Addendum – August 2015

This section of the Project File includes all information pertaining to the Addendum completed in August 2015.

CASH CLIENTS - LONDON
ATTN: TriMatrix Laboratories, Jim McFadden
5560 Corporate Exchange Ct
Grand Rapids MI 49512

Date Received: 31-MAR-15
Report Date: 08-APR-15 14:58 (MT)
Version: FINAL

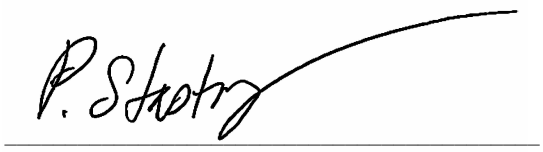
Client Phone: 616-976-4544

Certificate of Analysis

Lab Work Order #: L1593446

Project P.O. #: NOT SUBMITTED
Job Reference: GRAND MARAIS DRAIN
C of C Numbers:
Legal Site Desc:

Comments: ADDITIONAL 07-APR-15 11:51



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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1593446-1 FILTRATE							
Sampled By: CLIENT on 26-MAR-15 @ 10:00							
Matrix: WATER							
F1-F4-O.Reg 153/04 (July 2011)							
F1-F4 Hydrocarbon Calculated Parameters							
Total Hydrocarbons (C6-C50)	<370		370	ug/L		06-APR-15	
F1-O.Reg 153/04 (July 2011)							
F1 (C6-C10)	<25		25	ug/L		02-APR-15	R3168058
Surrogate: 3,4-Dichlorotoluene	97.6		60-140	%		02-APR-15	R3168058
F2-F4-O.Reg 153/04 (July 2011)							
F2 (C10-C16)	350		100	ug/L	01-APR-15	02-APR-15	R3169210
F3 (C16-C34)	<250		250	ug/L	01-APR-15	02-APR-15	R3169210
F4 (C34-C50)	<250		250	ug/L	01-APR-15	02-APR-15	R3169210
Chrom. to baseline at nC50	YES				01-APR-15	02-APR-15	R3169210
Surrogate: 2-Bromobenzotrifluoride	104.0		60-140	%	01-APR-15	02-APR-15	R3169210

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
F1-F4-511-CALC-WT	Water	F1-F4 Hydrocarbon Calculated Parameters	CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-511-WT	Water	F1-O.Reg 153/04 (July 2011)	E3398/CCME TIER 1-HS

Fraction F1 is determined by analyzing by headspace-GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

F2-F4-511-WT	Water	F2-F4-O.Reg 153/04 (July 2011)	MOE DECPH-E3398/CCME TIER 1

Fractions F2, F3 and F4 are determined by liquid/liquid extraction with a solvent. The solvent recovered from the extracted sample is dried and treated to remove polar material. The extract is then analyzed by GC/FID.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: CASH CLIENTS - LONDON
5560 Corporate Exchange Ct
Grand Rapids MI 49512
Contact: TriMatrix Laboratories, Jim McFadden

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-511-WT	**Water**							
Batch R3168058								
WG2059513-1 CVS								
F1 (C6-C10)			98.4		%		80-120	02-APR-15
WG2059513-2 MB								
F1 (C6-C10)			<25		ug/L		25	02-APR-15
Surrogate: 3,4-Dichlorotoluene			102.8		%		60-140	02-APR-15
F2-F4-511-WT	**Water**							
Batch R3169210								
WG2063916-1 CVS								
F2 (C10-C16)			111.6		%		80-120	02-APR-15
F3 (C16-C34)			109.4		%		80-120	02-APR-15
F4 (C34-C50)			113.9		%		80-120	02-APR-15
WG2063916-2 CVS								
F2 (C10-C16)			111.7		%		80-120	02-APR-15
F3 (C16-C34)			107.7		%		80-120	02-APR-15
F4 (C34-C50)			112.5		%		80-120	02-APR-15
WG2063743-2 LCS								
F2 (C10-C16)			99.0		%		65-135	02-APR-15
F3 (C16-C34)			98.8		%		65-135	02-APR-15
F4 (C34-C50)			113.9		%		65-135	02-APR-15
WG2063743-1 MB								
F2 (C10-C16)			<100		ug/L		100	02-APR-15
F3 (C16-C34)			<250		ug/L		250	02-APR-15
F4 (C34-C50)			<250		ug/L		250	02-APR-15
Surrogate: 2-Bromobenzotrifluoride			92.5		%		60-140	02-APR-15

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L1593446-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	TriMatrix Laboratories	Select Report Format:	☒PDF ☐EXCEL ☐EDD (DIGITAL)	R ☑Regular (Standard TAT if received by 3 pm - business days)
Contact:	Jim Mc Fadden	Quality Control (QC) Report with Report	☒Yes ☐No	P ☐Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5560 Corporate Exchange Court Grand Rapids MI, 49512	☐Criteria on Report - provide details below if box checked		E ☐Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
		Select Distribution:	☑EMAIL ☐MAIL ☐FAX	E2 ☐Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	616-976-4544	Email 1 or Fax	mcfaddenj@trimatrixlabs.com	Specify Date Required for E2,E or P:
		Email 2		

Invoice To		Invoice Distribution	
	Same as Report To ☒Yes ☐No	Select Invoice Distribution:	☑EMAIL ☐MAIL ☐FAX
	Copy of Invoice with Report ☒Yes ☐No	Email 1 or Fax	mcfaddenj@trimatrixlabs.com
Company:	Trimatrix	Email 2	
Contact:	Accounts Payable		

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q49885	Approver ID:	Cost Center:
Job #:		GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	L1593446	ALS Contact:	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F1-F4-511-P-WT	Number of Containers
-1	Filtrate	26-3-15	10:00	Water	R	5

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐Yes ☒No	
Are samples for human drinking water use? ☐Yes ☒No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐		SIF Observations	Yes ☐	No ☐		
Ice packs	Yes ☐	No ☐	Custody seal intact	Yes ☐	No ☐		
Cooling Initiated	☐						

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
					6.6

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: 3/26/15	Time: 12:00	Received by:	Date: 3/26/15	Time: 1200	Received by:	Date: 27/3/15	Time: 1200

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS-FM-0329e v08 Front03 October 2013

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form

April 09, 2015

WATERSOLVE, LLC
Attn: Doug Walker
5031 68th St. SE
Calendonia, MI 49316

Project: Filtrate Project

Dear Doug Walker,

Enclosed is a copy of the laboratory report for the following work order(s) received by TriMatrix Laboratories:

Work Order	Received	Description
1503390	03/26/2015	Laboratory Services

This report relates only to the sample(s) as received. Test results are in compliance with the requirements of the National Environmental Laboratory Accreditation Program (NELAP) and/or one of the following certification programs:

ACLASS DoD-ELAP/ISO17025 (#ADE-1542); Arkansas DEP (#88-0730/13-049-0); Florida DEP (#E87622-24); Georgia EPD (#E87622-24); Illinois DEP (#200026/003329); Kansas DPH (#E-10302); Kentucky DEP (#0021); Louisiana DEP (#103068); Michigan DPH (#0034); Minnesota DPH (#491715); New York ELAP (#11776/48855); North Carolina DNRE (#659); Virginia DCLS (#460153/2592); Wisconsin DNR (#999472650); USDA Soil Import Permit (#P330-12-00236).

Any qualification or narration of results, including sample acceptance requirements and test exceptions to the above referenced programs, is presented in the Statement of Data Qualifications and Project Technical Narrative sections of this report. Estimates of analytical uncertainties and certification documents for the test results contained within this report are available upon request.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

James D. McFadden
Project Chemist

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Individual sample results relate only to the sample tested.
5560 Corporate Exchange Court SE ♦ Grand Rapids, MI 49512 ♦ 616.975.4500 ♦ Fax 616.942.7463 ♦ www.trimatrixlabs.com

PROJECT TECHNICAL NARRATIVE(s)

Polychlorinated Biphenyls (PCBs) by EPA Method 8082A

Narrative: Due to sample volumes, batch matrix quality control (QC) was not performed for this analysis. A Method Blank and Laboratory Control Sample comprise the batch QC.

Analysis: USEPA-8082A

Sample/Analyte: 1503390-01 Filtrate

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PROJECT TECHNICAL NARRATIVE(s)

Semivolatile Organic Compounds by EPA Method 8270C

Narrative: Due to sample volumes, batch matrix quality control (QC) was not performed for this analysis. A Method Blank and Laboratory Control Sample comprise the batch QC.

Analysis: USEPA-8270C

Sample/Analyte: 1503390-01 Filtrate

Narrative: Manual integration was required on the analytes listed below. All manual integrations were performed and reviewed in accordance with TriMatrix laboratory policy.

Analysis: USEPA-8270C

Sample/Analyte: 1503390-01 Filtrate Naphthalene

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PROJECT TECHNICAL NARRATIVE(s)

Total Metals by EPA 6000/7000 Series Methods

Narrative: Due to sample matrix-related Internal Standard failure, the sample was reanalyzed at dilution. The RL for this analyte has been elevated.

Analysis: USEPA-6020A

Sample/Analyte:			
	1503390-01	Filtrate	Lead
	1503390-01	Filtrate	Uranium

Narrative: The CRL recovery for this analyte was outside of the laboratory control limits.

Analysis: USEPA-6020A

	5D08026-CRL1	Antimony

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STATEMENT OF DATA QUALIFICATIONS

Volatile Organic Compounds by EPA Method 8260B

Qualification: The corresponding CCV for this analytical batch had a recovery exceeding the upper control limit of the method. A positive result for this analyte in any associated samples are considered estimated. Non-detectable results are not qualified.

Analysis: USEPA-8260B

Sample/Analyte: 1503390-01 Filtrate Bromomethane

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STATEMENT OF DATA QUALIFICATIONS

Total Metals by EPA 6000/7000 Series Methods

Qualification: The LCS recovery exceeded the upper control limit. Positive results for this analyte in all samples in the associated QC batch are considered estimated. Non-detectable results are not qualified.

Analysis: USEPA-6020A

Sample/Analyte: 1503390-01 Filtrate Antimony

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STATEMENT OF DATA QUALIFICATIONS

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Qualification: The MS and/or MSD recovery was outside the laboratory or method control limit.

Analysis: USEPA-7196A

Sample/Analyte:			
	1503390-01	Filtrate	Chromium, Hexavalent

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TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**WATERSOLVE, LLC**	Work Order:	**1503390**		
Project:	Filtrate Project	Description:	Laboratory Services		
Client Sample ID:	**Filtrate**	Sampled:	03/26/15 10:00		
Lab Sample ID:	**1503390-01**	Sampled By:	Doug Walker		
Matrix:	Water	Received:	03/26/15 12:00		
Unit:	ug/L	Prepared:	03/30/15 12:06	By:	ALK
Dilution Factor:	1	Analyzed:	04/02/15 16:39	By:	MSZ
QC Batch:	1502849	Analytical Batch:	5D03016		

Polychlorinated Biphenyls (PCBs) by EPA Method 8082A

CAS Number	Analyte	Analytical Result	RL
12674-11-2	PCB-1016	<0.20	0.20
11104-28-2	PCB-1221	<0.20	0.20
11141-16-5	PCB-1232	<0.20	0.20
53469-21-9	PCB-1242	<0.20	0.20
12672-29-6	PCB-1248	<0.20	0.20
11097-69-1	PCB-1254	<0.20	0.20
11096-82-5	PCB-1260	<0.20	0.20

Surrogates:	***% Recovery***	***Control Limits***
Decachlorobiphenyl	*81*	*52-139*
Tetrachloro-m-xylene	*78*	*26-118*

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TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**WATERSOLVE, LLC**	Work Order:	**1503390**
Project:	Filtrate Project	Description:	Laboratory Services
Client Sample ID:	**Filtrate**	Sampled:	03/26/15 10:00
Lab Sample ID:	**1503390-01**	Sampled By:	Doug Walker
Matrix:	Water	Received:	03/26/15 12:00
Unit:	ug/L	Prepared:	03/27/15 07:00 By: DLV
Dilution Factor:	1	Analyzed:	03/31/15 03:17 By: DLV
QC Batch:	1502874	Analytical Batch:	5C31010

Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	**7.7**	5.0
71-43-2	Benzene	<1.0	1.0
75-27-4	Bromodichloromethane	<1.0	1.0
75-25-2	Bromoform	<1.0	1.0
*74-83-9	Bromomethane	<1.0	1.0
56-23-5	Carbon Tetrachloride	<1.0	1.0
108-90-7	Chlorobenzene	<1.0	1.0
67-66-3	Chloroform	<1.0	1.0
124-48-1	Dibromochloromethane	<1.0	1.0
106-93-4	1,2-Dibromoethane	<1.0	1.0
95-50-1	1,2-Dichlorobenzene	<1.0	1.0
541-73-1	1,3-Dichlorobenzene	<1.0	1.0
106-46-7	1,4-Dichlorobenzene	<1.0	1.0
75-71-8	Dichlorodifluoromethane	<1.0	1.0
75-34-3	1,1-Dichloroethane	<1.0	1.0
107-06-2	1,2-Dichloroethane	<1.0	1.0
75-35-4	1,1-Dichloroethene	<1.0	1.0
156-59-2	cis-1,2-Dichloroethene	<1.0	1.0
156-60-5	trans-1,2-Dichloroethene	<1.0	1.0
78-87-5	1,2-Dichloropropane	<1.0	1.0
10061-01-5	cis-1,3-Dichloropropene	<1.0	1.0
10061-02-6	trans-1,3-Dichloropropene	<1.0	1.0
100-41-4	Ethylbenzene	<1.0	1.0
110-54-3	Hexane	<10	10
1634-04-4	Methyl tert-Butyl Ether	<1.0	1.0
75-09-2	Methylene Chloride	<1.0	1.0
78-93-3	2-Butanone (MEK)	<5.0	5.0
108-10-1	4-Methyl-2-pentanone (MIBK)	<5.0	5.0
100-42-5	Styrene	<1.0	1.0

Continued on next page

*See Statement of Data Qualifications

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TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**WATERSOLVE, LLC**	Work Order:	**1503390**		
Project:	Filtrate Project	Description:	Laboratory Services		
Client Sample ID:	**Filtrate**	Sampled:	03/26/15 10:00		
Lab Sample ID:	**1503390-01**	Sampled By:	Doug Walker		
Matrix:	Water	Received:	03/26/15 12:00		
Unit:	ug/L	Prepared:	03/27/15 07:00	By:	DLV
Dilution Factor:	1	Analyzed:	03/31/15 03:17	By:	DLV
QC Batch:	1502874	Analytical Batch:	5C31010		

Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
630-20-6	1,1,1,2-Tetrachloroethane	<1.0	1.0
79-34-5	1,1,2,2-Tetrachloroethane	<1.0	1.0
127-18-4	Tetrachloroethene	<1.0	1.0
108-88-3	Toluene	<1.0	1.0
71-55-6	1,1,1-Trichloroethane	<1.0	1.0
79-00-5	1,1,2-Trichloroethane	<1.0	1.0
79-01-6	Trichloroethene	<1.0	1.0
75-69-4	Trichlorofluoromethane	<1.0	1.0
75-01-4	Vinyl Chloride	<1.0	1.0
179601-23-1	Xylene, Meta + Para	<2.0	2.0
95-47-6	Xylene, Ortho	<1.0	1.0
1330-20-7	Xylene (Total)	<3.0	3.0

Surrogates:	***% Recovery***	***Control Limits***
Dibromofluoromethane	*100*	*85-118*
1,2-Dichloroethane-d4	*105*	*87-122*
Toluene-d8	*97*	*85-113*
4-Bromofluorobenzene	*97*	*82-110*

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TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**WATERSOLVE, LLC**	Work Order:	**1503390**		
Project:	Filtrate Project	Description:	Laboratory Services		
Client Sample ID:	**Filtrate**	Sampled:	03/26/15 10:00		
Lab Sample ID:	**1503390-01**	Sampled By:	Doug Walker		
Matrix:	Water	Received:	03/26/15 12:00		
Unit:	ug/L	Prepared:	03/31/15 10:14	By:	ALK
Dilution Factor:	1	Analyzed:	04/03/15 13:17	By:	ASC
QC Batch:	1502854	Analytical Batch:	5D06015		

Semivolatile Organic Compounds by EPA Method 8270C

CAS Number	Analyte	Analytical Result	RL
83-32-9	Acenaphthene	<0.50	0.50
208-96-8	Acenaphthylene	<0.50	0.50
120-12-7	Anthracene	<0.50	0.50
56-55-3	Benzo(a)anthracene	<0.50	0.50
50-32-8	Benzo(a)pyrene	<0.50	0.50
205-99-2	Benzo(b)fluoranthene	<0.50	0.50
207-08-9	Benzo(k)fluoranthene	<0.50	0.50
191-24-2	Benzo(g,h,i)perylene	<0.50	0.50
218-01-9	Chrysene	<0.50	0.50
53-70-3	Dibenz(a,h)anthracene	<0.50	0.50
206-44-0	Fluoranthene	<0.50	0.50
86-73-7	Fluorene	<0.50	0.50
193-39-5	Indeno(1,2,3-cd)pyrene	<0.50	0.50
91-57-6	2-Methylnaphthalene	<0.50	0.50
90-12-0	1-Methylnaphthalene	<0.50	0.50
91-20-3	Naphthalene	<0.50	0.50
85-01-8	Phenanthrene	<0.50	0.50
129-00-0	Pyrene	<0.50	0.50

Surrogates:	*% Recovery*	*Control Limits*
2-Fluorophenol	*24*	*20-70*
Phenol-d6	*20*	*18-45*
Nitrobenzene-d5	*71*	*31-123*

Continued on next page

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ANALYTICAL REPORT

Client:	**WATERSOLVE, LLC**	Work Order:	**1503390**
Project:	Filtrate Project	Description:	Laboratory Services
Client Sample ID:	**Filtrate**	Sampled:	03/26/15 10:00
Lab Sample ID:	**1503390-01**	Sampled By:	Doug Walker
Matrix:	Water	Received:	03/26/15 12:00
Unit:	ug/L	Prepared:	03/31/15 10:14 By: ALK
Dilution Factor:	1	Analyzed:	04/03/15 13:17 By: ASC
QC Batch:	1502854	Analytical Batch:	5D06015

Semivolatile Organic Compounds by EPA Method 8270C (Continued)

Surrogates (Continued):	***% Recovery***	***Control Limits***
2-Fluorobiphenyl	*63*	*25-113*
2,4,6-Tribromophenol	*46*	*30-121*
o-Terphenyl	*64*	*42-125*

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TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**WATERSOLVE, LLC**	Work Order:	**1503390**
Project:	Filtrate Project	Description:	Laboratory Services
Client Sample ID:	**Filtrate**	Sampled:	03/26/15 10:00
Lab Sample ID:	**1503390-01**	Sampled By:	Doug Walker
Matrix:	Water	Received:	03/26/15 12:00

Total Metals by EPA 6000/7000 Series Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Time Analyzed	By	QC Batch
*Antimony	<1.0	1.0	ug/L	1	USEPA-6020A	04/08/15 14:37	MSM	1502842
Arsenic	**2.3**	1.0	ug/L	1	USEPA-6020A	04/08/15 10:55	DSC	1502842
Barium	**220**	10	ug/L	10	USEPA-6020A	04/08/15 12:30	DSC	1502842
Beryllium	<1.0	1.0	ug/L	1	USEPA-6020A	04/08/15 14:37	MSM	1502842
Boron	**150**	50	ug/L	5	USEPA-6020A	04/08/15 14:36	MSM	1502842
Cadmium	**0.35**	0.20	ug/L	1	USEPA-6020A	04/08/15 10:55	DSC	1502842
Chromium	**3.1**	1.0	ug/L	1	USEPA-6020A	04/08/15 10:55	DSC	1502842
Cobalt	**2.6**	1.0	ug/L	1	USEPA-6020A	04/08/15 10:55	DSC	1502842
Copper	**4.1**	1.0	ug/L	1	USEPA-6020A	04/08/15 10:55	DSC	1502842
Lead	<5.0	5.0	ug/L	5	USEPA-6020A	04/08/15 11:07	DSC	1502842
Molybdenum	**13**	1.0	ug/L	1	USEPA-6020A	04/08/15 10:55	DSC	1502842
Mercury	<0.20	0.20	ug/L	1	USEPA-7470A	04/02/15 17:58	CKD	1502917
Nickel	**5.0**	1.0	ug/L	1	USEPA-6020A	04/08/15 10:55	DSC	1502842
Selenium	**1.3**	1.0	ug/L	1	USEPA-6020A	04/08/15 15:02	MSM	1502842
Silver	<0.20	0.20	ug/L	1	USEPA-6020A	04/08/15 10:55	DSC	1502842
Thallium	<1.0	1.0	ug/L	5	USEPA-6020A	04/08/15 11:07	DSC	1502842
Uranium	<5.0	5.0	ug/L	5	USEPA-6020A	04/08/15 11:07	DSC	1502842
Vanadium	**1.4**	1.0	ug/L	1	USEPA-6020A	04/08/15 10:55	DSC	1502842
Zinc	**22**	10	ug/L	1	USEPA-6020A	04/08/15 10:55	DSC	1502842

*See Statement of Data Qualifications

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TRIMATRIX LABORATORIES

ANALYTICAL REPORT

Client:	**WATERSOLVE, LLC**	Work Order:	**1503390**
Project:	Filtrate Project	Description:	Laboratory Services
Client Sample ID:	**Filtrate**	Sampled:	03/26/15 10:00
Lab Sample ID:	**1503390-01**	Sampled By:	Doug Walker
Matrix:	Water	Received:	03/26/15 12:00

Physical/Chemical Parameters by EPA/APHA/ASTM Methods

Analyte	Analytical Result	RL	Unit	Dilution Factor	Method	Date Time Analyzed	By	QC Batch
*Chromium, Hexavalent	<0.0010	0.0010	mg/L	1	USEPA-7196A	03/26/15 13:52	LMA	1502924

*See Statement of Data Qualifications

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PRETREATMENT SUMMARY PAGE

Client: **WATERSOLVE, LLC**
Project: **Filtrate Project**

Pretreatment	Lab Sample ID	Batch	By	Date & Time Prepared
USEPA-3020A Metals Digestion	1503390-01	1502842	ARB	03/31/15 08:00
USEPA-3510C Liquid-Liquid Extraction	1503390-01	1502849	ALK	03/30/15 12:06
		1502854	ALK	03/31/15 10:14
USEPA-3665A/3660B Sulfuric Acid/Sulfur Cleanup	1503390-01	5C31066	ALK	03/31/15 12:00
USEPA-7470A Mercury Digestion	1503390-01	1502917	JBA	04/01/15 13:00

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TRIMATRIX LABORATORIES

Chain of Custody Record

COC No. 150336593

5560 Corporate Exchange Court SE, Grand Rapids, MI 49512
Phone (616) 975-4500 Fax (616) 942-7463 www.trimatrixlabs.com

Pg. 1 of 1

For Lab Use Only
Cart: 9
VOA Rack/Tray: 636
Receipt Log No.: 3-4
Project Chemist: Jim McFadden
Work Order No.: 1503390

Client Name: WATERSOLVE, LLC
Address: 5031 68th St. SE
City, State Zip: Caledonia, MI 49316
Phone: (616) 443-4568 Fax
Email: dougw@gowatersolve.com

Project Name: Filtrate Project
Client Project No. / P.O. No.
Invoice To: ☑ Client ☐ Other (comments)
Contact/Report To: Doug Walker

Analyses Requested

	D	A	A	B	H						
	VOCs	PAH & PCB	Hexavalent Chromium	Metals	PHC F1-F4						
Container Type (corresponds to Container Packing List)	1	2	3	6	9						
Number of Containers Submitted	3	4	1	1	5					Total	Sample Comments

PRESERVATIVES
A NONE pH~7
B HNO_3 pH<2
C H_2SO_4 pH<2
D 1+1 HCl pH<2
E NaOH pH>12
F ZnAc/NaOH pH>9
G MeOH
H Other (note below)

	Schedule	Matrix Code	Sample Number	Field Sample ID	Cooler ID	Sample Date	Sample Time	COMP	GRAB	Matrix	Total	Sample Comments
1			01	FILTRATE		3/26/15	10:00		✓	W	14	
2												
3												
4												
5												
6												
7												
8												
9												
10												

Sampled By (print): DOUG WALKER
Sampler's Signature:
Company: WATERSOLVE, LLC

How Shipped? Hand X Carrier
Tracking No.

Comments: **Please sample the Hexavalent Chromium as late as possible and overnight to the lab due to a short holding time of 24hrs.** PHC F1-F4 vials preserved with NaHSO4 and the amber glass bottles are preserved with soudium bisulfate.

	1. Relinquished By	Date	Time	2. Relinquished By	Date	Time	3. Relinquished By	Date	Time
		3/26/15	12:00						
	1. Received By	Date	Time	2. Received By	Date	Time	3. Received For Lab By	Date	Time
	Ray Johnson	3/26/15	1200					3.26.15	12

ORIGINAL - LABORATORY COPY - SAMPLER

SAMPLE RECEIVING / LOG-IN CHECKLIST

TRIMATRIX LABORATORIES

Client: Watersolve	Work Order #: 1503390
	New / Add To
Receipt Record Page/Line #: 3-6	Project Chemist / Sample #s

Recorded by (initials/date): WC 3-26-15	☒ Cooler ☐ Box ☐ Other____	Qty Received: 1	Thermometer Used: ☒ IR Gun (#202) ☐ Digital Thermometer (#54) ☐ Other (#____) ☐ See Additional Cooler Information Form

Cooler #: Tm 1500 **Time:** 1648

Custody Seals: ☒ None ☐ Present / Intact ☐ Present / Not Intact

Coolant Type: ☐ Loose Ice ☐ Bagged Ice ☐ Blue Ice ☒ None

Coolant Location: Dispersed / Top / Middle / Bottom

Temp Blank Present: ☐ Yes ☐ No

If Present, Temperature Blank Location is: ☐ Representative ☐ Not Representative

	Observed °C	Correction Factor °C	Actual °C
Temp Blank:			
Sample 1:	20.6	–	20.6
Sample 2:	20.6	–	20.6
Sample 3:	20.6	–	20.6

3 Sample Average °C: 20.6

☐ Cooler ID on COC?
☐ VOC Trip Blank received?

(Cooler columns 2–4: Cooler #, Time, Custody Seals, Coolant Type, Coolant Location, Temp Blank, temperature table, 3 Sample Average °C, Cooler ID on COC?, VOC Trip Blank received? — blank)

If any shaded areas checked, complete Sample Receiving Non-Conformance and/or Inventory Form

Paperwork Received

Yes / No
- ☒ Yes — Chain of Custody record(s)? If No, Initiated By ______
- ☒ Yes — Received for Lab Signed/Date/Time?
- ☒ No — Shipping document?
- ☒ No — Other ______

COC Information

☒ TriMatrix COC ☐ Other______

COC ID Numbers:

Check Sample Preservation

N/A / Yes / No
- ☒ Yes — Temperature Blank **OR** average sample temperature, ≥6° C?
- ☒ N/A — If either is ≥6° C, was thermal preservation required?
- ☒ N/A — If "Yes", Project Chemist Approval Initials:______
- ☒ N/A — If "Yes" Completed Non Con Cooler - Cont Inventory Form?
- ☒ Yes — Completed Sample Preservation Verification Form?
- ☒ Yes — Samples chemically preserved correctly?
- ☒ N/A — If "No", added orange tag?
- ☐ Received pre-preserved VOC soils? ☐ MeOH ☐ Na_2SO_4

Check COC for Accuracy

Yes / No
- ☒ Yes — Analysis Requested?
- ☒ Yes — Sample ID matches COC?
- ☒ Yes — Sample Date and Time matches COC?
- ☒ Yes — Container type completed on COC?
- ☒ Yes — All container types indicated are received?

Check for Short Hold-Time Prep/Analyses

- ☐ Bacteriological
- ☐ Air Bags
- ☐ EnCores / Methanol Pre-Preserved
- ☐ Formaldehyde/Aldehyde
- ☒ Green-tagged containers
- ☐ Yellow/White-tagged 1 L ambers (SV Prep-Lab)

AFTER HOURS ONLY: COPIES OF COC TO LAB AREA(S)
- ☐ NONE RECEIVED
- ☒ RECEIVED, COCs TO LAB(S)

Sample Condition Summary

N/A / Yes / No
- ☒ No — Broken containers/lids?
- ☒ No — Missing or incomplete labels?
- ☒ No — Illegible information on labels?
- ☒ No — Low volume received?
- ☒ No — Inappropriate or non-TriMatrix containers received?
- ☒ No — VOC vials / TOX containers have headspace?
- ☒ No — Extra sample locations / containers not listed on COC?

Notes

☐ Trip Blank received ☐ Trip Blank not listed on COC

Cooler Received (Date/Time)	Paperwork Delivered (Date/Time)	≤1 Hour Goal Met?
3-26-15 1200	3-26-15 1655	Yes (No)

TRIMATRIX LABORATORIES — SAMPLE PRESERVATION VERIFICATION FORM

page 1 of 1

Client	Watersolve	Work Order #	1503390
Receipt Log #	3.6	Completed By (initials/date)	WC 3.26.15
		Project Chemist	

COC ID # 150336593

Adjusted by: _____
Date: _____

DO NOT ADJUST pH FOR THESE CONTAINER TYPES

Container Type	5 / 23	4	13		3	6	15	
Tag Color	Lt. Blue	Blue	Brown		Green	Red	Red Stripe	
Preservative	NaOH	H_2SO_4	H_2SO_4		None	HNO_3	HNO_3	
Expected pH	>12	<2	<2		6-8	<2	<2	
COC Line #1					✓	✓		
COC Line #2								
COC Line #3								
COC Line #4								
COC Line #5								
COC Line #6								
COC Line #7								
COC Line #8								
COC Line #9								
COC Line #10								

Comments

pH Strip Reagent #

☑ 4120838

☐ _____

Aqueous Samples: For each sample and container type, check the box if pH is acceptable. If pH is not acceptable for any sample container, record pH in box, and note on Sample Receiving Checklist and on Sample Receiving Non-Conformance Form. If approved by Project Chemist, add acid or base to the sample to achieve the correct pH. Add up to, but do not exceed 2x the volume initially added at container prep (see table below for initial volumes used). Add orange pH tag to sample container and record information requested. Record adjusted pH on this form. Do not adjust pH for container types 3, 6, and 15.

COC ID # _____

Adjusted by: _____
Date: _____

DO NOT ADJUST pH FOR THESE CONTAINER TYPES

Container Type	5 / 23	4	13		3	6	15	
Tag Color	Lt. Blue	Blue	Brown		Green	Red	Red Stripe	
Preservative	NaOH	H_2SO_4	H_2SO_4		None	HNO_3	HNO_3	
Expected pH	>12	<2	<2		6-8	<2	<2	
COC Line #1								
COC Line #2								
COC Line #3								
COC Line #4								
COC Line #5								
COC Line #6								
COC Line #7								
COC Line #8								
COC Line #9								
COC Line #10								

Comments

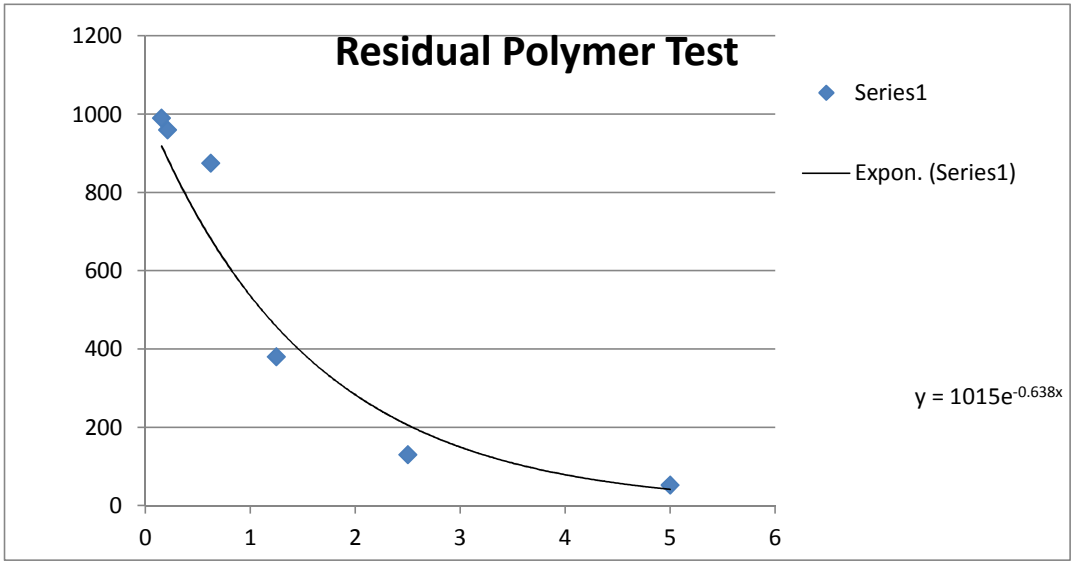
Container Size (mL)	Original Vol. of Preservative (mL)
Container Type 5	NaOH
500	2.5
1000	5.0
Container Type 4	H_2SO_4
125	0.5
250	1.0
500	2.0
1000	4.0
Container Type 13	H_2SO_4
500	2.5

Residual Polymer Test

Date: 3/31/2015 Analyst: DCW

Customer: Bishop/Grand Marais Drain

P.P.M.	Settling Time (sec)
5	53
2.5	130
1.25	380
0.625	875
0.2125	960
0.15625	990
0	1080
Sample 3/31/2015	1040
Sample 3/31/2015	1090



Date	Settling time	PPM
3/31/2015	1040	0.038 ppm
3/31/2015	> 1080	0 ppm

WaterSolve LLC

5031 68 St. SE
Caledonia MI 49316
616-575-8693

Bishop Water Technologies

TENCATE Geotube®

Phone: 343-361-0463 220 Carswell St, Renfrew ON K7V 2G4

Fax: 1-844-272-6102 kevin@bishopwater.ca www.bishopwater.ca

Intelligent Solutions for Water

Dear Dave

This letter pertains to the dewatering report dated 18 Feb 2015 and the subsequent analysis of polymer residual test.

The first step in determining the requirements for chemical conditioning is to collect a representative sample of the sediments along with overlying water from the site. This sample should be a volumetric average of the sediments in the area to be removed to the extent practical. This sample will then be tested to determine the most effective product or combination of products from 20-30 different products. The total dry weight solids of the *in situ* material and the recommended dilution will be measured and the chemical dose(s) in terms of KG per dry ton can be calculated. A report will be prepared with recommendations for chemical product, dosing rate, slurry concentration, mixing energy, and other related factors.

As per the dewatering report a polymer dose rate of 2.1 KG/BDMT was seen as the correct dose to ensure good flocculation of the material and capture of TSS within the Geotube. The 2.1 Kg/BDT dose rate was derived from the diluted sample of 9.4% solid. This equates to a dose rate of 200 parts of raw polymer per million parts of water.

The volumes to be dewatered in the Grand Marais are 1080 cubic meters .We will assume that the sample from the dewatering report of 31.5% solid is consistent .We can therefore determine that we have 385 BDMT to dewater.

At 2.1 Kg/BDT of polymer we would anticipate a total of 792 Kg of polymer or 4 barrels to dewater the volumes as described above. This equates, at a SG of 1.02, to 776 liters of polymer that will be used. Based on a total flor of 3.959.767 liters of material and water to be dredge this equates to 196 PPM.

Based on the bench testing that was performed 216B which is a NSF certified polymer was chosen as the best performing polymer. This rating was based on 3 factors, speed of dewatering, clarity of effluent water and robustness of the floc. These 3 factors are important in a dewatering application.

Speed of dewatering is related to the release of filtrate from the Geotube this is a good indicator of how quickly the material will dry.

Clarity of effluent this indicates the retention of solid within the Geotube and ensures that TSS in the filtrate is kept to a minimum.

Robustness of the floc during pumping there can be significant pressures on the floc material which in certain circumstances can lead to the floc breaking up. By testing the material for robustness, we are able to ensure that during pumping the material will be sufficiently flocked that it will retain solids in the Geotube.

We recommend a system that automatically adjusts the chemical dose(s) based on the in line slurry flow rate and solids concentration, such as Geo-dredging and Dewatering solutions Chemical Control and Tracking System (CCTS). This system has an ECA with the MOE in Ontario. This system represents the best available technology to insure that the proper dose of chemical product is added to optimize the dewatering and to minimize the potential for any residual polymer because the chemical dose is matched with the in line slurry conditions at all times. An experienced operator will monitor the system and may need to make periodic adjustments as the characteristics of the dredged material change.

Filtrate from the jar testing was collected and sent away for testing for a variety of Hydrocarbons and heavy metals. This data has already been supplied to Landmark.

We also wanted to determine the presence of residual polymer using the flocculation method. The purpose of this method is to provide a means of qualitatively determining the presence of a flocculent or coagulant within a solution, water sample, etc. Additionally, in cases where the polymer present within a sample is known, this method can be tentatively used as a quantitative measure.

Slurry of kaolin clay is very easily flocculated or coagulated when either a flocculent or a coagulant is present. Therefore, for qualitative purposes, the sample being tested is mixed with kaolin clay slurry, and the effects are visually assessed by comparison to a blank. If polymer is present, significant coagulation or flocculation will be seen from the sample being tested as compared to that seen in the blank.

These principles can also be applied to the quantification of the concentration of polymer present within a sample. However, the exact product present within the sample must be known, and the water used to prepare all solutions must be similar in pH, hardness, etc. to the water present in the sample being tested. Standard solutions containing the known product are prepared at different concentrations. Each solution is then mixed with a kaolin clay slurry, and the settlement time of each is measured. A curve and the equation of the curve are then generated from the obtained results, the settlement time of the unknown sample is measured, and the concentration of the specific product in the unknown sample is calculated by substitution into the obtained equation.

Procedure

Preparation of the Clay Slurry

1. Preparation of a 1% Calcium Chloride Solution

    a. Determine how much 1% calcium chloride will be needed to perform the required testing. Please note that approximately 1.7 mL of a 1% calcium chloride solution is required for each test.
    b. Calculate the required weight of calcium chloride needed to obtain the desired weight of 1% calcium chloride solution using the equation below.

$$W_1 = \frac{W_2 \ x \ C_2}{C_1}$$

Where:
W_1 = Weight of Calcium Chloride Required to Prepare the Solution (g)
C_1 = Concentration of the Calcium Chloride Being Used (%)
W_2 = Desired Weight of 1% Calcium Chloride Solution (g)
C_2 = Concentration of Calcium Chloride Solution Required (1%)

c. Tare an appropriately sized bottle on a three place top loading balance.
d. Accurately weigh out the calculated weight of calcium chloride required into the tared bottle. The accuracy of this weight should be ±0.002 g. Add deionized water to the bottle to achieve the desired final solution weight. For example, if 100 g of 1% calcium chloride solution is desired, add 1.000 g of pure calcium chloride to a tared bottle, and add deionized water to achieve a final weight of 100.000 g.

2. Preparation of the Clay Slurry

a. Determine how much clay slurry will be needed to perform the required testing. Please note that 5 mL of slurry is needed for each test.
b. Tare an appropriately sized bottle on a three place top loading balance.
c. Into the tared bottle, weigh out 2 parts laboratory grade Kaolin clay and 1 part 1% calcium chloride solution.
d. Cap the bottle, and shake vigorously until the contents are homogeneous.

Qualitative Determination of the Presence of Polymer in a Sample

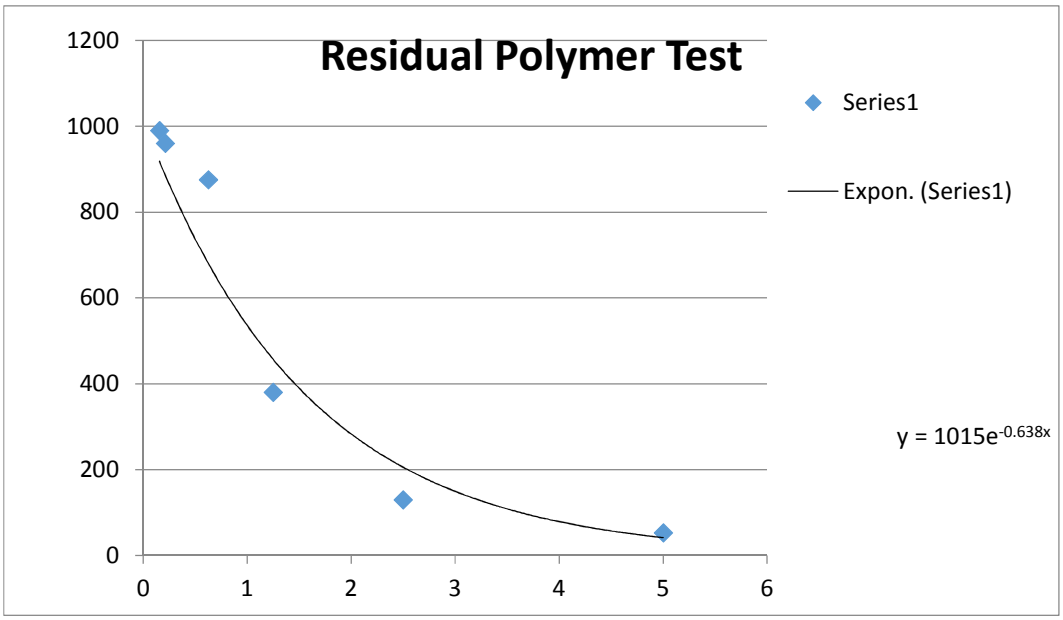
1. Perform a blank as follows. To a 100 mL glass mixing cylinder, add 5 mL of the previously prepared clay slurry and 90 mL of water. Please note that the water used for this blank should be similar in quality to the water present in the sample which is to be tested with regard to hardness, pH, etc.

2. To a second 100 mL glass mixing cylinder, add 5 mL of the previously prepared clay slurry and 90 mL of the sample being tested.

3. Invert both cylinders three times, and visually assess whether flocculation or coagulation has occurred in the sample being tested by comparing the settlement rate and floc size of the clay in the sample cylinder to the settlement rate and floc size of the clay in the blank sample. Record observations.

Residual Polymer Test	
Date: 3/31/2015	Analyst: DCW
Customer: Bishop/Grand Marais Drain	
P.P.M.	Settling Time (sec)
5	53
2.5	130
1.25	380
0.625	875
0.2125	960
0.15625	990
0	1080
Sample 3/31/2015	1040
Sample 3/31/2015	1090

In our testing of the Marais Drain site 7 samples were created with a variation of polymer solution in them ranging from 5 PPM of polymer to 0 PPM. From the the following graph was created.



From this the following exponential log graph was created.

2 samples were then taken from the RDT test that was performed on the material using 216B polymer.

http://www.bishopwater.ca/userfiles/file/Geotube%20RDT%20Guide.pdf

These two samples were then added to the same China clay solution as had been done with the known quantities of made down polymer and settling time was observed.

As can be seen the first sample had a settling time of 1040 and would indicate some residual polymer. This residual would be between 0.15625 PPM and 0. Whilst it is difficult to exactly quantify the amount we are looking at Parts per billion of residual polymer. The second sample had a settling time equivalent to the 0 sample and would be an indicator of zero residual polymer.

If some form of GAC or sand filter was added to the treatment train before discharge we would anticipate the risk associated with residual polymer to be negligible. A recent project using cationic emulsion polymer and Geotube for sediment removal from the Chaudière River. The river had been impacted after the Lac Megantic train disaster, and the filtrate was allowed to be directly discharged back into the river GAC treatment.

I have attached the MSDS for 216B a copy of the dewatering report and also added 2 documents one titled, Evaluation of the use of Polyacrylamides in Environmental applications, the Other is Overview of the effect of residual flocculants on aquatic life. I have also included PDF of the flow calculator and Geotube estimator

Trusting this to be satisfactory

Kind Regards

Kevin Bossy

Cationic
Solve 216B

Material Safety Data Sheet

Date Issued: 07/01/11
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. 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **SOLVE 216B**
CHEMICAL TYPE: Water soluble polymer in emulsion.
COMPANY: WaterSolve, LLC, 4964 Starr St. S.E., Grand Rapids, MI 49546, USA
For Product information call 616-575-8693.
For Chemical Emergency Spill, Leak, Fire, Exposure, or Accident
Call CHEMTREC Day or Night
Within USA and Canada: 1-800-424-9300
Outside USA and Canada: +1 703-527-3887 (collect calls accepted)

2. COMPOSITION/INFORMATION ON INGREDIENTS

Identification of the preparation: Processing aid for industrial applications.
Regulated Components: None

Material	Case RN	Weight %
Polyacrylamide	69418-26-4	33-37
Solvent oil	64742-47-8	30-35
Water	7732-18-5	25-30
Surfactant	proprietary	3-6

3. HAZARDS IDENTIFICATION

Appearance and Odor
Form: Viscous liquid
Color: Milky
Odor: Aliphatic

Emergency Overview:
Spills produce extremely slippery surfaces.

4. FIRST AID MEASURES

Inhalation: Move to fresh air. No hazards which require special first aid measures.

Skin Contact: Wash off immediately with soap and plenty of water. In case of persistent skin irritation, consult a physician.

Eye Contact: Rinse thoroughly with plenty of water, also under the eyelids. In case of persistent eye irritation, consult a physician.

Ingestion: The product is not considered toxic based on studies on laboratory animals.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: Water, water spray, foam, carbon dioxide (CO_2), dry powder.

Special fire-fighting precautions: Spills produce extremely slippery surfaces.

Protective equipment for firefighters: No Special protective equipment required.
Flash point: Does not flash.
Autoignition temperature: Does not ignite.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: No special precautions required.

Environmental precautions: Do not contaminate water.

Methods for cleaning up: Do not flush with water. Dam up. Soak up with inert absorbent material. If liquid has been spilled in large quantities clean up promptly by scoop or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. When preparing the working solution ensure there is adequate ventilation. When using do not smoke.

Storage: Keep in a dry, cool place (0-35 ^{o}C). Keep away from heat and sources of ignition. Freezing will affect the physical condition and may damage the material.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: Use local exhaust if misting occurs. Natural ventilation is adequate in absence of mists.

Personal protection equipment

Respiratory protection: In case of insufficient ventilation wear suitable respiratory equipment.
Hand Protection: Rubber gloves.
Eye protection: Safety glasses with side-shields. Do not wear contact lenses.
Skin protection: Chemical resistant apron or protective suit if splashing or contact with solution is likely.
Hygiene measures: Wash hands before breaks and at the end of workday. Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form:	viscous liquid
Color:	milky
Odor:	aliphatic
Ionic Character:	Cationic
Charge Density:	High
Molecular Weight:	High
pH:	3-7 @ 5 g/l;
Flash point (^{o}C):	Does not flash.
Autoignition temp. (^{o}C):	Does not ignite.
Specific gravity:	1.035
Bulk Viscosity (cps):	1200

Maximum concentration (g/l):	10
Stability of D.I. solution (days):	1
Dilution to obtain	
5 g/l active content:	90
Approx. viscosity @ 5g/l	
Active content (cps):	1000
Storage Temperature (℃):	0-35
Shelf Life (months):	6
Vapor pressure (mm Hg):	0.13 @ 20 ^{o}C
Approx bulk density:	8.62

10. STABILITY AND REACTIVITY

Stability: Product is stable. No hazardous polymerization will occur. Oxidizing agents may cause exothermic reactions.

Hazardous decomposition Products: Thermal decomposition may produce: hydrogen chloride gas, nitrogen oxides (NOX), carbon oxides (COx).

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral: LD50/oral/rat > 5,000 mg/kg
Dermal: The results of testing on rabbits showed this material to be non-toxic even at high dose levels.
Inhalation: The product is not expected to be toxic by inhalation.

Irritation

Skin: May cause skin irritation with susceptible persons.
Eyes: **May cause** mild eye irritation with susceptible persons..
Sensitization: The results of testing on guinea pigs showed this material to be non-sensitizing.
Chronic toxicity: A two year feeding study on rats did not reveal adverse health effects. A one year feeding study on dogs did not reveal adverse health effects. Prolonged skin contact may defat the skin and produce dermatitis.

12. ECOLOGICAL INFORMATION

Aquatic toxicity

Fish: **LC50/Danio rerio/96 hr> 10-**100 mg/L (OECD 203) (Based on the toxicity of the Conventional Method.

Algae: Algal inhibitions tests are not appropriate. The flocculating characteristic of the product interfere directly in the test medium preventing homogenous distribution which invalidate the test.

Daphnia: EC50/Daphnia magna/48 hr >50mg/L (OECD 202) (Based on the toxicity of the components using the Conventional Method.

.**Environmental Fate:**
Hydrolysis: At natural pHs (>6) the polymer degrades due to hydrolysis to more than 70% in 28 days. The hydrolysis products are not harmful to aquatic organisms.
Other Ecological information:

The effects of this product on aquatic organism are rapidly and significantly mitigated by the presence of dissolved organic carbon in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

Waste from residues/unused products:

In accordance with federal, state and local regulations

Contaminated packaging:

Rinse empty containers with water and use the rinse water to prepare the working solution. Can be landfilled or incinerated, when in compliance with local regulations.

14. TRANSPORT INFORMATION

Not classified as dangerous in the meaning of DOT, ICAO/IATA, IMO/IMDG regulations.

15. REGULATORY INFORMATION

International Inventories

European Union (REACH): All components of this product have been registered or pre-registered with the European Chemicals Agency or are exempt from registration.

USA (TSCA): All components of this product are either listed on the inventory or are exempt from listings.

Canada (DSL): All components of this product are either listed on the inventory or are exempt from listings.

Australia (AICS): All components of this product are either listed on the inventory or are exempt from listings.

China (IECSC): All components of this product are either listed on the inventory or are exempt from listings.

Japan (ENCS): All components of this product are either listed on the inventory or are exempt from listings.

Korea(ECL): All components of this product are either listed on the inventory or are exempt from listings.

Philippines (PICCS): All components of this product are either listed on the inventory or are exempt from listings.

HMIS & NFPA Rating	HMIS	NFPA
Health:	1	1
Flammability:	1	1
Reactivity:	0	0
Personal Protective/Special	B	

16. OTHER INFORMATION

This information is for the specific material described only and may not be valid if the material is used in combination with any other materials or in any process. The user is responsible to determine the completeness of the information and suitability for the user's own particular use. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release, and is not to be considered a warranty or quality specification. The knowledge and belief of the company, the information is accurate and reliable as of the date indicated but the company makes no express or implied warranty of merchantability for the material or the information. The company makes no express or implied warranty of fitness for a purpose for the material or for

the information. The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication.