUT	0.5	1.5	2.0		8.1	1.1	14.0
	17K0197-02		3.8%	11.4%	15.2%		61.4%	8.3%	
						Total SSC by Summation →		13.2	
			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
						Total SSC by Summation →		0.0	
			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
						Total SSC by Summation →		0.0	
LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	Water pH -log[H ⁺]	ECw [Spec Cond] μS/cm	COLOR, TRUE PtCo Units	COLOR APPARENT PtCo Units	TOTAL IRON Fe (diss.) mg/l	TOTAL VOLATILE SUSPENDED SOLIDS (TVSS) mg/l	

COMMENTS

The matrix has a very low concentration of TSS particles amounting to only <30 ppm in the input sample; likewise the output sample is very low at <15 ppm. In this case the overall reduction averaged right at 50% coincidentally in both analytics (i.e., TSS by summation vs analytical TSS). The specific fraction reductions going from coarsest to finest fractions are as follows: 66.7%, 50.0%, 60.0%, 44.1%, and 54.2%. The distribution is uni-modal with the mode in the second finest size class (i.e., 4-63 μ class). In this case the RPDs are exactly the same as both are excellent as follows: ±2.9%, and ±2.9%.

\\ NOTES: Tests were done according to methodology as per Association of Testing Materials (ASTM): Suspended Sediment Concentration – Modified ASTM D3977 (Practice for Determining Suspended-Sediment Concentration in Water Samples). Standard Methods is followed for the other tests: Color - 2120 C; Spec Cond. (ECw) - 2510 B; Iron - 3500-Fe B; pH - 4500-H+ B; TRPH - 5520 C.

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17K0197)
Project #: 16T001-035
Client : Analytical Resources, Inc.
Source: Multiple
MTC Sample#: Multiple

Date Received: November 14, 2017
Sampled By: Others
Date Reported: November 29, 2017
Tested By: B. Goble

CASE NARRATIVE

1. Three samples were submitted for sediment concentration by ASTM D3977, Method C.
2. The coarse material was screened over a No. 230 sieve.
3. The suspended solids are reported in mg/L.
4. The data is provided in a summary table.
5. There were no other noted anomalies in this project.

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by: 

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980
Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6061 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974
Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17K0197)

Client: Analytical Resources, Inc.

Project #: 16T001-035

Date Received: November 14, 2017

Sampled by: Others

Date Tested: November 15, 2017

Tested by: B. Goble

Suspended Sediment Concentration ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC ($>63\mu\text{m}$) (mg/L)	FineFraction SSC ($<63\mu\text{m}$) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	T17-1644	11/13/2017	13.2	24.8	38.0
WUFF-OUT	T17-1645	11/13/2017	4.6	12.9	17.5

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by:

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Regional Offices: Olympia ~ 360.534.9777

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Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	17K0197-01	Water	13-Nov-2017 13:00	13-Nov-2017 14:06
WUFF-OUT	17K0197-02	Water	13-Nov-2017 13:00	13-Nov-2017 14:06
WUFF-IN	17K0197-03	Water	13-Nov-2017 13:00	13-Nov-2017 14:06
WUFF-OUT	17K0197-04	Water	13-Nov-2017 13:00	13-Nov-2017 14:06



Herrera Environmental Consultants
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Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

Case Narrative

Sample receipt

Samples as listed on the preceding page were received November 13, 2017 under ARI workorder 17K0197. For details regarding sample receipt, please refer to the Cooler Receipt Form. The TSS and TVSS analysis were subcontracted to ETS Labs. The SSC analysis was subcontracted to MTC Labs.

Total and Dissolved Metals - EPA Method 200.8

The samples were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.

Total Hardness - EPA Method 6010C

The samples were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank was clean at the reporting limits.

The LCS percent recoveries were within control limits.

Wet Chemistry (O-Phos, T-Phos)

The samples were prepared and analyzed within the recommended holding times.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.



Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

WUFF-IN
17K0197-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 11/13/2017 13:00

Instrument: ICPMS2

Analyzed: 18-Nov-2017 22:18

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0365 Sample Size: 25 mL
Prepared: 14-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	22.0	ug/L	
Zinc	7440-66-6	1	4.00	71.7	ug/L	



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Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

WUFF-IN
17K0197-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/13/2017 13:00
Analyzed: 17-Nov-2017 11:53

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0454 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	10.5	mg/L	
Magnesium	7439-95-4	1	0.0500	2.58	mg/L	



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Reported:
01-Dec-2017 11:25

WUFF-IN
17K0197-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-1

Sampled: 11/13/2017 13:00
Analyzed: 14-Nov-2017 12:32

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFK0378
Prepared: 14-Nov-2017

Sample Size: 50 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0090	mg-P/L	

Instrument: UV1800-2

Analyzed: 21-Nov-2017 17:12

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFK0548
Prepared: 20-Nov-2017

Sample Size: 25 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0700	mg-P/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

WUFF-IN
17K0197-01 (Water)

Calculation

Method: SM 2340 B-97
Instrument: [CALC]

Sampled: 11/13/2017 13:00
Analyzed: 17-Nov-2017 11:53

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 16-Nov-2017 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	37.0	mg/L	



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Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

WUFF-OUT
17K0197-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 11/13/2017 13:00

Instrument: ICPMS2

Analyzed: 18-Nov-2017 21:34

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0365 Sample Size: 25 mL
Prepared: 14-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	18.1	ug/L	
Zinc	7440-66-6	1	4.00	62.9	ug/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

WUFF-OUT
17K0197-02 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/13/2017 13:00
Analyzed: 17-Nov-2017 11:57

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0454 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	11.3	mg/L	
Magnesium	7439-95-4	1	0.0500	2.90	mg/L	



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Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

WUFF-OUT
17K0197-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-1

Sampled: 11/13/2017 13:00
Analyzed: 14-Nov-2017 12:33

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFK0378
Prepared: 14-Nov-2017

Sample Size: 50 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0070	mg-P/L	

Instrument: UV1800-2

Analyzed: 21-Nov-2017 17:13

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFK0548
Prepared: 20-Nov-2017

Sample Size: 25 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0420	mg-P/L	



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Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

WUFF-OUT
17K0197-02 (Water)

Calculation

Method: SM 2340 B-97
Instrument: [CALC]

Sampled: 11/13/2017 13:00
Analyzed: 17-Nov-2017 11:57

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 16-Nov-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	40.2	mg/L	



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Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

WUFF-IN
17K0197-03 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/13/2017 13:00
Analyzed: 17-Nov-2017 18:44

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0447 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	7.14	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	24.2	ug/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

WUFF-OUT
17K0197-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 11/13/2017 13:00

Instrument: ICPMS2

Analyzed: 17-Nov-2017 18:49

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0447 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	7.18	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	24.6	ug/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

Metals and Metallic Compounds - Quality Control

Batch BFK0365 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0365-BLK1)			Prepared: 14-Nov-2017 Analyzed: 17-Nov-2017 14:53								
Copper	63	ND	0.500	ug/L							U
Copper	65	ND	0.500	ug/L							U
Zinc	66	ND	4.00	ug/L							U
Zinc	67	ND	4.00	ug/L							U
LCS (BFK0365-BS1)			Prepared: 14-Nov-2017 Analyzed: 17-Nov-2017 19:55								
Copper	63	25.8	0.500	ug/L	25.0		103	80-120			
Copper	65	26.1	0.500	ug/L	25.0		104	80-120			
Zinc	66	90.7	4.00	ug/L	80.0		113	80-120			
Zinc	67	87.4	4.00	ug/L	80.0		109	80-120			



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

Metals and Metallic Compounds - Quality Control

Batch BFK0454 - TWC EPA 3010A

Instrument: ICP2 Analyst: TCH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0454-BLK1) Prepared: 16-Nov-2017 Analyzed: 17-Nov-2017 10:47										
Calcium	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
LCS (BFK0454-BS1) Prepared: 16-Nov-2017 Analyzed: 17-Nov-2017 11:32										
Calcium	10.2	0.0500	mg/L	10.0		102	80-120			
Magnesium	10.9	0.0500	mg/L	10.0		109	80-120			



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BFK0447 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0447-BLK1)			Prepared: 16-Nov-2017 Analyzed: 16-Nov-2017 14:33								
Copper, Dissolved	63	ND	0.500	ug/L							U
Copper, Dissolved	65	ND	0.500	ug/L							U
Zinc, Dissolved	66	ND	4.00	ug/L							U
Zinc, Dissolved	67	ND	4.00	ug/L							U
LCS (BFK0447-BS1)			Prepared: 16-Nov-2017 Analyzed: 16-Nov-2017 15:20								
Copper, Dissolved	63	29.5	0.500	ug/L	25.0		118	80-120			
Copper, Dissolved	65	29.3	0.500	ug/L	25.0		117	80-120			
Zinc, Dissolved	66	95.8	4.00	ug/L	80.0		120	80-120			
Zinc, Dissolved	67	89.2	4.00	ug/L	80.0		111	80-120			



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

Wet Chemistry - Quality Control

Batch BFK0378 - No Prep Wet Chem

Instrument: UV1800-1 Analyst: GM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0378-BLK1)									
					Prepared: 14-Nov-2017 Analyzed: 14-Nov-2017 12:28				
Orthophosphorus	ND	0.0040	mg-P/L						U
LCS (BFK0378-BS1)									
					Prepared: 14-Nov-2017 Analyzed: 14-Nov-2017 12:28				
Orthophosphorus	0.147	0.0040	mg-P/L	0.150		98.0 90-110			



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

Wet Chemistry - Quality Control

Batch BFK0548 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0548-BLK2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 16:50										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0548-BLK3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:08										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0548-BLK4) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:22										
Total Phosphorus	ND	0.0080	mg-P/L							U
DL (BFK0548-BS2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 16:52										
Total Phosphorus	0.324	0.0080	mg-P/L	0.300		108	90-110			
LCS (BFK0548-BS3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:10										
Total Phosphorus	0.324	0.0080	mg-P/L	0.300		108	90-110			
LCS (BFK0548-BS4) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:22										
Total Phosphorus	0.320	0.0080	mg-P/L	0.300		107	90-110			



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Project: Hydro International
Project Number: 13-05605-000
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Reported:
01-Dec-2017 11:25

Certified Analyses included in this Report

Analyte	Certifications
EPA 200.8 in Water	
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
EPA 6010C in Water	
Calcium	WADOE,NELAP,DoD-ELAP
Magnesium	WADOE,NELAP,DoD-ELAP
SM 4500-P E-99 in Water	
Orthophosphorus	WADOE,NELAP
Total Phosphorus	WADOE,NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/11/2018
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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Project: Hydro International
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Project Manager: Dylan Ahearn

Reported:
01-Dec-2017 11:25

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
J	Estimated concentration value detected below the reporting limit.
D	The reported value is from a dilution
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

November 13, 2017

Data_17K0224

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17K0224-01	WUFF-IN	13-05605-000	Water	11/14/2017	11/14/2017	11/16/2017	11/17/2017	SM 2340 B-97		Hardness	34.0		mg/L
17K0224-02	WUFF-OUT	13-05605-000	Water	11/14/2017	11/14/2017	11/16/2017	11/17/2017	SM 2340 B-97		Hardness	50.6		mg/L
BFK0423-BLK1	Blank	13-05605-000	Water			11/15/2017	11/15/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFK0423-BS1	LCS	13-05605-000	Water			11/15/2017	11/15/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.146		mg-P/L
BFK0423-DUP1	WUFF-IN	13-05605-000	Water	11/14/2017	11/14/2017	11/15/2017	11/15/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0140		mg-P/L
BFK0423-MS1	WUFF-IN	13-05605-000	Water	11/14/2017	11/14/2017	11/15/2017	11/15/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.114		mg-P/L
17K0224-01	WUFF-IN	13-05605-000	Water	11/14/2017	11/14/2017	11/15/2017	11/15/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0140		mg-P/L
17K0224-02	WUFF-OUT	13-05605-000	Water	11/14/2017	11/14/2017	11/15/2017	11/15/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0180		mg-P/L
BFK0447-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0447-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	29.5		ug/L
17K0224-03	WUFF-IN	13-05605-000	Water	11/14/2017	11/14/2017	11/16/2017	11/18/2017	EPA 200.8-Dissolved	7440-50-8	Copper	12.8		ug/L
17K0224-04	WUFF-OUT	13-05605-000	Water	11/14/2017	11/14/2017	11/16/2017	11/18/2017	EPA 200.8-Dissolved	7440-50-8	Copper	12.6		ug/L
BFK0447-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0447-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	29.3		ug/L
BFK0447-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0447-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	95.8		ug/L
17K0224-03	WUFF-IN	13-05605-000	Water	11/14/2017	11/14/2017	11/16/2017	11/18/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	41.0		ug/L
17K0224-04	WUFF-OUT	13-05605-000	Water	11/14/2017	11/14/2017	11/16/2017	11/18/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	36.5		ug/L
BFK0447-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0447-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	89.2		ug/L
BFK0449-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0449-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	28.4		ug/L
17K0224-02	WUFF-OUT	13-05605-000	Water	11/14/2017	11/14/2017	11/16/2017	11/18/2017	EPA 200.8	7440-50-8	Copper	34.2		ug/L
BFK0449-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0449-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8	7440-50-8	Copper	28.6		ug/L
17K0224-01	WUFF-IN	13-05605-000	Water	11/14/2017	11/14/2017	11/16/2017	11/18/2017	EPA 200.8	7440-50-8	Copper	49.1		ug/L
BFK0449-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0449-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	102	*	ug/L
BFK0449-BLK1	Blank	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0449-BS1	LCS	13-05605-000	Water			11/16/2017	11/16/2017	EPA 200.8	7440-66-6	Zinc	94.2		ug/L
BFK0454-BLK1	Blank	13-05605-000	Water			11/16/2017	11/17/2017	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BFK0454-BS1	LCS	13-05605-000	Water			11/16/2017	11/17/2017	EPA 6010C	7440-70-2	Calcium	10.2		mg/L
17K0224-01	WUFF-IN	13-05605-000	Water	11/14/2017	11/14/2017	11/16/2017	11/17/2017	EPA 6010C	7440-70-2	Calcium	9.87		mg/L
17K0224-02	WUFF-OUT	13-05605-000	Water	11/14/2017	11/14/2017	11/16/2017	11/17/2017	EPA 6010C	7440-70-2	Calcium	13.7		mg/L
BFK0454-BLK1	Blank	13-05605-000	Water			11/16/2017	11/17/2017	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BFK0454-BS1	LCS	13-05605-000	Water			11/16/2017	11/17/2017	EPA 6010C	7439-95-4	Magnesium	10.9		mg/L
17K0224-01	WUFF-IN	13-05605-000	Water	11/14/2017	11/14/2017	11/16/2017	11/17/2017	EPA 6010C	7439-95-4	Magnesium	2.28		mg/L
17K0224-02	WUFF-OUT	13-05605-000	Water	11/14/2017	11/14/2017	11/16/2017	11/17/2017	EPA 6010C	7439-95-4	Magnesium	3.98		mg/L
BFK0532-BLK1	Blank	13-05605-000	Water			11/20/2017	11/20/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0532-BS1	LCS	13-05605-000	Water			11/20/2017	11/20/2017	EPA 200.8	7440-66-6	Zinc	103	*	ug/L
BFK0532-BS2	LCS	13-05605-000	Water			11/20/2017	11/21/2017	EPA 200.8	7440-66-6	Zinc	95.8		ug/L
BFK0532-BLK1	Blank	13-05605-000	Water			11/20/2017	11/20/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0532-BS1	LCS	13-05605-000	Water			11/20/2017	11/20/2017	EPA 200.8	7440-66-6	Zinc	96.1		ug/L
BFK0532-BS2	LCS	13-05605-000	Water			11/20/2017	11/21/2017	EPA 200.8	7440-66-6	Zinc	90.8		ug/L
17K0224-01RE1	WUFF-IN	13-05605-000	Water	11/14/2017	11/14/2017	11/20/2017	11/20/2017	EPA 200.8	7440-66-6	Zinc	158		ug/L
17K0224-02RE1	WUFF-OUT	13-05605-000	Water	11/14/2017	11/14/2017	11/20/2017	11/20/2017	EPA 200.8	7440-66-6	Zinc	86.5		ug/L
BFK0548-BLK2	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BLK3	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0548-BLK4	Blank	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L

Data_17K0224

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BFK0548-BS2	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.324		mg-P/L
BFK0548-BS3	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.324		mg-P/L
BFK0548-BS4	LCS	13-05605-000	Water			11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.320		mg-P/L
17K0224-01	WUFF-IN	13-05605-000	Water	11/14/2017	11/14/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.148		mg-P/L
17K0224-02	WUFF-OUT	13-05605-000	Water	11/14/2017	11/14/2017	11/20/2017	11/21/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0960		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

21 December 2017

Dylan Ahearn
Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle, WA 98121

RE: Hydro International

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)
17K0224

Associated SDG ID(s)
N/A

Amanda Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical
Resources, Inc., ou=Client
Services, cn=Amanda
Volgardsen,
email=amandav@arilabs.com
Date: 2017.12.21 11:02:11 -08'00'

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclosed Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.





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

Chain of Custody Record

Project Name: Hydro International Up-flo Filter		Project Number: 13-05605-000		Client: Herrera Environmental		Analyses Requested											
Report To: Dylan Ahearn				Copy To:		Total Suspended Solids - SM 2540D	Suspended Sediment Concentration - SMD3977	Total volatile Suspended solids - SM2540-E	Particle size Distribution - ASTM-3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Hardness as CaCO3-SM 2340B	Copper, dissolved - EPA 200.8	Copper, total - EPA 200.8	Zinc, dissolved - EPA 200.8	Zinc, total - EPA 200.8	Lab ID No.
Sampled By: M. Mullen		Delivery Method: 12 cooler hand delivered															
Laboratory: Analytical Resources Inc.		Requested Completion Date:		Total No. of Containers: 2													
Lab Use:		Sample ID	Date	Time	Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)										
		WUFF-IN	11.14.17	12:45	C	N	SW	x	X	x	X	X	X	X	X	X	
		WUFF-OUT	11.14.17	12:45	C	N	SW	x	X	X	X	X	X	X	X	X	
Comments/Special Instructions: Send 1 liter to ETS, Inc 975 Transport Way, Suite 2, Petaluma, CA for PSD, TSS, and TVSS. PSD to be run for >500, 500-125, 125-62.5, 62.5-4, <4.																	
Relinquished by (Name/CO/ Meghan Mullen / Herrera		Signature <i>Meghan Mullen</i>		Date/Time 11-14-17 13:30		Received By (Name/CO) Stephanie Fisher / AR		Signature <i>Stephanie Fisher</i>		Date/Time 11/14/17 13:30							
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)



WORK ORDER

17K0224

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
17K0224-01 A	Large OJ, 1000 mL	
17K0224-01 B	Large OJ, 1000 mL	
17K0224-01 C	Small OJ, 500 mL, 9N H ₂ SO ₄	L2 pass
17K0224-01 D	Small OJ, 500 mL	
17K0224-01 E	HDPE NM, 500 mL, 1:1 HNO ₃	L2 pass
17K0224-02 A	Large OJ, 1000 mL	
17K0224-02 B	Large OJ, 1000 mL	
17K0224-02 C	Small OJ, 500 mL, 9N H ₂ SO ₄	L2 pass
17K0224-02 D	Small OJ, 500 mL	
17K0224-02 E	HDPE NM, 500 mL, 1:1 HNO ₃	L2 pass
17K0224-03 A	HDPE NM, 500 mL	72 Fail
17K0224-04 A	HDPE NM, 500 mL	72 Fail

SF

Preservation Confirmed By

11/14/17
Date



Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 17K0224

Preliminary Examination Phase:

Project Name: Hydro International

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Tracking No: _____ NA

Were intact, properly signed and dated custody seals attached to the outside of to cooler? _____

YES ☒ NO ☒

Were custody papers included with the cooler? _____

YES ☒ NO ☒

Were custody papers properly filled out (ink, signed, etc.) _____

YES ☒ NO ☒

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time: 1330

S.2

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: Don5200

Cooler Accepted by: SF

Date: 11/14/17

Time: 1330

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? _____

YES ☒ NO ☒

What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: None

Was sufficient ice used (if appropriate)? _____

NA ☒ YES ☒ NO ☒

Were all bottles sealed in individual plastic bags? _____

YES ☒ NO ☒

Did all bottles arrive in good condition (unbroken)? _____

YES ☒ NO ☒

Were all bottle labels complete and legible? _____

YES ☒ NO ☒

Did the number of containers listed on COC match with the number of containers received? _____

YES ☒ NO ☒

Did all bottle labels and tags agree with custody papers? _____

YES ☒ NO ☒

Were all bottles used correct for the requested analyses? _____

YES ☒ NO ☒

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...

YES ☒ NO ☒

Were all VOC vials free of air bubbles? _____

NA ☒ YES ☒ NO ☒

Was sufficient amount of sample sent in each bottle? _____

YES ☒ NO ☒

Date VOC Trip Blank was made at ARI: _____

NA ☒

Was Sample Split by ARI: NA ☒ YES ☒ Date/Time: 11/14/17 Equipment: Churn Split Split by: SF

Samples Logged by: SF

Date: 11/14/17

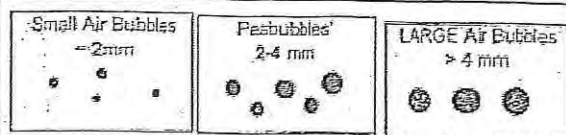
Time: 1550

** Notify Project Manager of discrepancies or concerns **

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____



Small → "sm" (< 2 mm)

Peabubbles → "pb" (2 to < 4 mm)

Large → "lg" (4 to < 6 mm)

Headspace → "hs" (> 6 mm)



ETS

Environmental Technical Services

- Soil, Water & Air Testing & Monitoring
- Analytical Labs
- Technical Support

975 Transport Way, Suite 2
Petaluma, CA 94954
(707) 778-9605/FAX 778-9612
e-mail: entech@pacbell.net

**Serving people and the environment
so that both benefit.**

COMPANY: Analytical Resources, Inc., 4611 S. 134 th Place, Suite 100, Tukwila, WA 98168						ANALYST(S) S. Santos L. Quijano	SUPERVISOR D. Jacobson LAB DIRECTOR G.S. Conrad, PhD
ATTN: Amanda Volgardsen			DATE COLLECTED	DATE RECEIVED	DATE COMPLETED		
JOB: Hydro International Up-Flo Filter			11/14/2017	11/20/2017	11/30/2017		
SITE: Oregon-Washington							

PARTICLE SIZE DISTRIBUTION (PSD) ANALYSIS & REPORT – 5 PART

LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	SUSPENDED SOLIDS mg/l @ ≥500 μ	SUSPENDED SOLIDS mg/l @ 125 μ	SUSPENDED SOLIDS mg/l @ 63 μ	SUSPENDED SOLIDS mg/l @ 32 μ	SUSPENDED SOLIDS mg/l @ 4 μ	SUSPENDED SOLIDS mg/l @ 1 μ	SUSPENDED SEDIMENT CONC TSS mg/l
07576-1	HI-31HEC/RW	WUFF-IN	2.5 3.3%	6.5 8.6%	5.5 7.3%		35.1 46.4%	26.0 34.4%	74.0
	17K0224-01					Total SSC by Summation →		75.6	
07576-2	HI-32HEC/RW	WUFF-OUT	0.5 1.6%	1.5 4.9%	2.0 6.6%		12.6 41.4%	13.8 45.4%	28.0
	17K0224-02					Total SSC by Summation →		30.4	
			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
						Total SSC by Summation →		0.0	
			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
						Total SSC by Summation →		0.0	
LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	Water pH -log[H ⁺]	ECw [Spec Cond] μS/cm	COLOR, TRUE PtCo Units	COLOR APPARENT PtCo Units	TOTAL IRON Fe (diss.) mg/l	TOTAL VOLATILE SUSPENDED SOLIDS (TVSS) mg/l	

COMMENTS

The matrix has a very low concentration of TSS particles amounting to roughly 75 ppm in the input sample; and the output sample is also very low at ~30 ppm. For this pair of samples, the overall reduction averaged right at 61% (i.e., TSS by summation vs analytical TSS). The specific fraction reductions going from coarsest to finest fraction sizes are as follows: 80.0%, 76.9%, 63.6%, 64.1%, and 46.9%. Note there was a more or less continually declining proportion of removal going from the coarsest to finest size fractions, i.e., removal is more efficient at the coarser end of the range and less efficient at the finer end of the size range. Also in this case, the distribution is essentially uni-modal with the great preponderance of particles in the finest two size fractions (i.e., 4-63 & 1-4 μ fractions) with >80% in these two classes. This sort of distribution is not uncommon. The RPDs are essentially excellent as follows: ±1.1%, and ±4.1%.

\\ NOTES: Tests were done according to methodology as per Association of Testing Materials (ASTM): Suspended Sediment Concentration – Modified ASTM D3977 (Practice for Determining Suspended-Sediment Concentration in Water Samples). Standard Methods is followed for the other tests: Color - 2120 C; Spec Cond. (ECw) - 2510 B; Iron - 3500-Fe B; pH - 4500-H⁺ B; TRPH - 5520 C.

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17K0224)
Project #: 16T001-035
Client : Analytical Resources, Inc.
Source: Multiple
MTC Sample#: Multiple

Date Received: November 16, 2017
Sampled By: Others
Date Reported: December 20, 2017
Tested By: B. Goble

CASE NARRATIVE

1. Two samples were submitted for sediment concentration by ASTM D3977, Method C.
2. The coarse material was screened over a No. 230 sieve.
3. The suspended solids are reported in mg/L.
4. The data is provided in a summary table.
5. There were no other noted anomalies in this project.

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

Reviewed by: 

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Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974
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Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17K0224)

Client: Analytical Resources, Inc.

Project #: 16T001-035

Date Received: November 16, 2017

Sampled by: Others

Date Tested: December 13, 2017

Tested by: B. Goble

Suspended Sediment Concentration ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC ($>63\mu\text{m}$) (mg/L)	FineFraction SSC ($<63\mu\text{m}$) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	T17-1664	11/29/2017	39.1	27.7	66.8
WUFF-OUT	T17-1665	11/29/2017	9.0	7.0	16.0

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Reviewed by:

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Herrera Environmental Consultants
2200 6th Avenue, Suite 1100
Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
21-Dec-2017 10:59

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	17K0224-01	Water	14-Nov-2017 12:45	14-Nov-2017 13:30
WUFF-OUT	17K0224-02	Water	14-Nov-2017 12:45	14-Nov-2017 13:30
WUFF-IN	17K0224-03	Water	14-Nov-2017 12:45	14-Nov-2017 13:30
WUFF-OUT	17K0224-04	Water	14-Nov-2017 12:45	14-Nov-2017 13:30



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Reported:
21-Dec-2017 10:59

Case Narrative

Sample receipt

Samples as listed on the preceding page were received November 14, 2017 under ARI workorder 17K0224. For details regarding sample receipt, please refer to the Cooler Receipt Form. The TSS and TVSS analysis were subcontracted to ETS Labs. The SSC analysis was subcontracted to MTC Labs.

Total and Dissolved Metals - EPA Method 200.8

The samples were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blanks were clean at the reporting limits.

The BFK0449 LCS has high percent recovery for Zinc. The LCS was reprepared and BFK0532 also has high LCS percent recovery for Zinc. This is likely matrix interference. No further corrective action was taken.

Total Hardness - EPA Method 6010C

The samples were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank was clean at the reporting limits.

The LCS percent recoveries were within control limits.

Wet Chemistry (O-Phos, T-Phos)

The samples were prepared and analyzed within the recommended holding times.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.

A O-Phos matrix spike and duplicate were prepared in conjunction with sample WUFF-IN. The matrix spike percent recovery and duplicate RPD were within QC limits.



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
21-Dec-2017 10:59

WUFF-IN
17K0224-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 11/14/2017 12:45

Instrument: ICPMS2

Analyzed: 18-Nov-2017 23:40

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0449 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	49.1	ug/L	



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WUFF-IN
17K0224-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/14/2017 12:45
Analyzed: 17-Nov-2017 12:42

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0454 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	9.87	mg/L	
Magnesium	7439-95-4	1	0.0500	2.28	mg/L	



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WUFF-IN
17K0224-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-1

Sampled: 11/14/2017 12:45
Analyzed: 15-Nov-2017 13:35

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFK0423
Prepared: 15-Nov-2017

Sample Size: 50 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0140	mg-P/L	

Instrument: UV1800-2

Analyzed: 21-Nov-2017 17:14

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFK0548
Prepared: 20-Nov-2017

Sample Size: 25 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.148	mg-P/L	



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Reported:
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WUFF-IN
17K0224-01 (Water)

Calculation

Method: SM 2340 B-97
Instrument: [CALC]

Sampled: 11/14/2017 12:45
Analyzed: 17-Nov-2017 12:42

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 16-Nov-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	34.0	mg/L	



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Reported:
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WUFF-IN
17K0224-01RE1 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 11/14/2017 12:45

Instrument: ICPMS1

Analyzed: 20-Nov-2017 17:04

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0532 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Zinc	7440-66-6	1	4.00	158	ug/L	



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Project: Hydro International
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Reported:
21-Dec-2017 10:59

WUFF-OUT
17K0224-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/14/2017 12:45
Analyzed: 18-Nov-2017 23:45

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0449 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	34.2	ug/L	



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Project Manager: Dylan Ahearn

Reported:
21-Dec-2017 10:59

WUFF-OUT
17K0224-02 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/14/2017 12:45
Analyzed: 17-Nov-2017 12:46

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0454 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	13.7	mg/L	
Magnesium	7439-95-4	1	0.0500	3.98	mg/L	



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Reported:
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WUFF-OUT
17K0224-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99
Instrument: UV1800-1

Sampled: 11/14/2017 12:45
Analyzed: 15-Nov-2017 13:37

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFK0423
Prepared: 15-Nov-2017

Sample Size: 50 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0180	mg-P/L	

Instrument: UV1800-2

Analyzed: 21-Nov-2017 17:14

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFK0548
Prepared: 20-Nov-2017

Sample Size: 25 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0960	mg-P/L	



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Reported:
21-Dec-2017 10:59

WUFF-OUT
17K0224-02 (Water)

Calculation

Method: SM 2340 B-97
Instrument: [CALC]

Sampled: 11/14/2017 12:45
Analyzed: 17-Nov-2017 12:46

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 16-Nov-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	50.6	mg/L	



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Reported:
21-Dec-2017 10:59

WUFF-OUT
17K0224-02RE1 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 11/14/2017 12:45

Instrument: ICPMS1

Analyzed: 20-Nov-2017 17:00

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0532 Sample Size: 25 mL
Prepared: 20-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Zinc	7440-66-6	1	4.00	86.5	ug/L	



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Reported:
21-Dec-2017 10:59

WUFF-IN
17K0224-03 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/14/2017 12:45
Analyzed: 18-Nov-2017 23:50

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0447 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	12.8	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	41.0	ug/L	



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Project: Hydro International
Project Number: 13-05605-000
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Reported:
21-Dec-2017 10:59

WUFF-OUT
17K0224-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/14/2017 12:45
Analyzed: 18-Nov-2017 22:37

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFK0447 Sample Size: 25 mL
Prepared: 16-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	12.6	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	36.5	ug/L	



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
21-Dec-2017 10:59

Metals and Metallic Compounds - Quality Control

Batch BFK0449 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0449-BLK1)			Prepared: 16-Nov-2017 Analyzed: 16-Nov-2017 14:38								
Copper	63	ND	0.500	ug/L							U
Copper	65	ND	0.500	ug/L							U
Zinc	66	ND	4.00	ug/L							U
Zinc	67	ND	4.00	ug/L							U
LCS (BFK0449-BS1)			Prepared: 16-Nov-2017 Analyzed: 16-Nov-2017 14:58								
Copper	63	28.4	0.500	ug/L	25.0		114	80-120			
Copper	65	28.6	0.500	ug/L	25.0		115	80-120			
Zinc	66	102	4.00	ug/L	80.0		128	80-120			*
Zinc	67	94.2	4.00	ug/L	80.0		118	80-120			



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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
21-Dec-2017 10:59

Metals and Metallic Compounds - Quality Control

Batch BFK0454 - TWC EPA 3010A

Instrument: ICP2 Analyst: TCH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0454-BLK1)										
Prepared: 16-Nov-2017 Analyzed: 17-Nov-2017 10:47										
Calcium	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
LCS (BFK0454-BS1)										
Prepared: 16-Nov-2017 Analyzed: 17-Nov-2017 11:32										
Calcium	10.2	0.0500	mg/L	10.0		102	80-120			
Magnesium	10.9	0.0500	mg/L	10.0		109	80-120			



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Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
21-Dec-2017 10:59

Metals and Metallic Compounds - Quality Control

Batch BFK0532 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0532-BLK1)			Prepared: 20-Nov-2017 Analyzed: 20-Nov-2017 16:04								
Zinc	66	ND	4.00	ug/L							U
Zinc	67	ND	4.00	ug/L							U

LCS (BFK0532-BS1)

Prepared: 20-Nov-2017 Analyzed: 20-Nov-2017 16:08

Zinc	66	103	4.00	ug/L	80.0		129	80-120			*
Zinc	67	96.1	4.00	ug/L	80.0		120	80-120			

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFK0532-BS2)			Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 14:46								
Zinc	66	95.8	4.00	ug/L	80.0		120	80-120			
Zinc	67	90.8	4.00	ug/L	80.0		114	80-120			



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Seattle WA, 98121

Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
21-Dec-2017 10:59

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BFK0447 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0447-BLK1)			Prepared: 16-Nov-2017 Analyzed: 16-Nov-2017 14:33								
Copper, Dissolved	63	ND	0.500	ug/L							U
Copper, Dissolved	65	ND	0.500	ug/L							U
Zinc, Dissolved	66	ND	4.00	ug/L							U
Zinc, Dissolved	67	ND	4.00	ug/L							U
LCS (BFK0447-BS1)			Prepared: 16-Nov-2017 Analyzed: 16-Nov-2017 15:20								
Copper, Dissolved	63	29.5	0.500	ug/L	25.0		118	80-120			
Copper, Dissolved	65	29.3	0.500	ug/L	25.0		117	80-120			
Zinc, Dissolved	66	95.8	4.00	ug/L	80.0		120	80-120			
Zinc, Dissolved	67	89.2	4.00	ug/L	80.0		111	80-120			



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Reported:
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Wet Chemistry - Quality Control

Batch BFK0423 - No Prep Wet Chem

Instrument: UV1800-1 Analyst: GM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0423-BLK1) Prepared: 15-Nov-2017 Analyzed: 15-Nov-2017 13:34										
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BFK0423-BS1) Prepared: 15-Nov-2017 Analyzed: 15-Nov-2017 13:34										
Orthophosphorus	0.146	0.0040	mg-P/L	0.150		97.3	90-110			
Duplicate (BFK0423-DUP1) Source: 17K0224-01 Prepared: 15-Nov-2017 Analyzed: 15-Nov-2017 13:35										
Orthophosphorus	0.0140	0.0040	mg-P/L		0.0140			0.00		
Matrix Spike (BFK0423-MS1) Source: 17K0224-01 Prepared: 15-Nov-2017 Analyzed: 15-Nov-2017 13:36										
Orthophosphorus	0.114	0.0040	mg-P/L	0.0999	0.0140	100	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.



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Wet Chemistry - Quality Control

Batch BFK0548 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0548-BLK2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 16:50										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0548-BLK3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:08										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0548-BLK4) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:22										
Total Phosphorus	ND	0.0080	mg-P/L							U
DL (BFK0548-BS2) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 16:52										
Total Phosphorus	0.324	0.0080	mg-P/L	0.300		108	90-110			
LCS (BFK0548-BS3) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:10										
Total Phosphorus	0.324	0.0080	mg-P/L	0.300		108	90-110			
LCS (BFK0548-BS4) Prepared: 20-Nov-2017 Analyzed: 21-Nov-2017 17:22										
Total Phosphorus	0.320	0.0080	mg-P/L	0.300		107	90-110			



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Certified Analyses included in this Report

Analyte	Certifications
EPA 200.8 in Water	
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
EPA 6010C in Water	
Calcium	WADOE,NELAP,DoD-ELAP
Magnesium	WADOE,NELAP,DoD-ELAP
SM 4500-P E-99 in Water	
Orthophosphorus	WADOE,NELAP
Total Phosphorus	WADOE,NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/11/2018
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
J	Estimated concentration value detected below the reporting limit.
D	The reported value is from a dilution
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

