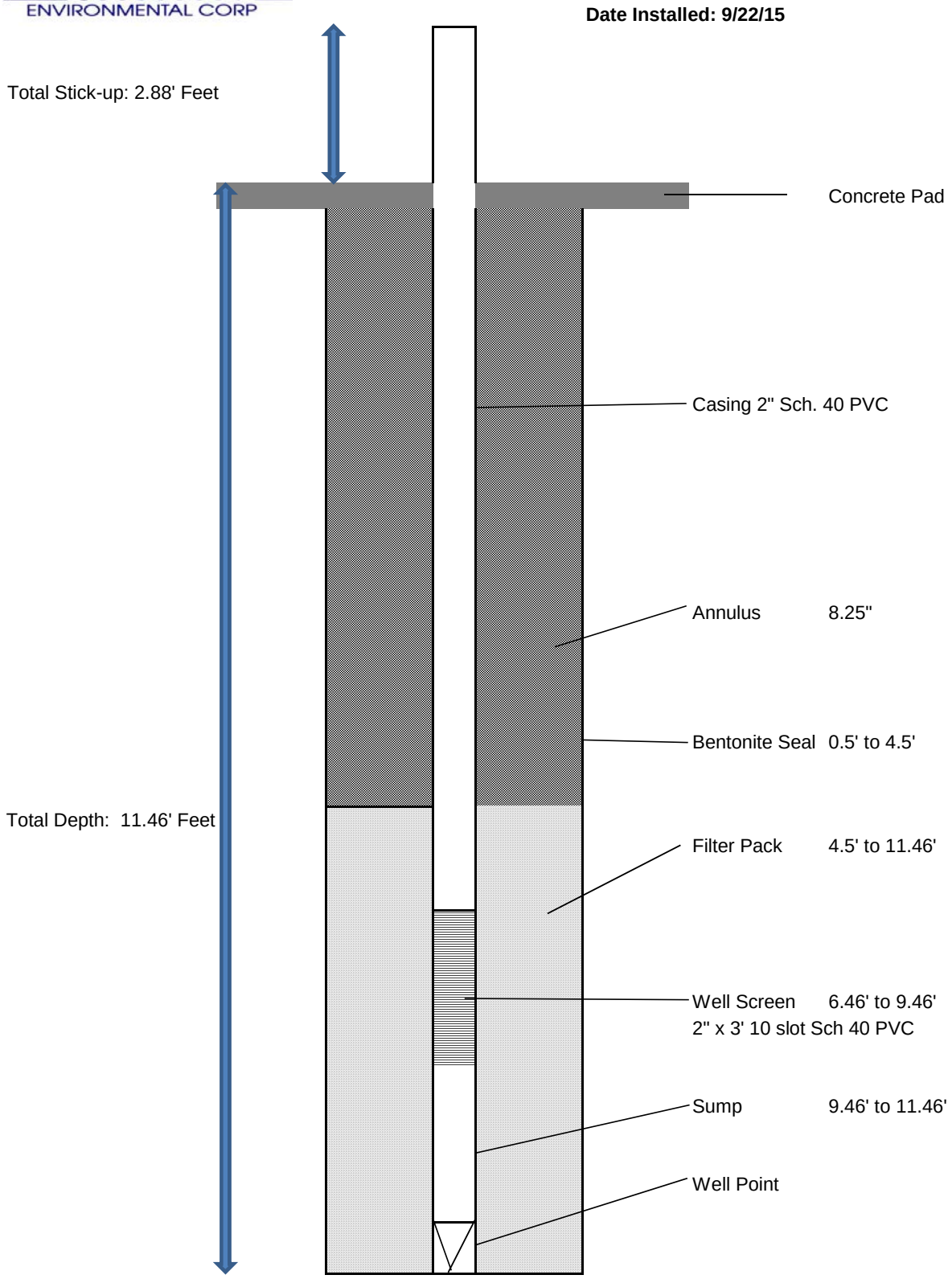
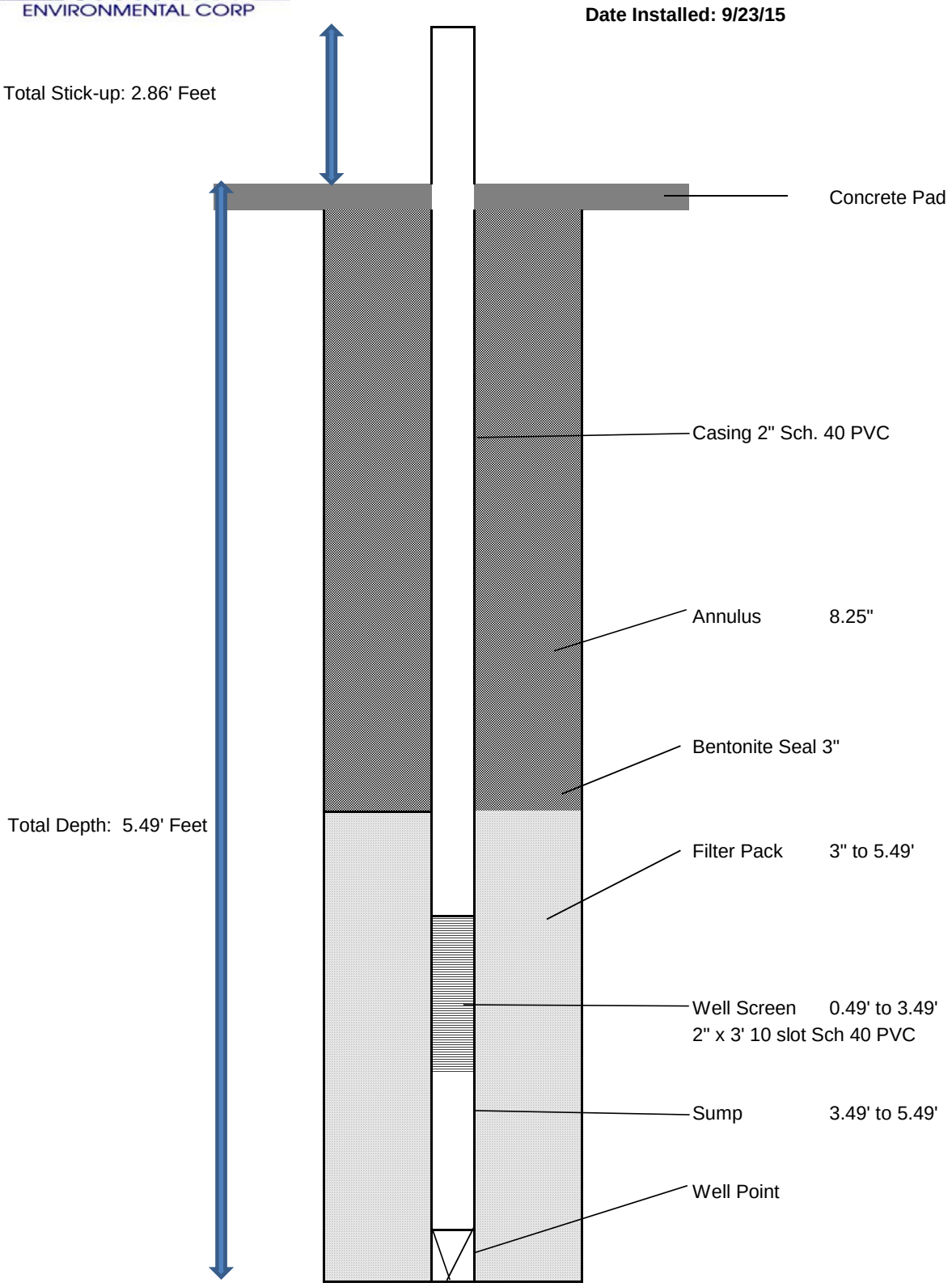
Attachment F

Talmadge Creek Groundwater Metals Evaluation Data

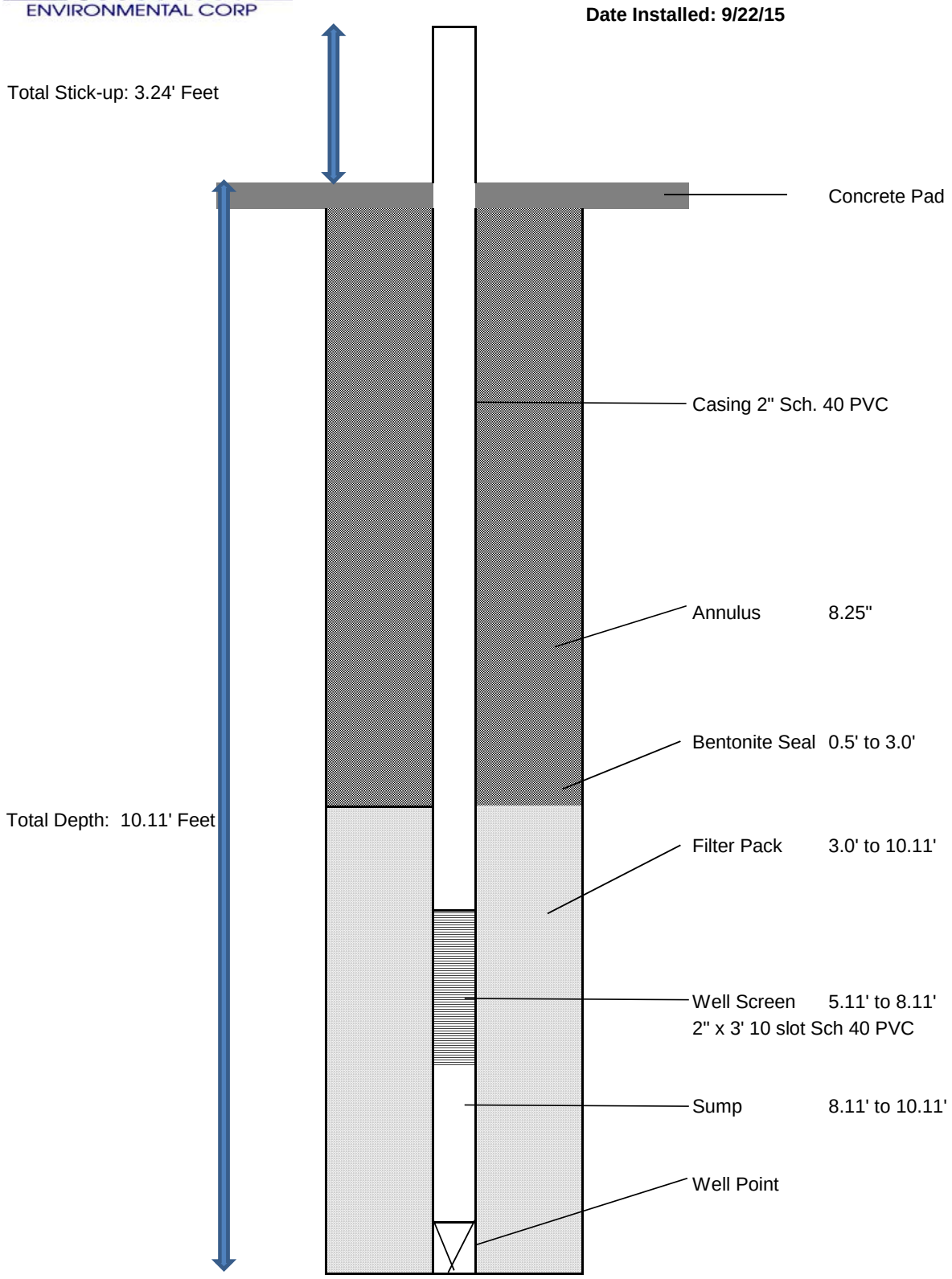
WELL CONSTRUCTION DIAGRAM
MWTC0025L25
Date Installed: 9/22/15



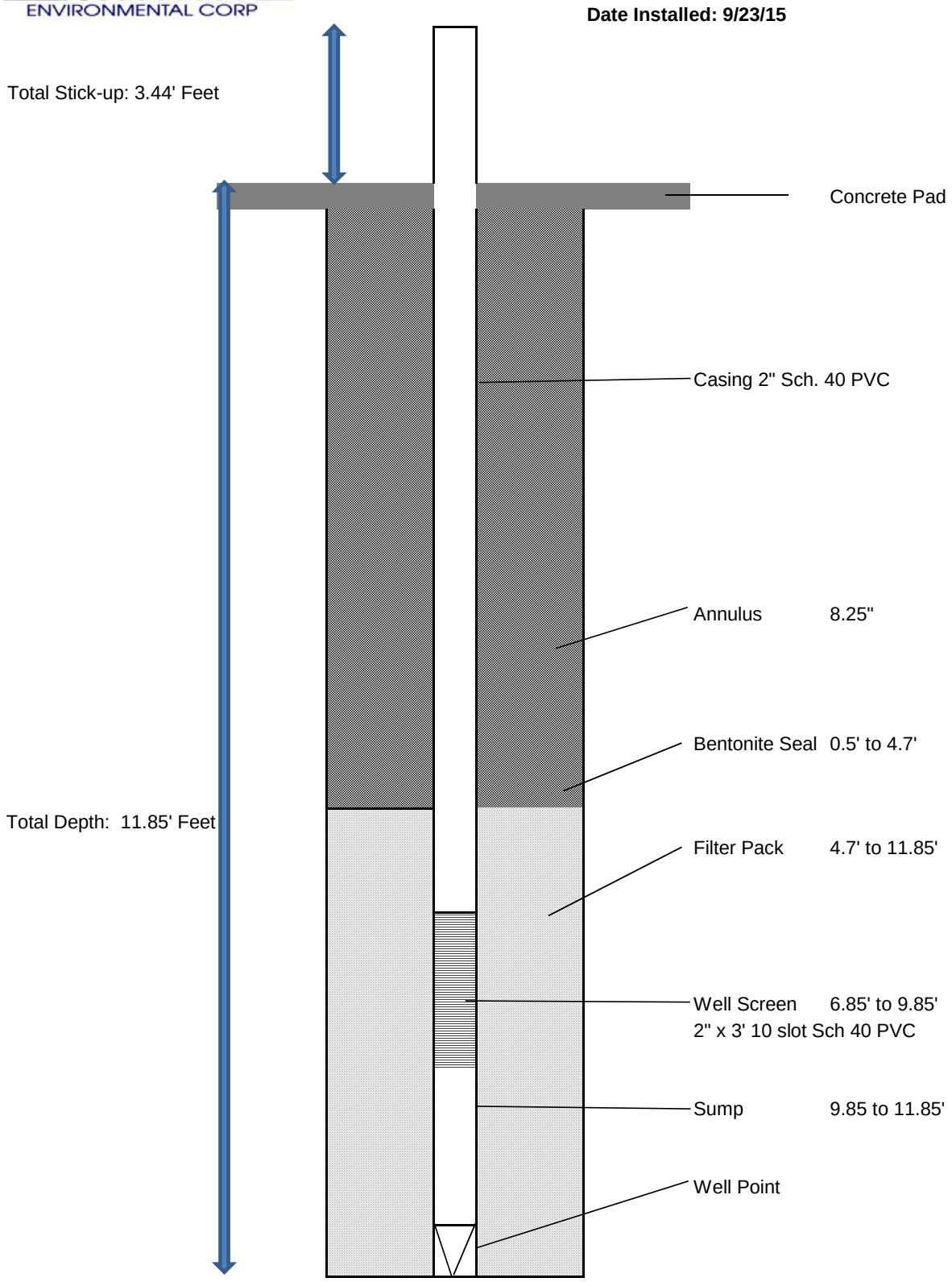
WELL CONSTRUCTION DIAGRAM
MWTC0025L505
Date Installed: 9/23/15



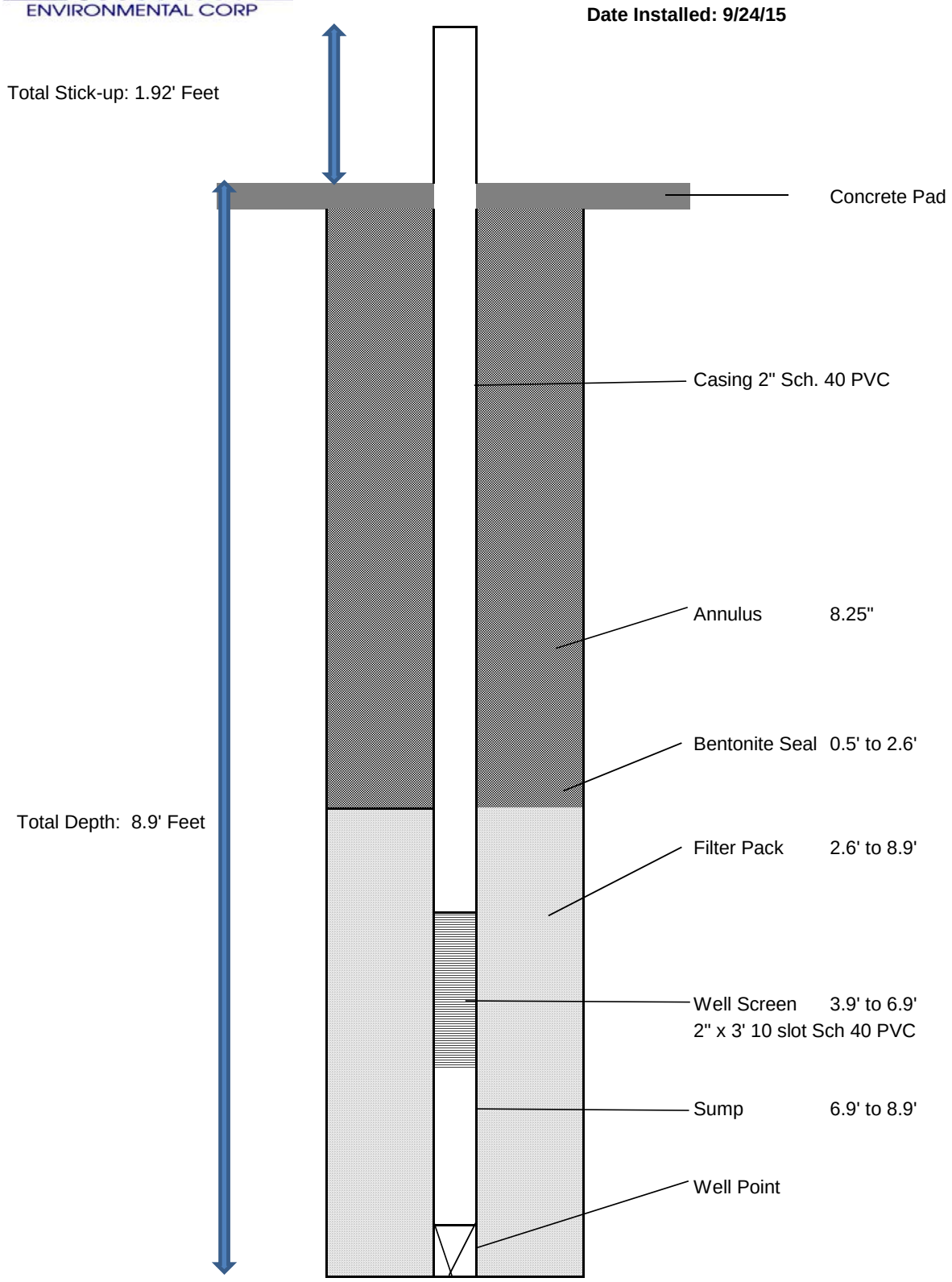
WELL CONSTRUCTION DIAGRAM
MWTC0025R001
Date Installed: 9/22/15



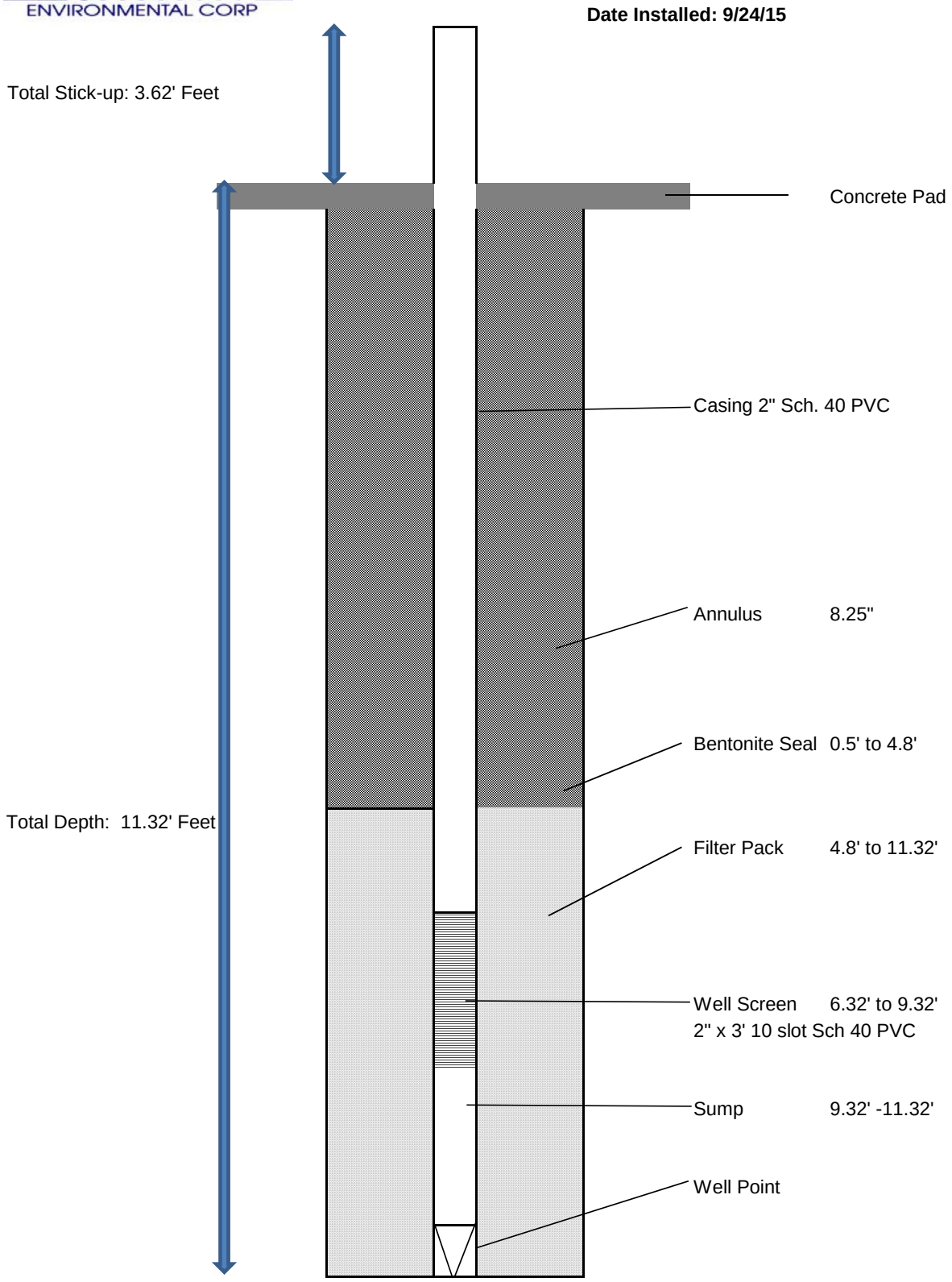
WELL CONSTRUCTION DIAGRAM
MWTC0050L05E
Date Installed: 9/23/15



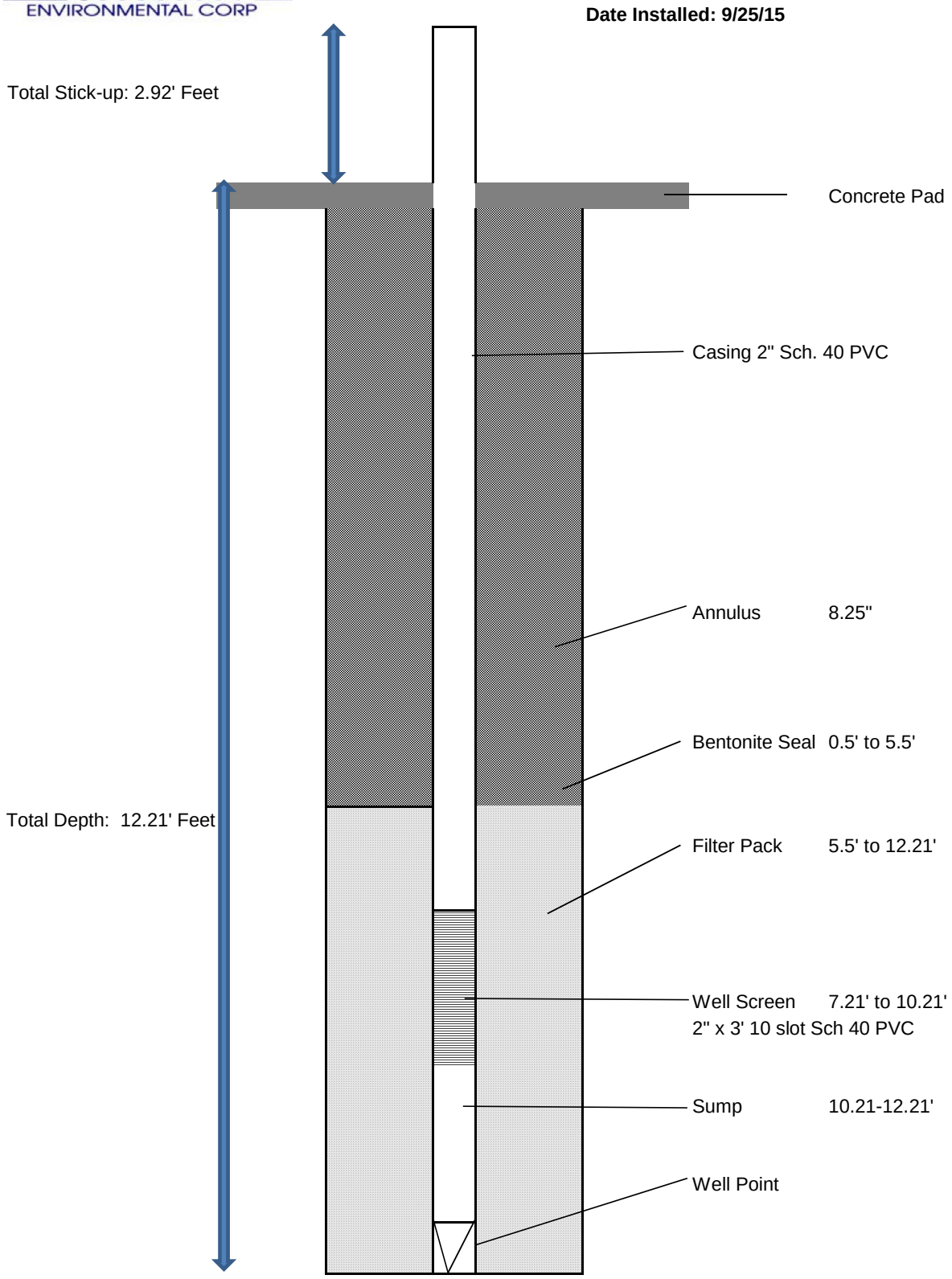
WELL CONSTRUCTION DIAGRAM
MWTC0050L14B
Date Installed: 9/24/15



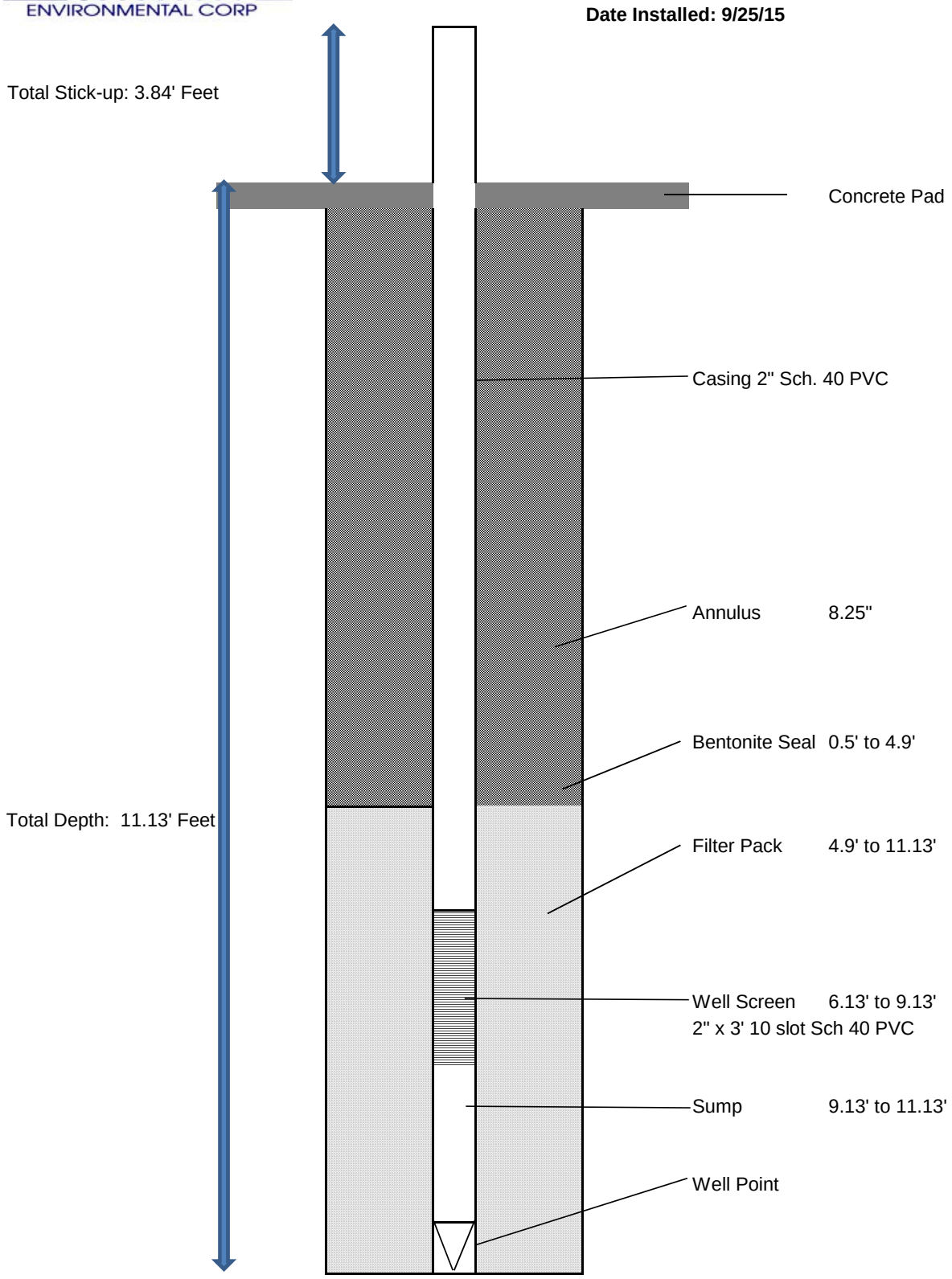
WELL CONSTRUCTION DIAGRAM
MWTC0075R012
Date Installed: 9/24/15



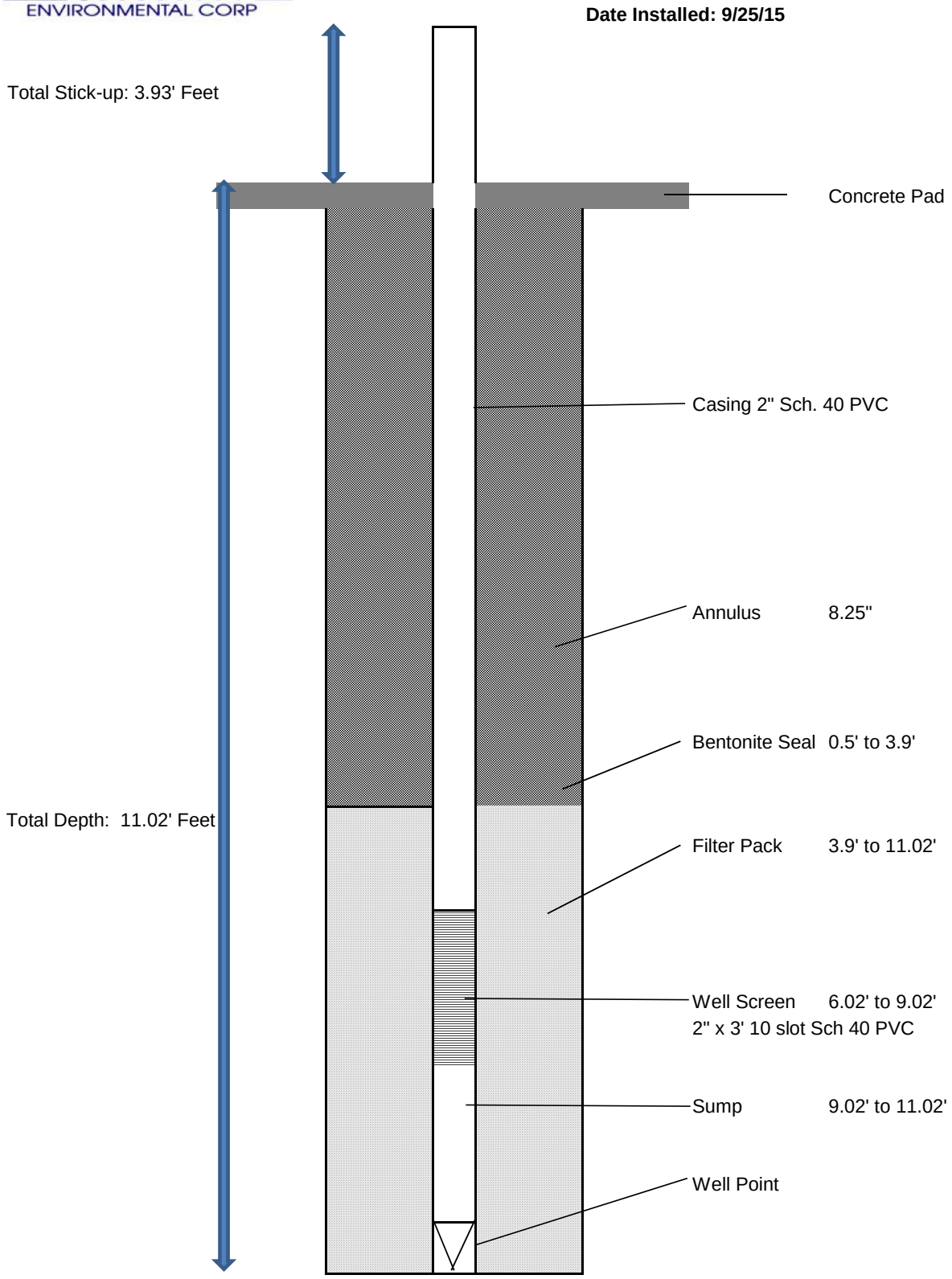
WELL CONSTRUCTION DIAGRAM
MWTC0075R036
Date Installed: 9/25/15



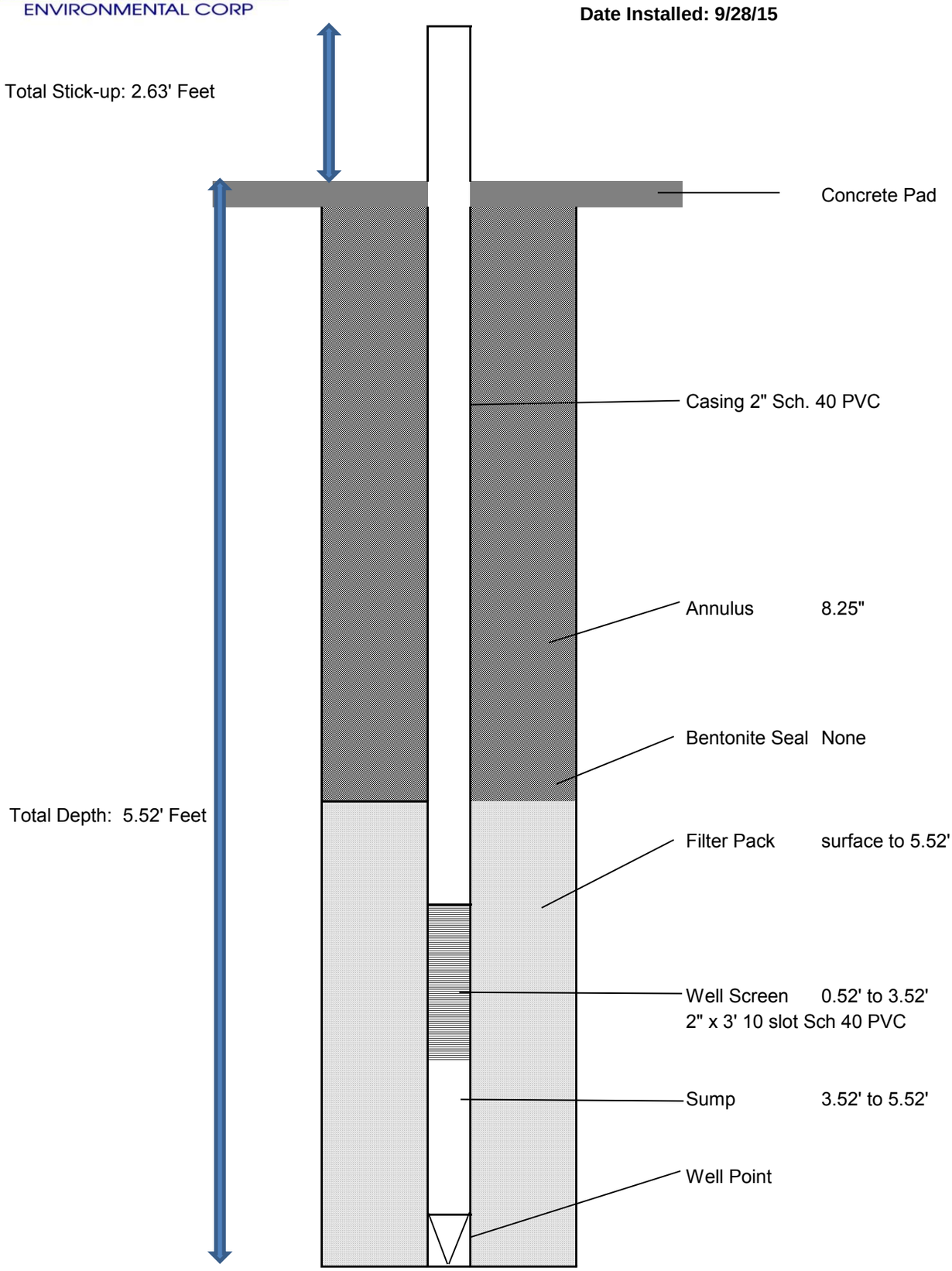
WELL CONSTRUCTION DIAGRAM
MWTC0150R012A
Date Installed: 9/25/15



WELL CONSTRUCTION DIAGRAM
MWTC0175L028
Date Installed: 9/25/15



WELL CONSTRUCTION DIAGRAM
MWTC0200L090
Date Installed: 9/28/15



15-Oct-2015

Alison Bitel
AECOM Environment
3950 Sparks Drive SE
Grand Rapids, MI 49546

Re: **Marshall GWMon 0075R-0200L 10.13.15** Work Order: **1510918**

Dear Alison, Revision: **1**

ALS Environmental received 5 samples on 14-Oct-2015 10:00 AM for the analyses presented in the following report.

This is a REVISED REPORT. The Case Narrative provides information discussing the reason for issuing a revised report. The total number of pages in this revision is 13.

If you have any questions regarding these test results, please feel free to contact me.

Sincerely,

Chad Whelton

Electronically approved by: Chad Whelton

Chad Whelton
Project Manager

Certificate No: MN 532786

ALS Group USA, Corp

Date: 15-Oct-15

Client: AECOM Environment
Project: Marshall GWMon 0075R-0200L 10.13.15
Work Order: **1510918**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
1510918-01	MWTC0075R012S101315G082	Groundwater		10/13/2015 09:00	10/14/2015 10:00	☐
1510918-02	MWTC0075R036S101315G083	Groundwater		10/13/2015 11:00	10/14/2015 10:00	☐
1510918-03	MWTC0150R012AS101315G076	Groundwater		10/13/2015 12:15	10/14/2015 10:00	☐
1510918-04	MWTC0175L028S101315G074	Groundwater		10/13/2015 14:05	10/14/2015 10:00	☐
1510918-05	MWTC0200L090S101315G017	Groundwater		10/13/2015 15:20	10/14/2015 10:00	☐

Revision: 1

Client: AECOM Environment
Project: Marshall GWMon 0075R-0200L 10.13.15
Work Order: 1510918

Case Narrative

Revised report sent 10/15/15 due to client request for an MDL report.

ALS Group USA, Corp

Date: 15-Oct-15

Client: AECOM Environment
Project: Marshall GWMon 0075R-0200L 10.13.15
WorkOrder: **1510918**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and PQL, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
mg/L	Milligrams per Liter

Revision: 1

ALS Group USA, Corp

Date: *15-Oct-15*

Client: AECOM Environment
Project: Marshall GWMon 0075R-0200L 10.13.15
Sample ID: MWTC0075R012S101315G082
Collection Date: 10/13/2015 09:00 AM

Work Order: 1510918
Lab ID: 1510918-01
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
METALS BY ICP-MS			Method: **SW6020A**		Prep: SW3005A / 10/14/15		Analyst: **RH**
Vanadium	ND		0.00040	0.0050	mg/L	1	10/14/2015 22:24

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group USA, Corp

Date: *15-Oct-15*

Client: AECOM Environment
Project: Marshall GWMon 0075R-0200L 10.13.15
Sample ID: MWTC0075R036S101315G083
Collection Date: 10/13/2015 11:00 AM

Work Order: 1510918
Lab ID: 1510918-02
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
METALS BY ICP-MS			Method: **SW6020A**		Prep: SW3005A / 10/14/15		Analyst: **RH**
Vanadium	ND		0.00040	0.0050	mg/L	1	10/14/2015 22:30

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group USA, Corp

Date: *15-Oct-15*

Client: AECOM Environment
Project: Marshall GWMon 0075R-0200L 10.13.15
Sample ID: MWTC0150R012AS101315G076
Collection Date: 10/13/2015 12:15 PM

Work Order: 1510918
Lab ID: 1510918-03
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
METALS BY ICP-MS		Method: **SW6020A**			Prep: SW3005A / 10/14/15		Analyst: **RH**
Vanadium	ND		0.00040	0.0050	mg/L	1	10/14/2015 22:36

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group USA, Corp

Date: *15-Oct-15*

Client: AECOM Environment
Project: Marshall GWMon 0075R-0200L 10.13.15
Sample ID: MWTC0175L028S101315G074
Collection Date: 10/13/2015 02:05 PM

Work Order: 1510918
Lab ID: 1510918-04
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
METALS BY ICP-MS			Method: **SW6020A**		Prep: SW3005A / 10/14/15		Analyst: **RH**
Vanadium	ND		0.00040	0.0050	mg/L	1	10/14/2015 22:42

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group USA, Corp

Date: *15-Oct-15*

Client: AECOM Environment
Project: Marshall GWMon 0075R-0200L 10.13.15
Sample ID: MWTC0200L090S101315G017
Collection Date: 10/13/2015 03:20 PM

Work Order: 1510918
Lab ID: 1510918-05
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
METALS BY ICP-MS		Method: **SW6020A**			Prep: SW3005A / 10/14/15		Analyst: **RH**
Beryllium	ND		0.00020	0.0020	mg/L	1	10/14/2015 22:49
Nickel	ND		0.00040	0.0050	mg/L	1	10/14/2015 22:49
Vanadium	ND		0.00040	0.0050	mg/L	1	10/14/2015 22:49

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group USA, Corp

Date: 15-Oct-15

Client: AECOM Environment
Work Order: 1510918
Project: Marshall GWMon 0075R-0200L 10.13.15

QC BATCH REPORT

Batch ID: **77476** Instrument ID **ICPMS1** Method: **SW6020A**

MBLK Sample ID: **MBLK-77476-77476** Units: **mg/L** Analysis Date: **10/14/2015 09:53 PM**
Client ID: Run ID: **ICPMS1_151014A** SeqNo: **3510414** Prep Date: **10/14/2015** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Beryllium	ND	0.0020								
Nickel	ND	0.0050								
Vanadium	ND	0.0050								

LCS Sample ID: **LCS-77476-77476** Units: **mg/L** Analysis Date: **10/14/2015 10:18 PM**
Client ID: Run ID: **ICPMS1_151014A** SeqNo: **3510420** Prep Date: **10/14/2015** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Beryllium	0.09769	0.0020	0.1	0	97.7	80-120	0			
Nickel	0.1002	0.0050	0.1	0	100	80-120	0			
Vanadium	0.1004	0.0050	0.1	0	100	80-120	0			

MS Sample ID: **1510919-03AMS** Units: **mg/L** Analysis Date: **10/14/2015 11:57 PM**
Client ID: Run ID: **ICPMS1_151014A** SeqNo: **3510444** Prep Date: **10/14/2015** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Beryllium	0.09273	0.0020	0.1	-8.314E-05	92.8	75-125	0			
Nickel	0.09511	0.0050	0.1	0.0009764	94.1	75-125	0			
Vanadium	0.1002	0.0050	0.1	0.000162	100	75-125	0			

MSD Sample ID: **1510919-03AMSD** Units: **mg/L** Analysis Date: **10/15/2015 12:03 A**
Client ID: Run ID: **ICPMS1_151014A** SeqNo: **3510445** Prep Date: **10/14/2015** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Beryllium	0.09336	0.0020	0.1	-8.314E-05	93.4	75-125	0.09273	0.677	20	
Nickel	0.09503	0.0050	0.1	0.0009764	94.1	75-125	0.09511	0.0841	20	
Vanadium	0.1007	0.0050	0.1	0.000162	101	75-125	0.1002	0.498	20	

The following samples were analyzed in this batch:

1510918-01A	1510918-02A	1510918-03A
1510918-04A	1510918-05A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

1510770

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate.

Page: 1 of 1
Cooler # ALS of

COC # ENBRIDGE_101315_ADB1 | Task: GW MON
Total # of Samples: 5 | Event Complete? Yes

Turn Around Time: 24 Hours | Rush: No

Billing Code: 201.07

Lab Information:
Lab Name: ALS Laboratory Group
Address: 3352 128th Ave. Holland, MI 49424-9283
Lab PM: Chad Whelton
Phone/Fax: 616-582-5201/616-368-0372
Lab PM email: Chad.Whelton@ALSGlobal.com
Applicable Lab Quote #:

Project Information:
Site ID #:
Project #: 60339671
Site Address: 3950 Sparks Br SE
City: Grand Rapids | State, Zip: 616-574-8427 | MI, 49546
Site PM Name: Dave Dryburgh
Phone/Fax: 616-406-7330
Site PM Email: David.Dryburgh@aecom.com

Other Information:
Send Invoice to: Enbridge Energy - ATTN Accounts Payable
Address: 1100 Louisiana Suite 1100
City/State: Houston, TX | Phone #: 713-621-2000
PO #
Send EDD to
CC Hardcopy report
CC Hardcopy report

ITEM #	SAMPLE ID (Samples IDs MUST BE UNIQUE)	SAMPLE LOCATION	MATRIX CODE	G=GRAB C=COMP	SAMPLE DATE	#OF CONTAINERS	Comments/Lab Sample I.D.	V by 6020 (Preservative: HNO3)	Be, V, Ni by 6020 (Preservative: HNO3)
	MWTC0075R012S101315G082	MWTC0075R012	WG	G	10/13/2015 09:00	1		X	
	MWTC0075R036S101315G083	MWTC0075R036	WG	G	10/13/2015 11:00	1		X	
	MWTC0150R012AS101315G076	MWTC0150R012A	WG	G	10/13/2015 12:15	1		X	
	MWTC0175L028S101315G074	MWTC0175L028	WG	G	10/13/2015 14:05	1		X	
	MWTC0200L090S101315G017	MWTC0200L090	WG	G	10/13/2015 15:20	1			X

Additional Comments/Special Instructions:
Andrew Boyce

[illegible]	1445	[illegible]	[signature]	10/14/15	1000

Company:
Tracking #:
PRINT Name of SAMPLER:
SIGNATURE of SAMPLER:
DATE Signed:
Time:

Sample Receipt Conditions				
Temp in C	3.4°			
Samples on Ice?	Y/N	Y/N	Y/N	Y/N
Sample Intact?	Y/N	Y/N	Y/N	Y/N
Trip Blank?	Y/N	Y/N	Y/N	Y/N

CUSTODY SEAL
DATE 10-12-15
SIGNATURE
AECOM
Jon Curreth
QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **AECOM - GR** Date/Time Received: **14-Oct-15 10:00**

Work Order: **1510918** Received by: **PD**

Checklist completed by Keith Wierenga (eSignature) 14-Oct-15 (Date) Reviewed by: Chad Whelton (eSignature) 15-Oct-15 (Date)

Matrices: Groundwater
Carrier name: ALSHN

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.4/3.4 C	SR2	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	10/14/2015 3:03:57 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Revision: 1

SRC Page 1 of 1

15-Oct-2015

Alison Bitel
AECOM Environment
3950 Sparks Drive SE
Grand Rapids, MI 49546

Re: **Marshall GWMon 0025L-0050L 10.12.15** Work Order: **1510919**

Dear Alison, Revision: **1**

ALS Environmental received 6 samples on 14-Oct-2015 10:00 AM for the analyses presented in the following report.

This is a REVISED REPORT. The Case Narrative provides information discussing the reason for issuing a revised report. The total number of pages in this revision is 14.

If you have any questions regarding these test results, please feel free to contact me.

Sincerely,

Chad Whelton

Electronically approved by: Chad Whelton

Chad Whelton
Project Manager

Certificate No: MN 532786

ADDRESS 3352 128th Avenue Holland, Michigan 49424-9263 | PHONE (616) 399-6070 | FAX (616) 399-6185
ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental www.alsglobal.com
RIGHT SOLUTIONS RIGHT PARTNER

ALS Group USA, Corp

Date: 15-Oct-15

Client: AECOM Environment
Project: Marshall GWMon 0025L-0050L 10.12.15
Work Order: **1510919**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
1510919-01	MWTC0025L25D101215G075	Groundwater		10/12/2015 12:40	10/14/2015 10:00	☐
1510919-02	MWTC0025L25S101215G075	Groundwater		10/12/2015 12:40	10/14/2015 10:00	☐
1510919-03	MWTC0025L505S101215G014	Groundwater		10/12/2015 14:55	10/14/2015 10:00	☐
1510919-04	MWTC0025R001S101215G055	Groundwater		10/12/2015 09:40	10/14/2015 10:00	☐
1510919-05	MWTC0050L05ES101215G079	Groundwater		10/12/2015 16:40	10/14/2015 10:00	☐
1510919-06	MWTC0050L14BS101215G050	Groundwater		10/12/2015 17:55	10/14/2015 10:00	☐

Revision: 1

Client: AECOM Environment
Project: Marshall GWMon 0025L-0050L 10.12.15
Work Order: 1510919

Case Narrative

Revised report sent 10/15/15 due to client request for an MDL report.

ALS Group USA, Corp

Date: 15-Oct-15

Client: AECOM Environment
Project: Marshall GWMon 0025L-0050L 10.12.15
WorkOrder: **1510919**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and PQL, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
mg/L	Milligrams per Liter

Revision: 1

ALS Group USA, Corp

Date: *15-Oct-15*

Client: AECOM Environment
Project: Marshall GWMon 0025L-0050L 10.12.15
Sample ID: MWTC0025L25D101215G075
Collection Date: 10/12/2015 12:40 PM

Work Order: 1510919
Lab ID: 1510919-01
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
METALS BY ICP-MS		Method: **SW6020A**			Prep: SW3005A / 10/14/15		Analyst: **RH**
Vanadium	ND		0.00040	0.0050	mg/L	1	10/14/2015 23:38

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group USA, Corp

Date: *15-Oct-15*

Client: AECOM Environment
Project: Marshall GWMon 0025L-0050L 10.12.15
Sample ID: MWTC0025L25S101215G075
Collection Date: 10/12/2015 12:40 PM

Work Order: 1510919
Lab ID: 1510919-02
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
METALS BY ICP-MS			Method: **SW6020A**		Prep: SW3005A / 10/14/15		Analyst: **RH**
Vanadium	ND		0.00040	0.0050	mg/L	1	10/14/2015 23:44

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group USA, Corp

Date: *15-Oct-15*

Client: AECOM Environment
Project: Marshall GWMon 0025L-0050L 10.12.15
Sample ID: MWTC0025L505S101215G014
Collection Date: 10/12/2015 02:55 PM

Work Order: 1510919
Lab ID: 1510919-03
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
METALS BY ICP-MS			Method: **SW6020A**		Prep: SW3005A / 10/14/15		Analyst: **RH**
Vanadium	ND		0.00040	0.0050	mg/L	1	10/14/2015 23:51

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group USA, Corp

Date: *15-Oct-15*

Client: AECOM Environment
Project: Marshall GWMon 0025L-0050L 10.12.15
Sample ID: MWTC0025R001S101215G055
Collection Date: 10/12/2015 09:40 AM

Work Order: 1510919
Lab ID: 1510919-04
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
METALS BY ICP-MS		Method: **SW6020A**			Prep: SW3005A / 10/14/15		Analyst: **RH**
Vanadium	ND		0.00040	0.0050	mg/L	1	10/15/2015 00:09

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group USA, Corp

Date: *15-Oct-15*

Client: AECOM Environment
Project: Marshall GWMon 0025L-0050L 10.12.15
Sample ID: MWTC0050L05ES101215G079
Collection Date: 10/12/2015 04:40 PM

Work Order: 1510919
Lab ID: 1510919-05
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
METALS BY ICP-MS		Method: **SW6020A**			Prep: SW3005A / 10/14/15		Analyst: **RH**
Beryllium	ND		0.00020	0.0020	mg/L	1	10/15/2015 00:15
Nickel	ND		0.00040	0.0050	mg/L	1	10/15/2015 00:15
Vanadium	ND		0.00040	0.0050	mg/L	1	10/15/2015 00:15

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group USA, Corp

Date: *15-Oct-15*

Client: AECOM Environment
Project: Marshall GWMon 0025L-0050L 10.12.15
Sample ID: MWTC0050L14BS101215G050
Collection Date: 10/12/2015 05:55 PM

Work Order: 1510919
Lab ID: 1510919-06
Matrix: GROUNDWATER

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
METALS BY ICP-MS		Method: **SW6020A**			Prep: SW3005A / 10/14/15		Analyst: **RH**
Beryllium	ND		0.00020	0.0020	mg/L	1	10/15/2015 00:22
Nickel	ND		0.00040	0.0050	mg/L	1	10/15/2015 00:22
Vanadium	ND		0.00040	0.0050	mg/L	1	10/15/2015 00:22

Note: See Qualifiers page for a list of qualifiers and their definitions.

Revision: 1

ALS Group USA, Corp

Date: 15-Oct-15

Client: AECOM Environment
Work Order: 1510919
Project: Marshall GWMon 0025L-0050L 10.12.15

QC BATCH REPORT

Batch ID: **77476** Instrument ID **ICPMS1** Method: **SW6020A**

MBLK Sample ID: **MBLK-77476-77476** Units: **mg/L** Analysis Date: **10/14/2015 09:53 PM**
Client ID: Run ID: **ICPMS1_151014A** SeqNo: **3510414** Prep Date: **10/14/2015** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Beryllium	ND	0.0020								
Nickel	ND	0.0050								
Vanadium	ND	0.0050								

LCS Sample ID: **LCS-77476-77476** Units: **mg/L** Analysis Date: **10/14/2015 10:18 PM**
Client ID: Run ID: **ICPMS1_151014A** SeqNo: **3510420** Prep Date: **10/14/2015** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Beryllium	0.09769	0.0020	0.1	0	97.7	80-120	0			
Nickel	0.1002	0.0050	0.1	0	100	80-120	0			
Vanadium	0.1004	0.0050	0.1	0	100	80-120	0			

MS Sample ID: **1510919-03AMS** Units: **mg/L** Analysis Date: **10/14/2015 11:57 PM**
Client ID: **MWTC0025L505S101215G014** Run ID: **ICPMS1_151014A** SeqNo: **3510444** Prep Date: **10/14/2015** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Beryllium	0.09273	0.0020	0.1	-8.314E-05	92.8	75-125	0			
Nickel	0.09511	0.0050	0.1	0.0009764	94.1	75-125	0			
Vanadium	0.1002	0.0050	0.1	0.000162	100	75-125	0			

MSD Sample ID: **1510919-03AMSD** Units: **mg/L** Analysis Date: **10/15/2015 12:03 A**
Client ID: **MWTC0025L505S101215G014** Run ID: **ICPMS1_151014A** SeqNo: **3510445** Prep Date: **10/14/2015** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Beryllium	0.09336	0.0020	0.1	-8.314E-05	93.4	75-125	0.09273	0.677	20	
Nickel	0.09503	0.0050	0.1	0.0009764	94.1	75-125	0.09511	0.0841	20	
Vanadium	0.1007	0.0050	0.1	0.000162	101	75-125	0.1002	0.498	20	

The following samples were analyzed in this batch:

1510919-01A	1510919-02A	1510919-03A
1510919-04A	1510919-05A	1510919-06A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Revision: 1

1510919

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate.

Page: 1 of 1
Cooler # ALS of

COC # ENBRIDGE_101215_ADB1 | Task: GW MON
Total # of Samples: 6 | Event Complete? No
Turn Around Time: 24 Hours | Rush: No

Lab Information:
Lab Name: ALS Laboratory Group
Address: 3352 128th Ave. Holland, MI 49424-9283
Lab PM: Chad Whelton
Phone/Fax: 616-582-5201/616-368-0372
Lab PM email: Chad.Whelton@ALSGlobal.com
Applicable Lab Quote #:

Project Information:
Site ID #:
Project #: 60339471
Site Address: 3560 Sparks Dr SE
City: Grand Rapids | State, Zip 616-674-8427 | MI, 49546
Site PM Name: Dave Dryburgh
Phone/Fax: 616-406-7330
Site PM Email: David.Dryburgh@aecom.com

Other Information:
Send Invoice to: Enbridge Energy - ATTN Accounts Payable
Address: 1100 Louisiana Suite 1100
City/State: Houston, TX | Phone #: 713-821-2000
PO #
Send EDD to
CC Hardcopy report
CC Hardcopy report

Billing Code:291.07

ITEM #	SAMPLE ID (Samples IDs MUST BE UNIQUE)	SAMPLE LOCATION	MATRIX CODE	G=GRAB C=COMP	SAMPLE DATE	#OF CONTAINERS	Comments/Lab Sample I.D.	Preservative: HNO3	Preservative: HNO3	Analysis: V by 6020	Analysis: Be, V, Ni by 6020
	MWTC0025L25D101215G075	MWTC0025L25	WG	G	10/12/2015 12:40	1	DUPLICATE			X	
	MWTC0025L25S101215G075	MWTC0025L25	WG	G	10/12/2015 12:40	1				X	
	MWTC0025L505S101215G014	MWTC0025L505	WG	G	10/12/2015 14:55	2	MS/MSD			X	
	MWTC0025R001S101215G055	MWTC0025R001	WG	G	10/12/2015 09:40	1				X	
	MWTC0050L05ES101215G079	MWTC0050L05E	WG	G	10/12/2015 16:40	1			X		
	MWTC0050L14BS101215G050	MWTC0050L14B	WG	G	10/12/2015 17:55	1			X		

Additional Comments/Special Instructions:
Andrew Boyce

[illegible]	10-14-15	10:40	[illegible]	10/14/15	1000	

Company:
Tracking #:
PRINT Name of SAMPLER:
SIGNATURE of SAMPLER:
Date Signed:
Time:

Sample Receipt Conditions

Temp in 0C	Samples on Ice?	Sample Intact?	Trip Blank?
3.4°C	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N
	Y/N	Y/N	Y/N

CUSTODY SEAL
DATE 10-13-15
SIGNATURE
AECOM
Jon Lanetin
QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

ALS Group USA, Corp

Sample Receipt Checklist

Client Name: **AECOM - GR** Date/Time Received: **14-Oct-15 10:00**

Work Order: **1510919** Received by: **PD**

Checklist completed by Keith Wierenga (eSignature) 14-Oct-15 (Date) Reviewed by: Chad Whelton (eSignature) 15-Oct-15 (Date)

Matrices: Groundwater
Carrier name: ALSHN

	Yes	No	Not Present
Shipping container/cooler in good condition?	☑	☐	☐
Custody seals intact on shipping container/cooler?	☐	☐	☑
Custody seals intact on sample bottles?	☐	☐	☑
Chain of custody present?	☑	☐	
Chain of custody signed when relinquished and received?	☑	☐	
Chain of custody agrees with sample labels?	☑	☐	
Samples in proper container/bottle?	☑	☐	
Sample containers intact?	☑	☐	
Sufficient sample volume for indicated test?	☑	☐	
All samples received within holding time?	☑	☐	
Container/Temp Blank temperature in compliance?	☑	☐	
Sample(s) received on ice?	☑	☐	

Temperature(s)/Thermometer(s): 3.4/3.4 C SR2

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage: 10/14/2015 3:08:11 PM

	Yes	No		
Water - VOA vials have zero headspace?	☐	☐	No VOA vials submitted	☑
Water - pH acceptable upon receipt?	☑	☐	N/A	☐
pH adjusted?	☐	☑	N/A	☐

pH adjusted by: -

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Revision: 1

SRC Page 1 of 1

AECOM
250 Apollo Drive
Chelmsford, MA 01824

978.905.2100 tel
978.905.2101 fax

Data Review Memorandum

Project Name: Marshall Line 6B Incident
Task Name: GWMon
Laboratory: ALS LAB GROUP
Laboratory Report No.: 1510918
Matrix: Wastewater
Level 1 Review: 10/21/2015

The laboratory report cited above contained the results for five field samples.

Level 1 review was performed using the laboratory report and electronic data deliverable. The review included the following:

- Comparison of results to the requested analyses on the Chain-of-Custody;
- Verification of field sample IDs;
- Review of the sample receipt forms for proper sample preservation.
- Identification of potential data usability issues based on holding times, recoveries of surrogates, laboratory control samples, or matrix spikes, and/or quality control issues identified in the laboratory report narrative.

Criteria for assessing data usability were derived from the *USEPA National Functional Guidelines for Organic Data Review, USEPA National Functional Guidelines for Inorganic Data Review*, and the Quality Assurance Project Plan.

The following samples were reviewed:

Sample ID	Lab ID	Sample Date	Analyses
MWTC0075R012S101315G082	1510918-01	10/13/2015	1
MWTC0075R036S101315G083	1510918-02	10/13/2015	1
MWTC0150R012AS101315G076	1510918-03	10/13/2015	1
MWTC0175L028S101315G074	1510918-04	10/13/2015	1
MWTC0200L090S101315G017	1510918-05	10/13/2015	1

Analyses Performed Codes:
[1] Metals by Inductively Coupled Plasma Mass Spectrometry (EPA 6020A)

Results:

- All requested analyses identified on the Chain-of-Custody were performed.
- Sample IDs match the Chain-of-Custody.
- Sample condition and preservation on receipt at the laboratory was acceptable.
- No significant data usability issues were noted; the data are therefore considered acceptable for use.

AECOM
250 Apollo Drive
Chelmsford, MA 01824

978.905.2100 tel
978.905.2101 fax

Data Review Memorandum

Project Name: Marshall Line 6B Incident
Task Name: GWMON
Laboratory: ALS LAB GROUP
Laboratory Report No.: 1510919
Matrix: Groundwater
Level 1 Review: 10/21/2015

The laboratory report cited above contained the results for five field samples and one field duplicate.

Level 1 review was performed using the laboratory report and electronic data deliverable. The review included the following:

- Comparison of results to the requested analyses on the Chain-of-Custody;
- Verification of field sample IDs;
- Review of the sample receipt forms for proper sample preservation.
- Identification of potential data usability issues based on holding times, recoveries of surrogates, laboratory control samples, or matrix spikes, and/or quality control issues identified in the laboratory report narrative.

Criteria for assessing data usability were derived from the *USEPA National Functional Guidelines for Organic Data Review, USEPA National Functional Guidelines for Inorganic Data Review*, and the Quality Assurance Project Plan.

The following samples were reviewed:

Sample ID	Lab ID	Sample Date	Analyses
MWTC0025L25D101215G075	1510919-01	10/12/2015	1
MWTC0025L25S101215G075	1510919-02	10/12/2015	1
MWTC0025L505S101215G014	1510919-03	10/12/2015	1
MWTC0025R001S101215G055	1510919-04	10/12/2015	1
MWTC0050L05ES101215G079	1510919-05	10/12/2015	1
MWTC0050L14BS101215G050	1510919-06	10/12/2015	1

Analyses Performed Codes:
[1] Metals by Inductively Coupled Plasma Mass Spectrometry (EPA 6020A)

Results:

- All requested analyses identified on the Chain-of-Custody were performed.
- Sample IDs match the Chain-of-Custody.
- Sample condition and preservation on receipt at the laboratory was acceptable.
- No significant data usability issues were noted; the data are therefore considered acceptable for use.

AECOM

Low Flow Ground Water Sample Collection Record

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

Well ID: MWTC0025L25
+ DUPLICATE

INSPECTION

Label on well?	YES	NO	Is cap locked?	YES	NO
Is reference mark visible?	YES	NO	Standing water present?	YES	NO
Condition of well	Okay		Any indication of surface runoff in well?	YES	NO
Weather	Sunny, windy		Air Temperature:	55°F	

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 10-12-15 Time: 10:19 AM/PM

Depth to Water: 3.70 Measured with: Electronic Tape Chalk & Steel Tape

Length of Well: ~~14.21~~ 14.34 measured after sampling AB Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 10-12-15 Begin Time: 10:26 AM/PM Purging Equipment: Peristaltic Pump

End Time: 12:40 AM/PM Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

14.34	ft.	Length of well
3.70	ft.	- depth of water (before purge start)
10.64	ft.	=length of water column
		x conversion factor (2" well) 0.16
1.70	Gal.	=1 casing volume

Yield: HIGH LOW

If low, recovery time: —

Actual volume purged: 6.75 gallons

Actual purge flow rate: 160 ~~ml/min~~ or L/min

Notes: Depth Purged + Sampled @: 10.38 ft TOC 7.5 ft bgs

• missed 3 readings due to Brian Albig showing me other well locations.

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 10:40	0.50	3.72	7.17	0.493	9.6	0.00	15.43	-45
10:45	—	3.72	—	—	—	—	—	—
10:50	—	—	—	—	—	—	—	—
10:55	—	—	—	—	—	—	—	—
11:00	2.0	3.72	7.20	0.487	9.4	0.00	16.08	-45
11:05	2.25	3.72	7.19	0.482	9.4	0.00	16.69	-44
11:10	2.25	3.72	7.19	0.478	9.3	0.00	17.30	-43
11:15	2.50	3.72	7.19	0.472	9.7	0.00	17.73	-41
11:20	2.75	3.72	7.18	0.473	9.1	0.00	17.82	-39
11:25	3.0	3.72	7.17	0.475	9.2	0.00	17.81	-38
~~Final:~~ 11:30	3.25	3.72	7.16	0.470	9.3	0.00	18.14	-36

SAMPLE COLLECTION

Date: 10-12-15 Time: 12:40 AM/PM Method: Peristaltic Pump

Appearance of Sample: Clear Actual Sample Flow Rate: 160 ~~ml/min~~ or L/min

SAMPLE BOTTLE COLLECTED: 1-metals Sample ID: MWTC0025L25S101215G075
Duplicate: MWTC0025L25D101215G075

SAMPLING PERSONNEL

Name: A. Boyce Company: AECOM

p. 1 of 3

AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0025L25

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well? YES NO
Is reference mark visible? YES NO
Condition of well _____
Weather _____
Is cap locked? YES NO
Standing water present? YES NO
Any indication of surface runoff in well? YES NO
Air Temperature: _____
Notes: _____

STATIC WATER LEVEL PRIOR TO PURGING

Date: _____ Time: _____ AM/PM
Depth to Water: _____
Length of Well: _____
Measured with: Electronic Tape Chalk & Steel Tape
Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: _____ Begin Time: _____ AM/PM
End Time: _____ AM/PM
Purging Equipment: _____
Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

_____ ft. Length of well
_____ ft. - depth of water (before purge start)
_____ ft. =length of water column
x conversion factor (2" well) 0.16
_____ Gal. =1 casing volume

Yield: HIGH LOW
If low, recovery time: _____
Actual volume purged _____ gallons
Actual purge flow rate _____ ml/min or L/min

Notes _____

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 11:35	3.50	3.72	7.14	0.472	9.4	0.00	18.06	-34
11:40	3.75	3.72	7.12	0.475	9.1	0.00	17.53	-30
11:45	4.0	3.72	7.09	0.479	9.6	0.00	17.09	-26
11:50	4.25	3.72	7.09	0.480	9.1	0.00	17.05	-26
11:55	4.50	3.72	7.08	0.492	10.2	0.00	15.35	-25
12:00	4.75	3.72	7.06	0.496	11.4	0.00	14.94	-23
12:05	5.0	3.72	7.04	0.495	10.9	0.00	14.89	-22
12:10	5.25	3.72	7.02	0.498	9.0	0.00	15.16	-19
12:15	5.50	3.72	6.98	0.498	9.0	0.00	15.43	-17
12:20	5.75	3.72	6.85	0.498	8.9	0.00	15.49	-8
Final: 12:25	6.0	3.72	6.85	0.498	9.2	0.00	15.46	-7

SAMPLE COLLECTION

Date: _____ Time: _____ AM/PM
Method _____
Appearance of Sample: _____
Actual Sample Flow Rate: _____ ml/min or L/min
SAMPLE BOTTLE COLLECTED: _____

SAMPLING PERSONNEL

Name: _____ Company: _____

p. 2 of 3

AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC 0025L25

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well? YES NO
Is reference mark visible? YES NO
Condition of well _____
Weather _____
Is cap locked? YES NO
Standing water present? YES NO
Any indication of surface runoff in well? YES NO
Air Temperature: _____
Notes: _____

STATIC WATER LEVEL PRIOR TO PURGING

Date: _____ Time: _____ AM/PM
Depth to Water: _____
Length of Well: _____
Measured with: Electronic Tape Chalk & Steel Tape
Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: _____ Begin Time: _____ AM/PM
End Time: _____ AM/PM
Purging Equipment: _____
Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

_____ ft. Length of well
_____ ft. - depth of water (before purge start)
_____ ft. =length of water column
x conversion factor (2" well) 0.16
_____ Gal. =1 casing volume

Yield: HIGH LOW
If low, recovery time: _____
Actual volume purged _____ gallons
Actual purge flow rate _____ ml/min or L/min

Notes _____

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
~~Start:~~ 12:30	6.25	3.72	6.83	0.499	8.8	0.00	15.48	-5
12:35	6.50	3.72	6.82	0.498	8.9	0.00	15.47	
Final: 12:40	6.75	3.72	6.80	0.498	8.9	0.00	15.44	-2

SAMPLE COLLECTION

Date: _____ Time: _____ AM/PM
Method _____
Appearance of Sample: _____
Actual Sample Flow Rate: _____ ml/min or L/min
SAMPLE BOTTLE COLLECTED: _____

SAMPLING PERSONNEL

Name: _____ Company: _____

p. 3 of 3

AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0025L505

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well?	YES	NO	Is cap locked?	YES	NO
Is reference mark visible?	YES	NO	Standing water present?	YES	NO
Condition of well	Okay		Any indication of surface runoff in well?	YES	NO
Weather	Windy, cloudy		Air Temperature:	55°F	

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 10-12-15 Time: 13:29 AM/PM

Depth to Water: 3.30 Measured with: Electronic Tape Chalk & Steel Tape

Length of Well: ~~8.21~~ 8.35 - measured after sampling AB Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 10-12-15 Begin Time: 13:45 AM/PM Purging Equipment: peristaltic pump

End Time: 14:55 AM/PM Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

8.35	ft.	Length of well
3.30	ft.	- depth of water (before purge start)
5.05	ft.	=length of water column
		x conversion factor (2" well) 0.16
0.808	Gal.	=1 casing volume

Yield: HIGH LOW

If low, recovery time: —

Actual volume purged: 3.75 gallons

Actual purge flow rate: 155 ml/min or L/min

Notes: Depth purged + sampled @ 4.23 ft. TOC 1.37 ft. bgs

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 13:55	0.25	3.39	6.86	0.478	12.7	1.32	22.81	+126
14:00	1.0	3.39	6.78	0.486	10.8	1.07	21.95	+125
14:05	1.25	3.39	6.76	0.490	10.9	0.99	21.49	+125
14:10	1.50	3.39	6.74	0.499	10.2	0.98	20.54	+123
14:15	1.75	3.39	6.73	0.503	11.0	0.95	20.19	+123
14:20	2.0	3.39	6.73	0.506	10.8	0.91	19.89	+123
14:25	2.25	3.39	6.73	0.510	11.0	0.94	19.65	+122
14:30	2.50	3.39	6.73	0.511	10.2	0.95	19.50	+121
14:35	2.75	3.39	6.98	0.529	10.2	1.34	18.96	+44
14:40	3.0	3.39	6.87	0.526	3.6	1.22	19.01	+47
Final: 14:45	3.25	3.39	6.77	0.526	2.9	1.39	19.15	+53

SAMPLE COLLECTION

Date: 10-12-15 Time: 14:55 AM/PM Method: peristaltic pump

Appearance of Sample: Clear Actual Sample Flow Rate: 155 ml/min or L/min

SAMPLE BOTTLE COLLECTED: 1-metal Sample ID: MWTC0025L505S101215G1~~37~~ 014 JTC 10-13-15

SAMPLING PERSONNEL

Name: A. Boyce Company: AECOM

p. 1 of 2

AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0025L505

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well? YES NO
Is reference mark visible? YES NO
Condition of well _____
Weather _____
Is cap locked? YES NO
Standing water present? YES NO
Any indication of surface runoff in well? YES NO
Air Temperature: _____
Notes: _____

STATIC WATER LEVEL PRIOR TO PURGING

Date: _____ Time: _____ AM/PM
Depth to Water: _____
Length of Well: _____
Measured with: Electronic Tape Chalk & Steel Tape
Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: _____ Begin Time: _____ AM/PM
End Time: _____ AM/PM
Purging Equipment: _____
Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

_____ ft. Length of well
_____ ft. - depth of water (before purge start)
_____ ft. =length of water column
x conversion factor (2" well) 0.16
_____ Gal. =1 casing volume

Yield: HIGH LOW
If low, recovery time: _____
Actual volume purged _____ gallons
Actual purge flow rate _____ ml/min or L/min

Notes _____

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 14:50	3.50	3.39	6.74	0.525	2.8	1.38	19.25	+56
Final: 14:55	3.75	3.39	6.71	0.523	3.1	1.48	19.43	+59

SAMPLE COLLECTION

Date: _____ Time: _____ AM/PM
Method _____
Appearance of Sample: _____
Actual Sample Flow Rate: _____ ml/min or L/min
SAMPLE BOTTLE COLLECTED: _____

SAMPLING PERSONNEL

Name: _____ Company: _____

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AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0025R001

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well?	YES	NO	Is cap locked?	YES	NO
Is reference mark visible?	YES	NO	Standing water present?	YES	NO
Condition of well	Okay		Any indication of surface runoff in well?	YES	NO
Weather	Windy, Sunny		Air Temperature:	55°F	

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 10-12-15 Time: 08:31 AM/PM

Depth to Water: 4.82 Measured with: Electronic Tape Chalk & Steel Tape

Length of Well: ~~13.35~~ 13.20 measured after sampling Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 10-12-15 Begin Time: 08:39 AM/PM Purging Equipment: Peristaltic Pump

End Time: 09:40 AM/PM Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

13.35	ft.	Length of well
4.82	ft.	- depth of water (before purge start)
8.53	ft.	=length of water column
		x conversion factor (2" well) 0.16
1.36	Gal.	=1 casing volume

Yield: HIGH LOW

If low, recovery time: —

Actual volume purged: 3.0 gallons

Actual purge flow rate: 115 ml/min or L/min

Purged + Sampled @ 8.74 ft TOC ~~AGS~~ 5.5 ft bgs

Notes: Total Depth = 13.20 ft, measured after sampling.

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 08:50	0.25	4.83	6.26	0.534	9.9	0.00	13.38	+138
08:55	0.50	4.83	6.45	0.533	9.5	0.00	13.26	+93
09:00	1.00	4.83	6.58	0.534	12.1	0.00	13.23	+41
09:05	1.25	4.83	6.66	0.535	9.7	0.00	13.18	+14
09:10	1.50	4.83	6.75	0.535	10.1	0.00	13.20	-9
09:15	1.75	4.83	6.80	0.535	9.9	0.00	13.20	-22
09:20	2.0	4.83	6.85	0.535	9.8	0.00	13.18	-33
09:25	2.25	4.83	6.88	0.535	10.9	0.00	13.27	-39
09:30	2.50	4.83	6.93	0.532	10.5	0.00	13.22	-48
09:35	2.75	4.83	6.93	0.532	10.3	0.00	13.23	-52
Final: 09:40	3.0	4.83	6.95	0.532	9.8	0.00	13.21	-53

SAMPLE COLLECTION

Date: 10-12-15 Time: 09:40 AM/PM Method: peristaltic Pump

Appearance of Sample: clear Actual Sample Flow Rate: 115 ml/min or L/min

SAMPLE BOTTLE COLLECTED: 1-metals Sample ID: MWTC0025R001S101215G055

SAMPLING PERSONNEL

Name: A. Boyce Company: AECom

AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0050L05E

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well?	YES	NO	Is cap locked?	YES	NO
Is reference mark visible?	YES	NO	Standing water present?	YES	NO
Condition of well	okay		Any indication of surface runoff in well?	YES	NO
Weather	windy, cloudy		Air Temperature:	55°F	

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 10-12-15 Time: 15:39 AM/PM

Depth to Water: 5.62 Measured with: Electronic Tape Chalk & Steel Tape

Length of Well: 15.29 - measured after sampling Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 10-12-15 Begin Time: 15:50 AM/PM Purging Equipment: Peristaltic Pump

End Time: 16:40 AM/PM Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

15.29	ft.	Length of well	Yield:	HIGH LOW
5.62	ft.	- depth of water (before purge start)	If low, recovery time:	
9.67	ft.	=length of water column		
		x conversion factor (2" well) 0.16	Actual volume purged	2.75 gallons
1.55	Gal.	=1 casing volume	Actual purge flow rate	140 ml/min or L/min

Notes: Depth purged + Sampled at 11.34 ft TOC 7.90 ft bgs

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 16:00	0.25	5.64	6.95	0.467	3.4	0.00	19.84	+45
16:05	0.75	5.64	6.95	0.470	3.4	0.00	19.37	+25
16:10	1.0	5.64	6.95	0.476	3.1	0.00	18.98	+1
16:15	1.25	5.64	6.96	0.473	3.1	0.00	19.01	-14
16:20	1.50	5.64	6.96	0.475	3.2	0.00	18.87	-25
16:25	1.75	5.64	6.96	0.478	3.5	0.00	18.83	-46
16:30	2.0	5.64	6.96	0.477	3.4	0.00	18.77	-52
16:35	2.5	5.64	6.96	0.480	3.4	0.00	18.78	-58
Final: 16:40	2.75	5.64	6.96	0.4	3.4	0.0	18.83	-63

SAMPLE COLLECTION

Date: 10-12-15 Time: 16:40 AM/PM Method Peristaltic Pump

Appearance of Sample: Clear Actual Sample Flow Rate: 140 ml/min or L/min

SAMPLE BOTTLE COLLECTED: 1-metals Sample ID: MWTC0050L05ES101215G~~790~~ 079 JRC 10-13-15

SAMPLING PERSONNEL

Name: A. Boyce Company: AECOM

AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0050L14B

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well?	YES	NO	Is cap locked?	YES	NO
Is reference mark visible?	YES	NO	Standing water present?	YES	NO
Condition of well	okay		Any indication of surface runoff in well?	YES	NO
Weather	Cloudy, windy		Air Temperature:	55°F	

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 10-12-15 Time: 17:07 AM/PM

Depth to Water: 3.32 Measured with: Electronic Tape Chalk & Steel Tape

Length of Well: ~~10.69~~ 10.82 AB Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 10-12-15 Begin Time: 17:11 AM/PM Purging Equipment: Peristaltic Pump

End Time: 17:55 AM/PM Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

10.82 ft. Length of well

3.32 ft. - depth of water (before purge start)

7.5 ft. =length of water column

x conversion factor (2" well) 0.16

1.2 Gal. =1 casing volume

Yield: HIGH LOW

If low, recovery time: —

Actual volume purged 2.0 gallons

Actual purge flow rate 130 ml/min or L/min

Notes: Depth Purge + Sampled @ 6.92 ft TOC 5.0 ft bgs

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 17:20	0.25	3.52	6.95	0.552	4.6	0.00	15.49	+48
17:25	0.50	3.52	6.95	0.554	4.8	0.00	15.26	+22
17:30	0.75	3.52	6.94	0.555	4.4	0.00	15.03	0
17:35	1.0	3.52	6.94	0.555	4.2	0.00	15.05	-6
17:40	1.25	3.52	6.93	0.556	3.8	0.00	15.01	-14
17:45	1.50	3.52	6.93	0.556	3.8	0.00	14.99	-22
17:50	1.75	3.52	6.92	0.558	3.8	0.00	15.08	-30
Final: 17:55	2.0	3.52	6.92	0.559	3.8	0.00	15.03	-37

SAMPLE COLLECTION

Date: 10-12-15 Time: 17:55 AM/PM Method Peristaltic Pump

Appearance of Sample: Clear Actual Sample Flow Rate: 130 ml/min or L/min

SAMPLE BOTTLE COLLECTED: 1-metals Sample ID: MWTC0050L14BS101215G050

SAMPLING PERSONNEL

Name: A. Boyce Company: AECOM

AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0075R012

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well?	YES	NO	Is cap locked?	YES	NO
Is reference mark visible?	YES	NO	Standing water present?	YES	NO
Condition of well	Okay		Any indication of surface runoff in well?	YES	NO
Weather	Cloudy + windy		Air Temperature:	53°F	

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 10-13-15 Time: 07:58 AM/PM

Depth to Water: 5.68 Measured with: Electronic Tape Chalk & Steel Tape

Length of Well: 14.94 Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 10-13-15 Begin Time: 08:07 AM/PM Purging Equipment: Peristaltic Pump

End Time: 09:00 AM/PM Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

14.94 ft. Length of well

5.68 ft. - depth of water (before purge start)

9.26 ft. =length of water column

x conversion factor (2" well) 0.16

1.48 Gal. =1 casing volume

Yield: HIGH LOW

If low, recovery time: —

Actual volume purged: 2.75 gallons

Actual purge flow rate: 130 ml/min or L/min

Notes: Purge + Sample Depth @ 11.82 ft. TOC 8.20 ft. bgs

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 08:20	0.75	5.73	6.17	0.587	11.3	0.00	12.11	+60
08:25	1.0	5.73	6.34	0.584	11.7	0.00	12.06	+30
08:30	1.25	5.73	6.40	0.583	8.0	0.00	12.12	+18
08:35	1.50	5.73	6.55	0.575	9.6	0.00	12.17	-19
08:40	1.75	5.73	6.59	0.572	8.5	0.00	12.15	-28
08:45	2.0	5.73	6.64	0.569	5.8	0.00	12.11	-43
08:50	2.25	5.73	6.68	0.564	5.4	0.00	12.16	-53
08:55	2.50	5.73	6.70	0.560	2.8	0.00	12.19	-62
Final: 09:00	2.75	5.73	6.71	0.560	2.4	0.00	12.20	-67

SAMPLE COLLECTION

Date: 10-13-15 Time: 09:00 AM/PM Method: Peristaltic Pump

Appearance of Sample: clear Actual Sample Flow Rate: 130 ml/min or L/min

SAMPLE BOTTLE COLLECTED: 1-metals Sample ID: MWTC0075R012S101315G082

SAMPLING PERSONNEL

Name: A. Boyce Company: AECOM

AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0075R036

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well?	YES	NO	Is cap locked?	YES	NO
Is reference mark visible?	YES	NO	Standing water present?	YES	NO
Condition of well	Okay		Any indication of surface runoff in well?	YES	NO
Weather	Cloudy, overcast		Air Temperature:	52°F	

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 10-13-15 Time: 09:31 AM/PM

Depth to Water: 1.97 Measured with: Electronic Tape Chalk & Steel Tape

Length of Well: 15.13 Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 10-13-15 Begin Time: 09:40 AM/PM Purging Equipment: Peristaltic Pump

End Time: 11:00 AM/PM Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

15.13 ft. Length of well

1.97 ft. - depth of water (before purge start)

13.16 ft. =length of water column

x conversion factor (2" well) 0.16

2.11 Gal. =1 casing volume

Yield: HIGH / LOW

If low, recovery time: —

Actual volume purged: 3.5 gallons

Actual purge flow rate: 135 ml/min or L/min

Notes: Depth of purge + Sampled @ 11.17 ft TOC 8.25 ft. bgs

	Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
	Start: 09:45	0.25	2.64	6.78	0.601	1.92	7.21	11.98	-65
	09:50	0.50	2.64	6.83	0.597	1.9	5.51	12.12	-73
AB	0955 ~~10:00~~	0.75	2.64	6.84	0.600	5.2	4.98	12.14	-74
AB	1000 ~~10:05~~	1.0	2.64	6.87	0.599	8.53	2.45	12.30	-81
AB	1005 ~~10:10~~	1.25	2.64	6.87	0.598	18.7	2.45	12.35	-82
	10:10	1.50	2.64	6.90	0.594	32.6	1.17	12.45	-83
	10:15	1.75	2.64	6.89	0.594	28.8	0.99	12.45	-83
	10:20	1.75	2.64	6.90	0.595	26.8	0.62	12.52	-83
	10:25	2.0	2.64	6.90	0.595	22.4	0.41	12.55	-84
	10:30	2.25	2.64	6.91	0.594	17.3	0.00	12.64	-86
	~~Final:~~ 10:35	2.50	2.64	6.91	0.594	12.0	0.00	12.70	-89

SAMPLE COLLECTION

Date: 10-13-15 Time: 11:00 AM/PM Method: peristaltic Pump

Appearance of Sample: clear Actual Sample Flow Rate: 135 ml/min or L/min

SAMPLE BOTTLE COLLECTED: 1-metals Sample ID: MWTC0075R036S101315G ~~825~~ 083 JTU 10-12-15

SAMPLING PERSONNEL

Name: A. Boyce Company: AECOM

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AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0075R036

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well? YES NO
Is reference mark visible? YES NO
Condition of well _____
Weather _____
Notes: _____

Is cap locked? YES NO
Standing water present? YES NO
Any indication of surface runoff in well? YES NO
Air Temperature: _____

STATIC WATER LEVEL PRIOR TO PURGING

Date: _____ Time: _____ AM/PM
Depth to Water: _____
Length of Well: _____

Measured with: Electronic Tape Chalk & Steel Tape
Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: _____ Begin Time: _____ AM/PM
End Time: _____ AM/PM

Purging Equipment: _____
Decontamination: Pre Steam Cleaned DI Water Other
New Tubing

CALCULATION OF 1 CASING VOLUME

_____ ft. Length of well
_____ ft. - depth of water (before purge start)
_____ ft. =length of water column
x conversion factor (2" well) 0.16
_____ Gal. =1 casing volume

Yield: HIGH LOW
If low, recovery time: _____
Actual volume purged _____ gallons
Actual purge flow rate _____ ml/min or L/min

Notes _____

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 10:40	2.75	2.64	6.91	0.594	8.6	0.00	12.73	-89
10:45	2.75	2.64	6.91	0.594	7.5	0.00	12.78	-90
10:50	3.0	2.64	6.92	0.591	5.5	0.00	12.95	-92
10:55	3.25	2.64	6.92	0.592	4.3	0.00	12.97	-93
Final: 11:00	3.50	2.64	6.92	0.589	3.2	0.00	13.06	-94

SAMPLE COLLECTION

Date: _____ Time: _____ AM/PM
Method _____
Appearance of Sample: _____
Actual Sample Flow Rate: _____ ml/min or L/min
SAMPLE BOTTLE COLLECTED: _____

SAMPLING PERSONNEL

Name: _____ Company: _____

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AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0150R012A

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well?	YES	NO	Is cap locked?	YES	NO
Is reference mark visible?	YES	NO	Standing water present?	YES	NO
Condition of well	okay		Any indication of surface runoff in well?	YES	NO
Weather	Overcast		Air Temperature:	50°F	

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 10-13-15 Time: 11:38 AM/PM

Depth to Water: 4.40 Measured with: Electronic Tape Chalk & Steel Tape

Length of Well: 14.97 Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 10-13-15 Begin Time: 11:42 AM/PM Purging Equipment: peristaltic pump

End Time: ~~12:10~~ 12:15 AM/PM AB Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

14.97 ft. Length of well

4.40 ft. - depth of water (before purge start)

10.57 ft. =length of water column

x conversion factor (2" well) 0.16

1.69 Gal. =1 casing volume

Yield: HIGH LOW

If low, recovery time: —

Actual volume purged 1.75 gallons

Actual purge flow rate 135 ml/min or L/min

Notes: Depth Purged + Sampled @ 11.44 ft TOC 7.6 ft bgs

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 11:50	< 0.25	4.40	6.77	0.644	5.26	0.00	13.40	-62
11:55	0.50	4.40	6.72	0.643	6.8	0.00	13.46	-61
12:00	0.75	4.40	6.71	0.642	3.1	0.00	13.49	-61
12:05	1.0	4.40	6.71	0.641	2.8	0.00	13.53	-62
12:10	1.5	4.40	6.70	0.640	1.8	0.00	13.54	-62
Final: 12:15	1.75	4.40	6.71	0.640	1.3	0.00	13.54	-62

SAMPLE COLLECTION

Date: 10-13-15 Time: ~~12:15~~ AB 12:15 AM/PM Method peristaltic pump

Appearance of Sample: Clear Actual Sample Flow Rate: 135 ml/min or L/min

SAMPLE BOTTLE COLLECTED: 1-Metals Sample ID: MWTC0150R012A S101315G076

SAMPLING PERSONNEL

Name: A. Boyce Company: AECOM

AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0175L028

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well?	YES	NO	Is cap locked?	YES	NO
Is reference mark visible?	YES	NO	Standing water present?	YES	NO
Condition of well	Okay		Any indication of surface runoff in well?	YES	NO
Weather	overcast		Air Temperature:	55°F	

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 10-13-15 Time: AB ~~3.96~~ 12:43 AM/PM

Depth to Water:	3.96	Measured with:	Electronic Tape	Chalk & Steel Tape	
Length of Well:	14.95	Decontamination:	Pre Steam Cleaned	DI Water	Other

WELL PURGING

Date: 10-13-15 Begin Time: 12:47 AM/PM Purging Equipment: Peristaltic Pump

End Time: 14:05 AM/PM Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

14.95	ft.	Length of well
3.96	ft.	- depth of water (before purge start)
10.99	ft.	=length of water column
		x conversion factor (2" well) 0.16
1.76	Gal.	=1 casing volume

Yield: HIGH / LOW

If low, recovery time: —

Actual volume purged: 4.25 gallons

Actual purge flow rate: 140 ml/min or L/min

Notes: Depth Purged + Sampled @ 11.33 ft TOC 7.4 ft bgs

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 12:55	0.25	4.30	6.84	0.522	4.7	0.00	13.32	-59
13:00	0.50	4.30	6.91	0.517	7.5	0.00	13.28	-59
13:05	1.0	4.30	6.91	0.517	26.4	0.00	13.30	-54
13:10	1.25	4.30	6.90	0.516	24.8	0.00	13.30	-53
13:15	1.5	4.30	6.89	0.516	26.5	0.00	13.33	-52
13:20	1.5	4.30	6.92	0.515	29.3	0.00	13.37	-50
13:25	1.75	4.30	6.96	0.515	27.4	0.00	13.26	-25
13:30	2.0	4.30	7.00	0.515	25.1	0.00	13.22	-24
13:35	2.5	4.30	6.95	0.516	26.1	0.00	13.16	-22
13:40	3.0	4.30	6.91	0.518	11.8	0.00	13.18	-22
Final: 13:45	3.25	4.30	6.90	0.518	7.6	0.00	13.22	-22

SAMPLE COLLECTION

Date: 10-13-15 Time: 14:05 AM/PM Method: Peristaltic Pump

Appearance of Sample: Clear Actual Sample Flow Rate: 105 ml/min or L/min

SAMPLE BOTTLE COLLECTED: 1-Metals Sample ID: MWTC0175L028S101315G074

SAMPLING PERSONNEL

Name: A. Boyce Company: AECOM

AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0175L028

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well? YES NO
Is reference mark visible? YES NO
Condition of well _____
Weather _____
Is cap locked? YES NO
Standing water present? YES NO
Any indication of surface runoff in well? YES NO
Air Temperature: _____
Notes: _____

STATIC WATER LEVEL PRIOR TO PURGING

Date: _____ Time: _____ AM/PM
Depth to Water: _____
Length of Well: _____
Measured with: Electronic Tape Chalk & Steel Tape
Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: _____ Begin Time: _____ AM/PM
End Time: _____ AM/PM
Purging Equipment: _____
Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

_____ ft. Length of well
_____ ft. - depth of water (before purge start)
_____ ft. =length of water column
x conversion factor (2" well) 0.16
_____ Gal. =1 casing volume

Yield: HIGH LOW
If low, recovery time: _____
Actual volume purged _____ gallons
Actual purge flow rate _____ ml/min or L/min

Notes _____

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 13:50	3.5	4.30	6.90	0.517	6.6	0.00	13.23	-22
13:55	3.75	4.30	6.89	0.518	5.3	0.00	13.25	-23
14:00	4.0	4.30	6.89	0.517	3.6	0.00	13.26	-22
Final: 14:05	4.25	4.30	6.89	0.518	3.1	0.00	13.27	-23

SAMPLE COLLECTION

Date: _____ Time: _____ AM/PM
Method _____
Appearance of Sample: _____
Actual Sample Flow Rate: _____ ml/min or L/min
SAMPLE BOTTLE COLLECTED: _____

SAMPLING PERSONNEL

Name: _____ Company: _____

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AECOM

Low Flow Ground Water Sample Collection Record

Well ID: MWTC0200L090

Client: Enbridge
Location: Marshall, MI
Project #: 60339671

INSPECTION

Label on well?	YES	NO	Is cap locked?	YES	NO
Is reference mark visible?	YES	NO	Standing water present?	YES	NO
Condition of well	okay		Any indication of surface runoff in well?	YES	NO
Weather	overcast		Air Temperature:	55°F	

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 10-13-15 Time: 14:39 AM/PM

Depth to Water: 3.95 Measured with: Electronic Tape Chalk & Steel Tape

Length of Well: 8.15 Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 10-13-15 Begin Time: 14:42 AM/PM Purging Equipment: Peristaltic Pump

End Time: 15:20 AM/PM Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

8.15 ft. Length of well

3.95 ft. - depth of water (before purge start)

4.2 ft. =length of water column

x conversion factor (2" well) 0.16

0.67 Gal. =1 casing volume

Yield: HIGH / LOW (med)

If low, recovery time:

Actual volume purged: 1.75 gallons

Actual purge flow rate: 120 ml/min or L/min

Notes: Purged + Sampled at 4.33 ft TOC 1.7 ft bgs

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 14:50	0.25	4.10	6.54	1.18	2.48	0.00	14.07	-2
14:55	0.50	4.13	6.56	1.21	2.1	0.00	14.14	-17
15:00	0.75	4.13	6.57	1.21	1.3	0.00	14.03	-26
15:05	1.0	4.13	6.59	1.22	1.2	0.00	14.13	-38
15:10	1.25	4.13	6.59	1.22	0.9	0.00	14.12	-41
15:15	1.50	4.13	6.59	1.22	0.9	0.00	14.21	-42
Final: 15:20	1.75	4.13	6.59	1.22	0.9	0.00	14.27	-44

SAMPLE COLLECTION

Date: 10-13-15 Time: 15:20 AM/PM Method: peristaltic pump

Appearance of Sample: Clear Actual Sample Flow Rate: 120 ml/min or L/min

SAMPLE BOTTLE COLLECTED: 1-metals Sample ID: MWTC0200L090S101315G017

SAMPLING PERSONNEL

Name: A. Boyce Company: AECOM