November 19, 2017

Data_17K0382

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17K0382-01	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/27/2017	12/04/2017	SM 2340 B-97		Hardness	33.8		mg/L
17K0382-02	WUFF-OUT	13-05605-000	Water	11/20/2017	11/20/2017	11/27/2017	12/04/2017	SM 2340 B-97		Hardness	37.1		mg/L
BFK0603-BLK1	Blank	13-05605-000	Water			11/21/2017	11/21/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFK0603-BS1	LCS	13-05605-000	Water			11/21/2017	11/21/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.149		mg-P/L
BFK0603-DUP1	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/21/2017	11/21/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFK0603-MS1	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/21/2017	11/21/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.103		mg-P/L
17K0382-01	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/21/2017	11/21/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040		mg-P/L
17K0382-02	WUFF-OUT	13-05605-000	Water	11/20/2017	11/20/2017	11/21/2017	11/21/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFK0682-BLK1	Blank	13-05605-000	Water			11/27/2017	12/04/2017	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BFK0682-BS1	LCS	13-05605-000	Water			11/27/2017	12/04/2017	EPA 6010C	7440-70-2	Calcium	9.46		mg/L
17K0382-01	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/27/2017	12/04/2017	EPA 6010C	7440-70-2	Calcium	10.3		mg/L
17K0382-02	WUFF-OUT	13-05605-000	Water	11/20/2017	11/20/2017	11/27/2017	12/04/2017	EPA 6010C	7440-70-2	Calcium	11.1		mg/L
BFK0682-BLK1	Blank	13-05605-000	Water			11/27/2017	12/04/2017	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BFK0682-BS1	LCS	13-05605-000	Water			11/27/2017	12/04/2017	EPA 6010C	7439-95-4	Magnesium	9.89		mg/L
17K0382-01	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/27/2017	12/04/2017	EPA 6010C	7439-95-4	Magnesium	1.98		mg/L
17K0382-02	WUFF-OUT	13-05605-000	Water	11/20/2017	11/20/2017	11/27/2017	12/04/2017	EPA 6010C	7439-95-4	Magnesium	2.26		mg/L
BFK0704-BLK1	Blank	13-05605-000	Water			11/28/2017	11/28/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0704-BS1	LCS	13-05605-000	Water			11/28/2017	11/28/2017	EPA 200.8	7440-50-8	Copper	27.0		ug/L
17K0382-01	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/28/2017	11/28/2017	EPA 200.8	7440-50-8	Copper	30.4		ug/L
17K0382-02	WUFF-OUT	13-05605-000	Water	11/20/2017	11/20/2017	11/28/2017	11/28/2017	EPA 200.8	7440-50-8	Copper	28.2		ug/L
BFK0704-BLK1	Blank	13-05605-000	Water			11/28/2017	11/28/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFK0704-BS1	LCS	13-05605-000	Water			11/28/2017	11/28/2017	EPA 200.8	7440-50-8	Copper	27.1		ug/L
BFK0704-BLK1	Blank	13-05605-000	Water			11/28/2017	11/28/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0704-BS1	LCS	13-05605-000	Water			11/28/2017	11/28/2017	EPA 200.8	7440-66-6	Zinc	85.3		ug/L
17K0382-01	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/28/2017	11/28/2017	EPA 200.8	7440-66-6	Zinc	93.9		ug/L
17K0382-02	WUFF-OUT	13-05605-000	Water	11/20/2017	11/20/2017	11/28/2017	11/28/2017	EPA 200.8	7440-66-6	Zinc	94.6		ug/L
BFK0704-BLK1	Blank	13-05605-000	Water			11/28/2017	11/28/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFK0704-BS1	LCS	13-05605-000	Water			11/28/2017	11/28/2017	EPA 200.8	7440-66-6	Zinc	83.5		ug/L
BFK0714-BLK1	Blank	13-05605-000	Water			11/28/2017	12/01/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0714-BLK2	Blank	13-05605-000	Water			11/28/2017	12/01/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BFK0714-BS1	LCS	13-05605-000	Water			11/28/2017	12/01/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.290		mg-P/L
BFK0714-BS2	LCS	13-05605-000	Water			11/28/2017	12/01/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.296		mg-P/L
BFK0714-DUP1	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/28/2017	12/01/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0820		mg-P/L
BFK0714-MS1	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/28/2017	12/01/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	2.10	D	mg-P/L
17K0382-01	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/28/2017	12/01/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0820		mg-P/L
17K0382-02	WUFF-OUT	13-05605-000	Water	11/20/2017	11/20/2017	11/28/2017	12/01/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0900		mg-P/L
BFK0767-BLK2	Blank	13-05605-000	Water			11/30/2017	12/01/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0767-BS2	LCS	13-05605-000	Water			11/30/2017	12/01/2017	EPA 200.8-Dissolved	7440-50-8	Copper	26.2		ug/L
17K0382-03	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/30/2017	11/30/2017	EPA 200.8-Dissolved	7440-50-8	Copper	10.1		ug/L
17K0382-04	WUFF-OUT	13-05605-000	Water	11/20/2017	11/20/2017	11/30/2017	11/30/2017	EPA 200.8-Dissolved	7440-50-8	Copper	10.5		ug/L
BFK0767-BLK2	Blank	13-05605-000	Water			11/30/2017	12/01/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFK0767-BS2	LCS	13-05605-000	Water			11/30/2017	12/01/2017	EPA 200.8-Dissolved	7440-50-8	Copper	26.0		ug/L
BFK0767-BLK2	Blank	13-05605-000	Water			11/30/2017	12/01/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0767-BS2	LCS	13-05605-000	Water			11/30/2017	12/01/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	80.4		ug/L
17K0382-03	WUFF-IN	13-05605-000	Water	11/20/2017	11/20/2017	11/30/2017	11/30/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	37.1		ug/L
17K0382-04	WUFF-OUT	13-05605-000	Water	11/20/2017	11/20/2017	11/30/2017	11/30/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	33.0		ug/L
BFK0767-BLK2	Blank	13-05605-000	Water			11/30/2017	12/01/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFK0767-BS2	LCS	13-05605-000	Water			11/30/2017	12/01/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	76.4		ug/L

Analytical Resources, Incorporated
Analytical Chemists and Consultants

27 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)	Associated SDG ID(s)
17K0382	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: 2017.12.27 14:56:12 -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 reqirements 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.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

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

Chain of Custody Record

17K0382

Project Name:	Project Number:	Client:
Hydro International Up-flo Filter	13-05605-000	Herrera Environmental
Report To: Dylan Ahearn		Copy To:
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 ID	Date	Time	Sample Type (see codes)	Preser-vative? (Y/N)	Matrix (see codes)	Total Suspended Solids- SM 2540D	Analyses Requested: 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.
WUFF-IN	11.20.17	14:30	C	N	SW	x	X	x	X	X	X	X	X	X	X	X	
WUFF-OUT	11.20.17	14:30	C	N	SW	x	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/	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Meghan Mulla/Herrera		11.20.17 15:35	Brandon Fisk /ARI		1535 11/20/17
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

17K0382

Client: Herrera Environmental Consultants | **Project Manager:** Amanda Volgardsen

Project: Hydro International | **Project Number:** 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
17K0382-01 A	Large OJ, 1000 mL	
17K0382-01 B	Large OJ, 1000 mL	
17K0382-01 C	Small OJ, 500 mL, 9N H2SO4	<2 pass
17K0382-01 D	Small OJ, 500 mL	
17K0382-01 E	HDPE NM, 500 mL, 1:1 HNO3	<2 pass
17K0382-02 A	Large OJ, 1000 mL	
17K0382-02 B	Large OJ, 1000 mL	
17K0382-02 C	Small OJ, 500 mL, 9N H2SO4	<2 pass
17K0382-02 D	Small OJ, 500 mL	
17K0382-02 E	HDPE NM, 500 mL, 1:1 HNO3	<2 pass
17K0382-03 A	HDPE NM, 500 mL	>2 Fail
17K0382-04 A	HDPE NM, 500 mL	>2 Fail

SF — Preservation Confirmed By

11/20/17 — Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Hoerem

COC No(s): _____ NA

Assigned ARI Job No: 17K0382

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) 6.4

Time: _____

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

Temp Gun ID#: 120256

Cooler Accepted by: JF Date: 11/20/17 Time: 1535

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	(NA)		

Was Sample Split by ARI : (NA) YES Date/Time: 11/20/17 Equipment: ChurnSplit Split by: SF

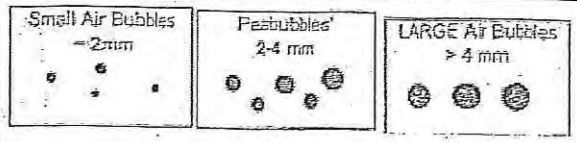
Samples Logged by: SF Date: 11/20/17 Time: 1713

*** 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)

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

Cooler#:	Temperature(°C): 6.4	
Sample ID	Bottle Count	Bottle Type
samples recieved	above	6°C

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: BF Date: 11/20/17 Time: 1535

E T S

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. 134th Place, Suite 100, Tukwila, WA 98168				ANALYST(S)	SUPERVISOR
ATTN:	Amanda Volgardsen	DATE	DATE	DATE	S. Santos	D. Jacobson
JOB:	Hydro International Up-Flo Filter	COLLECTED	RECEIVED	COMPLETED	L. Quijano	LAB DIRECTOR
SITE:	Oregon-Washington	11/20/2017	11/22/2017	12/1/2017		G.S. Conrad,PhD

PARTICLE SIZE DISTRIBUTION (PSD)/TSS & TVSS ANALYSIS & REPORT

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
07577-1	HI-43HEC/RW 17K0382-01	WUFF-IN	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	**44.6**
						Total SSC by Summation →		**0.0**	
07577-2	HI-44HEC/RW 17K0382-02	WUFF-OUT	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	**26.6**
						Total SSC by Summation →		**0.0**	
			#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
07577-1	HI-43HEC/RW 17K0382-01	WUFF-IN						**25.6**
07577-2	HI-44HEC/RW 17K0382-02	WUFF-OUT						**12.4**

COMMENTS

The matrix has a very low concentration of TSS particles amounting to <50 ppm in the input sample; and the output sample is two-fifths that amount, i.e., for this pair of samples, the overall reduction in TSS is just over 40%. Because TVSS was done these data have been generated as well and show that roughly half of the total TSS is volatile which, of course, means that the other half is non-volatile, i.e., the fixed solids. The proportion that is volatile in the input sample is 57.4%, while this proportion drops in the output sample to 46.6%. Thus, it would appear proportionately more volatile than fixed solids are being removed by the filtration process, although perhaps this difference may arise from the very fact that by their very nature, some volatile solids simply dissipate during the removal/filtration process. In any case, input sample fixed soldis amount to right at 19.0 ppm; in the output sample fixed solids are porportionately higher and total 14.2 ppm.

\\\ 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 (17K0382)	**Date Received:**	November 28, 2017
Project #:	16T001-035	**Sampled By:**	Others
Client :	Analytical Resources, Inc.	**Date Reported:**	December 20, 2017
Source:	Multiple	**Tested By:**	B. Goble
MTC Sample#:	Multiple		

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.

Reviewed by: _____

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

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Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Hydro International (17K0382)
Project #: 16T001-035
Date Received: November 28, 2017
Date Tested: December 13, 2017

Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: B. Goble

Suspended Sediment Concentration
ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC (>63µm) (mg/L)	FineFraction SSC (<63µm) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	T17-1690	11/20/2017	20.6	17.4	38.1
WUFF-OUT	T17-1691	11/20/2017	11.4	19.6	30.9

Reviewed by: E Gabriel Goble

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Visit our website: www.mtc-inc.net

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	17K0382-01	Water	20-Nov-2017 14:30	20-Nov-2017 15:35
WUFF-OUT	17K0382-02	Water	20-Nov-2017 14:30	20-Nov-2017 15:35
WUFF-IN	17K0382-03	Water	20-Nov-2017 14:30	20-Nov-2017 15:35
WUFF-OUT	17K0382-04	Water	20-Nov-2017 14:30	20-Nov-2017 15:35

4611 S. 134th Place, Suite 100 • Tukwila, WA 98168 • Ph: (206) 695-6200 • Fax: (206) 695-6202

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

Case Narrative

Sample receipt

Samples as listed on the preceding page were received November 20, 2017 under ARI workorder 17K0382. For details regarding sample receipt, please refer to the Cooler Receipt Form. The samples were split by sample receiving prior to analysis. The TSS and TVSS analysis was subcontracted to ETS Labs. The SSC 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.

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.

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

WUFF-IN

17K0382-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/20/2017 14:30
Analyzed: 28-Nov-2017 23:24

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFK0704 Sample Size: 25 mL
Prepared: 28-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	**30.4**	ug/L	
Zinc	7440-66-6	1	4.00	**93.9**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

WUFF-IN

17K0382-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/20/2017 14:30
Analyzed: 04-Dec-2017 20:30

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0682
Prepared: 27-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	**10.3**	mg/L	
Magnesium	7439-95-4	1	0.0500	**1.98**	mg/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

WUFF-IN

17K0382-01 (Water)

Wet Chemistry

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

Sampled: 11/20/2017 14:30
Analyzed: 21-Nov-2017 12:36

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFK0603 Sample Size: 50 mL
Prepared: 21-Nov-2017 Final Volume: 50 mL

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

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFK0714 Sample Size: 25 mL
Prepared: 28-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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Herrera Environmental Consultants	Project: Hydro International	
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Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

WUFF-IN

17K0382-01 (Water)

Calculation

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

Sampled: 11/20/2017 14:30
Analyzed: 04-Dec-2017 20:30

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 27-Nov-2017 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	**33.8**	mg/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

WUFF-OUT

17K0382-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/20/2017 14:30
Analyzed: 28-Nov-2017 23:29

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFK0704 Sample Size: 25 mL
Prepared: 28-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	**28.2**	ug/L	
Zinc	7440-66-6	1	4.00	**94.6**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

WUFF-OUT

17K0382-02 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 11/20/2017 14:30
Analyzed: 04-Dec-2017 20:34

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFK0682
Prepared: 27-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	**11.1**	mg/L	
Magnesium	7439-95-4	1	0.0500	**2.26**	mg/L	

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

WUFF-OUT

17K0382-02 (Water)

Wet Chemistry

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

Sampled: 11/20/2017 14:30
Analyzed: 21-Nov-2017 12:38

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFK0603 Sample Size: 50 mL
Prepared: 21-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-4 Strong Acid
Preparation Batch: BFK0714 Sample Size: 25 mL
Prepared: 28-Nov-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	**0.0900**	mg-P/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

WUFF-OUT

17K0382-02 (Water)

Calculation

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

Sampled: 11/20/2017 14:30
Analyzed: 04-Dec-2017 20:34

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 27-Nov-2017 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	**37.1**	mg/L	

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Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

WUFF-IN

17K0382-03 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/20/2017 14:30
Analyzed: 30-Nov-2017 21:08

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFK0767 Sample Size: 25 mL
Prepared: 30-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	**10.1**	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	**37.1**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

WUFF-OUT

17K0382-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 11/20/2017 14:30
Analyzed: 30-Nov-2017 21:13

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFK0767 Sample Size: 25 mL
Prepared: 30-Nov-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	**10.5**	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	**33.0**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
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Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

Metals and Metallic Compounds - Quality Control

Batch BFK0682 - 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 (BFK0682-BLK1)				Prepared: 27-Nov-2017 Analyzed: 04-Dec-2017 17:47						
Calcium	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
LCS (BFK0682-BS1)				Prepared: 27-Nov-2017 Analyzed: 04-Dec-2017 18:24						
Calcium	9.46	0.0500	mg/L	10.0		94.6	80-120			
Magnesium	9.89	0.0500	mg/L	10.0		98.9	80-120			

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

Metals and Metallic Compounds - Quality Control

Batch BFK0704 - 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 (BFK0704-BLK1)				Prepared: 28-Nov-2017 Analyzed: 28-Nov-2017 14:26							
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 (BFK0704-BS1)				Prepared: 28-Nov-2017 Analyzed: 28-Nov-2017 15:26							
Copper	63	27.0	0.500	ug/L	25.0		108	80-120			
Copper	65	27.1	0.500	ug/L	25.0		109	80-120			
Zinc	66	85.3	4.00	ug/L	80.0		107	80-120			
Zinc	67	83.5	4.00	ug/L	80.0		104	80-120			

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BFK0767 - 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 (BFK0767-BLK2)				Prepared: 30-Nov-2017 Analyzed: 01-Dec-2017 17:55							
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 (BFK0767-BS2)				Prepared: 30-Nov-2017 Analyzed: 01-Dec-2017 18:34							
Copper, Dissolved	63	26.2	0.500	ug/L	25.0		105	80-120			
Copper, Dissolved	65	26.0	0.500	ug/L	25.0		104	80-120			
Zinc, Dissolved	66	80.4	4.00	ug/L	80.0		101	80-120			
Zinc, Dissolved	67	76.4	4.00	ug/L	80.0		95.5	80-120			

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

Wet Chemistry - Quality Control

Batch BFK0603 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: GM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0603-BLK1)			Prepared: 21-Nov-2017 Analyzed: 21-Nov-2017 12:35							
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BFK0603-BS1)			Prepared: 21-Nov-2017 Analyzed: 21-Nov-2017 12:35							
Orthophosphorus	0.149	0.0040	mg-P/L	0.150		99.3	90-110			
Duplicate (BFK0603-DUP1)	**Source: 17K0382-01**		Prepared: 21-Nov-2017 Analyzed: 21-Nov-2017 12:37							
Orthophosphorus	ND	0.0040	mg-P/L		0.0040					U
Matrix Spike (BFK0603-MS1)	**Source: 17K0382-01**		Prepared: 21-Nov-2017 Analyzed: 21-Nov-2017 12:37							
Orthophosphorus	0.103	0.0040	mg-P/L	0.0999	0.0040	99.1	75-125			

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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

Wet Chemistry - Quality Control

Batch BFK0714 - 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 (BFK0714-BLK1)			Prepared: 28-Nov-2017 Analyzed: 01-Dec-2017 17:00							
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BFK0714-BLK2)			Prepared: 28-Nov-2017 Analyzed: 01-Dec-2017 17:07							
Total Phosphorus	ND	0.0080	mg-P/L							U
LCS (BFK0714-BS1)			Prepared: 28-Nov-2017 Analyzed: 01-Dec-2017 17:01							
Total Phosphorus	0.290	0.0080	mg-P/L	0.300		96.7	90-110			
DL (BFK0714-BS2)			Prepared: 28-Nov-2017 Analyzed: 01-Dec-2017 17:08							
Total Phosphorus	0.296	0.0080	mg-P/L	0.300		98.7	90-110			
Duplicate (BFK0714-DUP1)	**Source: 17K0382-01**		Prepared: 28-Nov-2017 Analyzed: 01-Dec-2017 17:03							
Total Phosphorus	0.0820	0.0080	mg-P/L		0.0820			0.00		
Matrix Spike (BFK0714-MS1)	**Source: 17K0382-01**		Prepared: 28-Nov-2017 Analyzed: 01-Dec-2017 17:03							
Total Phosphorus	2.10	0.0800	mg-P/L	2.00	0.0820	101	75-125			D

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

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	27-Dec-2017 14:54

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.
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 21, 2017

Data_17K0457

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BFK0675-BLK1	Blank	13-05605-000	Water			11/27/2017	11/27/2017	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.100	U	mg/L
BFK0675-BS1	LCS	13-05605-000	Water			11/27/2017	11/27/2017	NWTPH-Dx		Diesel Range Organics (C12-C24)	2.72		mg/L
17K0457-01	WUFF-IN	13-05605-000	Water	11/21/2017	11/21/2017	11/27/2017	11/27/2017	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.359		mg/L
17K0457-03	WUFF-IN QA	13-05605-000	Water	11/21/2017	11/21/2017	11/27/2017	11/27/2017	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.433		mg/L
17K0457-02	WUFF-OUT	13-05605-000	Water	11/21/2017	11/21/2017	11/27/2017	11/27/2017	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.424		mg/L
BFK0675-BLK1	Blank	13-05605-000	Water			11/27/2017	11/27/2017	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	0.200	U	mg/L
17K0457-01	WUFF-IN	13-05605-000	Water	11/21/2017	11/21/2017	11/27/2017	11/27/2017	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	1.08		mg/L
17K0457-03	WUFF-IN QA	13-05605-000	Water	11/21/2017	11/21/2017	11/27/2017	11/27/2017	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	1.37		mg/L
17K0457-02	WUFF-OUT	13-05605-000	Water	11/21/2017	11/21/2017	11/27/2017	11/27/2017	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	1.24		mg/L
BFK0675-BLK1	Blank	13-05605-000	Water			11/27/2017	11/27/2017	NWTPH-Dx	84-15-1	o-Terphenyl	100		%
BFK0675-BS1	LCS	13-05605-000	Water			11/27/2017	11/27/2017	NWTPH-Dx	84-15-1	o-Terphenyl	99.0		%
17K0457-01	WUFF-IN	13-05605-000	Water	11/21/2017	11/21/2017	11/27/2017	11/27/2017	NWTPH-Dx	84-15-1	o-Terphenyl	94.0		%
17K0457-03	WUFF-IN QA	13-05605-000	Water	11/21/2017	11/21/2017	11/27/2017	11/27/2017	NWTPH-Dx	84-15-1	o-Terphenyl	90.8		%
17K0457-02	WUFF-OUT	13-05605-000	Water	11/21/2017	11/21/2017	11/27/2017	11/27/2017	NWTPH-Dx	84-15-1	o-Terphenyl	91.2		%

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)	Associated SDG ID(s)
17K0457	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 14:15:33 -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 reqirements 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.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

17K0457

HERRERA
2200 Sixth Avenue | Suite 1100
Seattle, Washington | 98121
p 206 441 9080 | f 206 441 9108
PORTLAND, OR | MISSOULA, MT | OLYMPIA, WA
WINTHROP, WA | GUANGZHOU, CHINA

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:
M Mullen	ice cooler hand delivered

Laboratory:	Requested Completion Date:	Total No. of Containers:
Analytical Resources Inc.		6

Sample ID	Date	Time	Sample Type (see codes)	Preserv-ative? (Y/N)	Matrix (see codes)	Number of Containers	Analyses Requested: NWTPH-Dx	Lab ID No.
WUFF-IN	11.21.17	13:00	G	N	SW	2	X	
WUFF-OUT	11.21.17	13:00	G	N	SW	2	X	
* WUFF-IN QA	11.21.17	13:00	G	N	SW	2	X	

Comments/Special Instructions: * Field duplicate

Relinquished by (Name/CO/	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Meghan Mullen / Herrera	Meghan Mullen	11.21.17 14:00	Brandon Fisk/ARI		11/21/17 1400
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)

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 17K0457

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): 3.4

Time: _____

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

Temp Gun ID#: 70095206

Cooler Accepted by: BF Date: 11/21/17 Time: 1400

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) YES Date/Time: _____ Equipment: _____ Split by: _____

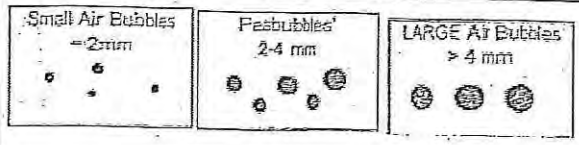
Samples Logged by: SF Date: 11/22/17 Time: 1055

*** 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	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	06-Dec-2017 14:14

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	17K0457-01	Water	21-Nov-2017 13:00	21-Nov-2017 14:00
WUFF-OUT	17K0457-02	Water	21-Nov-2017 13:00	21-Nov-2017 14:00
WUFF-IN QA	17K0457-03	Water	21-Nov-2017 13:00	21-Nov-2017 14:00

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	06-Dec-2017 14:14

Case Narrative

Sample receipt

Samples as listed on the preceding page were received November 21, 2017 under ARI workorder 17K0457. 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.

The method blank was clean at the reporting limits.

The LCS percent recoveries were within control limits.

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	06-Dec-2017 14:14

WUFF-IN

17K0457-01 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx
Instrument: FID3

Sampled: 11/21/2017 13:00
Analyzed: 27-Nov-2017 16:13

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BFK0675
Prepared: 27-Nov-2017
Sample Size: 440 mL
Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.114	**0.359**	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.227	**1.08**	mg/L	
HC ID: MOTOR OIL						
Surrogate: o-Terphenyl			*50-150 %*	*94.0*	*%*	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	06-Dec-2017 14:14

WUFF-OUT

17K0457-02 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx
Instrument: FID3

Sampled: 11/21/2017 13:00
Analyzed: 27-Nov-2017 16:29

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BFK0675
Prepared: 27-Nov-2017
Sample Size: 450 mL
Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.111	**0.424**	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.222	**1.24**	mg/L	
HC ID: MOTOR OIL						
Surrogate: o-Terphenyl			*50-150 %*	*91.2*	*%*	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	06-Dec-2017 14:14

WUFF-IN QA

17K0457-03 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx
Instrument: FID3

Sampled: 11/21/2017 13:00
Analyzed: 27-Nov-2017 16:45

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BFK0675
Prepared: 27-Nov-2017
Sample Size: 445 mL
Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.112	**0.433**	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.225	**1.37**	mg/L	
HC ID: MOTOR OIL						
Surrogate: o-Terphenyl			*50-150 %*	*90.8*	*%*	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	06-Dec-2017 14:14

Petroleum Hydrocarbons - Quality Control

Batch BFK0675 - EPA 3510C SepF

Instrument: FID3 Analyst: ML

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFK0675-BLK1)				Prepared: 27-Nov-2017 Analyzed: 27-Nov-2017 14:52						
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	0.451		mg/L	*0.450*		*100*	*50-150*			
LCS (BFK0675-BS1)				Prepared: 27-Nov-2017 Analyzed: 27-Nov-2017 15:08						
Diesel Range Organics (C12-C24)	2.72	0.100	mg/L	3.00		90.6	56-120			
Surrogate: o-Terphenyl	0.446		mg/L	*0.450*		*99.0*	*50-150*			

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	06-Dec-2017 14:14

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	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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	06-Dec-2017 14:14

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
D	The reported value is from a dilution
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.

December 28, 2017

Data_17L0472

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BFL0670-BLK1	Blank	13-05605-000	Water			12/30/2017	12/30/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFL0670-BS1	LCS	13-05605-000	Water			12/30/2017	12/30/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.150		mg-P/L
BFL0670-DUP1	WUFF-IN	13-05605-000	Surface Water	12/29/2017	12/29/2017	12/30/2017	12/30/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0090	*, L	mg-P/L
BFL0670-MS1	WUFF-IN	13-05605-000	Surface Water	12/29/2017	12/29/2017	12/30/2017	12/30/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.105		mg-P/L
17L0472-01	WUFF-IN	13-05605-000	Surface Water	12/29/2017	12/29/2017	12/30/2017	12/30/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0170		mg-P/L
17L0472-02	WUFF-OUT	13-05605-000	Surface Water	12/29/2017	12/29/2017	12/30/2017	12/30/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0110		mg-P/L
BGA0130-BLK1	Blank	13-05605-000	Water			01/05/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0220	*	mg-P/L
BGA0130-BLK2	Blank	13-05605-000	Water			01/05/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0220	*	mg-P/L
BGA0130-BLK3	Blank	13-05605-000	Water			01/05/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0220	*	mg-P/L
BGA0130-BS1	LCS	13-05605-000	Water			01/05/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.328	B	mg-P/L
BGA0130-BS2	LCS	13-05605-000	Water			01/05/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.330	B	mg-P/L
BGA0130-BS4	LCS	13-05605-000	Water			01/05/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.328	B	mg-P/L
17L0472-01	WUFF-IN	13-05605-000	Surface Water	12/29/2017	12/29/2017	01/05/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.142	B	mg-P/L
BGA0136-BLK1	Blank	13-05605-000	Water			01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGA0136-BLK2	Blank	13-05605-000	Water			01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGA0136-BLK4	Blank	13-05605-000	Water			01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGA0136-BS1	LCS	13-05605-000	Water			01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.306		mg-P/L
BGA0136-BS2	LCS	13-05605-000	Water			01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.304		mg-P/L
BGA0136-BS3	LCS	13-05605-000	Water			01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.304		mg-P/L
17L0472-02	WUFF-OUT	13-05605-000	Surface Water	12/29/2017	12/29/2017	01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0700		mg-P/L

Analytical Resources, Incorporated
Analytical Chemists and Consultants

24 January 2018

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)	Associated SDG ID(s)
17L0472	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: 2018.01.24 16:45:19 -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 reqirements 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 it" entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

17L0472

HERRERA
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: Dylan Ahearn		**Copy To:**
Sampled By: Dylan Ahearn		**Delivery Method:**
Laboratory: Analytical Resources Inc.	**Requested Completion Date:** 1/12/18	**Total No. of Containers:** 2

Lab Use:							Analyses Requested											
Sample ID	Date	Time	Sample Type (see codes)	Preser-vative? (Y/N)	Matrix (see codes)	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.
WUFF-IN	12/29/17	11:12	C	N	SW	x	X	x	X	X	X	X	X	X	X	X	
WUFF-OUT	12/29/17	11:12	C	N	SW	x	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/	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Dylan Ahearn		12/29/17 12:56		Stephanie Fisher	12/29/17 1256
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

17L0472

Client: Herrera Environmental Consultants | **Project Manager:** Amanda Volgardsen

Project: Hydro International | **Project Number:** 13-05605-000

Analysis	Due	TAT	Expires	Comments
Environmental Technical Services				
17L0472-02 WUFF-OUT [Water] Sampled 29-Dec-2017 11:12 (GMT-08:00) Pacific Time (US & Canada)				
Solids, Total Volatile Suspended SM 25	15-Jan-2018 15:00	10	05-Jan-2018 11:12	
Solids, Total Suspended SM 2540 D-97	15-Jan-2018 15:00	10	05-Jan-2018 11:12	
PSD (Particle Size Distribution by Laser	15-Jan-2018 15:00	10	05-Jan-2018 11:12	
Materials Testing & Consulting, Inc.				
17L0472-01 WUFF-IN [Water] Sampled 29-Dec-2017 11:12 (GMT-08:00) Pacific Time (US & Canada)				
Suspended Sed Conc ASTM D3977 (Su	15-Jan-2018 15:00	10	05-Jan-2018 11:12	
17L0472-02 WUFF-OUT [Water] Sampled 29-Dec-2017 11:12 (GMT-08:00) Pacific Time (US & Canada)				
Suspended Sed Conc ASTM D3977 (Su	15-Jan-2018 15:00	10	05-Jan-2018 11:12	

Preservation Confirmation

Container ID	Container Type	pH
17L0472-01 A	Large OJ, 1000 mL	
17L0472-01 B	Large OJ, 1000 mL	
17L0472-01 C	Large OJ, 1000 mL	
17L0472-01 D	Small OJ, 500 mL, 9N H2SO4	CZ pass
17L0472-01 E	Small OJ, 500 mL	
17L0472-02 A	Large OJ, 1000 mL	
17L0472-02 B	Large OJ, 1000 mL	
17L0472-02 C	Large OJ, 1000 mL	
17L0472-02 D	Small OJ, 500 mL, 9N H2SO4	CZ pass
17L0472-02 E	Small OJ, 500 mL	

SF
Preservation Confirmed By

12/29/17
Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera

Project Name: Hydro International

COC No(s): _____ NA

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

Assigned ARI Job No: 17L0472

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) 3.3

Time: _____

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

Temp Gun ID#: D002565

Cooler Accepted by: SF Date: 12/29/17 Time: 1256

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...	NA		

Was Sample Split by ARI : NA YES Date/Time: 12/29/17 Equipment: Churn Splitter Split by: SF

Samples Logged by: SF Date: 12/29/17 Time: 1326

*** 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:

NO sample time on bottle labels

By: SF Date: 12/29/17

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)

E T S

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. 134th Place, Suite 100, Tukwila, WA 98168				ANALYST(S)	SUPERVISOR
ATTN:	Amanda Volgardsen	DATE	DATE	DATE	S. Santos	D. Jacobson
JOB:	Hydro International Up-Flo Filter	COLLECTED	RECEIVED	COMPLETED	L. Quijano	LAB DIRECTOR
SITE:	Oregon-Washington	12/29/2017	1/3/2018	1/10/2018		G.S. Conrad,PhD

PARTICLE SIZE DISTRIBUTION (PSD), TSS & TVSS 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
07607-1	HI-45HEC/RW 17L0472-01	WUFF-IN	**0.5**	**1.0**	**1.5**		**8.9**	**7.7**	**20.0**
			2.6%	5.1%	7.7%		45.4%	39.3%	
						Total SSC by Summation →		**19.6**	
07607-2	HI-45HEC/RW 17L0472-02	WUFF-OUT	**0.0**	**0.0**	**0.5**		**3.4**	**2.3**	**5.0**
			0.0%	0.0%	8.1%		54.8%	37.1%	
						Total SSC by Summation →		**6.2**	
			#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
07607-1	HI-45HEC/RW 17L0472-01	WUFF-IN						**17.0**
07607-2	HI-45HEC/RW 17L0472-02	WUFF-OUT						**3.0**

COMMENTS

The matrix has a very low concentration of TSS particles amounting to ~20 ppm in the input sample; and the output sample is about a quarter of that amount. The overall average reduction in TSS is >71%. The reductions in each fraction are very substantial as follows: 100%, 100%, 66.7%, 61.8%, and 70.1%. Because TVSS data were generated the amount of volatiles is known and calculates to be at about 86% (85.0%-86.7%) in the input sample; and at >54% in the output sample. Because there is proportionately more variation in the TSS results for the output sample, the calcuated TVSS range is greater at 48.4% -60.0%. But then TSS values are so low it doesn't take very much absolute difference to increase any given parameter range. In any case, most of input particulate matter is organic (i.e., volatile) with only about 15% being mineral (or other non-volatile). This declines some in the output smaple indicating that proportiionately a little more volatile was remove that non-volatile. The RPDs are excellent to good (borderline very good) as follows: ±1.0%; and ±10.7%.

\\\ 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 (17L0472)	**Date Received:**	January 5, 2018
Project #:	16T001-035	**Sampled By:**	Others
Client :	Analytical Resources, Inc.	**Date Reported:**	January 24, 2018
Source:	Multiple	**Tested By:**	B. Goble
MTC Sample#:	Multiple		

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.

Reviewed by: EGabrielle Goble

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Materials Testing & Consulting, Inc.

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Project: Hydro International (17L0472)
Project #: 16T001-035
Date Received: January 5, 2018
Date Tested: January 19, 2018

Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: B. Goble

Suspended Sediment Concentration
ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC (>63µm) (mg/L)	FineFraction SSC (<63µm) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	S18-0009	12/29/2017	6.0	26.0	32.1
WUFF-OUT	S18-0009	12/29/2017	1.4	14.5	16.0

Reviewed by: EJ Goble

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Analytical Report

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:35

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	17L0472-01	Water	29-Dec-2017 11:12	29-Dec-2017 12:56
WUFF-OUT	17L0472-02	Water	29-Dec-2017 11:12	29-Dec-2017 12:56

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:35

Case Narrative

Sample receipt

Samples as listed on the preceding page were received December 29, 2017 under ARI workorder 17L0472. For details regarding sample receipt, please refer to the Cooler Receipt Form. The samples were split by sample receiving prior to analysis. The PSD, TSS and TVSS analysis was subcontracted to ETS Labs. The SSC analysis was subcontracted to MTC.

Wet Chemistry (O-Phos, T-Phos)

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

Initial and continuing calibrations were within method requirements.

The T-Phos method blank has detections above the reporting limits. Associated samples and QC have been flagged with an "B" qualifier. The analysis was reanalyzed with all QC within control limits. No further corrective action was taken.

The LCS percent recoveries were within control limits.

An 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 an O-Phos concentration <=5 times the reporting limit, and the replicate control limit defaults to +/- the reporting limit instead of 20% of the RPD. The duplicate has been flagged with an "L" qualifier. The results are advisory. No further corrective action was taken.

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:35

WUFF-IN

17L0472-01 (Water)

Wet Chemistry

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

Sampled: 12/29/2017 11:12
Analyzed: 30-Dec-2017 15:46

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFL0670 Sample Size: 50 mL
Prepared: 30-Dec-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	**0.0170**	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGA0130 Sample Size: 25 mL
Prepared: 05-Jan-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0160	**0.1420**	mg-P/L	B

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:35

WUFF-OUT

17L0472-02 (Water)

Wet Chemistry

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

Sampled: 12/29/2017 11:12
Analyzed: 30-Dec-2017 15:48

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFL0670
Prepared: 30-Dec-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	**0.0110**	mg-P/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGA0136
Prepared: 06-Jan-2018
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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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:35

Wet Chemistry - Quality Control

Batch BFL0670 - 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 (BFL0670-BLK1)				Prepared: 30-Dec-2017 Analyzed: 30-Dec-2017 15:45						
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BFL0670-BS1)				Prepared: 30-Dec-2017 Analyzed: 30-Dec-2017 15:46						
Orthophosphorus	0.150	0.0040	mg-P/L	0.150		100	90-110			
Duplicate (BFL0670-DUP1)	**Source: 17L0472-01**			Prepared: 30-Dec-2017 Analyzed: 30-Dec-2017 15:46						
Orthophosphorus	0.0090	0.0040	mg-P/L		0.0170			61.50	20	*, L
Matrix Spike (BFL0670-MS1)	**Source: 17L0472-01**			Prepared: 30-Dec-2017 Analyzed: 30-Dec-2017 15:47						
Orthophosphorus	0.105	0.0040	mg-P/L	0.0999	0.0170	88.1	75-125			

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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:35

Wet Chemistry - Quality Control

Batch BGA0130 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGA0130-BLK1)			Prepared: 05-Jan-2018 Analyzed: 06-Jan-2018 17:17							
Total Phosphorus	0.0220	0.0160	mg-P/L							*
Blank (BGA0130-BLK2)			Prepared: 05-Jan-2018 Analyzed: 06-Jan-2018 17:39							
Total Phosphorus	0.0220	0.0160	mg-P/L							*
Blank (BGA0130-BLK3)			Prepared: 05-Jan-2018 Analyzed: 06-Jan-2018 17:43							
Total Phosphorus	0.0220	0.0160	mg-P/L							*
LCS (BGA0130-BS1)			Prepared: 05-Jan-2018 Analyzed: 06-Jan-2018 17:18							
Total Phosphorus	0.328	0.0160	mg-P/L	0.300		109	90-110			B
LCS (BGA0130-BS2)			Prepared: 05-Jan-2018 Analyzed: 06-Jan-2018 17:40							
Total Phosphorus	0.330	0.0160	mg-P/L	0.300		110	90-110			B
LCS (BGA0130-BS4)			Prepared: 05-Jan-2018 Analyzed: 06-Jan-2018 17:45							
Total Phosphorus	0.328	0.0160	mg-P/L	0.300		109	90-110			B

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:35

Wet Chemistry - Quality Control

Batch BGA0136 - 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 (BGA0136-BLK1)			Prepared: 06-Jan-2018 Analyzed: 06-Jan-2018 16:41							
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BGA0136-BLK2)			Prepared: 06-Jan-2018 Analyzed: 06-Jan-2018 16:45							
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BGA0136-BLK4)			Prepared: 06-Jan-2018 Analyzed: 06-Jan-2018 16:47							
Total Phosphorus	ND	0.0080	mg-P/L							U
LCS (BGA0136-BS1)			Prepared: 06-Jan-2018 Analyzed: 06-Jan-2018 16:41							
Total Phosphorus	0.306	0.0080	mg-P/L	0.300		102	90-110			
LCS (BGA0136-BS2)			Prepared: 06-Jan-2018 Analyzed: 06-Jan-2018 16:46							
Total Phosphorus	0.304	0.0080	mg-P/L	0.300		101	90-110			
LCS (BGA0136-BS3)			Prepared: 06-Jan-2018 Analyzed: 06-Jan-2018 16:48							
Total Phosphorus	0.304	0.0080	mg-P/L	0.300		101	90-110			

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:35

Certified Analyses included in this Report

Analyte	Certifications
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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:35

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 +/- RL instead of 20% RPD
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.

January 4, 2018

Data_18A0070

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
18A0070-01	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/08/2018	01/08/2018	SM 2340 B-97		Hardness	49.5		mg/L
18A0070-03	WUFF-OUT	Hydro International	Surface Water	01/04/2018	01/05/2018	01/08/2018	01/08/2018	SM 2340 B-97		Hardness	59.9		mg/L
BGA0135-BLK1	Blank	Hydro International	Water			01/05/2018	01/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BGA0135-BS1	LCS	Hydro International	Water			01/05/2018	01/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.152		mg-P/L
BGA0135-DUP1	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/05/2018	01/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0130		mg-P/L
BGA0135-MS1	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/05/2018	01/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.110		mg-P/L
18A0070-01	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/05/2018	01/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0120		mg-P/L
18A0070-03	WUFF-OUT	Hydro International	Surface Water	01/04/2018	01/05/2018	01/05/2018	01/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0120		mg-P/L
BGA0136-BLK1	Blank	Hydro International	Water			01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGA0136-BLK2	Blank	Hydro International	Water			01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGA0136-BLK4	Blank	Hydro International	Water			01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGA0136-BS1	LCS	Hydro International	Water			01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.306		mg-P/L
BGA0136-BS2	LCS	Hydro International	Water			01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.304		mg-P/L
BGA0136-BS3	LCS	Hydro International	Water			01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.304		mg-P/L
18A0070-01	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.122		mg-P/L
18A0070-03	WUFF-OUT	Hydro International	Surface Water	01/04/2018	01/05/2018	01/06/2018	01/06/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0480		mg-P/L
BGA0139-BLK1	Blank	Hydro International	Water			01/08/2018	01/09/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGA0139-BS1	LCS	Hydro International	Water			01/08/2018	01/09/2018	EPA 200.8	7440-50-8	Copper	27.1		ug/L
18A0070-01	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/08/2018	01/09/2018	EPA 200.8	7440-50-8	Copper	30.5		ug/L
18A0070-03	WUFF-OUT	Hydro International	Surface Water	01/04/2018	01/05/2018	01/08/2018	01/09/2018	EPA 200.8	7440-50-8	Copper	16.4		ug/L
BGA0139-BLK1	Blank	Hydro International	Water			01/08/2018	01/09/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGA0139-BS1	LCS	Hydro International	Water			01/08/2018	01/09/2018	EPA 200.8	7440-66-6	Zinc	84.7		ug/L
18A0070-01	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/08/2018	01/09/2018	EPA 200.8	7440-66-6	Zinc	96.1		ug/L
18A0070-03	WUFF-OUT	Hydro International	Surface Water	01/04/2018	01/05/2018	01/08/2018	01/09/2018	EPA 200.8	7440-66-6	Zinc	51.4		ug/L
BGA0139-BLK1	Blank	Hydro International	Water			01/08/2018	01/09/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGA0139-BS1	LCS	Hydro International	Water			01/08/2018	01/09/2018	EPA 200.8	7440-66-6	Zinc	79.5		ug/L
BGA0140-BLK1	Blank	Hydro International	Water			01/08/2018	01/08/2018	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BGA0140-BS1	LCS	Hydro International	Water			01/08/2018	01/08/2018	EPA 6010C	7440-70-2	Calcium	10.4		mg/L
18A0070-01	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/08/2018	01/08/2018	EPA 6010C	7440-70-2	Calcium	14.1		mg/L
18A0070-03	WUFF-OUT	Hydro International	Surface Water	01/04/2018	01/05/2018	01/08/2018	01/08/2018	EPA 6010C	7440-70-2	Calcium	17.0		mg/L
BGA0140-BLK1	Blank	Hydro International	Water			01/08/2018	01/08/2018	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BGA0140-BS1	LCS	Hydro International	Water			01/08/2018	01/08/2018	EPA 6010C	7439-95-4	Magnesium	10.8		mg/L
18A0070-01	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/08/2018	01/08/2018	EPA 6010C	7439-95-4	Magnesium	3.48		mg/L
18A0070-03	WUFF-OUT	Hydro International	Surface Water	01/04/2018	01/05/2018	01/08/2018	01/08/2018	EPA 6010C	7439-95-4	Magnesium	4.22		mg/L
BGA0174-BLK1	Blank	Hydro International	Water			01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BGA0174-BS1	LCS	Hydro International	Water			01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-50-8	Copper	25.3		ug/L
BGA0174-DUP1	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-50-8	Copper	11.8		ug/L
BGA0174-MS1	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-50-8	Copper	35.6		ug/L
18A0070-02	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-50-8	Copper	11.7		ug/L
18A0070-04	WUFF-OUT	Hydro International	Surface Water	01/04/2018	01/05/2018	01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-50-8	Copper	12.0		ug/L
BGA0174-BLK1	Blank	Hydro International	Water			01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BGA0174-BS1	LCS	Hydro International	Water			01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-50-8	Copper	25.4		ug/L
BGA0174-BLK1	Blank	Hydro International	Water			01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BGA0174-BS1	LCS	Hydro International	Water			01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	75.2		ug/L
BGA0174-DUP1	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	36.5		ug/L
BGA0174-MS1	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	109		ug/L
18A0070-02	WUFF-IN	Hydro International	Surface Water	01/04/2018	01/05/2018	01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	36.3		ug/L

Data_18A0070

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
18A0070-04	WUFF-OUT	Hydro International	Surface Water	01/04/2018	01/05/2018	01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	39.2		ug/L
BGA0174-BLK1	Blank	Hydro International	Water			01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BGA0174-BS1	LCS	Hydro International	Water			01/09/2018	01/10/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	72.8		ug/L

Analytical Resources, Incorporated
Analytical Chemists and Consultants

24 January 2018

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)	Associated SDG ID(s)
18A0070	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: 2018.01.24 16:45:05 -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 reqirements 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.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

~~18A00A~~ BF 1/5/18 18A0070

HERRERA
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:
A. Svendsen	cooler w/ ice

Laboratory:	Requested Completion Date:	Total No. of Containers:
Analytical Resources Inc.		2

Sample ID	Date	Time	Sample Type (see codes)	Preser-vative? (Y/N)	Matrix (see codes)	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.
WUFF-IN	1/5/18	0545	C	N	SW	x	X	x	X	X	X	X	X	X	X	X	
WUFF-OUT	1/5/18	0555	C	N	SW	x	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/	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Alex Svendsen / HCC		1/5/18 1400	Brandon Fisk / ARI		1/5/18 1400
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)

E T S

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. 134th Place, Suite 100, Tukwila, WA 98168				ANALYST(S)	SUPERVISOR
ATTN:	Amanda Volgardsen	DATE	DATE	DATE	S. Santos	D. Jacobson
JOB:	Hydro International Up-Flo Filter	COLLECTED	RECEIVED	COMPLETED	L. Quijano	LAB DIRECTOR
SITE:	Oregon-Washington	1/4/2018	1/9/2018	1/18/2018		G.S. Conrad,PhD

PARTICLE SIZE DISTRIBUTION (PSD), TSS & TVSS 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
07615-1	HI-49HEC/RW 18A0070-01 D & F	WUFF-IN	**0.2**	**1.7**	**1.5**		**9.1**	**17.1**	**30.0**
			0.7%	5.7%	5.1%		30.7%	57.8%	
						Total SSC by Summation →		**29.6**	
07615-2	HI-50HEC/RW 18A0070-03 D & F	WUFF-OUT	**0.0**	**0.2**	**0.2**		**1.0**	**2.7**	**4.0**
			0.0%	4.9%	4.9%		24.4%	65.9%	
						Total SSC by Summation →		**4.1**	
			#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
07607-1	HI-49HEC/RW 18A0070-01 D & F	WUFF-IN						**30.0**
07607-2	HI-50HEC/RW 18A0070-03 D & F	WUFF-OUT						**4.0**

COMMENTS

The matrix has a very low concentration of TSS particles amounting to ~30 ppm in the input sample; and the output sample is not much more than a tenth of that amount. The overall average reduction in TSS is >86%. The range is very narrow in this case at just 86.1%-86.7% (TSS by summation vs TSS by analytical method). The reductions in each fraction are very substantial as follows: 100%, 88.2%, 86.7%, 89.0%, and 84.2%. Because TVSS data were generated, the amount of volatiles is known and calculates to be at 100% in both the input and output samples. This obviously means that virtually all of the particulate matter is organic in nature; probably mostly leaf matter and other vegetation debris, although anthropogenic materials, e.g. paper, polymer fibers, etc., may be a part of the overall mix of organics. The RPDs are both excellent as follows: ±0.7%; and ±1.2%.

\\\ 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	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18A0070-01	Water	04-Jan-2018 05:45	05-Jan-2018 14:00
WUFF-IN	18A0070-02	Water	04-Jan-2018 05:45	05-Jan-2018 14:00
WUFF-OUT	18A0070-03	Water	04-Jan-2018 05:55	05-Jan-2018 14:00
WUFF-OUT	18A0070-04	Water	04-Jan-2018 05:55	05-Jan-2018 14:00

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

Case Narrative

Sample receipt

Samples as listed on the preceding page were received January 5, 2018 under ARI workorder 18A0070. For details regarding sample receipt, please refer to the Cooler Receipt Form. The samples were split by sample receiving prior to analysis. The PSD, TVSS and TSS analysis was subcontracted to ETS Labs. The SSC analysis was subcontracted to MTC.

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 matrix spike and duplicate were prepared in conjunction with sample WUFF-IN. The matrix spike percent recoveries and duplciate 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.

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 QC limits.

An 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.

WORK ORDER

18A0070

Client: Herrera Environmental Consultants | **Project Manager:** Amanda Volgardsen

Project: Hydro International | **Project Number:** [none]

Preservation Confirmation

Container ID	Container Type	pH	
18A0070-01 A	HDPE NM, 500 mL, 1:1 HNO3	< 2	pass
18A0070-01 B	Small OJ, 500 mL		
18A0070-01 C	Small OJ, 500 mL, 9N H2SO4	< 2	
18A0070-01 D	Large OJ, 1000 mL		
18A0070-01 E	Large OJ, 1000 mL		
18A0070-01 F	Large OJ, 1000 mL		
18A0070-02 A	HDPE NM, 500 mL	> 2	fail
18A0070-03 A	HDPE NM, 500 mL, 1:1 HNO3	< 2	pass
18A0070-03 B	Small OJ, 500 mL		
18A0070-03 C	Small OJ, 500 mL, 9N H2SO4	< 2	pass
18A0070-03 D	Large OJ, 1000 mL		
18A0070-03 E	Large OJ, 1000 mL		
18A0070-03 F	Large OJ, 1000 mL		
18A0070-04 A	HDPE NM, 500 mL	> 2	fail

BF
Preservation Confirmed By

1/5/18
Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 18A0070

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): 5.9

Time: _____

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

Temp Gun ID#: D0025065

Cooler Accepted by: BF Date: 1/5/18 Time: 1400

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 YES Date/Time: 1/5/18 1512 Equipment: churn splitter Split by: BF

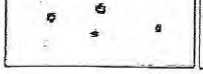
Samples Logged by: BF Date: 1/5/18 Time: 1440 → 1512 BF 1/5/18

** *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 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)

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project:	Hydro International (18A0070)	**Date Received:**	January 8, 2018
Project #:	16T001-035	**Sampled By:**	Others
Client :	Analytical Resources, Inc.	**Date Reported:**	January 24, 2018
Source:	Multiple	**Tested By:**	B. Goble
MTC Sample#:	Multiple		

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.

Reviewed by: EGabe Goble

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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 (18A0070)
Project #: 16T001-035
Date Received: January 8, 2018
Date Tested: January 19, 2018

Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: B. Goble

Suspended Sediment Concentration
ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC (>63µm) (mg/L)	FineFraction SSC (<63µm) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	S18-0020	1/4/2018	10.9	28.5	39.4
WUFF-OUT	S18-0021	1/4/2018	0.7	7.3	8.0

Reviewed by: E Gabriel Goble

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

WUFF-IN

18A0070-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 01/04/2018 05:45
Analyzed: 09-Jan-2018 15:55

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGA0139 Sample Size: 25 mL
Prepared: 08-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	**30.5**	ug/L	
Zinc	7440-66-6	1	4.00	**96.1**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

WUFF-IN

18A0070-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 01/04/2018 05:45
Analyzed: 08-Jan-2018 11:06

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BGA0140 Sample Size: 25 mL
Prepared: 08-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	**14.1**	mg/L	
Magnesium	7439-95-4	1	0.0500	**3.48**	mg/L	

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

WUFF-IN

18A0070-01 (Water)

Wet Chemistry

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

Sampled: 01/04/2018 05:45
Analyzed: 05-Jan-2018 18:38

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGA0135
Prepared: 05-Jan-2018
Sample Size: 50 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	**0.0120**	mg-P/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGA0136
Prepared: 06-Jan-2018
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	**0.122**	mg-P/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

WUFF-IN

18A0070-01 (Water)

Calculation

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

Sampled: 01/04/2018 05:45
Analyzed: 08-Jan-2018 11:06

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 08-Jan-2018 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	**49.5**	mg/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

WUFF-IN

18A0070-02 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 01/04/2018 05:45
Analyzed: 10-Jan-2018 14:15

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGA0174 Sample Size: 25 mL
Prepared: 09-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	**11.7**	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	**36.3**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

WUFF-OUT

18A0070-03 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 01/04/2018 05:55
Analyzed: 09-Jan-2018 16:00

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGA0139 Sample Size: 25 mL
Prepared: 08-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	**16.4**	ug/L	
Zinc	7440-66-6	1	4.00	**51.4**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

WUFF-OUT

18A0070-03 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 01/04/2018 05:55
Analyzed: 08-Jan-2018 11:36

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BGA0140
Prepared: 08-Jan-2018
Sample Size: 25 mL
Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	**17.0**	mg/L	
Magnesium	7439-95-4	1	0.0500	**4.22**	mg/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

WUFF-OUT

18A0070-03 (Water)

Wet Chemistry

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

Sampled: 01/04/2018 05:55
Analyzed: 05-Jan-2018 18:39

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGA0135
Prepared: 05-Jan-2018
Sample Size: 50 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	**0.0120**	mg-P/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGA0136
Prepared: 06-Jan-2018
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	**0.0480**	mg-P/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

WUFF-OUT

18A0070-03 (Water)

Calculation

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

Sampled: 01/04/2018 05:55
Analyzed: 08-Jan-2018 11:36

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 08-Jan-2018 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	**59.9**	mg/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

WUFF-OUT

18A0070-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 01/04/2018 05:55
Analyzed: 10-Jan-2018 13:57

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGA0174 Sample Size: 25 mL
Prepared: 09-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	**12.0**	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	**39.2**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

Metals and Metallic Compounds - Quality Control

Batch BGA0139 - 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 (BGA0139-BLK1)				Prepared: 08-Jan-2018 Analyzed: 09-Jan-2018 12:48							
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 (BGA0139-BS1)				Prepared: 08-Jan-2018 Analyzed: 09-Jan-2018 13:30							
Copper	63	27.1	0.500	ug/L	25.0		108	80-120			
Copper	65	26.8	0.500	ug/L	25.0		107	80-120			
Zinc	66	84.7	4.00	ug/L	80.0		106	80-120			
Zinc	67	79.5	4.00	ug/L	80.0		99.4	80-120			

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

Metals and Metallic Compounds - Quality Control

Batch BGA0140 - 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 (BGA0140-BLK1)				Prepared: 08-Jan-2018 Analyzed: 08-Jan-2018 10:45						
Calcium	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
LCS (BGA0140-BS1)				Prepared: 08-Jan-2018 Analyzed: 08-Jan-2018 11:23						
Calcium	10.4	0.0500	mg/L	10.0		104	80-120			
Magnesium	10.8	0.0500	mg/L	10.0		108	80-120			

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BGA0174 - 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 (BGA0174-BLK1)				Prepared: 09-Jan-2018 Analyzed: 10-Jan-2018 13:43							
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 (BGA0174-BS1)				Prepared: 09-Jan-2018 Analyzed: 10-Jan-2018 14:24							
Copper, Dissolved	63	25.3	0.500	ug/L	25.0		101	80-120			
Copper, Dissolved	65	25.4	0.500	ug/L	25.0		102	80-120			
Zinc, Dissolved	66	75.2	4.00	ug/L	80.0		94.0	80-120			
Zinc, Dissolved	67	72.8	4.00	ug/L	80.0		91.0	80-120			
Duplicate (BGA0174-DUP1)			**Source: 18A0070-02**	Prepared: 09-Jan-2018 Analyzed: 10-Jan-2018 14:10							
Copper, Dissolved	63	11.8	0.500	ug/L		11.7			0.49	20	
Zinc, Dissolved	66	36.5	4.00	ug/L		36.3			0.46	20	
Matrix Spike (BGA0174-MS1)			**Source: 18A0070-02**	Prepared: 09-Jan-2018 Analyzed: 10-Jan-2018 14:19							
Copper, Dissolved	63	35.6	0.500	ug/L	25.0	11.7	95.4	75-125			
Zinc, Dissolved	66	109	4.00	ug/L	80.0	36.3	90.3	75-125			

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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

Wet Chemistry - Quality Control

Batch BGA0135 - 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 (BGA0135-BLK1)			Prepared: 05-Jan-2018 Analyzed: 05-Jan-2018 18:37							
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BGA0135-BS1)			Prepared: 05-Jan-2018 Analyzed: 05-Jan-2018 18:37							
Orthophosphorus	0.152	0.0040	mg-P/L	0.150		101	90-110			
Duplicate (BGA0135-DUP1)	**Source: 18A0070-01**		Prepared: 05-Jan-2018 Analyzed: 05-Jan-2018 18:38							
Orthophosphorus	0.0130	0.0040	mg-P/L		0.0120			8.00	20	
Matrix Spike (BGA0135-MS1)	**Source: 18A0070-01**		Prepared: 05-Jan-2018 Analyzed: 05-Jan-2018 18:38							
Orthophosphorus	0.110	0.0040	mg-P/L	0.0999	0.0120	98.1	75-125			

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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

Wet Chemistry - Quality Control

Batch BGA0136 - 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 (BGA0136-BLK1)			Prepared: 06-Jan-2018 Analyzed: 06-Jan-2018 16:41							
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BGA0136-BLK2)			Prepared: 06-Jan-2018 Analyzed: 06-Jan-2018 16:45							
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BGA0136-BLK4)			Prepared: 06-Jan-2018 Analyzed: 06-Jan-2018 16:47							
Total Phosphorus	ND	0.0080	mg-P/L							U
LCS (BGA0136-BS1)			Prepared: 06-Jan-2018 Analyzed: 06-Jan-2018 16:41							
Total Phosphorus	0.306	0.0080	mg-P/L	0.300		102	90-110			
LCS (BGA0136-BS2)			Prepared: 06-Jan-2018 Analyzed: 06-Jan-2018 16:46							
Total Phosphorus	0.304	0.0080	mg-P/L	0.300		101	90-110			
LCS (BGA0136-BS3)			Prepared: 06-Jan-2018 Analyzed: 06-Jan-2018 16:48							
Total Phosphorus	0.304	0.0080	mg-P/L	0.300		101	90-110			

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:42

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
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.

January 7, 2018

Data_18A0093

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
18A0093-01	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/10/2018	01/15/2018	SM 2340 B-97		Hardness	70.2		mg/L
18A0093-03	WUFF-OUT	13-05605-000	Water	01/08/2018	01/08/2018	01/10/2018	01/15/2018	SM 2340 B-97		Hardness	74.9		mg/L
BGA0172-BLK1	Blank	13-05605-000	Water			01/09/2018	01/09/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGA0172-BS1	LCS	13-05605-000	Water			01/09/2018	01/09/2018	EPA 200.8	7440-50-8	Copper	26.5		ug/L
18A0093-01	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/09/2018	01/09/2018	EPA 200.8	7440-50-8	Copper	19.2		ug/L
18A0093-03	WUFF-OUT	13-05605-000	Water	01/08/2018	01/08/2018	01/09/2018	01/09/2018	EPA 200.8	7440-50-8	Copper	18.2		ug/L
BGA0172-BLK1	Blank	13-05605-000	Water			01/09/2018	01/09/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGA0172-BS1	LCS	13-05605-000	Water			01/09/2018	01/09/2018	EPA 200.8	7440-50-8	Copper	26.2		ug/L
BGA0172-BLK1	Blank	13-05605-000	Water			01/09/2018	01/09/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGA0172-BS1	LCS	13-05605-000	Water			01/09/2018	01/09/2018	EPA 200.8	7440-66-6	Zinc	79.9		ug/L
18A0093-01	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/09/2018	01/09/2018	EPA 200.8	7440-66-6	Zinc	64.8		ug/L
18A0093-03	WUFF-OUT	13-05605-000	Water	01/08/2018	01/08/2018	01/09/2018	01/09/2018	EPA 200.8	7440-66-6	Zinc	62.5		ug/L
BGA0172-BLK1	Blank	13-05605-000	Water			01/09/2018	01/09/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGA0172-BS1	LCS	13-05605-000	Water			01/09/2018	01/09/2018	EPA 200.8	7440-66-6	Zinc	76.5		ug/L
BGA0174-BLK1	Blank	13-05605-000	Water			01/09/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGA0174-BS1	LCS	13-05605-000	Water			01/09/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	25.3		ug/L
18A0093-02	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/09/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	9.88		ug/L
18A0093-04	WUFF-OUT	13-05605-000	Water	01/08/2018	01/08/2018	01/09/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	10.3		ug/L
BGA0174-BLK1	Blank	13-05605-000	Water			01/09/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGA0174-BS1	LCS	13-05605-000	Water			01/09/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	25.4		ug/L
BGA0174-BLK1	Blank	13-05605-000	Water			01/09/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGA0174-BS1	LCS	13-05605-000	Water			01/09/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	75.2		ug/L
18A0093-02	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/09/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	36.1		ug/L
18A0093-04	WUFF-OUT	13-05605-000	Water	01/08/2018	01/08/2018	01/09/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	38.5		ug/L
BGA0174-BLK1	Blank	13-05605-000	Water			01/09/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGA0174-BS1	LCS	13-05605-000	Water			01/09/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	72.8		ug/L
BGA0186-BLK1	Blank	13-05605-000	Water			01/10/2018	01/11/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGA0186-BLK2	Blank	13-05605-000	Water			01/10/2018	01/11/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGA0186-BS1	LCS	13-05605-000	Water			01/10/2018	01/11/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.250	*	mg-P/L
BGA0186-BS2	LCS	13-05605-000	Water			01/10/2018	01/11/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.254	*	mg-P/L
BGA0186-BS3	LCS	13-05605-000	Water			01/10/2018	01/11/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.254	*	mg-P/L
BGA0190-BLK1	Blank	13-05605-000	Water			01/09/2018	01/09/2018	SM 4500-P	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BGA0190-BS1	LCS	13-05605-000	Water			01/09/2018	01/09/2018	SM 4500-P	1426-54-42	Orthophosphorus	0.153		mg-P/L
BGA0190-DUP1	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/09/2018	01/09/2018	SM 4500-P	1426-54-42	Orthophosphorus	0.0080		mg-P/L
BGA0190-MS1	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/09/2018	01/09/2018	SM 4500-P	1426-54-42	Orthophosphorus	0.107		mg-P/L
18A0093-01	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/09/2018	01/09/2018	SM 4500-P	1426-54-42	Orthophosphorus	0.0080		mg-P/L
18A0093-03	WUFF-OUT	13-05605-000	Water	01/08/2018	01/08/2018	01/09/2018	01/09/2018	SM 4500-P	1426-54-42	Orthophosphorus	0.0070		mg-P/L
BGA0196-BLK1	Blank	13-05605-000	Water			01/10/2018	01/15/2018	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BGA0196-BS1	LCS	13-05605-000	Water			01/10/2018	01/15/2018	EPA 6010C	7440-70-2	Calcium	10.2		mg/L
BGA0196-DUP1	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/10/2018	01/15/2018	EPA 6010C	7440-70-2	Calcium	20.3		mg/L
BGA0196-MS1	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/10/2018	01/15/2018	EPA 6010C	7440-70-2	Calcium	30.5		mg/L
18A0093-01	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/10/2018	01/15/2018	EPA 6010C	7440-70-2	Calcium	20.2		mg/L
18A0093-03	WUFF-OUT	13-05605-000	Water	01/08/2018	01/08/2018	01/10/2018	01/15/2018	EPA 6010C	7440-70-2	Calcium	21.5		mg/L
BGA0196-BLK1	Blank	13-05605-000	Water			01/10/2018	01/15/2018	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BGA0196-BS1	LCS	13-05605-000	Water			01/10/2018	01/15/2018	EPA 6010C	7439-95-4	Magnesium	10.4		mg/L
BGA0196-DUP1	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/10/2018	01/15/2018	EPA 6010C	7439-95-4	Magnesium	4.80		mg/L
BGA0196-MS1	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/10/2018	01/15/2018	EPA 6010C	7439-95-4	Magnesium	15.6		mg/L
18A0093-01	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/10/2018	01/15/2018	EPA 6010C	7439-95-4	Magnesium	4.81		mg/L
18A0093-03	WUFF-OUT	13-05605-000	Water	01/08/2018	01/08/2018	01/10/2018	01/15/2018	EPA 6010C	7439-95-4	Magnesium	5.17		mg/L

Data_18A0093

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BGA0317-BLK1	Blank	13-05605-000	Water			01/15/2018	01/16/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGA0317-BLK2	Blank	13-05605-000	Water			01/15/2018	01/16/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGA0353-BLK1	Blank	13-05605-000	Water			01/17/2018	01/17/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGA0353-BLK2	Blank	13-05605-000	Water			01/17/2018	01/17/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGA0353-BS1	LCS	13-05605-000	Water			01/17/2018	01/17/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.306		mg-P/L
BGA0353-BS2	LCS	13-05605-000	Water			01/17/2018	01/17/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.310		mg-P/L
BGA0353-DUP1	WUFF-OUT	13-05605-000	Water	01/08/2018	01/08/2018	01/17/2018	01/17/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.0420		mg-P/L
BGA0353-MS1	WUFF-OUT	13-05605-000	Water	01/08/2018	01/08/2018	01/17/2018	01/17/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.242		mg-P/L
18A0093-03RE1	WUFF-OUT	13-05605-000	Water	01/08/2018	01/08/2018	01/17/2018	01/17/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.0480		mg-P/L
BGA0389-BLK1	Blank	13-05605-000	Water			01/18/2018	01/20/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGA0389-BLK2	Blank	13-05605-000	Water			01/18/2018	01/20/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGA0389-BS1	LCS	13-05605-000	Water			01/18/2018	01/20/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.294		mg-P/L
BGA0389-BS2	LCS	13-05605-000	Water			01/18/2018	01/20/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.298		mg-P/L
BGA0389-DUP1	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/18/2018	01/20/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.0300		mg-P/L
BGA0389-MS2	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/18/2018	01/20/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.228		mg-P/L
18A0093-01RE1	WUFF-IN	13-05605-000	Water	01/08/2018	01/08/2018	01/18/2018	01/20/2018	SM 4500-P	7723-14-0	Total Phosphorus	0.0300		mg-P/L

Analytical Resources, Incorporated
Analytical Chemists and Consultants

24 January 2018

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)	Associated SDG ID(s)
18A0093	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: 2018.01.24 16:45:35 -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 reqirements 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.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

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

18A0093

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:
A. Svendsen		Cooler w/ ice
Laboratory:	Requested Completion Date:	Total No. of Containers:
Analytical Resources Inc.		2
Lab Use:		

Sample ID	Date	Time	Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)	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
WUFF-IN	1/8/18	0437	C	N	SW	x	X	x	X	X	X	X	X	X	X	X	
WUFF-OUT	1/8/18	0422	C	N	SW	x	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/	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Alex Svendsen / HEC		1/8/18 1304	Stephanie Fisher / ARI	Stephanie Fisher	1/8/18 1304
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)

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Chain of Custody Record

Project Name:	Project Number:	Client:
Hydro International Up-flo Filter	13-05605-000	Herrera Environmental
Report To: Dylan Ahearn		Copy To:
Sampled By: A. Svendsen		Delivery Method: cooler w/ ice
Laboratory: Analytical Resources Inc.	Requested Completion Date:	Total No. of Containers: 2

Lab Use:

Sample ID	Date	Time	Sample Type (see codes)	Preser-vative? (Y/N)	Matrix (see codes)	Total Suspended Solids- SM 2540D	Analyses Requested: 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.
WUFF-IN	1/7/18	1641	C	N	SW	x	X	x	X	X	X	X	X	X	X	X	
WUFF-OUT	1/7/18	1916	C	N	SW	x	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/	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Adam Svendsen / HEC		1/8/18 1304	Stephanie Fisher ARI	Stephanie Fisher	1/8/18 1304
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

18A0093

Client: Herrera Environmental Consultants | **Project Manager:** Amanda Volgardsen

Project: Hydro International | **Project Number:** 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
18A0093-01 A	Large OJ, 1000 mL	
18A0093-01 B	Large OJ, 1000 mL	
18A0093-01 C	Large OJ, 1000 mL	
18A0093-01 D	Small OJ, 500 mL	
18A0093-01 E	Small OJ, 500 mL, 9N H2SO4	<2 pass
18A0093-01 F	HDPE NM, 500 mL, 1:1 HNO3	<2 pass
18A0093-02 A	HDPE NM, 500 mL	>2 fail
18A0093-03 A	Large OJ, 1000 mL	
18A0093-03 B	Large OJ, 1000 mL	
18A0093-03 C	Large OJ, 1000 mL	
18A0093-03 D	Small OJ, 500 mL	
18A0093-03 E	Small OJ, 500 mL, 9N H2SO4	<2 pass
18A0093-03 F	HDPE NM, 500 mL, 1:1 HNO3	<2 pass
18A0093-04 A	HDPE NM, 500 mL	>2 fail

SF
Preservation Confirmed By

1/8/18
Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera

Project Name: Hydro International

COC No(s): _____ NA

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

Assigned ARI Job No: 18A0093

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) 4.8		
Time: _____		

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

Temp Gun ID#: D00256F

Cooler Accepted by: SF Date: 1/8/18 Time: 1304

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...	(NA)		

Was Sample Split by ARI : (NA) YES Date/Time: 1/8/18 Equipment: Churn Splitter Split by: SF BF

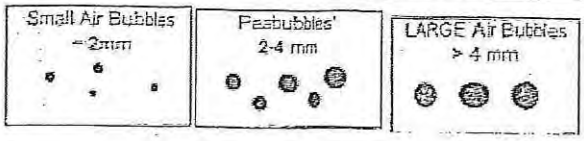
Samples Logged by: SF Date: 1/8/18 Time: 1502

*** 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)

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18A0093

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:**
A. Svindseth		cooler w/ ice
Laboratory:	**Requested Completion Date:**	**Total No. of Containers:**
Analytical Resources Inc.		2

Lab Use:							Analyses Requested												
Sample ID	Date	Time	Sample Type (see codes)	Preser-vative? (Y/N)	Matrix (see codes)	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
WUFF-IN	1/8/18	0437	C	N	SW	x	X	x	X	X	X	X	X	X	X	X	
WUFF-OUT	1/8/18	0422	C	N	SW	x	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/	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Ada Svindseth / HEC		1/8/18 1304	Stephanie Fisher / ARI	Stephanie Fisher	1/8/18 1304
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)

E T S

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

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COMPANY:	Analytical Resources, Inc., 4611 S. 134th Place, Suite 100, Tukwila, WA 98168				ANALYST(S)	SUPERVISOR
ATTN:	Amanda Volgardsen	DATE	DATE	DATE	S. Santos	D. Jacobson
JOB:	Hydro International Up-Flo Filter	COLLECTED	RECEIVED	COMPLETED	L. Quijano	LAB DIRECTOR
SITE:	Oregon-Washington	1/8/2018	1/10/2018	1/22/2018		G.S. Conrad,PhD

PARTICLE SIZE DISTRIBUTION (PSD), TSS & TVSS 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
07618-1	HI-51HEC/RW 18A0093-01	WUFF-IN	**0.2**	**0.7**	**0.5**		**2.7**	**7.9**	**13.5**
			1.7%	5.8%	4.2%		22.5%	65.8%	
						Total SSC by Summation →		**12.0**	
07618-2	HI-52HEC/RW 18A0093-03	WUFF-OUT	**0.0**	**0.2**	**0.3**		**2.2**	**5.4**	**8.0**
			0.0%	2.5%	3.7%		27.2%	66.7%	
						Total SSC by Summation →		**8.1**	
			#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
07618-1	HI-51HEC/RW 18A0093-01	WUFF-IN						**9.5**
07618-2	HI-52HEC/RW 18A0093-03	WUFF-OUT						**5.0**

COMMENTS

The matrix has a bordereline extremely low concentration of TSS particles amounting to ~11-14 ppm in the input sample; and the output sample is half to two-thirds that amount. The overall average reduction in TSS is more than a third at nearly 37%. The range is somewhat broad in this case at 32.5%-40.7% (TSS by summation vs TSS by analytical method). The reductions in each fraction are variable as follows: 100%, 71.4%, 40.0%, 18.5%, and 31.6%. The TVSS data show that the amount of volatiles calculates to an average of just under 75% in the input sample; and averages just over 62% in the output sample. This means that in both cases the majority of the suspended particulate matter is organic in nature; probably mostly leaf matter along with other vegetation debris, although anthropogenic materials, e.g. paper, polymer fibers, etc., may be a part of the overall mix of organics. The RPDs are both excellent as follows: ±5.9%;and ±0.6%.

\\\ 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	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18A0093-01	Water	08-Jan-2018 04:37	08-Jan-2018 13:04
WUFF-IN	18A0093-02	Water	08-Jan-2018 04:37	08-Jan-2018 13:04
WUFF-OUT	18A0093-03	Water	08-Jan-2018 04:22	08-Jan-2018 13:04
WUFF-OUT	18A0093-04	Water	08-Jan-2018 04:22	08-Jan-2018 13:04

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

Case Narrative

Sample receipt

Samples as listed on the preceding page were received January 8, 2018 under ARI workorder 18A0093. For details regarding sample receipt, please refer to the Cooler Receipt Form. The samples were split by sample receiving prior to analysis. The PSD and TSS analysis was subcontracted to ETS Labs. The SSC analysis was subcontracted to MTC.

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.

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.

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 T-Phos LCS BGA0186 has low percent recoveries. The LCS was re-read to verify with similiar results. The samples and QC were reanalyzed with the LCS percent recovery within control limits. No further corrective action was taken.

An 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.

An 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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WORK ORDER

18A0093

Client: Herrera Environmental Consultants | **Project Manager:** Amanda Volgardsen

Project: Hydro International | **Project Number:** 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
18A0093-01 A	Large OJ, 1000 mL	
18A0093-01 B	Large OJ, 1000 mL	
18A0093-01 C	Large OJ, 1000 mL	
18A0093-01 D	Small OJ, 500 mL	
18A0093-01 E	Small OJ, 500 mL, 9N H2SO4	<2 pass
18A0093-01 F	HDPE NM, 500 mL, 1:1 HNO3	<2 pass
18A0093-02 A	HDPE NM, 500 mL	>2 fail
18A0093-03 A	Large OJ, 1000 mL	
18A0093-03 B	Large OJ, 1000 mL	
18A0093-03 C	Large OJ, 1000 mL	
18A0093-03 D	Small OJ, 500 mL	
18A0093-03 E	Small OJ, 500 mL, 9N H2SO4	<2 pass
18A0093-03 F	HDPE NM, 500 mL, 1:1 HNO3	<2 pass
18A0093-04 A	HDPE NM, 500 mL	>2 fail

SF
Preservation Confirmed By

1/8/18
Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera

Project Name: Hydro International

COC No(s): _____ NA

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

Assigned ARI Job No: 18A0093

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) 4.8 ____ ____ ____ ____

Time: _____

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

Temp Gun ID#: D002-565

Cooler Accepted by: SF Date: 1/8/18 Time: 1304

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	(NA)		

Was Sample Split by ARI : ~~SF~~ NA (YES) Date/Time: 1/8/18 Equipment: Churn Splitter Split by: SF BF

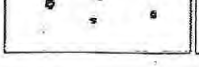
Samples Logged by: SF Date: 1/8/18 Time: 1502

*** 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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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:
A. Svendsen		cooler w/ ice
Laboratory:	Requested Completion Date:	Total No. of Containers:
Analytical Resources Inc.		2

Lab Use:						Analyses Requested											
Sample ID	Date	Time	Sample Type (see codes)	Preser-vative? (Y/N)	Matrix (see codes)	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.
WUFF-IN	1/7/18	1641	C	N	SW	x	X	x	X	X	X	X	X	X	X	X	
WUFF-OUT	1/7/18	1916	C	N	SW	x	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/	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Alex Svendsen / HEC		1/8/18 1304	Stephanie Fisher ARI	Stephanie Fisher	1/8/18 1304
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)

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project:	Hydro International (18A0093)	**Date Received:**	January 12, 2018
Project #:	16T001-035	**Sampled By:**	Others
Client :	Analytical Resources, Inc.	**Date Reported:**	January 24, 2018
Source:	Multiple	**Tested By:**	B. Goble
MTC Sample#:	Multiple		

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.

Reviewed by: EJ Gable

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Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Hydro International (18A0093)
Project #: 16T001-035
Date Received: January 12, 2018
Date Tested: January 19, 2018

Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: B. Goble

Suspended Sediment Concentration
ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC (>63µm) (mg/L)	FineFraction SSC (<63µm) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	S18-0041	1/8/2018	1.0	11.9	12.9
WUFF-OUT	S18-0042	1/8/2018	0.4	7.3	7.8

Reviewed by: EGabriel Goble

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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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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

WUFF-IN

18A0093-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 01/08/2018 04:37
Analyzed: 09-Jan-2018 16:51

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGA0172 Sample Size: 25 mL
Prepared: 09-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	**19.2**	ug/L	
Zinc	7440-66-6	1	4.00	**64.8**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

WUFF-IN

18A0093-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 01/08/2018 04:37
Analyzed: 15-Jan-2018 16:20

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BGA0196
Prepared: 10-Jan-2018
Sample Size: 25 mL
Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	**20.2**	mg/L	
Magnesium	7439-95-4	1	0.0500	**4.81**	mg/L	

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

WUFF-IN

18A0093-01 (Water)

Wet Chemistry

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

Sampled: 01/08/2018 04:37
Analyzed: 09-Jan-2018 14:41

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGA0190
Prepared: 09-Jan-2018
Sample Size: 50 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	**0.0080**	mg-P/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

WUFF-IN

18A0093-01 (Water)

Calculation

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

Sampled: 01/08/2018 04:37
Analyzed: 15-Jan-2018 16:20

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10-Jan-2018 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	**70.2**	mg/L	

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2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

WUFF-IN

18A0093-01RE1 (Water)

Wet Chemistry

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

Sampled: 01/08/2018 04:37
Analyzed: 20-Jan-2018 11:25

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGA0389 Sample Size: 25 mL
Prepared: 18-Jan-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0160	**0.0300**	mg-P/L	

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Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

WUFF-IN

18A0093-02 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 01/08/2018 04:37
Analyzed: 10-Jan-2018 14:54

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGA0174 Sample Size: 25 mL
Prepared: 09-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	**9.88**	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	**36.1**	ug/L	

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

WUFF-OUT

18A0093-03 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 01/08/2018 04:22
Analyzed: 09-Jan-2018 16:56

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGA0172 Sample Size: 25 mL
Prepared: 09-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	**18.2**	ug/L	
Zinc	7440-66-6	1	4.00	**62.5**	ug/L	

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2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

WUFF-OUT

18A0093-03 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 01/08/2018 04:22
Analyzed: 15-Jan-2018 15:10

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BGA0196
Prepared: 10-Jan-2018
Sample Size: 25 mL
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	**5.17**	mg/L	

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

WUFF-OUT

18A0093-03 (Water)

Wet Chemistry

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

Sampled: 01/08/2018 04:22
Analyzed: 09-Jan-2018 14:44

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGA0190
Prepared: 09-Jan-2018
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	

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2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

WUFF-OUT

18A0093-03 (Water)

Calculation

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

Sampled: 01/08/2018 04:22
Analyzed: 15-Jan-2018 15:10

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10-Jan-2018 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	**74.9**	mg/L	

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Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

WUFF-OUT

18A0093-03RE1 (Water)

Wet Chemistry

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

Sampled: 01/08/2018 04:22
Analyzed: 17-Jan-2018 16:09

Sample Preparation: Preparation Method: SM 4500-P B-5 Persulfate
Preparation Batch: BGA0353 Sample Size: 25 mL
Prepared: 17-Jan-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	**0.0480**	mg-P/L	

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2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

WUFF-OUT

18A0093-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 01/08/2018 04:22
Analyzed: 10-Jan-2018 14:58

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGA0174 Sample Size: 25 mL
Prepared: 09-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	**10.3**	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	**38.5**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

Metals and Metallic Compounds - Quality Control

Batch BGA0172 - 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 (BGA0172-BLK1)				Prepared: 09-Jan-2018 Analyzed: 09-Jan-2018 12:52							
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 (BGA0172-BS1)				Prepared: 09-Jan-2018 Analyzed: 09-Jan-2018 13:25							
Copper	63	26.5	0.500	ug/L	25.0		106	80-120			
Copper	65	26.2	0.500	ug/L	25.0		105	80-120			
Zinc	66	79.9	4.00	ug/L	80.0		99.8	80-120			
Zinc	67	76.5	4.00	ug/L	80.0		95.6	80-120			

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

Metals and Metallic Compounds - Quality Control

Batch BGA0196 - 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 (BGA0196-BLK1)			Prepared: 10-Jan-2018 Analyzed: 15-Jan-2018 14:22							
Calcium	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
LCS (BGA0196-BS1)			Prepared: 10-Jan-2018 Analyzed: 15-Jan-2018 14:52							
Calcium	10.2	0.0500	mg/L	10.0		102	80-120			
Magnesium	10.4	0.0500	mg/L	10.0		104	80-120			
Duplicate (BGA0196-DUP1)	**Source: 18A0093-01**		Prepared: 10-Jan-2018 Analyzed: 15-Jan-2018 16:16							
Calcium	20.3	0.0500	mg/L		20.2			0.26	20	
Magnesium	4.80	0.0500	mg/L		4.81			0.18	20	
Matrix Spike (BGA0196-MS1)	**Source: 18A0093-01**		Prepared: 10-Jan-2018 Analyzed: 15-Jan-2018 14:48							
Calcium	30.5	0.0500	mg/L	10.0	20.2	103	75-125			
Magnesium	15.6	0.0500	mg/L	10.0	4.81	108	75-125			

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

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BGA0174 - 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 (BGA0174-BLK1)				Prepared: 09-Jan-2018 Analyzed: 10-Jan-2018 13:43							
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 (BGA0174-BS1)				Prepared: 09-Jan-2018 Analyzed: 10-Jan-2018 14:24							
Copper, Dissolved	63	25.3	0.500	ug/L	25.0		101	80-120			
Copper, Dissolved	65	25.4	0.500	ug/L	25.0		102	80-120			
Zinc, Dissolved	66	75.2	4.00	ug/L	80.0		94.0	80-120			
Zinc, Dissolved	67	72.8	4.00	ug/L	80.0		91.0	80-120			

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Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

Wet Chemistry - Quality Control

Batch BGA0186 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGA0186-BLK1)			Prepared: 10-Jan-2018 Analyzed: 11-Jan-2018 12:21							
Total Phosphorus	ND	0.0160	mg-P/L							U
Blank (BGA0186-BLK2)			Prepared: 10-Jan-2018 Analyzed: 11-Jan-2018 12:41							
Total Phosphorus	ND	0.0160	mg-P/L							U
LCS (BGA0186-BS1)			Prepared: 10-Jan-2018 Analyzed: 11-Jan-2018 12:22							
Total Phosphorus	0.250	0.0160	mg-P/L	0.300		83.3	90-110			*
LCS (BGA0186-BS2)			Prepared: 10-Jan-2018 Analyzed: 11-Jan-2018 12:36							
Total Phosphorus	0.254	0.0160	mg-P/L	0.300		84.7	90-110			*
LCS (BGA0186-BS3)			Prepared: 10-Jan-2018 Analyzed: 11-Jan-2018 12:42							
Total Phosphorus	0.254	0.0160	mg-P/L	0.300		84.7	90-110			*

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

Wet Chemistry - Quality Control

Batch BGA0190 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGA0190-BLK1)			Prepared: 09-Jan-2018 Analyzed: 09-Jan-2018 14:40							
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BGA0190-BS1)			Prepared: 09-Jan-2018 Analyzed: 09-Jan-2018 14:40							
Orthophosphorus	0.153	0.0040	mg-P/L	0.150		102	90-110			
Duplicate (BGA0190-DUP1)		**Source: 18A0093-01**	Prepared: 09-Jan-2018 Analyzed: 09-Jan-2018 14:42							
Orthophosphorus	0.0080	0.0040	mg-P/L		0.0080			0.00		
Matrix Spike (BGA0190-MS1)		**Source: 18A0093-01**	Prepared: 09-Jan-2018 Analyzed: 09-Jan-2018 14:43							
Orthophosphorus	0.107	0.0040	mg-P/L	0.0999	0.0080	99.1	75-125			

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

Herrera Environmental Consultants	Project: Hydro International	
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Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

Wet Chemistry - Quality Control

Batch BGA0317 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-1 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGA0317-BLK1)				Prepared: 15-Jan-2018 Analyzed: 16-Jan-2018 14:35						
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BGA0317-BLK2)				Prepared: 15-Jan-2018 Analyzed: 16-Jan-2018 14:43						
Total Phosphorus	ND	0.0080	mg-P/L							U

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Herrera Environmental Consultants	Project: Hydro International	
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Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

Wet Chemistry - Quality Control

Batch BGA0353 - SM 4500-P B-5 Persulfate

Instrument: UV1800-1 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGA0353-BLK1)				Prepared: 17-Jan-2018 Analyzed: 17-Jan-2018 16:08						
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BGA0353-BLK2)				Prepared: 17-Jan-2018 Analyzed: 17-Jan-2018 16:13						
Total Phosphorus	ND	0.0080	mg-P/L							U
LCS (BGA0353-BS1)				Prepared: 17-Jan-2018 Analyzed: 17-Jan-2018 16:09						
Total Phosphorus	0.306	0.0080	mg-P/L	0.300		102	90-110			
LCS (BGA0353-BS2)				Prepared: 17-Jan-2018 Analyzed: 17-Jan-2018 16:13						
Total Phosphorus	0.310	0.0080	mg-P/L	0.300		103	90-110			
Duplicate (BGA0353-DUP1)		**Source: 18A0093-03RE1**		Prepared: 17-Jan-2018 Analyzed: 17-Jan-2018 16:10						
Total Phosphorus	0.0420	0.0080	mg-P/L		0.0480			13.30	20	
Matrix Spike (BGA0353-MS1)		**Source: 18A0093-03RE1**		Prepared: 17-Jan-2018 Analyzed: 17-Jan-2018 16:10						
Total Phosphorus	0.242	0.0080	mg-P/L	0.200	0.0480	97.1	75-125			

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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

Wet Chemistry - Quality Control

Batch BGA0389 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGA0389-BLK1)				Prepared: 18-Jan-2018 Analyzed: 20-Jan-2018 11:24						
Total Phosphorus	ND	0.0160	mg-P/L							U
Blank (BGA0389-BLK2)				Prepared: 18-Jan-2018 Analyzed: 20-Jan-2018 11:38						
Total Phosphorus	ND	0.0160	mg-P/L							U
LCS (BGA0389-BS1)				Prepared: 18-Jan-2018 Analyzed: 20-Jan-2018 11:24						
Total Phosphorus	0.294	0.0160	mg-P/L	0.300		98.0	90-110			
LCS (BGA0389-BS2)				Prepared: 18-Jan-2018 Analyzed: 20-Jan-2018 11:38						
Total Phosphorus	0.298	0.0160	mg-P/L	0.300		99.3	90-110			
Duplicate (BGA0389-DUP1)		**Source: 18A0093-01RE1**		Prepared: 18-Jan-2018 Analyzed: 20-Jan-2018 11:25						
Total Phosphorus	0.0300	0.0160	mg-P/L		0.0300			0.00		
Matrix Spike (BGA0389-MS2)		**Source: 18A0093-01RE1**		Prepared: 18-Jan-2018 Analyzed: 20-Jan-2018 11:37						
Total Phosphorus	0.228	0.0160	mg-P/L	0.200	0.0300	99.1	75-125			

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

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:18

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.

January 8, 2018

Data_18A0109

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
18A0109-01	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/15/2018	SM 2340 B-97		Hardness	39.2		mg/L
18A0109-03	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/15/2018	SM 2340 B-97		Hardness	51.5		mg/L
BGA0186-BLK1	Blank	13-05605-000	Water			01/10/2018	01/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGA0186-BLK2	Blank	13-05605-000	Water			01/10/2018	01/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGA0186-BS1	LCS	13-05605-000	Water			01/10/2018	01/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.250	*	mg-P/L
BGA0186-BS2	LCS	13-05605-000	Water			01/10/2018	01/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.254	*	mg-P/L
BGA0186-BS3	LCS	13-05605-000	Water			01/10/2018	01/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.254	*	mg-P/L
BGA0193-BLK1	Blank	13-05605-000	Water			01/09/2018	01/09/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BGA0193-BS1	LCS	13-05605-000	Water			01/09/2018	01/09/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.152		mg-P/L
BGA0193-DUP1	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/09/2018	01/09/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0050		mg-P/L
BGA0193-MS1	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/09/2018	01/09/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.104		mg-P/L
18A0109-01	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/09/2018	01/09/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0050		mg-P/L
18A0109-03	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/09/2018	01/09/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0070		mg-P/L
BGA0195-BLK1	Blank	13-05605-000	Water			01/10/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGA0195-BS1	LCS	13-05605-000	Water			01/10/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	26.5		ug/L
BGA0195-DUP1	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	21.1		ug/L
BGA0195-MS1	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	47.6		ug/L
18A0109-01	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	21.4		ug/L
18A0109-03	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	18.3		ug/L
BGA0195-BLK1	Blank	13-05605-000	Water			01/10/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGA0195-BS1	LCS	13-05605-000	Water			01/10/2018	01/10/2018	EPA 200.8	7440-50-8	Copper	26.6		ug/L
BGA0195-BLK1	Blank	13-05605-000	Water			01/10/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGA0195-BS1	LCS	13-05605-000	Water			01/10/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	82.4		ug/L
BGA0195-DUP1	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	66.7		ug/L
BGA0195-MS1	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	144		ug/L
18A0109-01	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	66.2		ug/L
18A0109-03	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	60.7		ug/L
BGA0195-BLK1	Blank	13-05605-000	Water			01/10/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGA0195-BS1	LCS	13-05605-000	Water			01/10/2018	01/10/2018	EPA 200.8	7440-66-6	Zinc	78.9		ug/L
BGA0196-BLK1	Blank	13-05605-000	Water			01/10/2018	01/15/2018	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BGA0196-BS1	LCS	13-05605-000	Water			01/10/2018	01/15/2018	EPA 6010C	7440-70-2	Calcium	10.2		mg/L
18A0109-01	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/15/2018	EPA 6010C	7440-70-2	Calcium	11.9		mg/L
18A0109-03	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/15/2018	EPA 6010C	7440-70-2	Calcium	15.0		mg/L
BGA0196-BLK1	Blank	13-05605-000	Water			01/10/2018	01/15/2018	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BGA0196-BS1	LCS	13-05605-000	Water			01/10/2018	01/15/2018	EPA 6010C	7439-95-4	Magnesium	10.4		mg/L
18A0109-01	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/15/2018	EPA 6010C	7439-95-4	Magnesium	2.33		mg/L
18A0109-03	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/10/2018	01/15/2018	EPA 6010C	7439-95-4	Magnesium	3.43		mg/L
BGA0264-BLK1	Blank	13-05605-000	Water			01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BGA0264-BS1	LCS	13-05605-000	Water			01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-50-8	Copper	27.7		ug/L
BGA0264-DUP1	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-50-8	Copper	8.35		ug/L
BGA0264-MS1	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-50-8	Copper	35.1		ug/L
18A0109-02	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-50-8	Copper	8.28		ug/L
18A0109-04	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-50-8	Copper	8.48		ug/L
BGA0264-BLK1	Blank	13-05605-000	Water			01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BGA0264-BS1	LCS	13-05605-000	Water			01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-50-8	Copper	27.4		ug/L
BGA0264-BLK1	Blank	13-05605-000	Water			01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BGA0264-BS1	LCS	13-05605-000	Water			01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	112		ug/L
BGA0264-DUP1	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	28.3		ug/L
BGA0264-MS1	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	106		ug/L

Data_18A0109

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
18A0109-02	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	28.2		ug/L
18A0109-04	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	30.0		ug/L
BGA0264-BLK1	Blank	13-05605-000	Water			01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BGA0264-BS1	LCS	13-05605-000	Water			01/12/2018	01/12/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	102		ug/L
BGA0389-BLK1	Blank	13-05605-000	Water			01/18/2018	01/20/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGA0389-BLK2	Blank	13-05605-000	Water			01/18/2018	01/20/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGA0389-BS1	LCS	13-05605-000	Water			01/18/2018	01/20/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.294		mg-P/L
BGA0389-BS2	LCS	13-05605-000	Water			01/18/2018	01/20/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.298		mg-P/L
18A0109-01RE1	WUFF-IN	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/18/2018	01/20/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0380		mg-P/L
18A0109-03RE1	WUFF-OUT	13-05605-000	Surface Water	01/09/2018	01/09/2018	01/18/2018	01/20/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0340		mg-P/L

Analytical Resources, Incorporated
Analytical Chemists and Consultants

24 January 2018

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)	Associated SDG ID(s)
18A0109	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: 2018.01.24 16:12:20 -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 reqirements 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.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

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

18A0109

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:
A. Svendsen		IN COOLER W/ICE
Laboratory:	Requested Completion Date:	Total No. of Containers:
Analytical Resources Inc.		2

Lab Use:

Sample ID	Date	Time	Sample Type (see codes)	Preser-vative? (Y/N)	Matrix (see codes)	Total Suspended Solids- SM 2540D	Analyses Requested: 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.
WUFF-IN	1/9/18	0254	C	N	SW	x	X	x	X	X	X	X	X	X	X	X	
WUFF-OUT	1/9/18	0258	C	N	SW	x	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/	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Alex Svendsen / HEC		1/9/18 1305	Brandon Fisk / ARI		1/9/18 1305
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)

E T S

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. 134th Place, Suite 100, Tukwila, WA 98168				ANALYST(S)	SUPERVISOR
ATTN:	Amanda Volgardsen	DATE	DATE	DATE	S. Santos	D. Jacobson
JOB:	Hydro International Up-Flo Filter	COLLECTED	RECEIVED	COMPLETED	L. Quijano	LAB DIRECTOR
SITE:	Oregon-Washington	1/9/2018	1/11/2018	1/22/2018		G.S. Conrad,PhD

PARTICLE SIZE DISTRIBUTION (PSD), TSS & TVSS 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
07619-1	HI-53HEC/RW 18A0109-01	WUFF-IN	**0.5**	**1.2**	**0.5**		**9.7**	**11.4**	**23.0**
			2.1%	5.2%	2.1%		41.6%	48.9%	
						Total SSC by Summation →		**23.3**	
07619-2	HI-54HEC/RW 18A0109-03	WUFF-OUT	**0.2**	**0.7**	**0.3**		**6.9**	**8.0**	**17.5**
			1.2%	4.3%	1.9%		42.9%	49.7%	
						Total SSC by Summation →		**16.1**	
			#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
07619-1	HI-53HEC/RW 18A0109-01	WUFF-IN						**11.5**
07619-2	HI-54HEC/RW 18A0109-03	WUFF-OUT						**9.0**

COMMENTS

The matrix has a very low concentration of TSS particles amounting to ~20-25 ppm in the input sample; and the output sample is nearly three-quarters of that amount. The overall average reduction in TSS is only a little more than a quarter at over 27%. The range is somewhat broad in this case at 23.9%-30.9% (TSS by analytical method vs TSS by summation). The reductions in each fraction vary somewhat as follows: 60.0%, 41.7%, 40.0%, 28.9%, and 29.8%. The TVSS data show that the amount of volatiles calculates to an average of close to 50% in the input sample; and averages nearly 54% in the output sample. In this set, this means that in both cases right around half of the suspended particulate matter is organic in nature; probably mostly leaf matter along with other vegetation debris, although anthropogenic materials, e.g. paper, polymer fibers, etc., may be a part of the overall mix of organics. The RPDs are both excellent as follows: ±0.7%;and ±4.2%.

\\\ 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;

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project:	Hydro International (18A0109)	**Date Received:**	January 12, 2018
Project #:	16T001-035	**Sampled By:**	Others
Client :	Analytical Resources, Inc.	**Date Reported:**	January 24, 2018
Source:	Multiple	**Tested By:**	B. Goble
MTC Sample#:	Multiple		

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.

Reviewed by: E Gabriel Goble

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Materials Testing & Consulting, Inc.

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Project: Hydro International (18A0109)
Project #: 16T001-035
Date Received: January 12, 2018
Date Tested: January 19, 2018

Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: B. Goble

Suspended Sediment Concentration
ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC (>63µm) (mg/L)	FineFraction SSC (<63µm) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	S18-0043	1/9/2018	9.7	12.9	22.5
WUFF-OUT	S18-0044	1/9/2018	8.7	9.0	17.7

Reviewed by: E Gabe Goble

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18A0109-01	Water	09-Jan-2018 02:54	09-Jan-2018 13:05
WUFF-IN	18A0109-02	Water	09-Jan-2018 02:54	09-Jan-2018 13:05
WUFF-OUT	18A0109-03	Water	09-Jan-2018 02:58	09-Jan-2018 13:05
WUFF-OUT	18A0109-04	Water	09-Jan-2018 02:58	09-Jan-2018 13:05

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

Case Narrative

Sample receipt

Samples as listed on the preceding page were received January 9, 2018 under ARI workorder 18A0109. For details regarding sample receipt, please refer to the Cooler Receipt Form. The samples were split by sample receiving prior to analysis. The PSD and TSS analysis was subcontracted to ETS Labs. The SSC analysis was subcontracted to MTC.

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

A dissolved 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 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 T-Phos LCS BGA0186 has low percent recoveries. The LCS was re-read to verify with similiar results. The samples and QC were reanalyzed with the LCS percent recovery within control limits. No further corrective action was taken.

An 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.

4611 S. 134th Place, Suite 100 • Tukwila, WA 98168 • Ph: (206) 695-6200 • Fax: (206) 695-6202

WORK ORDER

18A0109

Client: Herrera Environmental Consultants | **Project Manager:** Amanda Volgardsen

Project: Hydro International | **Project Number:** 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
18A0109-01 A	Large OJ, 1000 mL	
18A0109-01 B	Large OJ, 1000 mL	
18A0109-01 C	Large OJ, 1000 mL	
18A0109-01 D	Small OJ, 500 mL, 9N H2SO4	<2 pass
18A0109-01 E	Small OJ, 500 mL	
18A0109-01 F	HDPE NM, 500 mL, 1:1 HNO3	<2 pass
18A0109-02 A	HDPE NM, 500 mL	>2 Fail
18A0109-03 A	Large OJ, 1000 mL	
18A0109-03 B	Large OJ, 1000 mL	
18A0109-03 C	Large OJ, 1000 mL	
18A0109-03 D	Small OJ, 500 mL, 9N H2SO4	<2 pass
18A0109-03 E	Small OJ, 500 mL	
18A0109-03 F	HDPE NM, 500 mL, 1:1 HNO3	<2 pass
18A0109-04 A	HDPE NM, 500 mL	>2 Fail

SF
Preservation Confirmed By

1/9/18
Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 18A0109

Project Name: R 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) 2.9		
Time: _____		

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

Temp Gun ID#: D00256S

Cooler Accepted by: BF Date: 1/9/18 Time: 1305

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 (YES) Date/Time: 1/9/18 Equipment: Churn splitter Split by: SF BF

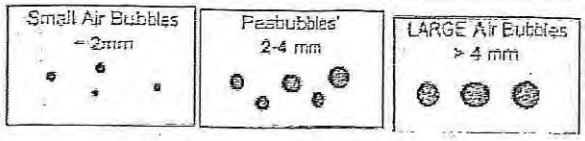
Samples Logged by: SF Date: 1/9/18 Time: 1501

*** 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	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

WUFF-IN

18A0109-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 01/09/2018 02:54
Analyzed: 10-Jan-2018 13:07

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGA0195 Sample Size: 25 mL
Prepared: 10-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	**21.4**	ug/L	
Zinc	7440-66-6	1	4.00	**66.2**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

WUFF-IN

18A0109-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 01/09/2018 02:54
Analyzed: 15-Jan-2018 15:14

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BGA0196
Prepared: 10-Jan-2018
Sample Size: 25 mL
Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	**11.9**	mg/L	
Magnesium	7439-95-4	1	0.0500	**2.33**	mg/L	

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

WUFF-IN

18A0109-01 (Water)

Wet Chemistry

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

Sampled: 01/09/2018 02:54
Analyzed: 09-Jan-2018 16:22

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGA0193
Prepared: 09-Jan-2018
Sample Size: 50 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	**0.0050**	mg-P/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

WUFF-IN

18A0109-01 (Water)

Calculation

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

Sampled: 01/09/2018 02:54
Analyzed: 15-Jan-2018 15:14

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10-Jan-2018 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	**39.2**	mg/L	

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Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

WUFF-IN

18A0109-01RE1 (Water)

Wet Chemistry

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

Sampled: 01/09/2018 02:54
Analyzed: 20-Jan-2018 11:27

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGA0389 Sample Size: 25 mL
Prepared: 18-Jan-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0160	**0.0380**	mg-P/L	

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Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

WUFF-IN

18A0109-02 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 01/09/2018 02:54
Analyzed: 12-Jan-2018 15:24

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGA0264 Sample Size: 25 mL
Prepared: 12-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	**8.28**	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	**28.2**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

WUFF-OUT

18A0109-03 (Water)

Metals and Metallic Compounds

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 01/09/2018 02:58
Analyzed: 10-Jan-2018 13:16

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGA0195 Sample Size: 25 mL
Prepared: 10-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	**18.3**	ug/L	
Zinc	7440-66-6	1	4.00	**60.7**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

WUFF-OUT

18A0109-03 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 01/09/2018 02:58
Analyzed: 15-Jan-2018 15:18

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BGA0196
Prepared: 10-Jan-2018
Sample Size: 25 mL
Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	**15.0**	mg/L	
Magnesium	7439-95-4	1	0.0500	**3.43**	mg/L	

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

WUFF-OUT

18A0109-03 (Water)

Wet Chemistry

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

Sampled: 01/09/2018 02:58
Analyzed: 09-Jan-2018 16:24

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGA0193
Prepared: 09-Jan-2018
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	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

WUFF-OUT

18A0109-03 (Water)

Calculation

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

Sampled: 01/09/2018 02:58
Analyzed: 15-Jan-2018 15:18

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10-Jan-2018 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	**51.5**	mg/L	

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Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

WUFF-OUT

18A0109-03RE1 (Water)

Wet Chemistry

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

Sampled: 01/09/2018 02:58
Analyzed: 20-Jan-2018 11:28

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGA0389 Sample Size: 25 mL
Prepared: 18-Jan-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0160	**0.0340**	mg-P/L	

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Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

WUFF-OUT

18A0109-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 01/09/2018 02:58
Analyzed: 12-Jan-2018 15:52

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGA0264 Sample Size: 25 mL
Prepared: 12-Jan-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	**8.48**	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	**30.0**	ug/L	

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Herrera Environmental Consultants	Project: Hydro International	
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Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

Metals and Metallic Compounds - Quality Control

Batch BGA0195 - 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 (BGA0195-BLK1)				Prepared: 10-Jan-2018 Analyzed: 10-Jan-2018 12:48							
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 (BGA0195-BS1)				Prepared: 10-Jan-2018 Analyzed: 10-Jan-2018 13:25							
Copper	63	26.5	0.500	ug/L	25.0		106	80-120			
Copper	65	26.6	0.500	ug/L	25.0		106	80-120			
Zinc	66	82.4	4.00	ug/L	80.0		103	80-120			
Zinc	67	78.9	4.00	ug/L	80.0		98.7	80-120			
Duplicate (BGA0195-DUP1)		**Source: 18A0109-03**		Prepared: 10-Jan-2018 Analyzed: 10-Jan-2018 13:11							
Copper	63	21.1	0.500	ug/L		18.3			14.20	20	
Zinc	66	66.7	4.00	ug/L		60.7			9.39	20	
Matrix Spike (BGA0195-MS1)		**Source: 18A0109-03**		Prepared: 10-Jan-2018 Analyzed: 10-Jan-2018 13:20							
Copper	63	47.6	0.500	ug/L	25.0	18.3	117	75-125			
Zinc	66	144	4.00	ug/L	80.0	60.7	105	75-125			

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

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

Metals and Metallic Compounds - Quality Control

Batch BGA0196 - 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 (BGA0196-BLK1)				Prepared: 10-Jan-2018 Analyzed: 15-Jan-2018 14:22						
Calcium	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
LCS (BGA0196-BS1)				Prepared: 10-Jan-2018 Analyzed: 15-Jan-2018 14:52						
Calcium	10.2	0.0500	mg/L	10.0		102	80-120			
Magnesium	10.4	0.0500	mg/L	10.0		104	80-120			

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Herrera Environmental Consultants	Project: Hydro International	
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Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BGA0264 - 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 (BGA0264-BLK1)				Prepared: 12-Jan-2018 Analyzed: 12-Jan-2018 13:54							
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 (BGA0264-BS1)				Prepared: 12-Jan-2018 Analyzed: 12-Jan-2018 15:34							
Copper, Dissolved	63	27.7	0.500	ug/L	25.0		111	80-120			
Copper, Dissolved	65	27.4	0.500	ug/L	25.0		110	80-120			
Zinc, Dissolved	66	112	4.00	ug/L	80.0		140	80-120			
Zinc, Dissolved	67	102	4.00	ug/L	80.0		128	80-120			
Duplicate (BGA0264-DUP1)		**Source: 18A0109-02**		Prepared: 12-Jan-2018 Analyzed: 12-Jan-2018 15:19							
Copper, Dissolved	63	8.35	0.500	ug/L		8.28			0.79	20	
Zinc, Dissolved	66	28.3	4.00	ug/L		28.2			0.30	20	
Matrix Spike (BGA0264-MS1)		**Source: 18A0109-02**		Prepared: 12-Jan-2018 Analyzed: 12-Jan-2018 15:29							
Copper, Dissolved	63	35.1	0.500	ug/L	25.0	8.28	107	75-125			
Zinc, Dissolved	66	106	4.00	ug/L	80.0	28.2	97.4	75-125			

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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

Wet Chemistry - Quality Control

Batch BGA0186 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGA0186-BLK1)				Prepared: 10-Jan-2018 Analyzed: 11-Jan-2018 12:21						
Total Phosphorus	ND	0.0160	mg-P/L							U
Blank (BGA0186-BLK2)				Prepared: 10-Jan-2018 Analyzed: 11-Jan-2018 12:41						
Total Phosphorus	ND	0.0160	mg-P/L							U
LCS (BGA0186-BS1)				Prepared: 10-Jan-2018 Analyzed: 11-Jan-2018 12:22						
Total Phosphorus	0.250	0.0160	mg-P/L	0.300		83.3	90-110			*
LCS (BGA0186-BS2)				Prepared: 10-Jan-2018 Analyzed: 11-Jan-2018 12:36						
Total Phosphorus	0.254	0.0160	mg-P/L	0.300		84.7	90-110			*
LCS (BGA0186-BS3)				Prepared: 10-Jan-2018 Analyzed: 11-Jan-2018 12:42						
Total Phosphorus	0.254	0.0160	mg-P/L	0.300		84.7	90-110			*

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

Wet Chemistry - Quality Control

Batch BGA0193 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGA0193-BLK1)			Prepared: 09-Jan-2018 Analyzed: 09-Jan-2018 16:19							
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BGA0193-BS1)			Prepared: 09-Jan-2018 Analyzed: 09-Jan-2018 16:21							
Orthophosphorus	0.152	0.0040	mg-P/L	0.150		101	90-110			
Duplicate (BGA0193-DUP1)		**Source: 18A0109-01**	Prepared: 09-Jan-2018 Analyzed: 09-Jan-2018 16:22							
Orthophosphorus	0.0050	0.0040	mg-P/L		0.0050			0.00		
Matrix Spike (BGA0193-MS1)		**Source: 18A0109-01**	Prepared: 09-Jan-2018 Analyzed: 09-Jan-2018 16:23							
Orthophosphorus	0.104	0.0040	mg-P/L	0.0999	0.0050	99.1	75-125			

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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

Wet Chemistry - Quality Control

Batch BGA0389 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGA0389-BLK1)				Prepared: 18-Jan-2018 Analyzed: 20-Jan-2018 11:24						
Total Phosphorus	ND	0.0160	mg-P/L							U
Blank (BGA0389-BLK2)				Prepared: 18-Jan-2018 Analyzed: 20-Jan-2018 11:38						
Total Phosphorus	ND	0.0160	mg-P/L							U
LCS (BGA0389-BS1)				Prepared: 18-Jan-2018 Analyzed: 20-Jan-2018 11:24						
Total Phosphorus	0.294	0.0160	mg-P/L	0.300		98.0	90-110			
LCS (BGA0389-BS2)				Prepared: 18-Jan-2018 Analyzed: 20-Jan-2018 11:38						
Total Phosphorus	0.298	0.0160	mg-P/L	0.300		99.3	90-110			

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	24-Jan-2018 16:10

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.

January 27, 2018

Data_18A0436

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BGA0663-BLK1	Blank	13-05605-000	Water			01/29/2018	01/29/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BGA0663-BS1	LCS	13-05605-000	Water			01/29/2018	01/29/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.150		mg-P/L
18A0436-01	WUFF-IN	13-05605-000	Surface Water	01/27/2018	01/29/2018	01/29/2018	01/29/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0050	H	mg-P/L
18A0436-02	WUFF-OUT	13-05605-000	Surface Water	01/27/2018	01/29/2018	01/29/2018	01/29/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0060	H	mg-P/L
BGA0688-BLK1	Blank	13-05605-000	Water			01/30/2018	02/01/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGA0688-BLK2	Blank	13-05605-000	Water			01/30/2018	02/01/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGA0688-BS1	LCS	13-05605-000	Water			01/30/2018	02/01/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.146		mg-P/L
BGA0688-BS2	LCS	13-05605-000	Water			01/30/2018	02/01/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.148		mg-P/L
18A0436-01	WUFF-IN	13-05605-000	Surface Water	01/27/2018	01/29/2018	01/30/2018	02/01/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0320		mg-P/L
18A0436-02	WUFF-OUT	13-05605-000	Surface Water	01/27/2018	01/29/2018	01/30/2018	02/01/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0480		mg-P/L

Analytical Resources, Incorporated
Analytical Chemists and Consultants

16 February 2018

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)	Associated SDG ID(s)
18A0436	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: 2018.02.16 12:32:34 -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.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

18A0436

HERRERA
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:
B. Bland		
Laboratory:	Requested Completion Date:	Total No. of Containers:
Analytical Resources Inc.		

Sample ID	Date	Time	Sample Type (see codes)	Preser-vative? (Y/N)	Matrix (see codes)	Total Suspended Solids- SM 2540D	Analyses Requested: 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.
WUFF-IN	1.27.18	9:36	C	N	SW	x	X	X	X	X	X	X	X	X	X	X	
WUFF-OUT	1.27.18	6:02	C	N	SW	x	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/	Signature	Date/Time	Received By (Name/CO)	Signature	Date/Time
Brianna Bland		1.29.18 15:15	Stephanie Fisher		1/29/18 15:15
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)

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	16-Feb-2018 12:31

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18A0436-01	Water	27-Jan-2018 09:36	29-Jan-2018 15:15
WUFF-OUT	18A0436-02	Water	27-Jan-2018 06:02	29-Jan-2018 15:15

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	16-Feb-2018 12:31

Case Narrative

Sample receipt

Samples as listed on the preceding page were received January 29, 2018 under ARI workorder 18A0436. For details regarding sample receipt, please refer to the Cooler Receipt Form. The samples were split by sample receiving prior to analysis. The TSS and PSD analysis was subcontracted to ETS Labs. The SSC analysis was subcontracted to MTC.

Wet Chemistry (O-Phos, T-Phos)

The O-Phos was received outside of the fourty-eight hour recommended holding time, and has been flagged with an "H" qualifier.

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.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera

Project Name: Hydro International

COC No(s): _____ NA

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

Assigned ARI Job No: 18A0436

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) 6.5

Time: _____

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

Temp Gun ID#: D00256S

Cooler Accepted by: SEF Date: 1/29/18 Time: 1515

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	NA		

Was Sample Split by ARI : NA YES Date/Time: 1/29/18 Equipment: Churn splitter Split by: SEF

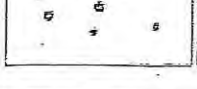
Samples Logged by: SEF Date: 1/29/18 Time: 1705

*** 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)

Incorporated
Analytical Chemists and
Consultants

Cooler Temperature Compliance Form

18A0436

Cooler#: _____ Temperature(°C): 6.5

Sample ID	Bottle Count	Bottle Type
Samples received above 6°		

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: SEF Date: 4/29/18 Time: 15 15

E T S

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. 134th Place, Suite 100, Tukwila, WA 98168				ANALYST(S)	SUPERVISOR
ATTN:	Amanda Volgardsen	DATE	DATE	DATE	S. Santos	D. Jacobson
JOB:	Hydro International Up-Flo Filter	COLLECTED	RECEIVED	COMPLETED	L. Quijano	LAB DIRECTOR
SITE:	Oregon-Washington	1/27/2018	1/31/2018	2/12/2018		G.S. Conrad,PhD

PARTICLE SIZE DISTRIBUTION (PSD), TSS & TVSS 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
07645-1	HI-55HEC/RW 18A0436-01	WUFF-IN	**2.7**	**2.2**	**2.0**		**13.3**	**7.3**	**24.0**
			9.8%	8.0%	7.3%		48.4%	26.5%	
						Total SSC by Summation →		**27.5**	
07645-2	HI-56HEC/RW 18A0436-03	WUFF-OUT	**2.0**	**2.2**	**1.5**		**7.2**	**5.5**	**19.5**
			10.9%	12.0%	8.2%		39.1%	29.9%	
						Total SSC by Summation →		**18.4**	
			#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 just under 25 ppm in the input sample; and the output sample is about four-fifths of that amount. The overall average reduction in TSS is just under 26% of the total TSS. The range is fairly wide in this case at 18.8%-33.1%% (TSS by analytical method vs TSS by summation). The reductions in each fraction vary somewhat as follows: 25.9%, 0.0%, 25.0%, 45.9%, and 24.7%. Notice that for the input sample the mode is at the 4-63 µ fraction at nearly half of the total TSS (48.4%), and the finest fraction is a little over one-quarter (26.5%); all other fractions are much lower in proportion being in the 7%-10% range. Thus, the size distribution is skewed low, but is not right at the bottom of the range. Based on the overall distribution, it seems most probable that the majority of the 4-63 µ fraction would be below 20 µ in size. The RPDs are very good to excellent as follows: ±6.8%; 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 (18A0436)	**Date Received:**	January 31, 2018
Project #:	16T001-035	**Sampled By:**	Others
Client :	Analytical Resources, Inc.	**Date Reported:**	February 16, 2018
Source:	Multiple	**Tested By:**	B. Goble
MTC Sample#:	Multiple		

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.

Reviewed by: EJabin Goble

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Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Hydro International (18A0436)
Project #: 16T001-035
Date Received: January 31, 2018
Date Tested: February 6, 2018

Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: B. Goble

Suspended Sediment Concentration
ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC (>63µm) (mg/L)	FineFraction SSC (<63µm) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	S18-0135	1/27/2018	15.0	12.0	27.0
WUFF-OUT	S18-0136	1/27/2018	9.3	12.5	21.8

Reviewed by: EGabriel Goble

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	16-Feb-2018 12:31

WUFF-IN

18A0436-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99 — Sampled: 01/27/2018 09:36

Instrument: UV1800-2 — Analyzed: 29-Jan-2018 18:32

Sample Preparation: Preparation Method: SM 5310 A-00, 0.45um filtration
Preparation Batch: BGA0663 — Sample Size: 50 mL
Prepared: 29-Jan-2018 — Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	**0.0050**	mg-P/L	H

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGA0688 — Sample Size: 25 mL
Prepared: 30-Jan-2018 — Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0160	**0.0320**	mg-P/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	16-Feb-2018 12:31

WUFF-OUT

18A0436-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99 — Sampled: 01/27/2018 06:02

Instrument: UV1800-2 — Analyzed: 29-Jan-2018 18:32

Sample Preparation: Preparation Method: SM 5310 A-00, 0.45um filtration
Preparation Batch: BGA0663 — Sample Size: 50 mL
Prepared: 29-Jan-2018 — Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	**0.0060**	mg-P/L	H

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGA0688 — Sample Size: 25 mL
Prepared: 30-Jan-2018 — Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0160	**0.0480**	mg-P/L	

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	16-Feb-2018 12:31

Wet Chemistry - Quality Control

Batch BGA0663 - 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 (BGA0663-BLK1)				Prepared: 29-Jan-2018 Analyzed: 29-Jan-2018 18:27						
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BGA0663-BS1)				Prepared: 29-Jan-2018 Analyzed: 29-Jan-2018 18:27						
Orthophosphorus	0.150	0.0040	mg-P/L	0.150		100	90-110			

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	16-Feb-2018 12:31

Wet Chemistry - Quality Control

Batch BGA0688 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: SK

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGA0688-BLK1)				Prepared: 30-Jan-2018 Analyzed: 01-Feb-2018 15:38						
Total Phosphorus	ND	0.0160	mg-P/L							U
Blank (BGA0688-BLK2)				Prepared: 30-Jan-2018 Analyzed: 01-Feb-2018 16:04						
Total Phosphorus	ND	0.0160	mg-P/L							U
LCS (BGA0688-BS1)				Prepared: 30-Jan-2018 Analyzed: 01-Feb-2018 15:39						
Total Phosphorus	0.146	0.0160	mg-P/L	0.150		97.3	90-110			
LCS (BGA0688-BS2)				Prepared: 30-Jan-2018 Analyzed: 01-Feb-2018 16:05						
Total Phosphorus	0.148	0.0160	mg-P/L	0.150		98.7	90-110			

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Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	16-Feb-2018 12:31

Certified Analyses included in this Report

Analyte	Certifications
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

Herrera Environmental Consultants	Project: Hydro International	
2200 6th Avenue, Suite 1100	Project Number: 13-05605-000	**Reported:**
Seattle WA, 98121	Project Manager: Dylan Ahearn	16-Feb-2018 12:31

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
H	Hold time violation - Hold time was exceeded.
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.