

APPENDIX I

Laboratory Reports

**February 4, 2016 –
Rinsate Blank 1**

Data: AVL7

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
16-1760-AVL7A	WUFF-IN	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/16/16	02/16/16	E200.8-Total	7440-50-8	Copper	0.5	U	ug/L
16-1760-AVL7A	WUFF-IN	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/16/16	02/16/16	E200.8-Total	7440-66-6	Zinc	4	U	ug/L
16-1760-AVL7A	WUFF-IN	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/08/16	02/08/16	EPA 365.2		Total Phosphorus	0.009		mg-P/L
16-1760-AVL7A	WUFF-IN	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/06/16	02/06/16	EPA 365.2		Ortho-Phosphorus	0.004	U	mg-P/L
16-1760-AVL7ADP	WUFF-IN	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/06/16	02/06/16	EPA 365.2		Ortho-Phosphorus	0.004	U	mg-P/L
16-1760-AVL7AMS	WUFF-IN	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/06/16	02/06/16	EPA 365.2		Ortho-Phosphorus	0.098		mg-P/L
16-1761-021616MB	Method Blank	Hydro International Up-flo Filter	Water			02/16/16	02/16/16	E200.8-Total	7440-50-8	Copper	0.5	U	ug/L
16-1761-021616LCS	Lab Control	Hydro International Up-flo Filter	Water			02/16/16	02/16/16	E200.8-Total	7440-50-8	Copper	29.2		ug/L
16-1761-AVL7B	WUFF-OUT	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/16/16	02/16/16	E200.8-Total	7440-50-8	Copper	0.5	U	ug/L
16-1761-021616MB	Method Blank	Hydro International Up-flo Filter	Water			02/16/16	02/16/16	E200.8-Total	7440-66-6	Zinc	4	U	ug/L
16-1761-021616LCS	Lab Control	Hydro International Up-flo Filter	Water			02/16/16	02/16/16	E200.8-Total	7440-66-6	Zinc	88		ug/L
16-1761-AVL7B	WUFF-OUT	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/16/16	02/16/16	E200.8-Total	7440-66-6	Zinc	4	U	ug/L
16-1761-AVL7B	WUFF-OUT	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/08/16	02/08/16	EPA 365.2		Total Phosphorus	0.008	U	mg-P/L
16-1761-AVL7B	WUFF-OUT	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/06/16	02/06/16	EPA 365.2		Ortho-Phosphorus	0.004	U	mg-P/L
16-1762-AVL7C	WUFF-IN	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/16/16	02/16/16	E200.8-Diss	7440-50-8	Copper	0.5	U	ug/L
16-1762-AVL7C	WUFF-IN	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/16/16	02/16/16	E200.8-Diss	7440-66-6	Zinc	4	U	ug/L
16-1763-021616MB	Method Blank	Hydro International Up-flo Filter	Water			02/16/16	02/16/16	E200.8-Diss	7440-50-8	Copper	0.5	U	ug/L
16-1763-021616LCS	Lab Control	Hydro International Up-flo Filter	Water			02/16/16	02/16/16	E200.8-Diss	7440-50-8	Copper	28.4		ug/L
16-1763-AVL7D	WUFF-OUT	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/16/16	02/16/16	E200.8-Diss	7440-50-8	Copper	0.5	U	ug/L
16-1763-021616MB	Method Blank	Hydro International Up-flo Filter	Water			02/16/16	02/16/16	E200.8-Diss	7440-66-6	Zinc	4	U	ug/L
16-1763-021616LCS	Lab Control	Hydro International Up-flo Filter	Water			02/16/16	02/16/16	E200.8-Diss	7440-66-6	Zinc	81		ug/L
16-1763-AVL7D	WUFF-OUT	Hydro International Up-flo Filter	Water	02/04/16	02/04/16	02/16/16	02/16/16	E200.8-Diss	7440-66-6	Zinc	4	U	ug/L
MB020816_1604	Method Blank	Hydro International Up-flo Filter	Water			02/08/16	02/08/16	EPA 365.2		Total Phosphorus	0.010		mg-P/L
SRM020816_1604	ERA #241213	Hydro International Up-flo Filter	Water			02/08/16	02/08/16	EPA 365.2		Total Phosphorus	0.307		mg-P/L
MB020616_1120	Method Blank	Hydro International Up-flo Filter	Water			02/06/16	02/06/16	EPA 365.2		Ortho-Phosphorus	0.004	U	mg-P/L
MB020616_1120	Method Blank	Hydro International Up-flo Filter	Water			02/06/16	02/06/16	EPA 365.2		Ortho-Phosphorus	0.004	U	mg-P/L
SRM020616_1120	ERA #280415	Hydro International Up-flo Filter	Water			02/06/16	02/06/16	EPA 365.2		Ortho-Phosphorus	0.148		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

18 February 2016

Dylan Ahearn
Herrera Environmental Consultants, Inc.
2200 Sixth Avenue, Suite 1100
Seattle, WA 98121-1823

RE: Project – Hydro International Up-Flo Filter
ARI Job No. AVL7

Dear Dylan:

Please find enclosed the original chain of custody (COC) record and the final results for the samples from the project referenced above. Analytical Resources, Inc. (ARI) accepted two water samples on February 4, 2016. The samples were analyzed for total phosphorous, ortho-phosphorous and total and dissolved metals as requested.

A small amount of contamination was detected in the method blank associated with the total phosphorous analyses of these samples. Total phosphorous was detected in sample WUFF-IN only. Since the concentration of total phosphorous measured in sample WUFF-IN was significantly greater than the amount found in the blank, no corrective actions were taken.

The remaining analyses proceeded without incident of note.

An electronic copy of these reports will be kept on file at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark Harris
Project Manager
markh@arilabs.com
206/695-6210

Enclosures

cc: file AVL7

MDH/mdh



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)



Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: AVL7

Project Name: Hydro International Up-Flow Filter

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: _____

3.4 5.3

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

Temp Gun ID#: D005276

Cooler Accepted by: TR

Date: 2-4-16

Time: 1530

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? _____

YES ☐ NO ☒

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

Was sufficient ice used (if appropriate)? _____

NA ☐ YES ☒ NO ☐

Were all bottles sealed in individual plastic bags? _____

YES ☐ NO ☒

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

YES ☒ NO ☐

Were all bottle labels complete and legible? _____

YES ☒ NO ☐

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

YES ☒ NO ☐

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

YES ☒ NO ☐

Were all bottles used correct for the requested analyses? _____

YES ☒ NO ☐

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

NA ☐ YES ☒ NO ☐

Were all VOC vials free of air bubbles? _____

NA ☒ YES ☐ NO ☐

Was sufficient amount of sample sent in each bottle? _____

YES ☒ NO ☐

Date VOC Trip Blank was made at ARI: _____

NA ☒

Was Sample Split by ARI: NA ☒

Date/Time: 2-4-16 1615

Equipment: Pitcher

Split by: TR

Samples Logged by: TR

Date: 2-4-16

Time: 1615

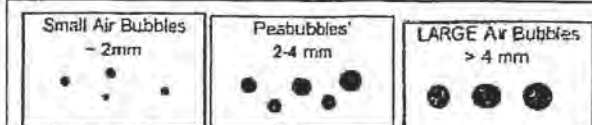
**** Notify Project Manager of discrepancies or concerns ****

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)

Sample ID Cross Reference Report



ARI Job No: AVL7

Client: Herrera

Project Event: 13-05605-000

Project Name: Hydro International Up-flo Filter

Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1. WUFF-IN	AVL7A	16-1760	Water	02/04/16 14:30	02/04/16 15:30
2. WUFF-OUT	AVL7B	16-1761	Water	02/04/16 14:00	02/04/16 15:30
3. WUFF-IN	AVL7C	16-1762	Water	02/04/16 14:30	02/04/16 15:30
4. WUFF-OUT	AVL7D	16-1763	Water	02/04/16 14:00	02/04/16 15:30



Data Reporting Qualifiers

Effective 12/31/13

Inorganic Data

- U Indicates that the target analyte was not detected at the reported concentration
- * Duplicate RPD is not within established control limits
- B Reported value is less than the CRDL but \geq the Reporting Limit
- N Matrix Spike recovery not within established control limits
- NA Not Applicable, analyte not spiked
- H The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
- L Analyte concentration is ≤ 5 times the Reporting Limit and the replicate control limit defaults to ± 1 RL instead of the normal 20% RPD

Organic Data

- U Indicates that the target analyte was not detected at the reported concentration
- * Flagged value is not within established control limits
- B Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
- J Estimated concentration when the value is less than ARI's established reporting limits
- D The spiked compound was not detected due to sample extract dilution
- E Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.



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- Q Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20%Drift or minimum RRF).
- S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte
- NA The flagged analyte was not analyzed for
- NR Spiked compound recovery is not reported due to chromatographic interference
- NS The flagged analyte was not spiked into the sample
- M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses
- N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"
- Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
- EMPC Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" **(Dioxin/Furan analysis only)**
- C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column
- P The analyte was detected on both chromatographic columns but the quantified values differ by $\geq 40\%$ RPD with no obvious chromatographic interference
- X Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**
- Z Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**



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Geotechnical Data

- A The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.
- F Samples were frozen prior to particle size determination
- SM Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations
- SS Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis
- W Weight of sample in some pipette aliquots was below the level required for accurate weighting

SAMPLE RESULTS-CONVENTIONALS
AVL7-Herrera



Matrix: Water
Data Release Authorized: *CWL*
Reported: 02/16/16

Project: Hydro International Up-flo F
Event: 13-05605-000
Date Sampled: 02/04/16
Date Received: 02/04/16

Client ID: WUFF-IN
ARI ID: 16-1760 AVL7A

Analyte	Date Batch	Method	Units	RL	Sample
Total Phosphorus	02/08/16 020816#1	EPA 365.2	mg-P/L	0.008	0.009
Ortho-Phosphorus	02/06/16 020616#1	EPA 365.2	mg-P/L	0.004	< 0.004 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AVL7-Herrera



Matrix: Water
Data Release Authorized: *cd*
Reported: 02/16/16

Project: Hydro International Up-flo F
Event: 13-05605-000
Date Sampled: 02/04/16
Date Received: 02/04/16

Client ID: WUFF-OUT
ARI ID: 16-1761 AVL7B

Analyte	Date Batch	Method	Units	RL	Sample
Total Phosphorus	02/08/16 020816#1	EPA 365.2	mg-P/L	0.008	< 0.008 U
Ortho-Phosphorus	02/06/16 020616#1	EPA 365.2	mg-P/L	0.004	< 0.004 U

RL Analytical reporting limit
U Undetected at reported detection limit

METHOD BLANK RESULTS-CONVENTIONALS
AVL7-Herrera



Matrix: Water
Data Release Authorized: *ML*
Reported: 02/16/16

Project: Hydro International Up-flo F
Event: 13-05605-000
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Total Phosphorus	EPA 365.2	02/08/16	mg-P/L	0.010	
Ortho-Phosphorus	EPA 365.2	02/06/16	mg-P/L	< 0.004 U	
		02/06/16		< 0.004 U	FB

FB Filtration Blank

STANDARD REFERENCE RESULTS-CONVENTIONALS
AVL7-Herrera



Matrix: Water
Data Release Authorized: *JDL*
Reported: 02/16/16

Project: Hydro International Up-flo F
Event: 13-05605-000
Date Sampled: NA
Date Received: NA

Analyte/SRM ID	Method	Date	Units	SRM	True Value	Recovery
Total Phosphorus ERA #241213	EPA 365.2	02/08/16	mg-P/L	0.307	0.300	102.3%
Ortho-Phosphorus ERA #280415	EPA 365.2	02/06/16	mg-P/L	0.148	0.150	98.7%

REPLICATE RESULTS-CONVENTIONALS
AVL7-Herrera



Matrix: Water
Data Release Authorized: *WCH*
Reported: 02/16/16

Project: Hydro International Up-flo F
Event: 13-05605-000
Date Sampled: 02/04/16
Date Received: 02/04/16

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: AVL7A Client ID: WUFF-IN						
Ortho-Phosphorus	EPA 365.2	02/06/16	mg-P/L	< 0.004	< 0.004	NA

MS/MSD RESULTS-CONVENTIONALS
AVL7-Herrera



Matrix: Water
Data Release Authorized: *OK*
Reported: 02/16/16

Project: Hydro International Up-flo F
Event: 13-05605-000
Date Sampled: 02/04/16
Date Received: 02/04/16

Analyte	Method	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: AVL7A Client ID: WUFF-IN							
Ortho-Phosphorus	EPA 365.2	02/06/16	mg-P/L	< 0.004	0.098	0.100	98.0%

INORGANICS ANALYSIS DATA SHEET

TOTAL METALS


Page 1 of 1

Sample ID: WUFF-IN
SAMPLE

Lab Sample ID: AVL7A

LIMS ID: 16-1760

Matrix: Water

Data Release Authorized: 

Reported: 02/17/16

QC Report No: AVL7-Herrera

Project: Hydro International Up-flo Filter

13-05605-000

Date Sampled: 02/04/16

Date Received: 02/04/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	02/16/16	200.8	02/16/16	7440-50-8	Copper	0.5	0.5	U
200.8	02/16/16	200.8	02/16/16	7440-66-6	Zinc	4	4	U

U-Analyte undetected at given LOQ
LOQ-Limit of Quantitation

INORGANICS ANALYSIS DATA SHEET

TOTAL METALS


Page 1 of 1

Sample ID: WUFF-OUT
SAMPLE

Lab Sample ID: AVL7B

LIMS ID: 16-1761

Matrix: Water

Data Release Authorized: 

Reported: 02/17/16

QC Report No: AVL7-Herrera

Project: Hydro International Up-flo Filter

13-05605-000

Date Sampled: 02/04/16

Date Received: 02/04/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	02/16/16	200.8	02/16/16	7440-50-8	Copper	0.5	0.5	U
200.8	02/16/16	200.8	02/16/16	7440-66-6	Zinc	4	4	U

U-Analyte undetected at given LOQ
LOQ-Limit of Quantitation

INORGANICS ANALYSIS DATA SHEET

DISSOLVED METALS


Page 1 of 1

Sample ID: WUFF-IN
SAMPLE

Lab Sample ID: AVL7C

LIMS ID: 16-1762

Matrix: Water

Data Release Authorized: 

Reported: 02/17/16

QC Report No: AVL7-Herrera

Project: Hydro International Up-flo Filter

13-05605-000

Date Sampled: 02/04/16

Date Received: 02/04/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	02/16/16	200.8	02/16/16	7440-50-8	Copper	0.5	0.5	U
200.8	02/16/16	200.8	02/16/16	7440-66-6	Zinc	4	4	U

U-Analyte undetected at given LOQ
LOQ-Limit of Quantitation

INORGANICS ANALYSIS DATA SHEET

DISSOLVED METALS

Page 1 of 1

Sample ID: WUFF-OUT
SAMPLE

Lab Sample ID: AVL7D

LIMS ID: 16-1763

Matrix: Water

Data Release Authorized: *EF*

Reported: 02/17/16

QC Report No: AVL7-Herrera

Project: Hydro International Up-flo Filter

13-05605-000

Date Sampled: 02/04/16

Date Received: 02/04/16

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	02/16/16	200.8	02/16/16	7440-50-8	Copper	0.5	0.5	U
200.8	02/16/16	200.8	02/16/16	7440-66-6	Zinc	4	4	U

U-Analyte undetected at given LOQ
LOQ-Limit of Quantitation

INORGANICS ANALYSIS DATA SHEET

TOTAL METALS

Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: AVL7MB

LIMS ID: 16-1761

Matrix: Water

Data Release Authorized: *EH*

Reported: 02/17/16

QC Report No: AVL7-Herrera

Project: Hydro International Up-flo Filter
13-05605-000

Date Sampled: NA

Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	02/16/16	200.8	02/16/16	7440-50-8	Copper	0.5	0.5	U
200.8	02/16/16	200.8	02/16/16	7440-66-6	Zinc	4	4	U

U-Analyte undetected at given LOQ
LOQ-Limit of Quantitation

INORGANICS ANALYSIS DATA SHEET

TOTAL METALS


Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: AVL7LCS

LIMS ID: 16-1761

Matrix: Water

Data Release Authorized: 

Reported: 02/17/16

QC Report No: AVL7-Herrera

Project: Hydro International Up-flo Filter

13-05605-000

Date Sampled: NA

Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Copper	200.8	29.2	25.0	117%	
Zinc	200.8	88	80	110%	

Reported in µg/L

N-Control limit not met

Control Limits: 80-120%

INORGANICS ANALYSIS DATA SHEET

DISSOLVED METALS


Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: AVL7MB

LIMS ID: 16-1763

Matrix: Water

Data Release Authorized: 

Reported: 02/17/16

QC Report No: AVL7-Herrera

Project: Hydro International Up-flo Filter

13-05605-000

Date Sampled: NA

Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	µg/L	Q
200.8	02/16/16	200.8	02/16/16	7440-50-8	Copper	0.5	0.5	U
200.8	02/16/16	200.8	02/16/16	7440-66-6	Zinc	4	4	U

U-Analyte undetected at given LOQ
LOQ-Limit of Quantitation

INORGANICS ANALYSIS DATA SHEET

DISSOLVED METALS

Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: AVL7LCS

LIMS ID: 16-1763

Matrix: Water

Data Release Authorized:

Reported: 02/17/16

QC Report No: AVL7-Herrera

Project: Hydro International Up-flo Filter

13-05605-000

Date Sampled: NA

Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Copper	200.8	28.4	25.0	114%	
Zinc	200.8	81	80	101%	

Reported in µg/L

N-Control limit not met

Control Limits: 80-120%

Data: BCW8

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
16-10127-BCW8A	WUFF-IN	Hydro International Up-flo Filter	Water	2/4/2016	2/4/2016	7/6/2016	7/6/2016	SM2540D		Total Suspended Solids	5.9	U	mg/L
16-10128-BCW8B	WUFF-OUT	Hydro International Up-flo Filter	Water	2/4/2016	2/4/2016	7/6/2016	7/6/2016	SM2540D		Total Suspended Solids	5.7	U	mg/L
MB070616_1328	Method Blank	Hydro International Up-flo Filter	Water			7/6/2016	7/6/2016	SM2540D		Total Suspended Solids	1	U	mg/L
LCS070616_1328	Lab Control	Hydro International Up-flo Filter	Water			7/6/2016	7/6/2016	SM2540D		Total Suspended Solids	49.4		mg/L



Analytical Resources, Incorporated

Analytical Chemists and Consultants

8 July 2016

Dylan Ahearn
Herrera Environmental Consultants, Inc.
2200 Sixth Avenue, Suite 1100
Seattle, WA 98121-1823

**RE: Project – Hydro International Up-Flo Filter
ARI Job No. BCW8**

Dear Dylan:

Please find enclosed the final results for the samples from the project referenced above. These samples were originally received on February 4, 2016. The samples were analyzed for TSS as requested on July 5, 2016.

These analyses proceeded without incident of note.

An electronic copy of these reports will be kept on file at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark Harris
Project Manager
markh@arilabs.com
206/695-6210

Enclosures

cc: file BCW8

MDH/mdh

Sample ID Cross Reference Report



ARI Job No: BCW8

Client: Herrera

Project Event: 13-05605-000

Project Name: Hydro International Up-flo Filter

Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1. WUFF-IN	BCW8A	16-10127	Water	02/04/16 14:30	02/04/16 15:30
2. WUFF-OUT	BCW8B	16-10128	Water	02/04/16 14:00	02/04/16 15:30



Data Reporting Qualifiers

Effective 12/31/13

Inorganic Data

- U Indicates that the target analyte was not detected at the reported concentration
- * Duplicate RPD is not within established control limits
- B Reported value is less than the CRDL but \geq the Reporting Limit
- N Matrix Spike recovery not within established control limits
- NA Not Applicable, analyte not spiked
- H The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
- L Analyte concentration is ≤ 5 times the Reporting Limit and the replicate control limit defaults to ± 1 RL instead of the normal 20% RPD

Organic Data

- U Indicates that the target analyte was not detected at the reported concentration
- * Flagged value is not within established control limits
- B Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
- J Estimated concentration when the value is less than ARI's established reporting limits
- D The spiked compound was not detected due to sample extract dilution
- E Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.



- Q Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20%Drift or minimum RRF).
- S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte
- NA The flagged analyte was not analyzed for
- NR Spiked compound recovery is not reported due to chromatographic interference
- NS The flagged analyte was not spiked into the sample
- M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses
- N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"
- Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
- EMPC Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" (**Dioxin/Furan analysis only**)
- C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column
- P The analyte was detected on both chromatographic columns but the quantified values differ by $\geq 40\%$ RPD with no obvious chromatographic interference
- X Analyte signal includes interference from polychlorinated diphenyl ethers. (**Dioxin/Furan analysis only**)
- Z Analyte signal includes interference from the sample matrix or perfluorokerosene ions. (**Dioxin/Furan analysis only**)



Analytical Resources,
Incorporated
Analytical Chemists and
Consultants

Geotechnical Data

- A The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.
- F Samples were frozen prior to particle size determination
- SM Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations
- SS Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis
- W Weight of sample in some pipette aliquots was below the level required for accurate weighting

SAMPLE RESULTS-CONVENTIONALS
BCW8-Herrera



Matrix: Water
Data Release Authorized:
Reported: 07/07/16

W

Project: Hydro International Up-flo F
Event: 13-05605-000
Date Sampled: 02/04/16
Date Received: 02/04/16

Client ID: WUFF-IN
ARI ID: 16-10127 BCW8A

Analyte	Date Batch	Method	Units	RL	Sample
Total Suspended Solids	07/06/16 070616#1	SM2540D	mg/L	5.9	< 5.9 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
BCW8-Herrera

**ANALYTICAL
RESOURCES
INCORPORATED**

Matrix: Water
Data Release Authorized:
Reported: 07/07/16

Project: Hydro International Up-flo F
Event: 13-05605-000
Date Sampled: 02/04/16
Date Received: 02/04/16

Client ID: WUFF-OUT
ARI ID: 16-10128 BCW8B

Analyte	Date Batch	Method	Units	RL	Sample
Total Suspended Solids	07/06/16 070616#1	SM2540D	mg/L	5.7	< 5.7 U

RL Analytical reporting limit
U Undetected at reported detection limit

METHOD BLANK RESULTS-CONVENTIONALS
BCW8-Herrera



Matrix: Water
Data Release Authorized: *U*
Reported: 07/07/16

Project: Hydro International Up-flo F
Event: 13-05605-000
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Total Suspended Solids	SM2540D	07/06/16	mg/L	< 1.0 U	

LAB CONTROL RESULTS-CONVENTIONALS
BCW8-Herrera



Matrix: Water
Data Release Authorized: *W*
Reported: 07/07/16

Project: Hydro International Up-flo F
Event: 13-05605-000
Date Sampled: NA
Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Total Suspended Solids SM2540D	ICVL	07/06/16	mg/L	49.4	50.0	98.8%

April 10, 2010 – Sediment Sample

Data_17D0147

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17D0147-03	TPH	13-05605-000	Sediment	04/10/2017	04/10/2017	04/11/2017	04/11/2017	PSEP 1986		Total Solids	23.65		%
BFD0268-BLK1	Blank	13-05605-000	Solid			04/12/2017	04/12/2017	EPA 160.4		Volatile Solids	0.01	U	%
BFD0268-DUP1	TVS	13-05605-000	Sediment	04/10/2017	04/10/2017	04/12/2017	04/12/2017	EPA 160.4		Volatile Solids	39.6		%
17D0147-02	TVS	13-05605-000	Sediment	04/10/2017	04/10/2017	04/12/2017	04/12/2017	EPA 160.4		Volatile Solids	41.1		%
BFD0302-BLK1	Blank	13-05605-000	Solid			04/13/2017	04/20/2017	NWTPH-Dx		Diesel Range Organics (C12-C24)	5.00	U	mg/kg wet
BFD0302-BS1	LCS	13-05605-000	Solid			04/13/2017	04/20/2017	NWTPH-Dx		Diesel Range Organics (C12-C24)	141		mg/kg wet
17D0147-03	TPH	13-05605-000	Sediment	04/10/2017	04/10/2017	04/13/2017	04/20/2017	NWTPH-Dx		Diesel Range Organics (C12-C24)	4750	D	mg/kg dry
BFD0302-BLK1	Blank	13-05605-000	Solid			04/13/2017	04/20/2017	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	10.0	U	mg/kg wet
17D0147-03	TPH	13-05605-000	Sediment	04/10/2017	04/10/2017	04/13/2017	04/20/2017	NWTPH-Dx		Motor Oil Range Organics (C24-C38)	19900	D	mg/kg dry
BFD0302-BLK1	Blank	13-05605-000	Solid			04/13/2017	04/20/2017	NWTPH-Dx	84-15-1	o-Terphenyl	103		%
BFD0302-BS1	LCS	13-05605-000	Solid			04/13/2017	04/20/2017	NWTPH-Dx	84-15-1	o-Terphenyl	91.6		%
17D0147-03	TPH	13-05605-000	Sediment	04/10/2017	04/10/2017	04/13/2017	04/20/2017	NWTPH-Dx	84-15-1	o-Terphenyl		D1, U	%



Analytical Resources, Incorporated
Analytical Chemists and Consultants

27 April 2017

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

RE: Hydro International

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

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

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

Associated Work Order(s)
17D0147

Associated SDG ID(s)
N/A

Mark Harris

Digitally signed by Mark Harris
DN: c=US, st=Washington, l=Tukwila,
o=Analytical Resources, Inc., ou=Client Services,
cn=Mark Harris, email=markh@arilabs.com
Date: 2017.04.27 06:48:37 -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 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.


Mark Harris, Project Manager

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.



1700147

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 1700147		Turn-around Requested:		Page: 1 of 1		 Analytical Resources, Incorporated Analytical Chemists and Consultants 4611 South 134th Place, Suite 100 Tukwila, WA 98168 206-695-6200 206-695-6201 (fax) www.arilabs.com							
ARI Client Company: Herrera		Phone: 206-941-9080		Date: 4-10-17				Ice Present?					
Client Contact: Dylan Ahearn				No. of Coolers:				Cooler Temps:					
Client Project Name: Hydro International upflow													
Client Project #: 13-05605-000		Samplers: M. Muller		Analysis Requested									
Sample ID	Date	Time	Matrix	No. Containers	PSD	TVS	TPH						Notes/Comments
PSD	4-10-17	3:00 p	SW	1	X								
TVS	4-10-17	3:00 p	SW	1		X							
TPH	4-10-17	3:00 p	SW	1			X						
Comments/Special Instructions		Relinquished by: (Signature) Meghan Muller		Received by: (Signature) Paul Mark		Relinquished by: (Signature)		Received by: (Signature)					
		Printed Name: Meghan Muller		Printed Name: Paul Mark		Printed Name:		Printed Name:					
		Company: Herrera		Company: ARI		Company:		Company:					
		Date & Time: 4-10-17 15:40		Date & Time: 4/10/2017 15:40		Date & Time:		Date & Time:					

Limits of Liability: ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, notwithstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.



Cooler Receipt Form

ARI Client: Herrera

Project Name: Hydro International Upflow

COC No(s): _____ NA

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

Assigned ARI Job No: 1700144 PM 1700147

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: 3.0

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: D005276

Cooler Accepted by: PM Date: 4/10/2017 Time: 15:40

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: PM Date: 4/11/2017 Time: 10:35

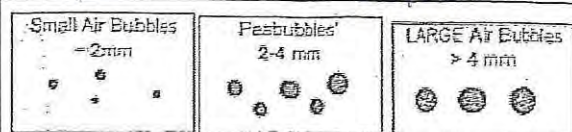
**** Notify Project Manager of discrepancies or concerns ****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC
UPFCO SUMP	PSD		
UPFLO SUMP	TVS		
UPFLO SUMP	TPH		

Additional Notes, Discrepancies, & Resolutions:

Times on COC and bottle labels do not match. Bottle labels are hard to read because bottles are covered in dirt.

By: PM Date: 4/11/2017



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:
27-Apr-2017 06:45

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PSD	17D0147-01	Solid	10-Apr-2017 15:00	10-Apr-2017 15:40
TVS	17D0147-02	Solid	10-Apr-2017 15:00	10-Apr-2017 15:40
TPH	17D0147-03	Solid	10-Apr-2017 15:00	10-Apr-2017 15:40



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

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

Reported:
27-Apr-2017 06:45

Case Narrative

Client: Herrera Environmental Consultants

Project: Hydro International

Workorder: 17D0147

Sample receipt

The samples listed on the preceding page were received 10-Apr-2017 15:40 under ARI work order 17D0147. For details regarding sample receipt, please refer to the Cooler Receipt Form.

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

This sample was extracted and analyzed within the recommended holding times.

All initial and continuing calibrations were within method requirements.

The percent recoveries for all surrogates were within acceptable QC limits.

No target compounds were detected in the method blank above the LOQs.

The percent recovery for diesel was within acceptable QC limits for the LCS.

Total Volatile Solids/Total Solids - EPA Method 160.4/PSEP 1986

This sample was prepared and analyzed within the recommended holding times.

No target compounds were detected in the method blanks above the LOQs.

A matrix duplicate (MD) was prepared and analyzed for TVS in conjunction with this sample. The RPD for TVS was within acceptable QC limits for the MD.



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

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

Reported:
27-Apr-2017 06:45

Wet Chemistry

Method: EPA 160.4

Sampled: 04/10/2017 15:00

Instrument: BAL2

Analyzed: 12-Apr-2017 09:57

Sample Preparation:

Preparation Method: No Prep Wet Chem

Preparation Batch: BFD0268

Prepared: 12-Apr-2017

Sample Size: 5 g (wet)

Final Volume: 5 g

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Volatile Solids		1	0.01	41.1	%	



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

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

Reported:
27-Apr-2017 06:45

TPH
17D0147-03 (Solid)

Petroleum Hydrocarbons

Method: NWTPH-Dx

Sampled: 04/10/2017 15:00

Instrument: FID4

Analyzed: 20-Apr-2017 20:07

Sample Preparation: Preparation Method: EPA 3546 (Microwave)
Preparation Batch: BFD0302 Sample Size: 10.06 g (wet) Dry Weight: 2.38 g
Prepared: 13-Apr-2017 Final Volume: 5 mL % Solids: 23.65

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Diesel Range Organics (C12-C24)		10	1050	4750	mg/kg	D
HC ID: DRO						
Motor Oil Range Organics (C24-C38)		10	2100	19900	mg/kg	D
HC ID: MOTOR OIL						
Surrogate: o-Terphenyl			50-150 %		D1	D1, U

Data File: \\TARGET\share\chem2\fid4a.i\20170420.b\17042029.D

Page 1

Date : 20-APR-2017 20:07

Client ID:

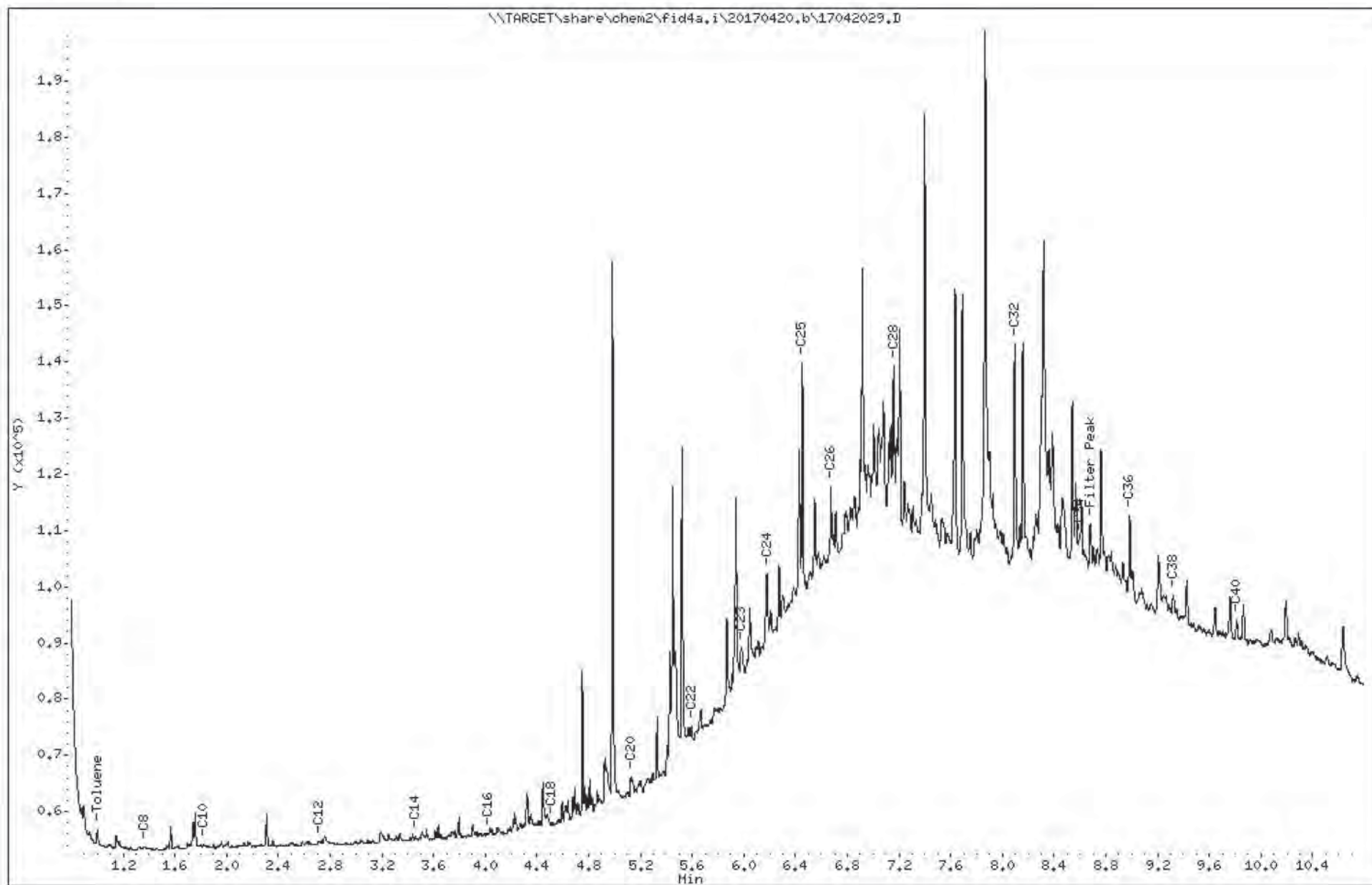
Sample Info: 17D0147-03,10

Instrument: fid4a.i

Operator: HL

Column phase: RTX-1

Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170420.b/17042029.D

Method: 20170420.b\FID4TPH.m

Instrument: fid4a.i, ML

Report Date: 04/21/2017

Macro: 20-APR-2017

Calibration Dates: Gas:XX-XXX-XXXX Diesel:20-APR-2017 M.Oil:20-APR-2017

ARI ID: 17D0147-03

Client ID:

Injection: 20-APR-2017 20:07

Dilution Factor: 10

FID:4A RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc (mg per L)
Toluene	1.000	0.054	3769	5466	WATPHG	(Tol-C12)	79244	3.3
C8	1.364	0.316	512	1068	WATPHD	(C12-C24)	2397603	226.0
C10	1.822	-0.079	902	1488	WATPHM	(C24-C38)	11053035	948.4
C12	2.710	-0.057	1523	1281	AK102	(C10-C25)	2837549	236.7
C14	3.457	-0.006	2373	3631				
C16	4.024	-0.032	3039	2354	OR.DIES	(C10-C28)	5878830	487.9
C18	4.517	-0.086	4835	7287				
C20	5.125	-0.019	12927	27026				
C22	5.594	-0.082	21962	40954				
C24	6.179	-0.011	49096	117549				
C25	6.452	0.014	86640	159136				
C26	6.674	-0.009	64489	229777				
C28	7.159	-0.011	86070	113090				
C32	8.095	-0.011	89978	178836				
C34	8.597	0.046	55411	54897				
Filter Peak	8.679	-0.094	57926	97936				
C36	8.985	-0.011	59478	98448				
C38	9.322	-0.116	45274	82739				
C40	9.812	-0.062	40775	89441				
o-terph	----							
Triacon Surr	----				NAS DIES	(C10-C24)	2441161	204.3

Range Times: NW Diesel (2.768 - 6.189) AK102 (1.90 - 6.44) Jet A (1.90 - 4.60)
NW M.Oil (6.19 - 9.44) AK103 (6.44 - 9.00) OR Diesel (1.90 - 7.17)

Surrogate	Area	Amount
o-Terphenyl	0	0.0
Triacontane	0	0.0

M Indicates the peak was manually integrated

Analyte	RF	Curve Date
o-Terph Surr	16570.9	20-APR-2017
Triacon Surr	15712.8	20-APR-2017
Gas	24336.2	XX-XXX-XXXX
Diesel	10608.0	20-APR-2017
Motor Oil	11654.0	20-APR-2017
AK102	11989.0	20-APR-2017
OR Diesel	12050.0	20-APR-2017
NAS Diesel	11950.0	20-APR-2017



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

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

Reported:
27-Apr-2017 06:45

TPH
17D0147-03 (Solid)

Extractions

Method: PSEP 1986
Instrument: N/A

Sampled: 04/10/2017 15:00
Analyzed: 11-Apr-2017 15:06

Sample Preparation: Preparation Method: No Prep-Organics
Preparation Batch: BFD0249 Sample Size: 1 g (wet)
Prepared: 11-Apr-2017 Final Volume: 1 g

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	23.65	%	



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

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

Reported:
27-Apr-2017 06:45

Petroleum Hydrocarbons - Quality Control

Batch BFD0302 - EPA 3546 (Microwave)

Instrument: FID4

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFD0302-BLK1)		Prepared: 13-Apr-2017 Analyzed: 20-Apr-2017 19:24								
Diesel Range Organics (C12-C24)	ND	5.00	mg/kg							U
Motor Oil Range Organics (C24-C38)	ND	10.0	mg/kg							U
Surrogate: o-Terphenyl	4.65		mg/kg	4.50		103	50-150			

Data File: \\TARGET\share\chem2\fid4a.i\20170420.b\17042027.D

Page 1

Date : 20-APR-2017 19:24

Client ID:

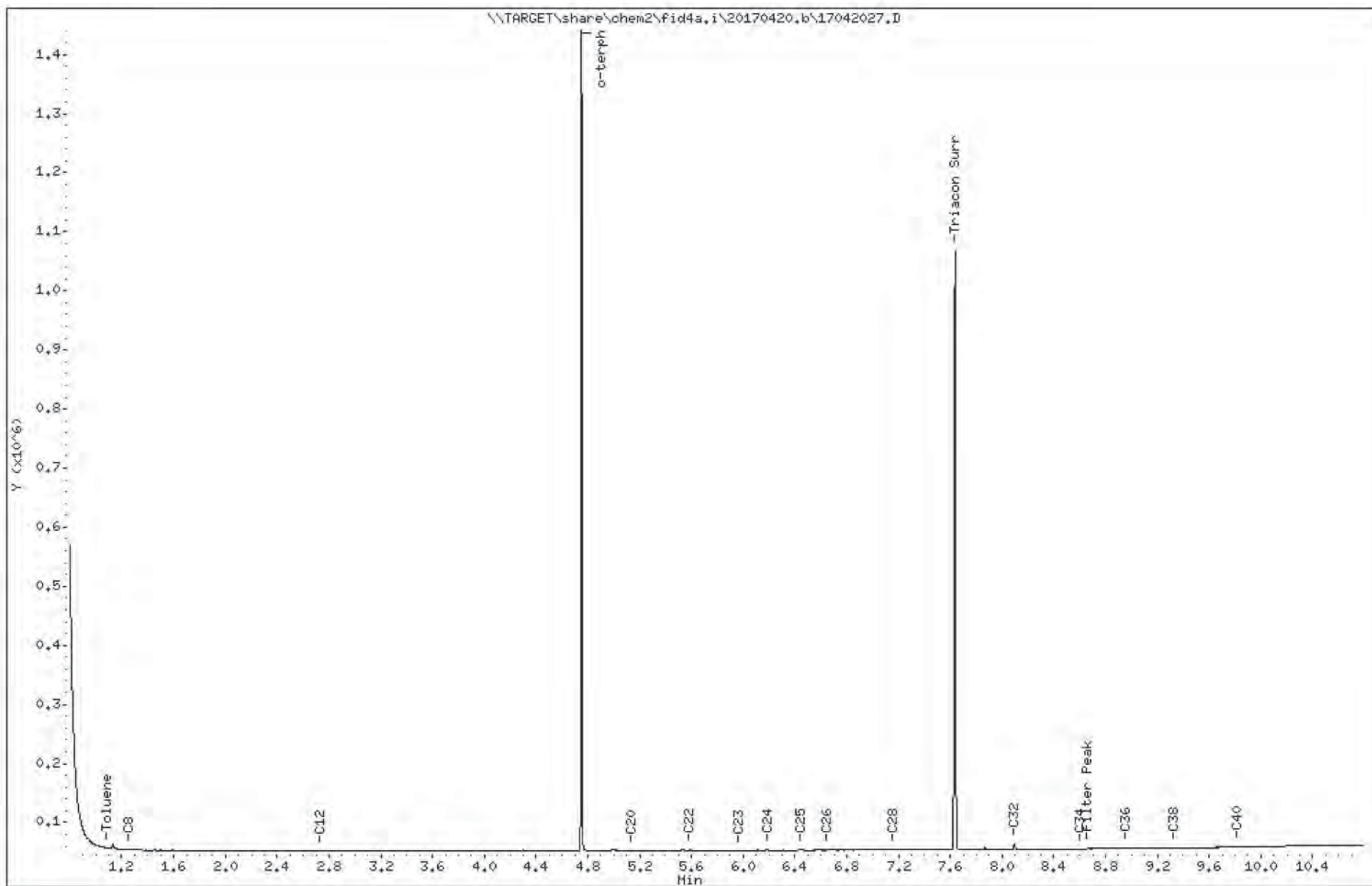
Sample Info: BFD0302-BLK1

Instrument: fid4a.i

Operator: HL

Column phase: RTX-1

Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170420.b/17042027.D

Method: 20170420.b\FID4TPH.m

Instrument: fid4a.i, ML

Report Date: 04/21/2017

Macro: 20-APR-2017

Calibration Dates: Gas:XX-XXX-XXXX Diesel:20-APR-2017 M.Oil:20-APR-2017

ARI ID: BFD0302-BLK1

Client ID:

Injection: 20-APR-2017 19:24

Dilution Factor: 1

FID:4A RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc(mg per L)
Toluene	1.086	0.140	5626	12532	WATPHG	(Tol-C12)	69593	2.9
C8	1.258	0.210	2504	5973	WATPHD	(C12-C24)	46922	4.4
C10	----				WATPHM	(C24-C38)	393079	33.7
C12	2.741	-0.026	749	1948	AK102	(C10-C25)	52152	4.3
C14	----							
C16	----				OR.DIES	(C10-C28)	97572	8.1
C18	----							
C20	5.136	-0.008	698	1292				
C22	5.593	-0.083	1900	2458				
C24	6.189	0.000	1436	3837				
C25	6.453	0.015	1577	3021				
C26	6.656	-0.026	1276	1940				
C28	7.159	-0.010	2211	3761				
C32	8.096	-0.010	11626	13740				
C34	8.604	0.054	3378	5671				
Filter Peak	8.663	-0.110	3701	10210				
C36	8.959	-0.036	4206	10533				
C38	9.328	-0.110	4827	4278				
C40	9.821	-0.053	6849	19906				
o-terph	4.753	-0.006	1388854	770010				
Triacon Surr	7.638	-0.008	1016052	759268	NAS DIES	(C10-C24)	48870	4.1

Range Times: NW Diesel(2.768 - 6.189) AK102(1.90 - 6.44) Jet A(1.90 - 4.60)
NW M.Oil(6.19 - 9.44) AK103(6.44 - 9.00) OR Diesel(1.90 - 7.17)

Surrogate	Area	Amount
o-Terphenyl	770010	46.5
Triacontane	759268	48.3

M Indicates the peak was manually integrated

Analyte	RF	Curve Date
o-Terph Surr	16570.9	20-APR-2017
Triacon Surr	15712.8	20-APR-2017
Gas	24336.2	XX-XXX-XXXX
Diesel	10608.0	20-APR-2017
Motor Oil	11654.0	20-APR-2017
AK102	11989.0	20-APR-2017
OR Diesel	12050.0	20-APR-2017
NAS Diesel	11950.0	20-APR-2017



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

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

Reported:
27-Apr-2017 06:45

Petroleum Hydrocarbons - Quality Control

Batch BFD0302 - EPA 3546 (Microwave)

Instrument: FID4

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BFD0302-BS1)					Prepared: 13-Apr-2017 Analyzed: 20-Apr-2017 19:46					
Diesel Range Organics (C12-C24)	141	5.00	mg/kg	150		93.8	63-120			
Surrogate: o-Terphenyl	4.12		mg/kg	4.50		91.6	50-150			

Data File: \\TARGET\share\chem2\fid4a.i\20170420.b\17042028.D

Page 1

Date : 20-APR-2017 19:46

Client ID:

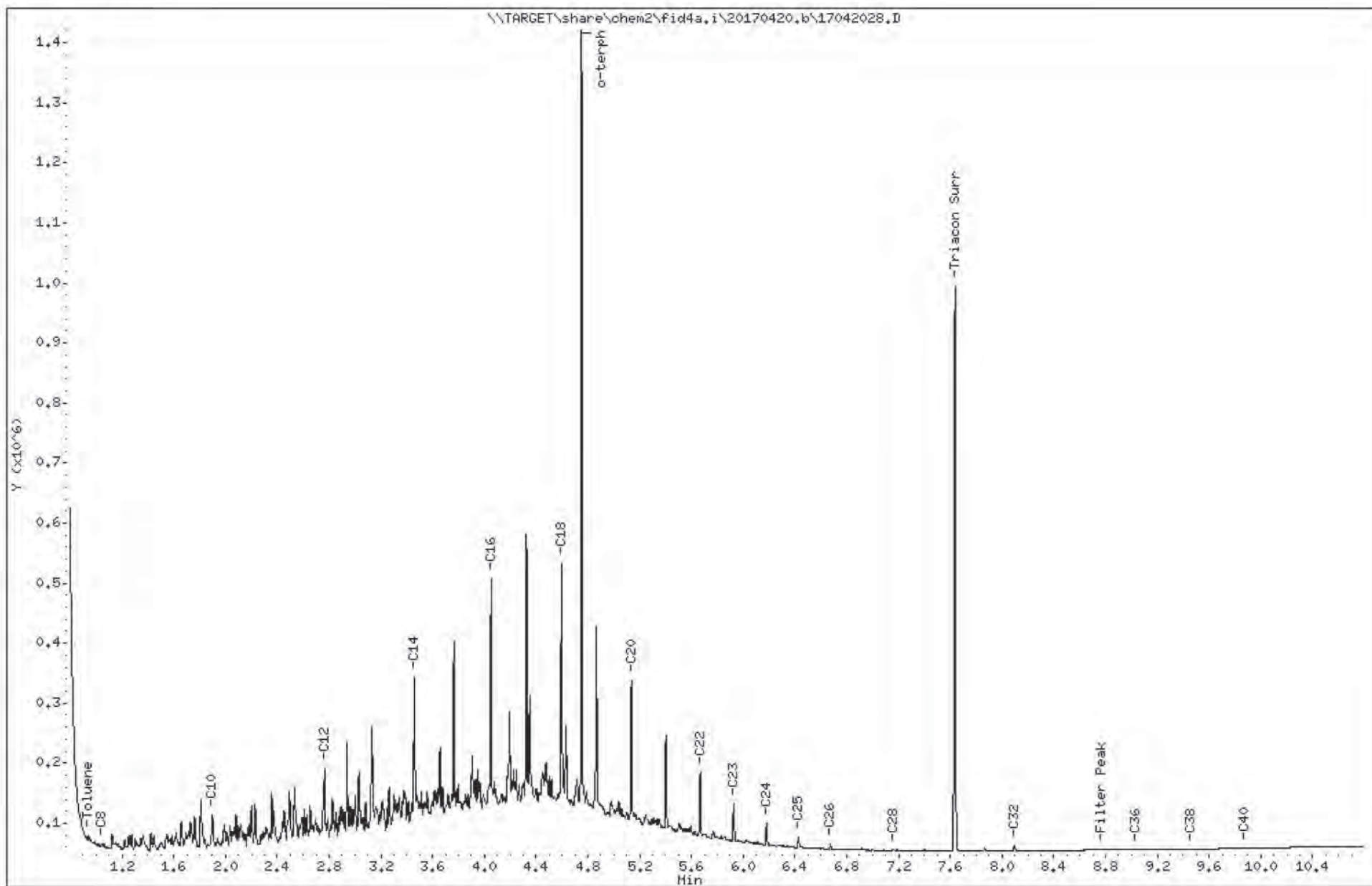
Instrument: fid4a.i

Sample Info: BFD0302-B81

Operator: HL

Column phase: RTX-1

Column diameter: 0.25



Analytical Resources Inc.
TPH Quantitation Report

Data file: 20170420.b/17042028.D

Method: 20170420.b\FID4TPH.m

Instrument: fid4a.i, ML

Report Date: 04/21/2017

Macro: 20-APR-2017

Calibration Dates: Gas:XX-XXX-XXXX Diesel:20-APR-2017 M.Oil:20-APR-2017

ARI ID: BFD0302-BS1

Client ID:

Injection: 20-APR-2017 19:46

Dilution Factor: 1

FID:4A RESULTS

Compound	RT	Shift	Height	Area	Method	Range	Total Area	Conc(mg per L)
Toluene	0.944	-0.002	24656	40052	WATPHG	(Tol-C12)	2833754	116.4
C8	1.044	-0.004	12052	11686	WATPHD	(C12-C24)	14929060	1407.3
C10	1.899	-0.002	60454	70830	WATPHM	(C24-C38)	290580	24.9
C12	2.765	-0.002	138433	160203	AK102	(C10-C25)	16993294	1417.4
C14	3.459	-0.004	287985	253658				
C16	4.052	-0.004	455218	510063	OR.DIES	(C10-C28)	17115179	1420.3
C18	4.595	-0.007	478384	470877				
C20	5.135	-0.009	283293	266061				
C22	5.667	-0.009	129890	128629				
C24	6.180	-0.009	45507	42075				
C25	6.427	-0.011	23077	30137				
C26	6.674	-0.009	10872	19854				
C28	7.159	-0.011	2275	2786				
C32	8.095	-0.011	8487	8383				
C34	----							
Filter Peak	8.767	-0.006	1458	2011				
C36	9.029	0.033	1813	1776				
C38	9.460	0.023	2760	4353				
C40	9.875	0.001	4321	15613				
o-terph	4.752	-0.007	1269964	683206				
Triacon Surr	7.635	-0.011	940840	686792	NAS DIES	(C10-C24)	16928776	1416.6

Range Times: NW Diesel(2.768 - 6.189) AK102(1.90 - 6.44) Jet A(1.90 - 4.60)
NW M.Oil(6.19 - 9.44) AK103(6.44 - 9.00) OR Diesel(1.90 - 7.17)

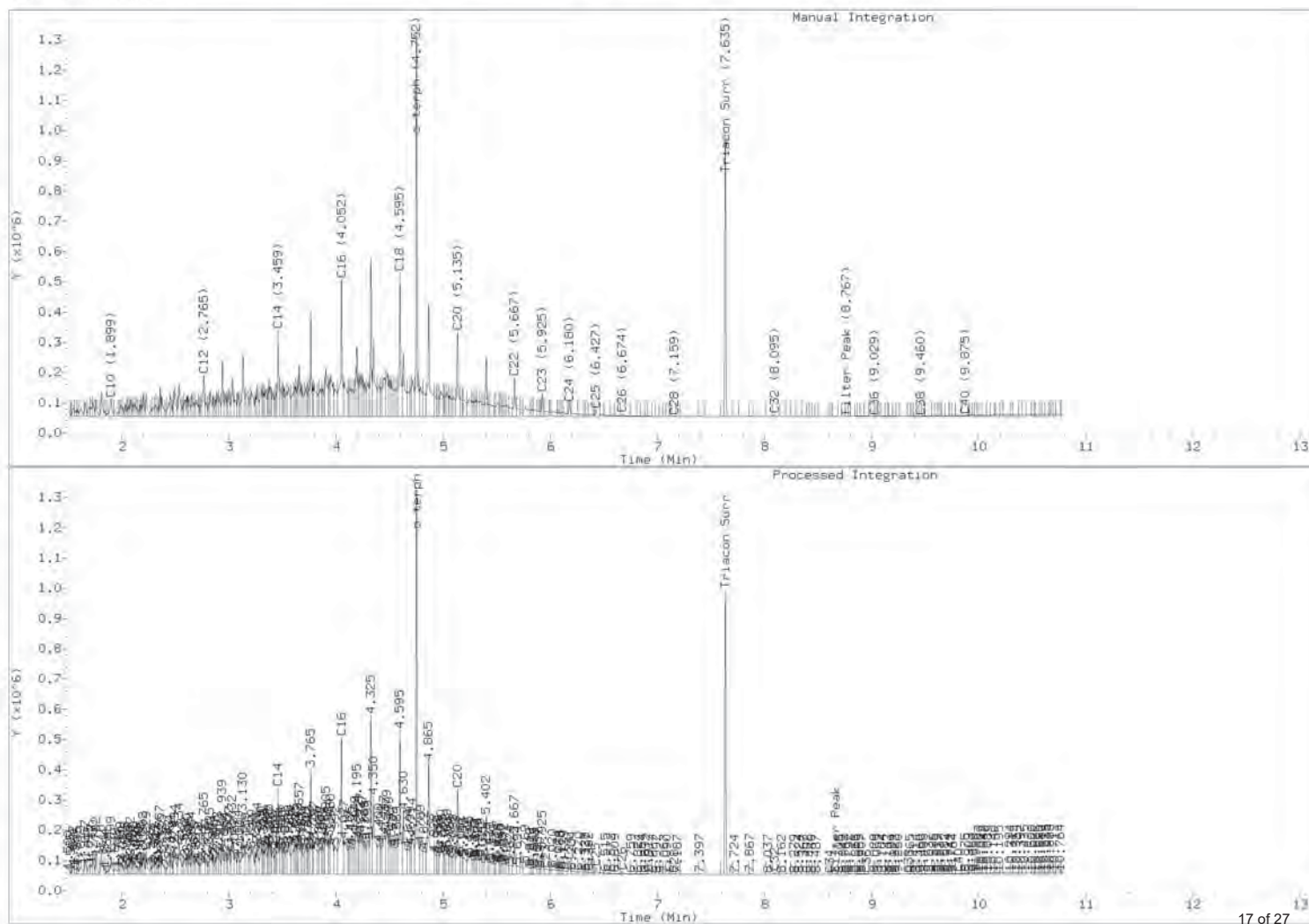
Surrogate	Area	Amount
o-Terphenyl	683206	41.2 M
Triacontane	686792	43.7

M Indicates the peak was manually integrated

Analyte	RF	Curve Date
o-Terph Surr	16570.9	20-APR-2017
Triacon Surr	15712.8	20-APR-2017
Gas	24336.2	XX-XXX-XXXX
Diesel	10608.0	20-APR-2017
Motor Oil	11654.0	20-APR-2017
AK102	11989.0	20-APR-2017
OR Diesel	12050.0	20-APR-2017
NAS Diesel	11950.0	20-APR-2017

TPH Manual Integrations Report

Datafile: FID4A, 20170420.b\17042028.D Injection: 20-APR-2017 19:46
Lab ID: BFD0302-BS1





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

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

Reported:
27-Apr-2017 06:45

Wet Chemistry - Quality Control

Batch BFD0268 - No Prep Wet Chem

Instrument: BAL2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFD0268-BLK1)					Prepared: 12-Apr-2017 Analyzed: 12-Apr-2017 09:57					
Volatile Solids	ND	0.01	%							U



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2200 6th Avenue, Suite 1100
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Project: Hydro International
Project Number: 13-05605-000
Project Manager: Dylan Ahearn

Reported:
27-Apr-2017 06:45

Wet Chemistry - Quality Control

Batch BFD0268 - No Prep Wet Chem

Instrument: BAL2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Duplicate (BFD0268-DUP1)		Source: 17D0147-02		Prepared: 12-Apr-2017		Analyzed: 12-Apr-2017 09:57				
Volatile Solids	39.6	0.01	%		41.1			3.69	20	



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Reported:
27-Apr-2017 06:45

Certified Analyses included in this Report

Analyte	Certifications
EPA 160.4 in Solid	
Volatile Solids	NELAP, DoD-ELAP, WADOE
NWTPH-Dx in Solid	
Diesel Range Organics (C12-C24)	DoD-ELAP, NELAP, WADOE
Diesel Range Organics (C10-C25)	DoD-ELAP, NELAP, WADOE
Diesel Range Organics (Tol-C18)	DoD-ELAP, NELAP, WADOE
Diesel Range Organics (C10-24)	DoD-ELAP, NELAP, WADOE
Diesel Range Organics (C10-C28)	DoD-ELAP, NELAP, WADOE
Motor Oil Range Organics (C24-C38)	DoD-ELAP, NELAP, WADOE
Motor Oil Range Organics (C25-C36)	DoD-ELAP, NELAP, WADOE
Motor Oil Range Organics (C24-C40)	DoD-ELAP, NELAP, WADOE
Mineral Oil Range Organics (C16-C28)	DoD-ELAP, NELAP, WADOE
Mineral Spirits Range Organics (Tol-C12)	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
Kerosene Range Organics (Tol-C18)	DoD-ELAP, NELAP, WADOE
Stoddard Range Organics (C8-C12)	DoD-ELAP, NELAP, WADOE
Creosote Range Organics (C12-C22)	DoD-ELAP, NELAP, WADOE
Bunker C Range Organics (C10-C38)	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	05/06/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	03/30/2017
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2017
WADOE	WA Dept of Ecology	C558	06/30/2017
WA-DW	Ecology - Drinking Water	C558	06/30/2017



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Project Manager: Dylan Ahearn

Reported:
27-Apr-2017 06:45

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
D1	Surrogate was not detected due to sample extract dilution
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.

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17D0147)
Project #: 16T001-035
Client : Analytical Resources, Inc.
Source: PSD
MTC Sample#: T17-0589

Date Received: April 12, 2017
Sampled By: Others
Date Reported: April 21, 2017
Tested By: K. O'Connell

CASE NARRATIVE

1. One sample was submitted for grain size analysis according to Puget Sound Estuary Protocol (PSEP) methodology.
2. The sample was run in a single batch and one sample from another job was chosen for triplicate analysis. The triplicate data is reported on the QA summary.
3. The sample contained organic matter which may have broken down, affecting the grain size analysis. The sample also contained an oil-like substance.
4. The data is provided in summary tables and plots.
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: _____

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17D0147)
Project #: 16T001-035
Date Received: April 12, 2017
Date Tested: April 21, 2017

Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: K. O'Connell

Apparent Grain Size Distribution Summary Percent Finer Than Indicated Size

Sample No.	Gravel			Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt				Clay	
Phi Size	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Sieve Size (microns)	3/8"	#4 (4750)	#10 (2000)	#18 (1000)	#35 (500)	#60 (250)	#120 (125)	#230 (63)	31.0	15.6	7.8	3.9	2.0	1.0
T17-0412	100.0	100.0	97.4	92.9	80.3	60.8	51.2	38.6	29.3	19.8	13.3	8.5	5.7	3.5
	100.0	100.0	96.0	91.4	78.8	59.1	49.5	37.8	28.5	19.6	13.2	8.5	5.8	3.7
	100.0	100.0	96.3	91.7	78.8	59.4	50.0	37.4	28.8	20.4	13.7	8.9	6.0	3.7
PSD	100.0	98.4	97.4	95.7	90.5	84.3	77.1	68.3	49.2	23.4	13.7	6.6	4.0	2.1

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Reviewed by: E. J. Hable

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Project: Hydro International (17D0147)
Project #: 16T001-035
Date Received: April 12, 2017
Date Tested: April 21, 2017

Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: K. O'Connell

Apparent Grain Size Distribution Summary Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay			Total Fines
Phi Size	< -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	> 10	> 4
Sieve Size (microns)	> #10 (2000)	10-18 (2000-1000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0	<230 (<62)
T17-0412	2.6	4.4	12.6	19.5	9.6	12.7	9.3	9.5	6.5	4.7	2.8	2.2	3.5	38.6
	4.0	4.6	12.7	19.7	9.6	11.7	9.2	9.0	6.4	4.6	2.7	2.1	3.7	37.8
	3.7	4.6	12.9	19.4	9.3	12.6	8.6	8.4	6.7	4.8	2.9	2.2	3.7	37.4
PSD	2.6	1.7	5.1	6.2	7.2	8.8	19.2	25.8	9.7	7.1	2.6	1.9	2.1	68.3

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Reviewed by: *E. J. Hable*

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Project: Hydro International (17D0147)
 Project #: 16T001-035
 Date Received: April 12, 2017
 Date Tested: April 21, 2017

Client: Analytical Resources, Inc.
 Sampled by: Others
 Tested by: K. O'Connell

Relative Standard Deviation, By Phi Size

Sample ID	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
T17-0412	100.0	100.0	97.4	92.9	80.3	60.8	51.2	38.6	29.3	19.8	13.3	8.5	5.7	3.5
	100.0	100.0	96.0	91.4	78.8	59.1	49.5	37.8	28.5	19.6	13.2	8.5	5.8	3.7
	100.0	100.0	96.3	91.7	78.8	59.4	50.0	37.4	28.8	20.4	13.7	8.9	6.0	3.7
AVE	100.0	100.0	96.6	92.0	79.3	59.8	50.3	37.9	28.9	19.9	13.4	8.7	5.8	3.7
STDEV	0.0	0.0	0.6	0.7	0.7	0.7	0.7	0.5	0.3	0.4	0.2	0.2	0.1	0.1
%RSD	0.0	0.0	0.6	0.7	0.9	1.3	1.4	1.3	1.1	1.8	1.8	2.0	1.8	2.5

The Triplicate Applies To The Following Samples

Client ID	Date Sampled	Date Extracted	Date Complete	QA Ratio (95-105)	Data Qualifiers	Pipette Portion (5.0-25.0g)
T17-0412	3/8/2017	3/16/2017	3/23/2017	99.4		8.8
	3/8/2017	3/16/2017	3/23/2017	98.1		8.6
	3/8/2017	3/16/2017	3/23/2017	98.1		8.4
PSD	4/10/2017	4/17/2017	4/21/2017	97.0		9.2

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.

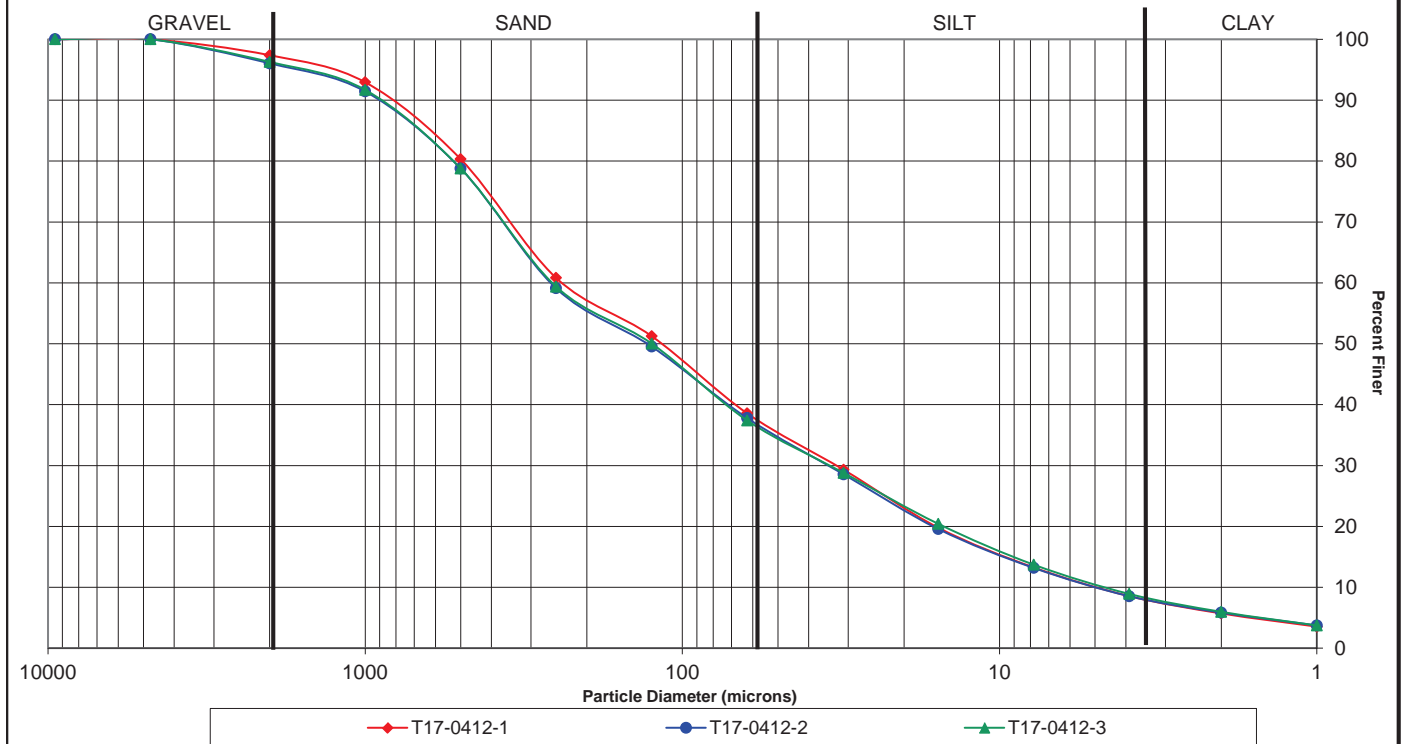
Reviewed by: E. Sabatella

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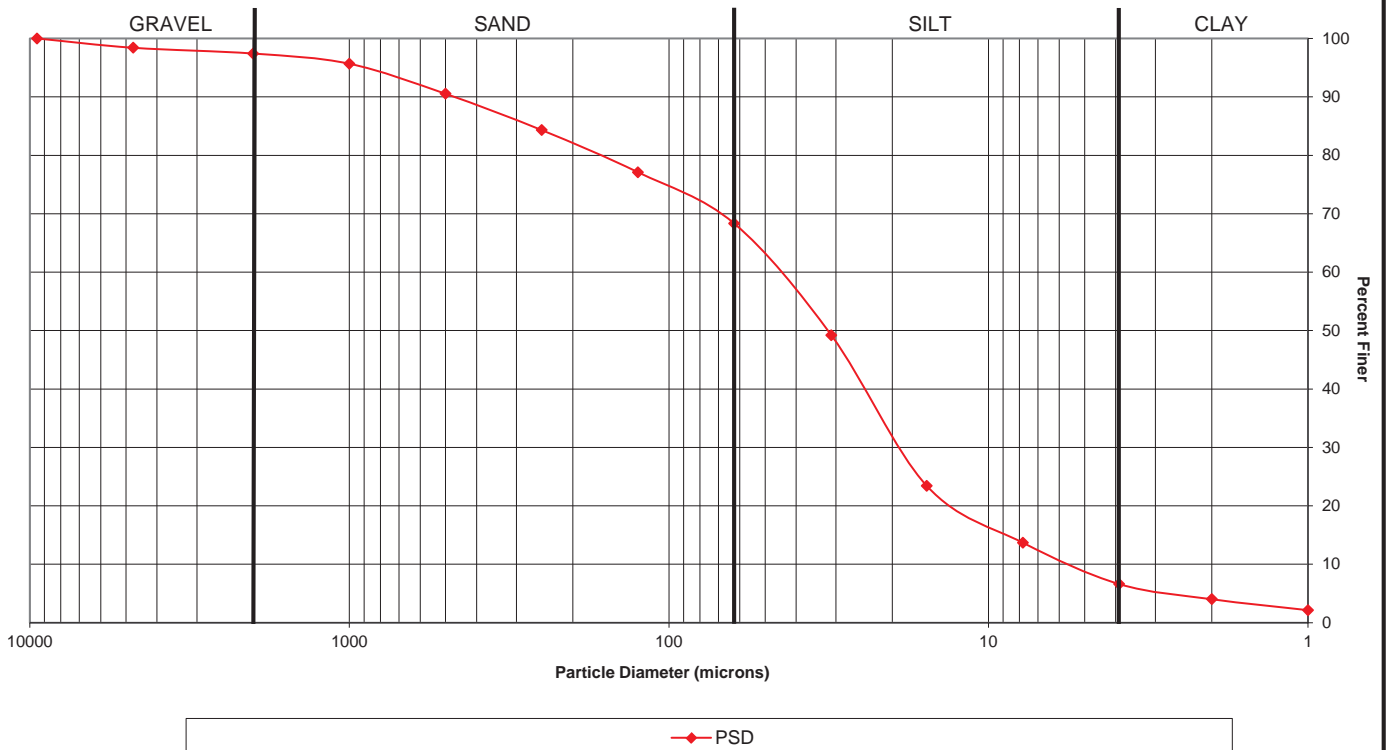
PSEP Grain Size Distribution

Triplicate Sample Plot





PSEP Grain Size Distribution



April 12, 2017

Data_17D0216

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17D0216-01	WUFF-IN	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	SM 2340 B-97		Hardness	38.8		mg/L
17D0216-02	WUFF-OUT	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	SM 2340 B-97		Hardness	43.8		mg/L
BFD0368-BLK2	Blank	13-05605-000	Water			04/14/2017	04/14/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFD0368-BS1	LCS	13-05605-000	Water			04/14/2017	04/14/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.152		mg-P/L
17D0216-01	WUFF-IN	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/14/2017	04/14/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0110		mg-P/L
17D0216-02	WUFF-OUT	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/14/2017	04/14/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0090		mg-P/L
BFD0372-BLK1	Blank	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFD0372-BS1	LCS	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8	7440-50-8	Copper	26.3		ug/L
17D0216-01	WUFF-IN	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	EPA 200.8	7440-50-8	Copper	21.8		ug/L
17D0216-02	WUFF-OUT	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	EPA 200.8	7440-50-8	Copper	18.5		ug/L
BFD0372-BLK1	Blank	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFD0372-BS1	LCS	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8	7440-50-8	Copper	25.9		ug/L
BFD0372-BLK1	Blank	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFD0372-BS1	LCS	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8	7440-66-6	Zinc	83.5		ug/L
17D0216-01	WUFF-IN	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	EPA 200.8	7440-66-6	Zinc	51.3		ug/L
17D0216-02	WUFF-OUT	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	EPA 200.8	7440-66-6	Zinc	43.1		ug/L
BFD0372-BLK1	Blank	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFD0372-BS1	LCS	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8	7440-66-6	Zinc	81.2		ug/L
BFD0376-BLK1	Blank	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFD0376-BS1	LCS	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	26.7		ug/L
17D0216-03	WUFF-IN	13-05605-000	Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	EPA 200.8-Dissolved	7440-50-8	Copper	14.6		ug/L
17D0216-04	WUFF-OUT	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	EPA 200.8-Dissolved	7440-50-8	Copper	14.0		ug/L
BFD0376-BLK1	Blank	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFD0376-BS1	LCS	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	26.3		ug/L
BFD0376-BLK1	Blank	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFD0376-BS1	LCS	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	78.7		ug/L
17D0216-03	WUFF-IN	13-05605-000	Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	31.0		ug/L
17D0216-04	WUFF-OUT	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	28.6		ug/L
BFD0376-BLK1	Blank	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFD0376-BS1	LCS	13-05605-000	Water			04/17/2017	04/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	74.7		ug/L
BFD0381-BLK1	Blank	13-05605-000	Water			04/17/2017	04/18/2017	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BFD0381-BS1	LCS	13-05605-000	Water			04/17/2017	04/18/2017	EPA 6010C	7440-70-2	Calcium	9.56		mg/L
17D0216-01	WUFF-IN	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	EPA 6010C	7440-70-2	Calcium	11.4		mg/L
17D0216-02	WUFF-OUT	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	EPA 6010C	7440-70-2	Calcium	12.8		mg/L
BFD0381-BLK1	Blank	13-05605-000	Water			04/17/2017	04/18/2017	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BFD0381-BS1	LCS	13-05605-000	Water			04/17/2017	04/18/2017	EPA 6010C	7439-95-4	Magnesium	10.1		mg/L
17D0216-01	WUFF-IN	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	EPA 6010C	7439-95-4	Magnesium	2.48		mg/L
17D0216-02	WUFF-OUT	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/17/2017	04/18/2017	EPA 6010C	7439-95-4	Magnesium	2.86		mg/L
BFD0422-BLK1	Blank	13-05605-000	Water			04/18/2017	04/19/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFD0422-BLK2	Blank	13-05605-000	Water			04/18/2017	04/19/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFD0422-BLK3	Blank	13-05605-000	Water			04/18/2017	04/19/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFD0422-BLK4	Blank	13-05605-000	Water			04/18/2017	04/19/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFD0422-BS1	LCS	13-05605-000	Water			04/18/2017	04/19/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.294		mg-P/L
BFD0422-BS2	LCS	13-05605-000	Water			04/18/2017	04/19/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.296		mg-P/L
BFD0422-BS3	LCS	13-05605-000	Water			04/18/2017	04/19/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.294		mg-P/L
BFD0422-BS4	LCS	13-05605-000	Water			04/18/2017	04/19/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.296		mg-P/L
17D0216-01	WUFF-IN	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/18/2017	04/19/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0460		mg-P/L
17D0216-02	WUFF-OUT	13-05605-000	Surface Water	04/13/2017	04/13/2017	04/18/2017	04/19/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0420		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

02 May 2017

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

RE: Hydro International

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

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

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

Associated Work Order(s)

17D0216

Associated SDG ID(s)

N/A

Mark Harris

Digitally signed by Mark Harris
DN: c=US, st=Washington, ou=Client Services,
o=Analytical Resources, Inc., email=markh@arilabs.com
Date: 2017.05.02 11:13:22 -0700

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.

Mark Harris, Project Manager

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

[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)



WORK ORDER

17D0216

Client: Herrera Environmental Consultants

Project Manager: Mark Harris

Project: Hydro International

Project Number: [none]

Preservation Confirmation

Container ID	Container Type	pH	
17D0216-01 A	Small OJ, 500 mL		
17D0216-01 A 01	Small OJ, 500 mL		
17D0216-01 B	Small OJ, 500 mL, 9N H2SO4	<2	P
17D0216-01 C	Large OJ, 1000 mL		
17D0216-01 D	Large OJ, 1000 mL		
17D0216-01 E	HDPE NM, 500 mL, 1:1 HNO3	<2	P
17D0216-02 A	Small OJ, 500 mL		
17D0216-02 A 01	Small OJ, 500 mL		
17D0216-02 B	Small OJ, 500 mL, 9N H2SO4	<2	P
17D0216-02 C	Large OJ, 1000 mL		
17D0216-02 D	Large OJ, 1000 mL		
17D0216-02 E	HDPE NM, 500 mL, 1:1 HNO3	<2	P
17D0216-03 A	HDPE NM, 500 mL	>2	F
17D0216-04 A	HDPE NM, 500 mL	↓	↓

PM

Preservation Confirmed By

4/14/2017

Date

p=pass f=fail



Cooler Receipt Form

ARI Client: Herrera

Project Name: Hydro International

COC No(s): _____ NA

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

Assigned ARI Job No: 17D0216

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) 7.5

Time: _____ Temp Gun ID#: D005276

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

Cooler Accepted by: HB Date: 4/13/2017 Time: 13:15

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES ☒ NO

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

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

Were all bottles sealed in individual plastic bags? YES ☒ NO

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

Were all bottle labels complete and legible? YES ☒ NO

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

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

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

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

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

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

Date VOC Trip Blank was made at ARI: NA ☒

Was Sample Split by ARI : NA ☒ Date/Time: 4/14/2017 1730 Equipment: chain split Split by: PM

Samples Logged by: PM Date: 4/14/2017 Time: 17:45

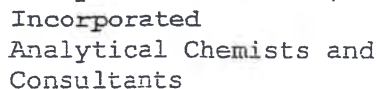
**** Notify Project Manager of discrepancies or concerns ****

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)
---------------------------------------	---------------------------------	--	---

[illegible]

Completed by: PM Date: 4/14/2017 Time: 18:00



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

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

Reported:
02-May-2017 10:35

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	17D0216-01	Water	13-Apr-2017 02:15	13-Apr-2017 13:15
WUFF-OUT	17D0216-02	Water	13-Apr-2017 02:15	13-Apr-2017 13:15
WUFF-IN	17D0216-03	Water	13-Apr-2017 02:15	13-Apr-2017 13:15
WUFF-OUT	17D0216-04	Water	13-Apr-2017 02:15	13-Apr-2017 13:15



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Project: Hydro International
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Reported:
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Case Narrative

Client: Herrera Environmental Consultants

Project: Hydro International

Workorder: 17D0216

Sample receipt

The samples listed on the preceding page were received 13-Apr-2017 13:15 under ARI work order 17D0216. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Total and Dissolved Metals/Hardness - EPA Methods 200.8/6010C

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

All initial and continuing calibrations were within method requirements.

No target elements were detected in the method blanks above the LOQs.

The percent recoveries for all elements were within acceptable QC limits for the LCSs.

Wet Chemistry

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

All initial and continuing calibrations were within method requirements.

No target compounds were detected in the method blanks above the LOQs.

The percent recoveries for all compounds were within acceptable QC limits for the LCSs.



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

Reported:
02-May-2017 10:35

WUFF-IN

17D0216-01 (Water)
Sampled: 04/13/2017 02:15

Metals and Metallic Compounds

Sample Preparation:	Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
	Preparation Batch: BFD0372
	Prepared: 04/17/2017 06:55
	Sample Size: 25 mL
	Final Volume: 25 mL

Analytical Method: EPA 200.8

Instrument: ICPMS1

Analyzed: 04/18/2017 16:47

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	21.8	ug/L	
Zinc	7440-66-6	1	4.00	51.3	ug/L	

Sample Preparation:	Preparation Method: TWC EPA 3010A
	Preparation Batch: BFD0381
	Prepared: 04/17/2017 09:45
	Sample Size: 25 mL
	Final Volume: 25 mL

Analytical Method: EPA 6010C

Instrument: ICP2

Analyzed: 04/18/2017 18:09

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	11.4	mg/L	
Magnesium	7439-95-4	1	0.0500	2.48	mg/L	



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Reported:
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WUFF-IN

17D0216-01 (Water)
Sampled: 04/13/2017 02:15

Wet Chemistry

Sample Preparation:	Preparation Method: No Prep Wet Chem Preparation Batch: BFD0368 Prepared: 04/14/2017 18:24	Sample Size: 10 mL Final Volume: 10 mL
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Analytical Method: SM 4500-P E-99 Instrument: UV1800-2 Analyzed: 04/14/2017 18:40

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

Sample Preparation:	Preparation Method: SM 4500-P B-5 Persulfate Preparation Batch: BFD0422 Prepared: 04/18/2017 10:45	Sample Size: 25 mL Final Volume: 50 mL
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Analytical Method: SM 4500-P E-99 Instrument: UV1800-2 Analyzed: 04/19/2017 13:58

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.00800	0.0460	mg-P/L	



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Reported:
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WUFF-IN

17D0216-01 (Water)
Sampled: 04/13/2017 02:15

Calculation

Sample Preparation:	Preparation Method: [CALC] Preparation Batch: [CALC] Prepared: 04/17/2017 09:45	Final Volume: 1
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Analytical Method: SM 2340 B-97 Instrument: [CALC] Analyzed: 04/18/2017 18:09

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	38.8	mg/L	



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

Reported:
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WUFF-OUT

17D0216-02 (Water)

Sampled: 04/13/2017 02:15

Metals and Metallic Compounds

Sample Preparation:	Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
	Preparation Batch: BFD0372
	Prepared: 04/17/2017 06:55
	Sample Size: 25 mL
	Final Volume: 25 mL

Analytical Method: EPA 200.8

Instrument: ICPMS1

Analyzed: 04/18/2017 16:51

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	18.5	ug/L	
Zinc	7440-66-6	1	4.00	43.1	ug/L	

Sample Preparation:	Preparation Method: TWC EPA 3010A
	Preparation Batch: BFD0381
	Prepared: 04/17/2017 09:45
	Sample Size: 25 mL
	Final Volume: 25 mL

Analytical Method: EPA 6010C

Instrument: ICP2

Analyzed: 04/18/2017 18:13

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	12.8	mg/L	
Magnesium	7439-95-4	1	0.0500	2.86	mg/L	



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Project Manager: Dylan Ahearn

Reported:
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WUFF-OUT

17D0216-02 (Water)
Sampled: 04/13/2017 02:15

Wet Chemistry

Sample Preparation:	Preparation Method: No Prep Wet Chem Preparation Batch: BFD0368 Prepared: 04/14/2017 18:24	Sample Size: 10 mL Final Volume: 10 mL
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Analytical Method: SM 4500-P E-99 Instrument: UV1800-2 Analyzed: 04/14/2017 18:41

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

Sample Preparation:	Preparation Method: SM 4500-P B-5 Persulfate Preparation Batch: BFD0422 Prepared: 04/18/2017 10:45	Sample Size: 25 mL Final Volume: 50 mL
---------------------	--	---

Analytical Method: SM 4500-P E-99 Instrument: UV1800-2 Analyzed: 04/19/2017 13:59

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.00800	0.0420	mg-P/L	



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Reported:
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WUFF-OUT

17D0216-02 (Water)
Sampled: 04/13/2017 02:15

Calculation

Sample Preparation:	Preparation Method: [CALC] Preparation Batch: [CALC] Prepared: 04/17/2017 09:45	Final Volume: 1
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Analytical Method: SM 2340 B-97

Instrument: [CALC]

Analyzed: 04/18/2017 18:13

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	43.8	mg/L	



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Reported:
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WUFF-IN

17D0216-03 (Water)
Sampled: 04/13/2017 02:15

Metals and Metallic Compounds (dissolved)

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFD0376 Sample Size: 25 mL
Prepared: 04/17/2017 08:43 Final Volume: 25 mL

Analytical Method: EPA 200.8

Instrument: ICPMS1

Analyzed: 04/18/2017 17:41

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	14.6	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	31.0	ug/L	



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

Reported:
02-May-2017 10:35

WUFF-OUT

17D0216-04 (Water)

Sampled: 04/13/2017 02:15

Metals and Metallic Compounds (dissolved)

Sample Preparation:	Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix					
	Preparation Batch: BFD0376			Sample Size: 25 mL		
	Prepared: 04/17/2017 08:43			Final Volume: 25 mL		

Analytical Method: EPA 200.8

Instrument: ICPMS1

Analyzed: 04/18/2017 17:45

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	14.0	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	28.6	ug/L	



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Reported:
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Metals and Metallic Compounds - Quality Control

Batch BFD0372 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFD0372-BLK1)			Prepared: 17-Apr-2017 Analyzed: 17-Apr-2017 13:05								
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 (BFD0372-BS1)			Prepared: 17-Apr-2017 Analyzed: 17-Apr-2017 13:50								
Copper	63	26.3	0.500	ug/L	25.0		105 %	80-120			
Copper	65	25.9	0.500	ug/L	25.0		104 %	80-120			
Zinc	66	83.5	4.00	ug/L	80.0		104 %	80-120			
Zinc	67	81.2	4.00	ug/L	80.0		101 %	80-120			



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Reported:
02-May-2017 10:35

Metals and Metallic Compounds - Quality Control

Batch BFD0381 - TWC EPA 3010A

Instrument: ICP2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFD0381-BLK1)		Prepared: 17-Apr-2017 Analyzed: 18-Apr-2017 15:48								
Calcium	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
LCS (BFD0381-BS1)		Prepared: 17-Apr-2017 Analyzed: 18-Apr-2017 17:48								
Calcium	9.56	0.0500	mg/L	10.0		95.6 %	80-120			
Magnesium	10.1	0.0500	mg/L	10.0		101 %	80-120			



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

Batch BFD0376 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFD0376-BLK1)			Prepared: 17-Apr-2017 Analyzed: 17-Apr-2017 15:11								
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 (BFD0376-BS1)			Prepared: 17-Apr-2017 Analyzed: 17-Apr-2017 15:56								
Copper, Dissolved	63	26.7	0.500	ug/L	25.0		107 %	80-120			
Copper, Dissolved	65	26.3	0.500	ug/L	25.0		105 %	80-120			
Zinc, Dissolved	66	78.7	4.00	ug/L	80.0		98.4 %	80-120			
Zinc, Dissolved	67	74.7	4.00	ug/L	80.0		93.3 %	80-120			



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Project: Hydro International
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Reported:
02-May-2017 10:35

Wet Chemistry - Quality Control

Batch BFD0368 - No Prep Wet Chem

Instrument: UV1800-2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFD0368-BLK2)										
					Prepared: 14-Apr-2017 Analyzed: 14-Apr-2017 18:56					
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BFD0368-BS1)										
					Prepared: 14-Apr-2017 Analyzed: 14-Apr-2017 18:37					
Orthophosphorus	0.152	0.0040	mg-P/L	0.150		101 %	90-110			



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Project: Hydro International
Project Number: 13-05605-000
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Reported:
02-May-2017 10:35

Wet Chemistry - Quality Control

Batch BFD0422 - SM 4500-P B-5 Persulfate

Instrument: UV1800-2

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFD0422-BLK1) Prepared: 18-Apr-2017 Analyzed: 19-Apr-2017 13:33										
Total Phosphorus	ND	0.00800	mg-P/L							U
Blank (BFD0422-BLK2) Prepared: 18-Apr-2017 Analyzed: 19-Apr-2017 13:52										
Total Phosphorus	ND	0.00800	mg-P/L							U
DL (BFD0422-BLK3) Prepared: 18-Apr-2017 Analyzed: 19-Apr-2017 14:00										
Total Phosphorus	ND	0.00800	mg-P/L							U
Blank (BFD0422-BLK4) Prepared: 18-Apr-2017 Analyzed: 19-Apr-2017 14:01										
Total Phosphorus	ND	0.00800	mg-P/L							U
LCS (BFD0422-BS1) Prepared: 18-Apr-2017 Analyzed: 19-Apr-2017 13:33										
Total Phosphorus	0.294	0.00800	mg-P/L	0.300		98.0 %	90-110			
DL (BFD0422-BS2) Prepared: 18-Apr-2017 Analyzed: 19-Apr-2017 13:52										
Total Phosphorus	0.296	0.00800	mg-P/L	0.300		98.7 %	90-110			
DL (BFD0422-BS3) Prepared: 18-Apr-2017 Analyzed: 19-Apr-2017 14:00										
Total Phosphorus	0.294	0.00800	mg-P/L	0.300		98.0 %	90-110			
LCS (BFD0422-BS4) Prepared: 18-Apr-2017 Analyzed: 19-Apr-2017 14:02										
Total Phosphorus	0.296	0.00800	mg-P/L	0.300		98.7 %	90-110			



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Project: Hydro International
Project Number: 13-05605-000
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Reported:
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Certified Analyses included in this Report

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

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/06/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	03/30/2017
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2017
WADOE	WA Dept of Ecology	C558	06/30/2017
WA-DW	Ecology - Drinking Water	C558	06/30/2017



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

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

Reported:
02-May-2017 10:35

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.

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17D0216)
Project #: 16T001-035
Client : Analytical Resources, Inc.
Source: Multiple
MTC Sample#: Multiple

Date Received: April 17, 2017
Sampled By: Others
Date Reported: April 18, 2017
Tested By: K. O'Connell

CASE NARRATIVE

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

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

Reviewed by: 

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

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17D0216)
Project #: 16T001-035
Date Received: April 17, 2017
Date Tested: April 18, 2017

Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: K. O'Connell

Suspended Sediment Concentration ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC ($>63\mu\text{m}$) (mg/L)	Fine Fraction SSC ($<63\mu\text{m}$) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	T17-0595	4/13/2017	1.0	6.6	7.6
WUFF-OUT	T17-0596	4/13/2017	1.1	1.5	2.6

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.

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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 G.Hernandez	SUPERVISOR D. Jacobson	
ATTN: Mark Harris		DATE COLLECTED	DATE RECEIVED		DATE COMPLETED	LAB DIRECTOR G.S. Conrad,PhD
JOB: Hydro International Up-Flo Filter		4/13/2017	4/19/2017		4/28/2017	
SITE: Oregon-Washington						

PARTICLE SIZE DISTRIBUTION (PSD) ANALYSIS & REPORT – 5 PART										
LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	SUSPENDED SOLIDS mg/l @ ≥500 μ	SUSPENDED SOLIDS mg/l @ 125 μ	SUSPENDED SOLIDS mg/l @ 63 μ	SUSPENDED SOLIDS mg/l @ 32 μ	SUSPENDED SOLIDS mg/l @ 4 μ	SUSPENDED SOLIDS mg/l @ 1 μ	SUSPENDED SEDIMENT CONC TSS mg/l	
07315-1	HI-18/RW	WUFF-IN	0.0	1.0	1.0		5.7	1.1	8.0	
	17B0216-01 C		0.0%	11.4%	11.4%		64.8%	12.5%		
						Total SSC by Summation →		8.8		
07315-2	HI-19/RW	WUFF-OUT	0.0	0.0	0.5		0.0	1.1	2.0	
	17B0216-02 C		0.0%	0.0%	31.3%		0.0%	68.8%		
						Total SSC by Summation →		1.6		
			#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		
07315-1	HI-18/RW	WUFF-IN						2.0		
	17B0216-01 C									
07315-2	HI-19/RW	WUFF-OUT						1.6-2.0		
	17B0216-02 C									

COMMENTS

The matrix has an extremely low concentration of TSS particles amounting to <10 ppm in both the input and output samples. For this pair of samples, the overall reduction averaged nearly four-fifth, i.e., @ >78% (i.e., TSS by summation vs testd TSS). The specific fraction reductions going from coarsest to finest fractions are as follows: N.A., 100%, 50.0%, 100%, and 0.0%. The TVSS values in this case show very different changes occurred as the proportions are very different. The proportion that is volatile suspended solids in the input sample averages just under 24%; but in the processed sample the amount of volatile suspended solids is essentially 100%. Thus, it seems that proportionately there is a more volatile suspended solids in the output sample; or, put another way, all of the output sample appears to have been volatiles. The RPDs are good to excellent as follows: ±4.5%; and ±11.1%.

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

April 19, 2017

Data_17D0317

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17D0317-01	WUFF-IN	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/21/2017	04/25/2017	SM 2340 B-97		Hardness	40.7		mg/L
17D0317-02	WUFF-OUT	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/21/2017	04/25/2017	SM 2340 B-97		Hardness	53.9		mg/L
BFD0510-BLK1	Blank	13-05605-000	Water			04/20/2017	04/20/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFD0510-BS1	LCS	13-05605-000	Water			04/20/2017	04/20/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.156		mg-P/L
BFD0510-DUP1	WUFF-OUT	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/20/2017	04/20/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0030	L, U	mg-P/L
BFD0510-MS1	WUFF-OUT	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/20/2017	04/20/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0990		mg-P/L
17D0317-01	WUFF-IN	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/20/2017	04/20/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0060		mg-P/L
17D0317-02	WUFF-OUT	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/20/2017	04/20/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040		mg-P/L
BFD0517-BLK1	Blank	13-05605-000	Water			04/21/2017	04/21/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFD0517-BS1	LCS	13-05605-000	Water			04/21/2017	04/21/2017	EPA 200.8	7440-50-8	Copper	27.2		ug/L
17D0317-01	WUFF-IN	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/21/2017	04/21/2017	EPA 200.8	7440-50-8	Copper	36.2		ug/L
17D0317-02	WUFF-OUT	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/21/2017	04/21/2017	EPA 200.8	7440-50-8	Copper	11.3		ug/L
BFD0517-BLK1	Blank	13-05605-000	Water			04/21/2017	04/21/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFD0517-BS1	LCS	13-05605-000	Water			04/21/2017	04/21/2017	EPA 200.8	7440-50-8	Copper	26.8		ug/L
BFD0517-BLK1	Blank	13-05605-000	Water			04/21/2017	04/21/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFD0517-BS1	LCS	13-05605-000	Water			04/21/2017	04/21/2017	EPA 200.8	7440-66-6	Zinc	85.3		ug/L
17D0317-02	WUFF-OUT	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/21/2017	04/21/2017	EPA 200.8	7440-66-6	Zinc	37.4		ug/L
BFD0517-BLK1	Blank	13-05605-000	Water			04/21/2017	04/21/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFD0517-BS1	LCS	13-05605-000	Water			04/21/2017	04/21/2017	EPA 200.8	7440-66-6	Zinc	82.2		ug/L
17D0317-01	WUFF-IN	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/21/2017	04/21/2017	EPA 200.8	7440-66-6	Zinc	90.8		ug/L
BFD0519-BLK1	Blank	13-05605-000	Water			04/21/2017	04/25/2017	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BFD0519-BS1	LCS	13-05605-000	Water			04/21/2017	04/25/2017	EPA 6010C	7440-70-2	Calcium	10.1		mg/L
17D0317-01	WUFF-IN	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/21/2017	04/25/2017	EPA 6010C	7440-70-2	Calcium	11.8		mg/L
17D0317-02	WUFF-OUT	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/21/2017	04/25/2017	EPA 6010C	7440-70-2	Calcium	15.4		mg/L
BFD0519-BLK1	Blank	13-05605-000	Water			04/21/2017	04/25/2017	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BFD0519-BS1	LCS	13-05605-000	Water			04/21/2017	04/25/2017	EPA 6010C	7439-95-4	Magnesium	10.5		mg/L
17D0317-01	WUFF-IN	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/21/2017	04/25/2017	EPA 6010C	7439-95-4	Magnesium	2.74		mg/L
17D0317-02	WUFF-OUT	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/21/2017	04/25/2017	EPA 6010C	7439-95-4	Magnesium	3.73		mg/L
BFD0538-BLK1	Blank	13-05605-000	Water			04/21/2017	04/22/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFD0538-BLK2	Blank	13-05605-000	Water			04/21/2017	04/22/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFD0538-BLK3	Blank	13-05605-000	Water			04/21/2017	04/22/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFD0538-BLK4	Blank	13-05605-000	Water			04/21/2017	04/22/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFD0538-BS1	LCS	13-05605-000	Water			04/21/2017	04/22/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.296		mg-P/L
BFD0538-BS2	LCS	13-05605-000	Water			04/21/2017	04/22/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.296		mg-P/L
BFD0538-BS3	LCS	13-05605-000	Water			04/21/2017	04/22/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.298		mg-P/L
BFD0538-BS4	LCS	13-05605-000	Water			04/21/2017	04/22/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.296		mg-P/L
17D0317-01	WUFF-IN	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/21/2017	04/22/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.154		mg-P/L
17D0317-02	WUFF-OUT	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/21/2017	04/22/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0220		mg-P/L
BFD0569-BLK1	Blank	13-05605-000	Water			04/24/2017	04/25/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFD0569-BS1	LCS	13-05605-000	Water			04/24/2017	04/25/2017	EPA 200.8-Dissolved	7440-50-8	Copper	28.9		ug/L
17D0317-03	WUFF-IN	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/24/2017	04/25/2017	EPA 200.8-Dissolved	7440-50-8	Copper	14.2		ug/L
17D0317-04	WUFF-OUT	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/24/2017	04/25/2017	EPA 200.8-Dissolved	7440-50-8	Copper	10.4		ug/L
BFD0569-BLK1	Blank	13-05605-000	Water			04/24/2017	04/25/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFD0569-BS1	LCS	13-05605-000	Water			04/24/2017	04/25/2017	EPA 200.8-Dissolved	7440-50-8	Copper	28.7		ug/L
BFD0569-BLK1	Blank	13-05605-000	Water			04/24/2017	04/25/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFD0569-BS1	LCS	13-05605-000	Water			04/24/2017	04/25/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	82.6		ug/L
17D0317-03	WUFF-IN	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/24/2017	04/25/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	27.2		ug/L
17D0317-04	WUFF-OUT	13-05605-000	Surface Water	04/20/2017	04/20/2017	04/24/2017	04/25/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	29.4		ug/L
BFD0569-BLK1	Blank	13-05605-000	Water			04/24/2017	04/25/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFD0569-BS1	LCS	13-05605-000	Water			04/24/2017	04/25/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	80.2		ug/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

05 May 2017

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

RE: Hydro International

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

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

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

Associated Work Order(s)
17D0317

Associated SDG ID(s)
N/A

Mark Harris

Digitally signed by Mark Harris
DN: c=US, st=Washington, l=Tukwila,
o=Analytical Resources, Inc., ou=Client Services,
cn=Mark Harris, email=markh@arilabs.com
Date: 2017.05.05 09:18:58 -0700

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

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

Analytical Resources, Inc.

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





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

Chain of Custody Record

Project Name: Hydro International Up-flo Filter			Project Number: 13-05605-000			Client: Herrera Environmental			Total Suspended Solids- SM 2540D	Analyses Requested											
Report To: Dylan Ahearn						Copy To:				Suspended Sediment Concentration - SMD3977	Total volatile Suspended solids - SM2540-E	Particle size Distribution - ASTM 3977	Total phosphorus - EPA 365.3	Orthophosphorus - EPA 365.3	Hardness as CaCO3-SM 2340B	Copper, dissolved - EPA 200.8	Copper, total - EPA 200.8	Zinc, dissolved - EPA 200.8	Zinc, total - EPA 200.8		
Sampled By: M MULLEN						Delivery Method: ice - hand delivered															
Laboratory: Analytical Resources Inc.				Requested Completion Date:		Total No. of Containers: 2															
Lab Use:						Sample Type (see codes)	Preservative? (Y/N)	Matrix (see codes)													
Sample ID			Date		Time																
WUFF-IN			4/20/17		11:30	C	N	SW	x	X	x	X	X	X	X	X	X	X			
WUFF-OUT			4/20/17		11:30	C	N	SW	x	X	X	X	X	X	X	X	X	X			
Comments/Special Instructions: Send 1 liter to ETS, Inc 975 Restaurant Way, Suite 2, Petaluma, CA for PSD, TSS, and TVSS. PSD to be run for >500, 500-125, 125-62.5, 62.5-4, <4.																					
Relinquished by (Name/CO/) Meghan Muller/Herrera			Signature Meghan Muller			Date/Time 4/20/17 12:25			Received By (Name/CO) Brittney Hall /ARI			Signature Brittney Hall			Date/Time 4/20/17 12:25						
Relinquished by (Name/CO/)			Signature			Date/Time			Received By (Name/CO)			Signature			Date/Time						

Sample Type: G=Grab C=Composite

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



WORK ORDER

17D0317

Client: Herrera Environmental Consultants

Project Manager: Mark Harris

Project: Hydro International

Project Number: 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH	
17D0317-01 A	Small OJ, 500 mL, 9N H2SO4	<2	P
17D0317-01 B	Small OJ, 500 mL		
17D0317-01 C	Large OJ, 1000 mL		
17D0317-01 D	Large OJ, 1000 mL		
17D0317-01 E	Large OJ, 1000 mL		
17D0317-01 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
17D0317-02 A	Small OJ, 500 mL, 9N H2SO4	<2	P
17D0317-02 B	Small OJ, 500 mL		
17D0317-02 C	Large OJ, 1000 mL		
17D0317-02 D	Large OJ, 1000 mL		
17D0317-02 E	Large OJ, 1000 mL		
17D0317-02 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
17D0317-03 A	HDPE NM, 500 mL	>2	f
17D0317-04 A	HDPE NM, 500 mL	↓	↓

↓ = pass, f = fail

PM

4/20/2017

Preservation Confirmed By

Date



Cooler Receipt Form

ARI Client: Herrera

Project Name: Hydro International

COC No(s): _____ NA

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

Assigned ARI Job No: 17D0317

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: 12:25

4.1

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

Temp Gun ID#: D005206

Cooler Accepted by: B.H.

Date: 4/20/17

Time: 12:25

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: 4/20/17 13:00 Equipment: churn split

Split by: PM

Samples Logged by: PM Date: 4/20/2017 Time: 13:39

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

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

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____

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



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

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

Reported:
05-May-2017 09:13

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	17D0317-01	Water	20-Apr-2017 11:30	20-Apr-2017 12:25
WUFF-OUT	17D0317-02	Water	20-Apr-2017 11:30	20-Apr-2017 12:25
WUFF-IN	17D0317-03	Water	20-Apr-2017 11:30	20-Apr-2017 12:25
WUFF-OUT	17D0317-04	Water	20-Apr-2017 11:30	20-Apr-2017 12:25



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Case Narrative

Client: Herrera Environmental Consultants
Project: Hydro International
Workorder: 17D0317

Sample receipt

The samples listed on the preceding page were received 20-Apr-2017 12:25 under ARI work order 17D0317. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Total and Dissolved Metals/Hardness - EPA Methods 200.8/6010C

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

All initial and continuing calibrations were within method requirements.

The areas for all internal standards were within acceptable QC limits.

No target elements were detected in the method blanks above the LOQs.

The percent recoveries for all elements were within acceptable QC limits for the LCSs.

Wet Chemistry

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

All initial and continuing calibrations were within method requirements.

No target compounds were detected in the method blanks above the LOQs.

The percent recoveries for all compounds were within acceptable QC limits for the LCSs.

A matrix spike (MS) was prepared and analyzed for ortho-phosphorous in conjunction with sample 'WUFF-OUT'. The percent recovery for ortho-phosphorous was within acceptable QC limits for the MS.

A matrix duplicate (MD) was prepared and analyzed for ortho-phosphorous in conjunction with sample 'WUFF-OUT'. The RPD was high following the analysis of the MD. Since the percent recovery for ortho-phosphorous was within acceptable QC limits for the corresponding LCS, it was concluded that a lack of sample homogeneity was the cause of the high RPD. No corrective actions were taken.



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Reported:
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WUFF-IN
17D0317-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 04/20/2017 11:30

Instrument: ICPMS2

Analyzed: 21-Apr-2017 15:09

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFD0517 Sample Size: 25 mL
Prepared: 21-Apr-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	36.2	ug/L	
Zinc	7440-66-6	1	4.00	90.8	ug/L	



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WUFF-IN
17D0317-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 04/20/2017 11:30

Instrument: ICP2

Analyzed: 25-Apr-2017 13:50

Sample Preparation:

Preparation Method: TWC EPA 3010A

Preparation Batch: BFD0519

Prepared: 21-Apr-2017

Sample Size: 25 mL

Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	11.8	mg/L	
Magnesium	7439-95-4	1	0.0500	2.74	mg/L	



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WUFF-IN
17D0317-01 (Water)

Wet Chemistry

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

Sampled: 04/20/2017 11:30

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFD0510
Prepared: 20-Apr-2017

Sample Size: 10 mL
Final Volume: 10 mL

Analyte	Analyzed	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	04/20/17 16:30	1426-54-42	1	0.0040	0.0060	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-5 Persulfate
Preparation Batch: BFD0538
Prepared: 21-Apr-2017

Sample Size: 25 mL
Final Volume: 50 mL

Analyte	Analyzed	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	04/22/17 15:06	7723-14-0	1	0.00800	0.154	mg-P/L	



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Reported:
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WUFF-IN
17D0317-01 (Water)

Calculation

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

Sampled: 04/20/2017 11:30
Analyzed: 25-Apr-2017 13:50

Sample Preparation:

Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 21-Apr-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	40.7	mg/L	



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WUFF-OUT
17D0317-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 04/20/2017 11:30

Instrument: ICPMS2

Analyzed: 21-Apr-2017 15:14

Sample Preparation:

Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix

Preparation Batch: BFD0517

Sample Size: 25 mL

Prepared: 21-Apr-2017

Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	11.3	ug/L	
Zinc	7440-66-6	1	4.00	37.4	ug/L	



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Reported:
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WUFF-OUT
17D0317-02 (Water)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 04/20/2017 11:30

Instrument: ICP2

Analyzed: 25-Apr-2017 13:54

Sample Preparation:

Preparation Method: TWC EPA 3010A

Preparation Batch: BFD0519

Prepared: 21-Apr-2017

Sample Size: 25 mL

Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	15.4	mg/L	
Magnesium	7439-95-4	1	0.0500	3.73	mg/L	



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WUFF-OUT
17D0317-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 04/20/2017 11:30

Instrument: UV1800-2

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFD0510
Prepared: 20-Apr-2017

Sample Size: 10 mL
Final Volume: 10 mL

Analyte	Analyzed	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	04/20/17 16:32	1426-54-42	1	0.0040	0.0040	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-5 Persulfate
Preparation Batch: BFD0538
Prepared: 21-Apr-2017

Sample Size: 25 mL
Final Volume: 50 mL

Analyte	Analyzed	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	04/22/17 15:07	7723-14-0	1	0.00800	0.0220	mg-P/L	



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Project: Hydro International
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Reported:
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WUFF-OUT
17D0317-02 (Water)

Calculation

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

Sampled: 04/20/2017 11:30

Analyzed: 25-Apr-2017 13:54

Sample Preparation:

Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 21-Apr-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	53.9	mg/L	



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Reported:
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WUFF-IN
17D0317-03 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 04/20/2017 11:30

Instrument: ICPMS1

Analyzed: 25-Apr-2017 13:26

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFD0569 Sample Size: 25 mL
Prepared: 24-Apr-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	14.2	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	27.2	ug/L	



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Reported:
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WUFF-OUT
17D0317-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 04/20/2017 11:30

Instrument: ICPMS1

Analyzed: 25-Apr-2017 13:31

Sample Preparation:

Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix

Preparation Batch: BFD0569

Sample Size: 25 mL

Prepared: 24-Apr-2017

Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	10.4	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	29.4	ug/L	



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Metals and Metallic Compounds - Quality Control

Batch BFD0517 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2

QC Sample/Analyte	Isotope	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFD0517-BLK1)			Prepared: 21-Apr-2017 Analyzed: 21-Apr-2017 11:20								
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 (BFD0517-BS1)			Prepared: 21-Apr-2017 Analyzed: 21-Apr-2017 12:04								
Copper	63	27.2	0.500	ug/L	25.0		109	80-120			
Copper	65	26.8	0.500	ug/L	25.0		107	80-120			
Zinc	66	85.3	4.00	ug/L	80.0		107	80-120			
Zinc	67	82.2	4.00	ug/L	80.0		103	80-120			



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Blank (BFD0519-BLK1)

Prepared: 21-Apr-2017 Analyzed: 25-Apr-2017 13:31

Calcium	ND	0.0500	mg/L				U
Magnesium	ND	0.0500	mg/L				U

LCS (BFD0519-BS1)

Prepared: 21-Apr-2017 Analyzed: 25-Apr-2017 14:46

Calcium	10.1	0.0500	mg/L	10.0	101	80-120
Magnesium	10.5	0.0500	mg/L	10.0	105	80-120



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Blank (BFD0569-BLK1)

Prepared: 24-Apr-2017 Analyzed: 25-Apr-2017 11:56

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 (BFD0569-BS1)

Prepared: 24-Apr-2017 Analyzed: 25-Apr-2017 12:34

Copper, Dissolved	63	28.9	0.500	ug/L	25.0	116	80-120
Copper, Dissolved	65	28.7	0.500	ug/L	25.0	115	80-120
Zinc, Dissolved	66	82.6	4.00	ug/L	80.0	103	80-120
Zinc, Dissolved	67	80.2	4.00	ug/L	80.0	100	80-120



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Reported:
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Blank (BFD0510-BLK1)

Prepared: 20-Apr-2017 Analyzed: 20-Apr-2017 16:26

Orthophosphorus	ND	0.0040	mg-P/L					U
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LCS (BFD0510-BS1)

Prepared: 20-Apr-2017 Analyzed: 20-Apr-2017 16:27

Orthophosphorus	0.156	0.0040	mg-P/L	0.150	104	90-110		
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Duplicate (BFD0510-DUP1)

Source: 17D0317-02

Prepared: 20-Apr-2017 Analyzed: 20-Apr-2017 16:32

Orthophosphorus	0.0030	0.0040	mg-P/L	0.0040	28.60	20		L, U
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Matrix Spike (BFD0510-MS1)

Source: 17D0317-02

Prepared: 20-Apr-2017 Analyzed: 20-Apr-2017 16:33

Orthophosphorus	0.0990	0.0040	mg-P/L	0.0999	0.0040	95.1	75-125	
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Recovery limits for target analytes in MS/MSD QC samples are advisory only.



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Blank (BFD0538-BLK1)		Prepared: 21-Apr-2017 Analyzed: 22-Apr-2017 14:30				
Total Phosphorus	ND	0.00800	mg-P/L			U
Blank (BFD0538-BLK2)		Prepared: 21-Apr-2017 Analyzed: 22-Apr-2017 15:04				
Total Phosphorus	ND	0.00800	mg-P/L			U
DL (BFD0538-BLK3)		Prepared: 21-Apr-2017 Analyzed: 22-Apr-2017 15:12				
Total Phosphorus	ND	0.00800	mg-P/L			U
Blank (BFD0538-BLK4)		Prepared: 21-Apr-2017 Analyzed: 22-Apr-2017 15:14				
Total Phosphorus	ND	0.00800	mg-P/L			U
LCS (BFD0538-BS1)		Prepared: 21-Apr-2017 Analyzed: 22-Apr-2017 14:31				
Total Phosphorus	0.296	0.00800	mg-P/L	0.300	98.7	90-110
DL (BFD0538-BS2)		Prepared: 21-Apr-2017 Analyzed: 22-Apr-2017 15:05				
Total Phosphorus	0.296	0.00800	mg-P/L	0.300	98.7	90-110
DL (BFD0538-BS3)		Prepared: 21-Apr-2017 Analyzed: 22-Apr-2017 15:13				
Total Phosphorus	0.298	0.00800	mg-P/L	0.300	99.3	90-110
LCS (BFD0538-BS4)		Prepared: 21-Apr-2017 Analyzed: 22-Apr-2017 15:15				
Total Phosphorus	0.296	0.00800	mg-P/L	0.300	98.7	90-110



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Certified Analyses included in this Report

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

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/06/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	03/30/2017
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2017
WADOE	WA Dept of Ecology	C558	06/30/2017
WA-DW	Ecology - Drinking Water	C558	06/30/2017



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Notes and Definitions

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



ETS

Environmental Technical Services

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

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(707) 778-9605/FAX 778-9612
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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)	SUPERVISOR
ATTN: Mark Harris			DATE	DATE	DATE	S. Santos	D. Jacobson
JOB: Hydro International Up-Flo Filter			COLLECTED	RECEIVED	COMPLETED	G.Hernandez	LAB DIRECTOR
SITE: Oregon-Washington			4/20/2017	4/25/2017	5/4/2017		G.S. Conrad, PhD

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

LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	SUSPENDED SOLIDS mg/l @ ≥500 μ	SUSPENDED SOLIDS mg/l @ 125 μ	SUSPENDED SOLIDS mg/l @ 63 μ	SUSPENDED SOLIDS mg/l @ 32 μ	SUSPENDED SOLIDS mg/l @ 4 μ	SUSPENDED SOLIDS mg/l @ 1 μ	SUSPENDED SEDIMENT CONC TSS mg/l
07323-1	HI-20/RW	WUFF-IN	0.0	1.0	1.5		11.0	20.9	35.0
	17D0317-01	C/D	0.0%	2.9%	4.4%		32.0%	60.8%	
						Total SSC by Summation →		34.4	
07323-2	HI-21/RW	WUFF-OUT	0.0	0.0	0.5		1.1	2.2	3.0
	17D0317-02	C/D	0.0%	0.0%	13.2%		28.9%	57.9%	
						Total SSC by Summation →		3.8	
			#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	
07323-1	HI-20/RW	WUFF-IN						11.0	
	17D0317-01	C/D							
07323-2	HI-21/RW	WUFF-OUT						1.0	
	17D0317-02	C/D							

COMMENTS

The matrix has a very low concentration of TSS particles amounting to ~35 ppm in the input sample; and output is roughly ten times less. For this pair of samples, the overall reduction averaged more than nine-tenths, i.e., @ >90% (i.e., TSS by summation vs tested TSS). The specific fraction reductions going from coarsest to finest fractions are as follows: N.A., 100%, 66.7%, 90.0%, and 89.5%. The TVSS values in this case show very similar changes occurred as the average proportions are actually pretty close. The proportion that is volatile suspended solids in the input sample averages just under 32%, or just under one-third; and in the processed sample the amount of volatiles averaged nearly 30%; (the latter average is probably more reliable and reasonable than either 'tail' at roughly 33% & 26%). Thus, it seems that proportionately volatile suspended solids don't seem to change much between input and output samples. The RPDs are excellent and good as follows: ±0.9%; and ±11.8%.

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

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17D0317)
Project #: 16T001-035
Client : Analytical Resources, Inc.
Source: Multiple
MTC Sample#: Multiple

Date Received: April 21, 2017
Sampled By: Others
Date Reported: April 26, 2017
Tested By: K. O'Connell

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 noted anomalies in this project.

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

Reviewed by: 

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Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974
Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17D0317)
Project #: 16T001-035
Date Received: April 21, 2017
Date Tested: April 25, 2017

Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: K. O'Connell

Suspended Sediment Concentration ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC ($>63\mu\text{m}$) (mg/L)	Fine Fraction SSC ($<63\mu\text{m}$) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	T17-0628	4/20/2017	3.5	43.1	46.6
WUFF-OUT	T17-0629	4/20/2017	0.8	6.2	6.9

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: E. J. Hable

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May 11, 2017

Data_17E0196

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17E0196-01	WUFF-IN	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/15/2017	05/16/2017	SM 2340 B-97		Hardness	110		mg/L
17E0196-02	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/15/2017	05/16/2017	SM 2340 B-97		Hardness	90.1		mg/L
BFE0346-BLK1	Blank	13-05605-000	Water			05/13/2017	05/13/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFE0346-BS1	LCS	13-05605-000	Water			05/13/2017	05/13/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.149		mg-P/L
BFE0346-DUP1	WUFF-IN	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/13/2017	05/13/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0100		mg-P/L
BFE0346-MS1	WUFF-IN	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/13/2017	05/13/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.121		mg-P/L
17E0196-01	WUFF-IN	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/13/2017	05/13/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0110		mg-P/L
17E0196-02	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/13/2017	05/13/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0190		mg-P/L
BFE0361-BLK1	Blank	13-05605-000	Water			05/15/2017	05/16/2017	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BFE0361-BS1	LCS	13-05605-000	Water			05/15/2017	05/16/2017	EPA 6010C	7440-70-2	Calcium	9.38		mg/L
17E0196-01	WUFF-IN	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/15/2017	05/16/2017	EPA 6010C	7440-70-2	Calcium	29.3		mg/L
17E0196-02	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/15/2017	05/16/2017	EPA 6010C	7440-70-2	Calcium	24.3		mg/L
BFE0361-BLK1	Blank	13-05605-000	Water			05/15/2017	05/16/2017	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BFE0361-BS1	LCS	13-05605-000	Water			05/15/2017	05/16/2017	EPA 6010C	7439-95-4	Magnesium	9.67		mg/L
17E0196-01	WUFF-IN	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/15/2017	05/16/2017	EPA 6010C	7439-95-4	Magnesium	8.84		mg/L
17E0196-02	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/15/2017	05/16/2017	EPA 6010C	7439-95-4	Magnesium	7.14		mg/L
BFE0389-BLK1	Blank	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFE0389-BS1	LCS	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8	7440-50-8	Copper	27.4		ug/L
BFE0389-DUP1	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/16/2017	EPA 200.8	7440-50-8	Copper	22.0		ug/L
BFE0389-MS1	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/16/2017	EPA 200.8	7440-50-8	Copper	45.7		ug/L
17E0196-02	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/16/2017	EPA 200.8	7440-50-8	Copper	20.4		ug/L
BFE0389-BLK1	Blank	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFE0389-BS1	LCS	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8	7440-50-8	Copper	26.9		ug/L
17E0196-01	WUFF-IN	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/16/2017	EPA 200.8	7440-50-8	Copper	29.8		ug/L
BFE0389-BLK1	Blank	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFE0389-BS1	LCS	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8	7440-66-6	Zinc	88.5		ug/L
BFE0389-DUP1	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/16/2017	EPA 200.8	7440-66-6	Zinc	46.4		ug/L
BFE0389-MS1	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/16/2017	EPA 200.8	7440-66-6	Zinc	129		ug/L
17E0196-01	WUFF-IN	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/16/2017	EPA 200.8	7440-66-6	Zinc	95.7		ug/L
17E0196-02	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/16/2017	EPA 200.8	7440-66-6	Zinc	46.2		ug/L
BFE0389-BLK1	Blank	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFE0389-BS1	LCS	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8	7440-66-6	Zinc	83.4		ug/L
BFE0390-BLK1	Blank	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFE0390-BS1	LCS	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	29.0		ug/L
17E0196-04	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	17.6		ug/L
BFE0390-BLK1	Blank	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFE0390-BS1	LCS	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	27.1		ug/L
17E0196-03	WUFF-IN	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/16/2017	EPA 200.8-Dissolved	7440-50-8	Copper	15.2		ug/L
BFE0390-BLK1	Blank	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFE0390-BS1	LCS	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	92.7		ug/L
17E0196-03	WUFF-IN	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	37.9		ug/L
17E0196-04	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	36.4		ug/L
BFE0390-BLK1	Blank	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFE0390-BS1	LCS	13-05605-000	Water			05/16/2017	05/16/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	91.2		ug/L
BFE0412-BLK1	Blank	13-05605-000	Water			05/16/2017	05/17/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFE0412-BLK2	Blank	13-05605-000	Water			05/16/2017	05/17/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFE0412-BLK3	Blank	13-05605-000	Water			05/16/2017	05/17/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFE0412-BLK4	Blank	13-05605-000	Water			05/16/2017	05/17/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFE0412-BS1	LCS	13-05605-000	Water			05/16/2017	05/17/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.304		mg-P/L
BFE0412-BS2	LCS	13-05605-000	Water			05/16/2017	05/17/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.302		mg-P/L
BFE0412-BS3	LCS	13-05605-000	Water			05/16/2017	05/17/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.306		mg-P/L
BFE0412-BS4	LCS	13-05605-000	Water			05/16/2017	05/17/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.302		mg-P/L
17E0196-01	WUFF-IN	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/17/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.105		mg-P/L
17E0196-02	WUFF-OUT	13-05605-000	Surface Water	05/12/2017	05/12/2017	05/16/2017	05/17/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0460		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

30 May 2017

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

RE: Hydro International

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

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

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

Associated Work Order(s)

17E0196

Associated SDG ID(s)

N/A

Mark Harris

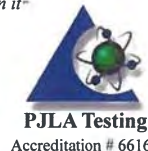
Digitally signed by Mark Harris
DN: c=US, st=Washington, l=Tukwila,
o=Analytical Resources, Inc., ou=Client Services,
cn=Mark Harris, email=markh@arilabs.com
Date: 2017.05.30 05:46:55 -07'00'

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.





17E0196

HERRERA

2 of 26

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





Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 17EQ196

Project Name: Hydro International Up-flo Filter

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: 4.0

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

Temp Gun ID#: D005204

Cooler Accepted by: PM Date: 5/12/2017 Time: 16:40

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..... B.H. NA ☒

Was Sample Split by ARI: NA ☒ YES Date/Time: 5/15/17 7:25 Equipment: Churn Splitter Split by: B.H.

Samples Logged by: B.H. Date: 5/15/17 Time: 7:58

**** 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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WORK ORDER

17E0196

Client: Herrera Environmental Consultants

Project Manager: Mark Harris

Project: Hydro International

Project Number: 13-05605-000

Preservation Confirmation

Container ID	Container Type	pH
17E0196-01 A	Small OJ, 500 mL	
B.H. 17E0196-01 A-01	Small OJ, 500 mL	
17E0196-01 B	Small OJ, 500 mL, 9N H2SO4	< 2 Pass
17E0196-01 C	Large OJ, 1000 mL	
17E0196-01 D	Large OJ, 1000 mL	
17E0196-01 E	Large OJ, 1000 mL	
17E0196-01 F	HDPE NM, 500 mL, 1:1 HNO3	< 2 Pass
17E0196-02 A	Small OJ, 500 mL	
B.H. 17E0196-02 A-01	Small OJ, 500 mL	
17E0196-02 B	Small OJ, 500 mL, 9N H2SO4	< 2 Pass
17E0196-02 C	Large OJ, 1000 mL	
17E0196-02 D	Large OJ, 1000 mL	
17E0196-02 E	Large OJ, 1000 mL	
17E0196-02 F	HDPE NM, 500 mL, 1:1 HNO3	< 2 Pass
17E0196-03 A	HDPE NM, 500 mL	> 2 Fail
17E0196-04 A	HDPE NM, 500 mL	> 2 Fail

B.H.

Preservation Confirmed By

5/15/17

Date

B.H.

Reviewed By

5/15/17

Date



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-May-2017 05:43

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WUFF-IN	17E0196-01	Water	12-May-2017 11:00	12-May-2017 16:40
WUFF-OUT	17E0196-02	Water	12-May-2017 11:00	12-May-2017 16:40
WUFF-IN	17E0196-03	Water	12-May-2017 11:00	12-May-2017 16:40
WUFF-OUT	17E0196-04	Water	12-May-2017 11:00	12-May-2017 16:40



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Project: Hydro International
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Reported:
30-May-2017 05:43

Case Narrative

Client: Herrera Environmental Consultants
Project: Hydro International
Workorder: 17E0196

Sample receipt

The samples listed on the preceding page were received 12-May-2017 16:40 under ARI work order 17E0196. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Total and Dissolved Metals/Hardness - EPA Methods 200.8/6010C

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

All initial and continuing calibrations were within method requirements.

The ares for all internal standards were within acceptable QC limits.

No target elements were detected in the method blanks above the LOQs.

The percent recoveries for all elements were within acceptable QC limits for the LCSs.

A matrix spike (MS) was prepared and analyzed for total metals in conjunction with sample WUFF-OUT'. The percent recoveries for all elements were within acceptable QC limits for the MS.

A matrix duplicate (MD) was prepared and analyzed for total metals in conjunction with sample WUFF-OUT'. The RPDs for all elements were within acceptable QC limits for the MD.

Wet Chemistry

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

All initial and continuing calibrations were within method requirements.

No target compounds were detected in the method blanks above the LOQs.

The percent recoveries for all compounds were within acceptable QC limits for the LCSs.

A matrix spike (MS) was prepared and analyzed for ortho-phosphorous in conjunction with sample WUFF-IN'. The percent recovery was within acceptable QC limits for the MS.

A matrix duplicate (MD) was prepared and analyzed for total metals in conjunction with sample WUFF-IN'. The RPD for was within acceptable QC limits for the MD.



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

Reported:
30-May-2017 05:43

WUFF-IN
17E0196-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 05/12/2017 11:00

Instrument: ICPMS2

Analyzed: 16-May-2017 19:17

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFE0389 Sample Size: 25 mL
Prepared: 16-May-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	29.8	ug/L	
Zinc	7440-66-6	1	4.00	95.7	ug/L	



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

Reported:
30-May-2017 05:43

WUFF-IN
17E0196-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C
Instrument: ICP2

Sampled: 05/12/2017 11:00
Analyzed: 16-May-2017 13:13

Sample Preparation: Preparation Method: TWC EPA 3010A
Preparation Batch: BFE0361
Prepared: 15-May-2017

Sample Size: 25 mL
Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	29.3	mg/L	
Magnesium	7439-95-4	1	0.0500	8.84	mg/L	



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

Reported:
30-May-2017 05:43

WUFF-IN
17E0196-01 (Water)

Wet Chemistry

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

Sampled: 05/12/2017 11:00
Analyzed: 13-May-2017 19:14

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFE0346
Prepared: 13-May-2017

Sample Size: 10 mL
Final Volume: 10 mL

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

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFE0412
Prepared: 16-May-2017

Sample Size: 25 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.00800	0.1050	mg-P/L	



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

Reported:
30-May-2017 05:43

WUFF-IN
17E0196-01 (Water)

Calculation

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

Sampled: 05/12/2017 11:00
Analyzed: 16-May-2017 13:13

Sample Preparation:

Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 15-May-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	110	mg/L	



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

Reported:
30-May-2017 05:43

WUFF-OUT
17E0196-02 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 05/12/2017 11:00

Instrument: ICPMS2

Analyzed: 16-May-2017 16:24

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFE0389 Sample Size: 25 mL
Prepared: 16-May-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	20.4	ug/L	
Zinc	7440-66-6	1	4.00	46.2	ug/L	



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

Reported:
30-May-2017 05:43

WUFF-OUT
17E0196-02 (Water)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 05/12/2017 11:00

Instrument: ICP2

Analyzed: 16-May-2017 13:17

Sample Preparation:

Preparation Method: TWC EPA 3010A

Preparation Batch: BFE0361

Prepared: 15-May-2017

Sample Size: 25 mL

Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	24.3	mg/L	
Magnesium	7439-95-4	1	0.0500	7.14	mg/L	



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

Reported:
30-May-2017 05:43

WUFF-OUT
17E0196-02 (Water)

Wet Chemistry

Method: SM 4500-P E-99

Sampled: 05/12/2017 11:00

Instrument: UV1800-2

Analyzed: 13-May-2017 19:15

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFE0346
Prepared: 13-May-2017

Sample Size: 10 mL
Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Orthophosphorus	1426-54-42	1	0.0040	0.0190	mg-P/L	

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFE0412
Prepared: 16-May-2017

Sample Size: 25 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.00800	0.0460	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:
30-May-2017 05:43

WUFF-OUT
17E0196-02 (Water)

Calculation

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

Sampled: 05/12/2017 11:00
Analyzed: 16-May-2017 13:17

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 15-May-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	90.1	mg/L	



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Project: Hydro International
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Reported:
30-May-2017 05:43

WUFF-IN
17E0196-03 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 05/12/2017 11:00

Instrument: ICPMS2

Analyzed: 16-May-2017 20:52

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFE0390 Sample Size: 25 mL
Prepared: 16-May-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	15.2	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	37.9	ug/L	



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Reported:
30-May-2017 05:43

WUFF-OUT
17E0196-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 05/12/2017 11:00

Instrument: ICPMS2

Analyzed: 16-May-2017 20:57

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFE0390 Sample Size: 25 mL
Prepared: 16-May-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	17.6	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	36.4	ug/L	



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Project: Hydro International
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Reported:
30-May-2017 05:43

Metals and Metallic Compounds - Quality Control

Batch BFE0361 - TWC EPA 3010A

Instrument: ICP2 Analyst: TCH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFE0361-BLK1)		Prepared: 15-May-2017 Analyzed: 16-May-2017 12:15								
Calcium	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
LCS (BFE0361-BS1)		Prepared: 15-May-2017 Analyzed: 16-May-2017 12:52								
Calcium	9.38	0.0500	mg/L	10.0		93.8	80-120			
Magnesium	9.67	0.0500	mg/L	10.0		96.7	80-120			



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Reported:
30-May-2017 05:43

Metals and Metallic Compounds - Quality Control

Batch BFE0389 - 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 (BFE0389-BLK1)					Prepared: 16-May-2017 Analyzed: 16-May-2017 16:14						
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 (BFE0389-BS1)					Prepared: 16-May-2017 Analyzed: 16-May-2017 16:34						
Copper	63	27.4	0.500	ug/L	25.0		110	80-120			
Copper	65	26.9	0.500	ug/L	25.0		107	80-120			
Zinc	66	88.5	4.00	ug/L	80.0		111	80-120			
Zinc	67	83.4	4.00	ug/L	80.0		104	80-120			
Duplicate (BFE0389-DUP1)					Source: 17E0196-02 Prepared: 16-May-2017 Analyzed: 16-May-2017 16:19						
Copper	63	22.0	0.500	ug/L		20.4			7.17	20	
Zinc	66	46.4	4.00	ug/L		46.2			0.38	20	
Matrix Spike (BFE0389-MS1)					Source: 17E0196-02 Prepared: 16-May-2017 Analyzed: 16-May-2017 16:28						
Copper	63	45.7	0.500	ug/L	25.0	20.4	101	75-125			
Zinc	66	129	4.00	ug/L	80.0	46.2	104	75-125			

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



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Reported:
30-May-2017 05:43

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BFE0390 - 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 (BFE0390-BLK1)					Prepared: 16-May-2017 Analyzed: 16-May-2017 17:23						
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 (BFE0390-BS1)					Prepared: 16-May-2017 Analyzed: 16-May-2017 17:44						
Copper, Dissolved	63	29.0	0.500	ug/L	25.0		116	80-120			
Copper, Dissolved	65	27.1	0.500	ug/L	25.0		108	80-120			
Zinc, Dissolved	66	92.7	4.00	ug/L	80.0		116	80-120			
Zinc, Dissolved	67	91.2	4.00	ug/L	80.0		114	80-120			



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Reported:
30-May-2017 05:43

Wet Chemistry - Quality Control

Batch BFE0346 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFE0346-BLK1)										
					Prepared: 13-May-2017		Analyzed: 13-May-2017 19:13			
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BFE0346-BS1)										
					Prepared: 13-May-2017		Analyzed: 13-May-2017 19:13			
Orthophosphorus	0.149	0.0040	mg-P/L	0.150		99.3	90-110			
Duplicate (BFE0346-DUP1)										
		Source: 17E0196-01		Prepared: 13-May-2017		Analyzed: 13-May-2017 19:14				
Orthophosphorus	0.0100	0.0040	mg-P/L		0.0110			9.52	20	
Matrix Spike (BFE0346-MS1)										
		Source: 17E0196-01		Prepared: 13-May-2017		Analyzed: 13-May-2017 19:14				
Orthophosphorus	0.121	0.0040	mg-P/L	0.0999	0.0110	110	75-125			

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



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Reported:
30-May-2017 05:43

Wet Chemistry - Quality Control

Batch BFE0412 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: CDE

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Prepared: 16-May-2017 Analyzed: 17-May-2017 17:32										
Blank (BFE0412-BLK1)										
Total Phosphorus	ND	0.00800	mg-P/L							U
Prepared: 16-May-2017 Analyzed: 17-May-2017 17:39										
Blank (BFE0412-BLK2)										
Total Phosphorus	ND	0.00800	mg-P/L							U
Prepared: 16-May-2017 Analyzed: 17-May-2017 17:50										
DL (BFE0412-BLK3)										
Total Phosphorus	ND	0.00800	mg-P/L							U
Prepared: 16-May-2017 Analyzed: 17-May-2017 17:52										
Blank (BFE0412-BLK4)										
Total Phosphorus	ND	0.00800	mg-P/L							U
Prepared: 16-May-2017 Analyzed: 17-May-2017 17:33										
LCS (BFE0412-BS1)										
Total Phosphorus	0.304	0.00800	mg-P/L	0.300		101	90-110			
Prepared: 16-May-2017 Analyzed: 17-May-2017 17:39										
DL (BFE0412-BS2)										
Total Phosphorus	0.302	0.00800	mg-P/L	0.300		101	90-110			
Prepared: 16-May-2017 Analyzed: 17-May-2017 17:50										
DL (BFE0412-BS3)										
Total Phosphorus	0.306	0.00800	mg-P/L	0.300		102	90-110			
Prepared: 16-May-2017 Analyzed: 17-May-2017 17:52										
LCS (BFE0412-BS4)										
Total Phosphorus	0.302	0.00800	mg-P/L	0.300		101	90-110			



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Reported:
30-May-2017 05:43

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	05/06/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	03/30/2017
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2017
WADOE	WA Dept of Ecology	C558	06/30/2017
WA-DW	Ecology - Drinking Water	C558	06/30/2017



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Notes and Definitions

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

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17E0196)
Project #: 16T001-035
Client : Analytical Resources, Inc.
Source: Multiple
MTC Sample#: Multiple

Date Received: May 15, 2017
Sampled By: Others
Date Reported: May 26, 2017
Tested By: K. O'Connell

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:

Eggen, T. A.

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980
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Materials Testing & Consulting, Inc.

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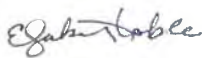
Project: Hydro International (17E0196)
Project #: 16T001-035
Date Received: May 15, 2017
Date Tested: May 25, 2017

Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: K. O'Connell

Suspended Sediment Concentration ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC ($>63\mu\text{m}$) (mg/L)	FineFraction SSC ($<63\mu\text{m}$) (mg/L)	Total Suspended Sediment Concentration (mg/L)
WUFF-IN	T17-0791	5/12/2017	24.6	10.9	35.5
WUFF-OUT	T17-0792	5/12/2017	2.6	3.8	6.4

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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**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 G.Hernandez	SUPERVISOR D. Jacobson LAB DIRECTOR G.S. Conrad, PhD
ATTN: Mark Harris	DATE COLLECTED 5/12/2017	DATE RECEIVED 5/16/2017	DATE COMPLETED 5/25/2017	
JOB: Hydro International Up-Flo Filter				
SITE: Oregon-Washington				

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

LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	SUSPENDED SOLIDS mg/l @ ≥500 μ	SUSPENDED SOLIDS mg/l @ 125 μ	SUSPENDED SOLIDS mg/l @ 63 μ	SUSPENDED SOLIDS mg/l @ 32 μ	SUSPENDED SOLIDS mg/l @ 4 μ	SUSPENDED SOLIDS mg/l @ 1 μ	SUSPENDED SEDIMENT CONC TSS mg/l
07348-1	HI-22/RW	WUFF-IN	7.0	5.0	4.5		7.3	2.4	27.0
		17E0196-01 C/D	26.7%	19.1%	17.2%		27.9%	9.2%	
						Total SSC by Summation →		26.2	
07348-2	HI-23/RW	WUFF-OUT	0.0	0.5	0.5		0.0	1.2	2.0
		17E0196-02 C/D	0.0%	22.7%	22.7%		0.0%	54.5%	
						Total SSC by Summation →		2.2	
			#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	
07348-1	HI-22/RW	WUFF-IN						21.0	
		17E0196-01 C/D							
07348-2	HI-23/RW	WUFF-OUT						2.0	
		17E0196-02 C/D							

COMMENTS

The matrix has a very low concentration of TSS particles amounting to <30 ppm in the input sample; and output is roughly ten times less. For this pair of samples, the overall reduction averaged more than nine-tenths, i.e., @ ~92% (i.e., TSS by summation vs tested TSS). The specific fraction reductions going from coarsest to finest sizes are as follows: 100%, 90.0%, 88.9%, 100%, and 50.0%. The TVSS values in this case are different, but not by a whole lot. The proportion that is volatile suspended solids in the input sample averages ~79%, while in the processed sample essentially all of the mass, i.e., 100%, was volatile particulates. Thus, in this case volatile suspended solids are substantial being very high or all of the suspended particulates. The RPDs are excellent as follows: ±1.5%; and ±4.8%.

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

May 15, 2017

Data_17E0232

ARI ID	Client ID	Proj ID	Matrix	Sampled	Rec	Prep	Analyzed	Method	CAS	Compound	Value	Q	Units
17E0232-01	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/18/2017	SM 2340 B-97		Hardness	52.7		mg/L
17E0232-03	upflow-OUT	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/18/2017	SM 2340 B-97		Hardness	54.3		mg/L
BFE0417-BLK1	Blank	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFE0417-BS1	LCS	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8	7440-50-8	Copper	27.2		ug/L
17E0232-01	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/17/2017	EPA 200.8	7440-50-8	Copper	23.1		ug/L
17E0232-03	upflow-OUT	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/17/2017	EPA 200.8	7440-50-8	Copper	17.8		ug/L
BFE0417-BLK1	Blank	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8	7440-50-8	Copper	0.500	U	ug/L
BFE0417-BS1	LCS	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8	7440-50-8	Copper	27.1		ug/L
BFE0417-BLK1	Blank	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFE0417-BS1	LCS	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8	7440-66-6	Zinc	95.2		ug/L
17E0232-01	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/17/2017	EPA 200.8	7440-66-6	Zinc	62.3		ug/L
17E0232-03	upflow-OUT	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/17/2017	EPA 200.8	7440-66-6	Zinc	48.0		ug/L
BFE0417-BLK1	Blank	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8	7440-66-6	Zinc	4.00	U	ug/L
BFE0417-BS1	LCS	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8	7440-66-6	Zinc	82.8		ug/L
BFE0418-BLK1	Blank	13-05605-000	Water			05/17/2017	05/18/2017	EPA 6010C	7440-70-2	Calcium	0.0500	U	mg/L
BFE0418-BS1	LCS	13-05605-000	Water			05/17/2017	05/18/2017	EPA 6010C	7440-70-2	Calcium	10.0		mg/L
17E0232-01	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/18/2017	EPA 6010C	7440-70-2	Calcium	15.0		mg/L
17E0232-03	upflow-OUT	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/18/2017	EPA 6010C	7440-70-2	Calcium	15.5		mg/L
BFE0418-BLK1	Blank	13-05605-000	Water			05/17/2017	05/18/2017	EPA 6010C	7439-95-4	Magnesium	0.0500	U	mg/L
BFE0418-BS1	LCS	13-05605-000	Water			05/17/2017	05/18/2017	EPA 6010C	7439-95-4	Magnesium	10.3		mg/L
17E0232-01	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/18/2017	EPA 6010C	7439-95-4	Magnesium	3.72		mg/L
17E0232-03	upflow-OUT	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/18/2017	EPA 6010C	7439-95-4	Magnesium	3.78		mg/L
BFE0419-BLK1	Blank	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFE0419-BS1	LCS	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	28.3		ug/L
BFE0419-DUP1	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	13.2		ug/L
BFE0419-MS1	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	37.6		ug/L
17E0232-02	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	13.2		ug/L
17E0232-04	upflow-OUT	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	10.6		ug/L
BFE0419-BLK1	Blank	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	0.500	U	ug/L
BFE0419-BS1	LCS	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-50-8	Copper	27.2		ug/L
BFE0419-BLK1	Blank	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFE0419-BS1	LCS	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	86.2		ug/L
BFE0419-DUP1	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	30.9		ug/L
BFE0419-MS1	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	106		ug/L
17E0232-02	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	29.0		ug/L
17E0232-04	upflow-OUT	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	28.3		ug/L
BFE0419-BLK1	Blank	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	4.00	U	ug/L
BFE0419-BS1	LCS	13-05605-000	Water			05/17/2017	05/17/2017	EPA 200.8-Dissolved	7440-66-6	Zinc	77.2		ug/L
BFE0465-BLK1	Blank	13-05605-000	Water			05/18/2017	05/18/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0040	U	mg-P/L
BFE0465-BS1	LCS	13-05605-000	Water			05/18/2017	05/18/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.150		mg-P/L
BFE0465-DUP1	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/18/2017	05/18/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0080		mg-P/L
BFE0465-MS1	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/18/2017	05/18/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.105		mg-P/L
17E0232-01	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/18/2017	05/18/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0080		mg-P/L
17E0232-03	upflow-OUT	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/18/2017	05/18/2017	SM 4500-P E-99	1426-54-42	Orthophosphorus	0.0090		mg-P/L
BFE0515-BLK1	Blank	13-05605-000	Water			05/20/2017	05/24/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFE0515-BLK2	Blank	13-05605-000	Water			05/20/2017	05/24/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFE0515-BLK3	Blank	13-05605-000	Water			05/20/2017	05/24/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.00800	U	mg-P/L
BFE0515-BS1	LCS	13-05605-000	Water			05/20/2017	05/24/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.290		mg-P/L
BFE0515-BS2	LCS	13-05605-000	Water			05/20/2017	05/24/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.294		mg-P/L
BFE0515-BS3	LCS	13-05605-000	Water			05/20/2017	05/24/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.294		mg-P/L
17E0232-01	upflow-IN	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/20/2017	05/24/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0520		mg-P/L
17E0232-03	upflow-OUT	13-05605-000	Surface Water	05/16/2017	05/16/2017	05/20/2017	05/24/2017	SM 4500-P E-99	7723-14-0	Total Phosphorus	0.0400		mg-P/L



Analytical Resources, Incorporated
Analytical Chemists and Consultants

26 May 2017

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

RE: Hydro International

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

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

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

Associated Work Order(s)
17E0232

Associated SDG ID(s)
N/A

Mark Harris

Digitally signed by Mark Harris
DN: c=US, st=Washington, l=Tukwila,
o=Analytical Resources, Inc., ou=Client Services,
cn=Mark Harris, email=markh@arilabs.com
Date: 2017.06.01 05:26:08 -0700

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.



HERRERA

[illegible]

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



Cooler Receipt Form

ARI Client: Herrera

COC No(s): _____ NA

Assigned ARI Job No: 17E0232

Project Name: Hydro International Upflow filter

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

Tracking No: _____ NA

Preliminary Examination Phase:

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

Were custody papers included with the cooler? YES ☒ NO ☐

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

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

Time: 5.9

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 0005296

Cooler Accepted by: PM Date: 5/16/2017 Time: 16:40

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES ☐ NO ☒

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

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

Were all bottles sealed in individual plastic bags? YES ☐ NO ☒

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

Were all bottle labels complete and legible? YES ☒ NO ☐

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

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

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

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

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

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

Date VOC Trip Blank was made at ARI: NA ☒

Was Sample Split by ARI: NA ☒ Date/Time: 5/16/2017 17:10 Equipment: churn split Split by: PM

Samples Logged by: PM Date: 5/16/2017 Time: 17:28

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

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC
up-flow-in	upflow-in		
up-flow-out	upflow-out		

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____

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

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

Reported:
26-May-2017 06:46

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
upflow-IN	17E0232-01	Water	16-May-2017 14:30	16-May-2017 16:40
upflow-IN	17E0232-02	Water	16-May-2017 14:30	16-May-2017 16:40
upflow-OUT	17E0232-03	Water	16-May-2017 14:30	16-May-2017 16:40
upflow-OUT	17E0232-04	Water	16-May-2017 14:30	16-May-2017 16:40



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

Reported:
26-May-2017 06:46

Case Narrative

Client: Herrera Environmental Consultants
Project: Hydro International
Workorder: 17E0232

Sample receipt

Samples as listed on the preceding page were received 16-May-2017 16:40 under ARI workorder 17E0232. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Total and Dissolved Metals/Hardness - EPA Methods 200.8/6010C

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

All initial and continuing calibrations were within method requirements.

No target elements were detected in the method blanks above the LOQs.

The percent recoveries for all elements were within acceptable QC limits for the LCSs.

A matrix spike (MS) was prepared and analyzed for dissolved metals in conjunction with sample 'upflow-IN'. The percent recoveries for all elements were within acceptable QC limits for the MS.

A matrix duplicate (MD) was prepared and analyzed for dissolved metals in conjunction with sample 'upflow-IN'. The RPDs for all elements were within acceptable QC limits for the MD.

Wet Chemistry

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

All initial and continuing calibrations were within method requirements.

No target compounds were detected in the method blanks above the LOQs.

The percent recoveries for all compounds were within acceptable QC limits for the LCSs.

A matrix spike (MS) was prepared and analyzed for ortho-phosphorous in conjunction with sample 'upflow-IN'. The percent recovery was within acceptable QC limits for the MS.

A matrix duplicate (MD) was prepared and analyzed for ortho-phosphorous in conjunction with sample 'upflow-IN'. The RPD was within acceptable QC limits for the MD.



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

Reported:
26-May-2017 06:46

upflow-IN
17E0232-01 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 05/16/2017 14:30

Instrument: ICPMS2

Analyzed: 17-May-2017 16:07

Sample Preparation:

Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Preparation Batch: BFE0417

Sample Size: 25 mL

Prepared: 17-May-2017

Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	23.1	ug/L	
Zinc	7440-66-6	1	4.00	62.3	ug/L	



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Project: Hydro International
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Reported:
26-May-2017 06:46

upflow-IN
17E0232-01 (Water)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 05/16/2017 14:30

Instrument: ICP2

Analyzed: 18-May-2017 13:56

Sample Preparation:

Preparation Method: TWC EPA 3010A
Preparation Batch: BFE0418
Prepared: 17-May-2017

Sample Size: 25 mL
Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	15.0	mg/L	
Magnesium	7439-95-4	1	0.0500	3.72	mg/L	



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Reported:
26-May-2017 06:46

upflow-IN
17E0232-01 (Water)

Wet Chemistry

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

Sampled: 05/16/2017 14:30
Analyzed: 18-May-2017 12:31

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFE0465
Prepared: 18-May-2017

Sample Size: 10 mL
Final Volume: 10 mL

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

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFE0515
Prepared: 20-May-2017

Sample Size: 25 mL
Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.00800	0.0520	mg-P/L	



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Reported:
26-May-2017 06:46

upflow-IN
17E0232-01 (Water)

Calculation

Method: SM 2340 B-97

Sampled: 05/16/2017 14:30

Instrument: [CALC]

Analyzed: 18-May-2017 13:56

Sample Preparation:

Preparation Method: [CALC]

Preparation Batch: [CALC]

Prepared: 17-May-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	52.7	mg/L	



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Reported:
26-May-2017 06:46

upflow-IN
17E0232-02 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 05/16/2017 14:30

Instrument: ICPMS2

Analyzed: 17-May-2017 18:14

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFE0419 Sample Size: 25 mL
Prepared: 17-May-2017 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.500	13.2	ug/L	
Zinc, Dissolved	7440-66-6	1	4.00	29.0	ug/L	



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

Reported:
26-May-2017 06:46

upflow-OUT
17E0232-03 (Water)

Metals and Metallic Compounds

Method: EPA 200.8

Sampled: 05/16/2017 14:30

Instrument: ICPMS2

Analyzed: 17-May-2017 16:12

Sample Preparation:

Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix

Preparation Batch: BFE0417

Sample Size: 25 mL

Prepared: 17-May-2017

Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.500	17.8	ug/L	
Zinc	7440-66-6	1	4.00	48.0	ug/L	



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Project: Hydro International
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Project Manager: Dylan Ahearn

Reported:
26-May-2017 06:46

upflow-OUT
17E0232-03 (Water)

Metals and Metallic Compounds

Method: EPA 6010C

Sampled: 05/16/2017 14:30

Instrument: ICP2

Analyzed: 18-May-2017 14:00

Sample Preparation:

Preparation Method: TWC EPA 3010A

Preparation Batch: BFE0418

Prepared: 17-May-2017

Sample Size: 25 mL

Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	0.0500	15.5	mg/L	
Magnesium	7439-95-4	1	0.0500	3.78	mg/L	



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Reported:
26-May-2017 06:46

upflow-OUT
17E0232-03 (Water)

Wet Chemistry

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

Sampled: 05/16/2017 14:30
Analyzed: 18-May-2017 12:34

Sample Preparation: Preparation Method: No Prep Wet Chem
Preparation Batch: BFE0465 Sample Size: 10 mL
Prepared: 18-May-2017 Final Volume: 10 mL

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

Sample Preparation: Preparation Method: SM 4500-P B-4 Strong Acid
Preparation Batch: BFE0515 Sample Size: 25 mL
Prepared: 20-May-2017 Final Volume: 50 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Phosphorus	7723-14-0	1	0.00800	0.0400	mg-P/L	



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

Reported:
26-May-2017 06:46

upflow-OUT
17E0232-03 (Water)

Calculation

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

Sampled: 05/16/2017 14:30
Analyzed: 18-May-2017 14:00

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 17-May-2017

Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.331	54.3	mg/L	



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Reported:
26-May-2017 06:46

upflow-OUT
17E0232-04 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8

Sampled: 05/16/2017 14:30

Instrument: ICPMS2

Analyzed: 17-May-2017 19:17

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO₃ matrix
Preparation Batch: BFE0419 Sample Size: 25 mL
Prepared: 17-May-2017 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	28.3	ug/L	



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Project: Hydro International
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Reported:
26-May-2017 06:46

Metals and Metallic Compounds - Quality Control

Batch BFE0417 - 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 (BFE0417-BLK1) Prepared: 17-May-2017 Analyzed: 17-May-2017 14:22											
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 (BFE0417-BS1) Prepared: 17-May-2017 Analyzed: 17-May-2017 14:41											
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	95.2	4.00	ug/L	80.0		119	80-120			
Zinc	67	82.8	4.00	ug/L	80.0		104	80-120			



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Reported:
26-May-2017 06:46

Metals and Metallic Compounds - Quality Control

Batch BFE0418 - TWC EPA 3010A

Instrument: ICP2 Analyst: TCH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFE0418-BLK1)										
				Prepared: 17-May-2017 Analyzed: 18-May-2017 11:49						
Calcium	ND	0.0500	mg/L							U
Magnesium	ND	0.0500	mg/L							U
LCS (BFE0418-BS1)										
				Prepared: 17-May-2017 Analyzed: 18-May-2017 12:34						
Calcium	10.0	0.0500	mg/L	10.0		100	80-120			
Magnesium	10.3	0.0500	mg/L	10.0		103	80-120			



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

Reported:
26-May-2017 06:46

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BFE0419 - 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 (BFE0419-BLK1)											
						Prepared: 17-May-2017 Analyzed: 17-May-2017 18:05					
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 (BFE0419-BS1)											
						Prepared: 17-May-2017 Analyzed: 17-May-2017 18:25					
Copper, Dissolved	63	28.3	0.500	ug/L	25.0		113	80-120			
Copper, Dissolved	65	27.2	0.500	ug/L	25.0		109	80-120			
Zinc, Dissolved	66	86.2	4.00	ug/L	80.0		108	80-120			
Zinc, Dissolved	67	77.2	4.00	ug/L	80.0		96.5	80-120			
Duplicate (BFE0419-DUP1)											
			Source: 17E0232-02			Prepared: 17-May-2017 Analyzed: 17-May-2017 18:10					
Copper, Dissolved	63	13.2	0.500	ug/L		13.2			0.14	20	
Zinc, Dissolved	66	30.9	4.00	ug/L		29.0			6.27	20	
Matrix Spike (BFE0419-MS1)											
			Source: 17E0232-02			Prepared: 17-May-2017 Analyzed: 17-May-2017 18:19					
Copper, Dissolved	63	37.6	0.500	ug/L	25.0	13.2	97.6	75-125			
Zinc, Dissolved	66	106	4.00	ug/L	80.0	29.0	96.5	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:
26-May-2017 06:46

Wet Chemistry - Quality Control

Batch BFE0465 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: AGW

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFE0465-BLK1)										
					Prepared: 18-May-2017		Analyzed: 18-May-2017 12:29			
Orthophosphorus	ND	0.0040	mg-P/L							U
LCS (BFE0465-BS1)										
					Prepared: 18-May-2017		Analyzed: 18-May-2017 12:29			
Orthophosphorus	0.150	0.0040	mg-P/L	0.150		100	90-110			
Duplicate (BFE0465-DUP1)										
		Source: 17E0232-01		Prepared: 18-May-2017		Analyzed: 18-May-2017 12:32				
Orthophosphorus	0.0080	0.0040	mg-P/L		0.0080			0.00		
Matrix Spike (BFE0465-MS1)										
		Source: 17E0232-01		Prepared: 18-May-2017		Analyzed: 18-May-2017 12:32				
Orthophosphorus	0.105	0.0040	mg-P/L	0.0999	0.0080	97.1	75-125			

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



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Seattle WA, 98121

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

Reported:
26-May-2017 06:46

Wet Chemistry - Quality Control

Batch BFE0515 - SM 4500-P B-4 Strong Acid

Instrument: UV1800-2 Analyst: KK

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFE0515-BLK1) Prepared: 20-May-2017 Analyzed: 24-May-2017 13:52										
Total Phosphorus	ND	0.00800	mg-P/L							U
Blank (BFE0515-BLK2) Prepared: 20-May-2017 Analyzed: 24-May-2017 14:00										
Total Phosphorus	ND	0.00800	mg-P/L							U
DL (BFE0515-BLK3) Prepared: 20-May-2017 Analyzed: 24-May-2017 14:04										
Total Phosphorus	ND	0.00800	mg-P/L							U
LCS (BFE0515-BS1) Prepared: 20-May-2017 Analyzed: 24-May-2017 13:53										
Total Phosphorus	0.290	0.00800	mg-P/L	0.300		96.7	90-110			
DL (BFE0515-BS2) Prepared: 20-May-2017 Analyzed: 24-May-2017 14:00										
Total Phosphorus	0.294	0.00800	mg-P/L	0.300		98.0	90-110			
DL (BFE0515-BS3) Prepared: 20-May-2017 Analyzed: 24-May-2017 14:05										
Total Phosphorus	0.294	0.00800	mg-P/L	0.300		98.0	90-110			



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Certified Analyses included in this Report

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

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/06/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	03/30/2017
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2017
WADOE	WA Dept of Ecology	C558	06/30/2017
WA-DW	Ecology - Drinking Water	C558	06/30/2017



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Notes and Definitions

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

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17E0232)
Project #: 16T001-035
Client : Analytical Resources, Inc.
Source: Multiple
MTC Sample#: Multiple

Date Received: May 17, 2017
Sampled By: Others
Date Reported: May 26, 2017
Tested By: K. O'Connell

CASE NARRATIVE

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

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

Reviewed by: 

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Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974
Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Project: Hydro International (17E0232)

Client: Analytical Resources, Inc.

Project #: 16T001-035

Date Received: May 17, 2017

Date Tested: May 25, 2017

Sampled by: Others

Tested by: K. O'Connell

Suspended Sediment Concentration ASTM D3977 Method C

Client Sample ID	MTC Sample ID	Sampling Date	Coarse Fraction SSC ($>63\mu\text{m}$) (mg/L)	Fine Fraction SSC ($<63\mu\text{m}$) (mg/L)	Total Suspended Sediment Concentration (mg/L)
upflow-IN	T17-0931	5/16/2017	2.8	14.7	17.5
upflow-OUT	T17-0932	5/16/2017	2.1	6.1	8.2

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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)		SUPERVISOR	
ATTN: Mark Harris				DATE	DATE	S. Santos	D. Jacobson
JOB: Hydro International Up-Flo Filter				COLLECTED	RECEIVED	G.Hernandez	LAB DIRECTOR
SITE: Oregon-Washington				5/16/2017	5/18/2017		G.S. Conrad, PhD
				5/31/2017			

PARTICLE SIZE DISTRIBUTION (PSD) ANALYSIS & REPORT – 5 PART									
LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	SUSPENDED SOLIDS mg/l @ ≥500 μ	SUSPENDED SOLIDS mg/l @ 125 μ	SUSPENDED SOLIDS mg/l @ 63 μ	SUSPENDED SOLIDS mg/l @ 32 μ	SUSPENDED SOLIDS mg/l @ 4 μ	SUSPENDED SOLIDS mg/l @ 1 μ	SUSPENDED SEDIMENT CONC TSS mg/l
07358-1	HI-24/RW	UF-IN	0.5	1.5	0.5		2.2	2.2	6.0
	17E0232-01	C/D/E	7.2%	21.7%	7.2%		31.9%	31.9%	
						Total SSC by Summation →		6.9	
07358-2	HI-25/RW	UF-OUT	0.0	0.0	0.0		1.2	1.2	2.0
	17E0232-03	C/D/E	0.0%	0.0%	0.0%		50.0%	50.0%	
						Total SSC by Summation →		2.4	
			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
						Total SSC by Summation →		0.0	
			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
						Total SSC by Summation →		0.0	
LAB SAMPLE NUMBER	SAMPLE ID	SOURCE of WATER	Water pH -log[H ⁺]	ECw [Spec Cond] μS/cm	COLOR, TRUE PtCo Units	COLOR APPARENT PtCo Units	TOTAL IRON Fe (diss.) mg/l	TOTAL VOLATILE SUSPENDED SOLIDS (TVSS) mg/l	
07358-1	HI-24/RW	UF-IN						6-6.9	
	17E0232-01	C/D/E							
07358-2	HI-25/RW	UF-OUT						2-2.4	
	17E0232-03	C/D/E							

COMMENTS

The matrix has an extremely low concentration of TSS particles amounting to <10 ppm in the input sample; and output is only in the 2-3 ppm. For this pair of samples, the overall reduction averaged nearly two-thirds, i.e., @ ~66% (i.e., TSS by summation vs tested TSS). The specific fraction reductions going from coarsest to finest sizes are as follows: 100%, 100%, 100%, 45.5%, and 45.5%. The TVSS values in this case are not at all different. The proportion that is volatile suspended solids in both the input and output samples is at 100% this time. Thus, in this case volatile suspended solids are all of the suspended particulates, i.e., essentially 100% organic matter; also, organic matter masses are so small that any residual "ash" is so low that it is not measurable. The RPDs are very good as follows: ±7.0%; and ±9.1%.

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

