

February 3, 2018

Data_18B0052

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
18B0052-01	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/06/2018	02/09/2018	SM 2340 B-97		Hardness	40.1		mg/L
18B0052-03	WUFF-OUT	13-05605-000	Water	02/03/2018	02/05/2018	02/06/2018	02/09/2018	SM 2340 B-97		Hardness	39.2		mg/L
BGB0091-BLK1	Blank	13-05605-000	Water			02/05/2018	02/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BGB0091-BS1	LCS	13-05605-000	Water			02/05/2018	02/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.148		mg-P/L
BGB0091-DUP1	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/05/2018	02/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0130	L	mg-P/L
BGB0091-MS1	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/05/2018	02/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.114		mg-P/L
18B0052-01	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/05/2018	02/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0100		mg-P/L
18B0052-03	WUFF-OUT	13-05605-000	Water	02/03/2018	02/05/2018	02/05/2018	02/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0130		mg-P/L
BGB0122-BLK1	Blank	13-05605-000	Water			02/06/2018	02/09/2018	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BGB0122-BS1	LCS	13-05605-000	Water			02/06/2018	02/09/2018	EPA 6010C	7440-70-2	Calcium	9.98		mg/L
18B0052-01	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/06/2018	02/09/2018	EPA 6010C	7440-70-2	Calcium	11.9		mg/L
18B0052-03	WUFF-OUT	13-05605-000	Water	02/03/2018	02/05/2018	02/06/2018	02/09/2018	EPA 6010C	7440-70-2	Calcium	11.6		mg/L
BGB0122-BLK1	Blank	13-05605-000	Water			02/06/2018	02/09/2018	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BGB0122-BS1	LCS	13-05605-000	Water			02/06/2018	02/09/2018	EPA 6010C	7439-95-4	Magnesium	10.1		mg/L
18B0052-01	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/06/2018	02/09/2018	EPA 6010C	7439-95-4	Magnesium	2.55		mg/L
18B0052-03	WUFF-OUT	13-05605-000	Water	02/03/2018	02/05/2018	02/06/2018	02/09/2018	EPA 6010C	7439-95-4	Magnesium	2.46		mg/L
BGB0162-BLK1	Blank	13-05605-000	Water			02/08/2018	02/08/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGB0162-BS1	LCS	13-05605-000	Water			02/08/2018	02/08/2018	EPA 200.8	7440-50-8	Copper	24.9		ug/L
18B0052-01	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/08/2018	02/08/2018	EPA 200.8	7440-50-8	Copper	33.0		ug/L
18B0052-03	WUFF-OUT	13-05605-000	Water	02/03/2018	02/05/2018	02/08/2018	02/08/2018	EPA 200.8	7440-50-8	Copper	22.7		ug/L
BGB0162-BLK1	Blank	13-05605-000	Water			02/08/2018	02/08/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGB0162-BS1	LCS	13-05605-000	Water			02/08/2018	02/08/2018	EPA 200.8	7440-50-8	Copper	26.2		ug/L
BGB0162-BLK1	Blank	13-05605-000	Water			02/08/2018	02/08/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGB0162-BS1	LCS	13-05605-000	Water			02/08/2018	02/08/2018	EPA 200.8	7440-66-6	Zinc	79.9		ug/L
BGB0162-BLK1	Blank	13-05605-000	Water			02/08/2018	02/08/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGB0162-BS1	LCS	13-05605-000	Water			02/08/2018	02/08/2018	EPA 200.8	7440-66-6	Zinc	75.3		ug/L
18B0052-01	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/08/2018	02/08/2018	EPA 200.8	7440-66-6	Zinc	99.9		ug/L
18B0052-03	WUFF-OUT	13-05605-000	Water	02/03/2018	02/05/2018	02/08/2018	02/08/2018	EPA 200.8	7440-66-6	Zinc	63.0		ug/L
BGB0205-BLK1	Blank	13-05605-000	Water			02/09/2018	02/09/2018	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BGB0205-BS1	LCS	13-05605-000	Water			02/09/2018	02/09/2018	EPA 200.8-Dissolved	7440-50-8	Copper	27.3		ug/L
18B0052-02	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/09/2018	02/12/2018	EPA 200.8-Dissolved	7440-50-8	Copper	10.7		ug/L
18B0052-04	WUFF-OUT	13-05605-000	Water	02/03/2018	02/05/2018	02/09/2018	02/12/2018	EPA 200.8-Dissolved	7440-50-8	Copper	10.6		ug/L
BGB0205-BLK1	Blank	13-05605-000	Water			02/09/2018	02/09/2018	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BGB0205-BS1	LCS	13-05605-000	Water			02/09/2018	02/09/2018	EPA 200.8-Dissolved	7440-50-8	Copper	27.4		ug/L
BGB0205-BLK1	Blank	13-05605-000	Water			02/09/2018	02/09/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BGB0205-BS1	LCS	13-05605-000	Water			02/09/2018	02/09/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	86.6		ug/L
18B0052-02	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/09/2018	02/12/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	31.3		ug/L
18B0052-04	WUFF-OUT	13-05605-000	Water	02/03/2018	02/05/2018	02/09/2018	02/12/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	31.1		ug/L
BGB0205-BLK1	Blank	13-05605-000	Water			02/09/2018	02/09/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BGB0205-BS1	LCS	13-05605-000	Water			02/09/2018	02/09/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	84.3		ug/L
BGB0292-BLK1	Blank	13-05605-000	Water			02/13/2018	02/14/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGB0292-BLK2	Blank	13-05605-000	Water			02/13/2018	02/14/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGB0292-BS1	LCS	13-05605-000	Water			02/13/2018	02/14/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.144		mg-P/L
BGB0292-BS2	LCS	13-05605-000	Water			02/13/2018	02/14/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.147		mg-P/L
BGB0292-DUP1	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/13/2018	02/14/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.114	*	mg-P/L
BGB0292-MS1	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/13/2018	02/14/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	1.84	D	mg-P/L
18B0052-01	WUFF-IN	13-05605-000	Water	02/03/2018	02/05/2018	02/13/2018	02/14/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0840		mg-P/L
18B0052-03	WUFF-OUT	13-05605-000	Water	02/03/2018	02/05/2018	02/13/2018	02/14/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0460		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

20 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)
18B0052

Associated SDG ID(s)
N/A

Amanda
Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical Resources,
Inc., ou=Client Services,
cn=Amanda Volgardsen,
email=amandav@arilabs.com
Date: 2018.02.20 16:08:12 -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 enclosed Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

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

Analytical Resources, Inc.

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





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

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

Reported:
20-Feb-2018 16:05

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18B0052-01	Water	03-Feb-2018 23:08	05-Feb-2018 12:00
WUFF-IN	18B0052-02	Water	03-Feb-2018 23:08	05-Feb-2018 12:00
WUFF-OUT	18B0052-03	Water	03-Feb-2018 23:08	05-Feb-2018 12:00
WUFF-OUT	18B0052-04	Water	03-Feb-2018 23:08	05-Feb-2018 12:00



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

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

Reported:
20-Feb-2018 16:05

Case Narrative

Sample receipt

Samples as listed on the preceding page were received February 5, 2018 under ARI workorder 18B0052. 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 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.

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 O-Phos matrix spike and duplicate were prepared in conjunction with sample WUFF-IN. The matrix spike percent recovery was within QC limits. The duplicate has a concentration ≤ 5 times the reporting limit, and the replicate control limit defaults to \pm the reporting limit instead of 20% of the RPD. The duplicate has been flagged with a "L" qualifier. The results are advisory. No further corrective action was taken.

A T-Phos matrix spike and duplicate were prepared in conjunction with sample WUFF-IN. The matrix spike percent recovery was within QC limits. The duplicate has a high RPD. The duplicate was re-read to verify with results reported as is. The results are advisory. No further corrective action was taken.



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

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

Reported:
20-Feb-2018 16:05



WORK ORDER

18B0052

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
18B0052-01 A	HDPE NM, 1000 mL	
18B0052-01 B	HDPE NM, 1000 mL	
18B0052-01 C	HDPE NM, 1000 mL	
18B0052-01 D	Small OJ, 500 mL	
18B0052-01 E	Small OJ, 500 mL, 9N H2SO4	L2 pass
18B0052-01 F	HDPE NM, 500 mL, 1:1 HNO3	L2 pass
18B0052-02 A	HDPE NM, 500 mL	>2 fail
18B0052-03 A	HDPE NM, 1000 mL	
18B0052-03 B	HDPE NM, 1000 mL	
18B0052-03 C	HDPE NM, 1000 mL	
18B0052-03 D	Small OJ, 500 mL	
18B0052-03 E	Small OJ, 500 mL, 9N H2SO4	L2 pass
18B0052-03 F	HDPE NM, 500 mL, 1:1 HNO3	L2 pass
18B0052-04 A	HDPE NM, 500 mL	>2 fail

SEF

Preservation Confirmed By

2/5/18

Date

Reviewed By

Date



Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 18B0052

Project Name: Hydro International

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

Tracking No: _____ NA

Preliminary Examination Phase:

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

YES ☐ NO ☒

Were custody papers included with the cooler? _____

YES ☒ NO ☐

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

YES ☒ NO ☐

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

Time: _____

2.8

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

Temp Gun ID#: 7002565

Cooler Accepted by: BF Date: 2/5/18 Time: 1200

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: 2/5/18 Equipment: Churn splitter Split by: SEF

Samples Logged by: SEF Date: 2/5/18 Time: 1318

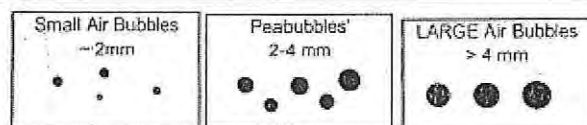
**** Notify Project Manager of discrepancies or concerns ****

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

Additional Notes, Discrepancies, & Resolutions:

By: _____

Date: _____



Small → "sm" (< 2 mm)

Peabubbles → "pb" (2 to < 4 mm)

Large → "lg" (4 to < 6 mm)

Headspace → "hs" (> 6 mm)



WORK ORDER

18B0052

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
18B0052-01 A	HDPE NM, 1000 mL	
18B0052-01 B	HDPE NM, 1000 mL	
18B0052-01 C	HDPE NM, 1000 mL	
18B0052-01 D	Small OJ, 500 mL	
18B0052-01 E	Small OJ, 500 mL, 9N H ₂ SO ₄	L2 pass
18B0052-01 F	HDPE NM, 500 mL, 1:1 HNO ₃	L2 pass
18B0052-02 A	HDPE NM, 500 mL	>2 fail
18B0052-03 A	HDPE NM, 1000 mL	
18B0052-03 B	HDPE NM, 1000 mL	
18B0052-03 C	HDPE NM, 1000 mL	
18B0052-03 D	Small OJ, 500 mL	
18B0052-03 E	Small OJ, 500 mL, 9N H ₂ SO ₄	L2 pass
18B0052-03 F	HDPE NM, 500 mL, 1:1 HNO ₃	L2 pass
18B0052-04 A	HDPE NM, 500 mL	>2 fail

SEF

Preservation Confirmed By

2/5/18

Date

2/8/18 DP
filtered + preserved

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (18B0052)
Project #: 16T001-035
Client : Analytical Resources, Inc.
Source: Multiple
MTC Sample#: Multiple

Date Received: February 6, 2018
Sampled By: Others
Date Reported: February 16, 2018
Tested By: B. Goble

CASE NARRATIVE

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

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

Reviewed by: 

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Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (18B0052)

Client: Analytical Resources, Inc.

Project #: 16T001-035

Date Received: February 6, 2018

Sampled by: Others

Date Tested: February 9, 2018

Tested by: B. Goble

Suspended Sediment Concentration ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC ($>63\mu\text{m}$) (mg/L)	FineFraction SSC ($<63\mu\text{m}$) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	S18-0147	2/3/2018	54.9	18.4	73.4
WUFF-OUT	S18-0148	2/3/2018	2.7	13.8	16.4

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

Reviewed by:

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ETS

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

COMPANY: Analytical Resources, Inc., 4611 S. 134 th Place, Suite 100, Tukwila, WA 98168						ANALYST(S) S. Santos L. Quijano	SUPERVISOR D. Jacobson LAB DIRECTOR G.S. Conrad, PhD
ATTN: Amanda Volgardsen			DATE	DATE	DATE		
JOB: Hydro International Up-Flo Filter			COLLECTED	RECEIVED	COMPLETED		
SITE: Oregon-Washington			2/3/2018	2/7/2018	2/19/2018		

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
07657-1	HI-57HEC/RW	WUFF-IN	3.0	3.0	2.0		15.7	7.1	27.5
	18B0052-01		9.7%	9.7%	6.5%		51.0%	23.1%	
						Total SSC by Summation →		30.8	
07657-2	HI-58HEC/RW	WUFF-OUT	0.2	0.7	0.7		9.5	5.0	16.0
	18B0052-03		1.2%	4.3%	4.3%		59.0%	31.1%	
						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	
07657-1	HI-57HEC/RW	WUFF-IN						19.5	
	18B0052-01								
07657-2	HI-58HEC/RW	WUFF-OUT						11.0	
	18B0052-03								

COMMENTS

The matrix has a very low concentration of TSS particles amounting to about 30 ppm in the input sample; and the output sample is more than half that amount. The overall average reduction in TSS is just under 45% of the total TSS. The range is fairly wide in this case at 41.8%-47.7% (TSS by analytical method vs TSS by summation). The reductions in each fraction vary a great deal as follows: 93.3%, 76.7%, 65.0%, 39.5%, and 29.6%. Notice that for the input sample the mode is at the 4-63 μ fraction at just over half of the total TSS (51%); there is a minor mode at the finest fraction which is a little under one-quarter (~23%); all other fractions are much lower in proportion being more or less 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 TVSS levels are actually very close this time. The range for the input sample is about 63%-71%; and for the output sample is practically nil at 68.3%-68.8%. The overall averages for the two are output at 67.1% TVSS; input @ 68.5% TVSS. The RPDs are very good to excellent as follows: ±5.7%; & ±0.3%.

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



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

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

Reported:
20-Feb-2018 16:05

WUFF-IN
18B0052-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 02/03/2018 23:08

Instrument: ICPMS2

Analyzed: 08-Feb-2018 16:43

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGB0162 Sample Size: 25 mL
Prepared: 08-Feb-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	33.0	ug/L	
Zinc	7440-66-6	1	4.00	99.9	ug/L	



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

Reported:
20-Feb-2018 16:05

WUFF-IN
18B0052-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 02/03/2018 23:08

Instrument: ICP2

Analyzed: 09-Feb-2018 12:47

Sample Preparation:

Preparation Method: TWC EPA 3010A

Preparation Batch: BGB0122

Prepared: 06-Feb-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	2.55	mg/L	



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Reported:
20-Feb-2018 16:05

WUFF-IN
18B0052-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 02/03/2018 23:08

Instrument: UV1800-2

Analyzed: 05-Feb-2018 17:24

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGB0091 Sample Size: 50 mL
Prepared: 05-Feb-2018 Final Volume: 50 mL

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

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGB0292 Sample Size: 25 mL
Prepared: 13-Feb-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0160	0.0840	mg-P/L	



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Reported:
20-Feb-2018 16:05

WUFF-IN
18B0052-01 (Water)

Calculation

Method: SM 2340 B-97

Sampled: 02/03/2018 23:08

Instrument: [CALC]

Analyzed: 09-Feb-2018 12:47

Sample Preparation:

Preparation Method: [CALC]

Preparation Batch: [CALC]

Prepared: 06-Feb-2018

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	40.1	mg/L	



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Project: Hydro International
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Reported:
20-Feb-2018 16:05

WUFF-IN
18B0052-02 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 02/03/2018 23:08

Instrument: ICPMS1

Analyzed: 12-Feb-2018 16:18

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGB0205 Sample Size: 25 mL
Prepared: 09-Feb-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	10.7	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	31.3	ug/L	



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

Reported:
20-Feb-2018 16:05

WUFF-OUT
18B0052-03 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 02/03/2018 23:08

Instrument: ICPMS2

Analyzed: 08-Feb-2018 16:47

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGB0162 Sample Size: 25 mL
Prepared: 08-Feb-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	22.7	ug/L	
Zinc	7440-66-6	1	4.00	63.0	ug/L	



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

Reported:
20-Feb-2018 16:05

WUFF-OUT
18B0052-03 (Water)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 02/03/2018 23:08

Instrument: ICP2

Analyzed: 09-Feb-2018 12:51

Sample Preparation:

Preparation Method: TWC EPA 3010A

Preparation Batch: BGB0122

Prepared: 06-Feb-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	11.6	mg/L	
Magnesium	7439-95-4	1	0.0500	2.46	mg/L	



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

Reported:
20-Feb-2018 16:05

WUFF-OUT
18B0052-03 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 02/03/2018 23:08

Instrument: UV1800-2

Analyzed: 05-Feb-2018 17:26

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGB0091 Sample Size: 50 mL
Prepared: 05-Feb-2018 Final Volume: 50 mL

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

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGB0292 Sample Size: 25 mL
Prepared: 13-Feb-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0160	0.0460	mg-P/L	



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Reported:
20-Feb-2018 16:05

WUFF-OUT
18B0052-03 (Water)

Calculation

Method: SM 2340 B-97

Sampled: 02/03/2018 23:08

Instrument: [CALC]

Analyzed: 09-Feb-2018 12:51

Sample Preparation:

Preparation Method: [CALC]

Preparation Batch: [CALC]

Prepared: 06-Feb-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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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
20-Feb-2018 16:05

WUFF-OUT
18B0052-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 02/03/2018 23:08

Instrument: ICPMS1

Analyzed: 12-Feb-2018 16:22

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGB0205 Sample Size: 25 mL
Prepared: 09-Feb-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	10.6	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	31.1	ug/L	



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

Reported:
20-Feb-2018 16:05

Metals and Metallic Compounds - Quality Control

Batch BGB0122 - TWC EPA 3010A

Instrument: ICP2 Analyst: TCH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Blank (BGB0122-BLK1) Prepared: 06-Feb-2018 Analyzed: 09-Feb-2018 11:06									
Calcium	ND	0.0500	mg/L						U
Magnesium	ND	0.0500	mg/L						U
LCS (BGB0122-BS1) Prepared: 06-Feb-2018 Analyzed: 09-Feb-2018 11:43									
Calcium	9.98	0.0500	mg/L	10.0		99.8 80-120			
Magnesium	10.1	0.0500	mg/L	10.0		101 80-120			



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Reported:
20-Feb-2018 16:05

Metals and Metallic Compounds - Quality Control

Batch BGB0162 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: CC

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGB0162-BLK1)			Prepared: 08-Feb-2018 Analyzed: 08-Feb-2018 16:25								
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 (BGB0162-BS1)			Prepared: 08-Feb-2018 Analyzed: 08-Feb-2018 17:12								
Copper	63	24.9	0.500	ug/L	25.0		99.5	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	75.3	4.00	ug/L	80.0		94.2	80-120			



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

Reported:
20-Feb-2018 16:05

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BGB0205 - 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 (BGB0205-BLK1)			Prepared: 09-Feb-2018 Analyzed: 09-Feb-2018 15:12								
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 (BGB0205-BS1)			Prepared: 09-Feb-2018 Analyzed: 09-Feb-2018 15:30								
Copper, Dissolved	63	27.3	0.500	ug/L	25.0		109	80-120			
Copper, Dissolved	65	27.4	0.500	ug/L	25.0		109	80-120			
Zinc, Dissolved	66	86.6	4.00	ug/L	80.0		108	80-120			
Zinc, Dissolved	67	84.3	4.00	ug/L	80.0		105	80-120			



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

Reported:
20-Feb-2018 16:05

Wet Chemistry - Quality Control

Batch BGB0091 - 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 (BGB0091-BLK1) Prepared: 05-Feb-2018 Analyzed: 05-Feb-2018 17:23										
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BGB0091-BS1) Prepared: 05-Feb-2018 Analyzed: 05-Feb-2018 17:24										
Orthophosphorus	0.148	0.0040	mg-P/L	0.150		98.7	90-110			
Duplicate (BGB0091-DUP1) Source: 18B0052-01 Prepared: 05-Feb-2018 Analyzed: 05-Feb-2018 17:24										
Orthophosphorus	0.0130	0.0040	mg-P/L		0.0100			26.10	20	L
Matrix Spike (BGB0091-MS1) Source: 18B0052-01 Prepared: 05-Feb-2018 Analyzed: 05-Feb-2018 17:25										
Orthophosphorus	0.114	0.0040	mg-P/L	0.0999	0.0100	104	75-125			

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



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

Reported:
20-Feb-2018 16:05

Wet Chemistry - Quality Control

Batch BGB0292 - 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 (BGB0292-BLK1) Prepared: 13-Feb-2018 Analyzed: 14-Feb-2018 11:22										
Total Phosphorus	ND	0.0080	mg-P/L							U
Blank (BGB0292-BLK2) Prepared: 13-Feb-2018 Analyzed: 14-Feb-2018 11:43										
Total Phosphorus	ND	0.0080	mg-P/L							U
LCS (BGB0292-BS1) Prepared: 13-Feb-2018 Analyzed: 14-Feb-2018 11:23										
Total Phosphorus	0.144	0.0080	mg-P/L	0.150		96.0	90-110			
LCS (BGB0292-BS2) Prepared: 13-Feb-2018 Analyzed: 14-Feb-2018 11:44										
Total Phosphorus	0.147	0.0080	mg-P/L	0.150		98.0	90-110			
Duplicate (BGB0292-DUP1) Source: 18B0052-01 Prepared: 13-Feb-2018 Analyzed: 14-Feb-2018 11:25										
Total Phosphorus	0.114	0.0080	mg-P/L		0.0840			30.30	20	*
Matrix Spike (BGB0292-MS1) Source: 18B0052-01 Prepared: 13-Feb-2018 Analyzed: 14-Feb-2018 11:26										
Total Phosphorus	1.84	0.160	mg-P/L	2.00	0.0840	92.1	75-125			D

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



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

Reported:
20-Feb-2018 16:05

Certified Analyses included in this Report

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

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



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Reported:
20-Feb-2018 16:05

Notes and Definitions

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

February 13, 2018

Data_18B0197

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BGB0371-BLK1	Blank	13-05605-000	Water			02/15/2018	02/15/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BGB0371-BS1	LCS	13-05605-000	Water			02/15/2018	02/15/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.155		mg-P/L
18B0197-01	WUFF-IN	13-05605-000	Surface Water	02/14/2018	02/14/2018	02/15/2018	02/15/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0170		mg-P/L
18B0197-02	WUFF-OUT	13-05605-000	Surface Water	02/14/2018	02/14/2018	02/15/2018	02/15/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0150		mg-P/L
BGB0613-BLK1	Blank	13-05605-000	Water			02/26/2018	02/27/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGB0613-BLK2	Blank	13-05605-000	Water			02/26/2018	02/27/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGB0613-BS1	LCS	13-05605-000	Water			02/26/2018	02/27/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.150		mg-P/L
BGB0613-BS2	LCS	13-05605-000	Water			02/26/2018	02/27/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.149		mg-P/L
18B0197-01	WUFF-IN	13-05605-000	Surface Water	02/14/2018	02/14/2018	02/26/2018	02/27/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0960		mg-P/L
18B0197-02	WUFF-OUT	13-05605-000	Surface Water	02/14/2018	02/14/2018	02/26/2018	02/27/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0860		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

28 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)
18B0197

Associated SDG ID(s)
N/A

Amanda
Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical Resources,
Inc., ou=Project Manager,
cn=Amanda Volgardsen,
email=amanda.volgardsen@arilab
s.com
Date: 2018.02.28 11:07:50 -08'00'

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

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

Analytical Resources, Inc.

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



Chain of Custody Record

Project Name: Hydro International Up-flo Filter		Project Number: 13-05605-000		Client: Herrera Environmental		Total Suspended Solids- SM 2540D		Analyses Requested												Lab ID No.			
Report To: Dylan Ahearn				Copy To:				Particle size Distribution - ASTM 3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3													
Sampled By: A. SVENDSEN				Delivery Method: IN TOTE W/ICE																			
Laboratory: Analytical Resources Inc.		Requested Completion Date:		Total No. of Containers: 2																			
Lab Use:				Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)																	
Sample ID		Date		Time																			
WUFF-IN		2/14/18		0138		C	N	SW	x				X	X	X								
WUFF-OUT		2/14/18		0138		C	N	SW	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/ Alex SVENDSEN/HCE				Signature 				Date/Time 2/14/18 1205				Received By (Name/CO) Stephanie Fisnel				Signature 				Date/Time 2/14/18 12			
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
2200 6th Avenue, Suite 1100
Seattle WA, 98121

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

Reported:
28-Feb-2018 11:07

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18B0197-01	Water	14-Feb-2018 01:38	14-Feb-2018 12:05
WUFF-OUT	18B0197-02	Water	14-Feb-2018 01:38	14-Feb-2018 12:05



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

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

Reported:
28-Feb-2018 11:07

Case Narrative

Sample receipt

Samples as listed on the preceding page were received February 14, 2018 under ARI workorder 18B0197. 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.

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 method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.



WORK ORDER

18B0197

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
18B0197-01 A	Large OJ, 1000 mL	
18B0197-01 B	Large OJ, 1000 mL	
18B0197-01 C	Small OJ, 500 mL	
18B0197-01 D	Small OJ, 500 mL, 9N H ₂ SO ₄	L2 pass
18B0197-02 A	Large OJ, 1000 mL	
18B0197-02 B	Large OJ, 1000 mL	
18B0197-02 C	Small OJ, 500 mL	
18B0197-02 D	Small OJ, 500 mL, 9N H ₂ SO ₄	L2 pass

SEF
Preservation Confirmed By

2/14/18
Date



Cooler Receipt Form

ARI Client: Henera

Project Name: Hydro International

COC No(s): _____ NA

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

Assigned ARI Job No: 18B0197

Tracking No: _____ NA

Preliminary Examination Phase:

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

Were custody papers included with the cooler? YES YES NO

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

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) Time: 3.7

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: D002565

Cooler Accepted by: SEF Date: 2/14/18 Time: 1205

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 YES NO

Were all bottle labels complete and legible? YES YES NO

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

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

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

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

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

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

Date VOC Trip Blank was made at ARI: NA NA

Was Sample Split by ARI: NA YES Date/Time: 2/14/18 Equipment: Churn splitter Split by: SEF

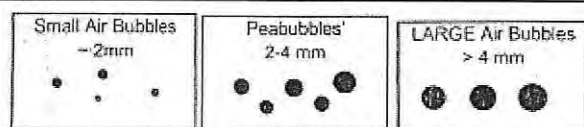
Samples Logged by: SEF Date: 2/14/18 Time: 1710 SEF 1719

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

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

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____



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



ETS

Environmental Technical Services

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

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

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

COMPANY: Analytical Resources, Inc., 4611 S. 134 th Place, Suite 100, Tukwila, WA 98168						ANALYST(S) S. Santos L. Quijano	SUPERVISOR D. Jacobson LAB DIRECTOR G.S. Conrad, PhD
ATTN: Amanda Volgardsen			DATE COLLECTED	DATE RECEIVED	DATE COMPLETED		
JOB: Hydro International Up-Flo Filter			2/14/2018	2/16/2018	2/27/2018		
SITE: Oregon-Washington							

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
07672-1	HI-59HEC/RW	WUFF-IN	6.0 19.9%	3.2 10.6%	1.7 5.6%		12.5 41.4%	6.8 22.5%	28.0
	18B0197-01					Total SSC by Summation →		30.2	
07672-2	HI-60HEC/RW	WUFF-OUT	0.7 4.3%	1.0 6.2%	1.2 7.4%		8.9 54.9%	4.4 27.2%	16.2
	18B0197-02					Total SSC by Summation →		16.2	
			#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 ⁺]	EC _w [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 30 ppm in the input sample; and the output sample is more than half that amount. The overall average reduction in TSS is just over 44% of the total TSS. And the range is moderate in this case at 42.1%-46.4% (TSS by analytical method vs TSS by summation). The reductions in each fraction vary a great deal as follows: 88.3%, 68.8%, 29.4%, 28.8%, and 35.3%. Notice that for the input sample the mode is at the 4-63 μ fraction at just over two-fifths of the total TSS (~41%); there are minor modes at about one-fifth of the TSS each at the 1-4 μ fraction (22.5%) and the ≥500 μ fraction (~20%); all other fractions are much lower in proportion being more or less (@ ~6%-11%). Thus, the size distribution is skewed low, but is not right at the bottom of the range. Based on the overall distribution, it may be that the majority of the 4-63 μ fraction could be below ~30 μ in size. The RPDs are excellent in both cases as follows: ±3.8%; & ±0.0%.

\\ 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. (EC_w) - 2510 B; Iron - 3500-Fe B; pH - 4500-H⁺ B; TRPH - 5520 C.



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

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

Reported:
28-Feb-2018 11:07

WUFF-IN
18B0197-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 02/14/2018 01:38

Instrument: UV1800-2

Analyzed: 15-Feb-2018 13:05

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGB0371 Sample Size: 50 mL
Prepared: 15-Feb-2018 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: BGB0613 Sample Size: 25 mL
Prepared: 26-Feb-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0160	0.0960	mg-P/L	



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

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

Reported:
28-Feb-2018 11:07

WUFF-OUT
18B0197-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 02/14/2018 01:38

Instrument: UV1800-2

Analyzed: 15-Feb-2018 13:06

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGB0371 Sample Size: 50 mL
Prepared: 15-Feb-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0150	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGB0613 Sample Size: 25 mL
Prepared: 26-Feb-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0160	0.0860	mg-P/L	



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

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

Reported:
28-Feb-2018 11:07

Wet Chemistry - Quality Control

Batch BGB0371 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: SK

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Blank (BGB0371-BLK1)									
					Prepared: 15-Feb-2018 Analyzed: 15-Feb-2018 12:43				
Orthophosphorus	ND	0.0040	mg-P/L						U
LCS (BGB0371-BS1)									
					Prepared: 15-Feb-2018 Analyzed: 15-Feb-2018 12:46				
Orthophosphorus	0.155	0.0040	mg-P/L	0.150		103 90-110			



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

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

Reported:
28-Feb-2018 11:07

Wet Chemistry - Quality Control

Batch BGB0613 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Blank (BGB0613-BLK1) Prepared: 26-Feb-2018 Analyzed: 27-Feb-2018 16:18									
Total Phosphorus	ND	0.0160	mg-P/L						U
Blank (BGB0613-BLK2) Prepared: 26-Feb-2018 Analyzed: 27-Feb-2018 16:25									
Total Phosphorus	ND	0.0160	mg-P/L						U
LCS (BGB0613-BS1) Prepared: 26-Feb-2018 Analyzed: 27-Feb-2018 16:19									
Total Phosphorus	0.150	0.0160	mg-P/L	0.150		100 90-110			
LCS (BGB0613-BS2) Prepared: 26-Feb-2018 Analyzed: 27-Feb-2018 16:26									
Total Phosphorus	0.149	0.0160	mg-P/L	0.150		99.3 90-110			



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

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

Reported:
28-Feb-2018 11:07

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
2200 6th Avenue, Suite 1100
Seattle WA, 98121

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

Reported:
28-Feb-2018 11:07

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
*	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.

February 28, 2018

Data_18C0025

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BGC0114-BLK1	Blank	13-05605-000	Water			03/06/2018	03/09/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.100	U	mg/L
BGC0114-BS1	LCS	13-05605-000	Water			03/06/2018	03/09/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	2.61		mg/L
BGC0114-BSD1	LCS Dup	13-05605-000	Water			03/06/2018	03/09/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	2.27		mg/L
18C0025-01	WUFF-IN	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/06/2018	03/09/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	1.27		mg/L
18C0025-02	WUFF-OU	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/06/2018	03/09/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.646		mg/L
BGC0114-BLK1	Blank	13-05605-000	Water			03/06/2018	03/09/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	0.200	U	mg/L
BGC0114-BS1	LCS	13-05605-000	Water			03/06/2018	03/09/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	0.200	U	mg/L
BGC0114-BSD1	LCS Dup	13-05605-000	Water			03/06/2018	03/09/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	0.200	U	mg/L
18C0025-01	WUFF-IN	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/06/2018	03/09/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	4.10		mg/L
18C0025-02	WUFF-OU	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/06/2018	03/09/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	1.34		mg/L
BGC0114-BLK1	Blank	13-05605-000	Water			03/06/2018	03/09/2018	NWTPH-Dx	84-15-1	o-Terphenyl	75.9		%
BGC0114-BS1	LCS	13-05605-000	Water			03/06/2018	03/09/2018	NWTPH-Dx	84-15-1	o-Terphenyl	89.5		%
BGC0114-BSD1	LCS Dup	13-05605-000	Water			03/06/2018	03/09/2018	NWTPH-Dx	84-15-1	o-Terphenyl	76.7		%
18C0025-01	WUFF-IN	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/06/2018	03/09/2018	NWTPH-Dx	84-15-1	o-Terphenyl	84.8		%
18C0025-02	WUFF-OU	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/06/2018	03/09/2018	NWTPH-Dx	84-15-1	o-Terphenyl	80.1		%



Analytical Resources, Incorporated
Analytical Chemists and Consultants

12 March 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)
18C0025

Associated SDG ID(s)
N/A

Amanda Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical Resources,
Inc., ou=Project Manager,
cn=Amanda Volgardsen,
email=amanda.volgardsen@arilab
s.com
Date: 2018.03.12 14:14:41 -07'00'

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



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

Analytical Resources, Inc.

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



Chain of Custody Record

Project Name: Hydro International Up-flo Filter		Project Number: 13-05605-000		Client: Herrera Environmental		Analyses Requested												Lab ID No.		
Report To: Dylan Ahearn				Copy To:																
Sampled By: D. Ahearn				Delivery Method: in room, hand delivered																
Laboratory: Analytical Resources Inc.		Requested Completion Date:		Total No. of Containers: 4																
Lab Use:				Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)	Number of Containers	NWTPH-Dx												
Sample ID	Date	Time																		
WUFF-IN	2-20-18	16:25	G	N	SW	2			X											
WUFF-OUT	2-20-18	16:30	G	N	SW	2			X											
Comments/Special Instructions:																				
Relinquished by (Name/CO/) Meghan Muller/Herrera		Signature 		Date/Time 2-1-18 12:30		Received By (Name/CO/) Jacob Walter/ARI		Signature 		Date/Time 03/01/18 12:30										
Relinquished by (Name/CO/)		Signature		Date/Time		Received By (Name/CO/)		Signature		Date/Time										

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



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

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

Reported:
12-Mar-2018 14:14

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18C0025-01	Water	28-Feb-2018 16:25	01-Mar-2018 12:30
WUFF-OUT	18C0025-02	Water	28-Feb-2018 16:30	01-Mar-2018 12:30



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

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

Reported:
12-Mar-2018 14:14

Case Narrative

Sample receipt

Samples as listed on the preceding page were received March 1, 2018 under ARI work order 18C0025. 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/LCSD percent recoveries and RPD were within control limits.



Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 18C0025

Project Name: Hydro International

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

Tracking No: _____ NA

Preliminary Examination Phase:

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

YES

NO

Were custody papers included with the cooler? _____

YES

NO

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

YES

NO

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

Time: 1230

1.5°C

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

Temp Gun ID#: 1005206

Cooler Accepted by: JSW

Date: 03/01/18

Time: 1230

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: SEF

Date: 3/1/18

Time: 1357

**** 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)
---------------------------------------	---------------------------------	--	---



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

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

Reported:
12-Mar-2018 14:14

WUFF-IN
18C0025-01 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/28/2018 16:25

Instrument: FID4

Analyzed: 09-Mar-2018 17:11

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BGC0114 Sample Size: 500 mL
Prepared: 06-Mar-2018 Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.100	1.27	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.200	4.10	mg/L	
HC ID: MOTOR OIL						
Surrogate: o-Terphenyl			50-150 %	84.8	%	



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

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

Reported:
12-Mar-2018 14:14

WUFF-OUT
18C0025-02 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 02/28/2018 16:30

Instrument: FID4

Analyzed: 09-Mar-2018 17:32

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BGC0114 Sample Size: 500 mL
Prepared: 06-Mar-2018 Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.100	0.646	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.200	1.34	mg/L	
HC ID: MOTOR OIL						
Surrogate: o-Terphenyl			50-150 %	80.1	%	



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

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

Reported:
12-Mar-2018 14:14

Petroleum Hydrocarbons - Quality Control

Batch BGC0114 - EPA 3510C SepF

Instrument: FID4 Analyst: JGR

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGC0114-BLK1) Prepared: 06-Mar-2018 Analyzed: 09-Mar-2018 13:20										
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	0.342		mg/L	0.450		75.9	50-150			
LCS (BGC0114-BS1) Prepared: 06-Mar-2018 Analyzed: 09-Mar-2018 13:42										
Diesel Range Organics (C12-C24)	2.61	0.100	mg/L	3.00		86.9	56-120			
Surrogate: o-Terphenyl	0.403		mg/L	0.450		89.5	50-150			
LCS Dup (BGC0114-BSD1) Prepared: 06-Mar-2018 Analyzed: 09-Mar-2018 14:03										
Diesel Range Organics (C12-C24)	2.27	0.100	mg/L	3.00		75.5	56-120	14.00	30	
Surrogate: o-Terphenyl	0.345		mg/L	0.450		76.7	50-150			



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

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

Reported:
12-Mar-2018 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-C24)	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	06/30/2018
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
2200 6th Avenue, Suite 1100
Seattle WA, 98121

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

Reported:
12-Mar-2018 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.

Data_18C0031

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BGC0062-BLK1	Blank	13-05605-000	Water			03/02/2018	03/02/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BGC0062-BS1	LCS	13-05605-000	Water			03/02/2018	03/02/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.145		mg-P/L
BGC0062-DUP1	WUFF-IN	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/02/2018	03/02/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0200	L	mg-P/L
BGC0062-MS1	WUFF-IN	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/02/2018	03/02/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.115		mg-P/L
18C0031-01	WUFF-IN	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/02/2018	03/02/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0160		mg-P/L
18C0031-02	WUFF-OUT	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/02/2018	03/02/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0220		mg-P/L
BGC0086-BLK1	Blank	13-05605-000	Water			03/05/2018	03/05/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGC0086-BS1	LCS	13-05605-000	Water			03/05/2018	03/05/2018	EPA 200.8	7440-50-8	Copper	28.3		ug/L
18C0031-01	WUFF-IN	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/05/2018	03/05/2018	EPA 200.8	7440-50-8	Copper	41.1		ug/L
18C0031-02	WUFF-OUT	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/05/2018	03/05/2018	EPA 200.8	7440-50-8	Copper	20.3		ug/L
BGC0086-BLK1	Blank	13-05605-000	Water			03/05/2018	03/05/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGC0086-BS1	LCS	13-05605-000	Water			03/05/2018	03/05/2018	EPA 200.8	7440-50-8	Copper	28.4		ug/L
BGC0086-BLK1	Blank	13-05605-000	Water			03/05/2018	03/05/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGC0086-BS1	LCS	13-05605-000	Water			03/05/2018	03/05/2018	EPA 200.8	7440-66-6	Zinc	88.6		ug/L
18C0031-01	WUFF-IN	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/05/2018	03/05/2018	EPA 200.8	7440-66-6	Zinc	138		ug/L
18C0031-02	WUFF-OUT	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/05/2018	03/05/2018	EPA 200.8	7440-66-6	Zinc	65.7		ug/L
BGC0086-BLK1	Blank	13-05605-000	Water			03/05/2018	03/05/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGC0086-BS1	LCS	13-05605-000	Water			03/05/2018	03/05/2018	EPA 200.8	7440-66-6	Zinc	83.4		ug/L
BGC0202-BLK1	Blank	13-05605-000	Water			03/08/2018	03/09/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGC0202-BLK2	Blank	13-05605-000	Water			03/08/2018	03/09/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGC0202-BS1	LCS	13-05605-000	Water			03/08/2018	03/09/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.151		mg-P/L
BGC0202-BS2	LCS	13-05605-000	Water			03/08/2018	03/09/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.150		mg-P/L
18C0031-02	WUFF-OUT	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/08/2018	03/09/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0560		mg-P/L
BGC0203-BLK1	Blank	13-05605-000	Water			03/08/2018	03/09/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGC0203-BLK2	Blank	13-05605-000	Water			03/08/2018	03/09/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGC0203-BS1	LCS	13-05605-000	Water			03/08/2018	03/09/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.145		mg-P/L
BGC0203-BS2	LCS	13-05605-000	Water			03/08/2018	03/09/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.144		mg-P/L
18C0031-01	WUFF-IN	13-05605-000	Surface Water	02/28/2018	03/01/2018	03/08/2018	03/09/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.112		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

20 March 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)
18C0031

Associated SDG ID(s)
N/A

Amanda Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical Resources,
Inc., ou=Project Manager,
cn=Amanda Volgardsen,
email=amanda.volgardsen@arilab
s.com
Date: 2018.03.20 17:32:44 -07'00'

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

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

Analytical Resources, Inc.

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





WORK ORDER

18C0031

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
18C0031-01 A	Small OJ, 500 mL	
18C0031-01 A 01	Small OJ, 500 mL	
18C0031-01 B	Small OJ, 500 mL, 9N H ₂ SO ₄	< 2 pass
18C0031-01 C	Large OJ, 1000 mL	
18C0031-01 D	Large OJ, 1000 mL	
18C0031-01 E	HDPE NM, 500 mL, 1:1 HNO ₃	< 2 pass
18C0031-02 A	Small OJ, 500 mL	
18C0031-02 A 01	Small OJ, 500 mL	
18C0031-02 B	Small OJ, 500 mL, 9N H ₂ SO ₄	< 2 pass
18C0031-02 C	Large OJ, 1000 mL	
18C0031-02 D	Large OJ, 1000 mL	
18C0031-02 E	HDPE NM, 500 mL, 1:1 HNO ₃	< 2 pass

Preservation Confirmed By BF

Date 3/2/18



Cooler Receipt Form

ARI Client: Herpera
COC No(s): _____ NA
Assigned ARI Job No: 18C0031

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) 1.5°C
Time: 1230
If cooler temperature is out of compliance fill out form 00070F
Cooler Accepted by: JSB Date: 03/01/18 Time: 1230 Temp Gun ID#: 1005706

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: 3/1/18 1645 Equipment: chem split Split by: BF

Samples Logged by: BF Date: 3/1/18 Time: 1645

** 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:
WVFF-IN COC - 2/28/18 22:11 label - 3/1/18 11:15
WVFF-OUT COC - 2/28/18 22:18 label - 3/1/18 11:15

By: BF Date: 3/1/18

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)



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

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

Reported:
20-Mar-2018 17:31

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18C0031-01	Water	28-Feb-2018 22:11	01-Mar-2018 12:30
WUFF-OUT	18C0031-02	Water	28-Feb-2018 22:18	01-Mar-2018 12:30



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Seattle WA, 98121

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

Reported:
20-Mar-2018 17:31

Case Narrative

Sample receipt

Samples as listed on the preceding page were received March 1, 2018 under ARI work order 18C0031. 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 analyses were subcontracted to ETS Labs.

Total 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 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.

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.

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 a concentration ≤ 5 times the reporting limit, and the replicate control limit defaults to \pm 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.



ETS

Environmental Technical Services

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

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

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

COMPANY: Analytical Resources, Inc., 4611 S. 134 th Place, Suite 100, Tukwila, WA 98168						ANALYST(S) S. Santos L. Quijano	SUPERVISOR D. Jacobson LAB DIRECTOR G.S. Conrad, PhD
ATTN: Amanda Volgardsen			DATE COLLECTED	DATE RECEIVED	DATE COMPLETED		
JOB: Hydro International Up-Flo Filter			2/28/2018	3/7/2018	3/15/2018		
SITE: Oregon-Washington							

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
07694-1	HI-61HEC/RW	WUFF-IN	0.2 0.4%	1.5 3.1%	2.0 4.2%		7.9 16.5%	36.2 75.7%	46.0
	18C0031-01					Total SSC by Summation →		47.8	
07694-2	HI-62HEC/RW	WUFF-OUT	0.0 0.0%	0.5 7.9%	0.7 11.1%		3.1 49.2%	2.0 31.7%	5.5
	18C0031-02					Total SSC by Summation →		6.3	
			#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 under 50 ppm in the input sample; and the output sample is extremely low at roughly 5-6 ppm. The overall average reduction in TSS is just over 87% of the total TSS. And the range is tight in this case at 86.8%-88.0% (TSS by summation vs TSS by analytical method). The reductions in each fraction varies somewhat as follows: 100%, 66.7%, 65.0%, 60.8%, and 94.5%. Notice that for the input sample the mode is definitely at the 1-4 μ fraction at just over three-quarters of the total TSS (>75%). The next largest fraction is the 4-63 μ fraction (@ 16.5%); the other three fractions are much lower in proportion being at about 4% or less. Thus, the size distribution is skewed low, and is right at the bottom of the size range in this case. The RPDs are very good to excellent as follows: ±1.9%; & ±6.8%.

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



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

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

Reported:
20-Mar-2018 17:31

WUFF-IN
18C0031-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 02/28/2018 22:11

Instrument: ICPMS2

Analyzed: 05-Mar-2018 14:27

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGC0086 Sample Size: 25 mL
Prepared: 05-Mar-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	41.1	ug/L	
Zinc	7440-66-6	1	4.00	138	ug/L	



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Reported:
20-Mar-2018 17:31

WUFF-IN
18C0031-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 02/28/2018 22:11

Instrument: UV1800-2

Analyzed: 02-Mar-2018 16:28

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGC0062 Sample Size: 50 mL
Prepared: 02-Mar-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0040	0.0160	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGC0203 Sample Size: 25 mL
Prepared: 08-Mar-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0160	0.112	mg-P/L	



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Reported:
20-Mar-2018 17:31

WUFF-OUT
18C0031-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 02/28/2018 22:18

Instrument: ICPMS2

Analyzed: 05-Mar-2018 14:32

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGC0086 Sample Size: 25 mL
Prepared: 05-Mar-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	20.3	ug/L	
Zinc	7440-66-6	1	4.00	65.7	ug/L	



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Reported:
20-Mar-2018 17:31

WUFF-OUT
18C0031-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 02/28/2018 22:18

Instrument: UV1800-2

Analyzed: 02-Mar-2018 16:29

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGC0062 Sample Size: 50 mL
Prepared: 02-Mar-2018 Final Volume: 50 mL

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

Sample Preparation: Preparation Method: SM 4500-P B-5 Persulfate
Preparation Batch: BGC0202 Sample Size: 25 mL
Prepared: 08-Mar-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0080	0.0560	mg-P/L	



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

Reported:
20-Mar-2018 17:31

Metals and Metallic Compounds - Quality Control

Batch BGC0086 - 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 (BGC0086-BLK1)			Prepared: 05-Mar-2018 Analyzed: 05-Mar-2018 11:43								
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 (BGC0086-BS1)			Prepared: 05-Mar-2018 Analyzed: 05-Mar-2018 12:20								
Copper	63	28.3	0.500	ug/L	25.0		113	80-120			
Copper	65	28.4	0.500	ug/L	25.0		114	80-120			
Zinc	66	88.6	4.00	ug/L	80.0		111	80-120			
Zinc	67	83.4	4.00	ug/L	80.0		104	80-120			



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

Reported:
20-Mar-2018 17:31

Wet Chemistry - Quality Control

Batch BGC0062 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: GM

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGC0062-BLK1) Prepared: 02-Mar-2018 Analyzed: 02-Mar-2018 16:26											
Orthophosphorus	ND	0.0040	0.0040	mg-P/L							U
LCS (BGC0062-BS1) Prepared: 02-Mar-2018 Analyzed: 02-Mar-2018 16:27											
Orthophosphorus	0.145	0.0040	0.0040	mg-P/L	0.150		96.7	90-110			
Duplicate (BGC0062-DUP1) Source: 18C0031-01 Prepared: 02-Mar-2018 Analyzed: 02-Mar-2018 16:28											
Orthophosphorus	0.0200	0.0040	0.0040	mg-P/L		0.0160			22.20	20	L
Matrix Spike (BGC0062-MS1) Source: 18C0031-01 Prepared: 02-Mar-2018 Analyzed: 02-Mar-2018 16:29											
Orthophosphorus	0.115	0.0040	0.0040	mg-P/L	0.0999	0.0160	99.1	75-125			

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



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

Reported:
20-Mar-2018 17:31

Wet Chemistry - Quality Control

Batch BGC0202 - SM 4500-P B-5 Persulfate

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGC0202-BLK1) Prepared: 08-Mar-2018 Analyzed: 09-Mar-2018 13:37											
Total Phosphorus	ND	0.0080	0.0080	mg-P/L							U
Blank (BGC0202-BLK2) Prepared: 08-Mar-2018 Analyzed: 09-Mar-2018 13:44											
Total Phosphorus	ND	0.0080	0.0080	mg-P/L							U
LCS (BGC0202-BS1) Prepared: 08-Mar-2018 Analyzed: 09-Mar-2018 13:38											
Total Phosphorus	0.151	0.0080	0.0080	mg-P/L	0.150		101	90-110			
LCS (BGC0202-BS2) Prepared: 08-Mar-2018 Analyzed: 09-Mar-2018 13:44											
Total Phosphorus	0.150	0.0080	0.0080	mg-P/L	0.150		100	90-110			



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

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

Reported:
20-Mar-2018 17:31

Wet Chemistry - Quality Control

Batch BGC0203 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: RLM

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGC0203-BLK1) Prepared: 08-Mar-2018 Analyzed: 09-Mar-2018 14:06											
Total Phosphorus	ND	0.0080	0.0160	mg-P/L							U
Blank (BGC0203-BLK2) Prepared: 08-Mar-2018 Analyzed: 09-Mar-2018 14:11											
Total Phosphorus	ND	0.0080	0.0160	mg-P/L							U
LCS (BGC0203-BS1) Prepared: 08-Mar-2018 Analyzed: 09-Mar-2018 14:06											
Total Phosphorus	0.145	0.0080	0.0160	mg-P/L	0.150		96.7	90-110			
LCS (BGC0203-BS2) Prepared: 08-Mar-2018 Analyzed: 09-Mar-2018 14:12											
Total Phosphorus	0.144	0.0080	0.0160	mg-P/L	0.150		96.0	90-110			



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Seattle WA, 98121

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

Reported:
20-Mar-2018 17:31

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
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	06/30/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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

Reported:
20-Mar-2018 17:31

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
L	Analyte concentration is ≤ 5 times the reporting limit and the replicate control limit defaults to \pm RL instead of 20% RPD
J	Estimated concentration value detected below the reporting limit.
D	The reported value is from a dilution
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.

March 8, 2018

Data_18C0179

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BGC0339-BLK1	Blank	13-05605-000	Water			03/14/2018	03/20/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.100	U	mg/L
BGC0339-BS1	LCS	13-05605-000	Water			03/14/2018	03/20/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	2.19		mg/L
BGC0339-BSD1	LCS Dup	13-05605-000	Water			03/14/2018	03/20/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	2.33		mg/L
18C0179-01	WUFF-IN	13-05605-000	Water	03/08/2018	03/09/2018	03/14/2018	03/20/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.499		mg/L
18C0179-02	WUFF-OUT	13-05605-000	Water	03/08/2018	03/09/2018	03/14/2018	03/20/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.325		mg/L
BGC0339-BLK1	Blank	13-05605-000	Water			03/14/2018	03/20/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	0.200	U	mg/L
BGC0339-BS1	LCS	13-05605-000	Water			03/14/2018	03/20/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	0.200	U	mg/L
BGC0339-BSD1	LCS Dup	13-05605-000	Water			03/14/2018	03/20/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	0.200	U	mg/L
18C0179-01	WUFF-IN	13-05605-000	Water	03/08/2018	03/09/2018	03/14/2018	03/20/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	1.87		mg/L
18C0179-02	WUFF-OUT	13-05605-000	Water	03/08/2018	03/09/2018	03/14/2018	03/20/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	0.832		mg/L
BGC0339-BLK1	Blank	13-05605-000	Water			03/14/2018	03/20/2018	NWTPH-Dx	84-15-1	o-Terphenyl	81.7		%
BGC0339-BS1	LCS	13-05605-000	Water			03/14/2018	03/20/2018	NWTPH-Dx	84-15-1	o-Terphenyl	79.8		%
BGC0339-BSD1	LCS Dup	13-05605-000	Water			03/14/2018	03/20/2018	NWTPH-Dx	84-15-1	o-Terphenyl	85.8		%
18C0179-01	WUFF-IN	13-05605-000	Water	03/08/2018	03/09/2018	03/14/2018	03/20/2018	NWTPH-Dx	84-15-1	o-Terphenyl	75.7		%
18C0179-02	WUFF-OUT	13-05605-000	Water	03/08/2018	03/09/2018	03/14/2018	03/20/2018	NWTPH-Dx	84-15-1	o-Terphenyl	79.2		%



Analytical Resources, Incorporated
Analytical Chemists and Consultants

21 March 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)
18C0179

Associated SDG ID(s)
N/A

Amanda
Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical Resources,
Inc., ou=Project Manager,
cn=Amanda Volgardsen,
email=amanda.volgardsen@arilabs
.com
Date: 2018.03.21 14:52:10 -07'00'

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

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

Analytical Resources, Inc.

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



2200 Sixth Avenue | Suite 1100
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PORTLAND, OR | MISSOULA, MT | OLYMPIA, WA
WINTHROP, WA | GUANGZHOU, CHINA

Chain of Custody Record

HERRERA

[illegible]

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



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

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

Reported:
21-Mar-2018 14:51

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18C0179-01	Water	08-Mar-2018 16:35	09-Mar-2018 12:00
WUFF-OUT	18C0179-02	Water	08-Mar-2018 16:40	09-Mar-2018 12:00



Herrera Environmental Consultants
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Seattle WA, 98121

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

Reported:
21-Mar-2018 14:51

Case Narrative

Sample receipt

Samples as listed on the preceding page were received March 9, 2018 under ARI work order 18C0179. 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/LCSD percent recoveries and RPD were within control limits.



Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera
COC No(s): _____ (NA)
Assigned ARI Job No: 18C0179

Project Name: HydroInternational
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) 3.8
Time: 1200
If cooler temperature is out of compliance fill out form 00070F
Temp Gun ID#: DO07516

Cooler Accepted by: SEF Date: 3/9/18 Time: 1200

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: _____ Equipment: _____ Split by: _____

Samples Logged by: AV Date: 3/9/18 Time: 1301

** 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: _____

<p>Small Air Bubbles - 2mm</p>	<p>Peabubbles 2-4 mm</p>	<p>LARGE Air Bubbles > 4 mm</p>	<p>Small → "sm" (< 2 mm)</p> <p>Peabubbles → "pb" (2 to < 4 mm)</p> <p>Large → "lg" (4 to < 6 mm)</p> <p>Headspace → "hs" (> 6 mm)</p>
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2200 6th Avenue, Suite 1100
Seattle WA, 98121

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

Reported:
21-Mar-2018 14:51

WUFF-IN
18C0179-01 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 03/08/2018 16:35

Instrument: FID3

Analyzed: 20-Mar-2018 21:00

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BGC0339 Sample Size: 500 mL
Prepared: 14-Mar-2018 Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.100	0.499	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.200	1.87	mg/L	
HC ID: RRO						
Surrogate: o-Terphenyl			50-150 %	75.7	%	



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

Reported:
21-Mar-2018 14:51

WUFF-OUT
18C0179-02 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 03/08/2018 16:40

Instrument: FID3

Analyzed: 20-Mar-2018 21:20

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BGC0339 Sample Size: 500 mL
Prepared: 14-Mar-2018 Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.100	0.325	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.200	0.832	mg/L	
HC ID: RRO						
Surrogate: o-Terphenyl			50-150 %	79.2	%	



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Seattle WA, 98121

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

Reported:
21-Mar-2018 14:51

Petroleum Hydrocarbons - Quality Control

Batch BGC0339 - EPA 3510C SepF

Instrument: FID3 Analyst: MDL

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Blank (BGC0339-BLK1) Prepared: 14-Mar-2018 Analyzed: 20-Mar-2018 14:46									
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	0.368		mg/L	0.450		81.7 50-150			
LCS (BGC0339-BS1) Prepared: 14-Mar-2018 Analyzed: 20-Mar-2018 15:05									
Diesel Range Organics (C12-C24)	2.19	0.100	mg/L	3.00		73.1 56-120			
Surrogate: o-Terphenyl	0.359		mg/L	0.450		79.8 50-150			
LCS Dup (BGC0339-BSD1) Prepared: 14-Mar-2018 Analyzed: 20-Mar-2018 15:25									
Diesel Range Organics (C12-C24)	2.33	0.100	mg/L	3.00		77.8 56-120	6.20	30	
Surrogate: o-Terphenyl	0.386		mg/L	0.450		85.8 50-150			



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

Reported:
21-Mar-2018 14:51

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-C24)	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	06/30/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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

Reported:
21-Mar-2018 14:51

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

Data_18C0180

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BGC0288-BLK1	Blank	13-05605-000	Water			03/10/2018	03/10/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BGC0288-BS1	LCS	13-05605-000	Water			03/10/2018	03/10/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.152		mg-P/L
BGC0288-DUP2	WUFF-IN	13-05605-000	Water	03/08/2018	03/09/2018	03/10/2018	03/10/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0160	L	mg-P/L
BGC0288-MS1	WUFF-IN	13-05605-000	Water	03/08/2018	03/09/2018	03/10/2018	03/10/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.115		mg-P/L
18C0180-01RE2	WUFF-IN	13-05605-000	Water	03/08/2018	03/09/2018	03/10/2018	03/10/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0120		mg-P/L
18C0180-02RE1	WUFF-OUT	13-05605-000	Water	03/08/2018	03/09/2018	03/10/2018	03/10/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0140		mg-P/L
BGC0291-BLK1	Blank	13-05605-000	Water			03/15/2018	03/16/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0140		mg-P/L
BGC0291-BLK2	Blank	13-05605-000	Water			03/10/2018	03/16/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGC0291-BS1	LCS	13-05605-000	Water			03/15/2018	03/16/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.316		mg-P/L
BGC0291-BS2	LCS	13-05605-000	Water			03/15/2018	03/16/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.312		mg-P/L
18C0180-01	WUFF-IN	13-05605-000	Water	03/08/2018	03/09/2018	03/15/2018	03/16/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.138		mg-P/L
18C0180-02	WUFF-OUT	13-05605-000	Water	03/08/2018	03/09/2018	03/15/2018	03/16/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0580		mg-P/L
BGC0293-BLK1	Blank	13-05605-000	Water			03/12/2018	03/12/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGC0293-BS1	LCS	13-05605-000	Water			03/12/2018	03/12/2018	EPA 200.8	7440-50-8	Copper	29.2		ug/L
18C0180-01	WUFF-IN	13-05605-000	Water	03/08/2018	03/09/2018	03/12/2018	03/13/2018	EPA 200.8	7440-50-8	Copper	45.9		ug/L
18C0180-02	WUFF-OUT	13-05605-000	Water	03/08/2018	03/09/2018	03/12/2018	03/13/2018	EPA 200.8	7440-50-8	Copper	26.6		ug/L
BGC0293-BLK1	Blank	13-05605-000	Water			03/12/2018	03/12/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGC0293-BS1	LCS	13-05605-000	Water			03/12/2018	03/12/2018	EPA 200.8	7440-50-8	Copper	28.5		ug/L
BGC0293-BLK1	Blank	13-05605-000	Water			03/12/2018	03/12/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGC0293-BS1	LCS	13-05605-000	Water			03/12/2018	03/12/2018	EPA 200.8	7440-66-6	Zinc	88.1		ug/L
18C0180-01	WUFF-IN	13-05605-000	Water	03/08/2018	03/09/2018	03/12/2018	03/13/2018	EPA 200.8	7440-66-6	Zinc	142		ug/L
18C0180-02	WUFF-OUT	13-05605-000	Water	03/08/2018	03/09/2018	03/12/2018	03/13/2018	EPA 200.8	7440-66-6	Zinc	77.4		ug/L
BGC0293-BLK1	Blank	13-05605-000	Water			03/12/2018	03/12/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGC0293-BS1	LCS	13-05605-000	Water			03/12/2018	03/12/2018	EPA 200.8	7440-66-6	Zinc	86.9		ug/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

28 March 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)
18C0180

Associated SDG ID(s)
N/A

Amanda
Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical Resources,
Inc., ou=Project Manager,
cn=Amanda Volgardsen,
email=amanda.volgardsen@arilab
s.com
Date: 2018.03.28 10:50:08 -07'00'

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

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

Analytical Resources, Inc.

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





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

Chain of Custody Record

18C0180

Project Name: Hydro International Up-flo Filter		Project Number: 13-05605-000		Client: Herrera Environmental		Analyses Requested																			
Report To: Dylan Ahearn		Copy To:		Delivery Method: IN TOTE W/ICE																					
Sampled By: ALEX SVENDSEN		Requested Completion Date:		Total No. of Containers: 2																					
Laboratory: Analytical Resources Inc.		Lab Use:		Sample Type (see codes)												Preservative? (Y/N)		Matrix (see codes)							
Sample ID		Date		Time		Sample Type (see codes)		Preservative? (Y/N)		Matrix (see codes)		Total Suspended Solids - SM 2540D		Particle size Distribution - ASTM 3977		Total phosphorus - EPA 365.3		Orthophosphorus - EPA 365.3		Copper, total - EPA 200.8		Zinc, total - EPA 200.8		Lab ID No.	
WUFF-IN		3/8/18		1821		C		N		SW		x		x		x		x		x		x		x	
WUFF-OUT		3/8/18		1821		C		N		SW		x		x		x		x		x		x		x	



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

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

Reported:
28-Mar-2018 10:48

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18C0180-01	Water	08-Mar-2018 18:21	09-Mar-2018 12:00
WUFF-OUT	18C0180-02	Water	08-Mar-2018 18:21	09-Mar-2018 12:00



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Case Narrative

Sample receipt

Samples as listed on the preceding page were received March 9, 2018 under ARI work order 18C0180. 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 analyses were subcontracted to ETS Labs.

Total 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 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.

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.

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 a concentration ≤ 5 times the reporting limit, and the replicate control limit defaults to \pm 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.



WORK ORDER

18C0180

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: [none]

Preservation Confirmation

Container ID	Container Type	pH	
18C0180-01 A	Large OJ, 1000 mL		
18C0180-01 B	Large OJ, 1000 mL		
18C0180-01 C	Small OJ, 500 mL, 9N H ₂ SO ₄	12	Pass
18C0180-01 D	Small OJ, 500 mL		
18C0180-01 E	HDPE NM, 500 mL, 1:1 HNO ₃	12	Pass
18C0180-02 A	Large OJ, 1000 mL		
18C0180-02 B	Large OJ, 1000 mL		
18C0180-02 C	Small OJ, 500 mL, 9N H ₂ SO ₄	12	Pass
18C0180-02 D	Small OJ, 500 mL		
18C0180-02 E	HDPE NM, 500 mL, 1:1 HNO ₃	12	Pass

Preservation Confirmed By

Date



Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera
COC No(s): _____ NA
Assigned ARI Job No: 18C0180

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) 3.8

Time: 1200

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

Temp Gun ID#: DO07516

Cooler Accepted by: SEF Date: 3/19/18 Time: 1200

Complete custody forms and attach all shipping documents

Log-In Phase:

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

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

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

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

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

Were all bottle labels complete and legible? YES NO

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

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

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

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

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

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

Date VOC Trip Blank was made at ARI: _____

Was Sample Split by ARI: NA YES Date/Time: 03/19/18 1255 Equipment: churn split Split by: SBC

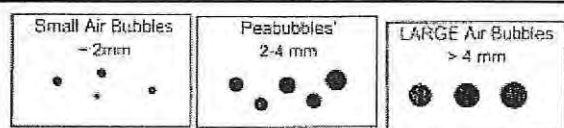
Samples Logged by: SBC Date: 03/19/18 Time: 1258

** Notify Project Manager of discrepancies or concerns **

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

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____



Small → "sm" (< 2 mm)

Peabubbles → "pb" (2 to < 4 mm)

Large → "lg" (4 to < 6 mm)

Headspace → "hs" (> 6 mm)



ETS

Environmental Technical Services

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

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

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

COMPANY: Analytical Resources, Inc., 4611 S. 134 th Place, Suite 100, Tukwila, WA 98168	ANALYST(S)	SUPERVISOR
ATTN: Amanda Volgardsen	S. Santos	D. Jacobson
JOB: Hydro International Up-Flo Filter	L. Quijano	LAB DIRECTOR
SITE: Oregon-Washington	3/8/2018	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
07701-1	HI-63HEC/RW	WUFF-IN	1.2	2.0	1.5		17.6	36.4	60.0
	18C0180-01A		2.0%	3.4%	2.6%		30.0%	62.0%	
						Total SSC by Summation →		58.7	
07701-2	HI-64HEC/RW	WUFF-OUT	0.0	0.2	0.5		2.7	8.7	12.0
	18C0180-02A		0.0%	1.7%	4.1%		22.3%	71.9%	
						Total SSC by Summation →		12.1	
			#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 ⁺]	EC _w [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 about 60 ppm in the input sample; and the output sample is extremely low at not much over 10 ppm. The overall average reduction in TSS is just under 80% of total TSS. And the range is very tight in this case at 79.4%-80.0% (TSS by summation vs TSS by analytical method). The reductions in each fraction vary some as follows: 100%, 90.0%, 66.7%, 84.7%, and 76.1%. Notice that for the input sample the mode is definitely at the 1-4 μ fraction at just over three-fifths of the total TSS (62%). The next largest size class is the 4-63 μ fraction (@ 30%); the other three fractions are much lower in proportion being at about 3%+ or less. Thus, the size distribution is skewed toward the smallest particle size, and thus is right at the bottom of the size range in this case. The RPDs are both excellent in this case as follows: ±1.1%; & ±0.4%.

\\ 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. (EC_w) - 2510 B; Iron - 3500-Fe B; pH - 4500-H⁺ B; TRPH - 5520 C.



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

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

Reported:
28-Mar-2018 10:48

WUFF-IN
18C0180-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 03/08/2018 18:21

Instrument: ICPMS2

Analyzed: 13-Mar-2018 18:06

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGC0293 Sample Size: 25 mL
Prepared: 12-Mar-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	45.9	ug/L	
Zinc	7440-66-6	1	4.00	142	ug/L	



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WUFF-IN
18C0180-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 03/08/2018 18:21

Instrument: UV1800-2

Analyzed: 16-Mar-2018 14:17

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGC0291 Sample Size: 25 mL
Prepared: 15-Mar-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0160	0.138	mg-P/L	



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Reported:
28-Mar-2018 10:48

WUFF-IN
18C0180-01RE2 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 03/08/2018 18:21

Instrument: UV1800-2

Analyzed: 10-Mar-2018 17:18

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGC0288 Sample Size: 50 mL
Prepared: 10-Mar-2018 Final Volume: 50 mL

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



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Reported:
28-Mar-2018 10:48

WUFF-OUT
18C0180-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 03/08/2018 18:21

Instrument: ICPMS2

Analyzed: 13-Mar-2018 18:02

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGC0293 Sample Size: 25 mL
Prepared: 12-Mar-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	26.6	ug/L	
Zinc	7440-66-6	1	4.00	77.4	ug/L	



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Reported:
28-Mar-2018 10:48

WUFF-OUT
18C0180-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 03/08/2018 18:21

Instrument: UV1800-2

Analyzed: 16-Mar-2018 14:17

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGC0291 Sample Size: 25 mL
Prepared: 15-Mar-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0160	0.0580	mg-P/L	



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Reported:
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WUFF-OUT
18C0180-02RE1 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 03/08/2018 18:21

Instrument: UV1800-2

Analyzed: 10-Mar-2018 17:05

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGC0288 Sample Size: 50 mL
Prepared: 10-Mar-2018 Final Volume: 50 mL

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



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Reported:
28-Mar-2018 10:48

Metals and Metallic Compounds - Quality Control

Batch BGC0293 - 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 (BGC0293-BLK1)			Prepared: 12-Mar-2018 Analyzed: 12-Mar-2018 13:43								
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 (BGC0293-BS1)			Prepared: 12-Mar-2018 Analyzed: 12-Mar-2018 14:25								
Copper	63	29.2	0.500	ug/L	25.0		117	80-120			
Copper	65	28.5	0.500	ug/L	25.0		114	80-120			
Zinc	66	88.1	4.00	ug/L	80.0		110	80-120			
Zinc	67	86.9	4.00	ug/L	80.0		109	80-120			



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Reported:
28-Mar-2018 10:48

Wet Chemistry - Quality Control

Batch BGC0288 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGC0288-BLK1) Prepared: 10-Mar-2018 Analyzed: 10-Mar-2018 17:03											
Orthophosphorus	ND	0.0040	0.0040	mg-P/L							U
LCS (BGC0288-BS1) Prepared: 10-Mar-2018 Analyzed: 10-Mar-2018 17:03											
Orthophosphorus	0.152	0.0040	0.0040	mg-P/L	0.150		101	90-110			
Duplicate (BGC0288-DUP2) Source: 18C0180-01RE2 Prepared: 10-Mar-2018 Analyzed: 10-Mar-2018 17:18											
Orthophosphorus	0.0160	0.0040	0.0040	mg-P/L		0.0120			28.60	20	L
Matrix Spike (BGC0288-MS1) Source: 18C0180-01RE2 Prepared: 10-Mar-2018 Analyzed: 10-Mar-2018 17:04											
Orthophosphorus	0.115	0.0040	0.0040	mg-P/L	0.0999	0.0120	103	75-125			

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



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Reported:
28-Mar-2018 10:48

Wet Chemistry - Quality Control

Batch BGC0291 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGC0291-BLK1) Prepared: 15-Mar-2018 Analyzed: 16-Mar-2018 14:13											
Total Phosphorus	0.0140	0.0080	0.0160	mg-P/L							
Blank (BGC0291-BLK2) Prepared: 10-Mar-2018 Analyzed: 16-Mar-2018 14:19											
Total Phosphorus	ND	0.0080	0.0160	mg-P/L							U
LCS (BGC0291-BS1) Prepared: 15-Mar-2018 Analyzed: 16-Mar-2018 14:13											
Total Phosphorus	0.316	0.0080	0.0160	mg-P/L	0.300		105	90-110			
LCS (BGC0291-BS2) Prepared: 15-Mar-2018 Analyzed: 16-Mar-2018 14:19											
Total Phosphorus	0.312	0.0080	0.0160	mg-P/L	0.300		104	90-110			



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Certified Analyses included in this Report

Analyte	Certifications
EPA 200.8 in Water	
Copper-63	NELAP,WADOE,WA-DW,DoD-ELAP
Copper-65	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-66	NELAP,WADOE,WA-DW,DoD-ELAP
Zinc-67	NELAP,WADOE,WA-DW,DoD-ELAP
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	06/30/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
L	Analyte concentration is ≤ 5 times the reporting limit and the replicate control limit defaults to \pm RL instead of 20% RPD
J	Estimated concentration value detected below the reporting limit.
D	The reported value is from a dilution
*	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.

March 13, 2018

Data_18C0251

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
18C0251-01	WUFF-IN	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/29/2018	03/29/2018	ASTM D3977	SC_>500	>500 µm	1.20		mg/L
18C0251-02	WUFF-OUT	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/29/2018	03/29/2018	ASTM D3977	SC_>500	>500 µm	0.00		mg/L
18C0251-01	WUFF-IN	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/29/2018	03/29/2018	ASTM D3977	SC_500-125	500-125 µm	4.00		mg/L
18C0251-02	WUFF-OUT	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/29/2018	03/29/2018	ASTM D3977	SC_500-125	500-125 µm	1.00		mg/L
18C0251-01	WUFF-IN	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/29/2018	03/29/2018	ASTM D3977	SC_125-62.5	125-62.5 µm	2.50		mg/L
18C0251-02	WUFF-OUT	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/29/2018	03/29/2018	ASTM D3977	SC_125-62.5	125-62.5 µm	0.50		mg/L
18C0251-01	WUFF-IN	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/29/2018	03/29/2018	ASTM D3977	SC_62.5-4	62.5-4 µm	22.00		mg/L
18C0251-02	WUFF-OUT	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/29/2018	03/29/2018	ASTM D3977	SC_62.5-4	62.5-4 µm	7.00		mg/L
18C0251-01	WUFF-IN	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/29/2018	03/29/2018	ASTM D3977	SC_4-1	4-1 µm	24.30		mg/L
18C0251-02	WUFF-OUT	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/29/2018	03/29/2018	ASTM D3977	SC_4-1	4-1 µm	2.70		mg/L
18C0251-01	WUFF-IN	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/29/2018	03/29/2018	ASTM D3977		Suspended Sediment Concentration	58.00		mg/L
18C0251-02	WUFF-OUT	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/29/2018	03/29/2018	ASTM D3977		Suspended Sediment Concentration	11.50		mg/L
BGC0291-BLK1	Blank	13-05605-000	Water			03/15/2018	03/16/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0140		mg-P/L
BGC0291-BLK2	Blank	13-05605-000	Water			03/10/2018	03/16/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0160	U	mg-P/L
BGC0291-BS1	LCS	13-05605-000	Water			03/15/2018	03/16/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.316		mg-P/L
BGC0291-BS2	LCS	13-05605-000	Water			03/15/2018	03/16/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.312		mg-P/L
18C0251-01	WUFF-IN	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/15/2018	03/16/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.140		mg-P/L
18C0251-02	WUFF-OUT	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/15/2018	03/16/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0640		mg-P/L
BGC0416-BLK2	Blank	13-05605-000	Water			03/15/2018	03/15/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGC0416-BS2	LCS	13-05605-000	Water			03/15/2018	03/15/2018	EPA 200.8	7440-50-8	Copper	25.6		ug/L
18C0251-01	WUFF-IN	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/15/2018	03/15/2018	EPA 200.8	7440-50-8	Copper	47.5	D	ug/L
18C0251-02	WUFF-OUT	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/15/2018	03/16/2018	EPA 200.8	7440-50-8	Copper	23.8		ug/L
BGC0416-BLK2	Blank	13-05605-000	Water			03/15/2018	03/15/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGC0416-BS2	LCS	13-05605-000	Water			03/15/2018	03/15/2018	EPA 200.8	7440-50-8	Copper	25.9		ug/L
BGC0416-BLK2	Blank	13-05605-000	Water			03/15/2018	03/15/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGC0416-BS2	LCS	13-05605-000	Water			03/15/2018	03/15/2018	EPA 200.8	7440-66-6	Zinc	87.0		ug/L
18C0251-01	WUFF-IN	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/15/2018	03/15/2018	EPA 200.8	7440-66-6	Zinc	182	D	ug/L
18C0251-02	WUFF-OUT	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/15/2018	03/16/2018	EPA 200.8	7440-66-6	Zinc	77.8		ug/L
BGC0416-BLK2	Blank	13-05605-000	Water			03/15/2018	03/15/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGC0416-BS2	LCS	13-05605-000	Water			03/15/2018	03/15/2018	EPA 200.8	7440-66-6	Zinc	79.3		ug/L
BGC0438-BLK1	Blank	13-05605-000	Water			03/15/2018	03/15/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BGC0438-BS1	LCS	13-05605-000	Water			03/15/2018	03/15/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.148		mg-P/L
BGC0438-DUP1	WUFF-IN	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/15/2018	03/15/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0150		mg-P/L
BGC0438-MS1	WUFF-IN	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/15/2018	03/15/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.101		mg-P/L
18C0251-01	WUFF-IN	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/15/2018	03/15/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0130		mg-P/L
18C0251-02	WUFF-OUT	13-05605-000	Surface Water	03/13/2018	03/14/2018	03/15/2018	03/15/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0110		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

30 March 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)
18C0251

Associated SDG ID(s)
N/A

Amanda
Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical Resources,
Inc., ou=Project Manager,
cn=Amanda Volgardsen,
email=amanda.volgardsen@arilab
s.com
Date: 2018.03.30 14:39:37 -07'00'

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

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

Analytical Resources, Inc.

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





HERRERA

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

Chain of Custody Record

[illegible]

Sample Type: G=Grab C=Composite

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



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

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

Reported:
30-Mar-2018 14:38

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18C0251-01	Water	13-Mar-2018 20:18	14-Mar-2018 14:05
WUFF-OUT	18C0251-02	Water	13-Mar-2018 20:18	14-Mar-2018 14:05



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

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

Reported:
30-Mar-2018 14:38

Case Narrative

Sample receipt

Samples as listed on the preceding page were received March 14, 2018 under ARI work order 18C0251. 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 analyses were subcontracted to ETS Labs.

Total 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 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.

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 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

18C0251

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
18C0251-01 A	Large OJ, 1000 mL	
18C0251-01 B	Large OJ, 1000 mL	
18C0251-01 C	Small OJ, 500 mL	
18C0251-01 D	Small OJ, 500 mL, 9N H ₂ SO ₄	L2 pass
18C0251-01 E	HDPE NM, 500 mL, 1:1 HNO ₃	L2 pass
18C0251-02 A	Large OJ, 1000 mL	
18C0251-02 B	Large OJ, 1000 mL	
18C0251-02 C	Small OJ, 500 mL	
18C0251-02 D	Small OJ, 500 mL, 9N H ₂ SO ₄	L2 pass
18C0251-02 E	HDPE NM, 500 mL, 1:1 HNO ₃	L2 pass

SEF

Preservation Confirmed By

3/14/18
Date



Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera
COC No(s): _____ NA
Assigned ARI Job No: 18C0251

Project Name: Hydro 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 YES ☒ NO ☐
Were custody papers properly filled out (ink, signed, etc.) YES YES ☒ NO ☐
Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)
Time: 1405 1.4°C in 0.8°C
If cooler temperature is out of compliance fill out form 00070F

Cooler Accepted by: SBH Date: 3/14/18 Time: 1405 Temp Gun ID#: P005206

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: 1500 NA ☐
Was Sample Split by ARI: NA ☐ YES ☒ Date/Time: 3/14/18 1300 Equipment: Churn Split Split by: SEF/BF
Samples Logged by: SEF Date: 3/14/18 Time: 1511

**** 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:
limited volume for metals Tpnos & o phos

By: SEF Date: 3/14/18

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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ETS

Environmental Technical Services

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

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

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

COMPANY: Analytical Resources, Inc., 4611 S. 134 th Place, Suite 100, Tukwila, WA 98168						ANALYST(S) S. Santos L. Quijano	SUPERVISOR D. Jacobson LAB DIRECTOR G.S. Conrad, PhD
ATTN: Amanda Volgardsen			DATE COLLECTED	DATE RECEIVED	DATE COMPLETED		
JOB: Hydro International Up-Flo Filter			3/13/2018	3/16/2018	3/29/2018		
SITE: Oregon-Washington							

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
07713-1	HI-65HEC/RW	WUFF-IN	1.2 2.2%	4.0 7.4%	2.5 4.6%		22.0 40.7%	24.3 45.0%	58.0
	18C0251-01					Total SSC by Summation →		54.0	
07713-2	HI-66HEC/RW	WUFF-OUT	0.0 0.0%	1.0 8.9%	0.5 4.5%		7.0 62.5%	2.7 24.1%	11.5
	18C0251-02					Total SSC by Summation →		11.2	
			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
						Total SSC by Summation →		0.0	
			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
						Total SSC by Summation →		0.0	
LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	Water pH -log[H ⁺]	ECw [Spec Cond] μS/cm	COLOR, TRUE PtCo Units	COLOR APPARENT PtCo Units	TOTAL IRON Fe (diss.) mg/l	TOTAL VOLATILE SUSPENDED SOLIDS (TVSS) mg/l	

COMMENTS

The matrix has a very low concentration of TSS particles amounting to 55-60 ppm in the input sample; and the output sample is extremely low at not much over 10 ppm. The overall average reduction in TSS is just under 80% of total TSS. And the range is very tight in this case at 79.3%-80.2% (TSS by summation vs TSS by analytical method). The reductions in each fraction vary some as follows: 100%, 75.0%, 80.0%, 68.2%, and 88.9%. Notice that for the input sample the mode is at the 1-4 μ fraction being right at 45%; but close to that is the next size class, 4-63 μ, comprising just over two-fifths of the total TSS. The other size classes are at much lower proportions being more or less in the 5%-7% range. Thus, in this case the size distribution is very strongly skewed toward the fines end of the TSS size range. It seems quite likely that a majority of particles in the 4-63 μ size class would be closer to 4 μ than 60+ μ. The RPDs are both excellent as follows: ±3.6%; & ±1.3%.

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



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

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

Reported:
30-Mar-2018 14:38

WUFF-IN
18C0251-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 03/13/2018 20:18

Instrument: ICPMS2

Analyzed: 15-Mar-2018 23:31

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGC0416 Sample Size: 25 mL
Prepared: 15-Mar-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	5	2.50	47.5	ug/L	D
Zinc	7440-66-6	5	20.0	182	ug/L	D



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Reported:
30-Mar-2018 14:38

WUFF-IN
18C0251-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 03/13/2018 20:18

Instrument: UV1800-2

Analyzed: 16-Mar-2018 14:18

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGC0291 Sample Size: 25 mL
Prepared: 15-Mar-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0160	0.140	mg-P/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGC0438 Sample Size: 50 mL
Prepared: 15-Mar-2018 Final Volume: 50 mL

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



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

Reported:
30-Mar-2018 14:38

WUFF-OUT
18C0251-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 03/13/2018 20:18

Instrument: ICPMS2

Analyzed: 16-Mar-2018 00:08

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGC0416 Sample Size: 25 mL
Prepared: 15-Mar-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	23.8	ug/L	
Zinc	7440-66-6	1	4.00	77.8	ug/L	



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Reported:
30-Mar-2018 14:38

WUFF-OUT
18C0251-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 03/13/2018 20:18

Instrument: UV1800-2

Analyzed: 16-Mar-2018 14:18

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGC0291 Sample Size: 25 mL
Prepared: 15-Mar-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0160	0.0640	mg-P/L	

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGC0438 Sample Size: 50 mL
Prepared: 15-Mar-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0040	0.0110	mg-P/L	



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Project: Hydro International
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Project Manager: Dylan Ahearn

Reported:
30-Mar-2018 14:38

Metals and Metallic Compounds - Quality Control

Batch BGC0416 - 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 (BGC0416-BLK2)			Prepared: 15-Mar-2018 Analyzed: 15-Mar-2018 16:28								
Copper	63	ND	0.500	ug/L							U
Copper	65	ND	0.500	ug/L							U
Zinc	66	ND	4.00	ug/L							U
Zinc	67	ND	4.00	ug/L							U
LCS (BGC0416-BS2)			Prepared: 15-Mar-2018 Analyzed: 15-Mar-2018 17:12								
Copper	63	25.6	0.500	ug/L	25.0		103	80-120			
Copper	65	25.9	0.500	ug/L	25.0		104	80-120			
Zinc	66	87.0	4.00	ug/L	80.0		109	80-120			
Zinc	67	79.3	4.00	ug/L	80.0		99.2	80-120			



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

Reported:
30-Mar-2018 14:38

Wet Chemistry - Quality Control

Batch BGC0291 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGC0291-BLK1) Prepared: 15-Mar-2018 Analyzed: 16-Mar-2018 14:13											
Total Phosphorus	0.0140	0.0080	0.0160	mg-P/L							
Blank (BGC0291-BLK2) Prepared: 10-Mar-2018 Analyzed: 16-Mar-2018 14:19											
Total Phosphorus	ND	0.0080	0.0160	mg-P/L							U
LCS (BGC0291-BS1) Prepared: 15-Mar-2018 Analyzed: 16-Mar-2018 14:13											
Total Phosphorus	0.316	0.0080	0.0160	mg-P/L	0.300		105	90-110			
LCS (BGC0291-BS2) Prepared: 15-Mar-2018 Analyzed: 16-Mar-2018 14:19											
Total Phosphorus	0.312	0.0080	0.0160	mg-P/L	0.300		104	90-110			



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Project: Hydro International
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Project Manager: Dylan Ahearn

Reported:
30-Mar-2018 14:38

Wet Chemistry - Quality Control

Batch BGC0438 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGC0438-BLK1)											
						Prepared: 15-Mar-2018 Analyzed: 15-Mar-2018 12:02					
Orthophosphorus	ND	0.0040	0.0040	mg-P/L							U
LCS (BGC0438-BS1)											
						Prepared: 15-Mar-2018 Analyzed: 15-Mar-2018 12:02					
Orthophosphorus	0.148	0.0040	0.0040	mg-P/L	0.150		98.7	90-110			
Duplicate (BGC0438-DUP1)											
				Source: 18C0251-01		Prepared: 15-Mar-2018 Analyzed: 15-Mar-2018 12:03					
Orthophosphorus	0.0150	0.0040	0.0040	mg-P/L		0.0130			14.30	20	
Matrix Spike (BGC0438-MS1)											
				Source: 18C0251-01		Prepared: 15-Mar-2018 Analyzed: 15-Mar-2018 12:03					
Orthophosphorus	0.101	0.0040	0.0040	mg-P/L	0.0999	0.0130	88.1	75-125			

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



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

Reported:
30-Mar-2018 14:38

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
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	06/30/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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

Reported:
30-Mar-2018 14:38

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.

March 22, 2018

Data_18C0396

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
18C0396-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	04/06/2018	04/06/2018	ASTM D3977	SC_>500	>500 µm	5.00		mg/L
18C0396-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	04/06/2018	04/06/2018	ASTM D3977	SC_>500	>500 µm	1.00		mg/L
18C0396-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	04/06/2018	04/06/2018	ASTM D3977	SC_500-125	500-125 µm	6.80		mg/L
18C0396-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	04/06/2018	04/06/2018	ASTM D3977	SC_500-125	500-125 µm	2.70		mg/L
18C0396-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	04/06/2018	04/06/2018	ASTM D3977	SC_125-62.5	125-62.5 µm	5.70		mg/L
18C0396-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	04/06/2018	04/06/2018	ASTM D3977	SC_125-62.5	125-62.5 µm	4.80		mg/L
18C0396-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	04/06/2018	04/06/2018	ASTM D3977	SC_62.5-4	62.5-4 µm	39.50		mg/L
18C0396-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	04/06/2018	04/06/2018	ASTM D3977	SC_62.5-4	62.5-4 µm	11.80		mg/L
18C0396-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	04/06/2018	04/06/2018	ASTM D3977	SC_4-1	4-1 µm	11.70		mg/L
18C0396-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	04/06/2018	04/06/2018	ASTM D3977	SC_4-1	4-1 µm	6.80		mg/L
18C0396-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	04/06/2018	04/06/2018	ASTM D3977		Suspended Sediment Concentration	74.50		mg/L
18C0396-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	04/06/2018	04/06/2018	ASTM D3977		Suspended Sediment Concentration	28.00		mg/L
BGC0663-BLK1	Blank	13-05605-000	Water			03/24/2018	03/26/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGC0663-BLK2	Blank	13-05605-000	Water			03/24/2018	03/26/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGC0663-BLK3	Blank	13-05605-000	Water			03/24/2018	03/26/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L
BGC0663-BS1	LCS	13-05605-000	Water			03/24/2018	03/26/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.154		mg-P/L
BGC0663-BS2	LCS	13-05605-000	Water			03/24/2018	03/26/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.155		mg-P/L
BGC0663-BS3	LCS	13-05605-000	Water			03/24/2018	03/26/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.153		mg-P/L
18C0396-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	03/24/2018	03/26/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.140		mg-P/L
18C0396-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	03/24/2018	03/26/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.100		mg-P/L
BGC0664-BLK1	Blank	13-05605-000	Water			03/24/2018	03/24/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BGC0664-BS1	LCS	13-05605-000	Water			03/24/2018	03/24/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.145		mg-P/L
18C0396-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	03/24/2018	03/24/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0120		mg-P/L
18C0396-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	03/24/2018	03/24/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0110		mg-P/L
BGC0666-BLK1	Blank	13-05605-000	Water			03/26/2018	03/26/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGC0666-BS1	LCS	13-05605-000	Water			03/26/2018	03/26/2018	EPA 200.8	7440-50-8	Copper	26.5		ug/L
18C0396-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	03/26/2018	03/27/2018	EPA 200.8	7440-50-8	Copper	36.3		ug/L
BGC0666-BLK1	Blank	13-05605-000	Water			03/26/2018	03/26/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BGC0666-BS1	LCS	13-05605-000	Water			03/26/2018	03/26/2018	EPA 200.8	7440-50-8	Copper	26.7		ug/L
18C0396-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	03/26/2018	03/27/2018	EPA 200.8	7440-50-8	Copper	51.4		ug/L
BGC0666-BLK1	Blank	13-05605-000	Water			03/26/2018	03/26/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGC0666-BS1	LCS	13-05605-000	Water			03/26/2018	03/26/2018	EPA 200.8	7440-66-6	Zinc	86.2		ug/L
18C0396-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	03/26/2018	03/27/2018	EPA 200.8	7440-66-6	Zinc	151		ug/L
18C0396-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	03/26/2018	03/27/2018	EPA 200.8	7440-66-6	Zinc	106		ug/L
BGC0666-BLK1	Blank	13-05605-000	Water			03/26/2018	03/26/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BGC0666-BS1	LCS	13-05605-000	Water			03/26/2018	03/26/2018	EPA 200.8	7440-66-6	Zinc	73.6		ug/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

09 April 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)
18C0396

Associated SDG ID(s)
N/A

Amanda
Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical Resources,
Inc., ou=Project Manager,
cn=Amanda Volgardsen,
email=amanda.volgardsen@arilab
s.com
Date: 2018.04.09 12:08:16 -07'00'

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

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

Analytical Resources, Inc.

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





p 206 441 9080 | f 206 441 9108

Chain of Custody Record

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)

Hydro 4110 CHC Composite Sample3.docx

Project Name

Page 1 of 1



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

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

Reported:
09-Apr-2018 12:05

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18C0396-01	Water	22-Mar-2018 16:41	23-Mar-2018 14:55
WUFF-OUT	18C0396-02	Water	22-Mar-2018 16:41	23-Mar-2018 14:55



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

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

Reported:
09-Apr-2018 12:05

Case Narrative

Sample receipt

Samples as listed on the preceding page were received March 23, 2018 under ARI work order 18C0396. 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 were subcontracted to ETS Labs.

Total 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 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.

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.



WORK ORDER

18C0396

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
18C0396-01 A	Large OJ, 1000 mL	
18C0396-01 B	Large OJ, 1000 mL	
18C0396-01 C	Small OJ, 500 mL	
18C0396-01 D	Small OJ, 500 mL, 9N H ₂ SO ₄	< 2 pass
18C0396-01 E	HDPE NM, 500 mL, 1:1 HNO ₃	< 2 pass
18C0396-02 A	Large OJ, 1000 mL	
18C0396-02 B	Large OJ, 1000 mL	
18C0396-02 C	Small OJ, 500 mL	
18C0396-02 D	Small OJ, 500 mL, 9N H ₂ SO ₄	< 2 pass
18C0396-02 E	HDPE NM, 500 mL, 1:1 HNO ₃	< 2 pass

Preservation Confirmed By BF

Date 3/23/18



Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera

Project Name: _____

COC No(s): _____ NA

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

Assigned ARI Job No: 18C0396

Tracking No: _____ NA

Preliminary Examination Phase:

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

Were custody papers included with the cooler? YES NO

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

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

Time: 144 1455 3.0

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

Temp Gun ID#: 2002565

Cooler Accepted by: BF Date: 3/23/18 Time: 1455

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: 3/23/18 1558 Equipment: churn splitter Split by: BF & SEF

Samples Logged by: BF Date: 3/23/18 Time: 1606

**** 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)



ETS

Environmental Technical Services

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

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

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

COMPANY: Analytical Resources, Inc., 4611 S. 134 th Place, Suite 100, Tukwila, WA 98168						ANALYST(S) S. Santos L. Quijano	SUPERVISOR D. Jacobson LAB DIRECTOR G.S. Conrad, PhD
ATTN: Amanda Volgardsen			DATE COLLECTED	DATE RECEIVED	DATE COMPLETED		
JOB: Hydro International Up-Flo Filter			3/22/2018	3/29/2018	4/6/2018		
SITE: Oregon-Washington							

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
07727-1	HI-67HEC/RW	WUFF-IN	5.0 7.3%	6.8 9.9%	5.7 8.3%		39.5 57.5%	11.7 17.0%	74.5
	18C0396-01 A/B					Total SSC by Summation →		68.7	
07727-2	HI-68HEC/RW	WUFF-OUT	1.0 3.7%	2.7 10.0%	4.8 17.7%		11.8 43.5%	6.8 25.1%	28.0
	18C0396-02 A/B					Total SSC by Summation →		27.1	
			#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	

COMMENTS

The matrix has a very low concentration of TSS particles amounting to about 70 ppm in the input sample; and the output sample is even lower at <30 ppm. The overall average reduction in TSS is at about 61.5% of total TSS. Also, the range is very tight in this case at 60.6%-62.4% (TSS by summation vs TSS by analytical method). The reductions in each fraction vary a good deal as follows: 80.0%, 60.3%, 15.8%, 70.1%, and 41.9%. Notice that for the input sample the mode is at the 4-63 μ fraction being right at 57.5%, and this is the only size class that is over 20% of the total TSS. The other size fractions are at much lower proportions being more or less in the 7%-17% range in the input sample. Thus, in this case the size distribution is strongly skewed toward the fines end of the TSS size range, but is not at the finest size fraction. The output sample has a roughly equivalent distribution in this case. The RPDs are both excellent as follows: ±4.1%; & ±1.6%.

\\ 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
2200 6th Avenue, Suite 1100
Seattle WA, 98121

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

Reported:
09-Apr-2018 12:05

WUFF-IN
18C0396-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 03/22/2018 16:41

Instrument: ICPMS1

Analyzed: 27-Mar-2018 22:46

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGC0666 Sample Size: 25 mL
Prepared: 26-Mar-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	51.4	ug/L	
Zinc	7440-66-6	1	4.00	151	ug/L	



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

Reported:
09-Apr-2018 12:05

WUFF-IN
18C0396-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 03/22/2018 16:41

Instrument: UV1800-1

Analyzed: 26-Mar-2018 17:59

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGC0663 Sample Size: 25 mL
Prepared: 24-Mar-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0080	0.140	mg-P/L	

Instrument: UV1800-2

Analyzed: 24-Mar-2018 15:54

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGC0664 Sample Size: 50 mL
Prepared: 24-Mar-2018 Final Volume: 50 mL

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



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

Reported:
09-Apr-2018 12:05

WUFF-IN
18C0396-01 (Water)

*** DEFAULT GENERAL METHOD ***

Method: ASTM D3977

Sampled: 03/22/2018 16:41

Instrument: ETSE

Analyzed: 06-Apr-2018 00:00

Analysis by: Environmental Technical Services

Sample Preparation:

Preparation Method: *** DEFAULT PREP ***

Preparation Batch: B040618

Prepared: 06-Apr-2018

Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
>500 µm	SC_>500	1	0.1	5.00	mg/L	
500-125 µm	SC_500-125	1	0.1	6.80	mg/L	
125-62.5 µm	SC_125-62.5	1	0.1	5.70	mg/L	
62.5-4 µm	SC_62.5-4	1	0.1	39.50	mg/L	
4-1 µm	SC_4-1	1	0.1	11.70	mg/L	
Suspended Sediment Concentration		1	0.1	74.50	mg/L	



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

Reported:
09-Apr-2018 12:05

WUFF-OUT
18C0396-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 03/22/2018 16:41

Instrument: ICPMS1

Analyzed: 27-Mar-2018 22:50

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGC0666 Sample Size: 25 mL
Prepared: 26-Mar-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	36.3	ug/L	
Zinc	7440-66-6	1	4.00	106	ug/L	



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

Reported:
09-Apr-2018 12:05

WUFF-OUT
18C0396-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 03/22/2018 16:41

Instrument: UV1800-1

Analyzed: 26-Mar-2018 18:00

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BGC0663 Sample Size: 25 mL
Prepared: 24-Mar-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0080	0.100	mg-P/L	

Instrument: UV1800-2

Analyzed: 24-Mar-2018 15:55

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGC0664 Sample Size: 50 mL
Prepared: 24-Mar-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0040	0.0110	mg-P/L	



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

Reported:
09-Apr-2018 12:05

WUFF-OUT
18C0396-02 (Water)

*** DEFAULT GENERAL METHOD ***

Method: ASTM D3977

Sampled: 03/22/2018 16:41

Instrument: ETSE

Analyzed: 06-Apr-2018 00:00

Analysis by: Environmental Technical Services

Sample Preparation:

Preparation Method: *** DEFAULT PREP ***

Preparation Batch: B040618

Prepared: 06-Apr-2018

Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
>500 µm	SC_>500	1	0.1	1.00	mg/L	
500-125 µm	SC_500-125	1	0.1	2.70	mg/L	
125-62.5 µm	SC_125-62.5	1	0.1	4.80	mg/L	
62.5-4 µm	SC_62.5-4	1	0.1	11.80	mg/L	
4-1 µm	SC_4-1	1	0.1	6.80	mg/L	
Suspended Sediment Concentration		1	0.1	28.00	mg/L	



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

Reported:
09-Apr-2018 12:05

Metals and Metallic Compounds - Quality Control

Batch BGC0666 - 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 (BGC0666-BLK1)			Prepared: 26-Mar-2018 Analyzed: 26-Mar-2018 15:38								
Copper	63	ND	0.500	ug/L							U
Copper	65	ND	0.500	ug/L							U
Zinc	66	ND	4.00	ug/L							U
Zinc	67	ND	4.00	ug/L							U
LCS (BGC0666-BS1)			Prepared: 26-Mar-2018 Analyzed: 26-Mar-2018 16:20								
Copper	63	26.5	0.500	ug/L	25.0		106	80-120			
Copper	65	26.7	0.500	ug/L	25.0		107	80-120			
Zinc	66	86.2	4.00	ug/L	80.0		108	80-120			
Zinc	67	73.6	4.00	ug/L	80.0		92.0	80-120			



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

Reported:
09-Apr-2018 12:05

Wet Chemistry - Quality Control

Batch BGC0663 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-1 Analyst: RLM

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGC0663-BLK1) Prepared: 24-Mar-2018 Analyzed: 26-Mar-2018 17:48											
Total Phosphorus	ND	0.0080	0.0080	mg-P/L							U
Blank (BGC0663-BLK2) Prepared: 24-Mar-2018 Analyzed: 26-Mar-2018 17:58											
Total Phosphorus	ND	0.0080	0.0080	mg-P/L							U
Blank (BGC0663-BLK3) Prepared: 24-Mar-2018 Analyzed: 26-Mar-2018 18:00											
Total Phosphorus	ND	0.0080	0.0080	mg-P/L							U
LCS (BGC0663-BS1) Prepared: 24-Mar-2018 Analyzed: 26-Mar-2018 17:49											
Total Phosphorus	0.154	0.0080	0.0080	mg-P/L	0.150		103	90-110			
LCS (BGC0663-BS2) Prepared: 24-Mar-2018 Analyzed: 26-Mar-2018 17:58											
Total Phosphorus	0.155	0.0080	0.0080	mg-P/L	0.150		103	90-110			
LCS (BGC0663-BS3) Prepared: 24-Mar-2018 Analyzed: 26-Mar-2018 18:01											
Total Phosphorus	0.153	0.0080	0.0080	mg-P/L	0.150		102	90-110			



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

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

Reported:
09-Apr-2018 12:05

Wet Chemistry - Quality Control

Batch BGC0664 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGC0664-BLK1)											
						Prepared: 24-Mar-2018 Analyzed: 24-Mar-2018 15:52					
Orthophosphorus	ND	0.0040	0.0040	mg-P/L							U
LCS (BGC0664-BS1)											
						Prepared: 24-Mar-2018 Analyzed: 24-Mar-2018 15:52					
Orthophosphorus	0.145	0.0040	0.0040	mg-P/L	0.150		96.7	90-110			



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

Reported:
09-Apr-2018 12:05

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
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	06/30/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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Reported:
09-Apr-2018 12:05

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.

Data_18C0399

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
BGC0680-BLK1	Blank	13-05605-000	Water			03/26/2018	03/28/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.100	U	mg/L
BGC0680-BS1	LCS	13-05605-000	Water			03/26/2018	03/28/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	2.33		mg/L
18C0399-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	03/26/2018	03/28/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.571		mg/L
18C0399-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	03/26/2018	03/28/2018	NWTPH-Dx		Diesel Range Organics (C12-C24)	0.200		mg/L
BGC0680-BLK1	Blank	13-05605-000	Water			03/26/2018	03/28/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	0.200	U	mg/L
BGC0680-BS1	LCS	13-05605-000	Water			03/26/2018	03/28/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	0.200	U	mg/L
18C0399-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	03/26/2018	03/28/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	1.79		mg/L
18C0399-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	03/26/2018	03/28/2018	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	0.325		mg/L
BGC0680-BLK1	Blank	13-05605-000	Water			03/26/2018	03/28/2018	NWTPH-Dx	84-15-1	o-Terphenyl	76.2		%
BGC0680-BS1	LCS	13-05605-000	Water			03/26/2018	03/28/2018	NWTPH-Dx	84-15-1	o-Terphenyl	77.7		%
18C0399-01	WUFF-IN	13-05605-000	Water	03/22/2018	03/23/2018	03/26/2018	03/28/2018	NWTPH-Dx	84-15-1	o-Terphenyl	78.5		%
18C0399-02	WUFF-OUT	13-05605-000	Water	03/22/2018	03/23/2018	03/26/2018	03/28/2018	NWTPH-Dx	84-15-1	o-Terphenyl	82.9		%



Analytical Resources, Incorporated
Analytical Chemists and Consultants

30 March 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)
18C0399

Associated SDG ID(s)
N/A

Amanda
Volgardsen

Digitally signed by Amanda
Volgardsen
DN: c=US, st=Washington,
l=Tukwila, o=Analytical Resources,
Inc., ou=Project Manager,
cn=Amanda Volgardsen,
email=amanda.volgardsen@arilab
s.com
Date: 2018.03.30 15:55:02 -07'00'

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

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

Analytical Resources, Inc.

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





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

Chain of Custody Record

HERRERA

Project Name: Hydro International Up-flo Filter		Project Number: 13-05605-000		Client: Herrera Environmental		Number of Containers		Analyses Requested										Lab ID No.									
Report To: Dylan Ahearn				Copy To:																							
Sampled By: ALEX SVENDSEN				Delivery Method: W cooler w/ ICE																							
Laboratory: Analytical Resources Inc.			Requested Completion Date:		Total No. of Containers: 4																						
Lab Use:			Sample ID		Date		Time		Sample Type (see codes)		Preservative? (Y/N)		Matrix (see codes)		Number of Containers		NWTPH-Dx										Lab ID No.
			WUFF-IN		3/22/18		1222		G		N		SW		2		X										
			WUFF-OUT		3/22/18		1225		G		N		SW		2		X										
Comments/Special Instructions:																											
Relinquished by (Name/CO/) ALEX SVENDSEN/HCC				Signature [Signature]				Date/Time 3/23/18/1455				Received By (Name/CO) Brandon Fisk/ARI				Signature [Signature]				Date/Time 3/23/18/1455							
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
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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
30-Mar-2018 15:54

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	18C0399-01	Water	22-Mar-2018 12:22	23-Mar-2018 14:55
WUFF-OUT	18C0399-02	Water	22-Mar-2018 12:25	23-Mar-2018 14:55



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Project: Hydro International
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Project Manager: Dylan Ahearn

Reported:
30-Mar-2018 15:54

Case Narrative

Sample receipt

Samples as listed on the preceding page were received March 23, 2018 under ARI work order 18C0399. 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.



Cooler Receipt Form

ARI Client: Herrera

Project Name: _____

COC No(s): _____ NA

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

Assigned ARI Job No: 18C0399

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) 3.0

Time: 7:44 1455

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

Temp Gun ID#: 0002565

Cooler Accepted by: BF Date: 3/23/18 Time: 1455

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: BF Date: 3/23/18 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: _____

<p>Small Air Bubbles ~ 2mm</p>	<p>Peabubbles 2-4 mm</p>	<p>LARGE Air Bubbles > 4 mm</p>	<p>Small → "sm" (< 2 mm)</p> <p>Peabubbles → "pb" (2 to < 4 mm)</p> <p>Large → "lg" (4 to < 6 mm)</p> <p>Headspace → "hs" (> 6 mm)</p>
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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
30-Mar-2018 15:54

WUFF-IN
18C0399-01 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 03/22/2018 12:22

Instrument: FID4

Analyzed: 28-Mar-2018 18:42

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BGC0680 Sample Size: 500 mL
Prepared: 26-Mar-2018 Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.100	0.571	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.200	1.79	mg/L	
HC ID: MOTOR OIL						
Surrogate: o-Terphenyl			50-150 %	78.5	%	



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Reported:
30-Mar-2018 15:54

WUFF-OUT
18C0399-02 (Water)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 03/22/2018 12:25

Instrument: FID4

Analyzed: 28-Mar-2018 19:03

Sample Preparation: Preparation Method: EPA 3510C SepF
Preparation Batch: BGC0680 Sample Size: 500 mL
Prepared: 26-Mar-2018 Final Volume: 1 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		1	0.100	0.200	mg/L	
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		1	0.200	0.325	mg/L	
HC ID: MOTOR OIL						
Surrogate: o-Terphenyl			50-150 %	82.9	%	



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

Reported:
30-Mar-2018 15:54

Petroleum Hydrocarbons - Quality Control

Batch BGC0680 - EPA 3510C SepF

Instrument: FID4 Analyst: MDL

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Blank (BGC0680-BLK1) Prepared: 26-Mar-2018 Analyzed: 28-Mar-2018 16:39									
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	0.343		mg/L	0.450		76.2	50-150		
LCS (BGC0680-BS1) Prepared: 26-Mar-2018 Analyzed: 28-Mar-2018 16:59									
Diesel Range Organics (C12-C24)	2.33	0.100	mg/L	3.00		77.7	56-120		
Surrogate: o-Terphenyl	0.350		mg/L	0.450		77.7	50-150		



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Reported:
30-Mar-2018 15:54

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-C24)	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	06/30/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2018
WADOE	WA Dept of Ecology	C558	06/30/2018
WA-DW	Ecology - Drinking Water	C558	06/30/2018



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Reported:
30-Mar-2018 15:54

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
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 12, 2018 –
Rinsate Blank 3**

Data_18L0049

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units	Batch
BGL0098-BLK1	Blank	13-05605-000	Water			12/05/2018	12/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg/L	BGL0098
BGL0098-BS1	LCS	13-05605-000	Water			12/05/2018	12/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.155		mg/L	BGL0098
BGL0098-DUP1	WUFF-IN-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/05/2018	12/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg/L	BGL0098
BGL0098-MS1	WUFF-IN-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/05/2018	12/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.101		mg/L	BGL0098
18L0049-01	WUFF-IN-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/05/2018	12/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg/L	BGL0098
18L0049-03	WUFF-OUT-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/05/2018	12/05/2018	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg/L	BGL0098
BGL0137-BLK1	Blank	13-05605-000	Water			12/06/2018	12/06/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L	BGL0137
BGL0137-BS1	LCS	13-05605-000	Water			12/06/2018	12/06/2018	EPA 200.8	7440-50-8	Copper	27.2		ug/L	BGL0137
18L0049-01	WUFF-IN-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/06/2018	12/06/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L	BGL0137
18L0049-03	WUFF-OUT-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/06/2018	12/06/2018	EPA 200.8	7440-50-8	Copper	0.625		ug/L	BGL0137
BGL0137-BLK1	Blank	13-05605-000	Water			12/06/2018	12/06/2018	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L	BGL0137
BGL0137-BS1	LCS	13-05605-000	Water			12/06/2018	12/06/2018	EPA 200.8	7440-50-8	Copper	27.1		ug/L	BGL0137
BGL0137-BLK1	Blank	13-05605-000	Water			12/06/2018	12/06/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L	BGL0137
BGL0137-BS1	LCS	13-05605-000	Water			12/06/2018	12/06/2018	EPA 200.8	7440-66-6	Zinc	88.3		ug/L	BGL0137
18L0049-01	WUFF-IN-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/06/2018	12/06/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L	BGL0137
18L0049-03	WUFF-OUT-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/06/2018	12/06/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L	BGL0137
BGL0137-BLK1	Blank	13-05605-000	Water			12/06/2018	12/06/2018	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L	BGL0137
BGL0137-BS1	LCS	13-05605-000	Water			12/06/2018	12/06/2018	EPA 200.8	7440-66-6	Zinc	83.1		ug/L	BGL0137
BGL0205-BLK1	Blank	13-05605-000	Water			12/10/2018	12/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L	BGL0205
BGL0205-BLK2	Blank	13-05605-000	Water			12/10/2018	12/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L	BGL0205
BGL0205-BS1	LCS	13-05605-000	Water			12/10/2018	12/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.300		mg-P/L	BGL0205
BGL0205-BS2	LCS	13-05605-000	Water			12/10/2018	12/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.296		mg-P/L	BGL0205
BGL0205-DUP1	WUFF-IN-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/10/2018	12/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L	BGL0205
BGL0205-MS1	WUFF-IN-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/10/2018	12/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.202		mg-P/L	BGL0205
18L0049-01	WUFF-IN-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/10/2018	12/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0140		mg-P/L	BGL0205
18L0049-03	WUFF-OUT-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/10/2018	12/11/2018	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0080	U	mg-P/L	BGL0205
BGL0206-BLK1	Blank	13-05605-000	Water			12/10/2018	12/11/2018	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L	BGL0206
BGL0206-BS1	LCS	13-05605-000	Water			12/10/2018	12/11/2018	EPA 200.8-Dissolved	7440-50-8	Copper	26.8		ug/L	BGL0206
18L0049-02	WUFF-IN-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/10/2018	12/11/2018	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L	BGL0206
18L0049-04	WUFF-OUT-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/10/2018	12/11/2018	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L	BGL0206
BGL0206-BLK1	Blank	13-05605-000	Water			12/10/2018	12/11/2018	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L	BGL0206
BGL0206-BS1	LCS	13-05605-000	Water			12/10/2018	12/11/2018	EPA 200.8-Dissolved	7440-50-8	Copper	26.8		ug/L	BGL0206
BGL0206-BLK1	Blank	13-05605-000	Water			12/10/2018	12/11/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L	BGL0206
BGL0206-BS1	LCS	13-05605-000	Water			12/10/2018	12/11/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	81.5		ug/L	BGL0206
18L0049-02	WUFF-IN-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/10/2018	12/11/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L	BGL0206
18L0049-04	WUFF-OUT-QA	13-05605-000	Water	12/04/2018	12/04/2018	12/10/2018	12/11/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L	BGL0206
BGL0206-BLK1	Blank	13-05605-000	Water			12/10/2018	12/11/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L	BGL0206
BGL0206-BS1	LCS	13-05605-000	Water			12/10/2018	12/11/2018	EPA 200.8-Dissolved	7440-66-6	Zinc	75.0		ug/L	BGL0206



Analytical Resources, Incorporated
Analytical Chemists and Consultants

12 December 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)
18L0049

Associated SDG ID(s)
N/A

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

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

Analytical Resources, Inc.

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





18L0049
2200 Sixth Avenue | Suite 1100
Seattle, Washington | 98121
p 206 441 9080 | f 206 441 9108

Chain of Custody Record

[illegible]

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



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

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

Reported:
12-Dec-2018 17:36

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN-QA	18L0049-01	Water	04-Dec-2018 00:00	04-Dec-2018 16:00
WUFF-IN-QA	18L0049-02	Water	04-Dec-2018 00:00	04-Dec-2018 16:00
WUFF-OUT-QA	18L0049-03	Water	04-Dec-2018 00:00	04-Dec-2018 16:00
WUFF-OUT-QA	18L0049-04	Water	04-Dec-2018 00:00	04-Dec-2018 16:00



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

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

Reported:
12-Dec-2018 17:36

Work Order Case Narrative

Sample receipt

Samples as listed on the preceding page were received December 4, 2018 under ARI work order 18L0049. For details regarding sample receipt, please refer to the Cooler Receipt Form. The samples were split by sample receiving prior to analysis.

Total and Dissolved Metals - EPA Method 200.8

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

Initial and continuing calibrations were within method requirements.

The method blanks were clean at the reporting limits.

The LCS percent recoveries were within control limits.

Wet Chemistry (O-Phos, T-Phos)

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

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.

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



WORK ORDER

18L0049

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: [none]

Preservation Confirmation

Container ID	Container Type	pH
18L0049-01 A	Small OJ, 500 mL, 9N H ₂ SO ₄	L2 pass
18L0049-01 B	Small OJ, 500 mL	
18L0049-01 C	HDPE NM, 500 mL, 1:1 HNO ₃	L2 pass
18L0049-02 A	HDPE NM, 500 mL	72 fail
18L0049-03 A	Small OJ, 500 mL, 9N H ₂ SO ₄	L2 pass
18L0049-03 B	Small OJ, 500 mL	
18L0049-03 C	HDPE NM, 500 mL, 1:1 HNO ₃	L2 pass
18L0049-04 A	HDPE NM, 500 mL	72 fail

Preservation Confirmed By

SeF

Date

12-4-18



WORK ORDER

18L0049

Client: Herrera Environmental Consultants

Project Manager: Amanda Volgardsen

Project: Hydro International

Project Number: [none]

Report To:

Herrera Environmental Consultants

Dylan Ahearn

2200 6th Avenue, Suite 1100

Seattle, WA 98121

Phone: 206-441-9080

Fax: -

Invoice To:

Herrera Environmental Consultants

Dylan Ahearn

2200 6th Avenue, Suite 1100

Seattle, WA 98121

Phone :206-441-9080

Fax: -

Date Due: 12-Dec-2018 18:00 (5 day TAT)

Received By: Stephanie Fishel

Date Received: 04-Dec-2018 16:00

Logged In By: Stephanie Fishel

Date Logged In: 04-Dec-2018 17:31

Samples Received at: 18.8°C

Intact, properly signed and dated custody seals attached to outside of cooler(s).....	No	Custody papers included with the cooler.....	Yes
Custody papers properly filled out (in, signed, analyses requested, etc).....	Yes	Was a temperature blank included in the cooler.....	No
Was sufficient ice used (if appropriate).....	No	All bottles sealed in individual plastic bags.....	No
All bottles arrived in good condition (unbroken).....	Yes	All bottle labels complete and legible.....	Yes
Number of containers listed on COC match number received.....	Yes	Bottle labels and tags agree with COC.....	Yes
Correct bottles used for the requested analyses.....	Yes	All VOC vials free of air bubbles.....	No
Analyses/bottles require preservation (attach preservation sheet excluding VOC).....	Yes	Sufficient amount of sample sent in each bottle.....	Yes
Sample split at ARI.....	Yes		

18L0049-01 WUFF-IN-QA [Water] Sampled 04-Dec-2018 00:00

Filter 0.45 micron (O-Phos)	12/12/2018	5	12/5/2018
Met 200.8 - Cu	12/12/2018	5	6/2/2019
Met 200.8 - Zn	12/12/2018	5	6/2/2019
Phosphorus, Ortho-P, SM 4500-P E-1999 (SI	12/12/2018	5	12/6/2018
Phosphorus, Total, SM 4500-P E-99	12/12/2018	5	1/1/2019

18L0049-02 WUFF-IN-QA [Water] Sampled 04-Dec-2018 00:00

Filter 0.45 micron	12/12/2018	5	12/5/2018
Met Diss 200.8 - Zn	12/12/2018	5	6/2/2019
Met Diss 200.8 - Cu	12/12/2018	5	6/2/2019

18L0049-03 WUFF-OUT-QA [Water] Sampled 04-Dec-2018 00:00

Met 200.8 - Cu	12/12/2018	5	6/2/2019
Filter 0.45 micron (O-Phos)	12/12/2018	5	12/5/2018
Met 200.8 - Zn	12/12/2018	5	6/2/2019
Phosphorus, Ortho-P, SM 4500-P E-1999 (SI	12/12/2018	5	12/6/2018
Phosphorus, Total, SM 4500-P E-99	12/12/2018	5	1/1/2019

18L0049-04 WUFF-OUT-QA [Water] Sampled 04-Dec-2018 00:00

Filter 0.45 micron	12/12/2018	5	12/5/2018
Met Diss 200.8 - Cu	12/12/2018	5	6/2/2019
Met Diss 200.8 - Zn	12/12/2018	5	6/2/2019



Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera
COC No(s): _____ NA
Assigned ARI Job No: 18L0049

Project Name: Hydro 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 YES NO
Were custody papers properly filled out (ink, signed, etc.) YES YES NO
Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 16.8
Time: 1600
If cooler temperature is out of compliance fill out form 00070F
Temp Gun ID#: DANSON
Cooler Accepted by: Set Date: 12-4-18 Time: 1600

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 NA
Was Sample Split by ARI: NA YES Date/Time: 12-4-18 Equipment: pitcher Split by: Set
Samples Logged by: Set Date: 12-4-18 Time: 1731

** 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: _____

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



Cooler Temperature Compliance Form

ARI Work Order: <u>18L0049</u>		
Cooler#:	Temperature(°C):	
Sample ID	Bottle Count	Bottle Type
Samples recieved 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: Sof

Date: 12-4-18

Time: _____

00070F

Cooler Temperature Compliance Form

Version 000
3/3/09



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

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

Reported:
12-Dec-2018 17:36

WUFF-IN-QA
18L0049-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 12/04/2018 00:00

Instrument: ICPMS2 Analyst: MCB

Analyzed: 12/06/2018 17:41

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGL0137 Sample Size: 25 mL
Prepared: 06-Dec-2018 Final Volume: 25 mL

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



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Project: Hydro International
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Project Manager: Dylan Ahearn

Reported:
12-Dec-2018 17:36

WUFF-IN-QA
18L0049-01 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 12/04/2018 00:00

Instrument: UV1800-2 Analyst: YK

Analyzed: 12/05/2018 11:23

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGL0098 Sample Size: 50 mL
Prepared: 05-Dec-2018 Final Volume: 50 mL

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

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGL0205 Sample Size: 25 mL
Prepared: 10-Dec-2018 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.0080	0.0080	0.0140	mg-P/L	



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

Reported:
12-Dec-2018 17:36

WUFF-IN-QA
18L0049-02 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 12/04/2018 00:00

Instrument: ICPMS2 Analyst: MCB

Analyzed: 12/11/2018 19:57

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGL0206 Sample Size: 25 mL
Prepared: 10-Dec-2018 Final Volume: 25 mL

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



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

Reported:
12-Dec-2018 17:36

WUFF-OUT-QA

18L0049-03 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 12/04/2018 00:00

Instrument: ICPMS2 Analyst: MCB

Analyzed: 12/06/2018 17:45

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BGL0137 Sample Size: 25 mL
Prepared: 06-Dec-2018 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	0.625	ug/L	
Zinc	7440-66-6	1	4.00	ND	ug/L	U



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

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

Reported:
12-Dec-2018 17:36

WUFF-OUT-QA
18L0049-03 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 12/04/2018 00:00

Instrument: UV1800-2 Analyst: YK

Analyzed: 12/05/2018 11:24

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGL0098 Sample Size: 50 mL
Prepared: 05-Dec-2018 Final Volume: 50 mL

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

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BGL0205 Sample Size: 25 mL
Prepared: 10-Dec-2018 Final Volume: 50 mL

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



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

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

Reported:
12-Dec-2018 17:36

WUFF-OUT-QA

18L0049-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 12/04/2018 00:00

Instrument: ICPMS2 Analyst: MCB

Analyzed: 12/11/2018 20:02

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BGL0206 Sample Size: 25 mL
Prepared: 10-Dec-2018 Final Volume: 25 mL

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



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

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

Reported:
12-Dec-2018 17:36

Metals and Metallic Compounds - Quality Control

Batch BGL0137 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGL0137-BLK1)			Prepared: 06-Dec-2018 Analyzed: 06-Dec-2018 14:59								
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 (BGL0137-BS1)			Prepared: 06-Dec-2018 Analyzed: 06-Dec-2018 15:03								
Copper	63	27.2	0.500	ug/L	25.0		109	80-120			
Copper	65	27.1	0.500	ug/L	25.0		108	80-120			
Zinc	66	88.3	4.00	ug/L	80.0		110	80-120			
Zinc	67	83.1	4.00	ug/L	80.0		104	80-120			



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Project: Hydro International
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Project Manager: Dylan Ahearn

Reported:
12-Dec-2018 17:36

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BGL0206 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGL0206-BLK1)			Prepared: 10-Dec-2018 Analyzed: 11-Dec-2018 17:29								
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 (BGL0206-BS1)			Prepared: 10-Dec-2018 Analyzed: 11-Dec-2018 17:34								
Copper, Dissolved	63	26.8	0.500	ug/L	25.0		107	80-120			
Copper, Dissolved	65	26.8	0.500	ug/L	25.0		107	80-120			
Zinc, Dissolved	66	81.5	4.00	ug/L	80.0		102	80-120			
Zinc, Dissolved	67	75.0	4.00	ug/L	80.0		93.7	80-120			



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

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

Reported:
12-Dec-2018 17:36

Wet Chemistry - Quality Control

Batch BGL0098 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: YK

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGL0098-BLK1)					Prepared: 05-Dec-2018 Analyzed: 05-Dec-2018 11:22						
Orthophosphorus	ND	0.0040	0.0040	mg/L							U
LCS (BGL0098-BS1)					Prepared: 05-Dec-2018 Analyzed: 05-Dec-2018 11:23						
Orthophosphorus	0.155	0.0040	0.0040	mg/L	0.150		103	90-110			
Duplicate (BGL0098-DUP1)					Source: 18L0049-01 Prepared: 05-Dec-2018 Analyzed: 05-Dec-2018 11:24						
Orthophosphorus	ND	0.0040	0.0040	mg/L		ND					U
Matrix Spike (BGL0098-MS1)					Source: 18L0049-01 Prepared: 05-Dec-2018 Analyzed: 05-Dec-2018 11:24						
Orthophosphorus	0.101	0.0040	0.0040	mg/L	0.0999	ND	101	75-125			

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



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

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

Reported:
12-Dec-2018 17:36

Wet Chemistry - Quality Control

Batch BGL0205 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: YK

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BGL0205-BLK1)					Prepared: 10-Dec-2018 Analyzed: 11-Dec-2018 15:42						
Total Phosphorus	ND	0.0080	0.0080	mg-P/L							U
Blank (BGL0205-BLK2)					Prepared: 10-Dec-2018 Analyzed: 11-Dec-2018 15:45						
Total Phosphorus	ND	0.0080	0.0080	mg-P/L							U
LCS (BGL0205-BS1)					Prepared: 10-Dec-2018 Analyzed: 11-Dec-2018 15:43						
Total Phosphorus	0.300	0.0080	0.0080	mg-P/L	0.300		100	90-110			
LCS (BGL0205-BS2)					Prepared: 10-Dec-2018 Analyzed: 11-Dec-2018 15:45						
Total Phosphorus	0.296	0.0080	0.0080	mg-P/L	0.300		98.7	90-110			
Duplicate (BGL0205-DUP1)					Source: 18L0049-01 Prepared: 10-Dec-2018 Analyzed: 11-Dec-2018 15:44						
Total Phosphorus	ND	0.0080	0.0080	mg-P/L		0.0140					U
Matrix Spike (BGL0205-MS1)					Source: 18L0049-01 Prepared: 10-Dec-2018 Analyzed: 11-Dec-2018 15:44						
Total Phosphorus	0.202	0.0080	0.0080	mg-P/L	0.200	0.0140	94.1	75-125			

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



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

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

Reported:
12-Dec-2018 17:36

Certified Analyses included in this Report

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

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	02/07/2019
CALAP	California Department of Public Health CAELAP	2748	06/30/2019
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/07/2019
DoD-ELAP DW	DoD-Environmental Laboratory Accreditation - Drinking Water	66169	02/07/2019
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006-011	05/12/2019
WADOE	WA Dept of Ecology	C558	06/30/2019
WA-DW	Ecology - Drinking Water	C558	06/30/2019



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

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

Reported:
12-Dec-2018 17:36

Notes and Definitions

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