

Preliminary Investigation of the Paleo-Channels of the AuSable River Floodplain

Wurtsmith Air Force Base

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1. Introduction

This technical memorandum summarizes and reports the findings of the preliminary Paleo-Channel investigation completed between January 10 and March 3 of 2017 in Oscoda, MI southeast of the former Wurtsmith Air Force Base (WAFB). AECOM conducted this investigation to address the following objectives:

1. Understand the geology within the Au Sable River floodplain;
2. Identify the presence of PFAS in groundwater within the potential paleo-channels of the Au Sable River floodplain; and
3. Develop a better understanding of the site with respect to regional/base-wide geology to continue to improve the base-wide Conceptual Site Model (CSM).

2. Background

The geology at WAFB is generally characterized as lacustrine and eolian sands overlying lacustrine clay, till, and ultimately bedrock consisting of the Marshall Sandstone and Coldwater Shale. The lacustrine sands and gravels are better characterized as deltaic, which were deposited as a series of large deltaic deposits created by the Glacial Au Sable River at the point it entered an evolving series of late Wisconsinan pro glacial lakes (**Figure 1**) (Burgis, 1977). As illustrated on **Figure 1**, WAFB is located on the northern limb of a large, fan-like delta, designated as part of the Algonquin Delta with several nearby paleo shorelines.

Site stratigraphy consists of progradational deltaic sediments, which are expected to dip to the east/north-east. A general depositional model suggestive of what was present at the time of deposition is shown in **Figure 2** (Larson and Schaetzl, 2001; Reineck and Singh, 1975). In a system with a high sediment load and a fan-like fluvial to slightly wave modified morphology, flat-lying, upper portions of the delta stratigraphy (topset bedding) are expected to be sandy, with only minor and spatially limited fine grained (silt and clay) delta plain facies present. Delta mouth bar deposits of coarse sand, upward-fining (gravel to fine sand) distributary channel fills, and minor medium to fine-grained beach ridge/shore face sands will also be present until the transition to delta slope (foreset) beds. The focus of the investigation is on the coarse-grain filled, distributary channels (i.e. paleo-channels) within the delta complex that could provide preferential pathways for offsite contaminant transport.

Understanding WAFB's deltaic stratigraphy and how specific observations from borings logs and analytical data fit in to an overall depositional model described above can help with issues at a range of scales, from base-wide to individual areas such as the Au Sable River floodplain.

3. Paleo-Channel Investigation

Beginning on January 11 2017, AECOM, contracted with subcontractor Cascade DrillingTM, to complete 13 soil borings within the Au Sable River floodplain at the locations shown in **Figure 3**. Soil boring logs are included in **Appendix A** and photo logs for each boring are included in **Appendix B**. AECOM collected continuous soil cores to evaluate lithology using a Roto-Sonic Mini Rig (operated by Cascade DrillingTM) with 4 inch core barrel and 6 inch outer casing. The soil cores were logged for lithological description. Soil samples were not submitted for laboratory analyses.

Vertical aquifer sampling (VAS) was used to collect groundwater samples from each of the 13 boring locations for laboratory analyses. VAS conducted at locations PCB10 through PCB14 utilized a “top down” approach, during which the sampling intervals are selected as zones of interest are encountered during drilling operations. Alternatively, VAS conducted at locations PCB1 through PCB3 and PCB5 through PCB9, utilized a “bottom up” approach, during which a boring is drilled to its maximum depth and sampling intervals are selected after reviewing the boring log developed from the soils encountered during the initial drilling. A 2-foot (ft) long temporary well screen was deployed at the bottom of the boring and exposed to the formation. The VAS samples for both “top down” and “bottom up” approaches were collected by purging water from the screen interval (two times the amount of water injected during drilling). After purging, groundwater samples were collected for PFAS analysis in laboratory supplied containers. During VAS water quality parameters (temperature, specific conductance, pH, dissolved solids, oxidation-reduction potential, and turbidity) were recorded following AECOM groundwater Standard Operating Procedures using an YSI Pro DDS water quality meter. Water quality measurements recorded during purging are included in **Appendix C** and stabilized parameters for each sample are summarized in **Table 2**. Parameters for boring PCB10 were not recorded due to faulty field equipment. The drilling subcontractor then withdrew the drill rods up through the formation until it was positioned at the next sample interval where the screen was again deployed and purged prior to sample collection.

VAS samples collected were submitted to Vista Analytical Laboratories and analyzed for a list of 21 PFAS which included:

- 6:2 Fluorotelomer sulfonic acid (6:2 FTS),
- 8:2 Fluorotelomer sulfonic acid (8:2 FTS),
- Perfluorooctane sulfonamide (FOSA),
- Perfluorobutanoic acid (PFBA),
- Perfluorobutane sulfonic acid (PFBS),
- Perfluorodecanoic acid (PFDA),
- Perfluorododecanoic acid (PFDODA),
- Perfluorodecane sulfonic acid (PFDS),
- Perfluoroheptanoic acid (PFHpA),
- Perfluoroheptane sulfonic acid (PFHpS),
- Perfluorohexanoic acid (PFHxA),
- Perfluorohexadecanoic acid (PFHxDA),
- Perfluorohexane sulfonic acid (PFHxS),
- Perfluorononanoic acid (PFNA),
- Perfluorooctanoic acid (PFOA),
- Perfluorooctadecanoic acid (PFODA),
- Perfluorooctane sulfonic acid (PFOS),
- Perfluoropentanoic acid (PFPeA),
- Perfluorotetradecanoic acid (PFTeDA),
- Perfluorotridecanoic acid (PFTTrDA), and
- Perfluoroundecanoic acid (PFUnDA).

Analytical results are summarized in **Table 3**.

Drill water and decontamination water was brought to site each morning by the subcontractor in 300 gallon totes. Composite samples of 50 milliliter (mL) from each tote, per day, were collected in 250mL high-density polyethylene jars and submitted for analysis. Between January 10 and February 13, 2017, the source of drill water was the Au Gres, MI water tower. However, a water sample collected directly from the Au Gres Water Tower on January 23, 2017 reported trace amounts of PFAS compounds. As a result, an alternate water source was identified in Harrisville, MI, approximately 20 miles north of the Site, where AECOM was granted access to obtain water from a hydrant near the Harrisville Airport. Drill water totes were rinsed and flushed with a mixture of Alconox and Harrisville water prior to being used. A water sample collected directly from the hydrant and analyzed by Vista Analytical Laboratory reported no detectable PFAS compounds. Water from this location was utilized for drilling and decontamination from February 13, 2017 until the end of the project.

Borings PCB2, PCB6, and PCB9 through PCB14 were drilled 10 ft to 15 ft below the top of the glacial till, which underlies the progradational deltaic deposits at a depth ranging between 23 ft to 41ft below ground surface (bgs). Borings PCB1, PCB3, PCB5, PCB7, and PCB8 were drilled to a total depth of 150 ft bgs.

The boreholes were backfilled using soil cuttings, hole plug, and bentonite chips. All equipment that came into contact with soil and/or ground water was decontaminated with an Alconox mixture and/or pressure washer with the exception of equipment that was dedicated (e.g. tubing). Global positioning system coordinates were collected for each location to provide an x, y coordinate and a ground surface elevation, as shown in **Table 1**. Field work was recorded daily in Field Activity Logs which are included in **Appendix D**.

4. Results

Two cross sections have been developed utilizing the boring logs developed from this effort to visualize and provide further insight into the complexity of the underlying geology within this study area. **Figure 4** depicts a transect map showing the locations and orientations of Cross Sections A-A' (**Figure 5**) and B-B' (**Figure 6**) in relation to the existing plume data on, and around, the Former Wurtsmith Air Force Base. The sediments observed throughout the area of investigation primarily consist of 23 ft to 41 ft of medium grained deltaic sands with occasional gravel zones, overlaying stiff, sandy clay with pebbles (possibly glacial till), as seen in borings PCB1, and PCB8 through PCB14. Borings PCB2, PCB3, PCB5, and PCB6 also include soft, sticky clay with shells (possibly lacustrine), that ranges from 2 ft to 21ft thick above stiff sandy clay with pebbles (possibly glacial till) encountered between 27 ft and 37 ft bgs. A potential channel was identified in the boring PCB7, which consisted of approximately 50 ft of soft, sticky clay with shells and increasing sand content with depth, overlaying medium to coarse grained sand and gravel before encountering stiff sandy clay with pebbles at approximately 72 ft bgs.

PFAS was detected in the VAS samples collected from all of the 13 borings. Overall, the PFAS concentrations were consistent with previous site investigations including residential wells samples. The majority of the samples were collected from the progradational deltaic deposits and a limited number of samples were collected from interbedded sands located beneath the lacustrine clay and/or glacier till.

The highest PFAS concentrations were found in VAS samples collected from deltaic deposits at PCB1 and PCB2, which are closer to the former base boundary and identified PFAS sources. PFAS were also detected across Van Etten Creek and south of Au Sable River at concentrations similar to those detected in residential wells from those areas. Trace levels of PFAS have been also found in some interbedded sands. However, trace level of PFAS were also found in the drilling and decontamination water obtained from the Au Gres Water Tower municipal water used initially during the investigation. Trace level of PFAS detections in the VAS samples might be the result of cross contamination during drilling. Further remedial investigation within this area is being conducted beginning July 2017 to further evaluate the potential paleo channel, delineate the extent of PFAS in groundwater, and to further develop upon the current CSM. Also, with the results from the follow up investigation it will be possible to verify if the PFAS trace

levels detected in the VAS samples were due to cross contamination from the drilling water. This investigation will include installation of a number of nested monitoring wells that will provide a more accurate delineation of the PFAS plume and hydraulic potential within the study area. The proposed location for the MDEQ PFAS RI can be found in **Figure 7**.

5. References

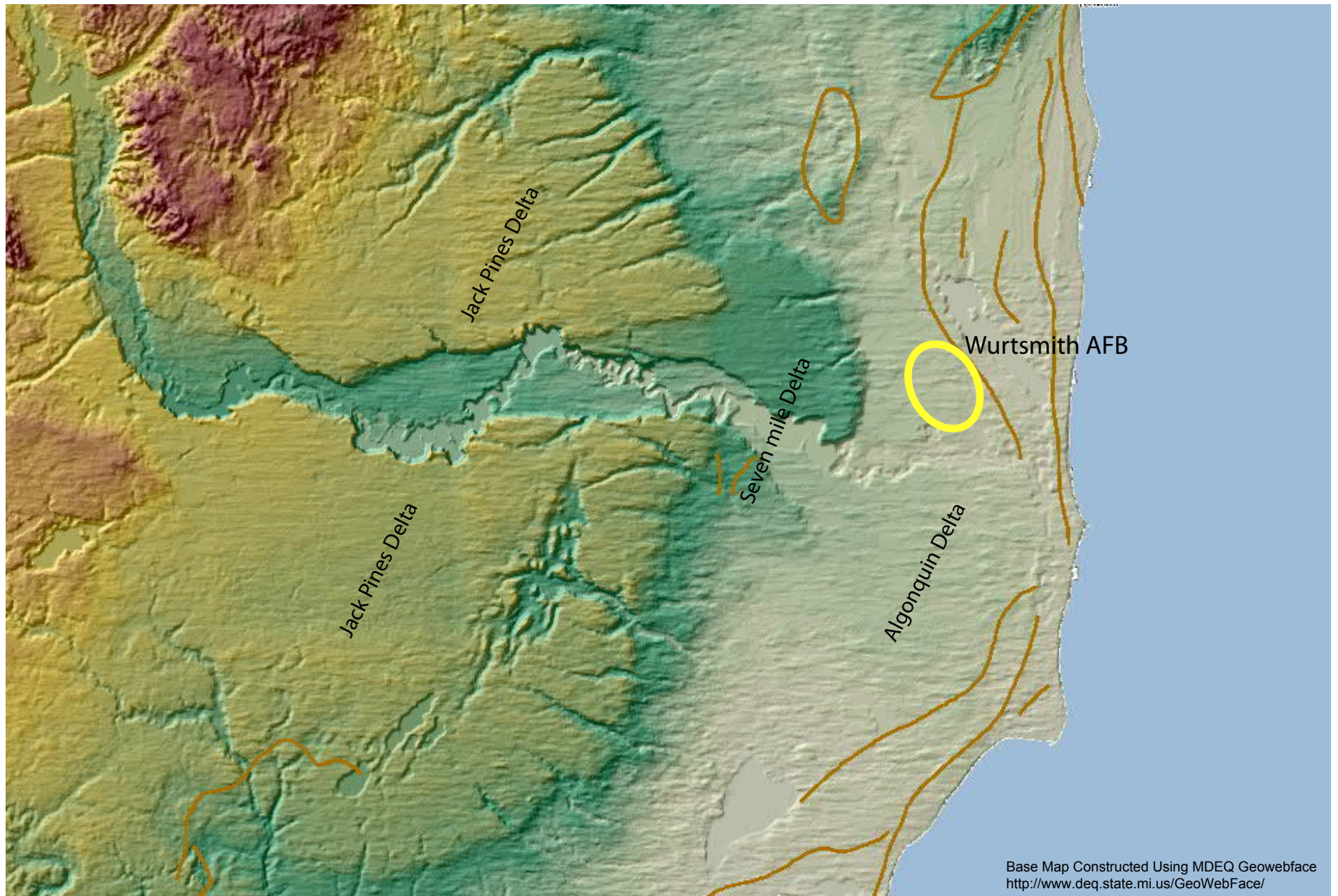
Burgis, Winifred A., 1977. Late-Wisconsinan History of Northeastern Lower Michigan. PhD Thesis, University of Michigan.

Larson, Grahame and Randall Schaetzl, 2001. Origin and Evolution of the Great Lakes. Journal of Great Lakes Research, 27(4): 518-546.

Reineck, H.E. and I.B. Singh, 1975, Depositional Sedimentary Environments with reference to terrigenous clastics. Springer-Verlag, Berlin.

Figures

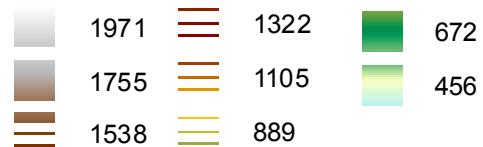
Figure 1- Wurtsmith Air Force Base Location Relative to Paleo AuSable River Delta Landforms



— Paleo Shorelines

Deltas identified on DEM, and labeled according to Nomenclature defined by Burgis, 1977

DEM Elevations (Ft.)



1:206,570

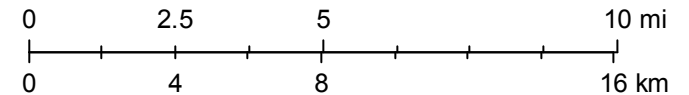
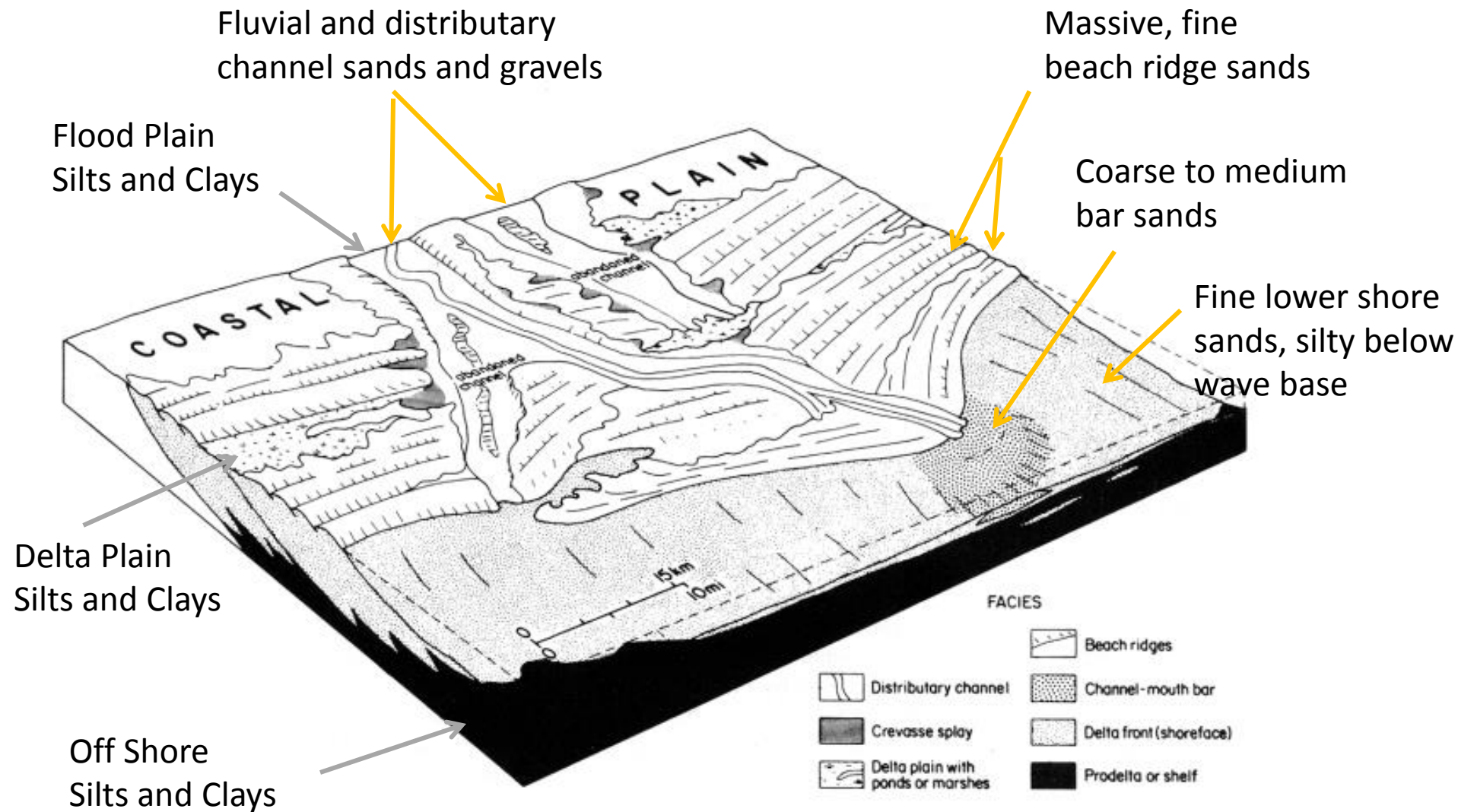
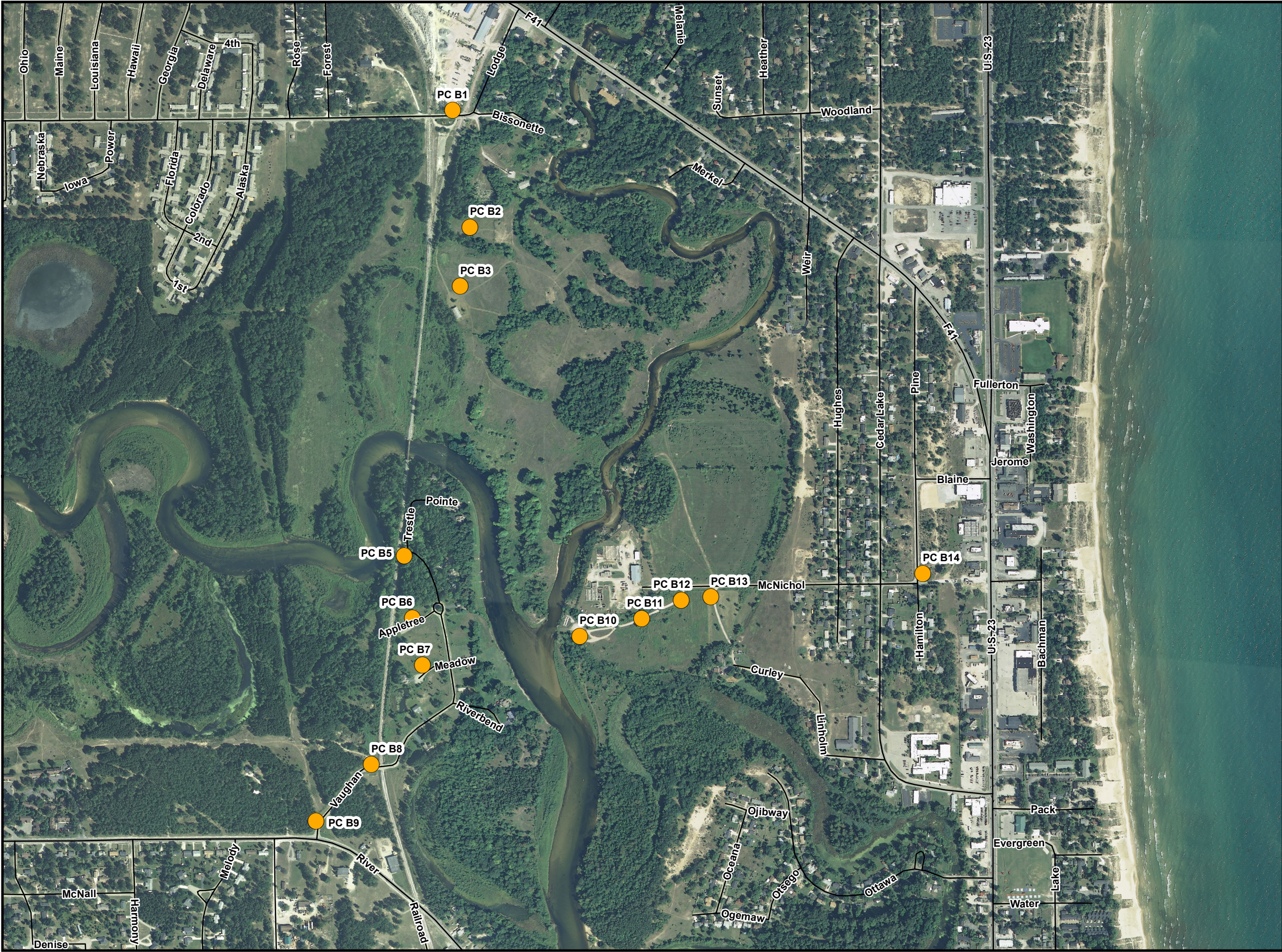


Figure 2 -Delta: Facies Components





Legend



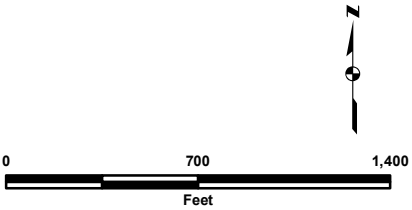
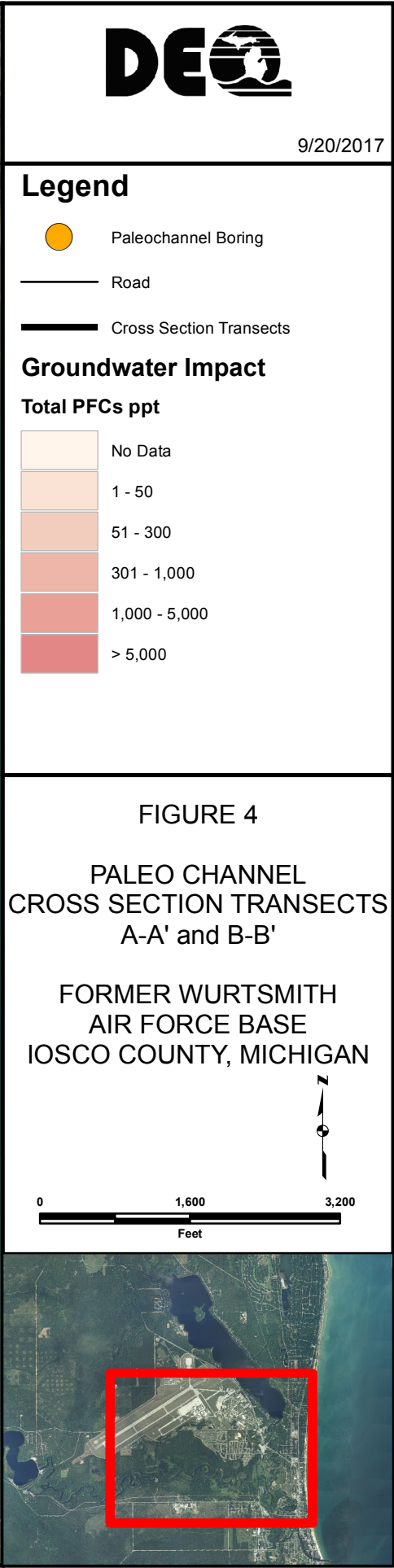
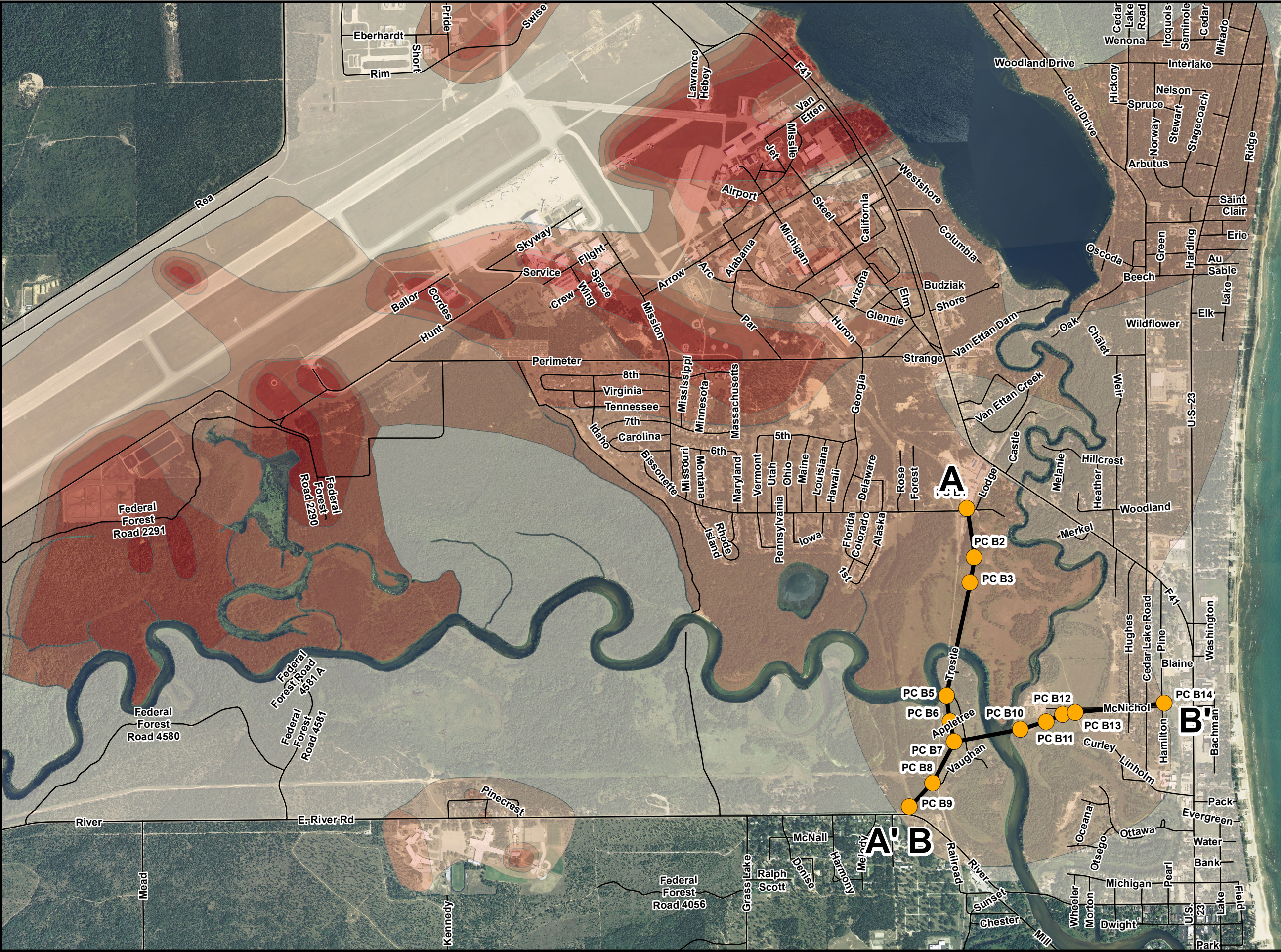
-  Paleochannel Boring
-  Road

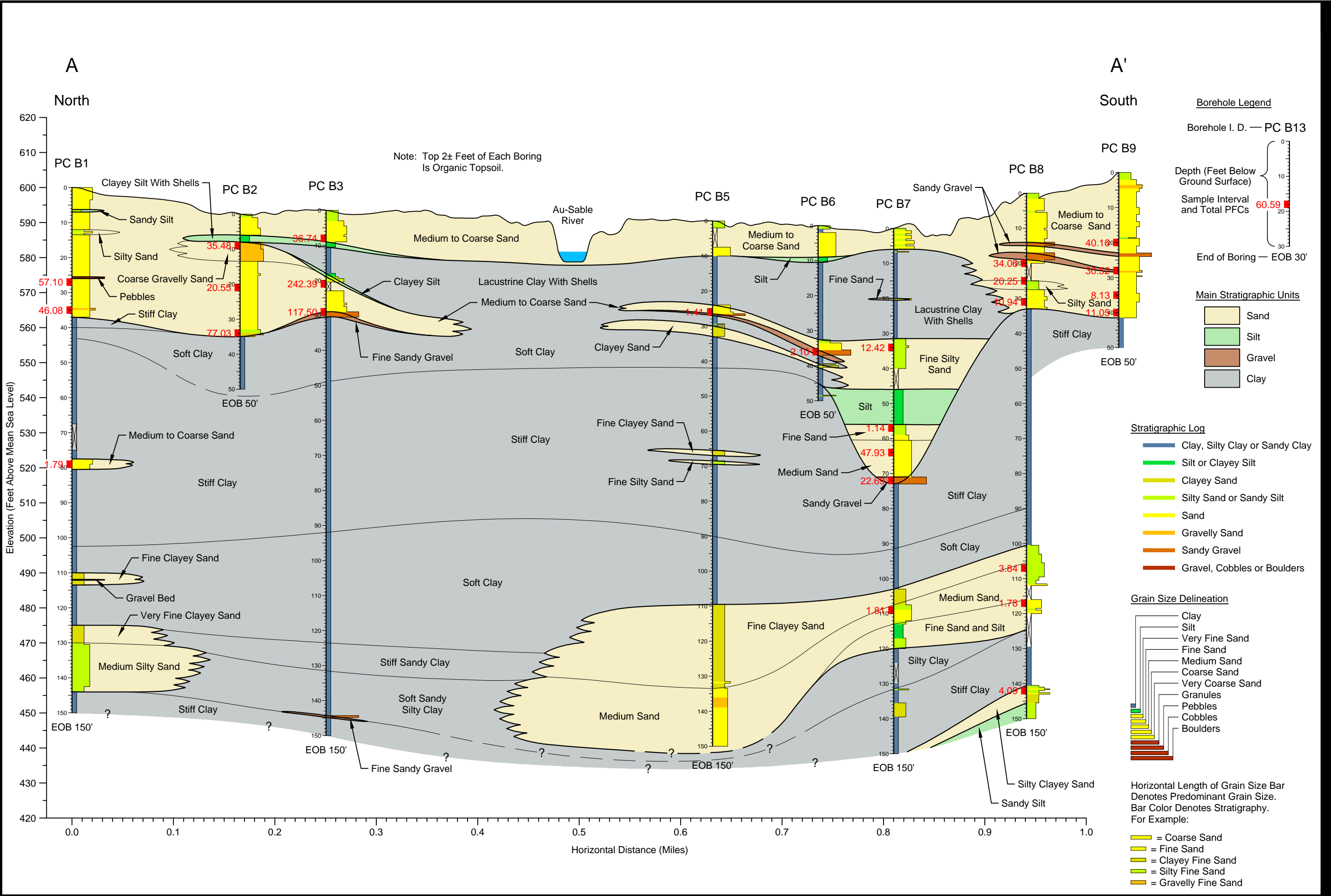
FIGURE 3

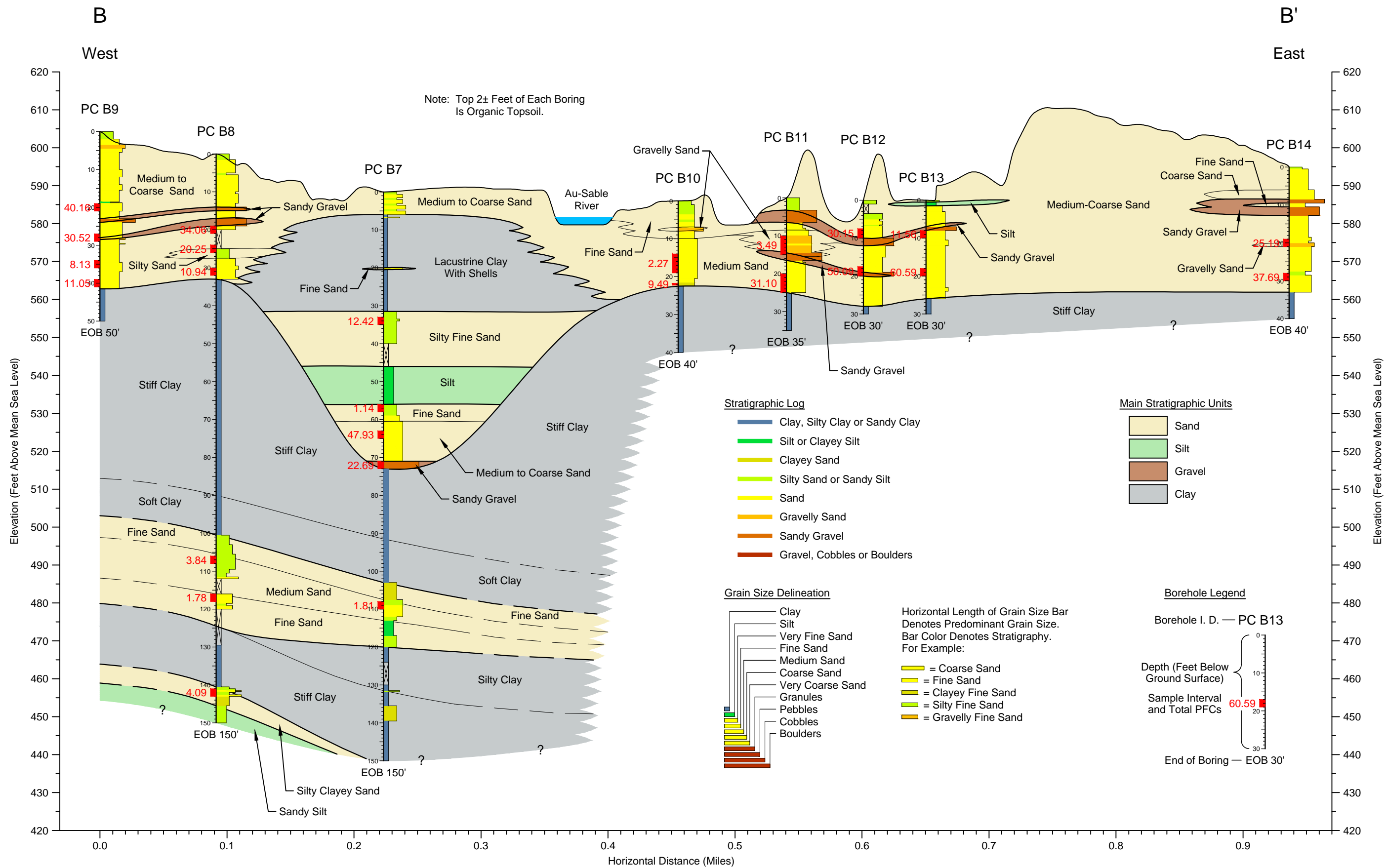
PALEO CHANNEL
INVESTIGATION
PHASE I BORINGS

FORMER WURTSMITH
AIR FORCE BASE
IOSCO COUNTY, MICHIGAN











9/26/2017

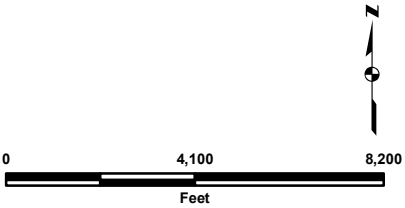
Legend
Proposed Boring

- Deep Proposed Boring
- Shallow Proposed Boring
- Surface Water
- Proposed Access
- Road
- B-16** Boring ID

FIGURE 7

PROPOSED REMEDIAL
INVESTIGATION LOCATIONS

FORMER WURTSMITH
AIR FORCE BASE
IOSCO COUNTY, MICHIGAN



Tables

Table 1
GPS Coordinates

LOCATION	LATITUDE	LONGITUDE	NORTHING	EASTING
PC B1	44.439545	-83.345201	411047.80	19951819.11
PC B2	44.43717	-83.344755	410183.48	19951946.48
PC B3	44.435976	-83.345056	409746.94	19951873.56
PC B5	44.430538	-83.34673	407759.32	19951461.15
PC B6	44.429276	-83.346517	407299.95	19951522.47
PC B7	44.428317	-83.346249	406951.40	19951596.94
PC B8	44.426323	-83.347734	406219.41	19951218.29
PC B9	44.425194	-83.349317	405802.86	19950810.00
PC B10	44.428869	-83.341805	407167.33	19952755.37
PC B11	44.429254	-83.340045	407294.39	19953214.10
PC B12	44.42957	-83.338925	407432.21	19953504.28
PC B13	44.429628	-83.33808	407456.20	19953724.68
PC B14	44.430048	-83.332091	407629.15	19955287.14
Au Gres Water Tower	44.03810	-83.69653	263747.85	19861273.25
Harrisville Well #2	44.668597	-83.302383	494685.91	19961905.97

Table 2
Stablized Water Quality Parameters

Well ID	Date	Sample Interval	Time Collected	pH	Specific Cond.	Turbidity	D.O.	Temp	ORP
		ft	24hr	SU	uS/cm	NTU	mg/L	°C	mV
PC B11	1/12/2017	10-15	16:45	7.25	599.4	155	0.91	9.03	-418.1
PC B11	1/16/2017	20-25	15:20	7.21	611.8	1241	0.33	8.55	-534
PC B12	1/18/2017	7.5-10	10:05	6.92	508.6	176	0.44	5.71	-495
PC B12	1/18/2017	17.5-20	17:00	6.99	573.2	14	0.4	8.76	-425.8
PC B14	1/19/2017	19-21	11:55	7.76	639	1144	1.53	11.48	-380
PC B14	1/19/2017	28-30	16:00	8.03	419.6	20.82	9.86	10.19	-37.2
PC B13	1/20/2017	8-10	12:30	6.95	453.9	29	0.19	8.33	-503
PC B13	1/21/2017	18-20	15:40	7.15	591.3	19	1.51	9.45	-251.6
PC B9	1/22/2017	39-41	17:15	8.08	205.8	2130	0.08	11.54	-576.6
PC B9	1/23/2017	34-36	9:55	8.08	195.4	38	0.14	9.81	-494.9
PC B9	1/23/2017	27-29	13:45	8.22	196.6	12	3.07	9.93	-84.2
PC B9	1/23/2017	19-21	15:10	8.57	212.4	31	0.33	10.8	-527.1
PC B8	1/24/2017	30-32	15:50	7.98	193.1	331	0.08	9.45	-544.4
PC B8	1/25/2017	19-21	13:30	8.6	221.2	1005	0.06	10.65	-598
PC B8	1/25/2017	24-26	12:10	7.8	270.4	2	2.2	7.61	-373.4
PC B8	1/31/2017	141-143	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PC B8	1/31/2017	116-118	16:45	7.91	5123	1741	0.14	8.5	-621.2
PC B8	2/1/2017	106-108	12:10	8.02	2338	6738	0.05	9.72	-534
PC B7	2/2/2017	71-73	15:10	7.99	339.8	74	9.48	6.8	-191
PC B7	2/2/2017	63-65	16:40	7.35	491.3	396	0.13	7.7	-442
PC B7	2/3/2017	56-58	9:30	6.65	677	517	0.12	7.25	-468
PC B7	2/3/2017	33-35	10:30	7.85	387	3978	0.08	8.4	-531
PC B7	2/3/2017	108-110	17:35	7.97	5449	407	0.19	3.75	-347
PC B6	2/5/2017	35-37	15:15	7.15	700	402	1.13	8.4	-513
PC B5	2/6/2017	35-37	11:05	7.04	969	377	1.81	5.2	-503.4
Drill Water	1/25/2017	Au Gres Water Tower	17:15	7.44	224.5	1.86	13.36	0.265	654.5
Harrisville Drill Water	2/13/2017	Hydrant	12:20	7.45	445.1	0	5.02	7.7	468.3
PC B1	2/22/2017	34-36	9:55	7.91	717	1064	2.56	10.2	-393
PC B1	2/22/2017	26-28	12:20	7.95	397.9	54	6.75	11.1	-238
PC B1	2/22/2017	78-80	17:20	8.05	4400	69	1.01	11.4	-572
PC B2	2/27/2017	33-35	15:40	7.93	414.3	1330	3.23	10.1	-186.5
PC B2	2/27/2017	20-22	17:20	8	435.5	42	2.29	10.3	-411.3
PC B2	2/27/2017	8-10	18:15	8.15	413.5	170	1.18	8.9	-580.8
PC B3	2/28/2017	28-30	14:40	7.94	425.3	32	1.35	10.1	-455.6
PC B3	2/28/2017	20-22	16:20	7.99	507	29	1.25	10.3	-480.2
PC B3	2/28/2017	7-9	17:25	7.73	446.3	91	1.29	6.9	-509.1

Notes:

ft = Feet

SU = Standard Unit

uS/cm = Microsiemens/centimeter

NTU = Nephelometric Turbidity Units

mg/L = Milligrams/Liter

°C = Degrees Celsius

mV = Millivolt

* Values in this table are the final "Stabilized" parameters

Cond. = Conductivity

D.O. = Dissolved Oxygen

Temp. = Temperature

ORP = Oxidization-Reduction Potential

Table 3
PFAS Detection Summary

Location (Depth in Feet)	Sample Date	Report ID	Type	Total PFASs	PFOA + PFOS	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTrDA	PFTeDA	PFHxDA	PFODA	PFBS	PFHxS	PFHpS	PFOS	PFDS	FOSA
PC B10 14-19 FT	1/11/2017	170081	VAS Boring	2.27	0.00	0.59	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.68	ND	ND	ND	ND
PC B10 22 FT	1/11/2017	170081	VAS Boring	9.49	3.67	1.80	0.93	ND	1.01	0.94	ND	ND	ND	ND	ND	ND	0.33	ND	ND	1.75	ND	2.73	ND	ND
PC B11 10-15 FT	1/12/2017	170081	VAS Boring	3.49	0.00	0.52	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.00	1.97	ND	ND	ND	ND
FB1-011317-JB	1/13/2017	170081	Field Blank	0.61	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.61	ND	ND	ND	ND
PC B11 20-25 FT	1/16/2017	1700123 Rev 2	VAS Boring	31.09	3.18	1.86	ND	ND	0.66	2.19	0.62	1.80	1.31	0.73	ND	1.00	ND	ND	1.30	15.50	3.13	0.99	ND	ND
PC B12 7.5-10 FT	1/18/2017	1700123 Rev 2	VAS Boring	30.15	5.99	3.22	1.71	2.02	1.51	1.29	0.73	ND	1.27	0.75	ND	0.95	ND	ND	2.81	6.71	2.48	4.70	ND	ND
PC B12 17.5-20 FT	1/18/2017	1700123 Rev 2	VAS Boring	50.10	5.79	6.74	1.68	4.13	0.92	4.78	0.40	1.76	1.06	0.58	ND	1.28	ND	ND	2.52	21.30	1.93	1.01	ND	ND
PC B14 19-21 FT	1/19/2017	1700123 Rev 2	VAS Boring	25.19	3.36	3.68	3.26	3.05	1.04	1.99	0.51	1.68	1.26	0.91	ND	0.69	ND	ND	2.81	1.53	1.41	1.37	ND	ND
PC B12 7.5-10 FT-DUP	1/18/2017	1700123 Rev 2	VAS Boring	30.68	4.57	2.65	1.38	1.59	1.28	1.91	0.83	2.68	1.30	0.81	ND	0.76	ND	ND	3.05	6.84	2.93	2.66	ND	ND
FB1-011917-JB	1/19/2017	1700123 Rev 2	Field Blank	3.24	0.46	ND	ND	ND	ND	0.46	ND	ND	1.28	0.83	ND	0.68	ND	ND	ND	ND	ND	ND	ND	ND
PC B14 28-30 FT	1/19/2017	1700123 Rev 2	VAS Boring	37.69	9.05	3.56	1.63	2.65	1.36	7.10	0.42	1.97	1.15	1.43	ND	0.70	ND	ND	1.97	11.80	ND	1.95	ND	ND
PC B13 8-10 FT	1/20/2017	1700123 Rev 2	VAS Boring	11.56	1.00	ND	ND	ND	0.64	1.00	ND	2.10	0.88	1.04	ND	0.64	ND	ND	ND	3.01	2.25	ND	ND	ND
PC B13 18-20 FT	1/21/2017	1700123 Rev 2	VAS Boring	60.59	7.20	3.93	6.67	13.30	3.03	6.63	0.41	1.46	1.03	0.82	ND	1.00	ND	ND	7.44	12.40	1.90	0.57	ND	ND
PC B9 39-41 FT	1/22/2017	1700122	VAS Boring	11.05	1.55	ND	ND	ND	0.77	0.44	0.39	0.73	1.16	0.92	ND	1.18	ND	ND	ND	0.71	3.64	1.11	ND	ND
PC B9 34-36 FT	1/23/2017	1700122	VAS Boring	8.13	1.47	ND	ND	ND	0.82	0.54	0.52	1.25	1.61	1.03	ND	0.69	ND	ND	ND	0.74	ND	0.93	ND	ND
PC B9 27-29 FT	1/23/2017	1700122	VAS Boring	30.52	9.26	3.13	6.92	ND	2.99	3.93	ND	ND	1.15	1.34	ND	0.42	ND	ND	1.95	3.36	ND	5.33	ND	ND
PC B9 19-21 FT	1/23/2017	1700122	VAS Boring	40.16	10.37	3.58	5.79	5.33	3.12	6.04	0.90	ND	1.09	1.14	ND	0.76	ND	ND	1.55	3.46	3.07	4.33	ND	ND
Decon Drill Water 012517	1/23/2017	1700123 Rev 2	Grab	15.41	3.65	1.60	0.95	ND	1.18	1.53	0.72	1.92	1.76	1.36	ND	0.88	ND	ND	ND	1.39	ND	2.12	ND	ND
PC B8 30-32 FT	1/24/2017	1700123 Rev 2	VAS Boring	10.94	0.93	ND	ND	ND	0.70	0.93	0.42	1.73	0.86	0.82	ND	0.75	ND	ND	ND	0.54	4.19	ND	ND	ND
Au Gres Water Tower	1/23/2017	1700122	Grab	12.62	4.19	1.56	0.82	ND	0.91	1.00	ND	ND	1.09	0.82	ND	0.94	ND	ND	0.88	1.43	ND	3.19	ND	ND
PC B8 24-26 FT	1/25/2017	1700123 Rev 2	VAS Boring	20.25	6.52	ND	1.18	1.58	2.18	5.20	0.61	1.86	1.17	1.32	ND	0.65	ND	ND	1.30	1.88	ND	1.32	ND	ND
PC B8 19-21 FT	1/25/2017	1700123 Rev 2	VAS Boring	34.06	7.24	2.09	3.61	3.60	2.67	5.20	0.84	2.08	1.59	1.06	ND	0.70	ND	ND	2.94	3.03	2.61	2.04	ND	ND
FB2-012517-JB	1/25/2017	1700123 Rev 2	Field Blank	5.64	0.51	ND	ND	ND	0.58	0.51	ND	2.01	0.97	0.70	ND	0.88	ND	ND	ND	ND	ND	ND	ND	ND
PC B8 116-118 A	1/31/2017	1700135	VAS Boring	1.78	0.00	ND	ND	ND	ND	ND	0.56	ND	ND	0.34	ND	ND	ND	ND	ND	ND	0.88	ND	ND	ND
PC B8 116-118 B	1/31/2017	1700135	VAS Boring	3.57	0.77	ND	ND	1.10	0.28	0.77	ND	ND	ND	0.46	ND	ND	ND	ND	ND	0.49	0.48	ND	ND	ND
PC B8 141-143	1/31/2017	1700135	VAS Boring	4.09	0.73	ND	ND	0.81	0.37	0.73	ND	ND	ND	0.47	ND	ND	ND	ND	ND	0.34	1.37	ND	ND	ND
PC B8 106-108 FT	2/1/2017	1700172	VAS Boring	3.84	1.33	1.37	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.14	1.33	ND	ND
EB1-020117-JB	2/1/2017	1700172	Equipment Blank	3.43	2.06	0.78	ND	ND	ND	ND	ND	ND	ND	0.59	ND	ND	ND	ND	ND	ND	ND	2.06	ND	ND
Drill Water Tote 1	2/1/2017	1700172	Grab	3.24	1.64	0.97	ND	ND	ND	ND	ND	ND	ND	0.63	ND	ND	ND	ND	ND	ND	ND	1.64	ND	ND
Drill Water Tote 2	2/1/2017	1700172	Grab	3.67	1.71	0.84	ND	ND	ND	ND	ND	ND	ND	0.65	ND	ND	ND	ND	ND	0.47	ND	1.71	ND	ND
PC B7 71-73FT	2/2/2017	1700172	VAS Boring	22.69	1.62	2.49	3.55	6.14	0.56	ND	ND	ND	ND	1.06	ND	ND	ND	ND	5.41	0.96	0.90	1.62	ND	ND
DUP 1	2/2/2017	1700172	VAS Boring	22.22	1.89	2.78	3.39	5.62	0.38	ND	ND	ND	ND	0.63	ND	ND	0.15	ND	5.44	0.93	1.01	1.89	ND	ND
PC B7 63-65FT	2/2/2017	1700172	VAS Boring	47.93	1.04	4.85	8.53	14.50	0.89	ND	ND	ND	ND	0.39	ND	ND	ND	ND	15.70	2.03	ND	1.04	ND	ND
PC B7 63-65FT DUP	2/2/2017	1700172	VAS Boring	44.62	0.43	4.26	8.16	14.00	0.95	ND	ND	ND	ND	0.38	ND	ND	ND	ND	14.70	1.74	ND	0.43	ND	ND
Decon/Drill Water	2/3/2017	1700172	Composite	4.41	2.60	0.92	ND	ND	ND	0.56	ND	ND	ND	0.89	ND	ND	ND	ND	ND	ND	ND	2.04	ND	ND
PC B7 56-58FT	2/3/2017	1700172	VAS Boring	1.14	0.50	ND	ND	ND	ND	ND	ND	ND	ND	0.64	ND	ND	ND	ND	ND	ND	ND	0.50	ND	ND
PC B7 33-35FT	2/3/2017	1700172	VAS Boring	12.42	1.46	1.96	1.56	3.16	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.06	0.55	0.67	1.46	ND	ND
PC B7 108-110FT	2/3/2017	1700172	VAS Boring	1.81	0.43	ND	ND	ND	ND	ND	ND	ND	ND	0.65	ND	ND	ND	ND	ND	ND	0.73	0.43	ND	ND
PC B6 35-37FT	2/5/2017	1700172	VAS Boring	2.10	0.85	ND	0.74	ND	ND	ND	ND	ND	ND	0.51	ND	ND	ND	ND	ND	ND	ND	0.85	ND	ND
PC B5 25-27FT	2/5/2017	1700172	VAS Boring	1.41	0.48	ND	ND	ND	ND	ND	ND	ND	ND	0.93	ND	ND	ND	ND	ND	ND	ND	0.48	ND	ND
Harrisville Well #2	2/13/2017	1700184	Grab	0.00	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PC B1 26-28 FT	2/22/2017	1700266	VAS Boring	57.10	7.39	1.24	3.35	5.79	1.89	7.39	ND	1.06	ND	ND	ND	ND	ND	ND	1.78	34.60	ND	ND	ND	ND
PC B1 34-36 FT	2/22/2017	1700266	VAS Boring	46.08	4.38	1.34	4.49	7.28	2.37	3.97	ND	1.14	ND	ND	ND	ND	ND	ND	1.78	23.30	ND	0.41	ND	ND
PC B1 78-80 FT	2/22/2017	1700266	VAS Boring	1.79	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.30	ND	ND	ND	1.49	ND	ND	ND
PC B1 78-80 FT TA	2/22/2017	J26362	VAS Boring	1.02	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.45	0.57	ND	ND	ND	ND	ND	ND	ND
Drill Water Comp 022417	2/22/2017	1700266	Composite	0.00	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PC B2 20-22FT	2/27/2017	1700305	VAS Boring	20.55	4.44	0.68	1.61	3.47	0.80	2.64	ND	1.29	ND	ND	ND	0.69	ND	ND	ND	5.84	1.73	1.80	ND	ND
PC B2 20-22FT TA	2/27/2017	J26362	VAS Boring	23.47	3.40	1.90	1.80	4.50	1.20	3.40	0.67	ND	ND	ND	ND	0.85	0.65	ND	1.00	7.50	ND	ND	ND	ND
PC B2 33-35FT	2/27/2017	1700305	VAS Boring	77.03	1.89	3.43	7.00	20.90	2.46	1.89	ND	ND	ND	ND	ND	0.43	ND	ND	10.60	28.30	2.02	ND	ND	ND
PC B2 8-10FT	2/27/2017	1700305	VAS Boring	35.48	6.66	1.19	1.37	3.42	1.49	4.80	ND	1.04	ND	ND	ND	0.60	ND	ND	1.32	16.40	1.99	1.86	ND	ND
Drill Water Comp 022817	2/28/2017	1700305	Composite	2.13	1.08	ND	ND	ND	ND	ND	ND	ND	0.53	ND	ND	0.52	ND	ND	ND	ND	ND	1.08	ND	ND
Drill Water Comp 02 2817 TA	2/28/2017	J26362	Composite	1.22	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.44	0.78	ND	ND	ND	ND	ND	ND	ND
PC B3 28-30FT	2/28/2017	1700305	VAS Boring	117.50	5.95	5.03	10.90	31.70	3.10	5.95	ND	0.72	ND	ND	ND	ND	ND	ND	22.30	37.80	ND	ND	ND	ND
PC B3 20-22FT	2/28/2017	1700305	VAS Boring	242.39	25.70	4.33	10.30	22.90	7.88	25.70	ND	1.00	0.56	ND	ND	0.48	ND	ND	8.24	161.00	ND	ND	ND	ND
PC B3 7-9FT	2/28/2017	1700305	VAS Boring	36.74	3.17	2.52	2.65	6.24	0.72	2.21	ND	0.87	ND	ND	ND	0.55	ND	ND	4.78	12.70	2.54	0.96	ND	ND
FB1-030317-JB	3/3/2017	1700305	Field Blank	1.81	0.00	ND	ND	ND	ND	ND	ND	0.81	ND	0.40	ND	0.60	ND	ND	ND	ND	ND	ND	ND	ND

ND = Non Detect

Concentrations are reported as ng/L or ppt

EB = Equipment Blank

FB = Field Blank

Drill water / Decon Water Composite samples were collected 50mL per tote of water used

TA = Duplicates were also sent to Test America

FOSA = Perfluorooctane sulfonamide

PFBA = Perfluorobutanoic acid

PFBS = Perfluorobutane sulfonic acid

PFDA = Perfluorodecanoic acid

PFDoDA = Perfluorododecanoic acid

Appendix A

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2/23/17

Drilling Progress										Geologic Description																							
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Strat Log Sketch							Texture	Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)		
																								LIMESTONES									
																									mud	wacke	pack	grain	nud & bound				
																									MUD	SAND	GRAVEL						
																									clay	silt	vc	gran	peb	cob	boul		
73																																	
74																																	
75	15:10						10YR 5/2	70	15	H	15	-	-	SR	T	-	SA	M	Q	-													
76							10YR 5/2	70	15	M	15	-	-	SR	T	-	SA	M	Q	-													
77																																	
78							10YR 5/3	-	T	-	5	20	75	SR	T	-	SA	M	PQ	-													
79							10YR 5/3	-	T	-	10	75	15	SR	-	-	-	MW	Q	-													
80							10YR 5/2	SS	15	A-L	20	T	-	SR	10	T	SA	P	Q	-													
81																																	
82																																	
83																																	
84																																	
85	8:29						10YR 5/2	65	15	M-L	20	-	-	SR	T	T	SA	P	Q	-													
86																																	
87																																	
2/23/17	Date: 2/22/17																																
Ft/Min or Ft/Hr																																	
Smooth, Chatter, Heavy Chatter, Loss of Circulation																																	
Grab, Discrete																																	
Non, High, Med, Low																																	
0.0029" to 0.017", No 40-200																																	
0.017" to 0.079", No 10-40																																	

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Drilling Progress										Geologic Description																								Log of Exploratory Boring Well No. <div>PC B1</div>				
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Strat Log Sketch										Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)					
																							LIMESTONES										Texture					
																							MUD SAND GRAVEL										Grain size and other notes (structures, palaeocurrents, fossils, color)					
																							clay silt v f m c gran peb cob boul															
																							mud waste pack grain mud & bound															
117							10YR 5/2	35	25	M	30	5	1	SR	5	T	SA	P	Q	-					Silty/VERY FINE SANDY CLAY WITH FEW PEbbLES THROUGHOUT													
118																																						
119																																						
120							10YR 5/2	30	20	M-L	30	5	5	SR	10	T	SA	P	Q	-																		
121																																						
122																																						
123																																						
124																																						
125	11:24						10YR 5/2	25	20	M-L	30	10	5	SR	10	T	SA	P	RQ	-					CLAYEY ^{VERY} FINE SAND POORLY SORTED WITH FEW PEbbLES THROUGHOUT.													
126																																						
127																																						
128																																						
129																																						
130							10YR 5/2	20	25	L-N	25	15	10	SR	5	T	SA	P	RQ	-																		
Date: 2/23/17										Non. High. Med. Low		0.0029" to 0.017", No 40-200		0.017" to 0.075", No 10-40		0.075" to 0.19", No 4-10		VR, A, SA, SR, R, VR		0.19" to 0.75", 20mm to No 4		0.75" to 3"		VR, A, SA, SR, R, VR		0, 1, 2, 3, 4		Rk frags, Quartz, Feldspar, Dark mins		None, Slight, High		Yellow, Ochre, Red, Gray, Black						
F/Min or F/Utr																																						
Smooth, Chatter, Heavy Chatter, Loss of Circulation																																						
Grab, Discrete																																						

Client: MDER	Project No.: 60516524	Site: OKLA, NE B1	Surface geologic unit and expected subsurface geology	Logged by: Mark Wolf / Jim Burrell	Drilling Co.: Dan Oyler / Russ Gordon	Driller: Cassady	Drilling Method: JWL	Drill Rig Model: 8'40 LC Geopond
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9 of 11

AECOM

Client: NDER

Project No.: 60516524

Site: OKLA, NE B1

Surface geologic unit and expected subsurface geology

Logged by: Mike Wolf / Jim Burrell

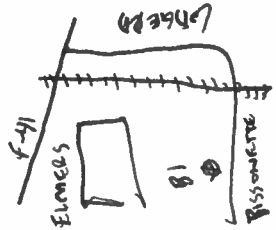
Drilling Co.: Dan O'Neil / Rick Gordon

Driller: Cassady

Drilling Method: JWLIC

Drill Rig Model: 8140 LC GEOPRIMO

Drill Pad Sketch Map



Log of Exploratory Boring

Well No.

PC B1

Drilling Progress										Geologic Description																		Strat Log Sketch	Texture	Comments	Log of Exploratory Boring																		
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/ drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	clay	mud	wacke	pack	grain	rud & bound	Grain size and other notes (structures, palaeocurrents, fossils, color)	(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)	Well No.																		
146	15:30						7.54e8/2	35	30	N	15	15	T	SR	S	T	SA	P	Q	-										STIFF SANDY TILL WITH FEW PEBBLES THROUGHOUT	DRILLING-INDUCED DEFORMATION, CORE DROPPED OUT OF CORE BARREL	PC B1																	
147																														DOMINANTLY 8-10mm TRACK 32-55mm	HAD TO BE RETRIEVED A SECOND TIME																		
148																																																	
149																																																	
150																																																	
Date: 2/23/17		FUMin or FUMhr		Smooth, Chatter, Heavy Chatter, Loss of Circulation		Grab, Discrete		Non, High, Med, Low		0.0029" to 0.017", No 40-200		0.017" to 0.079", No 10-40		0.079" to 0.19", No 4-10		VR, A, SA, SR, R, VR		0.19" to 0.75", 20mm to No 4		0.75" to 3"		VR, A, SA, SR, R, VR		0, 1, 2, 3, 4		Rk frags, Quartz, Feldspar, Dark mins		None, Slight, High		Yellow, Ochre, Red, Gray, Black		Client: MNEQ		Project No.: 60514524		Site: OSCODA, MI -B1		Surface geologic unit and expected subsurface geology		Logged by: MIKE WOLF / JIM BREWELL		Drilling Co.: CASCADE		Driller: DAN O'MARA / RUSSELL GORDON		Drilling Method: SONIC		Drill Rig Model: 6140 LC GEORGE	

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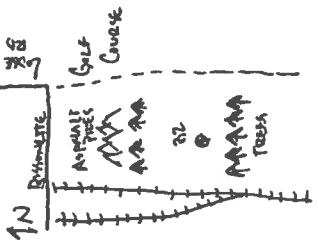
Drilling Progress						Geologic Description															Strat Log Sketch										Comments	Log of Exploratory Boring			
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	LIMESTONES											Texture	(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)
																								MUD SAND GRAVEL										Grain size and other notes (structures, palaeocurrents, fossils, color)	
																								clay silt m c vc gran peb cob boul											
15							10YR 6/3	-	-	-	5	25	10	SR	-	-	-	W	Q	-															
16																																			
17							10YR 6/3	-	T	-	10	30	55	SR	5	-	SR	P	Q _R	-				GRADATIONAE CONTACT											
14							10YR 6/3	-	-	-	10	40	10	SR	-	-	-	W	Q _R	-				SHARP CONTACT											
19																																			
20	10:45 ³⁰						10YR 7/3	T	10	N	5	45	25	SR	15	T	SR	P	Q _R	-				LITTLE PEBBLES THROUGHOUT										Collected VAS PC B2 20-22FT	
21	14:07																							DOMINANTLY 5-15mm TRACE 20-30mm										AT ON 2/27/17	
22							10YR 6/3	T	15	N	10	55	15	SR	5	T	SR	P	Q _R	-				FEW PEBBLES THROUGHOUT											
23																								DOMINANTLY 5-20mm TRACE 50mm											
24																								45mm GRAVEL AT 24 FT BAS											
25	2/27/17 14:50 ¹⁵						10YR 6/3	T	5	N	10	65	20	SR	T	T	SA	AP	Q _R	-				TRACE PEBBLES FROM 25-26FT											
26	11:50						10YR 4/3	T	5	N	10	75	10	SR	-	-	-	MW	Q	-				FINING UPWARD (GRADATIONAE CONTACT)											
27							10YR 6/3	T	5	N	15	40 ¹⁵	4	SR	-	-	-	MW	Q	-				SHARP CONTACT											
28																																			
24	Date: 2/22/17 2/27/17						10YR 6/3	T	5	N	10	70	10	SR	5	T	SA	MW	Q	-				TRACE PEBBLES											
		FU/Min or FU/Hr																																	
		Smooth, Chatter, Heavy Chatter, Loss of Circulation																																	
		Grab, Discrete																																	

Log of Exploratory Boring

Well No.

PC B2

Drill Pad Sketch Map



Client: MDEQ
 Project No.: 60518524
 Site: OSCODA, MS-B2
 Surface geologic unit and expected subsurface geology
 Logged by: Jim Buzzell
 Drilling Co.: CASCADE
 Driller: Dan O'HARA
 Drilling Method: Sonic
 Drill Rig Model: 8140 LC Geoprobe

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3/2/17

Drilling Progress							Geologic Description															Strat Log Sketch		Comments									
Depth	Time	FID/PI/D at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Texture					Grain size and other notes (structures, palaeocurrents, fossils, color)	(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)				
																								MUD	SAND	GRAVEL							
																								clay	silt	m	vc	gran	peb	cob	boul		
30	11:15						10 YR 6/3	T	T	N	5	15	25	SR	45	10	SR 1/2 A	P	RQ	-				0	0	0	0	0	0	0	0	PERGLES DOMINANTLY 2-7mm	Collected VAS PC-B3 28-30ft
31							10 YR 6/3	10	10	N	5	10	25	SR	35	5	SR 1/2 A	P	RQ	-				0	0	0	0	0	0	0	0	PERGLES 25-40mm	At 14:40 on 2/23/17
32							7.5 YR 5/2	60	25	H	15	-	-	-	T	T	SR 1/2 A	M	Q	-				1	0	0	0	0	0	0	0	TILL	
33							7.5 YR 5/2	60	25	A	10	-	-	-	S	T	SR 1/2 A	M	Q	-				1	0	0	0	0	0	0	0	PERGLES THROUGHOUT	
34																								1	0	0	0	0	0	0	0	FEW SANDY CLAY WITH FEW	
35							7.5 YR 5/2	60	20	H	10	-	-	-	S	T	SR 1/2 A	M	Q	-				1	0	0	0	0	0	0	0	PERGLES THROUGHOUT	
36																								1	0	0	0	0	0	0	0	DOMINANTLY 5-9mm	
37																								1	0	0	0	0	0	0	0	TRACE 19-37mm	
38																								1	0	0	0	0	0	0	0		
39																								1	0	0	0	0	0	0	0		
40	13:39						7.5 YR 5/2	55	25	H	15	T	T	SR	5	T	SR 1/2 A	NP	Q	-				1	0	0	0	0	0	0	0		
41																								1	0	0	0	0	0	0	0		
42																								1	0	0	0	0	0	0	0		
43																								1	0	0	0	0	0	0	0		

Date: 2/25 + 3/2/17

FU/Min or FU/Hr

Smooth, Chatter, Heavy Chatter, Loss of Circulation

Grab, Discrete

Non, High, Med, Low

0.0029" to 0.017", No 40-200

0.017" to 0.079", No 10-40

0.079" to 0.19", No 4-10

VR, A, SA, SR, R, VR

0.19" to 0.75", 20mm to No 4

0.75" to 3"

VR, A, SA, SR, R, VR

0, 1, 2, 3, 4

Rk frags, Quartz, Feldspar, Dark mins

None, Slight, High

Yellow, Ochre, Red, Gray, Black

PERGLES DOMINANTLY 2-7mm

PERGLES 25-40mm

TILL

PERGLES THROUGHOUT

FEW SANDY CLAY WITH FEW PERGLES THROUGHOUT

DOMINANTLY 5-9mm

TRACE 19-37mm

FEW PERGLES THROUGHOUT

DOMINANTLY 5-9mm

TRACE 19-37mm

Collected VAS PC-B3 28-30ft

At 14:40 on 2/23/17

Log of Exploratory Boring

Well No.

PC B3

AECOM

Page 3 of 11

Drill Pad Sketch Map



Client: MDEQ

Project No.: 60514524

Site: OXCOBA, ME - B3

Surface geologic unit and expected subsurface geology

Logged by: Jan Bruell

Drilling Co.: Cascade

Driller: Dan O'Hara

Drilling Method: Sonic

Drill Rig Model: 6140 LC GEOPHASE

[illegible]

[illegible]

[illegible]

[illegible]

Drilling Progress						Geologic Description																										
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Strat Log Sketch								Texture Grain size and other notes (structures, palaeocurrents, fossils, color)	Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)
																							LIMESTONES		SAND		GRAVEL					
																							mud - wacke - pack - gran - mud & bound	MUD	SAND	pebbles - gravel - cobbles - boulders	fine sand - medium sand - coarse sand	very fine gravel - fine gravel - medium gravel - coarse gravel	very coarse gravel - pebbles - cobbles - boulders			
102						10yR 5/2	95	5	A	-	-	-	-	-	-	-	-	-	-	-	-				Soft sticky clay							
103						10yR 5/2	90	10	H	-	-	-	-	-	T	A	N	-	-	-	-											
104																									75mm COBBLE AT 104 FT BGS							
105						10yR 5/2	90	10	H	-	-	-	-	T	-	A	N	-	-	-	-											
106																																
107						10yR 5/2	90	10	H	-	-	-	-	-	-	-	N	-	-	-	-											
108																									7.5yR 7/4 MOTTLED							
109																																
110	10:27					10yR 5/2	85	15	H	-	-	-	-	-	-	-	N	-	-	-	-				SOFT STICKY CLAY WITH TRACE PEBBLES							
111						10yR 5/2	80	15	H	5	T	-	-	T	-	SA	N	-	-	-	-											
112						10yR 5/2	70	20	M	5	T	T	SA	5	T	SA	M	-	-	-	-											
113						10yR 5/2	90	10	H	T	-	-	-	T	-	SA	N	-	-	-	-											
114						7.5yR 5/2	65	10	H	20	T	T	SR	5	T	SA	MP	D	-	-	-					SOFT SANDY CLAY WITH FEW PEBBLES THROUGHOUT						
115						7.5yR 5/2	60	10	M	20	T	T	GR	10	T	SA	MP	R	-	-	-											
116																																

Date:

3/3/17

Ft/Min or Ft/Hr

Smooth, Chatter, Heavy Chatter, Loss of CirculationGrab, Discrete

Non, High, Med, Low

0.0029" to 0.017", No 40-2000.017" to 0.079", No 10-400.079" to 0.19", No 4-10VR, A, SA, SR, R, VR0.19" to 0.75", 20mm to No 40.75" to 3"VR, A, SA, SR, R, VR0, 1, 2, 3, 4Rk frags, Quartz, Feldspar, Dark minsNone, Slight, HighYellow, Ochre, Red, Gray, Black

Client:

Project No.:

Site:

Surface geologic unit and expected subsurface geology

Logged by:

Drilling Co.:

Driller:

Drilling Method:

Drill Rig Model:

Log of Exploratory Boring

Well No.

PC B3

Page 6 of 11AECOM

[illegible]

[illegible]

Drilling Progress										Geologic Description															Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)	Log of Exploratory Boring Well No.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Strat Log Sketch										Texture Grain size and other notes (structures, palaeocurrents, fossils, color)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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Drilling Progress										Geologic Description														Strat Log Sketch										Comments	Log of Exploratory Boring
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	LIMESTONES	Texture	Grain size and other notes (structures, palaeocurrents, fossils, color)	Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)									
44							10 YR 4/2	70	5	L	20	-	-	SR	5	T	SA	MW	Q	-						STIFF SANDY CLAY WITH PEBBLES THROUGHOUT									
45																																			
46																																			
47							10 YR 4/2	75	5	L	15	-	-	SR	5	T	SA	MW	Q	-															
48																																			
49																																			
50	13:23						10 YR 4/2	70	10	L	15	-	-	SR	5	T	SA	MW	Q	-						VERY STIFF SANDY CLAY WITH FEW PEBBLES THROUGHOUT									
51																																			
52																																			
53																																			
54																																			
55																																			
56							10 YR 5/2	70	10	L	15	-	-	SR	5	T	SA	MW	Q	-															
57																																			
58																																			

Client: MDEQ

Project No.: 60518528

Site: Wurtsmith AFB, Oscoda, MI

Surface geologic unit and expected subsurface geology

Logged by: Jim Porell

Drilling Co.: Casade

Driller: Dan O'Hara

Drilling Method: Sonic

Drill Rig Model: 2000 Rora Sonic Mast Rig

Drill Pad Sketch Map

Log of Exploratory Boring

Well No. PC 95

Page 2 of 11

AECOM

2/7/17

Drilling Progress										Geologic Description														Strat Log Sketch		Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)		
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	MUD	SAND	GRAVEL		Texture	
59							10YR 5/2	70	10	L	15	-	-	SR	S	T	SA	MW	Q	-								
60	13:55						10YR 5/2	75	10	L	10	-	-	SR	S	T	SA	MW	Q	-								99mm COBBLE AT 60 FT FEW 2-11mm PEBBLES THROUGHOUT STIFF SANDY CLAY
61																												
62																												
63																												
64							10YR 5/2	75	10	L	10	-	-	SR	S	T	SA	MW	Q	-								
65				H																								
66							10YR 5/2	25	20	N	55	T	-	SR	T	P	SA	P	Q	-								CLAYEY SAND WITH FEW PEBBLES THROUGHOUT
67				H			10YR 5/2	70	10	L	15	-	-	SR	S	T	SA	MW	Q	-								STIFF SANDY CLAY WITH FEW PEBBLES THROUGHOUT
68																												
69							10YR 5/2	10	15	N	75	T	-	SR	-	-	-	MW	Q	-								FINE SILTY SAND
70	15:43			H			10YR 5/2	70	5	A	20	T	-	SR	S	T	SA	MW	Q	-								VERY STIFF SILTY CLAY WITH FEW PEBBLES THROUGHOUT
71							10YR 5/2	70	15	L	10	T	-	SR	S	T	SA	MW	Q	-								
72																												

Date: 2/6-7/17

F/Min or F/Hr

Smooth, Chatter, Heavy Chatter, Loss of Circulation

Grab, Discrete

Non, High, Med, Low

0.0029" to 0.017", No 40-200

0.017" to 0.075", No 10-40

0.075" to 0.19", No 4-10

VR, A, SA, SR, R, VR

0.19" to 0.75", 20mm to No 4

0.75" to 3"

VR, A, SA, SR, R, VR

0, 1, 2, 3, 4

Rt frags, Quartz, Feldspar, Dark mins

None, Slight, High

Yellow, Ochre, Red, Gray, Black

Client: MDEQ

Project No.: 60518528

Site: Wurtsmith AFB OSCADA, MI

Surface geologic unit and expected subsurface geology

Logged by: Jim Buzzell

Drilling Co.: CASCADE

Driller: DA OMARA

Drilling Method: GPMC

Drill Rig Model: 200LC Porta Service Mini Rig

Log of Exploratory Boring

Well No.

PC BS

Page 5 of 11

AECOM

Drilling Progress						Geologic Description																												
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Strat Log Sketch										Texture Grain size and other notes (structures, palaeocurrents, fossils, color)	Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)
																							LIMESTONES		MUD		SAND		GRAVEL		BOL			
73				C	X		10YR 5/2	70	15	L	10	T	-	SR	5	T	SA	MW	Q	-				clay	silt	mud	wedge	pack	grain	rud & bound	Very stiff silty clay with few pebbles throughout	Dry		
74					X																													
75				C	X																													
76					X		10YR 5/2	70	10	N	10	T	-	SR	5	5	SA	A	MW	Q	-											Dry very stiff silty clay with few pebbles throughout		
77					X																													
78				H	X																													
79					X																													
80	16:57				X		10YR 5/2	70	10	N	15	T	-	SR	5	T	SA	MW	Q	-														
81					X																													
82					X																													
83					X																													
84					X		10YR 5/2	70	10	N	15	T	-	SR	5	T	SA	MW	Q															
85					X																													
86				H	X		10YR 5/2	70	10	L	5	T	-	SR	5	T	SA	MW	Q															
87					X																													
Date:		FU/Min or FU/Hr		Smooth, Chatter, Heavy Chatter, Loss of Circulation		Grab, Discrete		Non, High, Med, Low		0.0029" to 0.017", No 40-200		0.017" to 0.079", No 10-40		0.079" to 0.19", No 4-10		VR, A, SA, SR, R, VR		0.19" to 0.75", 20mm to No 4		0.75" to 3"		VR, A, SA, SR, R, VR		0, 1, 2, 3, 4		Rk frags, Quartz, Feldspar, Dark mins		None, Slight, High		Yellow, Ochre, Red, Gray, Black				

Log of Exploratory Boring

Well No.

PC BS

Page 6 of 11

AECOM

Drill Pad Sketch Map

Client: MDEQ

Project No.: 60518528

Site: Wurtsmith AFB, Oscoda, MI

Surface geologic unit and expected subsurface geology

Logged by: Jim Bratt

Drilling Co.: Cascade

Driller: Dan O'Mara

Drilling Method: Sonic

Drill Rig Model: 700LC Data Series Mini Rig

[illegible]

[illegible]

Drilling Progress										Geologic Description															Strat Log Sketch		Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)				
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Limestones						Texture Grain size and other notes (structures, palaeocurrents, fossils, color)		
																								clay	mud	wedge	pack	gran		mud & bound	
117							10YR 5/2	20	20	N	45	5	-	SR	10	T	SA	P	Q	-											TIGHT CLAYEY SANDS WITH FEW PEBBLES THROUGHOUT
118																															
119																															
120	13:24						10YR 5/2	15	20	N	45	5	-	SR	10	S	SA	P	Q	-											CLAYEY FINE GRAIN SANDS WITH FEW PEBBLES THROUGHOUT TRACE COBBLES 6.7-8.5mm AT 120' DIS AND 122.5' DIS
121																															
122																															
123							10YR 5/2	20	20	N	45	5	-	SR	10	T	SA	P	Q	-											FEW PEBBLES 4-15mm THROUGHOUT
124																															
125																															
126							10YR 5/2	25	15	N	45	5	-	SR	10	T	SA	P	Q	-											
127																															
128																															
129																															
130							10YR 5/2																								
2/13/17	13:50																														
Date: 2/8/17																															
FID/PID at surface casing (ppm)																															
Penetration rates/drilling observations																															
Rig Motion																															
Sample recovery, type																															
Sample Interval																															
Munsell Color Code																															
% Clay																															
% Silt																															
Plasticity of fines																															
% Fine Sand																															
% Medium Sand																															
% Coarse Sand																															
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Cementation / HCl reaction																															
Mineral staining/Redox																															
USCS Code (if required)																															
																							Limestones						Texture Grain size and other notes (structures, palaeocurrents, fossils, color)		

Client: MDEQ

Project No.: 60518528

Site: Wurtsmith AFB

Surface geologic unit and expected subsurface geology

Logged by: Jim Rozell

Drilling Co.: Cascade

Driller: Dan O'Hara

Drilling Method: Sonic

Drill Rig Model: 200LC Rotasonic Plus Rch

Log of Exploratory Boring

Well No. PC B5

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AECOM

[illegible]

Drilling Progress										Geologic Description										Strat Log Sketch										Comments																								
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Texture										Grain size and other notes (structures, palaeocurrents, fossils, color)										Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)											
																									LIMESTONES																													
																									MUD SAND GRAVEL																													
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Drilling Progress										Geologic Description														Strat Log Sketch	Texture	Comments																			
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	MUD	SAND	GRAVEL	clay	silt	vf	f	m	c	vc	gran	peb	cob	boul	Grain size and other notes (structures, palaeocurrents, fossils, color)	(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)							
15							5Y2.5/2	85	15	11	1	1	1	1	1	1	1	2	1	1																				SILTY LOUPESTRIAN CLAY WITH TRACE SHELL FRAGMENTS AND ORGANICS THROUGHOUT					
16																																													
17																																													
18																																													
19																																													
20	10:42						5Y2.5/2	95	15	11	1	1	1	1	1	1	1	2	1	1																									
21																																													
22																																													
23							5Y4/1	85	15	11	1	1	1	1	1	1	1	2	1	1																									
24																																													
25																																													
26																																													
27																																													
28																																													
29																																													

Date: 2/5/17

FID/Min or FID/Hr

Smooth, Chatter, Heavy Chatter, Loss of Circulation

Grab, Discrete

Non, High, Med, Low

0.0029" to 0.017", No 40-200

0.017" to 0.079", No 10-40

0.079" to 0.19", No 4-10

VR, A, SA, SR, R, VR

0.19" to 0.75", 20mm to No 4

0.75" to 3"

VR, A, SA, SR, R, VR

0, 1, 2, 3, 4

Rk frags, Quartz, Feldspar, Dark mins

None, Slight, High

Yellow, Ochre, Red, Gray, Black

Client: MDEQ

Project No.: 60518528

Site: Wurtsmith AFB - Okeana, MI

Surface geologic unit and expected subsurface geology

Logged by: J. Brzez

Drilling Co.: CASCAD

Driller: Dan O'Brien

Drilling Method: Sonic

Drill Rig Model: 200 LC RotoSwave MIM 26

Log of Exploratory Boring

Well No. 7C B6

Page 2 of 4

AECOM

Drilling Progress					Geologic Description																				Strat Log Sketch		Comments	Log of Exploratory Boring																																																			
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	LIMESTONES	Texture	(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)																																																						
30							5G4/1	85	15	H	-	-	-	-	-	-	-	-	W	-	-					5 y 2.5/2 MORRIS THROUGHOUT																																																					
31																																																																															
32																																																																															
33							10YR 5/3	10	20	N	70	T	-	SR	-	-	-	MW	Q	-						ORGANIC WOODY DEBRIS AT 32.5 DISTINCT COLOR CHANGE																																																					
34							10YR 5/3	T	5	N	5	20	70	SR	-	-	-	M	RQ	-																																																											
35																																																																															
36							10YR 5/3	T	5	N	5	25	15	SR	65	5	SR	P	RQ	-						SHARP CONTACT DOMINANTLY PEBBLES 3-10mm FEW 35-44mm	VAS PC B6 35-37 FT COLLECTED AT 15:15 ON 2/5/17																																																				
37							10YR 5/2	60	10	M	15	-	-	SR	5	T	SR	MP	Q	-						SILTY/SANDY CLAY WITH FEW PEBBLES THROUGHOUT																																																					
38																																																																															
39																																																																															
40	11:06						10YR 5/2	20	15	N	5	15	35	SR	10	T	SA	P	Q	-						0.2' MED SAND AT 39.5																																																					
41							10YR 5/2	60	10	M	15	-	-	SR	5	T	SA	MP	Q	-						FEW PEBBLES THROUGHOUT																																																					
42																																																																															
43																																																																															
Date: 2/5/17					FV/Min or FV/Hr					Smooth, Chatter, Heavy Chatter, Loss of Circulation					Grab, Discrete					Non, High, Med, Low					0.0029" to 0.017", No 40-200					0.017" to 0.079", No 10-40					0.079" to 0.19", No 4-10					VR, A, SA, SR, R, VR					0.19" to 0.75", 20mm to No 4					0.75" to 3"					VR, A, SA, SR, R, VR					0, 1, 2, 3, 4					Rk frags, Quartz, Feldspar, Dark mins					None, Slight, High					Yellow, Ochre, Red, Gray, Black				

Drill Pad Sketch Map

Client: MDEQ

Project No.: 60518528

Site: Wurtsmith AFB - Okla, NE

Surface geologic unit and expected subsurface geology

Logged by: Jim Buzzell

Drilling Co.: Cascade

Driller: Dan O'Meara

Drilling Method: Sonic

Drill Rig Model: 200LC DOROSONIC MINI RIG

Log of Exploratory Boring

Well No. PC B6

Page 3 of 4

Client: MDEQ

Project No.: 60518528

Site: Wurtsmith AFB - Okla, NE

Surface geologic unit and expected subsurface geology

Logged by: Jim Fozzell

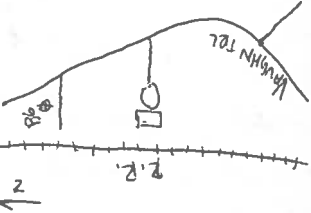
Drilling Co.: CASCADE

Driller: Dan D'Nea

Drilling Method: Sonic

Drill Rig Model: Zonal Porosonic Mini Rig

Drill Pad Sketch Map



Log of Exploratory Boring

Well No.

PC B6

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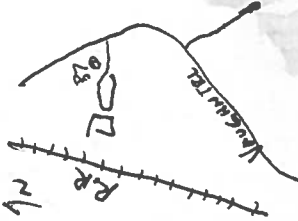
Drilling Progress										Geologic Description																	Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Strat Log Sketch										Texture Grain size and other notes (structures, palaeocurrents, fossils, color)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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Log of Exploratory Boring

Well No.

PC B7

Drill Pad Sketch Map



Client: MDEQ

Project No.: 60518528

Site: Wurtsmith AFB

Surface geologic unit and expected subsurface geology

Logged by:

Drilling Co.:

Driller:

Drilling Method:

Drill Rig Model:

2/3/17

[illegible]

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[illegible]

Drilling Progress							Geologic Description																	Strat Log Sketch	Texture	Comments	Log of Exploratory Boring	Drill Pad Sketch Map	Client: MDEQ	Project No.: 60518528	Site: Wurtsmith AFB	Surface geologic unit and expected subsurface geology	Logged by:	Drilling Co.:	Driller:	Drilling Method:	Drill Rig Model:																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	LIMESTONES	MUD	SAND	GRAVEL	Texture	Grain size and other notes (structures, palaeocurrents, fossils, color)		Well No.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														</

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Drilling Progress										Geologic Description														Strat Log Sketch		Comments											
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Limestones						Texture	(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)							
																							MUD	SAND	GRAVEL	clay	silt	mud	wacke		pack	grain	rud & bound	Grain size and other notes (structures, palaeocurrents, fossils, color)			
59							10YR 5/2	80	5	M	10	-	-	SR	S	T	SR	MD	Q	-																STIFF SANDY CLAY/TILL LITTLE V. FINE - FINE SAND	
60	13:40						10YR 5/2	80	5	M	10	-	-	SR	S	T	SR	MD	Q	-																	
61																																					
62																																					
63																																					
64																																					
65																																					
66																																					
67																																					
68																																					
69							10YR 5/2	75	5	M	10	-	-	SR	S	S	SR	MD	Q																		VERY STIFF TILL/CLAY
70	15:08																																				
71																																					
72																																					

Date: 1/30/17

F/Min or F/Hr

Smooth, Chatter, Heavy Chatter, Loss of Circulation

Grab, Discrete

Non, High, Med, Low

0.0029" to 0.017", No 40-200

0.017" to 0.079", No 10-40

0.079" to 0.19", No 4-10

VR, A, SA, SR, R, VR

0.19" to 0.75", 20mm to No 4

0.75" to 3"

VR, A, SA, SR, R, VR

0, 1, 2, 3, 4

Rk frags, Quartz, Feldspar, Dark mins

None, Slight, High

Yellow, Ochre, Red, Gray, Black

Strat Log Sketch

Texture

Comments

Log of Exploratory Boring

Well No.

PC B8

Page 5 of 11

AECOM

Drill Pad Sketch Map

Client: MNEQ

Project No.: 605145246

Site: Oyster, ME - B8

Surface geologic unit and expected subsurface geology

Logged by: Jim Buzzell

Drilling Co.: CASCADE

Driller: Don Dwyer / ARLEN LITTLE

Drilling Method: SONIC

Drill Rig Model: 220LC MINI SONIC

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Drilling Progress					Geologic Description															Strat Log Sketch		Comments																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	LIMESTONES										Texture Grain size and other notes (structures, palaeocurrents, fossils, color)	Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse	very coarse</

Drilling Progress										Geologic Description														Strat Log Sketch		Comments							
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	MUD	SAND	GRAVEL	Texture	Grain size and other notes (structures, palaeocurrents, fossils, color)	(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)					
																							clay	mud	silt	vs	fine	coarse	gravel	peb	cob	boul	
102																																	
103							10YR 5/2	15	25	N	45	15	-	SR	-	-	-	M	Q	-													
104																																	
105																																	
106							10YR 5/2	15	20	N	15	50	-	SR	-	-	-	M	Q	-													
107																																	
108																																	
109																																	
110							10YR 5/2	20	20	N	60	T	-	SR	-	-	-	M	Q	-													
111	9:55						10YR 6/2	5	75	L	20	-	-	SR	-	-	-	M	Q	-													
112							10YR 6/2	5	10	N	25	55	5	SR	-	-	-	M	Q	-													
113																																	
114																																	
115																																	
116																																	

Client: WDEQ

Project No.: 60516528

Site: OSCODA, MI - B8

Surface geologic unit and expected subsurface geology: Till

Logged by: Jim Brunell

Drilling Co.: CASCADE

Driller: Don Orsaga / ALEN LITTLE

Drilling Method: Sonic

Drill Rig Model: 200 LC MINI SONIC

Log of Exploratory Boring

Well No. PC B8

Drill Pad Sketch Map

PC B8 106-108 FT VAS

Collected C

Date: 1/30-31/17

Ft/Min or Ft/Hr

Smooth, Chatter, Heavy Chatter, Loss of Circulation

Grab, Discrete

NO RECOVERY

Non, High, Med, Low

0.0029" to 0.017", No 40-200

0.017" to 0.079", No 10-40

0.079" to 0.19", No 4-10

VR, A, SA, SR, R, VR

0.19" to 0.75", 20mm to No 4

0.75" to 3"

VR, A, SA, SR, R, VR

0, 1, 2, 3, 4

RK frags, Quartz, Feldspar, Dark mins

None, Slight, High

Yellow, Ochre, Red, Gray, Black

Strat Log Sketch

LIMESTONES

MUD

SAND

GRAVEL

Texture

Grain size and other notes (structures, palaeocurrents, fossils, color)

Comments

(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)

Client: WDEQ

Project No.: 60516528

Site: OSCODA, MI - B8

Surface geologic unit and expected subsurface geology: Till

Logged by: Jim Brunell

Drilling Co.: CASCADE

Driller: Don Orsaga / ALEN LITTLE

Drilling Method: Sonic

Drill Rig Model: 200 LC MINI SONIC

Log of Exploratory Boring

Well No. PC B8

Drill Pad Sketch Map

PC B8 106-108 FT VAS

Collected C

Date: 1/30-31/17

Ft/Min or Ft/Hr

Smooth, Chatter, Heavy Chatter, Loss of Circulation

Grab, Discrete

NO RECOVERY

Non, High, Med, Low

0.0029" to 0.017", No 40-200

0.017" to 0.079", No 10-40

0.079" to 0.19", No 4-10

VR, A, SA, SR, R, VR

0.19" to 0.75", 20mm to No 4

0.75" to 3"

VR, A, SA, SR, R, VR

0, 1, 2, 3, 4

RK frags, Quartz, Feldspar, Dark mins

None, Slight, High

Yellow, Ochre, Red, Gray, Black

Drilling Progress							Geologic Description															Strat Log Sketch		Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Texture																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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Drilling Progress						Geologic Description															Strat Log Sketch										Comments																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	LIMESTONES										Texture	Grain size and other notes (structures, palaeocurrents, fossils, color)	(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
																							MUD	SAND	GRAVEL	clay	silt	fine	med	coarse	fine	med				coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med	coarse	fine	med

Date: 1/22/17

FU/Min or FU/Hr

Smooth, Chatter, Heavy Chatter, Loss of Circulation

Grab, Discrete

Non, High, Med, Low

0.0029" to 0.017", No 40-200

0.017" to 0.079", No 10-40

0.079" to 0.19", No 4-10

VR, A, SA, SR, R, VR

0.19" to 0.75", 20mm to No 4

0.75" to 3"

VR, A, SA, SR, R, VR

0, 1, 2, 3, 4

Rx frags, Quartz, Feldspar, Dark mins

None, Slight, High

Yellow, Ochre, Red, Gray, Black

Client: MDEQ

Project No.: 66516526

Site: B9

Surface geologic unit and expected subsurface geology

Logged by: Jim Burzell

Drilling Co.: CASCADE

Driller: Dan Omer

Drilling Method: Sonic

Drill Rig Model: 200C Mini Sonic

Drill Pad Sketch Map

Log of Exploratory Boring

Well No.



PC B9

Drill Rig Model: 200C Mini Sonic

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Drilling Progress										Geologic Description														Strat Log Sketch		Comments							
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	LIMESTONES						Texture	Grain size and other notes (structures, palaeocurrents, fossils, color)			
																								clay	mud	silt	sand	gravel	pebbles		boulders		
30							10YR 7/3	-	-	-	5	75	20	SR	T	-	SA	MW	Q	-											0.1' VERY COARSE BED	Was 28-30ft @ 58	
31							10YR 7/3	-	-	-	5	65	30	SR	T	-	SA	MW	Q	-											TRACE PEBBLES 4-6mm THROUGHOUT.		
32																																	
33																																	
34																																	
35							10YR 7/3	-	-	-	5	20	60	SA	15	T	SA	P	Q												LITTLE PEBBLES DOMINANTLY 4-14mm TRACE PEBBLES 40-45mm	Was 34-36ft @ 9:55 1/23/17	
36																																	
37							10YR 7/3	-	-	-	25	60	15	SR	-	-	-	M	Q														
38							10YR 9/2	-	T	-	20	60	20	SR	T	-	SA	MP	Q												DISTINCT COLOR CHANGE		
39																																FINING UP SHARP CONTACT AT BASE 29.1' BGS. TRACE PEBBLES 5-9mm MAX 14mm	
40							10YR 9/2	-	-	-	15	75	10	SR	-	-	-	MW	Q														
41	14:35																															Was 39-41ft @ 17:15 1/22/17	
42	10:1						10YR 9/2	95	5	H	-	-	-	-	-	-	-	N	-												TOC 41.5 FT BGS		
43																																TILL STIFF	

Client: MDEQ

Project No.: 60516526

Site: B9

Surface geologic unit and expected subsurface geology

Logged by: Jim Burrell

Drilling Co.: CASCADE

Driller: Don OMARA

Drilling Method: Sonic

Drill Rig Model: 200LC Mini Sonic

Log of Exploratory Boring

Well No. PC B9

Drill Pad Sketch Map

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AECOM

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Drilling Progress										Geologic Description														Strat Log Sketch		Comments										
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Limestones						Texture	Grain size and other notes (structures, palaeocurrents, fossils, color)	(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)					
																								clay	mud	silt	vf	m	vc			gran	peb	cob	boul	
1	10:05			S			10YR 5/3	30	30	M	20	10	5	SR	5		SR	MS	Q																ORGANIC TOP SOIL	
2							10YR 6/3	10	10		60	20		SR					WS	Q																
3																																				
4							10YR 6/2				80	20		SR					WS	Q															ABRUPT COLOR CHANGE	
5							10YR 6/2	30			60	10		SR					MS	Q																
6							10YR 7/3				80	20							WS	Q																
7							10YR 6/3				30	40		SR	10	20		SR	PS	Q																
8							10YR 6/4				60	20	20						WS	Q															PEBBLES	
9																																				
10	10:50						10YR 6/3				30	50	20		5	5			MS	Q														SOME PEBBLES		
11							10YR 6/3				10	60	15		5				MS	Q																
12							10YR 6/3				10	60	20		5	5			MS	Q														SOME PEBBLES		
13							10YR 6/3				10	60	10						WS	Q																
14							10YR 6/3				10	75	10		5				MS	Q														FEW PEBBLES		
Date: 01/11/2017		FV/Min or FV/Hr		Smooth, Chatter, Heavy Chatter, Loss of Circulation		Grab, Discrete				Non, High, Med, Low		0.0029" to 0.017", No 40-200		0.017" to 0.079", No 10-40		0.079" to 0.19", No 4-10		VR, A, SA, SR, R, VR		0.19" to 0.75", 20mm to No 4		0.75" to 3"		VR, A, SA, SR, R, VR		0, 1, 2, 3, 4		Rk frags, Quartz, Feldspar, Dark mins		None, Slight, High		Yellow, Ochre, Red, Gray, Black				
Strat Log Sketch																																				
Texture																																				
Grain size and other notes (structures, palaeocurrents, fossils, color)																																				
Comments																																				
(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)																																				
Log of Exploratory Boring																																				
Boring Wet No.																																				
PC B10																																				
Drill Pad Sketch Map																																				
DAN MATHIAS																																				
BIO																																				
MATHIAS																																				
Client: MDEQ																																				
Project No.: 60514613.01																																				
Site: MDEQ WORTSMITH																																				
Surface geologic unit and expected subsurface geology																																				
Logged by: M WOLF																																				
Drilling Co.: CASCADE (BART)																																				
Driller: DAN																																				
Drilling Method: SONIC																																				
Drill Rig Model: BART MINT-SONIC																																				

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Drilling Progress										Geologic Description										Strat Log Sketch										Comments									
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	LIMESTONES	MUD	SAND	GRAVEL	Texture	Grain size and other notes (structures, palaeocurrents, fossils, color)	Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)										
30	15:45						10YR 6/20S	10	H							SSR												FEW PEBBLES, STIFF											
31																																							
32																																							
33																																							
34																																							
35																																							
36																																							
37																																							
38																																							
39																																							
40																																							
41																																							
42																																							
43																																							
44																																							
Client: MDEQ																																							
Project No.: 60514613.01																																							
Site: MDEQ WURTSMITH																																							
Surface geologic unit and expected subsurface geology																																							
Logged by: M WOLF																																							
Drilling Co.: CASCADE																																							
Driller: DAN																																							
Drilling Method: SONIC																																							
Drill Rig Model: BOART MINISONJIC																																							

Drilling Progress										Geologic Description														Strat Log Sketch		Comments			
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	LIMESTONES			Texture	Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)		
																							clay	MUD	SAND	GRAVEL		Grain size and other notes (structures, palaeocurrents, fossils, color)	
	11:05																												
1																													
2							7.5YR 3/1 5	20	H	10	10	T	SA	5	5	A	P	Q	N/A								ORGANIC TOPSOIL		
3							10YR 4/2	-	10	N/A	15	20	10	SR	35	20	A	VP	Q	-									
4																													
5																													
6																													
7							10YR 4/3	-	5	-	65	35	T	SR	-	-	MW	Q	-								10 YR 7/6 WHITING THROUGHOUT		
8																											DRINKIES, ROOTS AND WOODY DEBRIS		
9							10YR 4/3	-	T	-	20	65	15	SR	T	T	SR	M	Q	-							DISTINCT COLOR CHANGE WITH GRAB CONTACT	ABRUPT COLOR CHANGE	
10							10YR 4/3	-	-	-	5	50	45	SR	T	-	SA	M	Q	-	Wier						30mm PEBBLE AT 8.1'		
11	11:45																										FINING UP	WATER AT ~9 FT DEGS	
12																											LITTLE PEARL THROUGHOUT	VAS COLLECTED AT 16.45	
13																											10-15mm PGS		
14																											SE FEW TRACE PEBBLES V+H LARGIE 0.2" THICK		
																											ROUNDED-SUB-ANG PEBBLES 25-32mm		
																											13.5" 345		

Date: 1/12/17

Ft/Min or Ft/Hr

Smooth, Chatter, Heavy Chatter, Loss of Circulation

Grab, Discrete

Non, High, Med, Low

0.0029" to 0.017", No 40-200

0.017" to 0.079", No 10-40

0.079" to 0.19", No 4-10

VR, A, SA, SR, R, VR

0.19" to 0.75", 20mm to No 4

0.75" to 3"

VR, A, SA, SR, R, VR

0, 1, 2, 3, 4

Rk frags, Quartz, Feldspar, Dark mins

None, Slight, High

Yellow, Ochre, Red, Gray, Black

Client: MDEQ

Project No.: 60518526

Site: B11

Surface geologic unit and expected subsurface geology

Logged by: J. Bazzell

Drilling Co.: Cascade

Driller: Dan Ormura, ALLEN LITTLE

Drilling Method: SONIC

Drill Rig Model: 200LC MINI SONIC

Log of Exploratory Boring

Well No.

PC B11

1/13/17

Drilling Progress										Geologic Description															Strat Log Sketch		Comments										
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	LIMESTONES										Texture	Grain size and other notes (structures, palaeocurrents, fossils, color)	(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)		
																							MUD		SAND				GRAVEL								
																								clay	silt	mud	wt	fr	mc	vc	gran	peb	cob	boul			
15	11:45						10YR 4/3	-	-	-	-	10	30	SR	40	20	SA	M	Q	-																43mm PEBBLE AT 15' BGS	
16																																				FEW PEBBLES TI	
17							10YR 4/3	-	5	-	90	5	-	SR	-	-	-	W3	Q	-																	
18							10YR 4/2	-	-	-	75	15	SR	5	T	SA	M	Q	-																	LITTLE PEBBLES 15mm-40mm THROUGHOUT	
19																																					
20	11:00						10YR 5/4	-	-	-	10	70	15	SR	5	T	SA	M	Q	-																FEW PEBBLES 10mm-32mm THROUGHOUT 10YR 5/6 MOTTLED	
21																																					
22							10YR 4/3	-	T	-	20	70	10	SR	T	T	SA	M	Q	-																VAS COLLECTED 20-25 FT BGS 1/16/17 @ 15:20HRS	
23																																				TRACE PEBBLES 9mm-40mm THROUGHOUT	
24																																					
25	11:50						10YR 5/2	10	10	H	-	-	-	-	-	-	-	-	-	Q	-																
26							10YR 5/2	45	10	H	-	-	-	-	5	A	-	-	-	Q	-															FEW PEBBLES MOSTLY 5mm-10mm TRACE 1mm @ 27.2' BGS	
27							10YR 4/2	75	20	H	-	-	-	-	-	5	SA-A	-	-	Q	-																
28																																				FEW PEBBLES 10mm-20mm TRACE <10mm	
29																																					

Date:

FV/Min or FV/Hr

Smooth, Chatter, Heavy Chatter, Loss of Circulation

Grab, Discrete

Non, High, Med, Low

0.0029" to 0.017", No 40-200

0.017" to 0.079", No 10-40

0.079" to 0.19", No 4-10

VR, A, SA, SR, R, VR

0.19" to 0.75", 20mm to No 4

0.75" to 3"

VR, A, SA, SR, R, VR

0, 1, 2, 3, 4

Rk frags, Quartz, Feldspar, Dark mins

None, Slight, High

Yellow, Ochre, Red, Gray, Black

Strat Log Sketch

LIMESTONES

MUD SAND GRAVEL

Texture

Grain size and other notes (structures, palaeocurrents, fossils, color)

Comments

(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)

Log of Exploratory Boring

Well No.

PC 311

Drill Pad Sketch Map

DPW

120' 120' 120'

120'

120'

Client: WDEQ

Project No.: 60514524

Site: PC 311

Surface geologic unit and expected subsurface geology

Logged by: Jim Puzzeu

Drilling Co.: CASCADE Drilling

Driller: Don Dwyer / Aaron Little

Drilling Method: Air Lift

Drill Rig Model: 200 LC Hydraulic (Bore)

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[illegible]

Drilling Progress										Geologic Description														Strat Log Sketch	Comments					
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	LIMESTONES						Texture	(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)
																							clay	mud	silt	SAND	GRAVEL	Texture		
	16:10				X		10YR 4/2	25	30	N	30	40	5	SR	-	-	-	P	Q	-									ORGANIC TOP SOIL	
1																														
2																														
3																														
4							10YR 4/6	5	15	N	10	60	10	SR	-	-	-	MP	Q	-									FEW ORGANICS, ROOTS, WOODY DEBRIS THROUGHOUT	
5							10YR 4/3	5	10	N	10	65	10	SR	-	-	-	MP	Q	-										
6	16:25						10YR 8/2	T	10	N	55	30	5	SR	-	-	-	MP	Q	-										
7							10YR 6/3	-	-	-	10	65	25	SR	-	-	-	M	Q	-										
8							10YR 6/3	-	-	-	T	65	25	SR-SA	10	T	SA	MP	Q	-									ORGANICS AN 0.1' BED OF FINE SILTY SAND 10YR 4/1 WITH ROOTS AND WOODY DEBRIS	
9							10YR 6/3	-	-	-	T	75	25	SR-SA	T	-	SA	M	Q	-									FEW PEBBLES - DOMINANTLY 15-20mm MAX 45mm	
10	10:25						10YR 6/3	-	-	-	T	65	30	SR-SA	5	5	SA	MP	Q	-									FEW PEBBLES - DOMINANTLY 15mm TRACER > 20mm	VAS SAMPLE
11							10YR 6/3	-	T	-	20	70	10	SR	T	-	-	M	Q	-									THIN BEDS (2mm AND 20mm) OF N3/ MED GRAIN SAND.	PC BIZ 7.5'-10'
12							10YR 6/3	-	T	-	10	85	50	SR	5	T	SA	P	Q	-									NOTELY PEBBLES AND COARSE-V. COARSE SANDS 15-20mm MAX 50mm	
13							10YR 6/3	-	T	-	10	85	50	SR	5	T	SA	P	Q	-									10YR 6/1 GRAINING THROUGHOUT	
14																													FEW PEBBLES THROUGHOUT DOMINANTLY 4-20mm MAX 47mm	

1/16/17 + 1/18/17

FV/Min or FV/Hr

Smooth, Chatter, Heavy Chatter, Loss of Circulation

Grab, Discrete

Non, High, Med, Low

0.0029" to 0.017", No 40-200

0.017" to 0.079", No 10-40

0.079" to 0.19", No 4-10

VR, A, SA, SR, R, VR

0.19" to 0.75", 20mm to No 4

0.75" to 3"

VR, A, SA, SR, R, VR

0, 1, 2, 3, 4

Rk frags, Quartz, Feldspar, Dark mins

None, Slight, High

Yellow, Ochre, Red, Gray, Black

Strat Log Sketch

MUD SAND GRAVEL

Texture

Grain size and other notes (structures, palaeocurrents, fossils, color)

Comments

(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)

Log of Exploratory Boring

Well No.

PC BIZ

Drill Pad Sketch Map

DPW Medicines HUGHES

0812

Client: WDEO

Project No.: 60514528

Site: PC BIZ

Surface geologic unit and expected subsurface geology

Logged by: Jim Fuzzell

Drilling Co.: CASCADE

Driller: DAN O'NEAL / ARLEN LITTLE

Drilling Method: SONIC

Drill Rig Model: 200LC MINI SONIC (BOHRA)

Page 1 of 3

AECOM

Drilling Progress										Geologic Description														Strat Log Sketch	Comments											
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Limestones										Texture	Grain size and other notes (structures, palaeocurrents, fossils, color)	(drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)	
																							MUD		SAND				GRAVEL							
																								clay	mud	silt	fine	med	coarse	gran	peb	cob	boul			
15							10 YR 4/3	-	T	-	10	50	40	SR	T	-	SA	MP	Q	-															TRACE PEBBLES	
16							10 YR 6/3	-	-	-	5	75	20	SR	T	-	SA	M	Q	-														TRACE PEBBLES 5-8mm		
17																																			10 YR 6/6 SEMINING THROUGHOUT	
18																																			VAS Sample	
19							10 YR 4/3	T	T	-	5																								PC B12 17.5-20ft	
20	09:00						10 YR 6/3	T	T	-	5	10	30	SR	35	20	5/8	P	Q	-														DOMINANTLY PEBBLES 4-10mm		
21							10 YR 4/3	-	-	-	15	40	5	SR	T	T	5/8	MW	Q	-														LITTLE 20-30mm MAX 50mm		
22																																			TRACE PEBBLES 15-20mm	
23																																			THROUGHOUT	
24																																				
25																																				
26																																				
27																																				COBBLE 70mm @ 26.9'
28							10 YR 4/2	70	25	H	T	-	-	-	-	5	SA	W	-	-																
29																																				
Date: 1/18/17 + 1/19/17		FV/Min or FV/Hr		Smooth, Chatter, Heavy Chatter, Loss of Circulation		Grab, Discrete		Non, High, Med, Low		0.0029" to 0.017", No 40-200		0.017" to 0.079", No 10-40		0.079" to 0.19", No 4-10		VR, A, SA, SR, R, VR		0.19" to 0.75", 20mm to No 4		0.75" to 3"		VR, A, SA, SR, R, VR		0, 1, 2, 3, 4		Rk frags, Quartz, Feldspar, Dark mins		None, Slight, High		Yellow, Ochre, Red, Gray, Black						

Client: MDC

Project No.: 60516526

Site: B12

Surface geologic unit and expected subsurface geology

Logged by: Jim Brzezick

Drilling Co.: Cosco

Driller: Don Ortega / Arlen Little

Drilling Method: DMC

Drill Rig Model: 200 LC Mini Sonic

Log of Exploratory Boring

Well No. PC B12

Drill Pad Sketch Map

AECOM

Page 2 of 3

[illegible]

[illegible]

Drilling Progress							Geologic Description																												
Depth	Time	FID/PID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	Strat Log Sketch		Texture Grain size and other notes (structures, palaeocurrents, fossils, color)	Comments (drilling-induced deformation or homogenization, fossils, root casts, other pedogenic features, sedimentary facies, potential confining bed or high-permeability unit)									
																							LIMESTONES												
																							MUD	SAND	GRAVEL										
																							clay	silt	fine	med	coarse	gran	peb	cob	boul				
1	10:30						10 yr 4/4	-	T	-	10	85	5	SR	-	-	-	W	Q	-													ORGANIC TOP SOIL		
2							10 yr 4/6	-	T	-	15	40	5	SR	-	-	-	W	Q	-													10 yr 4/1 MOTTLED THROUGHOUT		
3							10 yr 6/4	-	-	-	10	90	T	SR	-	-	-	W	Q	-													GRADUAL COLOR CHANGE		
4																																			
5																																			
6							10 yr 4/4	-	-	-	15	30	55	SR	T	T	SA	P	Q	-													VERY COARSE SANDS		
7																																		TRACE PEBBLES THROUGHOUT	
8																																			
9							10 yr 7/3	-	T	-	15	10	10	SR	55	10	SA	P	Q	-															
10							10 yr 7/3	-	T	-	55	30	10	SR	T	5	SA	P	Q	-													COBBLE AT 9.75' 68mm		
11							10 yr 7/3	-	T	-	15	20	15	SR	40	10	SA	VP	Q	-													INTERBEDDED SANDS AND GRAVELS		
12							10 yr 7/3	-	T	-	20	65	10	SR	5	T	SA	MP	Q	-													PEBBLES THROUGHOUT		
13							10 yr 7/3	-	T	-	10	5	20	SR	45	20	SA	P	Q	-															
14							10 yr 7/3	-	-	-	20	65	10	SR	5	T	SA	MP	Q	-															
Date: 11/9/17		FV/Min or FV/Hr		Smooth, Chatter, Heavy Chatter, Loss of Circulation		Grab, Discrete		Non, High, Med, Low		0.0029" to 0.017", No 40-200		0.017" to 0.079", No 10-40		0.079" to 0.19", No 4-10		VR, A, SA, SR, R, VR		0.19" to 0.75", 20mm to No 4		0.75" to 3"		VR, A, SA, SR, R, VR		0, 1, 2, 3, 4		Rk frags, Quartz, Feldspar, Dark mins		None, Slight, High		Yellow, Ochre, Red, Gray, Black					

Log of Exploratory Boring

Well No. PC B14

Page 1 of 3

AECOM

Drill Pad Sketch Map

Client: MDEQ

Project No.: 60514528

Site: B14

Surface geologic unit and expected subsurface geology

Logged by: Jim Buzzell

Drilling Co.: CASCADE

Driller: Dan O'Mara

Drilling Method: JONIC

Drill Rig Model: 200LC Mini Sonic

[illegible]

Drilling Progress										Geologic Description															Strat Log Sketch	Texture	Comments				
Depth	Time	FID/PIID at surface casing (ppm)	Penetration rates/drilling observations	Rig Motion	Sample recovery, type	Sample Interval	Munsell Color Code	% Clay	% Silt	Plasticity of fines	% Fine Sand	% Medium Sand	% Coarse Sand	Roundness of Sand	% Fine Gravel	% Coarse Gravel	Roundness of Gravel	Degree of sorting	Sand Composition	Cementation / HCl reaction	Mineral staining/Redox	USCS Code (if required)	LIMESTONES	MUD	SAND	GRAVEL	Texture	Comments			
30	16:24				X		10YR 4/3	-	-	-	10	45	45	2 1/2	A	-	A	P	Q	-								- 0.5' FINE UP GRAVENS WITH DISCRETE TRANSITIONS - TRACE PEBBLES 5-10mm	16.00 Collected VAS PC B14 28-30FT		
31							10YR 4/3	-	5	-	10	65	20	2 1/2	T	-	A	P	R	Q	-							TRACE 5-9mm PEBBLES THROUGHOUT			
32																															
33							10YR 5/2	10	H	-	-	-	-	-	T	-	SA	W	-	-								TRACE PEBBLES 8-10mm			
34																															
35							10YR 5/2	45	15	H	-	-	-	-	T	-	SA	W	-	-								FEW PEBBLES 8-15mm THROUGHOUT			
36							10YR 5/2	85	10	H	-	-	-	-	5	T	SA	W	-	-								TRACE PEBBLES 30mm			
37																															
38							10YR 5/2	75	20	H	-	-	-	-	5	T	SA	W	-	-								Max 52mm AT 28.5'			
39																															
40																															
41																															
42																															
43																															
Date: 1/19/17		Fu/Min or Fu/Hr		Smooth, Chatter, Heavy Chatter, Loss of Circulation		Grab, Discrete		Non, High, Med, Low		0.0029" to 0.017", No 40-200		0.017" to 0.079", No 10-40		0.079" to 0.19", No 4-10		VR, A, SA, SR, R, VR		0.19" to 0.75", 20mm to No 4		0.75" to 3"		VR, A, SA, SR, R, VR		0, 1, 2, 3, 4		RK frags, Quartz, Feldspar, Dark mins		None, Slight, High		Yellow, Ochre, Red, Gray, Black	
Client: MDEQ		Project No.: 60514524		Site: B14		Surface geologic unit and expected subsurface geology		Logged by: Jim Russell		Drilling Co.: CASCADE Drilling		Driller: Dan O'Brien		Drilling Method: Sonic		Drill Rig Model: Zoom Mini Sonic															

Appendix B

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 1	Date: 2/21/17	
Direction Photo Taken: N/A		
Description: PC B1: 0-5ft		

Photo No. 2	Date: 2/21/17	
Direction Photo Taken: N/A		
Description: PC B1: 5-10ft		

Project Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528

Photo No. 3	Date: 2/21/17	 A photograph of a soil sample, identified as PC B1 from 10-20ft depth. The soil is dark brown, clumpy, and appears to be a mix of silt and clay. It is piled on a wooden surface, possibly a pallet. A white card with handwritten text "PC B1 10-20" and a circled "5" is placed in the center of the pile. A black folder or clipboard is visible at the bottom of the frame.
Direction Photo Taken: N/A		
Description: PC B1: 10-20ft		

Photo No. 4	Date: 2/21/17	 A photograph of a soil sample, identified as PC B1 from 25-30ft depth. The soil is dark brown, clumpy, and appears to be a mix of silt and clay. It is piled on a wooden surface, possibly a pallet. A white card with handwritten text "PC B1 25-30" and a circled "5" is placed in the center of the pile. A black folder or clipboard is visible at the bottom of the frame.
Direction Photo Taken: N/A		
Description: PC B1: 25-30ft		

Project Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
5**Date:**
2/21/17**Direction Photo Taken:**

N/A

Description:

PC B1: 30-35ft

**Photo No.**
6**Date:**
2/21/17**Direction Photo Taken:**

N/A

Description:

PC B1: 35-45ft (1)



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 7	Date: 2/21/17	
Direction Photo Taken: N/A		
Description: PC B1: 35-45ft (2)		

Photo No. 8	Date: 2/21/17	
Direction Photo Taken: N/A		
Description: PC B1: 45-50ft		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 9	Date: 2/22/17	
Direction Photo Taken: N/A		
Description: PC B1: 55-60ft *No Recovery of sediments from 50-55ft		

Photo No. 10	Date: 2/22/17	
Direction Photo Taken: N/A		
Description: PC B1: 60-62ft		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
11

Date:
2/22/17

Direction Photo Taken:

N/A

Description:

PC B1: 62-65ft (1)



Photo No.
12

Date:
2/22/17

Direction Photo Taken:

N/A

Description:

PC B1: 62-65ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 13	Date: 2/22/17
Direction Photo Taken: N/A	
Description: PC B1: 65-67.5ft (1)	



Photo No. 14	Date: 2/22/17
Direction Photo Taken: N/A	
Description: PC B1: 65-67.5ft (2)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
15

Date:
2/22/17

Direction Photo Taken:

N/A

Description:

>100mm Cobble stuck in drill shoe, block core barrel from collection of sediments 67.5-75ft

PC B1: 67.5ft bgs



Photo No.
16

Date:
2/22/17

Direction Photo Taken:

N/A

Description:

PC B1: 75-80ft (1)

*No Recovery of sediments from 67.5-80ft bgs.



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
17

Date:
2/22/17

Direction Photo Taken:

N/A

Description:

PC B1: 75-80ft (2)



Photo No.
18

Date:
2/22/17

Direction Photo Taken:

N/A

Description:

PC B1: 75-80ft (3)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
19

Date:
2/22/17

Direction Photo Taken:

N/A

Description:

PC B1: 80-85ft (1)



Photo No.
20

Date:
2/22/17

Direction Photo Taken:

N/A

Description:

PC B1: 80-85ft (2)



Project Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
21**Date:**
2/22/17**Direction Photo Taken:**

N/A

Description:

PC B1: 80-85ft (3)

**Photo No.**
22**Date:**
2/23/17**Direction Photo Taken:**

N/A

Description:

PC B1: 85-90ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
23

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 85-90ft (2)



Photo No.
24

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 85-90ft (3)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
25

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 90-95ft (1)



Photo No.
26

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 90-95ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
27

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 90-95ft (3)



Photo No.
28

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

Clay with sand/Clay contact.

PC B1: 92ft bgs



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
29

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 95-100ft (1)



Photo No.
30

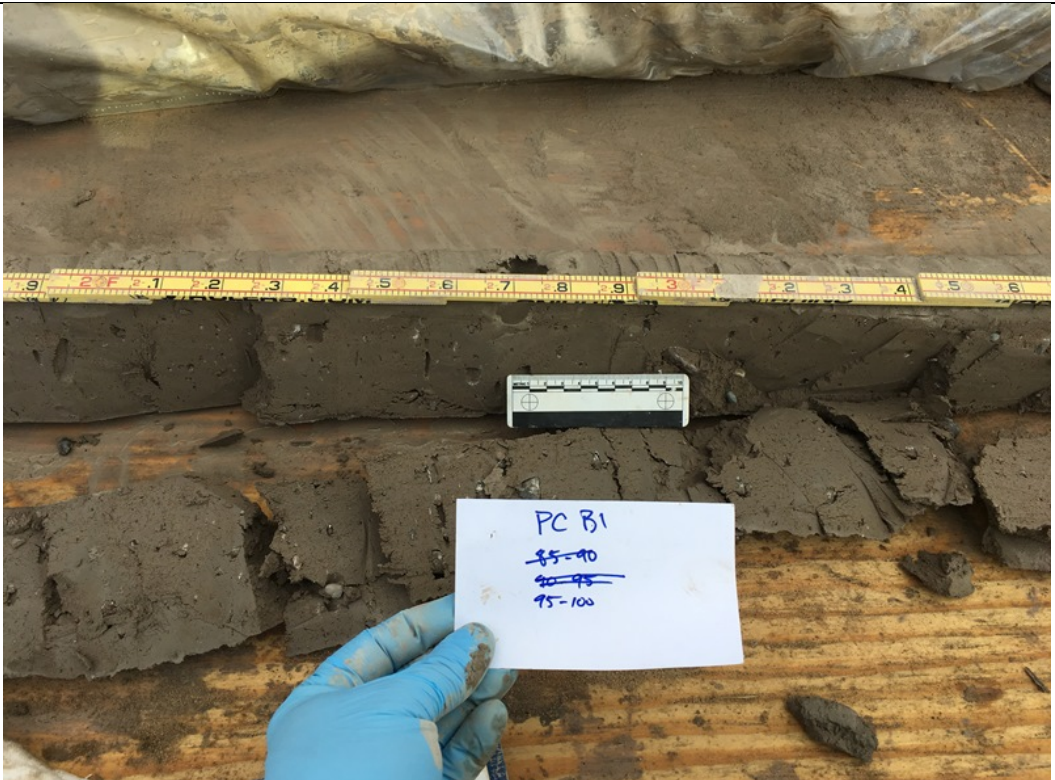
Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 95-100ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
31

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 95-100ft (3)



Photo No.
32

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 100-105ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 33	Date: 2/23/17	
Direction Photo Taken: N/A		
Description: PC B1: 100-105ft (2)		

Photo No. 34	Date: 2/23/17	
Direction Photo Taken: N/A		
Description: PC B1: 100-105ft (3)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
35

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 105-110ft (1)

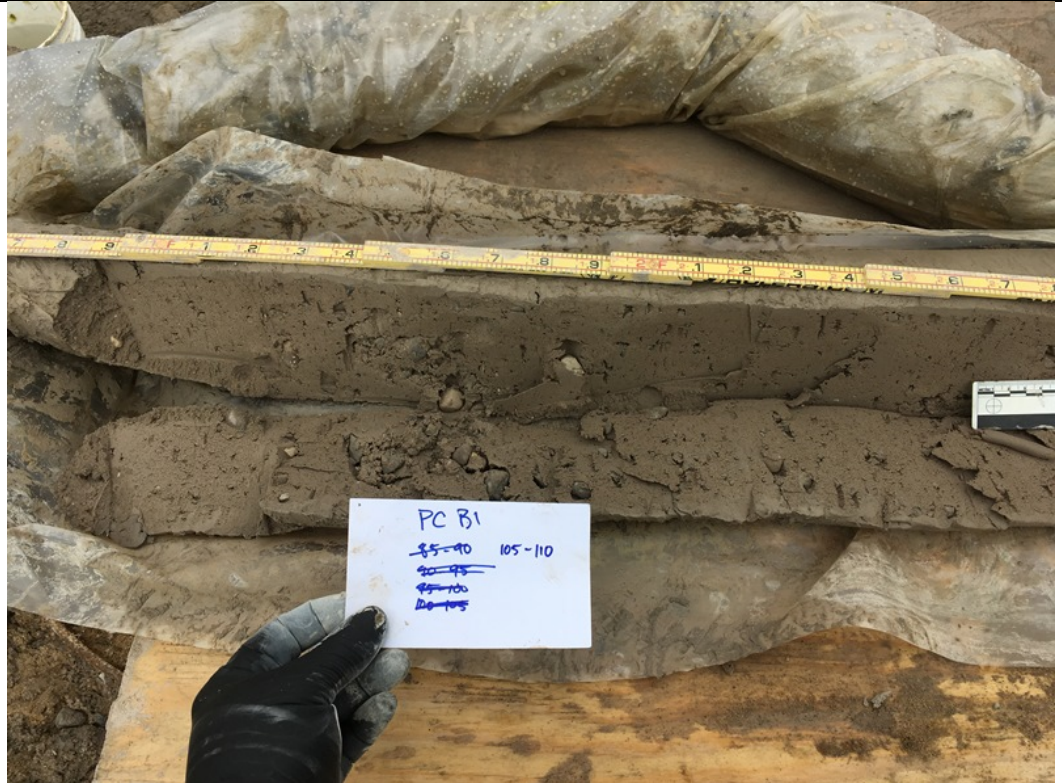


Photo No.
36

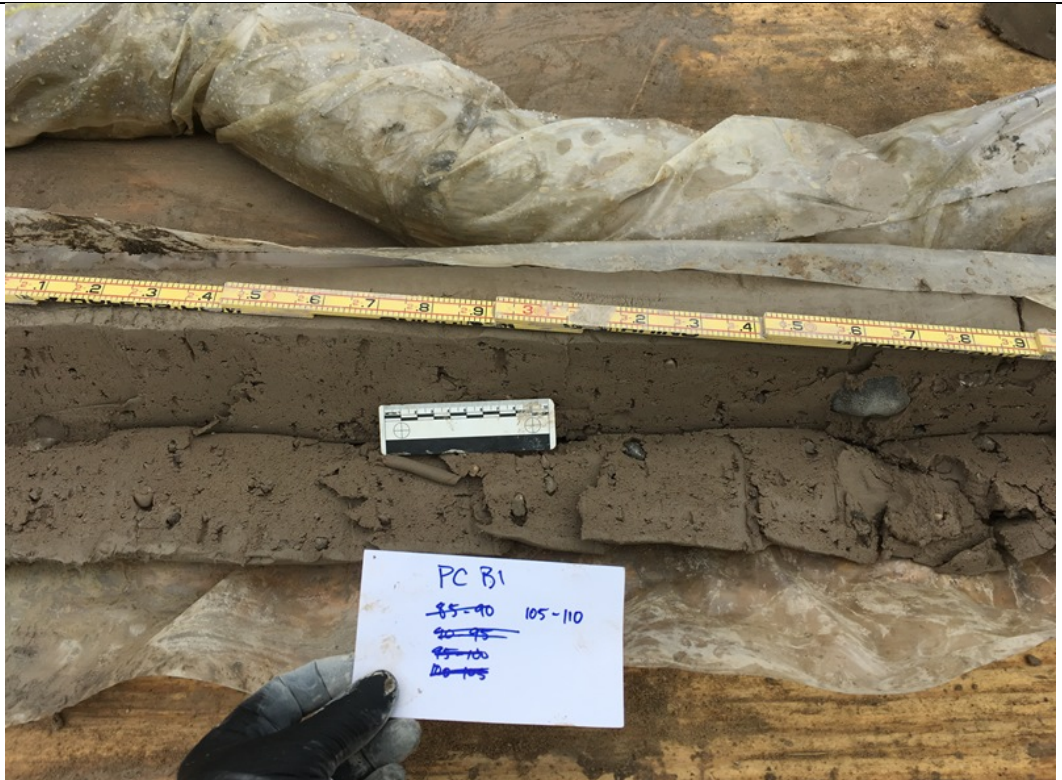
Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 105-110ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
37

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 105-110ft (3)



Photo No.
38

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 110-115ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 39	Date: 2/23/17	
Direction Photo Taken: N/A		
Description: PC B1: 110-115ft (2)		

Photo No. 40	Date: 2/23/17	
Direction Photo Taken: N/A		
Description: PC B1: 110-115ft (3)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
41

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

Thin bed of Silty Gravel

PC B1: 112ft bgs



Photo No.
42

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 115-120ft (1)



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 43	Date: 2/23/17	
Direction Photo Taken:		
N/A		
Description:		
PC B1: 115-120ft (2)		

Photo No. 44	Date: 2/23/17
Direction Photo Taken: N/A	
Description: PC B1: 115-120ft (3)	

A photograph showing a soil sample in a clear plastic bag. The bag is lying on a wooden surface. A yellow measuring tape is placed horizontally above the bag. A small white card with handwritten text "PC B1 115-120" is placed next to the bag. A red-handled tool is visible in the foreground. The background shows dry grass and soil.

Project Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
45**Date:**
2/23/17**Direction Photo Taken:**

N/A

Description:

PC B1: 120-125ft (1)

**Photo No.**
46**Date:**
2/23/17**Direction Photo Taken:**

N/A

Description:

PC B1: 120-125ft (2)

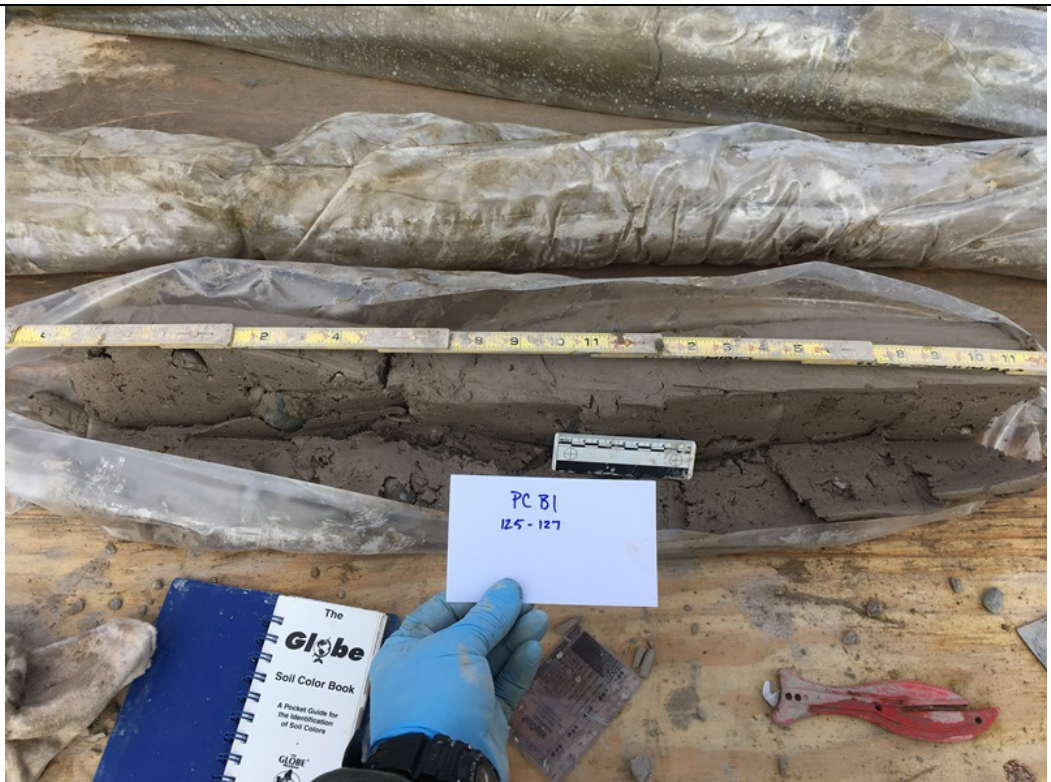


Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 47	Date: 2/23/17	
Direction Photo Taken: N/A		
Description: PC B1: 120-125ft (3)		

Photo No. 48	Date: 2/23/17	
Direction Photo Taken: N/A		
Description: PC B1: 125-127ft		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
49

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

Soft Clay/Clayey fine sand.

PC B1: 126ft bgs



Photo No.
50

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 127-130ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 51	Date: 2/23/17	
Direction Photo Taken: N/A		
Description: PC B1: 127-130ft (2)		

Photo No. 52	Date: 2/23/17	
Direction Photo Taken: N/A		
Description: PC B1: 130-135ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
53

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 130-135ft (2)

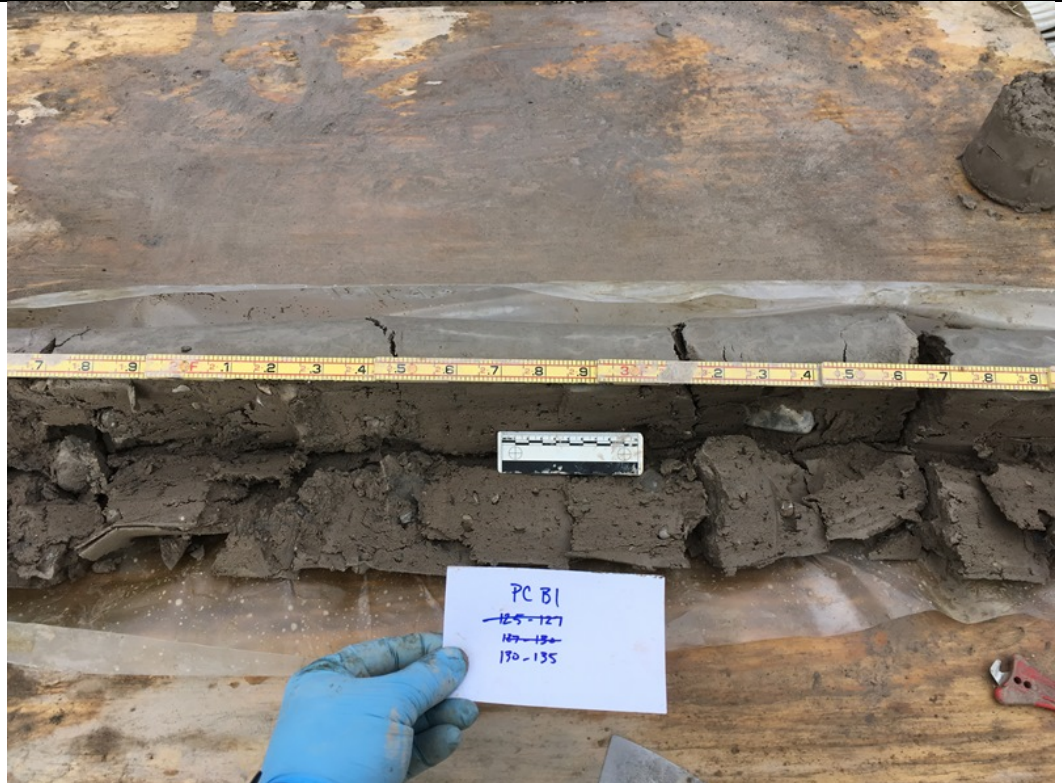


Photo No.
54

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 130-135ft (3)

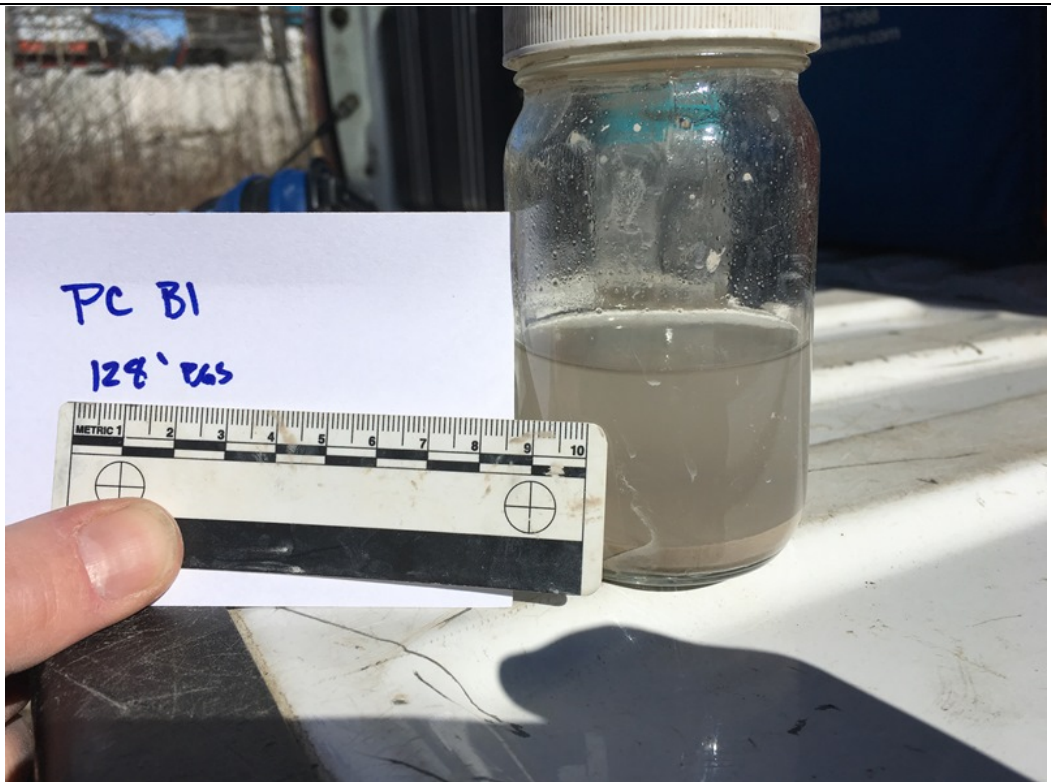


Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 55	Date: 2/23/17	
Direction Photo Taken: N/A		
Description: 10YR 4/1 staining PC B1: 131-131.5ft bgs		

Photo No. 56	Date: 2/23/17	
Direction Photo Taken: N/A		
Description: Sediment Settling Jar PC B1: 128ft bgs		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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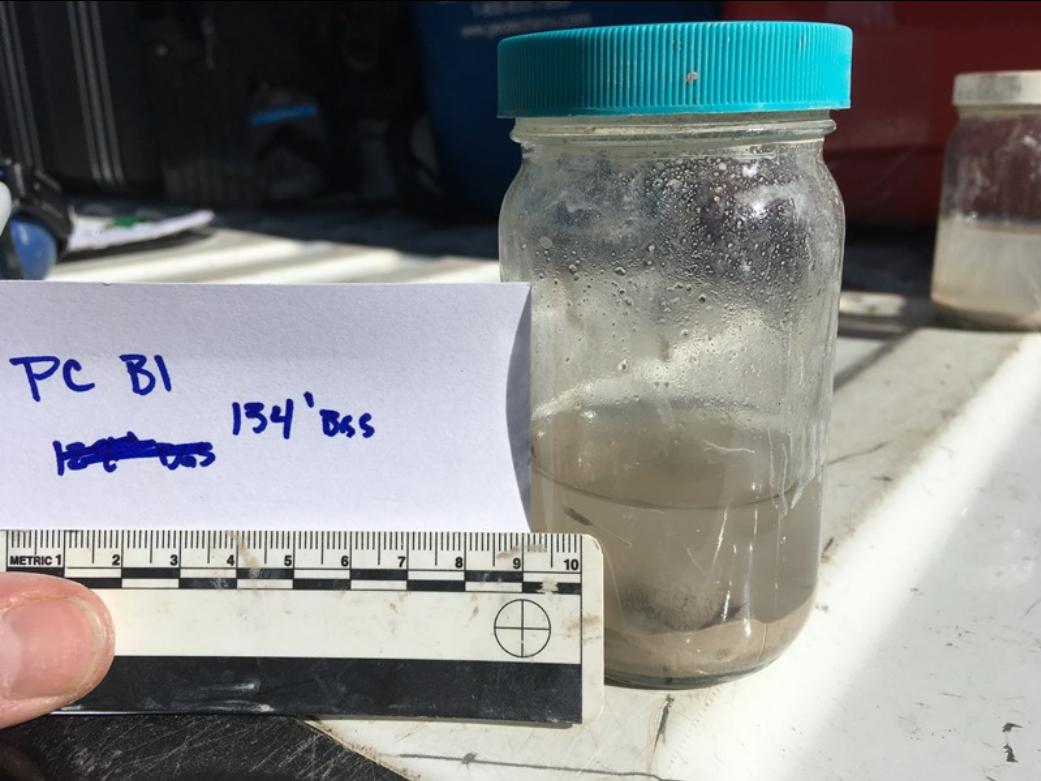
Photo No. 57	Date: 2/23/17	
Direction Photo Taken: N/A		
Description: Sediment Settling Jar PC B1: 134ft bgs		

Photo No. 58	Date: 2/23/17	
Direction Photo Taken: N/A		
Description: PC B1: 135-137.5ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
59

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 135-137.5ft (2)



Photo No.
60

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 137.5-142ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
61

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 137.5-142ft (2)



Photo No.
62

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 137.5-140ft (3)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
63

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 142-145ft (1)



Photo No.
64

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 142-145ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
65

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 142-145ft (3)



Photo No.
66

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

Cobbles/Boulders immediately above hard dry till.

PC B1: 143-144ft bgs



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
67

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 145-150ft (1)



Photo No.
68

Date:
2/23/17

Direction Photo Taken:

N/A

Description:

PC B1: 145-150ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
69

Date:
2/23/17

**Direction Photo
Taken:**

N/A

Description:

Stiff sandy till with pebbles
throughout.

PC B1: 147ft bgs



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 1	Date: 2/24/17	
Direction Photo Taken: N/A		
Description: PC B2: 0-5ft (1)		

Photo No. 2	Date: 2/24/17	
Direction Photo Taken: N/A		
Description: PC B2: 0-5ft (2)		

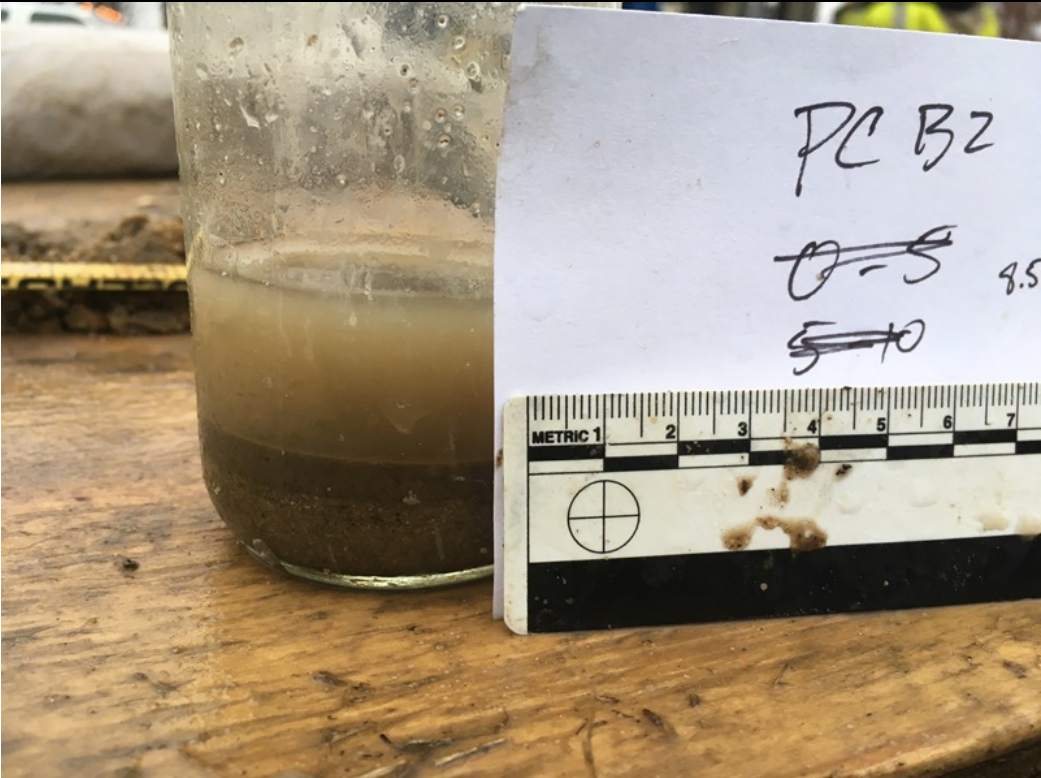
Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 3	Date: 2/24/17	
Direction Photo Taken: N/A		
Description: PC B2: 5-10ft (1)		

Photo No. 4	Date: 2/24/17	
Direction Photo Taken: N/A		
Description: PC B2: 5-10ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 5	Date: 2/24/17	
Direction Photo Taken: N/A		
Description: PC B2: 5-10ft (3)		

Photo No. 6	Date: 2/24/17	
Direction Photo Taken: N/A		
Description: Sediment settling jar - PC B2: 8.5ft		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 7	Date: 2/24/17	
Direction Photo Taken: N/A		
Description: PC B2: 10-15ft (1)		

Photo No. 8	Date: 2/24/17	
Direction Photo Taken: N/A		
Description: PC B2: 10-15ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 9	Date: 2/24/17	
Direction Photo Taken: N/A		
Description: PC B2: 10-15ft (3)		

Photo No. 10	Date: 2/24/17	
Direction Photo Taken: N/A		
Description: PC B2: 15-20ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
11

Date:
2/24/17

Direction Photo Taken:

N/A

Description:

PC B2: 15-20ft (2)



Photo No.
12

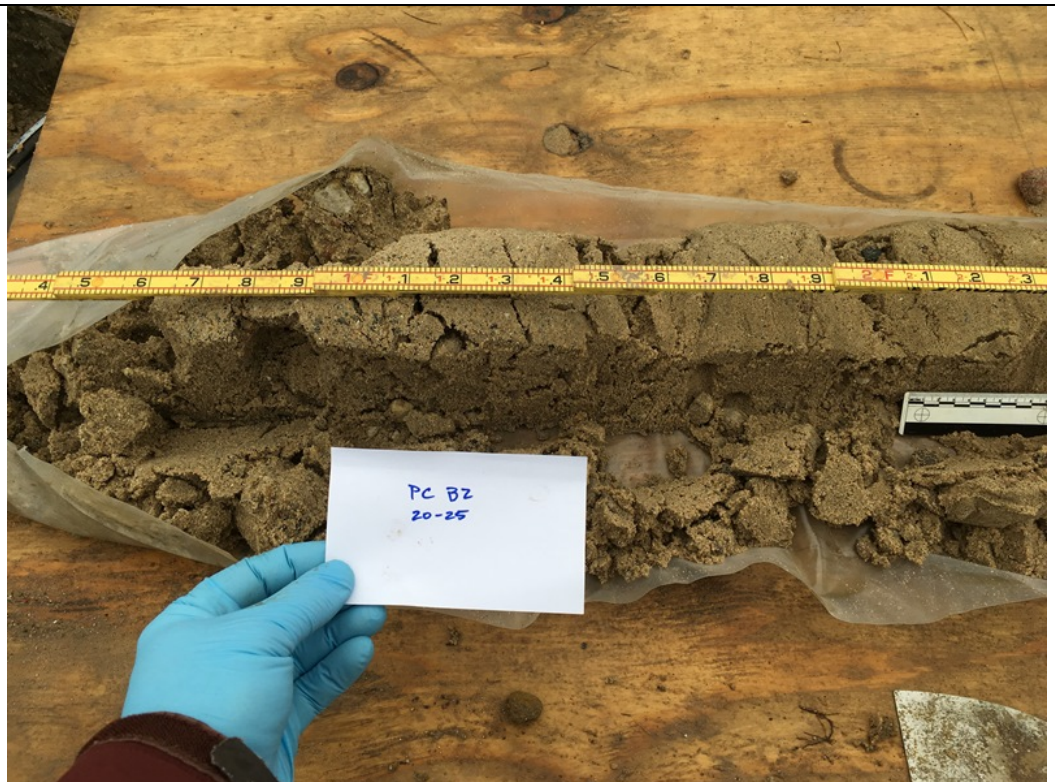
Date:
2/24/17

Direction Photo Taken:

N/A

Description:

PC B2: 20-25ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
13

Date:
2/24/17

Direction Photo Taken:

N/A

Description:

PC B2: 20-25ft (2)



Photo No.
14

Date:
2/24/17

Direction Photo Taken:

N/A

Description:

Sediment Settling Jar -
PC B2: 21.5ft bgs



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 15	Date: 2/24/17
Direction Photo Taken: N/A	
Description: Sediment Settling Jar - PC B2: 24ft bgs	

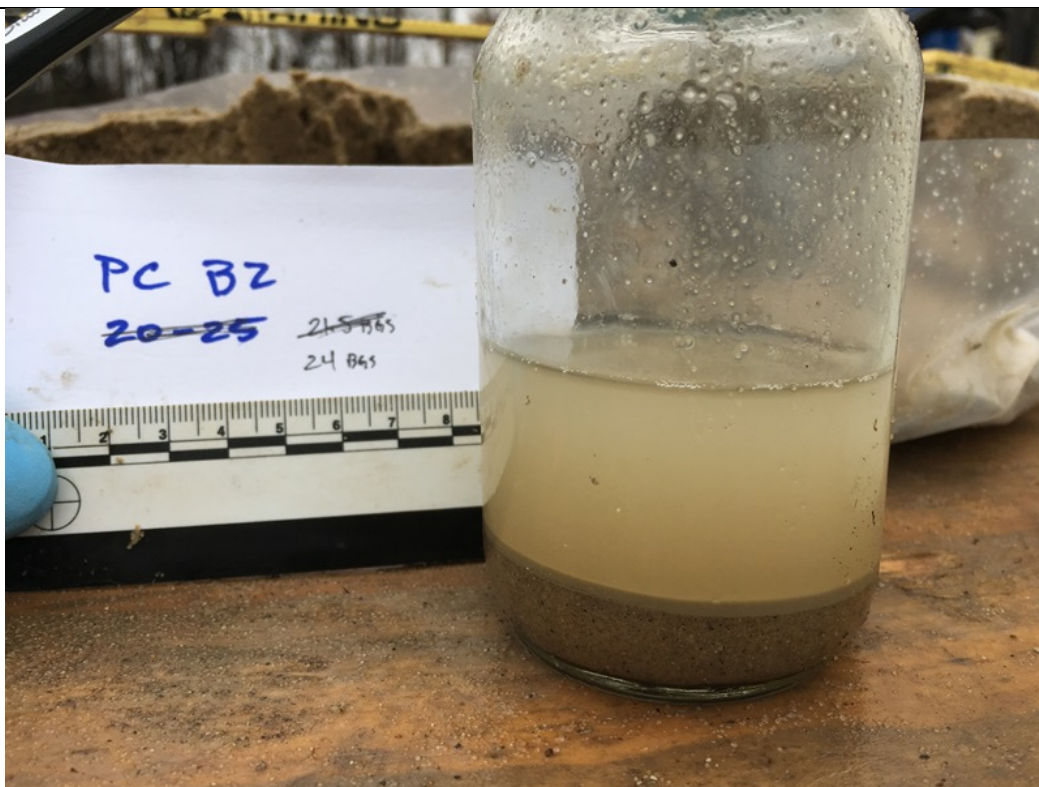


Photo No. 16	Date: 2/27/17
Direction Photo Taken: N/A	
Description: PC B2: 25-30ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 17	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 25-30ft (2)		

Photo No. 18	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 25-30ft (3)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 19	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 30-35ft (1)		

Photo No. 20	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 30-35ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 21	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 35ft bgs – Sand/Clay Contact		

Photo No. 22	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 35-40ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 23	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 35-40ft (2)		

Photo No. 24	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 35-40ft (3)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
25

Date:
2/27/17

Direction Photo Taken:

N/A

Description:

PC B2: 35ft Clean Fat Clay



Photo No.
26

Date:
2/27/17

Direction Photo Taken:

N/A

Description:

PC B2: 40-45ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 27	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 40-45ft (2)		

Photo No. 28	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 40-45ft (3)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
29

Date:
2/27/17

Direction Photo Taken:

N/A

Description:

PC B2: 43ft - Sandy Clay with pebbles



Photo No.
30

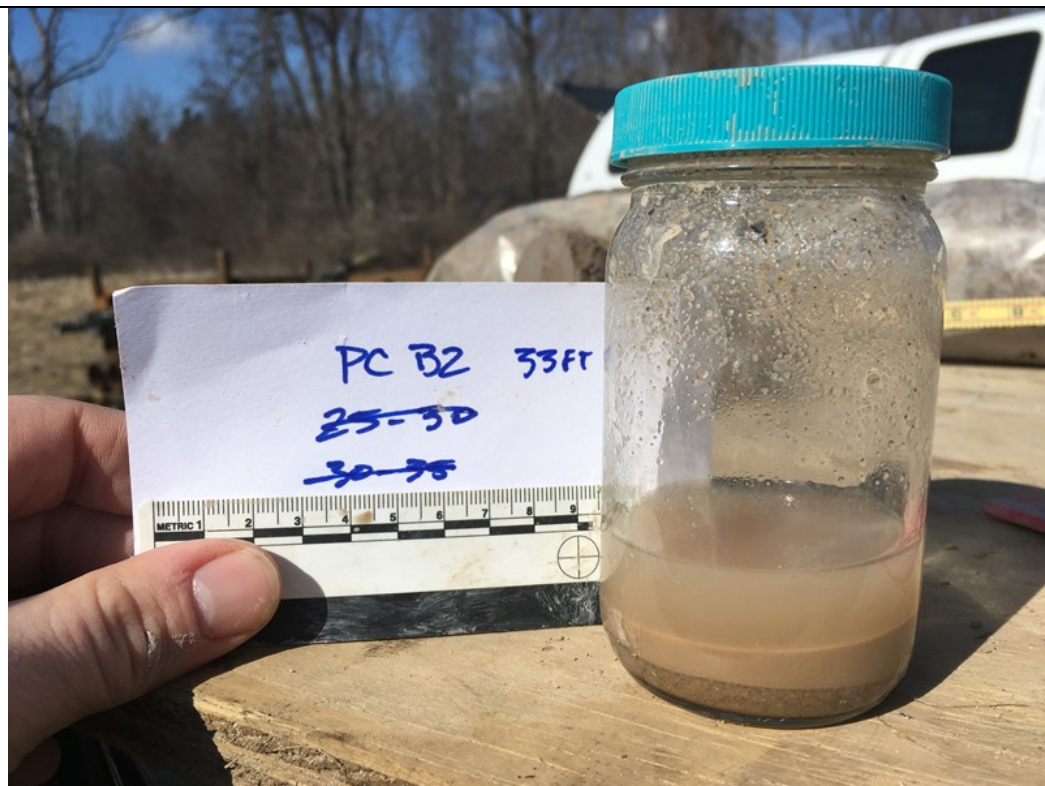
Date:
2/27/17

Direction Photo Taken:

N/A

Description:

Sediment Settling Jar -
PC B2: 33ft



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 31	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 45-50ft (1)		

Photo No. 32	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 45-50ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 33	Date: 2/27/17	
Direction Photo Taken: N/A		
Description: PC B2: 45-50ft (3)		



PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528



PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
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PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

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Project Name:
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PHOTOGRAPH LOG

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PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

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Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 1	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 0-5ft (1)		

Photo No. 2	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 0-5ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
3

Date:
2/28/17

Direction Photo Taken:

N/A

Description:

PC B3: 5-10ft (1)



Photo No.
4

Date:
2/28/17

Direction Photo Taken:

N/A

Description:

PC B3: 5-10ft (2)



Project Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528

Photo No. 5	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 5-10ft (3)		

Photo No. 6	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 9ft bgs – Sand/Clay Contact		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 7	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 10-15ft (1)		

Photo No. 8	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 10-15ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 9	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 10-15ft (3)		

Photo No. 10	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 15ft bgs – Shells in lacustrine clay		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
11

Date:
2/28/17

Direction Photo Taken:

N/A

Description:

PC B3: 15-20ft (1)



Photo No.
12

Date:
2/28/17

Direction Photo Taken:

N/A

Description:

PC B3: 15-20ft (2)



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 13	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 15-20ft (3)		

Photo No. 14	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 19.2ft bgs Clay/Sand contact		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 15	Date: 2/28/17
Direction Photo Taken: N/A	
Description: Sediment Settling Jar - PC B3: 19.5ft bgs	

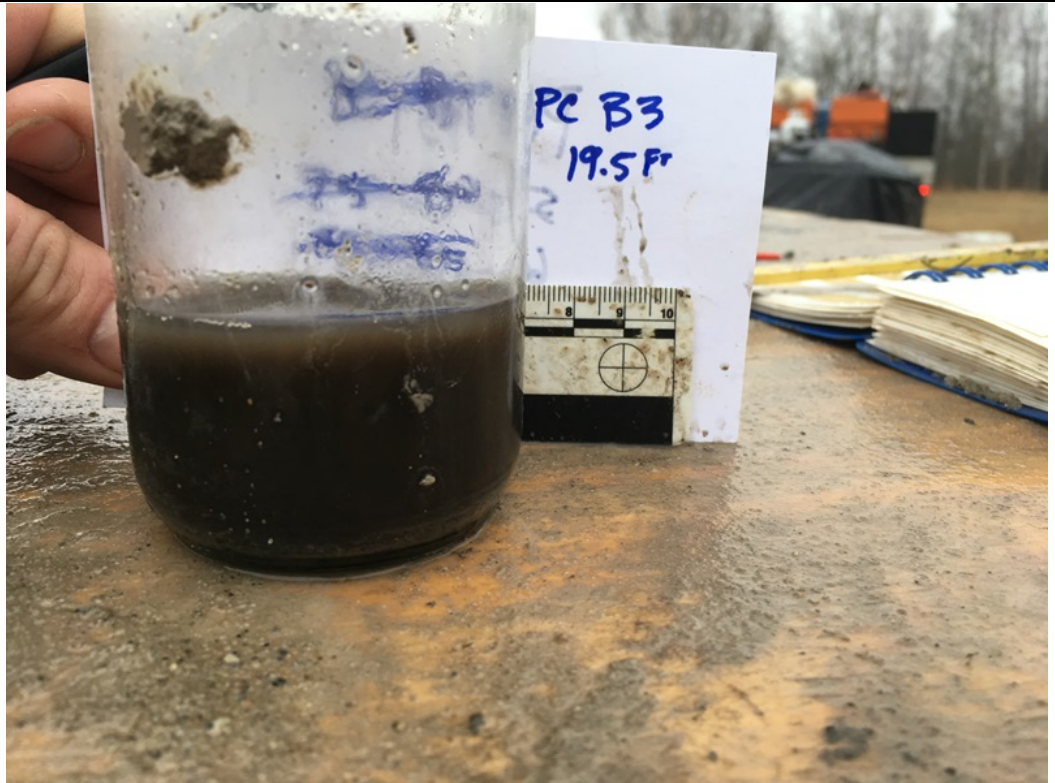


Photo No. 16	Date: 2/28/17
Direction Photo Taken: N/A	
Description: PC B3: 23-25ft (No Recovery: 20-23ft)	



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 17	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 25-30ft (1)		

Photo No. 18	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3:25-30ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 19	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 25-30ft (3)		

Photo No. 20	Date: 2/28/17	
Direction Photo Taken: N/A		
Description: PC B3: 30-35ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
21

Date:
2/28/17

Direction Photo Taken:

N/A

Description:

PC B3: 30-35ft (2)



Photo No.
22

Date:
2/28/17

Direction Photo Taken:

N/A

Description:

PC B3: 30-35ft (3)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
23

Date:
2/28/17

Direction Photo Taken:

N/A

Description:

PC B3: 35-40ft(1)



Photo No.
24

Date:
2/28/17

Direction Photo Taken:

N/A

Description:

PC B3: 35-40ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
25

Date:
2/28/17

Direction Photo Taken:

N/A

Description:

Sediment Settling Jar
PC B3: 32.5ft bgs

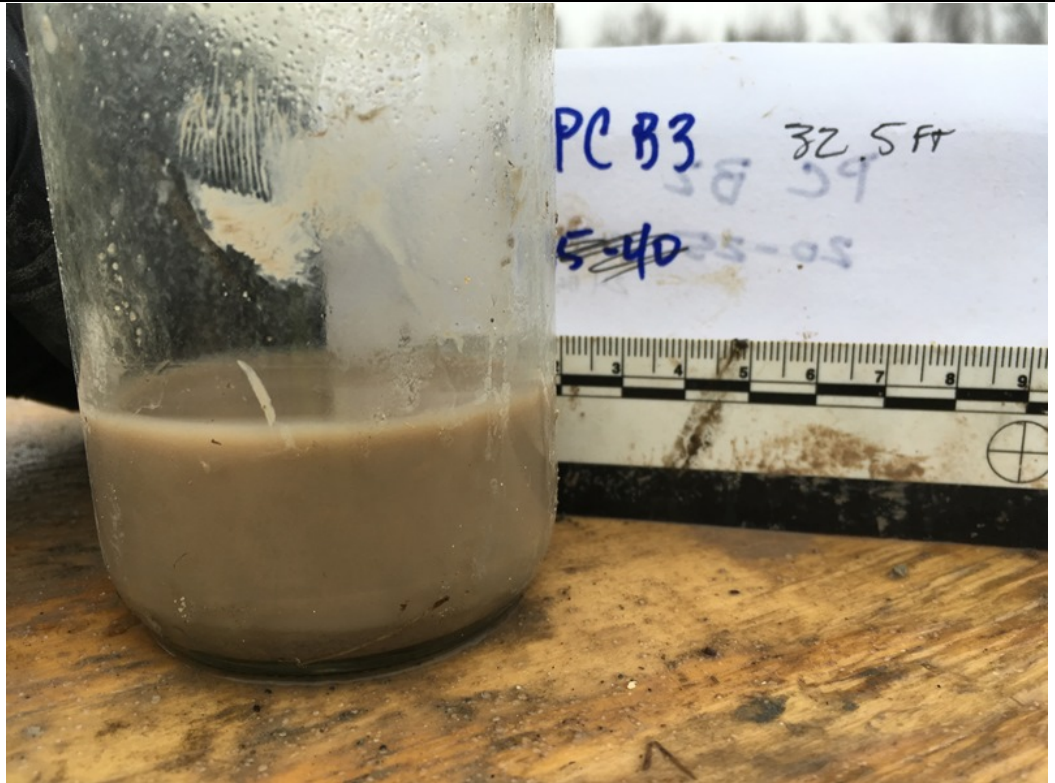


Photo No.
26

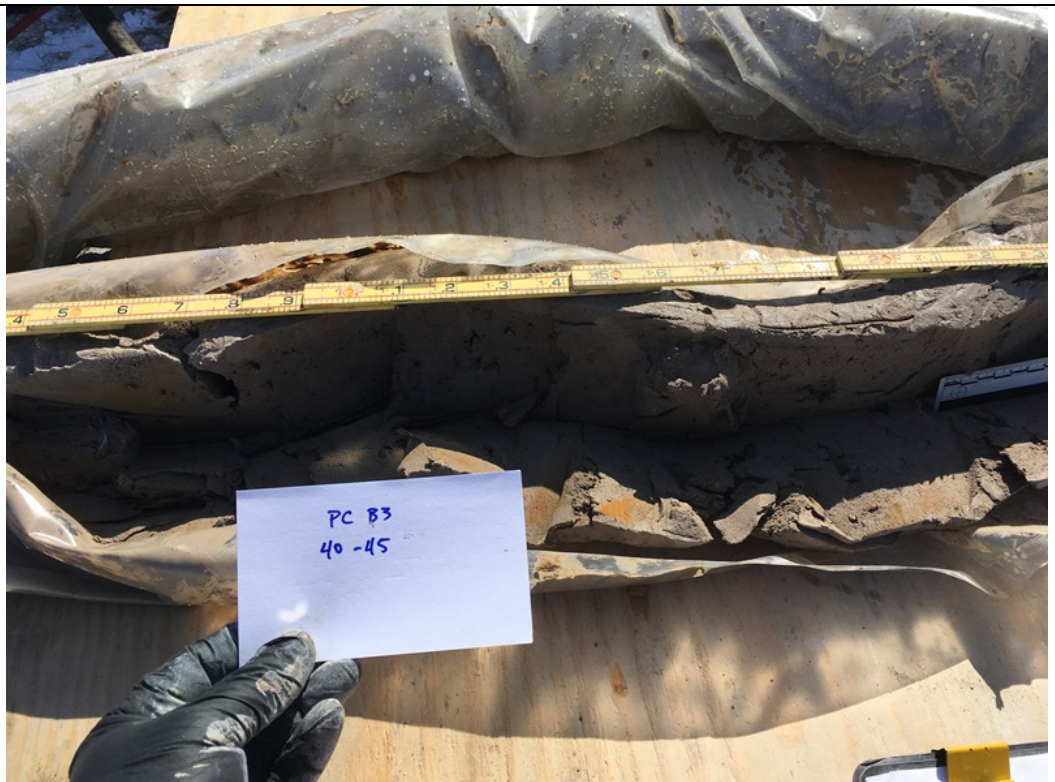
Date:
3/02/17

Direction Photo Taken:

N/A

Description:

PC B3: 40-45ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 27	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 40-45ft (1)		

Photo No. 28	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 40-45ft (3)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 29	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 45-50ft (1)		

Photo No. 30	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 45-50ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
31

Date:
3/02/17

Direction Photo Taken:

N/A

Description:

PC B3: 45-50ft (3)



Photo No.
32

Date:
3/02/17

Direction Photo Taken:

N/A

Description:

PC B3: 50-55ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 33	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 50-55ft (2)		

Photo No. 34	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 55-60ft (1)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 35	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 55-60ft (2)		

Photo No. 36	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 60-65ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 37	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 60-65ft (2)		

Photo No. 38	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 60-65ft (3)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 39	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 65-70ft (1)		

Photo No. 40	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 65-70ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 41	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 70-75ft (1)		

Photo No. 42	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 70-75ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 43	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 70-75ft (3)		

Photo No. 44	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 75-80ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
45

Date:
3/02/17

Direction Photo Taken:

N/A

Description:

PC B3: 75-80ft (2)



Photo No.
46

Date:
3/02/17

Direction Photo Taken:

N/A

Description:

PC B3: 80-85ft (1)



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 47	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 80-85ft (2)		

Photo No. 48	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 85-90ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 49	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 85-90ft (2)		

Photo No. 50	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 90-95ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 51	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 90-95ft (2)		

Photo No. 52	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 90-95ft (3)		


Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 53	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 95-100ft (1)		

Photo No. 54	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 95-100ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 55	Date: 3/02/17	
Direction Photo Taken: N/A		
Description: PC B3: 95-100ft (3)		

Photo No. 56	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 100-105ft (1)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
--	-------------------------------------	--------------------------------

Photo No. 57	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 100-105ft (2)		

Photo No. 58	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 100-105ft (3)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 59	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 105-110ft (1)		

Photo No. 60	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 105-110ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 61	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 105-110ft (3)		

Photo No. 62	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 110-115ft (1)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
--	-------------------------------------	--------------------------------

Photo No. 63	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: Soft Fat Clay/Soft Sandy Clay Contact PC B3: 112.5ft bgs		

Photo No. 64	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 110-115ft (3)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 65	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 115-120ft (1)		

Photo No. 66	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 115-120ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 67	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 115-120ft (3)		

Photo No. 68	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 120-125ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 69	Date: 3/03/17
Direction Photo Taken: N/A	
Description: PC B3: 120-125ft (2)	



Photo No. 70	Date: 3/03/17
Direction Photo Taken: N/A	
Description: PC B3: 125-130ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
71

Date:
3/03/17

Direction Photo Taken:

N/A

Description:

PC B3: 125-130ft (2)



Photo No.
72

Date:
3/03/17

Direction Photo Taken:

N/A

Description:

PC B3: 130-135ft (1)



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 73	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 130-135ft (2)		

Photo No. 74	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 135-140ft (1)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 75	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 135-140ft (2)		

Photo No. 76	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 140-145ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 77	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 140-145ft (2)		

Photo No. 78	Date: 3/03/17	
Direction Photo Taken: N/A		
Description: PC B3: 145-150ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
79

Date:
3/03/17

Direction Photo Taken:

N/A

Description:

PC B3: 145-150ft (2)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
1

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 0-2ft



Photo No.
2

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 7.5-10ft (1)

*No Recovery 2-7.5ft



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528

Photo No. 3	Date: 02/06/17
Direction Photo Taken: N/A	
Description: PC B5: 7.5-10ft (2)	



Photo No. 4	Date: 02/06/17
Direction Photo Taken: N/A	
Description: PC B5: 10-13ft (1)	



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 5	Date: 02/06/17	
Direction Photo Taken: N/A		
Description: PC B5: 10-13ft (2)		

Photo No. 6	Date: 02/06/17	
Direction Photo Taken: N/A		
Description: PC B5: 13-16ft (1)		

Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
7**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 13-16ft (2)

**Photo No.**
8**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 16-20ft (1)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
9**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 16-20ft (2)

**Photo No.**
10**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 16-20ft (3)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
11

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 20-23ft (1)



Photo No.
12

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 20-23ft (2)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
13**Date:**
02/06/17**Direction Photo
Taken:****Description:**

PC B5: 20-23ft (3)

**Photo No.**
14**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 23-26.5ft (1)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
15**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 23-26.5ft (2)

**Photo No.**
16**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 23-26.5ft (3)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
17

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 26.5-30ft (1)



Photo No.
18

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 26.5-30ft (2)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
19

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 26.5-30ft (3)



Photo No.
20

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 30-33.5ft (1)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
21**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 30-33.5ft (2)

**Photo No.**
22**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 30-33.5ft (3)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
23

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 33.5-37ft (1)



Photo No.
24

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 33.5-37ft (2)



Facility Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 25	Date: 02/06/17	
Direction Photo Taken:		
N/A		
Description:		
PC B5: 33.5-37ft (3)		

Photo No. 26	Date: 02/06/17	
Direction Photo Taken:		
N/A		
Description:		
PC B5: 37-40ft (1)		

Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
27**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 37-40ft (2)

**Photo No.**
28**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 40-43.5ft (1)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
29

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 40-43.5ft (2)



Photo No.
30

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5:43.5-46.5ft (1)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
31**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 43.5-46.5ft (2)

**Photo No.**
32**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 46.5-50ft (1)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
33

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 46.5-50ft (2)

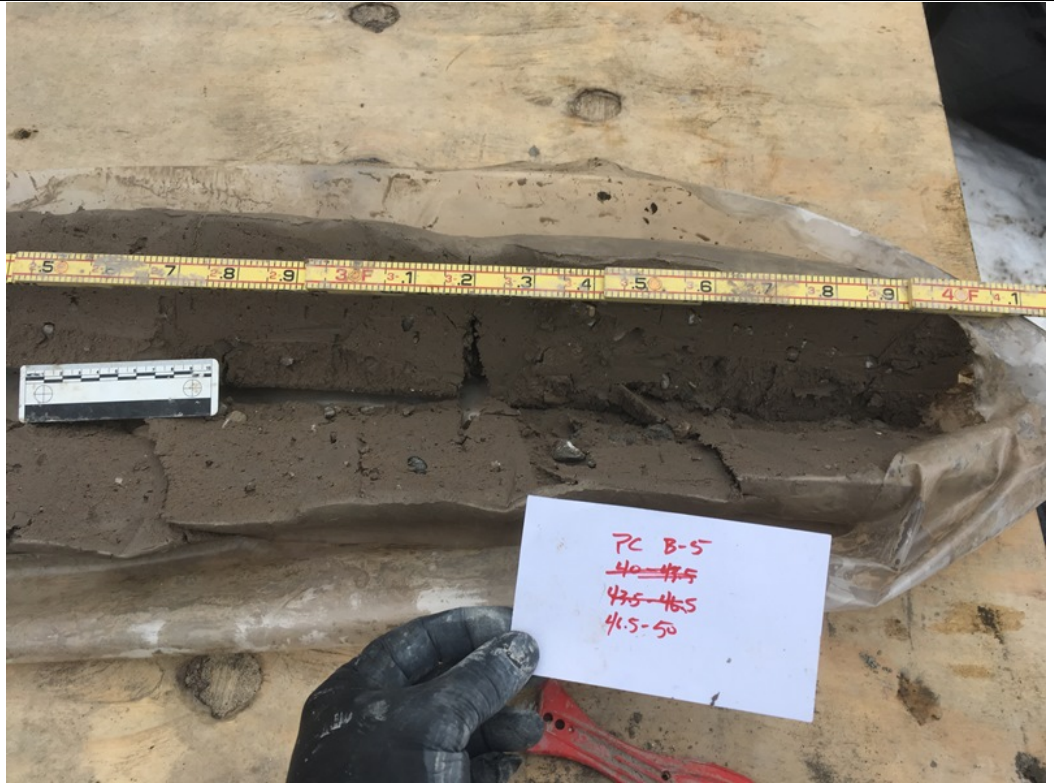


Photo No.
34

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 50-53ft (1)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
35

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 50-53ft (2)

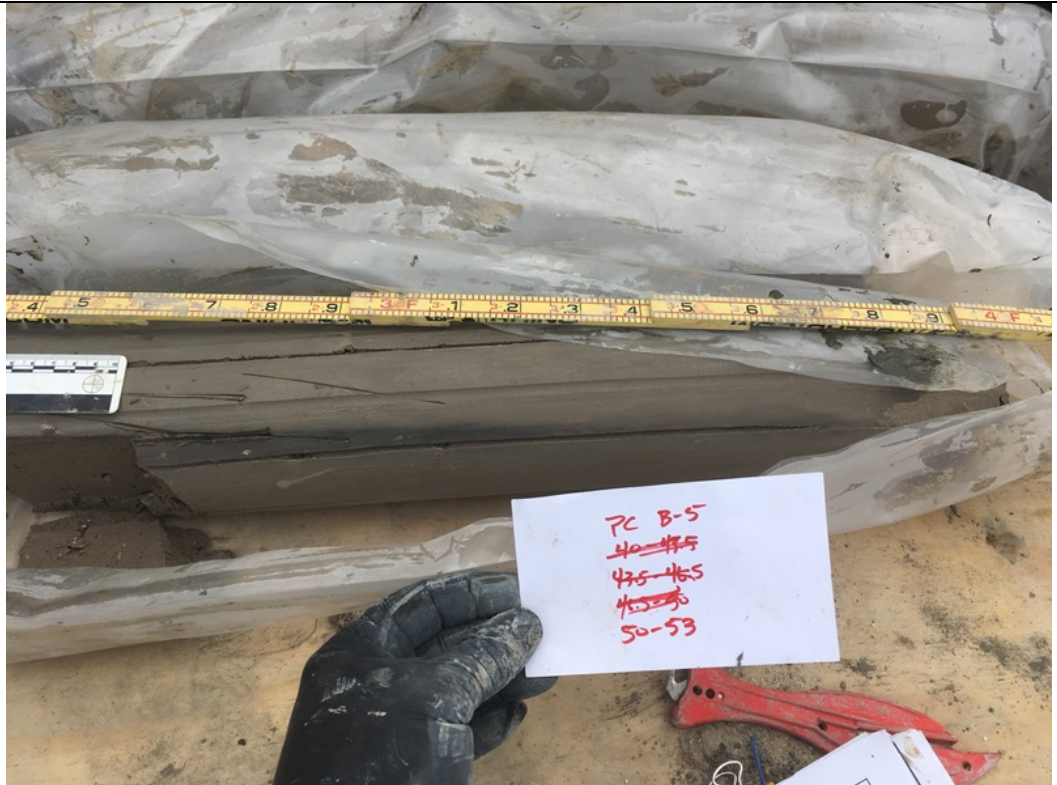


Photo No.
36

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 53-56ft (1)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
37**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 53-56ft (2)

**Photo No.**
38**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 56-60ft (1)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
39**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 56-60ft(2)

**Photo No.**
40**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 56-60ft (3)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
41**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 60-64ft (1)

**Photo No.**
42**Date:**
02/06/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 60-64ft (2)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528

Photo No. 43	Date: 02/06/17	
Direction Photo Taken: N/A		
Description: PC B5: 64-67ft (1)		

Photo No. 44	Date: 02/06/17	
Direction Photo Taken: N/A		
Description: PC B5: 64-67ft (2)		

Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
45

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 64-67ft (3)



Photo No.
46

Date:
02/06/17

Direction Photo Taken:

N/A

Description:

PC B5: 67-70ft (1)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
47**Date:**
02/06/17**Direction Photo Taken:**

N/A

Description:

PC B5: 67-70ft (2)

**Photo No.**
48**Date:**
02/06/17**Direction Photo Taken:**

N/A

Description:

PC B5: 67-70ft (3)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
49**Date:**
02/07/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 70-72.5ft (1)

**Photo No.**
50**Date:**
02/07/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 70-72.5ft (2)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
51

Date:
02/07/17

Direction Photo Taken:

N/A

Description:

PC B5: 72.5-76ft (1)



Photo No.
52

Date:
02/07/17

Direction Photo Taken:

N/A

Description:

PC B5: 72.6-76ft (2)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
53

Date:
02/07/17

Direction Photo Taken:

N/A

Description:

PC B5: 76-80ft (1)



Photo No.
54

Date:
02/07/17

Direction Photo Taken:

N/A

Description:

PC B5: 76-80ft (2)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
55**Date:**
02/07/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 76-80ft (3)

**Photo No.**
56**Date:**
02/07/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 80-84ft (1)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528

Photo No. 57	Date: 02/07/17	
Direction Photo Taken: N/A		
Description: PC B5: 80-84ft (2)		

Photo No. 58	Date: 02/07/17	
Direction Photo Taken: N/A		
Description: PC B5: 80-84ft (3)		

Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
59**Date:**
02/07/17**Direction Photo**
Taken:

N/A

Description:

PC B5: 84-87.5ft (1)

**Photo No.**
60**Date:**
02/07/17**Direction Photo**
Taken:

N/A

Description:

PC B5: 84-87.5ft (2)



Facility Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 61	Date: 02/07/17	
Direction Photo Taken: N/A		
Description: PC B5: 84-87.5ft (3)		

Photo No. 62	Date: 02/07/17	
Direction Photo Taken: N/A		
Description: PC B5: 87.5-90ft (1)		

Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
63

Date:
02/07/17

Direction Photo Taken:

N/A

Description:

PC B5: 87.5-90ft (2)



Photo No.
64

Date:
02/08/17

Direction Photo Taken:

N/A

Description:

PC B5: 90-93.5ft (1)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
65

Date:
02/08/17

Direction Photo Taken:

N/A

Description:

PC B5: 90-93.5ft (2)

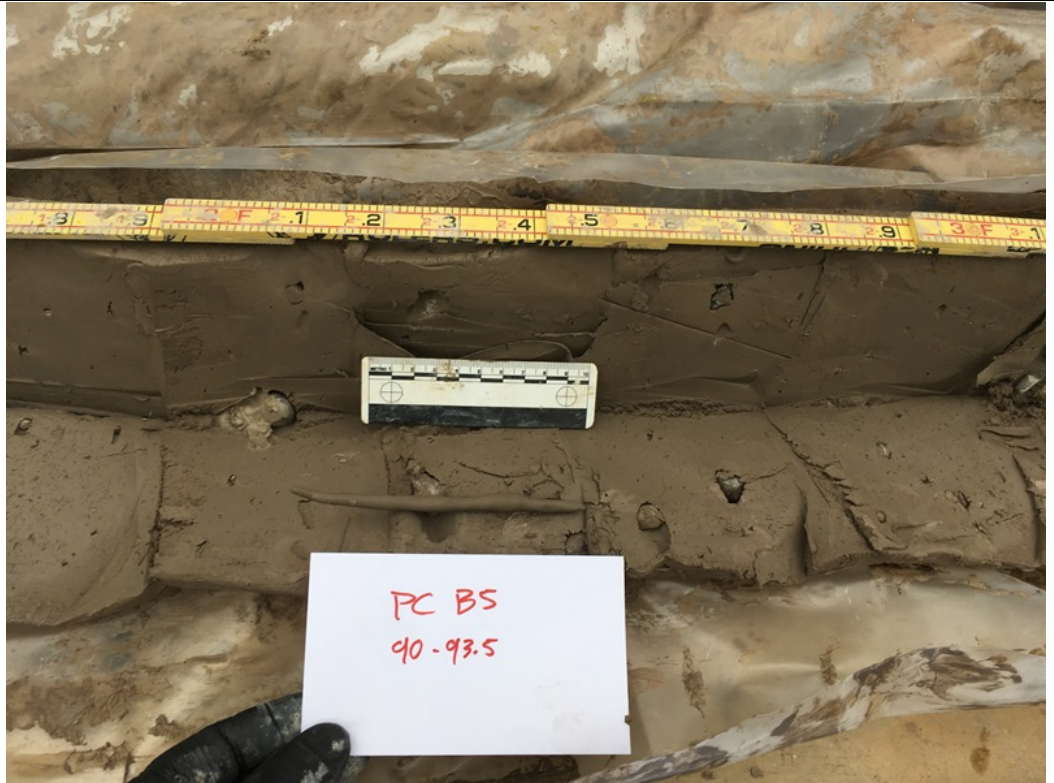


Photo No.
66

Date:
02/08/17

Direction Photo Taken:

N/A

Description:

PC B5: 90-93.5ft (3)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
67

Date:
02/08/17

Direction Photo Taken:

N/A

Description:

PC B5: 93.5-96.5ft (1)



Photo No.
68

Date:
02/08/17

Direction Photo Taken:

N/A

Description:

PC B5: 93.5-96.5ft (2)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
69

Date:
02/08/17

Direction Photo Taken:

N/A

Description:

PC B5: 93.5-96.5ft (3)



Photo No.
70

Date:
02/08/17

Direction Photo Taken:

N/A

Description:

PC B5: 96.5-100ft (1)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
71

Date:
02/08/17

**Direction Photo
Taken:**

N/A

Description:

PC B5: 96.5-100ft (2)



Photo No.
72

Date:
02/08/17

**Direction Photo
Taken:**

N/A

Description:

PC B5: 96.5-100ft (3)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
73

Date:
02/08/17

Direction Photo Taken:

N/A

Description:

PC B5: 100-102ft



Photo No.
74

Date:
02/08/17

Direction Photo Taken:

N/A

Description:

PC B5: 102-105.5ft (1)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
75**Date:**
02/08/17**Direction Photo
Taken:**

N/A

Description:

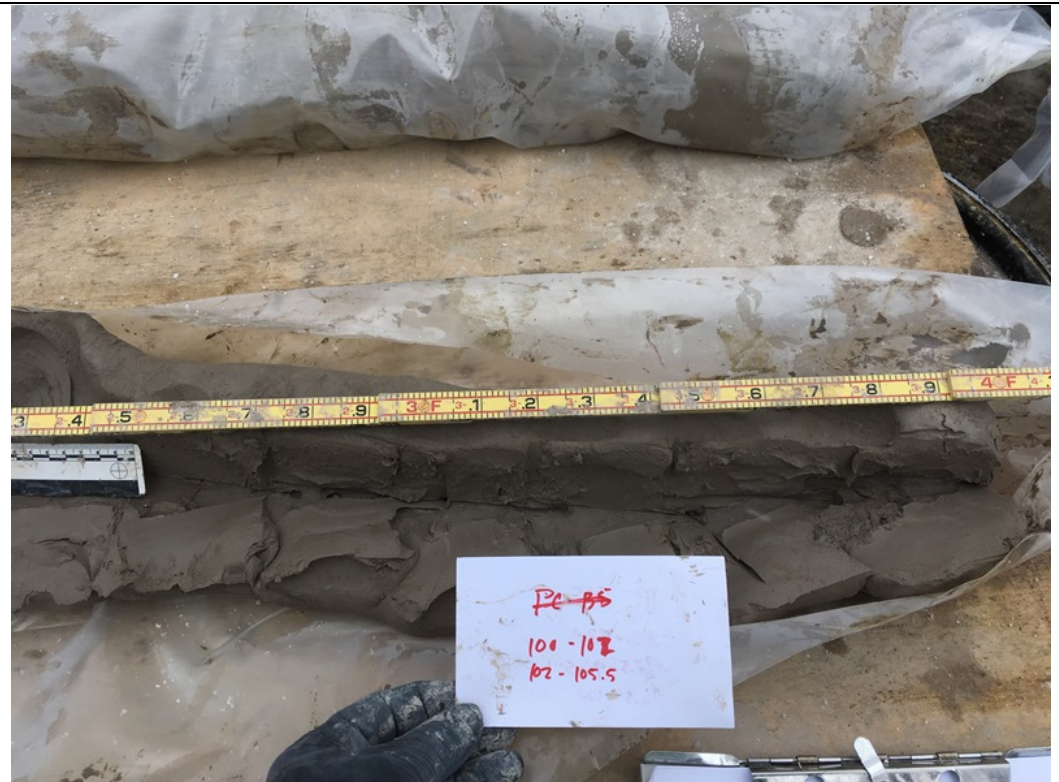
PC B5: 102-105.5ft (2)

**Photo No.**
76**Date:**
02/08/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 102-105.5ft (3)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
77

Date:
02/08/17

**Direction Photo
Taken:**

N/A

Description:

PC B5: 105.5-110ft (1)

*Card shown in photo is
incorrect.



Photo No.
78

Date:
02/08/17

**Direction Photo
Taken:**

N/A

Description:

PC B5: 105.5-110ft (2)

*Card shown in photo is
incorrect



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
79

Date:
02/08/17

**Direction Photo
Taken:**

N/A

Description:

Clay/Fine Clayey Sand
Contact
PC B5: 110ft bgs

*Card shown in photo is
incorrect.



Photo No.
80

Date:
02/08/17

**Direction Photo
Taken:**

N/A

Description:

PC B5: 110-113ft (1)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
81

Date:
02/08/17

**Direction Photo
Taken:**

Description:

PC B5: 110-113ft (2)



Photo No.
82

Date:
02/08/17

**Direction Photo
Taken:**

N/A

Description:

PC B5: 113-116.5ft (1)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
83**Date:**
02/08/17**Direction Photo Taken:**

N/A

Description:

PC B5: 113-116.5ft (2)

**Photo No.**
84**Date:**
02/08/17**Direction Photo Taken:**

N/A

Description:

PC B5: 116.5-120ft (1)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528

Photo No. 85	Date: 02/08/17
Direction Photo Taken: N/A	
Description: PC B5: 116.5-120ft (2)	



Photo No. 86	Date: 02/08/17
Direction Photo Taken: N/A	
Description: PC B5: 120-124ft (1)	



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
87**Date:**
02/08/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 120-124ft (2)

**Photo No.**
88**Date:**
02/08/17**Direction Photo
Taken:**

N/A

Description:

PC B5:120-124ft (3)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 89	Date: 02/08/17
Direction Photo Taken: N/A	
Description: PC B5: 124-126ft	



Photo No. 90	Date: 02/08/17
Direction Photo Taken: N/A	
Description: PC B5: 126-130ft (1)	



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 91	Date: 02/08/17
Direction Photo Taken: N/A	
Description: PC B5: 126-103ft (2)	



Photo No. 92	Date: 02/08/17
Direction Photo Taken: N/A	
Description: PC B5: 126-130ft(3)	



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
93

Date:
02/13/17

Direction Photo Taken:

N/A

Description:

PC B5: 130-133.5ft (1)



Photo No.
94

Date:
02/13/17

Direction Photo Taken:

N/A

Description:

PC B5:130-133.5ft (2)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
95**Date:**
02/13/17**Direction Photo
Taken:****Description:**

PC B5: 133.5-137ft (1)

**Photo No.**
96**Date:**
02/13/17**Direction Photo
Taken:**

N/A

Description:

PC B5: 133.5-137ft (2)



Facility Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
97

Date:
02/13/17

Direction Photo Taken:

N/A

Description:

PC B5: 137-140ft (1)



Photo No.
98

Date:
02/13/17

Direction Photo Taken:

N/A

Description:

PC B5: 137-140ft(2)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
99**Date:**
02/13/17**Direction Photo Taken:**

N/A

Description:

PC B5: 140-143.5ft (1)

**Photo No.**
100**Date:**
02/13/17**Direction Photo Taken:**

N/A

Description:

PC B5: 140-143.5ft (2)



Facility Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528**Photo No.**
101**Date:**
02/13/17**Direction Photo Taken:**

N/A

Description:

PC B5: 143.5-147ft (1)

**Photo No.**
102**Date:**
02/13/17**Direction Photo Taken:**

N/A

Description:

PC B5: 143.5-147ft (2)



Facility Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 103	Date: 02/13/17	
Direction Photo Taken: N/A		
Description: PC B5: 147-150ft (1)		

Photo No. 104	Date: 02/13/17	
Direction Photo Taken: N/A		
Description: PC B5: 147-150ft (2)		

Project Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528

Photo No. 1	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 0-2ft		

Photo No. 2	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 2.5-6.5ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
3

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 2.5-6.5ft (2)



Photo No.
4

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 6.5-10ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 5	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 6.5-10ft (2)		

Photo No. 6	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 10-13ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
7

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 10-13ft (2)



Photo No.
8

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 13-16ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
9

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 13-16ft (2)



Photo No.
10

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 16-20ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
11

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 16-20ft (2)



Photo No.
12

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 20-22.5ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
13

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 20-22.5ft (2)



Photo No.
14

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 26.5-30ft (1)



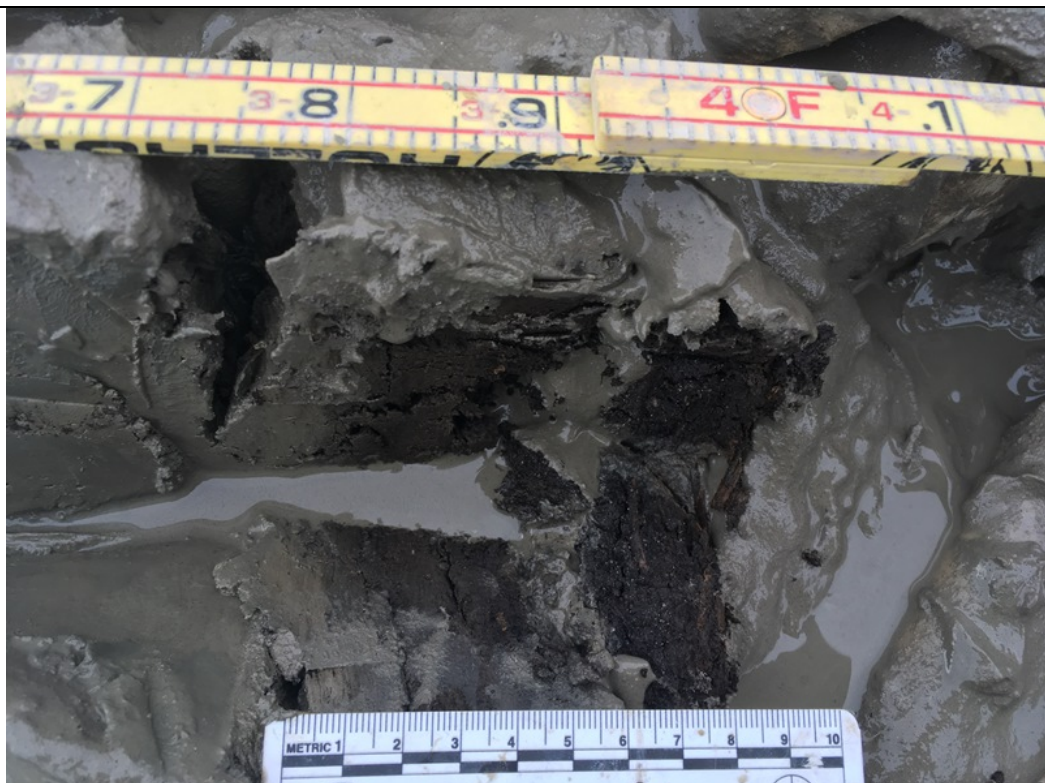
Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 15	Date: 2/5/17	 A photograph of a sediment sample, identified as PC B6, resting on a wooden surface. A yellow measuring tape is placed horizontally above the sample, showing measurements from approximately 3 to 10 feet. A white label with red handwritten text is held in front of the sample. The label reads: "PC B6", " 20-29.5 ", and "26.5-30". A black glove is visible holding the label. In the background, a stack of white plastic containers is partially visible.
Direction Photo Taken: N/A		
Description: PC B6: 26.5-30ft (2)		

Photo No. 16	Date: 2/5/17	 A photograph of a sediment sample, identified as PC B6, resting on a wooden surface. A yellow measuring tape is placed horizontally above the sample, showing measurements from approximately 6 to 10 feet. A white label with black handwritten text is held in front of the sample. The label reads: "PC B6" and "30-32.5". A white ruler is visible on the right side of the sample.
Direction Photo Taken: N/A		
Description: PC B6: 30-32.5ft (1)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 17	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 30-32.5ft (2)		

Photo No. 18	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 32.5ft bgs Organic woody debris at base of lacustrine clay/top of sand interval.		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 19	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 32.5-36.5ft (1)		

Photo No. 20	Date: 2/5/17
Direction Photo Taken: N/A	
Description: PC B6: 32.5-36.5ft (2)	

A photograph of a soil profile. A yellow measuring tape is placed horizontally across the top of the soil, showing measurements from approximately 1.7 to 2.7 feet. Below the tape, a white ruler is placed vertically. A white label with handwritten text is held in front of the soil. The label reads "PC B6", "30-37.5", and "32.5-36.5". The soil is dark brown and appears to be a mix of sand and clay. The background is a light-colored, possibly concrete or metal, surface.

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
21

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 32.5-36.5ft (3)



Photo No.
22

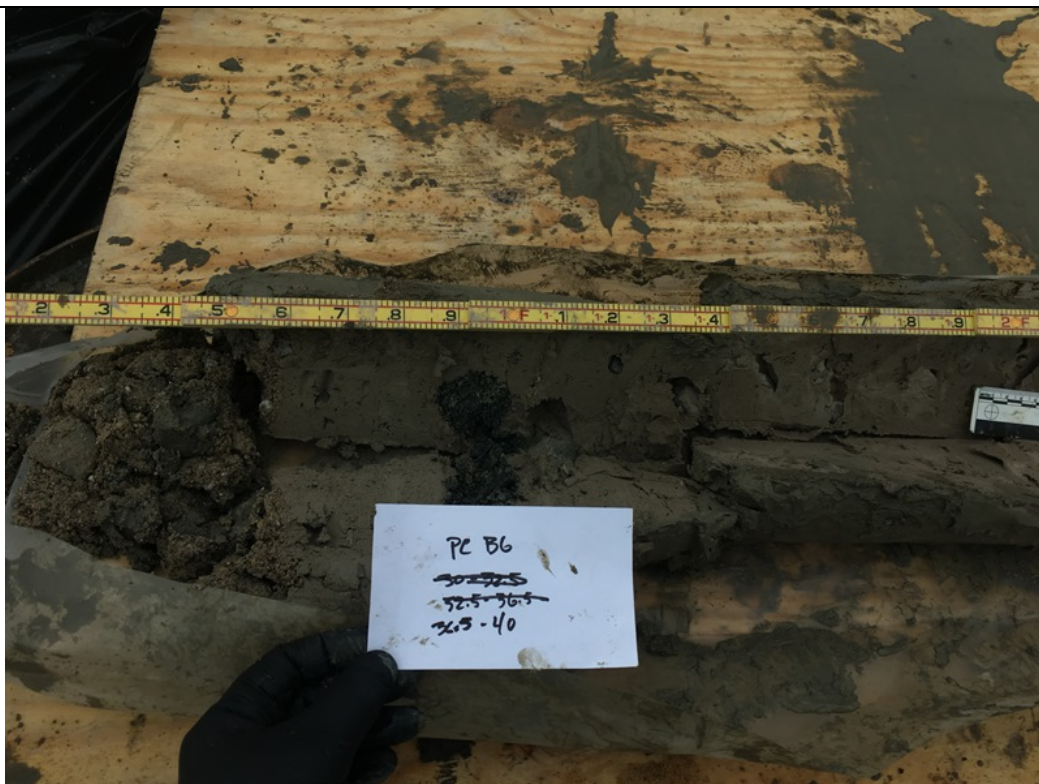
Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 36.5-40ft (1)



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 23	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 36.5-40ft (2)		

Photo No. 24	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 36.5-40ft (3)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 25	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 40-43ft (1)		

Photo No. 26	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 40-43ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
27

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 43-46ft (1)



Photo No.
28

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 43-46ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 29	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 46-50ft (1)		

Photo No. 30	Date: 2/5/17	
Direction Photo Taken: N/A		
Description: PC B6: 46-50ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
31

Date:
2/5/17

Direction Photo Taken:

N/A

Description:

PC B6: 46-50ft (3)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 1	Date: 02/01/17
Direction Photo Taken: N/A	
Description: PC B7: 0-1.5ft	



Photo No. 2	Date: 02/01/17
Direction Photo Taken: N/A	
Description: PC B7: 1.5-5ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
3

Date:
02/01/17

Direction Photo Taken:

N/A

Description:

PC B7: 1.5-5ft (2)



Photo No.
4

Date:
02/01/17

Direction Photo Taken:

N/A

Description:

PC B7: 5-7ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 5	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 5-7ft (2)		

Photo No. 6	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 10-13ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 7	Date: 02/01/17	 A photograph of a sediment sample in a clear plastic bag. A yellow ruler is placed horizontally above the bag, showing measurements from 4 to 11 inches. A small white label with the handwritten text "PC B7" and "10-13" is attached to the bag. The sediment is dark and appears to be a clay or silt.
Direction Photo Taken: N/A		
Description: PC B7: 10-13ft (2)		

Photo No. 8	Date: 02/01/17	 A close-up photograph of a sediment sample. A white ruler with black markings is placed horizontally across the sample. The sediment is dark and appears to be a clay or silt. A small, light-colored shell fragment is visible in the sediment.
Direction Photo Taken: N/A		
Description: Shell fragments throughout clay sediment. PC B7:12ft bgs		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
9

Date:
02/01/17

Direction Photo Taken:

N/A

Description:

PC B7: 13-16ft (1)



Photo No.
10

Date:
02/01/17

Direction Photo Taken:

N/A

Description:

PC B7: 13-16ft (2)



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 11	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 16-20ft (1)		

Photo No. 12	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7; 16-20ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 13	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7:16-20ft (3)		

Photo No. 14	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 20-23ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

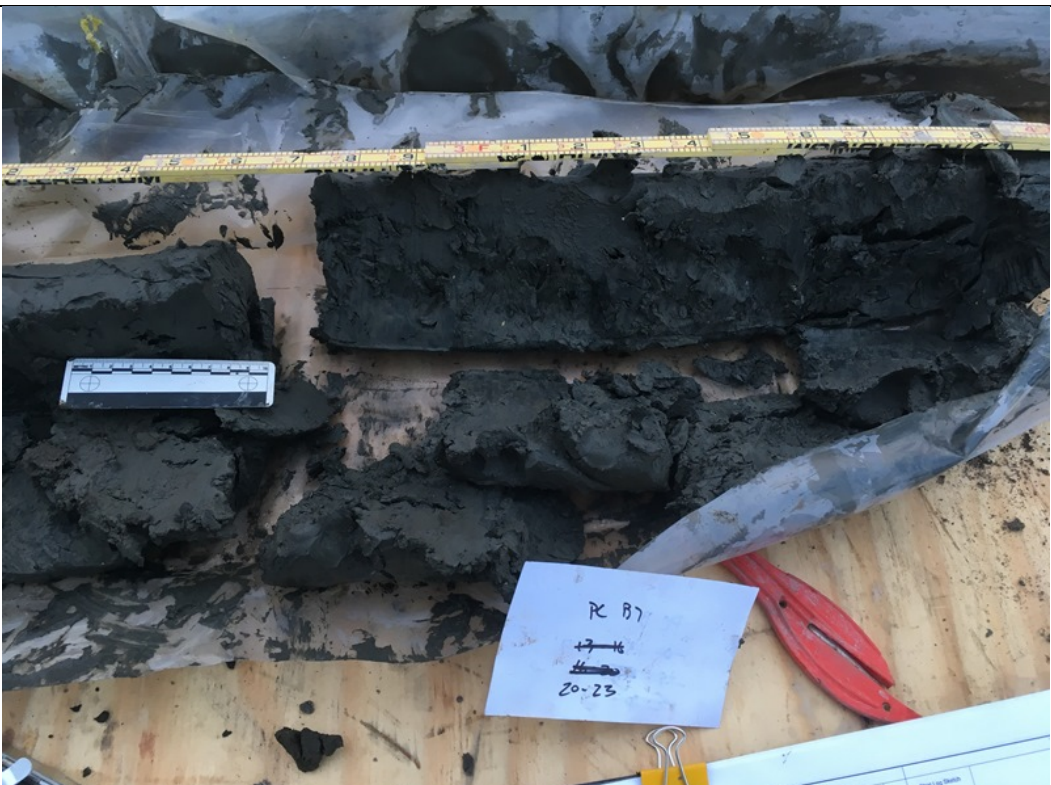
Photo No. 15	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 20-23ft (2)		

Photo No. 16	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 20-23ft (5GY 4/1 Mottling)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 17	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 23-27ft (1)		


Photo No. 18	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 23-27ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 19	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 23-27ft (3)		

Photo No. 20	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7:23-27ft (gradational change in dominant color)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 21	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 27-30ft (1)		

Photo No. 22	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 27-30ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 23	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 30-33ft (1)		

Photo No. 24	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 30-33ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 25	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 33-36ft (1)		

Photo No. 26	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 33-36ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 27	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 36-40ft (1)		

Photo No. 28	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: PC B7: 36-40ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 29	Date: 02/01/17	
Direction Photo Taken: N/A		
Description: Organic/Woody debris PC B7: 40ft		

Photo No. 30	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 46-50ft (1) * No Recovery 40-46ft bgs		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 31	Date: 02/01/17
Direction Photo Taken: N/A	
Description: PC B7: 46-50ft (2) * No Recovery 40-46ft bgs	



Photo No. 32	Date: 02/02/17
Direction Photo Taken: N/A	
Description: PC B7: 50-52ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 33	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 52-56ft (1)		

Photo No. 34	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 52-56ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 35	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 52-56ft (3)		

Photo No. 36	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: Woody debris PC B7: 55.5ft bgs		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 37	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 56-60ft (1)		

Photo No. 38	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 56-60ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 39	Date: 02/02/17
Direction Photo Taken: N/A	
Description: PC B7: 56-60ft (3)	



Photo No. 40	Date: 02/02/17
Direction Photo Taken: N/A	
Description: Woody debris PC B7: 56ft bgs	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
41

Date:
02/02/17

Direction Photo Taken:

N/A

Description:

Medium grained sand lens
with reddish clay fines

PC B7: 60ft bgs

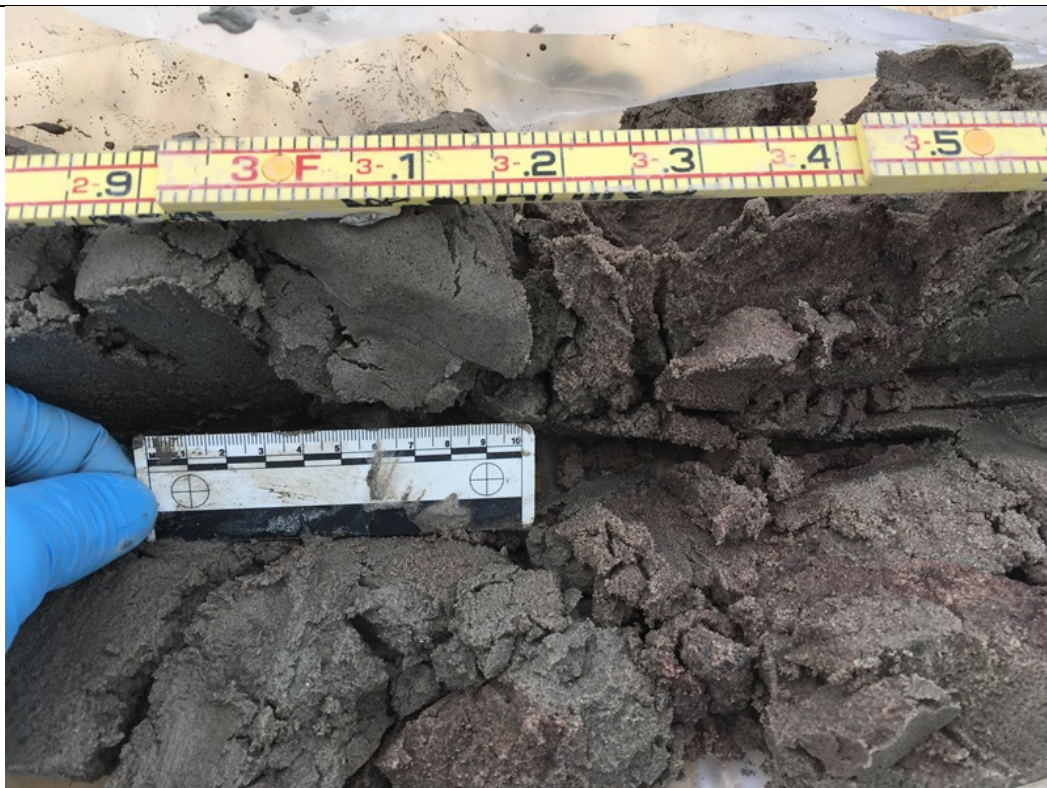


Photo No.
42

Date:
02/02/17

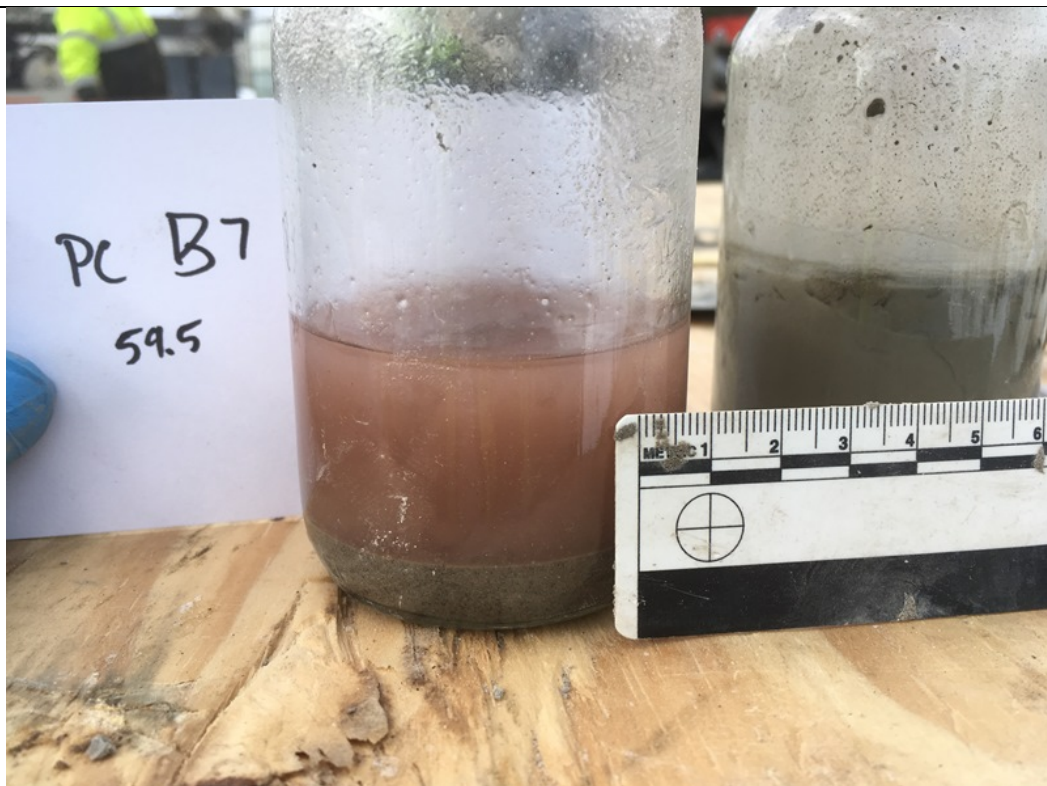
Direction Photo Taken:

N/A

Description:

Sediment Settling Jar

PC B7: 59.5



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 43	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 60-63ft (1)		

Photo No. 44	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 60-63ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 45	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 63-66.5ft (1)		

Photo No. 46	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 63-66.5ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 47	Date: 02/02/17
Direction Photo Taken: N/A	
Description: PC B7: 66.5-70ft (1)	



Photo No. 48	Date: 02/02/17
Direction Photo Taken: N/A	
Description: PC B7: 66.5-70ft (2)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
49

Date:
02/02/17

Direction Photo Taken:

N/A

Description:

PC B7: 69ft bgs



Photo No.
50

Date:
02/02/17

Direction Photo Taken:

N/A

Description:

PC B7: 70-74ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 51	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 70-74ft (2)		

Photo No. 52	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: Cobbles PC B7: 72.5ft bgs		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 53	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 74-77ft (1)		

Photo No. 54	Date: 02/02/17	
Direction Photo Taken: N/A		
Description: PC B7: 74-77ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 55	Date: 02/02/17
Direction Photo Taken: N/A	
Description: Hard very stiff clay PC B7: 75ft bgs	

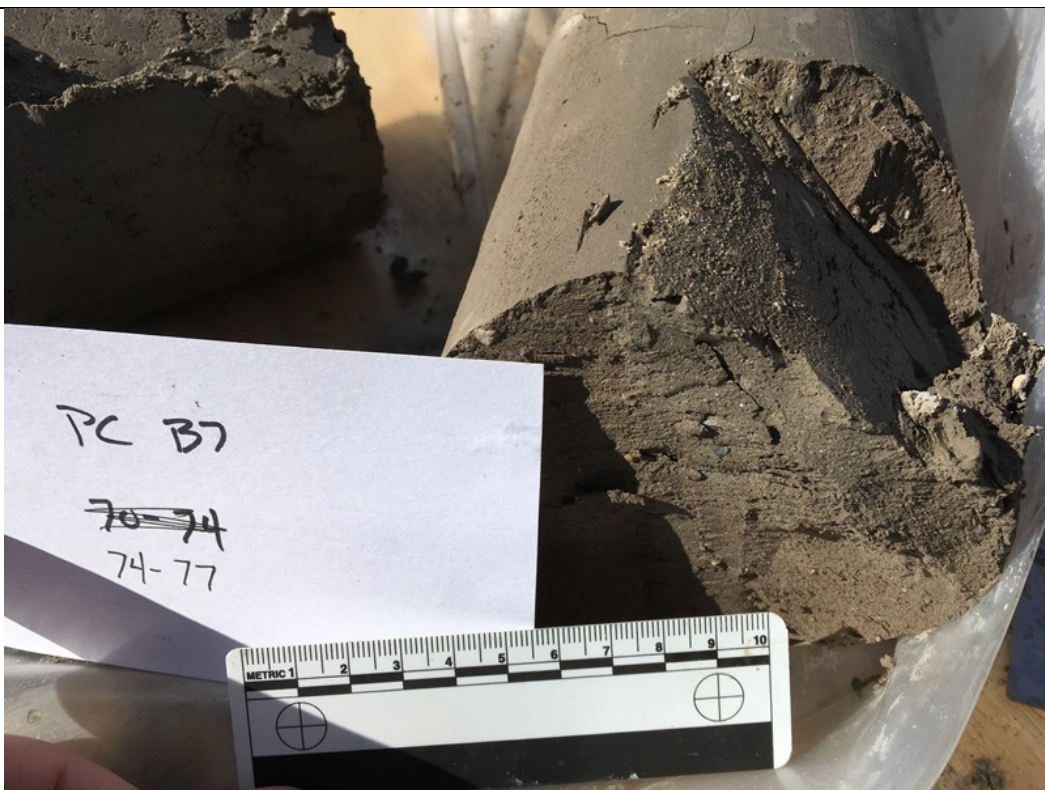


Photo No. 56	Date: 02/02/17
Direction Photo Taken: N/A	
Description: PC B7: 77-80ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 57	Date: 02/02/17
Direction Photo Taken: N/A	
Description: PC B7: 77-80ft (2)	



Photo No. 58	Date: 02/03/17
Direction Photo Taken: N/A	
Description: PC B7: 80-82.5ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 59	Date: 02/03/17
Direction Photo Taken: N/A	
Description: PC B7: 80-82.5ft (2)	



Photo No. 60	Date: 02/03/17
Direction Photo Taken: N/A	
Description: PC B7: 82.5-85.5ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 61	Date: 02/03/17
Direction Photo Taken: N/A	
Description: PC B7: 82.5-85.5ft (2)	



Photo No. 62	Date: 02/03/17
Direction Photo Taken: N/A	
Description: PC B7: 85.5-90ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 63	Date: 02/03/17
Direction Photo Taken: N/A	
Description: PC B7: 85.5-90ft (2)	



Photo No. 64	Date: 02/03/17
Direction Photo Taken: N/A	
Description: PC B7: 90-94.5ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 65	Date: 02/03/17
Direction Photo Taken: N/A	
Description: PC B7: 90-94.5ft (2)	



Photo No. 66	Date: 02/03/17
Direction Photo Taken: N/A	
Description: PC B7: 90-94.5ft (3)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 67	Date: 02/03/17
Direction Photo Taken: N/A	
Description: PC B7: 94.5-98ft (1)	



Photo No. 68	Date: 02/03/17
Direction Photo Taken: N/A	
Description: PC B7: 94.5-98ft (2)	



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 69	Date: 02/03/17	
Direction Photo Taken: N/A		
Description: PC B7: 94.5-98ft (3)		

Photo No. 70	Date: 02/03/17	
Direction Photo Taken: N/A		
Description: PC B7: 98-100ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 71	Date: 02/03/17
Direction Photo Taken: N/A	
Description: PC B7: 98-100ft (2)	



Photo No. 72	Date: 02/03/17
Direction Photo Taken: N/A	
Description: Soft Fat Clay PC B7: 98-100ft	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
73

Date:
02/03/17

Direction Photo Taken:

N/A

Description:

PC B7: 100-105ft (1)



Photo No.
74

Date:
02/03/17

Direction Photo Taken:

N/A

Description:

PC B7: 100-105ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
75

Date:
02/03/17

Direction Photo Taken:

N/A

Description:

PC B7: 105-110ft (1)



Photo No.
76

Date:
02/03/17

Direction Photo Taken:

N/A

Description:

PC B7: 105-110ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 77	Date: 02/04/17
Direction Photo Taken: N/A	
Description: PC B7: 110-114ft (1)	



Photo No. 78	Date: 02/04/17
Direction Photo Taken: N/A	
Description: PC B7: 110-114ft (2)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 79	Date: 02/04/17	
Direction Photo Taken: N/A		
Description: PC B7: 114-117ft (1)		

Photo No. 80	Date: 02/04/17	
Direction Photo Taken: N/A		
Description: PC B7: 114-117ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

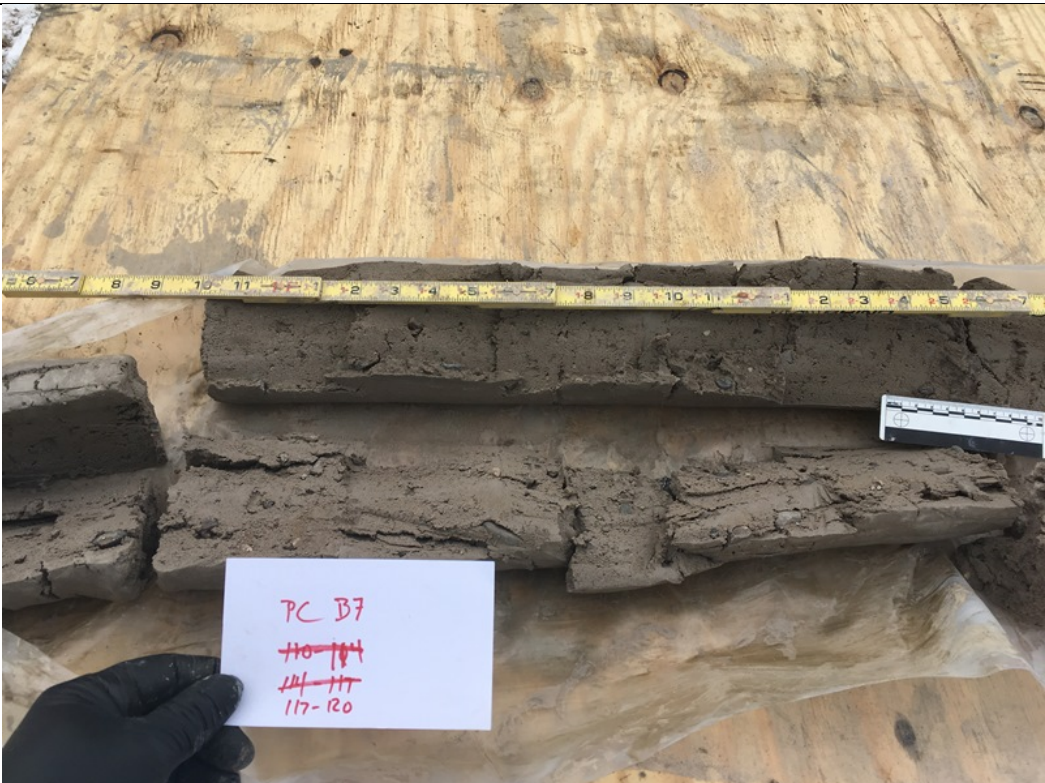
Photo No. 81	Date: 02/04/17	
Direction Photo Taken: N/A		
Description: PC B7: 117-120ft (1)		

Photo No. 82	Date: 02/04/17	
Direction Photo Taken: N/A		
Description: PC B7: 117-120ft (2)		

Project Name:
MDEQ Wurtsmith

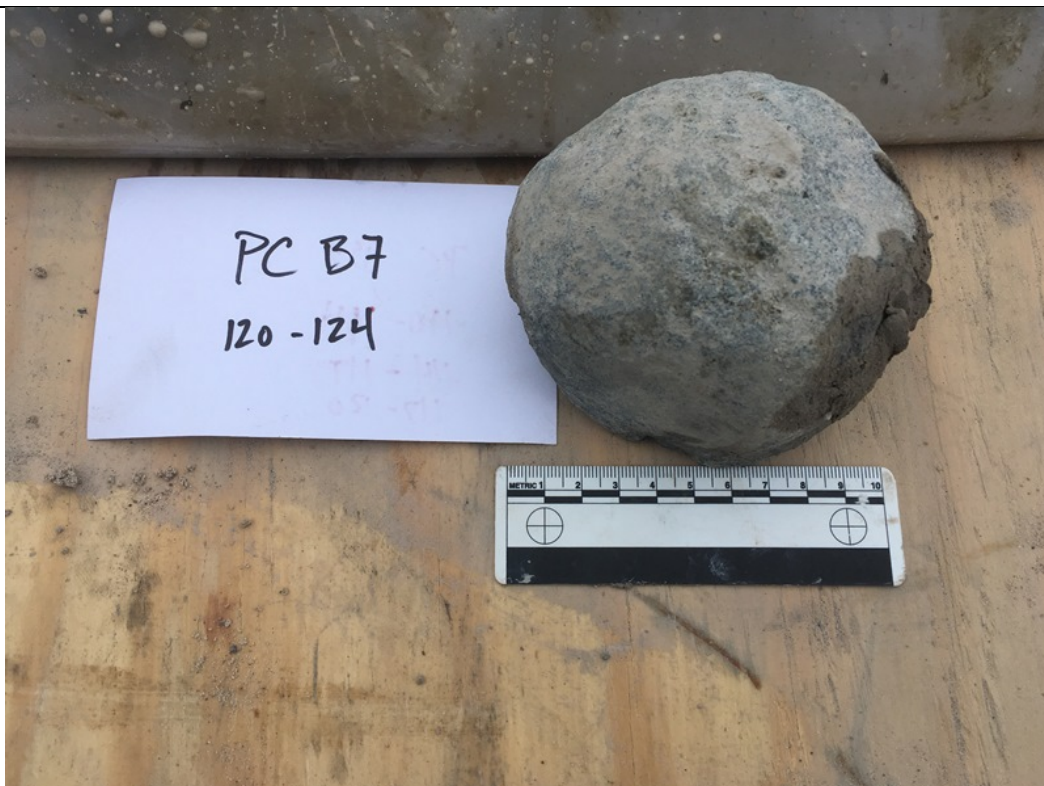
Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 83	Date: 02/04/17
Direction Photo Taken: N/A	
Description: PC B7: 120-124ft (1)	



Photo No. 84	Date: 02/04/17
Direction Photo Taken: N/A	
Description: Cobble lodged in drill shoe, no recovery 124-130ft bgs PC B7: 124ft bgs	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 85	Date: 02/04/17
Direction Photo Taken: N/A	
Description: Low Plasticity Sandy Clay PC B7: 120-124ft	

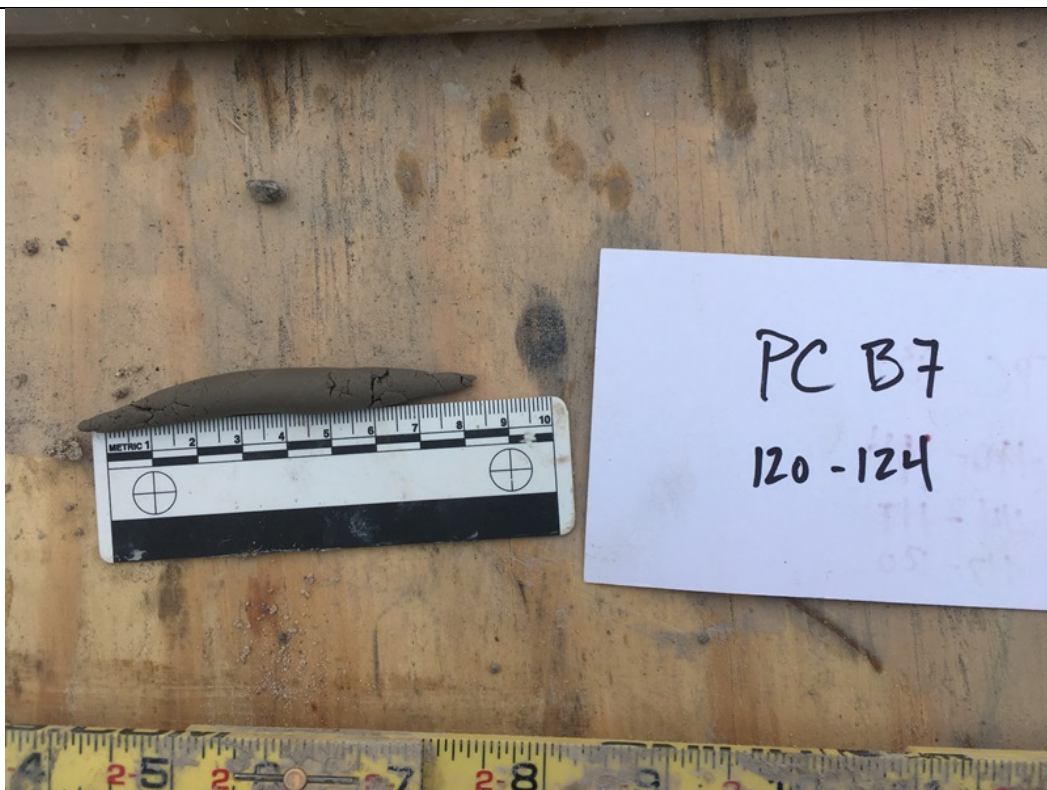


Photo No. 86	Date: 02/04/17
Direction Photo Taken: N/A	
Description: PC B7: 130-133ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 87	Date: 02/04/17
Direction Photo Taken: N/A	
Description: PC B7: 130-133ft (2)	



Photo No. 88	Date: 02/04/17
Direction Photo Taken: N/A	
Description: PC B7: 136-140ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 89	Date: 02/04/17
Direction Photo Taken: N/A	
Description: PC B7: 136-140ft (2)	



Photo No. 90	Date: 02/04/17
Direction Photo Taken: N/A	
Description: PC B7: 140-144ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 91	Date: 02/04/17
Direction Photo Taken: N/A	
Description: PC B7: 140-144ft (2)	



Photo No. 92	Date: 02/04/17
Direction Photo Taken: N/A	
Description: PC B7: 144-147ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 93	Date: 02/04/17	
Direction Photo Taken: N/A		
Description: PC B7: 144-147ft (2)		

Photo No. 94	Date: 02/04/17	
Direction Photo Taken: N/A		
Description: PC B7: 147-150ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
95

Date:
02/04/17

Direction Photo Taken:

N/A

Description:

PC B7: 147-150ft (2)





PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528



PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528



PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528



PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528



PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528



PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528



PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
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PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528



PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528



PHOTOGRAPH LOG

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
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Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 1	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 0-1.5ft		

Photo No. 2	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 1.5-5ft (1)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 3	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 1.5-5ft (2)		

Photo No. 4	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 5-10ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
5

Date:
1/22/17

Direction Photo Taken:

N/A

Description:

PC B9: 5-10ft (2)



Photo No.
6

Date:
1/22/17

Direction Photo Taken:

N/A

Description:

PC B9: 10-13ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 7	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 10-13ft (2)		

Photo No. 8	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 13-16ft (1)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
--	-------------------------------------	--------------------------------

Photo No. 9	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 13-16ft (2)		

Photo No. 10	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: Coarse base of fining up sequence. PC B9: 15ft bgs		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
11

Date:
1/22/17

Direction Photo Taken:

N/A

Description:

PC B9: 16-20ft (1)



Photo No.
12

Date:
1/22/17

Direction Photo Taken:

N/A

Description:

PC B9: 16-20FT (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
13

Date:
1/22/17

Direction Photo Taken:

N/A

Description:

Thin dry silt above water table.

PC B9: 18-19ft bgs



Photo No.
14

Date:
1/22/17

Direction Photo Taken:

N/A

Description:

PC B9: 20-23ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 15	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 20-23ft (2)		

Photo No. 16	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 23-26ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
17

Date:
1/22/17

Direction Photo Taken:

N/A

Description:

PC B9: 23-26ft (2)



Photo No.
18

Date:
1/22/17

Direction Photo Taken:

N/A

Description:

Coarse sand and gravel,
very high transmissivity
zone.

PC B9: 23ft bgs



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 19	Date: 1/22/17
Direction Photo Taken: N/A	
Description: PC B9: 26-30ft (1)	



Photo No. 20	Date: 1/22/17
Direction Photo Taken: N/A	
Description: PC B9: 26-30ft (2)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
21

Date:
1/22/17

Direction Photo Taken:

N/A

Description:

Coarse sand and gravel,
very high transmissivity
zone.

PC B9: 28.5ft bgs



Photo No.
22

Date:
1/22/17

Direction Photo Taken:

N/A

Description:


Thin very coarse sand
lense.

PC B9: 29.5ft bgs



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 23	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 30-35ft (1)		

Photo No. 24	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 30-35ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 25	Date: 1/22/17
Direction Photo Taken: N/A	
Description: Fining up sequence with pebbles at base. PC B9: 34-35ft bgs	



Photo No. 26	Date: 1/22/17
Direction Photo Taken: N/A	
Description: PC B9: 35-40ft (2)	



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 27	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 35-40ft (1)		

Photo No. 28	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 40-42ft		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
31

Date:
1/22/17

Direction Photo Taken:

N/A

Description:

PC B9: 42-45ft (1)



Photo No.
32

Date:
1/22/17

Direction Photo Taken:

N/A

Description:

PC B9: 42-45ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 33	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 45-50ft (1)		

Photo No. 34	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: PC B9: 45-50ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 35	Date: 1/22/17	
Direction Photo Taken: N/A		
Description: Increased Pebble/Gravel Content PC B9: 48ft bgs		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 1	Date: 1/11/17
Direction Photo Taken: N/A	
Description: PC B10: 0-10ft (1)	



Photo No. 2	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: 0-10ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 3	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: 10-20ft (1)		

Photo No. 4	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: 10-20ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 5	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: 10-20ft (3)		

Photo No. 6	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: 10-20ft (4)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 7	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: 10-20ft (5)		

Photo No. 8	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: 10-20ft (6)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 9	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: 20-30ft (1)		

Photo No. 10	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: 20-30ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 11	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: 20-30ft (3)		

Photo No. 12	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: Pebbles throughout clay. PC B10: 26ft bgs		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 13	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: Pebbles throughout Clay		

Photo No. 14	Date: 1/11/17
Direction Photo Taken:	
N/A	
Description:	
PC B10: 30-40ft (1)	

A photograph of a soil sample, likely a clay core, showing horizontal layering and several small, light-colored pebbles embedded within the dark brown clay matrix. A clear plastic bag is visible in the background. A clipboard with handwritten notes is placed in the foreground. The notes on the clipboard include: "B10", "20-30", "30-40", and some smaller text that is partially obscured. The sample is resting on a wooden surface.

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 15	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: 30-40ft (2)		

Photo No. 16	Date: 1/11/17	
Direction Photo Taken: N/A		
Description: PC B10: 30-40ft (3)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 1	Date: 1/12/17	
Direction Photo Taken: N/A		
Description: PC B11: 0-5ft (1)		

Photo No. 2	Date: 1/12/17	
Direction Photo Taken: N/A		
Description: PC B11: 0-5ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 3	Date: 1/12/17	
Direction Photo Taken: N/A		
Description: PC B11: 5-10ft (1)		

Photo No. 4	Date: 1/12/17	
Direction Photo Taken: N/A		
Description: PC B11: 5-10ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 5	Date: 1/12/17	
Direction Photo Taken: N/A		
Description: PC B11: 10-15ft (1)		

Photo No. 6	Date: 1/12/17	
Direction Photo Taken: N/A		
Description: PC B11: 10-15ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 7	Date: 1/12/17	
Direction Photo Taken: N/A		
Description: PC B11: 10-15ft (3)		

Photo No. 8	Date: 1/12/17	
Direction Photo Taken: N/A		
Description: PC B11: 15-20ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 9	Date: 1/12/17	
Direction Photo Taken: N/A		
Description: PC B11: 15-20ft (2)		

Photo No. 10	Date: 1/12/17	
Direction Photo Taken: N/A		
Description: PC B11: 15-20ft (3)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 11	Date: 1/13/17	
Direction Photo Taken: N/A		
Description: PC B11: 20-25ft (1)		

Photo No. 12	Date: 1/13/17	
Direction Photo Taken: N/A		
Description: 10YR 5/6 Mottling PC B11: 21ft bgs		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
13

Date:
1/13/17

Direction Photo Taken:

N/A

Description:

PC B11: 20-25ft (2)



Photo No.
14

Date:
1/13/17

Direction Photo Taken:

N/A

Description:

PC B11: 20-25ft (3)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 15	Date: 1/13/17	
Direction Photo Taken: N/A		
Description: Clay extracted from drill shoe PC B11: 25ft bgs		

Photo No. 16	Date: 1/13/17	
Direction Photo Taken: N/A		
Description: Clay extracted from drill shoe PC B11: 25ft bgs		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
17

Date:
1/13/17

Direction Photo Taken:

N/A

Description:

PC B11: 25ft bgs



Photo No.
18

Date:
1/13/17

Direction Photo Taken:

N/A

Description:

PC B11: 25-30ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
19

Date:
1/13/17

Direction Photo Taken:

N/A

Description:

PC B11: 25-30ft (2)



Photo No.
20

Date:
1/13/17

Direction Photo Taken:

N/A

Description:

Clay/Clay with pebbles contact.

PC B11: 25-25.5ft bgs



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
21

Date:
1/13/17

**Direction Photo
Taken:**

N/A

Description:

Clay with Silt and pebbles.

PC B11: 27ft bgs




Project Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528

Photo No. 1	Date: 1/16/17	
Direction Photo Taken: N/A		
Description: PC B12: 0-5ft		

Photo No. 2	Date: 1/16/17	
Direction Photo Taken: N/A		
Description: PC B12: 5-7.5ft		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 3	Date: 1/16/17	
Direction Photo Taken: N/A		
Description: PC B12: 7.5-10ft (1)		

Photo No. 4	Date: 1/16/17	
Direction Photo Taken: N/A		
Description: PC B12: 7.5-10ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
5

Date:
1/16/17

Direction Photo Taken:

N/A

Description:

PC B12: 8.5ft bgs



Photo No.
6

Date:
1/18/17

Direction Photo Taken:

N/A

Description:

PC B12: 10-15ft (1)



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 7	Date: 1/18/17	
Direction Photo Taken: N/A		
Description: PC B12: 10-15ft (2)		

Photo No. 8	Date: 1/18/17	
Direction Photo Taken: N/A		
Description: Coarse Sandy Gravel – Fining up sequence PC B12: 11.5-12ft bgs		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
9

Date:
1/18/17

Direction Photo Taken:

N/A

Description:

PC B12: 15-20ft (1)



Photo No.
10

Date:
1/18/17

Direction Photo Taken:

N/A

Description:

PC B12: 15-20ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
11

Date:
1/18/17

Direction Photo Taken:

N/A

Description:

High transmissivity,
coarse sand and gravel
seam.

PC B12: 19.5-20.5 ft bgs



Photo No.
12

Date:
1/18/17

Direction Photo Taken:

N/A

Description:

PC B12: 20-25ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
13

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B12: 20-25ft (2)



Photo No.
14

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B12: 25-30ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
15

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B12: 25-30ft (2)



Photo No.
16

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B12: 28ft bgs



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
17

Date:
1/19/17

**Direction Photo
Taken:**

N/A

Description:

Dominant pebble/gravel
size 10-25mm; Field
Plasticity test: high
Plasticity.

PC B12: 29ft bgs



Project Name:
MDEQ Wurtsmith**Site Location:**
Oscoda, MI**Project No.**
60518528

Photo No. 1	Date: 1/20/17
Direction Photo Taken: N/A	
Description: PC B13: 0-5ft (1)	



Photo No. 2	Date: 1/20/17
Direction Photo Taken: N/A	
Description: PC B13: 0-5ft (2)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528


Photo No. 5	Date: 1/20/17	
Direction Photo Taken: N/A		
Description: PC B13: 7ft bgs		

Photo No. 6	Date: 1/20/17	
Direction Photo Taken: N/A		
Description: PC B13: 10-12ft		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 7	Date: 1/20/17
Direction Photo Taken: N/A	
Description: PC B13: 12-16ft (1)	

Photo No. 8	Date: 1/20/17
Direction Photo Taken: N/A	
Description: PC B13: 12-16ft (2)	

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 9	Date: 1/20/17	
Direction Photo Taken: N/A		
Description: PC B13: 16-20ft (1)		

Photo No. 10	Date: 1/20/17	
Direction Photo Taken: N/A		
Description: PC B13: 16-20ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 11	Date: 1/21/17	
Direction Photo Taken: N/A		
Description: PC B13: 20-23ft		

Photo No. 12	Date: 1/21/17	
Direction Photo Taken: N/A		
Description: PC B13: 23-26ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 13	Date: 1/21/17	
Direction Photo Taken: N/A		
Description: PC B13: 23-26ft (2)		

Photo No. 14	Date: 1/21/17	
Direction Photo Taken: N/A		
Description: PC B13: 26-27ft		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 15	Date: 1/21/17
Direction Photo Taken: N/A	
Description: PC B13: 26.5ft bgs	



Photo No. 16	Date: 1/21/17
Direction Photo Taken: N/A	
Description: PC B13: 27-30ft (1)	




Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 17	Date: 1/21/17	
Direction Photo Taken: N/A		
Description: PC B13: 27-30ft (2)		

Photo No. 18	Date: 1/21/17	
Direction Photo Taken: N/A		
Description: PC B13: 27.5ft bgs		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
1

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 0-2.5ft (1)



Photo No.
2

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 0-2.5ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
3

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

Transitional weathering;
10YR 4/1 Mottling

PC B14: 1ft bgs



Photo No.
4

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 2.5-6ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
5

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 2.5-6ft (2)



Photo No.
6

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 6-10ft (1)



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 7	Date: 1/19/17	
Direction Photo Taken: N/A		
Description: PC B14: 6-10ft (2)		

Photo No. 8	Date: 1/19/17	
Direction Photo Taken: N/A		
Description: Large pebbles and 68mm cobble. PC B14: 9.75ft bgs		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
9

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 10-14ft (1)



Photo No.
10

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 10-14ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
11

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

Interbedded sands and gravels.

PC B14: 11ft bgs



Photo No.
12

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 14-17.5ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
13

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 14-17.5



Photo No.
14

Date:
1/19/17

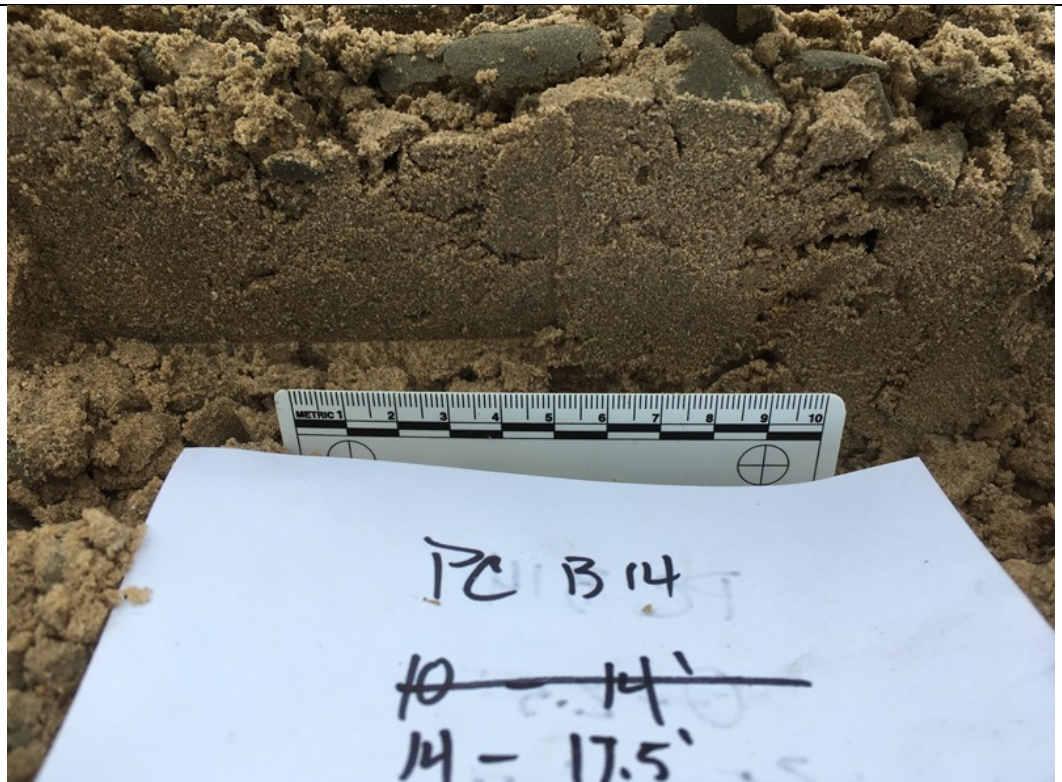
Direction Photo Taken:

N/A

Description:

Moist sediments: Massive medium sand.

PC B14: 17.5ft bgs



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
15

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 17.5-20ft (1)



Photo No.
16

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 17.5-20ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
17

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

Encountered water table at 19ft bgs.

PC B14: 19ft bgs



Photo No.
18

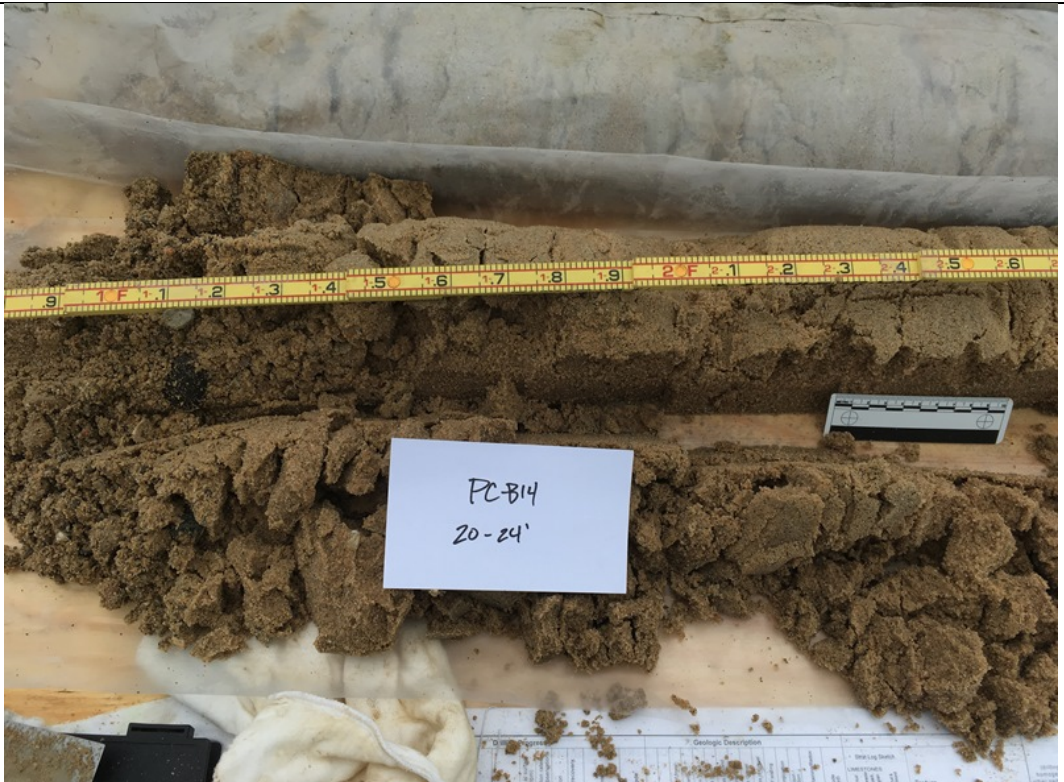
Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 20-24ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
19

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 20-24ft (2)



Photo No.
20

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 20ft bgs



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
21

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 24-27.5ft (1)



Photo No.
22

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 24-27.5ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
23

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 27.5-30ft (1)



Photo No.
24

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

PC B14: 27.5-30ft (2)



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 25	Date: 1/19/17	
Direction Photo Taken: N/A		
Description: PC B14: 30ft bgs		

Photo No. 26	Date: 1/19/17	
Direction Photo Taken: N/A		
Description: PC B14: 30-33ft * No recovery of soils from 30-31ft		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 27	Date: 1/19/17	
Direction Photo Taken: N/A		
Description: PC B14: 33-36ft (1)		

Photo No. 28	Date: 1/19/17	
Direction Photo Taken: N/A		
Description: PC B14: 33-36ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
29

Date:
1/19/17

Direction Photo Taken:

N/A

Description:

Clean clay with high plasticity, no pebbles

PC B14: 33ft bgs

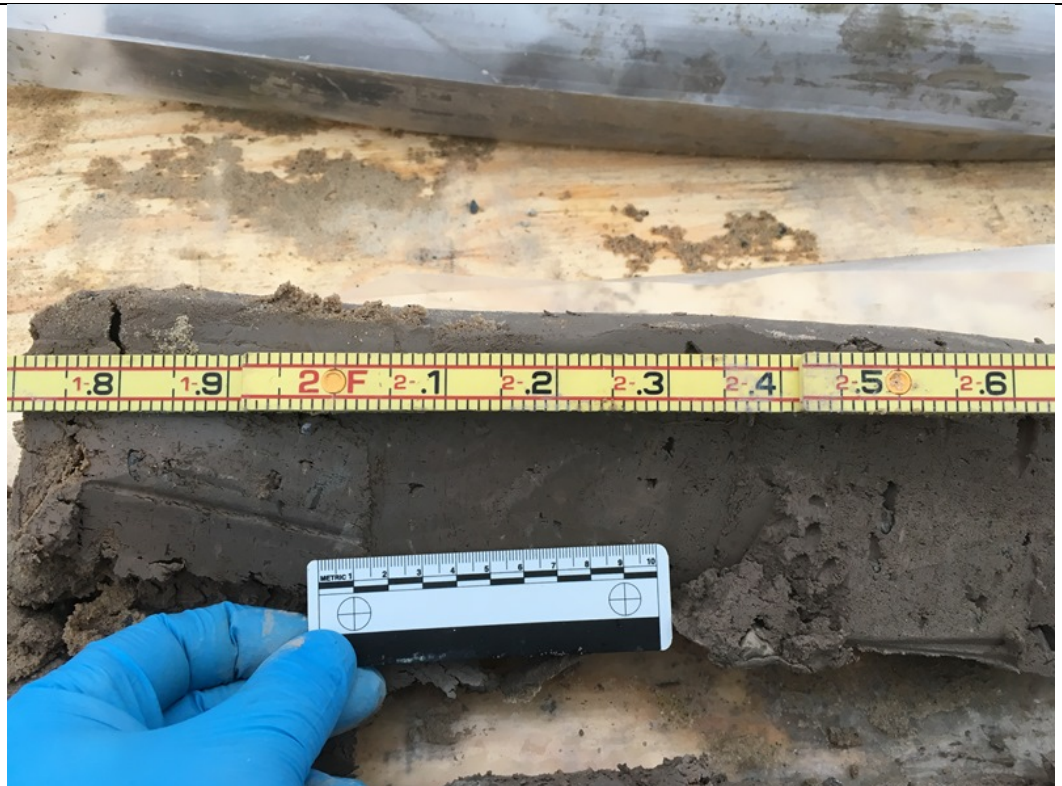


Photo No.
30

Date:
1/19/17

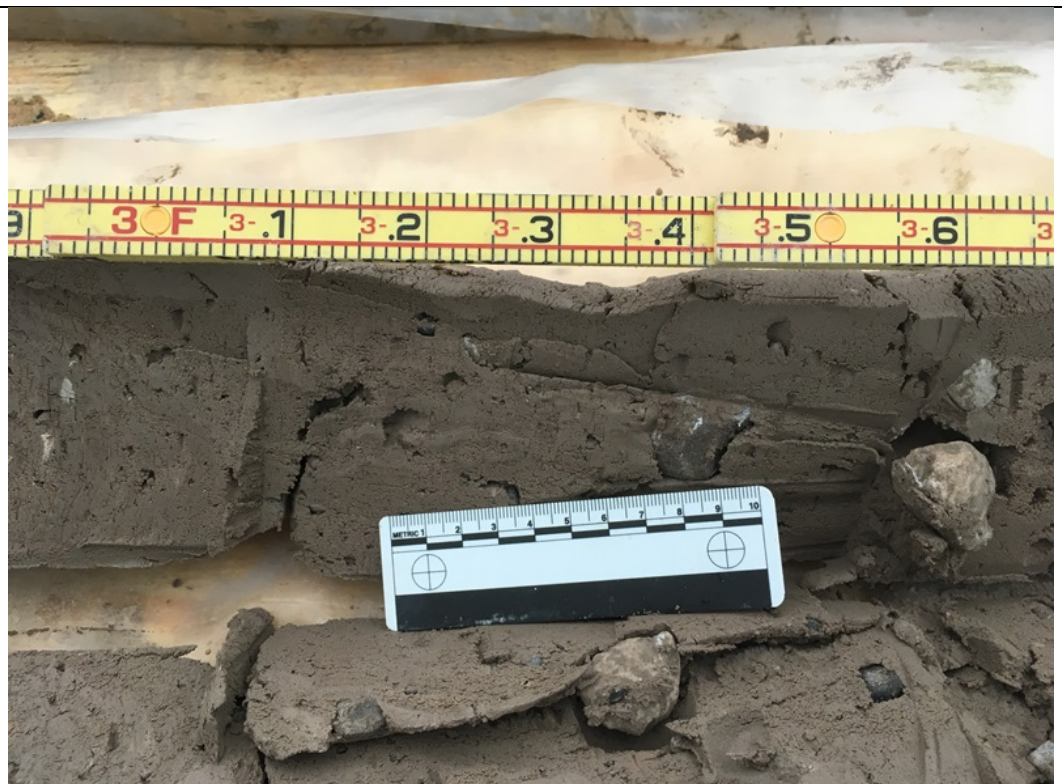
Direction Photo Taken:

N/A

Description:

Clay with pebbles throughout.

PC B14: 34ft bgs



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 31	Date: 1/19/17	
Direction Photo Taken: N/A		
Description: PC B14: 36-40ft (1)		

Photo No. 32	Date: 1/19/17	
Direction Photo Taken: N/A		
Description: PC B14: 36-40ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
33

Date:
1/19/17

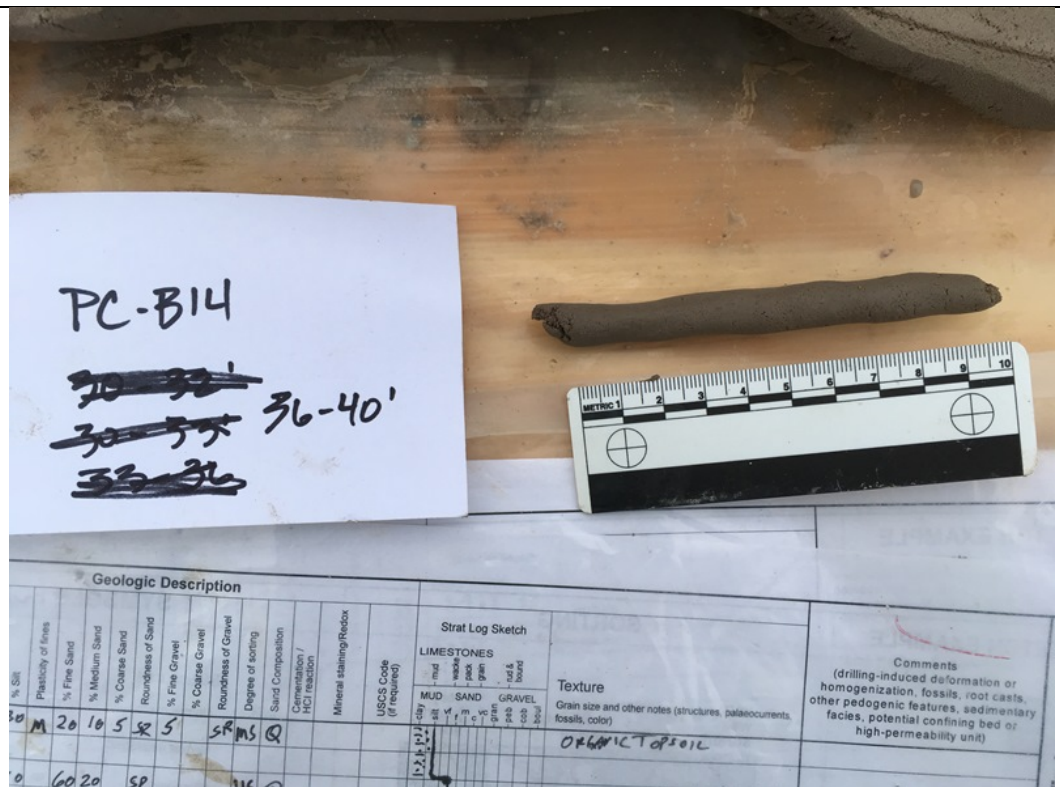
Direction Photo Taken:

N/A

Description:

Plasticity field test of clay
– High plasticity.

PC B14: 36-40ft bgs



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 1	Date: 01/23/17
Direction Photo Taken: N/A	
Description: PC B8: 0-3ft (1)	



Photo No. 2	Date: 01/23/17
Direction Photo Taken: N/A	
Description: PC B8: 0-3ft (2)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 3	Date: 01/23/17
Direction Photo Taken: N/A	
Description: PC B8: 3-6ft (1)	



Photo No. 4	Date: 01/23/17
Direction Photo Taken: N/A	
Description: PC B8: 3-6ft (2)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 5	Date: 01/23/17	
Direction Photo Taken: N/A		
Description: PC B8: 6-10ft (1)		

Photo No. 6	Date: 01/23/17	
Direction Photo Taken: N/A		
Description: PC B8: 6-10ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 7	Date: 01/23/17	
Direction Photo Taken: N/A		
Description: PC B8: 10-13ft (1)		

Photo No. 8	Date: 01/23/17	
Direction Photo Taken: N/A		
Description: PC B8: 10-13ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 9	Date: 01/23/17
Direction Photo Taken: N/A	
Description: PC B8: 13-16ft (1)	

Photo No. 10	Date: 01/23/17
Direction Photo Taken: N/A	
Description: PC B8: 13-16ft (2)	

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 11	Date: 01/23/17
Direction Photo Taken: N/A	
Description: PC B8: 14.5ft bgs	

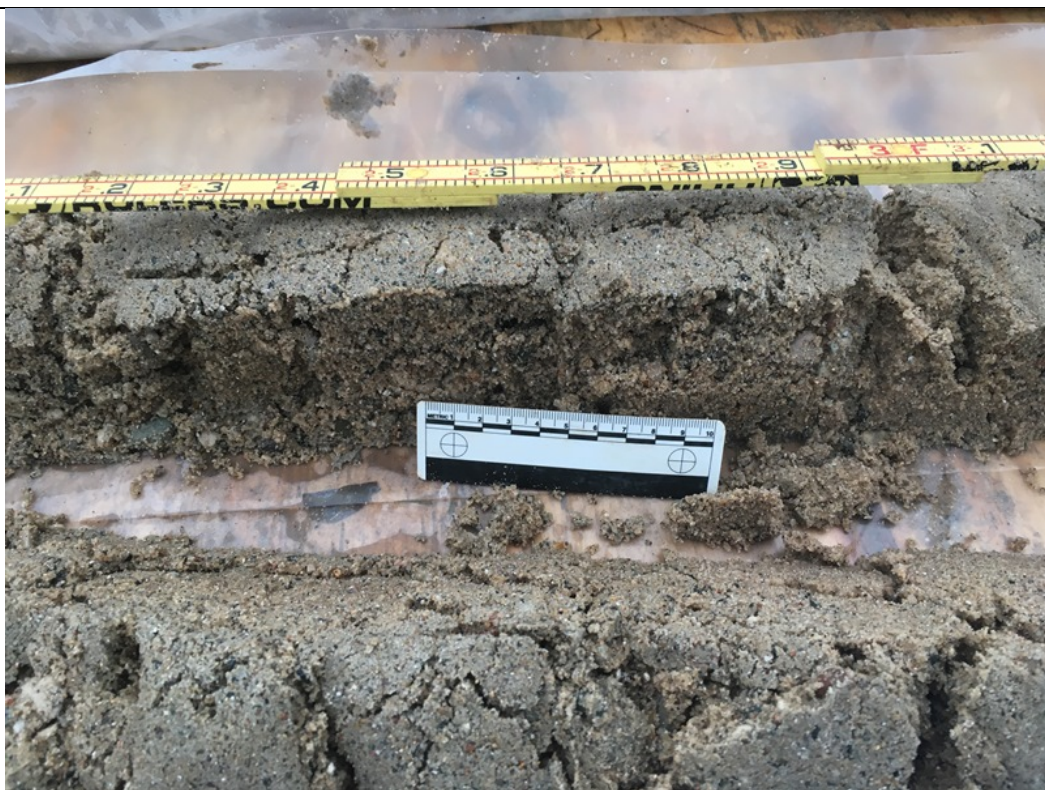


Photo No. 12	Date: 01/23/17
Direction Photo Taken: N/A	
Description: PC B8: 16-20ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 13	Date: 01/23/17
Direction Photo Taken: N/A	
Description: PC B8: 16-20ft (2)	



Photo No. 14	Date: 01/24/17
Direction Photo Taken: N/A	
Description: PC B8: 25-28ft (1) * No recovery of sediments from 20-25ft bgs	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 15	Date: 01/24/17
Direction Photo Taken: N/A	
Description: PC B8: 25-28ft (2)	



Photo No. 16	Date: 01/24/17
Direction Photo Taken: N/A	
Description: PC B8: 28-31.5ft (1)	



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 17	Date: 01/24/17	
Direction Photo Taken: N/A		
Description: PC B8: 28-31.5ft (2)		

Photo No. 18	Date: 01/24/17	
Direction Photo Taken: N/A		
Description: PC B8: 31.5-35ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 19	Date: 01/24/17	
Direction Photo Taken: N/A		
Description: PC B8: 31.5-35ft (2)		

Photo No. 20	Date: 01/24/17	
Direction Photo Taken: N/A		
Description: Clay/Clay with pebbles contact PC B8: 33.5ft bgs		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
21

Date:
01/25/17

Direction Photo Taken:

N/A

Description:

PC B8: 35-40ft (1)



Photo No.
22

Date:
01/25/17

Direction Photo Taken:

N/A

Description:

PC B8: 35-40ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
23

Date:
01/25/17

Direction Photo Taken:

N/A

Description:

PC B8: 35-40ft (3)



Photo No.
24

Date:
01/25/17

Direction Photo Taken:

N/A

Description:

PC B8: 35-40ft (4)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
25

Date:
01/25/17

Direction Photo Taken:

N/A

Description:

PC B8: 40-43ft (1)



Photo No.
26

Date:
01/25/17

Direction Photo Taken:

N/A

Description:

PC B8: 40-43ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 27	Date: 01/25/17
Direction Photo Taken: N/A	
Description: Sand Clay with Pebbles PC B8: 42.5ft bgs	



Photo No. 28	Date: 01/25/17
Direction Photo Taken: N/A	
Description: PC B8: 43-46.5ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
29

Date:
01/25/17

Direction Photo Taken:

N/A

Description:

PC B8: 43-46.5ft (2)



Photo No.
30

Date:
01/25/17

Direction Photo Taken:

N/A

Description:

PC B8: 46.5-50ft (1)

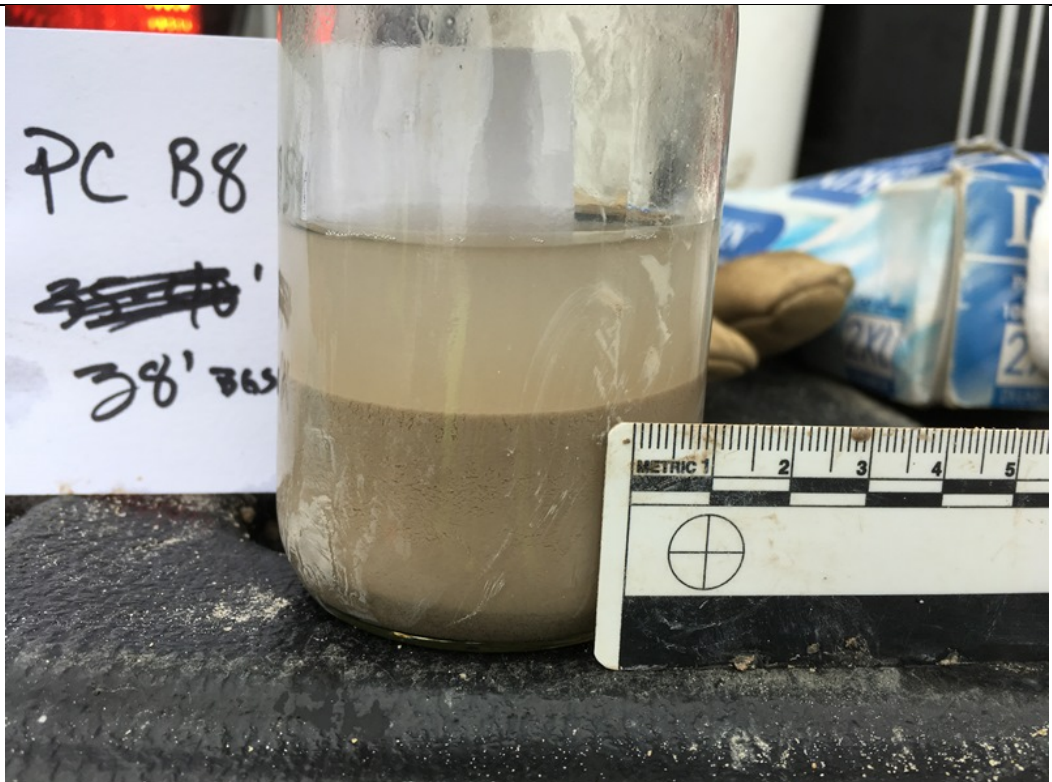


Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 31	Date: 01/25/17	
Direction Photo Taken: N/A		
Description: PC B8: 46.5-50ft (2)		

Photo No. 32	Date: 01/25/17	
Direction Photo Taken: N/A		
Description: Sediment Settling Jar PC B8: 38ft bgs		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 33	Date: 01/25/17	
Direction Photo Taken: N/A		
Description: Sediment Settling Jar PC B8: 45ft bgs		

Photo No. 34	Date: 01/25/17	
Direction Photo Taken: N/A		
Description: 2cm ³ sediment used for settling jar. PC B8: 50ft bgs		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
35

Date:
01/25/17

Direction Photo Taken:

N/A

Description:

Sediment Settling Jar

PC B8: 50ft bgs

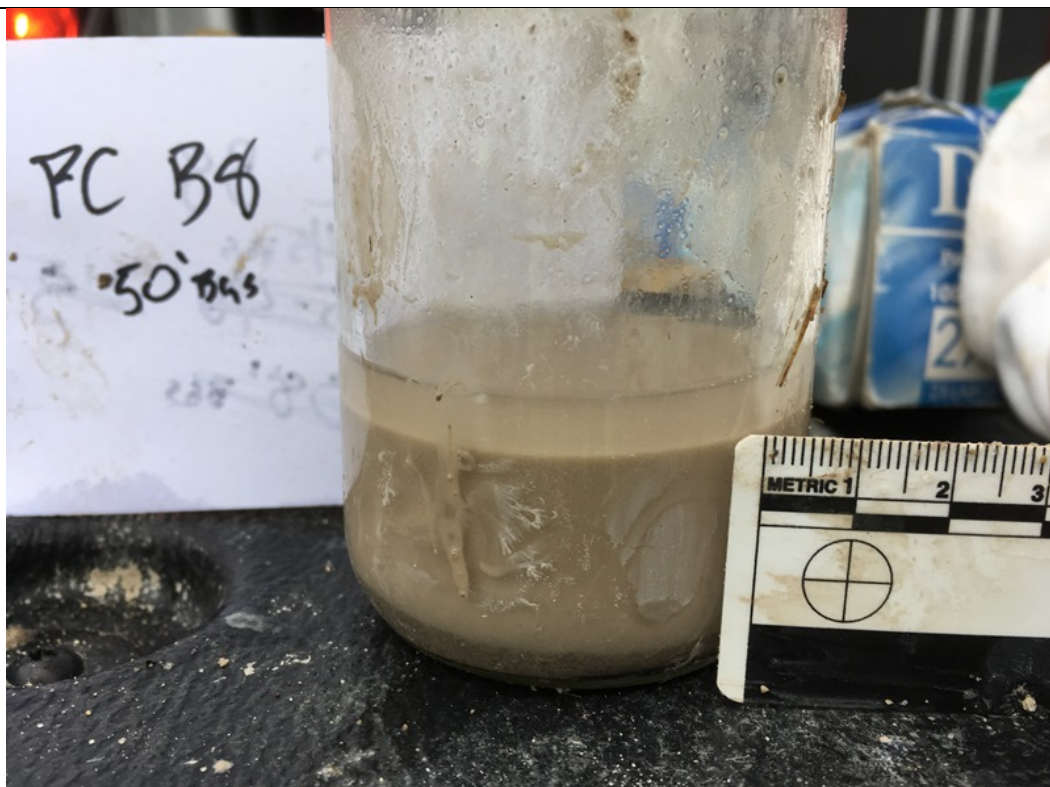


Photo No.
36

Date:
01/25/17

Direction Photo Taken:

N/A

Description:

PC B8: 50-52ft



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 37	Date: 01/25/17	
Direction Photo Taken: N/A		
Description: PC B8: 52-56ft (1)		

Photo No. 38	Date: 01/25/17	
Direction Photo Taken: N/A		
Description: PC B8: 52-56ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 39	Date: 01/25/17	
Direction Photo Taken: N/A		
Description: PC B8: 56-60ft (1)		

Photo No. 40	Date: 01/25/17	
Direction Photo Taken: N/A		
Description: PC B8: 56-60ft (2)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 41	Date: 01/25/17	
Direction Photo Taken: N/A		
Description: Clay becoming more stiff Decreasing sand content PC B8: 58-58.5ft bgs		

Photo No. 42	Date: 01/25/17
Direction Photo Taken: N/A	
Description: 2cm ³ sediment for settling jar, field plasticity test – Moderate. PC B8: 60ft bgs	

A photograph of a sediment sample on a wooden surface. A dark brown, irregularly shaped sediment sample is positioned next to a white rectangular label. The label has handwritten text in black ink: "PC B8" and "60' BGS". Below the label, a metric ruler is placed horizontally, showing a scale from 1 to 10 centimeters. A small, dark brown, elongated sediment sample is placed on the ruler, spanning approximately from the 4 cm mark to the 8 cm mark. The ruler also features two circular crosshair markings. The entire scene is set against a light-colored wooden background.

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 43	Date: 01/25/17
Direction Photo Taken: N/A	
Description: Sediment Settling Jar. PC B8: 60ft bgs	

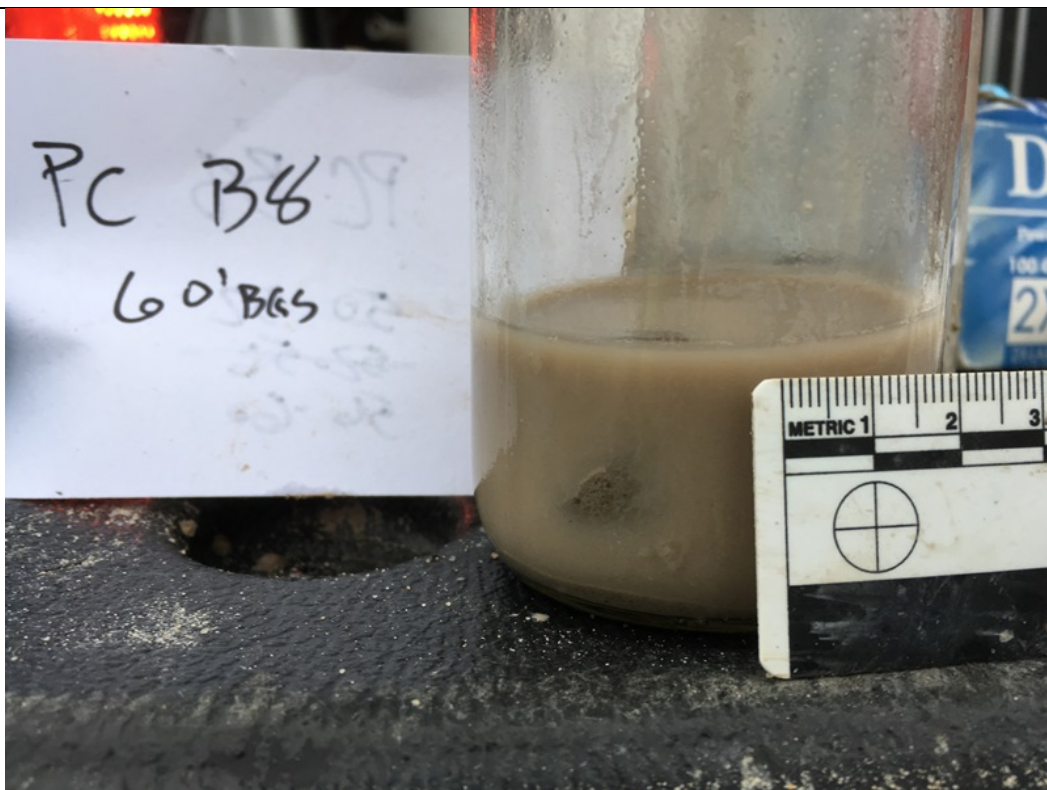


Photo No. 44	Date: 01/30/17
Direction Photo Taken: N/A	
Description: PC B8: 60-63ft (1)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 45	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 60-63ft (2)		

Photo No. 46	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 63-66ft (1)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 47	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 63-66ft (2)		

Photo No. 48	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 66-70ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 49	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 66-70ft (2)		

Photo No. 50	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 70-73.3ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
51

Date:
01/30/17

Direction Photo Taken:

N/A

Description:

PC B8: 70-73.3ft (2)



Photo No.
52

Date:
01/30/17

Direction Photo Taken:

N/A

Description:

PC B8: 73.3-76.6ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 53	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 73.3-76.6ft (2)		

Photo No. 54	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 76.6-80ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 55	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 76.6-80ft (2)		

Photo No. 56	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8 - Top: 80-83ft (1) Middle: 83-86ft (1) Bottom: 86-90ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 57	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8 - Top: 80-83ft (2) Middle: 83-86ft (2) Bottom: 86-90ft (2)		

Photo No. 58	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 90-93ft (1)		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 59	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 90-93ft (2)		

Photo No. 60	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 93-96ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 61	Date: 01/30/17
Direction Photo Taken: N/A	
Description: PC B8: 93-96ft (2)	



Photo No. 62	Date: 01/30/17
Direction Photo Taken: N/A	
Description: Field Plasticity Test: Very High Plasticity PC B8: 93-96ft bgs	



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 63	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 96-100ft (1)		

Photo No. 64	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 96-100ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
65

Date:
01/30/17

Direction Photo Taken:

N/A

Description:

PC B8: 100-103ft (1)



Photo No.
66

Date:
01/30/17

Direction Photo Taken:

N/A

Description:

PC B8: 100-103ft (2)



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 67	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: Clay/Clayey fine sands contact. PC B8: 100.5ft bgs		

Photo No. 68	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8:103-106ft (1)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 69	Date: 01/30/17
Direction Photo Taken: N/A	
Description: PC B8: 103-106ft (2)	



Photo No. 70	Date: 01/30/17
Direction Photo Taken: N/A	
Description: Clayey Fine Sand/Medium Sand Contact. PC B8: 104ft bgs	



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 71	Date: 01/30/17	
Direction Photo Taken: N/A		
Description: PC B8: 106-110ft (1)		

Photo No. 72	Date: 01/30/17
Direction Photo Taken: N/A	
Description: PC B8: 106-110ft (2)	

A photograph of a sediment sample, identified as PC B8: 106-110ft (2), resting on a wooden surface. The sample is a dark, silty material, possibly a core or a bulk sample, showing some cracking and uneven texture. A yellow measuring tape is placed horizontally above the sample, indicating its length. A small white ruler is visible on the left side of the sample. A white label with handwritten text "PC B8" and "106-110" is placed on the sample. A red tool, possibly a trowel or a small shovel, is visible in the bottom right corner. The wooden surface is light-colored and shows some staining and wear.

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
73

Date:
01/30/17

Direction Photo Taken:

N/A

Description:

Silt Laminations within sandy unit.

PC B8: 108ft bgs

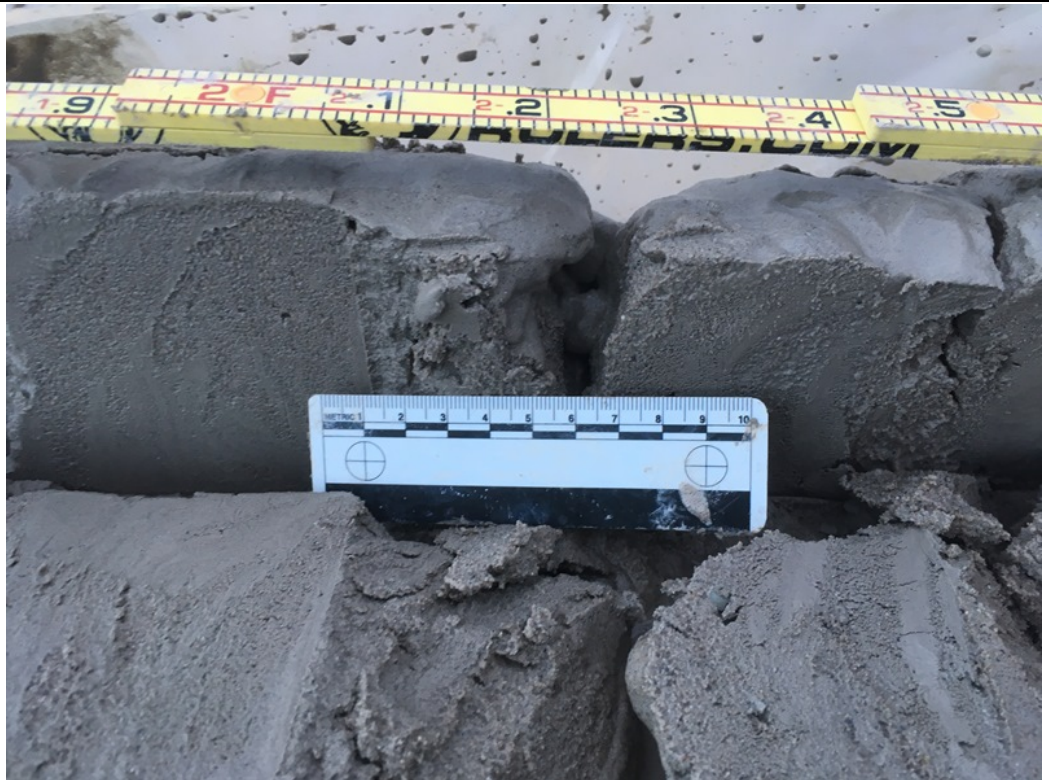


Photo No.
74

Date:
01/30/17

Direction Photo Taken:

N/A

Description:

Silt Laminations within sandy unit.

PC B8: 108.5ft bgs



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 75	Date: 01/31/17
Direction Photo Taken: N/A	
Description: PC B8: 110-112ft (1)	



Photo No. 76	Date: 01/31/17
Direction Photo Taken: N/A	
Description: PC B8: 110-112ft (2)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 77	Date: 01/31/17
Direction Photo Taken: N/A	
Description: PC B8: 116-120ft (1) * No Recovery of sediments from 112-116ft bgs	



Photo No. 78	Date: 01/31/17
Direction Photo Taken: N/A	
Description: PC B8: 116-120ft (2)	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
79

Date:
01/31/17

Direction Photo Taken:

N/A

Description:

PC B8: 116-120ft (3)



Photo No.
80

Date:
01/31/17

Direction Photo Taken:

N/A

Description:

Thin silt bed within medium sandy interval.

PC B8: 118.5ft bgs



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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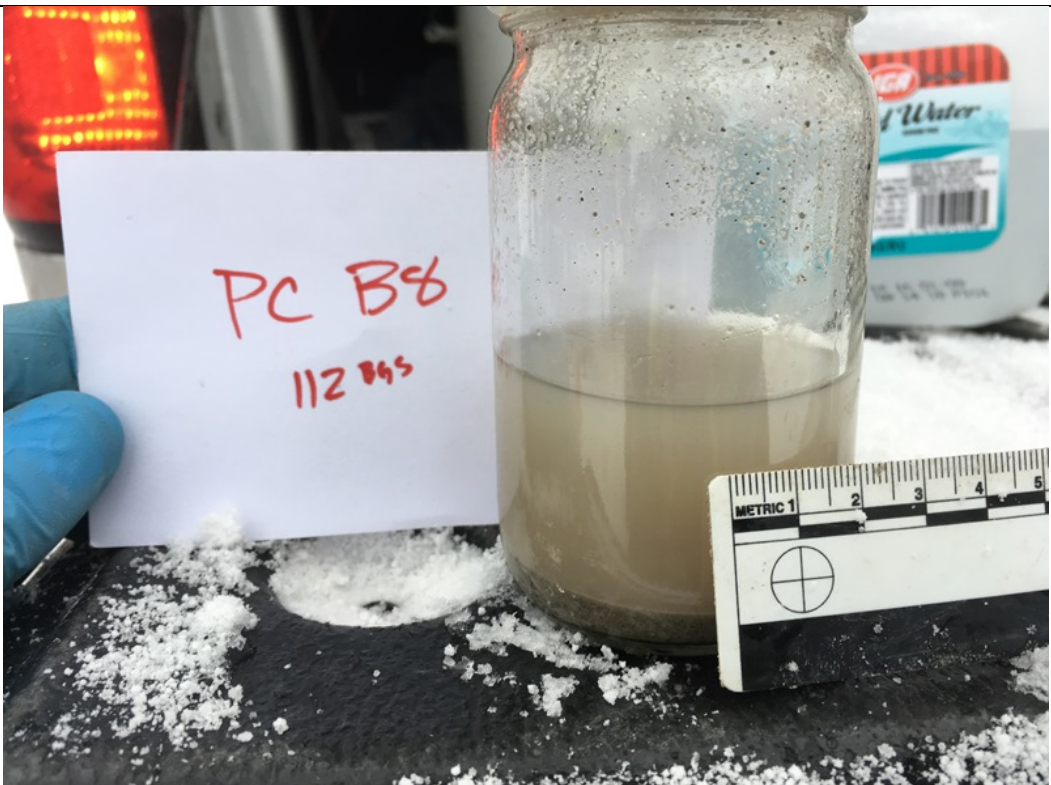
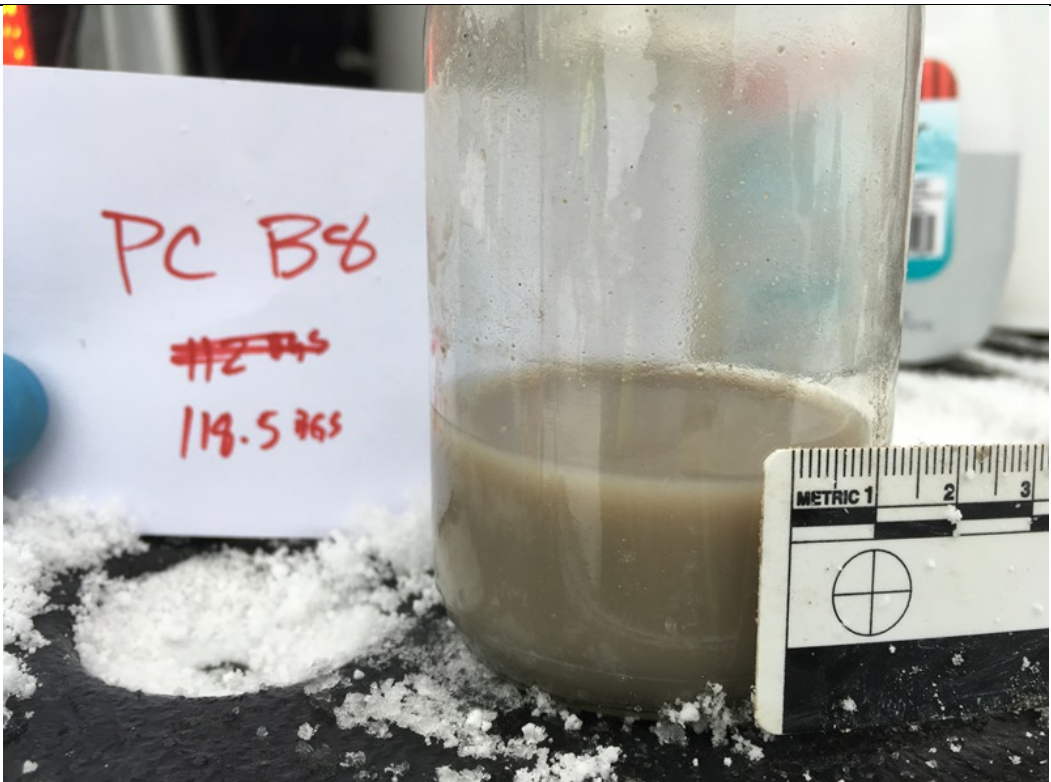
Photo No. 81	Date: 01/31/17	
Direction Photo Taken: N/A		
Description: Sediment Settling Jar. PC B8: 112ft bgs		

Photo No. 82	Date: 01/31/17	
Direction Photo Taken: N/A		
Description: Sediment Settling Jar. PC B8: 118.5ft bgs		

Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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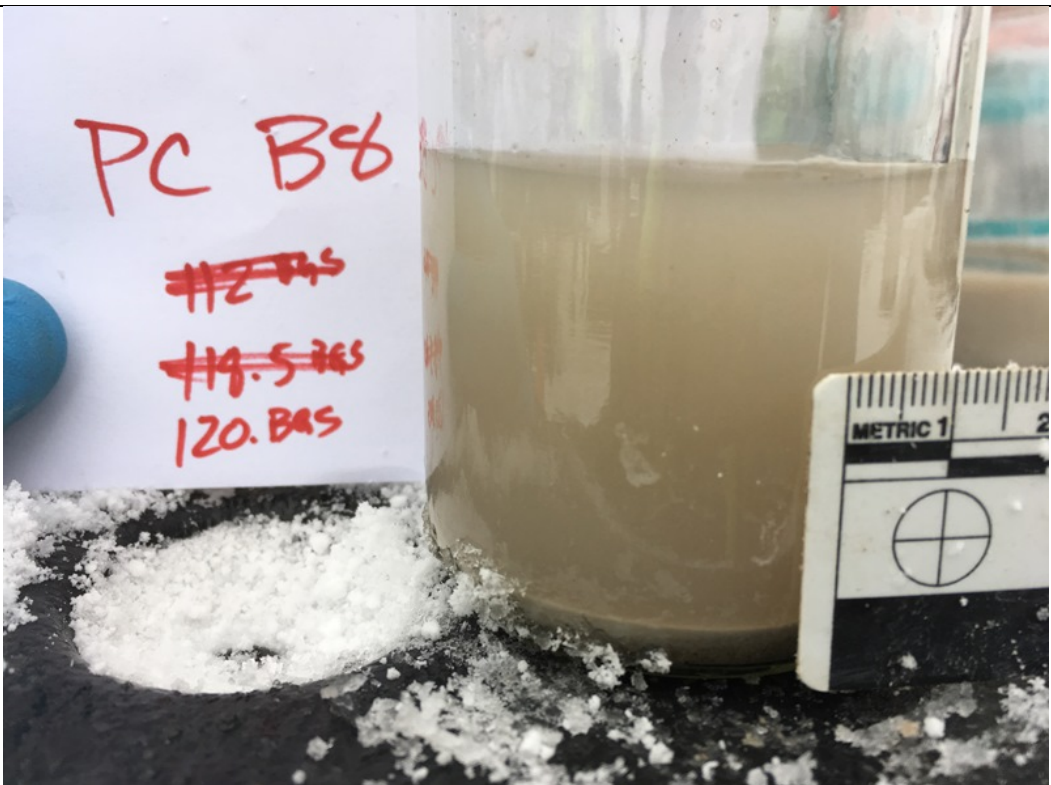
Photo No. 83	Date: 01/31/17	
Direction Photo Taken: N/A		
Description: Sediment Settling Jar. PC B8: 120ft bgs		

Photo No. 84	Date: 01/31/17	
Direction Photo Taken: N/A		
Description: 100mm Cobble lodged in drill shoe after drilling 120-130ft interval. No recovery of Sediments throughout this interval.		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
85

Date:
01/31/17

Direction Photo Taken:

N/A

Description:

PC B8: 130-133ft (1)



Photo No.
86

Date:
01/31/17

Direction Photo Taken:

N/A

Description:

PC B8:130-133ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 87	Date: 01/31/17	
Direction Photo Taken: N/A		
Description: PC B8: 133-136ft (1)		

Photo No. 88	Date: 01/31/17	
Direction Photo Taken: N/A		
Description: PC B8: 133-136ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 89	Date: 01/31/17	
Direction Photo Taken: N/A		
Description: PC B8: 136-140ft (1)		

Photo No. 90	Date: 01/31/17	
Direction Photo Taken: N/A		
Description: PC B8: 136-140ft (2)		

Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 91	Date: 01/31/17
Direction Photo Taken: N/A	
Description: PC B8: 136-140ft (3)	



Photo No. 92	Date: 01/31/17
Direction Photo Taken: N/A	
Description: Dominant pebble size 5-30m. Field plasticity test – High Plasticity PC B8: 136-140ft Interval	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
93

Date:
01/31/17

Direction Photo Taken:

N/A

Description:

PC B8: 140-143ft (1)



Photo No.
94

Date:
01/31/17

Direction Photo Taken:

N/A

Description:

PC B8: 140-143ft (2)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
95

Date:
01/31/17

Direction Photo Taken:

N/A

Description:

Thin Sand bed within Clay unit.

PC B8: 141.5ft bgs



Photo No.
96

Date:
01/31/17

Direction Photo Taken:

N/A

Description:

PC B8: 143-146.5ft (1)



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 97	Date: 01/31/17
Direction Photo Taken: N/A	
Description: PC B8: 143-146.5ft (2)	



Photo No. 98	Date: 01/31/17
Direction Photo Taken: N/A	
Description: Coarse sand interbedded within clay unit. PC B8: 143ft bgs	



Project Name: MDEQ Wurtsmith	Site Location: Oscoda, MI	Project No. 60518528
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Photo No. 99	Date: 01/31/17	
Direction Photo Taken: N/A		
Description: PC B8: 146.5-150ft (1)		

Photo No. 100	Date: 01/31/17	
Direction Photo Taken: N/A		
Description: PC B8: 146.5-150ft (2)		

Project Name:
MDEQ Wurtsmith

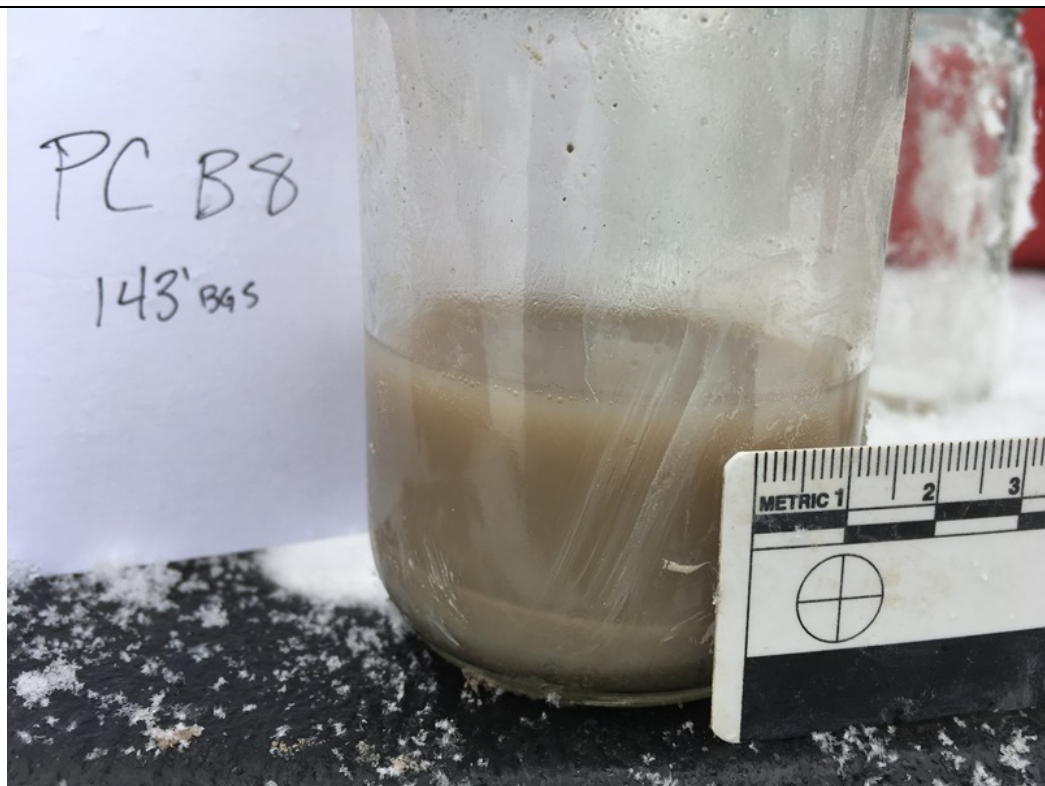
Site Location:
Oscoda, MI

Project No.
60518528

Photo No. 101	Date: 01/31/17
Direction Photo Taken: N/A	
Description: PC B8: 148ft bgs	



Photo No. 102	Date: 01/31/17
Direction Photo Taken: N/A	
Description: Sediment Settling Jar PC B8: 143ft bgs	



Project Name:
MDEQ Wurtsmith

Site Location:
Oscoda, MI

Project No.
60518528

Photo No.
103

Date:
01/31/17

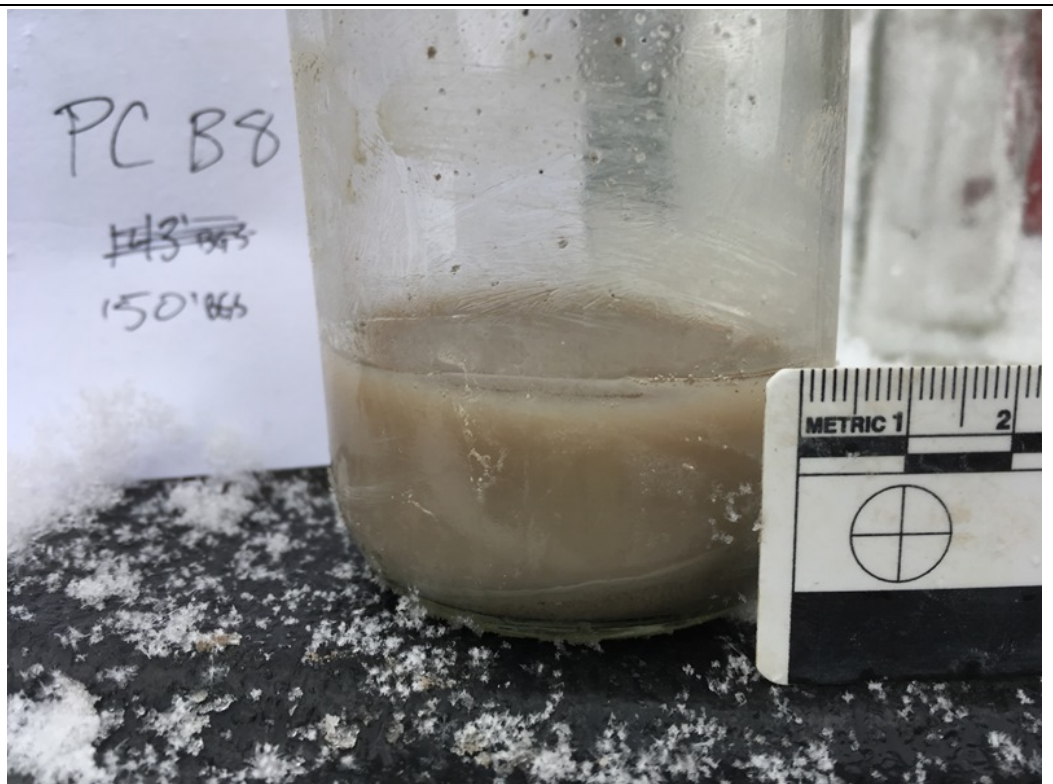
**Direction Photo
Taken:**

N/A

Description:

Sediment Settling Jar.

PC B8: 150ft bgs



Appendix C



Well ID: PC B1 34-36 FT

Company: **AECOM**



Client: MDEQ
Location: Oscoda, MI - Wurtsmith AFB
Project #: 60518528

Label on well?	YES	NO	Is cap locked?	YES	NO
Is reference mark visible?	YES	NO	Standing water present?	YES	NO
Condition of well	<u>N/A</u>		Any indication of surface runoff in well?	YES	NO
Weather	<u>Cloudy</u>		Air Temperature:	<u>47°F</u>	
Notes:	<hr/> <hr/> <hr/>				

Date: 2/22/17 Time: 10:38 AMPM

Depth to Water: 10.8

Length of Well: 24'

Measured with: Electronic Tape Chalk & Steel Tape

Decontamination: Pre Steam Cleaned DI Water Other

Date: 2/22/17 Begin Time: 10:40 AM/PM Purging Equipment: MEGA Hanson XL

End Time: 11:53 AM/PM Decontamination: Pre Steam Cleaned DI Water Other
New Tubing

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 150 ⁵⁵ gallons
 Actual purge flow rate 2 ⁵⁵ ml/min or well/min

Notes

100g/L INJECTED BETWEEN 25-30 FT DGS

SHUT DOWN MANSOUR PUMP AFTER 150 gal PURED AT 11:53

PURGING WITH PERISTALTIC ONLY FOR PARAMETER RECORDING 364 ml/min

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: 12:00	0.6	11.95	7.91	399.0	54	7.28	11.1	-220.4
12:05	1.1	11.62	7.91	398.3	55	7.08	11.1	-227.9
12:10	1.6	11.56	7.94	399.4	53	6.83	11.1	-237.2
12:15	2.25	11.55	7.94	398.1	51	6.83	11.1	-232.2
12:20	2.75	11.55	7.95	397.9	54	6.75	11.1	-238.0
Final:								

Date: 2/22/17 Time: 12:20 AM/PM Method: PERISTALTIC
Appearance of Sample: Clear Actual Sample Flow Rate: 364 ml/min or L/hr

SAMPLE BOTTLE COLLECTED: XL 250mL HDPE PFC Scan

Name: Jim Breen Company: AECOM



Low Flow Ground Water Sample Collection Record

Client: MDEQ

Location: Oscoda, MI - Wurtsmith AFB

Project #: 60518528

Well ID:

PC B1 78-80FT

INSPECTION

Label on well?

YES

NO

Is reference mark visible?

YES

NO

Condition of well

N/A

Weather

Cloudy

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: 2/22/17

Time: 15:54

AM/PM

Depth to Water:

7.92

Measured with:

Electronic Tape

Chalk & Steel Tape

Length of Well:

80

Decontamination:

Pre Steam Cleaned

DI Water

Other

WELL PURGING

Date: 2/22/17

Begin Time:

15:55

AM/PM

Purging Equipment:

MEGA Monsoon XL

End Time:

16:42

AM/PM

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

80

gallons

Actual purge flow rate

1.75

ml/min or

L/min

gal/min

Notes:

40 Gals Water injected from 75-80 ft. purge 80 gal before
Recording parameters. Reduce purge flow rate at 16:42 to 720 mL/min
17:00 purge flow rate 600 mL/min

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: 16:45	0.4	24.55	7.86	4170	846	1.29	11.9	-490
16:50	1.5	23.57	7.97	4297	338	1.09	11.8	-556
16:55	3.0	20.45	7.98	4336	49	1.07	11.5	-574
17:00	3.5	19.05	7.99	4355	119	1.05	11.7	-531
17:05	5	18.15	8.02	4381	49	1.03	11.6	-516
17:10	6.1	17.55	8.03	4379	78	1.02	11.4	-567
17:15	7.5	17.18	8.04	4391	68	1.01	11.4	-580
17:20	9.0	16.75	8.05	4400	69	1.01	11.4	-572
Final:								

SAMPLE COLLECTION

Date: 2/22/17

Time: 17:20

AM/PM

Method

MEGA Monsoon XL

Appearance of Sample:

Cloudy

Actual Sample Flow Rate:

600

ml/min or
L/min

SAMPLE BOTTLE COLLECTED:

x2 250mL HDPE PFC SAN + Dup for Test America PC B1 78-80 FT TA

SAMPLING PERSONNEL

Name:

Jim Russell

Company:

AECOM



Client: MDEQ
Location: Oscoda, MI - Wurtsmith AFB
Project #: 60518528

Label on well?	YES	NO	Is cap locked?	YES	NO
Is reference mark visible?	YES	NO	Standing water present?	YES	NO
Condition of well	<u>N/A</u>		Any indication of surface runoff in well?	YES	NO
Weather	<u>Clear</u>		Air Temperature:	<u>39°F</u>	
Notes:	<hr/> <hr/> <hr/> <hr/>				

Date: 2/27/17 Time: 14:40 AM/PM (P)

Depth to Water: 5.55 Measured with: Electronic Tape Chalk & Steel Tape

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

Date: 2/27/17 Begin Time: 14:42 AM/PM AM Purging Equipment: MEGA MANSION XL

End Time: 15:40 AM/PM AM Decontamination: Pre Steam Cleaned New Tubing DI Water Other

Notes	ft.	Length of well	Yield:	<u>HIGH</u> LOW
	ft.	- depth of water (before purge start)	If low, recovery time:	_____
	ft.	=length of water column		
		x conversion factor (2" well) 0.16	Actual volume purged	<u>90.5</u> gallons
	Gal.	=1 casing volume	Actual purge flow rate	<u>2.5</u> ml/min or gal/min
		<u>2100 gal injected BETWEEN 30-35 FT</u>		

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: 15:20	0.1	7.7	7.44	416.0	2074	3.33	10.5	-198.1
15:25	0.5	6.4	7.43	414.9	1561	3.38	10.5	-183.4
15:30	0.75	6.05	7.92	414.2	1377	3.39	10.1	-177.8
15:35	1.25	5.92	7.92	414.6	1363	3.32	10.2	-180.3
15:40	1.75	5.89	7.93	414.3	1330	3.23	10.1	-186.5
Final:								

Date: 2/27/17 Time: 15:40 AM/PM Method: PERISALTIC
Appearance of Sample: Cloudy Actual Sample Flow Rate: 2/00 ml/min or L/min

SAMPLE BOTTLE COLLECTED: x2 250mL HDPE PFC SCRN

Name: Jim Buzzell Company: **AECOM**



Low Flow Ground Water Sample Collection Record

Well ID: PC B2 20-22FT

Client: MDEQ
Location: Oscoda, MI - Wurtsmith AFB
Project #: 60518528

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 _____ Any indication of surface runoff in well? YES ☒ NO ☒
Weather _____ Air Temperature: _____
Notes: _____

STATIC WATER LEVEL PRIOR TO PURGING

Date: 2/27/17 Time: 16:12 AM/PM

Depth to Water: 8.0

Measured with:

Electronic Tape

Chalk & Steel Tape

Length of Well: 22

Decontamination:

Pre Steam Cleaned

DI Water

Other

WELL PURGING

Date: 2/27/17 Begin Time: 16:28 AM/PM

Purging Equipment:

PERISTALTIC

End Time: 17:20 AM/PM

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

4 gallons

Actual purge flow rate

332 ml/min or L/min

Notes: PURGED WELL DRY WITH MEGA MANSION XL (5 GAL) PERISTALTIC USE
ONLY PERISTALTIC AT 16:28

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: 16:40	1.10	16.2	8.12	434.3	387	1.41	10.6	-489.9
16:45	1.50	16.17	8.03	435.6	190	1.54	10.4	-469.1
16:50	1.75	16.01	8.05	435.7	131	1.69	10.3	-447.1
16:55	2.10	15.85	8.04	437.0	130	1.76	10.1	-439.4
17:00	2.50	15.72	8.02	436.7	79	1.88	10.3	-432.7
17:05	2.90	15.70	8.01	436.6	60	1.93	10.2	-425.9
17:10	3.25	15.75	8.00	436.4	47	2.07	10.3	-420.9
17:15	3.60	15.82	8.00	435.7	44	2.27	10.3	-411.7
17:20	4.00	15.85	8.00	435.5	42	2.29	10.3	-411.3
Final:								

SAMPLE COLLECTION

Date: 2/27/17 Time: 17:20 AM/PM

Method: PERISTALTIC

Appearance of Sample: CLEAR

Actual Sample Flow Rate: 332 ml/min or L/min

SAMPLE BOTTLE COLLECTED: x2 250 mL HDPE PFC SCREW PC B2 20-22FT TA

SAMPLING PERSONNEL

Name: Jim Buzzell

Company: AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC B2 8-10ft

Client: MDEQ
Location: Oscoda, MI - Wurtsmith AFB
Project #: 60518528

INSPECTION

Label on well? ~~YES~~ NO
Is reference mark visible? ~~YES~~ NO
Condition of well N/A
Weather Clear
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: 2/27/17 Time: 17:39 AM/PM
Depth to Water: 5.42
Length of Well: 10.0

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

WELL PURGING

Date: 2/27/17 Begin Time: 17:40 AM/PM
End Time: 18:15 AM/PM
Purging Equipment: PERISTALTIC pump
Decontamination: Pre Steam Cleaned DI Water Other
New Tubing

CALCULATION OF 1 CASING VOLUME

~~X~~ ft. Length of well
~~X~~ ft. - depth of water (before purge start)
~~X~~ ft. = length of water column
~~X~~ 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 460 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: <u>17:50</u>	<u>1.45</u>	<u>5.57</u>	<u>8.27</u>	<u>420.1</u>	<u>924</u>	<u>1.21</u>	<u>9.3</u>	<u>-610.6</u>
<u>17:55</u>	<u>2.15</u>	<u>5.55</u>	<u>8.24</u>	<u>417.9</u>	<u>725</u>	<u>1.18</u>	<u>9.3</u>	<u>-615.8</u>
<u>18:00</u>	<u>2.55</u>	<u>5.53</u>	<u>8.09</u>	<u>410.1</u>	<u>307</u>	<u>1.02</u>	<u>9.0</u>	<u>-612.5</u>
<u>18:05</u>	<u>3.40</u>	<u>5.54</u>	<u>8.14</u>	<u>414.7</u>	<u>200</u>	<u>1.14</u>	<u>9.0</u>	<u>-596.2</u>
<u>18:10</u>	<u>3.90</u>	<u>5.53</u>	<u>8.17</u>	<u>414.3</u>	<u>149</u>	<u>1.18</u>	<u>8.9</u>	<u>-596.9</u>
<u>18:15</u>	<u>4.40</u>	<u>5.53</u>	<u>8.15</u>	<u>413.5</u>	<u>170</u>	<u>1.18</u>	<u>8.9</u>	<u>-590.8</u>
Final:								

SAMPLE COLLECTION

Date: 2/27/17 Time: 18:15 AM/PM Method: PERISTALTIC
Appearance of Sample: Cloudy Actual Sample Flow Rate: 460 ml/min or L/min

SAMPLE BOTTLE COLLECTED: x2 250mL HDPE PFC Scan

SAMPLING PERSONNEL

Name: Jim Brubell Company: AECOM



Low Flow Ground Water Sample Collection Record

Client: MDEQ
Location: Oscoda, MI - Wurtsmith AFB
Project #: 60518528

Well ID: PC B3 28-30FT

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 N/A Any indication of surface runoff in well? YES ~~NO~~
Weather LIGHT RAIN Air Temperature: 38°F

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 2/24/17 Time: 12:54 AM/PM
Depth to Water: 2.58 Measured with: Electronic Tape Chalk & Steel Tape
Length of Well: Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 2/28/17 Begin Time: 13:00 AM/PM Purging Equipment: MEGA Hanson XL
End Time: 14:10 AM/PM Decontamination: Pre Steam Cleaned DI Water Other
New Tubing

CALCULATION OF 1 CASING VOLUME

ft. Length of well Yield: HIGH LOW
ft. - depth of water (before purge start) If low, recovery time: N/A
ft. = length of water column
x conversion factor (2" well) 0.16
Gal. = 1 casing volume Actual volume purged 129.60 gallons
Actual purge flow rate 2.0 ml/min or gal/min

Notes: PURGE 2/25 gal BEFORE SAMPLE
SHUT DOWN MEGA Hanson XL AT 14:02

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	0.0	22.12	7.91	422.4	23	1.92	10.0	-422.2
13:55	0.25	22.45	7.91	422.1	23	1.94	10.0	-405.1
14:00	0.60	22.55	7.92	421.4	30	2.12	9.9	-396.0
14:05	1.00	14.70	7.92	423.2	340	1.95	10.0	-386.9
14:10	1.55	10.20	7.91	424.9	52	1.68	10.1	-378.4
14:15	2.10	8.10	7.92	425.2	41	1.57	10.0	-386.8
14:20	2.60	7.03	7.93	425.0	52	1.48	10.0	-414.6
14:25	3.10	6.60	7.93	424.8	60	1.49	10.1	-438.9
14:30	3.75	6.65	7.93	424.3	29	1.47	10.1	-443.5
14:35	4.20	6.80	7.94	424.8	30	1.38	10.0	-452.5
Final: 14:40	4.60	6.88	7.94	425.3	32	1.35	10.1	-455.6

SAMPLE COLLECTION

Date: 2/28/17 Time: 14:40 AM/PM Method: PERISTALTIC
Appearance of Sample: CLEAR Actual Sample Flow Rate: 304 ml/min or L/min

SAMPLE BOTTLE COLLECTED: x 4 250mL HDPE PFC SAN PC B3 28-30FT TA

SAMPLING PERSONNEL

Name: Jim Brunk Company: AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC B3 7-9F

Client: MDEQ
Location: Oscoda, MI - Wurtsmith AFB
Project #: 60518528

INSPECTION

Label on well? YES ☒ NO ☒
Is reference mark visible? YES ☒ NO ☒
Condition of well N/A
Weather Heavy Rain
Notes:
Is cap locked? YES ☒ NO ☒
Standing water present? YES ☒ NO ☒
Any indication of surface runoff in well? YES ☒ NO ☒
Air Temperature: 39°F

STATIC WATER LEVEL PRIOR TO PURGING

Date: 2/28/17 Time: 16:44 AM/PM
Depth to Water: 2.71
Length of Well: 9
Measured with: Electronic Tape
Decontamination: Pre Steam Cleaned Chalk & Steel Tape
DI Water Other

WELL PURGING

Date: 2/28/17 Begin Time: 16:45 AM/PM
End Time: 17:25 AM/PM
Purging Equipment: PERISTALTIC
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
Actual purge flow rate 304 - 376 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: 17:00	1.5	3.28	7.83	435.1	416	1.26	7.4	-574.7
17:05	1.75	3.28	7.70	433.8	156	1.54	7.2	-579.5
17:10	2.25	3.35	7.74	437.4	134	1.30	7.1	-571.2
17:15	2.60	3.4	7.74	443.3	102	1.27	7.0	-558.4
17:20	3.00	3.48	7.74	444.9	95	1.26	7.0	-539.5
17:25	3.40	3.51	7.73	446.3	91	1.29	6.9	-509.1
Final:								

SAMPLE COLLECTION

Date: 2/28/17 Time: 17:25 AM/PM Method: PERISTALTIC
Appearance of Sample: Cloudy
Actual Sample Flow Rate: 376 ml/min or 304 L/min

SAMPLE BOTTLE COLLECTED: R2 250mL HDPE PFC

SAMPLING PERSONNEL

Name: Jim Burrell Company: AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC BS 35-37 ft

Client:
Location:
Project #:

INSPECTION

Label on well? YES ~~NO~~
Is reference mark visible? YES ~~NO~~
Condition of well N/A
Weather Overcast
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: 2/6/17 Time: 10:10 AM/PM
Depth to Water: 22.65 - 4.0 = 18.65 BGS Measured with: Electronic Tape Chalk & Steel Tape
Length of Well: 37 Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 2/6/17 Begin Time: 10:15 AM/PM Purging Equipment: PERISTALTIC PUMP
End Time: _____ AM/PM Decontamination: Pre Steam Cleaned DI Water Other

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 300 ml/min or
L/min

Notes: _____

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) ^{spec} US/cm +/- 3%	Turbidity (NTU) +/- 10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: <u>10:53</u>	<u>1.0</u>	<u>21.2</u>	<u>7.04</u>	<u>966</u>	<u>912.5</u>	<u>1.46</u>	<u>7.1</u>	<u>-509.6</u>
<u>10:55</u>	<u>1.35</u>	<u>21.4</u>	<u>7.04</u>	<u>968</u>	<u>770.2</u>	<u>1.43</u>	<u>7.0</u>	<u>-506.9</u>
<u>11:00</u>	<u>1.70</u>	<u>21.6</u>	<u>7.03</u>	<u>969</u>	<u>613</u>	<u>1.53</u>	<u>6.6</u>	<u>-507.2</u>
<u>11:05</u>	<u>2.00</u>	<u>21.75</u>	<u>7.04</u>	<u>969</u>	<u>377</u>	<u>1.41</u>	<u>5.2</u>	<u>-503.4</u>
Final:								

SAMPLE COLLECTION

Date: 2/6/17 Time: 11:05 AM/PM Method: PERISTALTIC
Appearance of Sample: Cloudy Actual Sample Flow Rate: 140 ml/min or
L/min

SAMPLE BOTTLE COLLECTED: x2 250-ml HDPE

SAMPLING PERSONNEL

Name: Jim Buzzell Company: AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC B6 35-37'Client:
Location:
Project #:

INSPECTION

Label on well? ~~YES~~ NO
Is reference mark visible? ~~YES~~ NO
Condition of well: N/A
Weather: SnowingIs cap locked? ~~YES~~ NO
Standing water present? ~~YES~~ NO
Any indication of surface runoff in well? ~~YES~~ NO
Air Temperature: 30°F

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 2/5/17 Time: 12:58 AM/PMDepth to Water: 6.9 ft Bas
Length of Well: 37Measured with: Electronic Tape Chalk & Steel Tape
Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 2/5/17 Begin Time: 12:59 AM/PM Purging Equipment: MEGA Monsoon XL
End Time: 15:15 AM/PM Decontamination: Pre Steam Cleaned DI Water Other

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 volumeYield: HIGH LOW
If low, recovery time:Actual volume purged: 836 gallons
Actual purge flow rate: 0.75 ml/min or gal/minNotes: 40 gal pumped down hole while drilling 30-40 ft (Purge 80 prior to recording flow rate for parameters)

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) uS/cm +/- 3%	Turbidity (NTU) +/- 10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: <u>14:45</u>	<u>80</u>	<u>14.4</u>	<u>7.13</u>	<u>696</u>	<u>307</u>	<u>8.5 DO</u>	<u>9.4</u>	<u>-34</u>
<u>14:50</u>	<u>81.2</u>	<u>14.2</u>	<u>7.14</u>	<u>696</u>	<u>48.5</u>	<u>8.0 DO</u>	<u>9.1</u>	<u>-398</u>
<u>14:55</u>	<u>81.5</u>	<u>9.86</u>	<u>7.14</u>	<u>693</u>	<u>40.7</u>	<u>8.1 DO</u>	<u>8.0</u>	<u>-432</u>
<u>15:00</u>	<u>81.9</u>	<u>9.10</u>	<u>7.13</u>	<u>701</u>	<u>112</u>	<u>8.1 DO</u>	<u>9.2</u>	<u>-407</u>
<u>15:05</u>	<u>82.5</u>	<u>8.62</u>	<u>7.14</u>	<u>701</u>	<u>160</u>	<u>1.12</u>	<u>8.9</u>	<u>-491</u>
<u>15:10</u>	<u>83.45</u>	<u>8.36</u>	<u>7.15</u>	<u>700</u>	<u>363</u>	<u>1.13</u>	<u>8.7</u>	<u>-511</u>
<u>15:15</u>	<u>83.60</u>	<u>8.11</u>	<u>7.15</u>	<u>700</u>	<u>402</u>	<u>1.13</u>	<u>8.4</u>	<u>-513</u>
Final:								

SAMPLE COLLECTION

Date: 2/5/17 Time: 15:15 AM/PMMethod: MEGA Monsoon XLAppearance of Sample: CLEARActual Sample Flow Rate: 288 ml/min or L/minSAMPLE BOTTLE COLLECTED: x2 250mL HDPE PFC scan

SAMPLING PERSONNEL

Name: Jim BurrellCompany: AECOM



Low Flow Ground Water Sample Collection Record

Client: MDEQ
Location: OSCODA, MI
Project #: 60514528

Well ID: PC B7 71-73 FT

INSPECTION

Label on well? YES ~~NO~~
Is reference mark visible? YES ~~NO~~
Condition of well N/A
Weather Clear
Notes: _____
Is cap locked? YES ~~NO~~
Standing water present? YES ~~NO~~
Any indication of surface runoff in well? YES ~~NO~~
Air Temperature: 22°F

STATIC WATER LEVEL PRIOR TO PURGING

Date: 2/2/17 Time: 13:15 AM/PM AM
Depth to Water: 7.08 Measured with: Electronic Tape Chalk & Steel Tape
Length of Well: 73 Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 2/2/17 Begin Time: 13:17 AM/PM AM Purging Equipment: MEGA Monsoon XL
End Time: AM/PM 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 20 gallons
Actual purge flow rate 0.5 m/min or gal/min

Notes

Collect Duplicate Sample
Drawdown = 0.5' / 70 sec

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (µS/cm) ^{SPEC} µm/cm +/- 3%	Turbidity (NTU) +/- 10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 14:20	15	52.49	8.24	275.8	152	13.33	9.2	-122
14:25	15.4	52.94	8.21	281.8	148	12.87	8.15	-130
14:30	15.4	53.25	8.22	290.8	141	12.54	5.95	-147
14:35	16.2	53.60	8.07	312.1	118	11.38	6.67	88 -169
14:40	16.6	54.90	7.93	339.5	156	9.02	10.15	-205
14:45	17.4	57.70	8.08	298.3	64	10.29	10.15	-147.1
14:50	17.9	58.70	8.11	303.0	76	10.63	9.45	-154
14:55	18.5	60.05	8.08	302.6	72	10.42	8.49	-151
15:00	19.0	60.50	8.08	313.8	75	10.19	7.37	-163
15:05	19.6	60.95	8.02	328.5	77	9.83	6.89	-160
Final: 15:10	20.1	61.3	7.99	339.8	74	9.44	6.80	-191

SAMPLE COLLECTION

Date: 2/2/17 Time: 15:10 AM/PM AM Method: MEGA Monsoon XL
Appearance of Sample: Cloudy / Clear Actual Sample Flow Rate: 260 m/min or L/min

SAMPLE BOTTLE COLLECTED: 2 250 mL HDPE + Duplicate PFC

SAMPLING PERSONNEL

Name: Jim Buzzell Company: AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC 87 63-65F5

Client:
Location:
Project #:

INSPECTION

Label on well? YES ~~NO~~
Is reference mark visible? YES ~~NO~~
Condition of well N/A
Weather CLEAR
Notes:
Is cap locked? YES ~~NO~~
Standing water present? YES ~~NO~~
Any indication of surface runoff in well? YES ~~NO~~
Air Temperature: 25°F

STATIC WATER LEVEL PRIOR TO PURGING

Date: 2/2/17 Time: 15:42 AM/PM
Depth to Water: 6.73 Measured with: Electronic Tape Chalk & Steel Tape
Length of Well: 65 Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 2/2/17 Begin Time: 15:43 AM/PM Purging Equipment: MEGA Monsoon
End Time: 16:40 AM/PM 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 1 m/min or gal/min
Notes: * Flow stopped at 16:18

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: 16:15	20	6.6	7.26	493	34	0.46	7.42	-366
* 16:20	20.35	6.6	7.34	484	58	2.63	4.13	-157
16:25	20.95	6.685	7.12	491	34	0.54	7.62	-363
16:30	21.5	6.92	7.26	491.6	355	0.37	8.52	-407
16:35	22.0	6.92	7.35	491.1	340	0.15	8.03	-434
16:40	22.5	6.90	7.35	491.3	396	0.13	7.70	-442
Final:								

SAMPLE COLLECTION

Date: 2/2/17 Time: 16:40 AM/PM Method: MEGA Monsoon
Appearance of Sample: 13 Clear Cloudy Actual Sample Flow Rate: 490 ml/min or L/min
SAMPLE BOTTLE COLLECTED: x2 250mL HDPE + Duplicate

SAMPLING PERSONNEL

Name: Jim Burrell Company: AECOM

Low Flow Ground Water Sample Collection Record

Well ID: PC B7 56-58 Fr

Client:
Location:
Project #:

INSPECTION

Label on well? YES NO
Is reference mark visible? YES NO
Condition of well N/A
Weather Mostly Cloudy
Notes:

Is cap locked? YES NO
Standing water present? YES NO
Any indication of surface runoff in well? YES NO
Air Temperature: 15°F

Notes: _____

STATIC WATER LEVEL PRIOR TO PURGING

Date: 2/3/17 Time: 4:57 AM PM

Depth to Water: 4.9 ft

Measured with: Electronic Tape Chalk & Steel Tape

Length of Well: _____

Decontamination:	Pre Steam Cleaned	DI Water	Other
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WELL PURGING

Date: 2/3/17 Begin Time: 8:58 AM/PM Purging Equipment: MEGA MONITOR XL

End Time: 9:30 AM/PM Decontamination: Pre Steam Cleaned DI Water Other

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 10.0 gallons

Actual purge flow rate 1 ml/min or gal/hr

Notes was sample collected at 9:05 after 6 gal poured in

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: 9:15	7.95	17.55	6.63	699	1187	0.25	8.08	-465
9:20	8.75	18.05	6.61	691	1503	0.17	8.58	-470
9:25	9.50	16.15	6.70	683	417	0.14	6.05	-468
9:30	10.00	14.8	6.65	677	517	0.12	7.25	-468
Final:								

SAMPLE COLLECTION

Date: 2/3/17 Time: 9:30 AM/PM

Method MEGA version XL

Appearance of Sample: Clumpy

Actual Sample Flow Rate: 360 ml/min or /min

SAMPLE BOTTLE COLLECTED: K2 250 ml HDPE

SAMPLING PERSONNEL

Name: Jim Buzzell

Company: AFcom



Low Flow Ground Water Sample Collection Record

Well ID:

PC 87 33-35 FT

Client:
Location:
Project #:

INSPECTION

Label on well?

~~YES~~ NO

Is reference mark visible?

~~YES~~ NO

Condition of well

N/A

Weather

CLEAR

Is cap locked?

~~YES~~ NO

Standing water present?

~~YES~~ NO

Any indication of surface runoff in well?

~~YES~~ NO

Air Temperature:

20°F

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 2/3/17

Time: 10:01 AM/PM

Depth to Water:

33.6 ft 6.30

Measured with:

Electronic Tape

Chalk & Steel Tape

Length of Well:

35 ft

Decontamination:

Pre Steam Cleaned

DI Water

Other

WELL PURGING

Date: 2/3/17

Begin Time:

10:04

AM/PM

Purging Equipment:

PERISTALTIC PUMP

End Time:

AM/PM

Decontamination:

Pre Steam Cleaned

DI Water

Other

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

360 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: 10:10	1.0	6.33	7.70	382	4555	0.24	8.81	-533
10:15	1.5	6.15	7.89	379	5370	0.14	8.02	-539
10:20	1.95	6.01	7.87	382	3775	0.12	8.41	-538
10:25	2.40	5.9	7.88	387	4051	0.10	8.25	-537
10:30	2.90	5.9	7.85	387	3978	0.08	8.40	-531
Final:								

SAMPLE COLLECTION

Date: 2/3/17

Time: 10:30 AM/PM

Method

PERISTALTIC

Appearance of Sample:

Cloudy

Actual Sample Flow Rate:

360

ml/min or
L/min

SAMPLE BOTTLE COLLECTED:

x2 250 mL HDPE p/c scan

SAMPLING PERSONNEL

Name:

Jim Burrell

Company:

AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC B7 108-110Fr

Client:
Location:
Project #:

INSPECTION

Label on well? ~~YES~~ NO
Is reference mark visible? ~~YES~~ NO
Condition of well: N/A
Weather: PARTLY CLOUDY
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: 2/3/17 Time: 16:01 AM/PM
Depth to Water: 1.15 Measured with: Electronic Tape Chalk & Steel Tape
Length of Well: _____ Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 2/3/17 Begin Time: 16:03 AM/PM Purging Equipment: MEGA MANSION
End Time: _____ AM/PM Decontamination: Pre Steam Cleaned DI Water Other
New Tubing

CALCULATION OF 1 CASING VOLUME

~~ft.~~ Length of well Yield: HIGH LOW
~~ft.~~ - depth of water (before purge start) If low, recovery time: _____
~~ft.~~ =length of water column
x conversion factor (2" well) 0.16
Gal. =1 casing volume Actual volume purged 78.5 gallons
Actual purge flow rate 1.10 gal/min

Notes: 60 gal injected while drilling 100-110

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) ^{SPEC} <u>us/cm</u> +/-3%	Turbidity (NTU) +/-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 17:10	77.5	2.8	8.27	5423	65	0.37	6.65	-203
17:15	78.4	2.2	8.13	5412	88	0.26	6.11	-256
17:20	78.95	1.8	8.14	5427	126	0.23	4.40	-283
17:25	79.50	1.6	8.07	5447	192	0.21	3.70	-307
17:30	80.0	1.6	8.02	5421	300	0.20	3.66	-329
17:35	80.4	1.6	7.97	5449	407	0.19	3.75	-347
Final:								

SAMPLE COLLECTION

Date: 2/3/17 Time: 17:35 AM/PM Method: MEGA MANSION XL
Appearance of Sample: CLOUDY/BROWN Actual Sample Flow Rate: 320 ml/min or L/min

SAMPLE BOTTLE COLLECTED: x2 250ml HDPE PFC SLOW

SAMPLING PERSONNEL

Name: Jim Farrell Company: AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC B8 30-32 FTClient:
Location:
Project #:

INSPECTION

Label on well? YES ~~NO~~
Is reference mark visible? YES ~~NO~~
Condition of well N/A
Weather RAINING
Notes: _____
Is cap locked? YES ~~NO~~
Standing water present? YES ~~NO~~
Any indication of surface runoff in well? YES ~~NO~~
Air Temperature: 36°F

STATIC WATER LEVEL PRIOR TO PURGING

Date: 1/24/17 Time: 14:30 AM/PM AM
Depth to Water: 14.0 Measured with: Electronic Tape Chalk & Steel Tape
Length of Well: _____ Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 1/24/17 Begin Time: 14:33 AM/PM AM Purging Equipment: Mega Monsoon XL + Peristaltic
End Time: 15:15 AM/PM AM Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

ft. Length of well Yield: HIGH LOW
ft. - depth of water (before purge start) If low, recovery time: _____
ft. = length of water column
x conversion factor (2" well) 0.16
Gal. = 1 casing volume Actual volume purged 50 gallons
Actual purge flow rate 1.2 ml/min or gal/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: 15:20	50.35	14.0	6.89	193.4	7.7	0.22	11.13	-490.2
15:25	50.70	14.4	7.24	193.4	11.8	0.18	11.66	-510.9
15:30	51.05	14.1	7.55	192.6	96.9	0.13	11.31	-523.3
15:35	51.40	14.4	7.76	193.2	482	0.11	11.62	-541.2
15:40	51.75	14.4	7.92	192.8	363	0.09	10.18	-540.6
15:45	52.10	14.4	7.95	192.3	349	0.10	10.16	-544.2
15:50	52.45	14.4	7.98	193.1	331	0.08	9.45	-544.4
Final:								

SAMPLE COLLECTION

Date: 1/24/17 Time: 15:50 AM/PM AM Method: Mega Monsoon XL
Appearance of Sample: _____ Actual Sample Flow Rate: 280 ml/min or L/min

SAMPLE BOTTLE COLLECTED: K2 250 mL HDPE PFC SCAN

SAMPLING PERSONNEL

Name: _____ Company: _____



Low Flow Ground Water Sample Collection Record

Well ID: PC 88 19-21 FT

Client:
Location:
Project #:

INSPECTION

Label on well? YES ~~NO~~
Is reference mark visible? YES ~~NO~~
Condition of well N/A
Weather SNOWING / RAINING
Notes:
Is cap locked? YES ~~NO~~
Standing water present? YES ~~NO~~
Any indication of surface runoff in well? YES ~~NO~~
Air Temperature: 36°F

STATIC WATER LEVEL PRIOR TO PURGING

Date: 1/25/17 Time: 12:36 AM/PM
Depth to Water: 13.6 Measured with: Electronic Tape Chalk & Steel Tape
Length of Well: 21 Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 1/25/17 Begin Time: 12:38 AM/PM Purging Equipment: PERISTALTIC
End Time: AM/PM 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 340 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: 13:05	2	13.6	8.11	220.8	1268	0.35	10.62	-560
13:10	2.5	13.6	8.49	220.2	1841	0.15	10.86	-586
13:15	3.0	13.6	8.57	221.2	2080	0.10	10.69	-588
13:20	3.5	13.6	8.60	221.3	1104	0.09	10.75	-593
13:25	4.0	13.6	8.58	221.7	1030	0.07	10.74	-597
13:30	4.5	13.6	8.60	221.2	1005	0.06	10.65	-598
Final:								

SAMPLE COLLECTION

Date: 1/25/17 Time: 13:30 AM/PM Method: PERISTALTIC
Appearance of Sample: Actual Sample Flow Rate: 340 ml/min or L/min

SAMPLE BOTTLE COLLECTED: x2 250mL NDPE REC SEAN

SAMPLING PERSONNEL

Name: Jim Burge Company: AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC 88 24-26 FT

Client:
Location:
Project #:

INSPECTION

Label on well?

YES ☒ NO ☒

Is reference mark visible?

YES ☒ NO ☒

Condition of well

N/A

Weather

Mostly Cloudy

Notes:

PURGED 770 gal 1/24/17 Continue purging 330 gal

Is cap locked?

YES ☒ NO ☒

Standing water present?

YES ☒ NO ☒

Any indication of surface runoff in well?

YES ☒ NO ☒

Air Temperature:

31°F

STATIC WATER LEVEL PRIOR TO PURGING

Date: 1/25/17

Time: 7:55 AM/PM

Depth to Water:

14.0 ft

Length of Well:

26 ft

Measured with:

Electronic Tape

Chalk & Steel Tape

Decontamination:

Pre Steam Cleaned

DI Water

Other

WELL PURGING

Date: 1/25/17

Begin Time:

8:00 AM/PM

Purging Equipment:

Media Washdown XL

End Time:

11:43 AM/PM

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

330 gallons

Actual purge flow rate

1.5 gal/min or 30 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: 11:45	330.50	14.4	7.85	267.6	1.9	2.53	10.17	-378.8
11:50	331.00	14.4	7.83	267.6	1.9	2.44	10.29	-367.5
11:55	331.50	14.8	7.45	268.4	2.0	2.51	9.02	-366.8
12:00	331.95	14.8	7.83	268.4	2.1	2.22	7.92	-376.3
12:05	332.40	14.8	7.81	270.4	2.03	2.20	7.75	-374.5
12:10	332.90	14.6	7.40	270.4	2.00	2.20	7.61	-373.4
Final:								

SAMPLE COLLECTION

Date: 1/25/17

Time: 12:10 AM/PM

Method: PERISTALTIC

Appearance of Sample:

CLEAR

Actual Sample Flow Rate:

340

ml/min or L/min

SAMPLE BOTTLE COLLECTED:

K2 250ML HDPE PFC SLOW

SAMPLING PERSONNEL

Name:

Jim Pizzelli

Company:

AECOM

Low Flow Ground Water Sample Collection Record



Low Flow Ground Water Sample Collection Record

Well ID:

PC 306 106-108 Ft

Client:
Location:
Project #:

INSPECTION

Label on well?

YES ☒ NO ☒

Is reference mark visible?

YES ☒ NO ☒

Condition of well

N/A

Weather

PARTLY Cloudy

Is cap locked?

YES ☒ NO ☒

Standing water present?

YES ☒ NO ☒

Any indication of surface runoff in well?

YES ☒ NO ☒

Air Temperature:

PARTLY Cloudy / 26°F

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 2/1/17

Time: 8:47

AM/PM

Depth to Water:

6.73

Measured with:

Electronic Tape

Chalk & Steel Tape

Length of Well:

108

Decontamination:

Pre Steam Cleaned

DI Water

Other

WELL PURGING

Date: 2/1/17

Begin Time:

8:48

AM/PM

Purging Equipment:

MEGA Monsoon XL

End Time:

AM/PM

Decontamination:

Pre Steam Cleaned

DI Water

Other

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

600

ml/min or
l/min

Notes:

Collected ERI-020117-JB @ 12:15

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) @ 25°C +3%	Turbidity (NTU) +/-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 10:55	38	51.6	8.43	1546.1	6930	0.22	9.05	-503
11:00	39.8	51.75	8.22	1700	7130	0.16	8.28	-510
11:05	39.6	51.85	7.86	4204	2740	0.12	9.46	-532
11:10	40.4	53.13	7.92	4466	4384	0.08	9.16	-541
11:15	41.2	54.5	8.01	3092	2664	0.07	9.57	-546
11:20	42.0	55.65	8.12	2041	5654	0.07	10.08	-546
11:25	42.8	56.6	8.21	1442	6406	0.08	10.12	-541
11:30	43.6	56.5	8.25	1297	5975	0.09	9.7	-535
11:35	44.4	59.75	8.14	1763	7007	0.06	8.70	-533
11:40	45.2	59.80	8.08	2061	7393	0.05	8.27	-535
Final: 12:10	50.0	62.70	8.02	2338	6738	0.05	9.72	-534

SAMPLE COLLECTION

Date: 2/1/17

Time: 12:10

AM/PM

Method

MEGA Monsoon XL

Appearance of Sample:

Cloudy / Brown

Actual Sample Flow Rate:

600

ml/min or
l/min

SAMPLE BOTTLE COLLECTED:

x2 250ml HDPE

SAMPLING PERSONNEL

Name:

Jim Burrell

Company:

AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC B9 39-41 ftClient:
Location:
Project #:

INSPECTION

Label on well? ~~YES~~ NO
Is reference mark visible? ~~YES~~ NO
Condition of well: 10/1A
Weather: FogIs cap locked? ~~YES~~ NO
Standing water present? ~~YES~~ NO
Any indication of surface runoff in well? ~~YES~~ NO
Air Temperature: 39°FNotes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 1/22/17 Time: 16:04 AM/PMDepth to Water: 22.9 - 3.4 = 19.5Length of Well: 41Measured with: Electronic Tape Chalk & Steel Tape
Decontamination: Pre Steam Cleaned DI Water Other

WELL PURGING

Date: 1/22/17 Begin Time: 16:10 AM/PM Purging Equipment: Mega Monsoon XL
End Time: 16:45 AM/PM Decontamination: Pre Steam Cleaned DI Water Other

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: 52.5 gallons
Actual purge flow rate: 1.5 ml/min or gal/minNotes:

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: 16:50	56.25	19.44	7.38	204.3	1441	0.25	10.77	-530.9
16:55	56.50	19.44	7.58	207.9	2537	0.25	12.12	-555.5
17:00	56.75	19.44	7.84	206.6	2341	0.16	11.89	-565.9
17:05	56.90	19.44	7.95	205.9	2151	0.12	11.68	-569.3
17:10	57.0	19.44	8.03	206.1	2220	0.09	11.70	-574.2
17:15	57.15	19.44	8.08	205.8	2130	0.08	11.54	-576.6
Final:								

SAMPLE COLLECTION

Date: 1/22/17 Time: 17:15 AM/PM Method: Mega Monsoon XLAppearance of Sample: Cloudy Actual Sample Flow Rate: 340 ml/min or l/minSAMPLE BOTTLE COLLECTED: x2 250ml HDPE PFC SCAN

SAMPLING PERSONNEL

Name: Jim Bazzell Company: AECOM22.44
3.4 19.44



Low Flow Ground Water Sample Collection Record

Well ID: PC B9 34-36 FTClient:
Location:
Project #:

INSPECTION

Label on well?

~~YES~~ NO

Is reference mark visible?

~~YES~~ NO

Condition of well

N/A

Weather

Overcast

Is cap locked?

~~YES~~ NO

Standing water present?

~~YES~~ NO

Any indication of surface runoff in well?

~~YES~~ NO

Air Temperature:

37°F

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 1/23/17Time: 8:40 AM/PM

Depth to Water:

18.90

Measured with:

Electronic Tape

Chalk & Steel Tape

Length of Well:

36'

Decontamination:

Pre Steam CleanedDI Water

Other

WELL PURGING

Date: 1/23/17

Begin Time:

8:45AM/PM

Purging Equipment:

Mega Monsoon XL

End Time:

9:25AM/PM

Decontamination:

Pre Steam CleanedDI Water

Other

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:

N/A

Actual volume purged

80

gallons

Actual purge flow rate

~2

min/min or GAL/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: <u>9:25</u>	<u>80</u>	<u>18.92</u>	<u>6.05</u>	<u>199.4</u>	<u>90</u>	<u>0.16</u>	<u>9.87</u>	<u>-553.0</u>
<u>9:30</u>	<u>80.15</u>	<u>18.92</u>	<u>7.86</u>	<u>191.3</u>	<u>61</u>	<u>0.16</u>	<u>9.89</u>	<u>-491.8</u>
<u>9:35</u>	<u>80.30</u>	<u>18.92</u>	<u>7.91</u>	<u>192.2</u>	<u>49</u>	<u>0.16</u>	<u>9.89</u>	<u>-492.0</u>
<u>9:40</u>	<u>80.50</u>	<u>18.92</u>	<u>7.93</u>	<u>192.3</u>	<u>66</u>	<u>0.15</u>	<u>9.90</u>	<u>-495.2</u>
<u>9:45</u>	<u>80.75</u>	<u>18.92</u>	<u>8.00</u>	<u>194.6</u>	<u>40</u>	<u>0.14</u>	<u>9.79</u>	<u>-492.0</u>
<u>9:50</u>	<u>81.00</u>	<u>18.92</u>	<u>8.04</u>	<u>194.7</u>	<u>37</u>	<u>0.14</u>	<u>9.80</u>	<u>-499.0</u>
<u>9:55</u>	<u>81.25</u>	<u>18.92</u>	<u>8.08</u>	<u>195.4</u>	<u>38</u>	<u>0.14</u>	<u>9.81</u>	<u>-494.9</u>
Final:								

SAMPLE COLLECTION

Date: 1/23/17Time: 9:55 AM/PM

Method:

PERISTALTIC

Appearance of Sample:

CLEAR

Actual Sample Flow Rate:

240ml/min or L/min

SAMPLE BOTTLE COLLECTED:

x2 250ml HDPE PFC 500ml

SAMPLING PERSONNEL

Name:

Jim Brezeli

Company:

AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC B9 19-21 frClient:
Location:
Project #:

INSPECTION

Label on well? YES ~~NO~~
Is reference mark visible? YES ~~NO~~
Condition of well N/A
Weather OVERCAST
Notes: _____

_____Is cap locked? YES ~~NO~~
Standing water present? YES ~~NO~~
Any indication of surface runoff in well? YES ~~NO~~
Air Temperature: 37°F

STATIC WATER LEVEL PRIOR TO PURGING

Date: 1/23/17 Time: 14:26 AM/PM
Depth to Water: 10.6 ft Measured with: Electronic Tape Chalk & Steel Tape
Length of Well: 21 ft Decontamination: Pre Steam Cleaned DI Water Other _____

WELL PURGING

Date: 1/23/17 Begin Time: 14:30 AM/PM Purging Equipment: PERISTALTIC
End Time: _____ AM/PM Decontamination: Pre Steam Cleaned DI Water Other New Tubing

CALCULATION OF 1 CASING VOLUME

ft. Length of well Yield: HIGH LOW
ft. - depth of water (before purge start) If low, recovery time: _____
ft. = length of water column
x conversion factor (2" well) 0.16
Gal. = 1 casing volume Actual volume purged _____ gallons
Actual purge flow rate 240 ml/min or L/minNotes: _____

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: <u>14:45</u>	<u>0.95</u>	<u>10.5</u>	<u>8.51</u>	<u>212.8</u>	<u>735</u>	<u>0.40</u>	<u>10.61</u>	<u>-530.1</u>
<u>14:50</u>	<u>1.25</u>	<u>10.5</u>	<u>8.70</u>	<u>212.4</u>	<u>341</u>	<u>0.37</u>	<u>10.83</u>	<u>-539.1</u>
<u>14:55</u>	<u>1.55</u>	<u>10.5</u>	<u>8.62</u>	<u>213.1</u>	<u>164</u>	<u>0.32</u>	<u>10.85</u>	<u>-540.2</u>
<u>15:00</u>	<u>1.85</u>	<u>10.5</u>	<u>8.60</u>	<u>212.9</u>	<u>35</u>	<u>0.35</u>	<u>10.84</u>	<u>-538.4</u>
<u>15:05</u>	<u>2.15</u>	<u>10.5</u>	<u>8.58</u>	<u>212.5</u>	<u>33</u>	<u>0.34</u>	<u>10.81</u>	<u>-530.2</u>
<u>15:10</u>	<u>2.45</u>	<u>10.5</u>	<u>8.57</u>	<u>212.4</u>	<u>31</u>	<u>0.33</u>	<u>10.80</u>	<u>-527.1</u>
Final:								

SAMPLE COLLECTION

Date: 1/23/17 Time: 15:10 AM/PM Method: PERISTALTIC
Appearance of Sample: CLEAR Actual Sample Flow Rate: 240 ml/min or L/minSAMPLE BOTTLE COLLECTED: 2 250 mL HDPE PEC 924N

SAMPLING PERSONNEL

Name: Jim Brzgal Company: Aecom



Client: MDEA
Location: PC 312
Project #: 60514524

Label on well?	YES	NO
Is reference mark visible?	YES	NO
Condition of well	#1A	
Weather	Cloudy	

Is cap locked? YES NO
Standing water present? YES NO
Any indication of surface runoff in well? YES NO
Air Temperature: 34°F

Notes: _____

Date: 1/14/17 Time: 9:43 AM/PM
Depth to Water: 4.53
Length of Well: 16.00

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

Date: 1/16/17 Begin Time: 9:46 AM/PM Purging Equipment: PERISTALTIC
End Time: 9:55 AM/PM Decontamination: Pre Steam Cleaned DI Water Other
New Tubing

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 412 ml/min or l/min

Notes	Collected Dup 1
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Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	D.O. (mg/L)	Temp (°C)	ORP
9:55			+/- 0.1	+ -3%	+ -10%	+/- 10%	+/- 5%	+/- 10 mV
Start: 10:00		4.53	6.91	513.4	577	0.65	5.61	-583.6
10:00		4.53	6.92	511.1	265	0.47	5.56	-518.4
10:05		4.53	6.92	508.6	176	0.44	5.71	-495.0
Final:								

Date: 1/15/17 Time: AM/PM Method: PERISTALTIC
Appearance of Sample: Actual Sample Flow Rate: 340 ml/min or L/min

SAMPLE BOTTLE COLLECTED: x2 HDPE TFC SCNN

Name: Jim Burrell Company: Accom



Client:
Location:
Project #:

Label on well?	YES	NO
Is reference mark visible?	YES	NO
Condition of well	N/A	
Weather	Overcast	

Is cap locked? YES NO
Standing water present? YES NO
Any indication of surface runoff in well? YES NO
Air Temperature: 35°F

Notes: _____

Date: 1/15/17 Time: AM/PM

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

Date: 1/16/17 Begin Time: 12:03 AM/PM PM Purging Equipment: MEGA Monsoon XL
End Time: 16:53 AM/PM PM Decontamination: Pre Steam Cleaned DI Water Other
New Tubing

20	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 $\frac{200}{159.1}$ gallons
Actual purge flow rate $\frac{1.75 \text{ gal/min}}{1.75 \text{ gal/min}}$ gal/min or L/min

Notes _____

Time	Volume (gallons)	Depth to Water (Feet) <small><0.33'</small>	pH (SU) <small>+/- 0.1</small>	Conductivity (mS/cm) <small>+ -3%</small>	Turbidity (NTU) <small>+ -10%</small>	D.O. (mg/L) <small>+/- 10%</small>	Temp (°C) <small>+/- 5%</small>	ORP <small>+/- 10 mV</small>
Start: 16:55			6.97	570.6	28.45	0.62	6.79	-398.1
17:00			6.99	573.2	14.0	0.4	8.76	-425.8
Final:								

Date: 1/14/17 Time: 17.00 AM/PM

Appearance of Sample: Clear Actual Sample Flow Rate: 380 ml/min or L/min

SAMPLE BOTTLE COLLECTED: x2 HDPE PFC SWIN

Name: Jim Brown Company: Acum

Low Flow Ground Water Sample Collection Record

Well ID: PC B13 8-10 FT

Client:
Location:
Project #:

INSPECTION

Label on well?	YES	NO
Is reference mark visible?	YES	NO
Condition of well	n/a	
Weather	OVERCAST	

Is cap locked?	YES	NO
Standing water present?	YES	NO
Any indication of surface runoff in well?	YES	NO
Air Temperature:	35°F	

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 1/20/17 Time: 11:45 AM/PM

Depth to Water:	<u>5.90'</u>
Length of Well:	10.00

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

WELL PURGING

Date: 1/20/17 Begin Time: 11:47 AM/PM Purging Equipment: PERISTALTIC PUMP
End Time: 12:30 AM/PM 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 3.5 gallons
Actual purge flow rate 600 ml/min or L/min

Notes _____

Time	Volume (gallons)	Depth to Water (Feet) ≤0.33'	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	D.O. (mg/L)	Temp (°C)	ORP
			+/- 0.1	+/- 3%	+/- 10%	+/- 10%	+/- 5%	+/- 10 mV
Start: 12:10	1.5	5.9	6.05	453	409	0.52	9.52	-485
12:15	2.0	5.9	6.54	451	163	0.32	8.97	-499
12:20	2.5	5.9	6.80	453	84.8	0.25	8.73	-485
12:25	3.0	5.9	6.91	451	36.5	0.21	8.37	-499
12:30	3.5	5.9	6.95	457.9	29	0.19	8.33	-503
Final:								

SAMPLE COLLECTION

Date: 12/17 Time: 12:30 AM/PM

Method PERISTALTIC

Appearance of Sample: CLEAR

Actual Sample Flow Rate: 420 ml/min or l/min

SAMPLE BOTTLE COLLECTED: x2 250mL HDPE PFC SCAN

SAMPLING PERSONNEL

Name: Jan Brual

Company: AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC B13 14-20 FT

Client:
Location:
Project #:

INSPECTION

Label on well?

YES ☒ NO ☒

Is reference mark visible?

YES ☒ NO ☒

Condition of well

N/A

Weather

OVERCAST / FOGGY

Is cap locked?

YES ☒ NO ☒

Standing water present?

YES ☒ NO ☒

Any indication of surface runoff in well?

YES ☒ NO ☒

Air Temperature:

37°F

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 1/21/17 Time: 11:40 AM/PM

Depth to Water:

Measured with:

Electronic Tape

Chalk & Steel Tape

Length of Well:

20

Decontamination:

Pre Steam Cleaned

DI Water

Other

WELL PURGING

Date: 1/21/17 Begin Time: 11:43 AM/PM Purging Equipment: MEGA MONSIEUR XL + PERISTALTIC
End Time: 15:05 AM/PM Decontamination: Pre Steam Cleaned DI Water Other

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

325 gallons

Actual purge flow rate

1.60 ml/min or gal/min

Notes

PUMPED 175 gallons DOWN HOLE WHILE CLEANING / SETTING
CASING, PURGE 325 gals BEFORE RECORDING PARAMETERS
BATTERY DIED / REPLACED AT 15:10 IN YSI EXO HAND HELD UNIT

Time	Volume (gallons)	Depth to Water (Feet) <0.33'	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	D.O. (mg/L)	Temp (°C)	ORP
SB 15:05			+/- 0.1	+3%	+10%	+/- 10%	+/- 5%	+/- 10 mV
Start: 11:44	325	6.65	7.06	593.2	10	2.29	9.4	-190.8
15:10	325.25	6.65	N/A	N/A	N/A	N/A	N/A	N/A
15:15	326	6.65	7.11	584.6	75	1.69	9.41	-224.2
15:20	326.4	6.65	7.13	582.4	39	1.59	9.49	-238.2
15:25	326.75	6.65	7.14	584.1	27	1.54	9.52	-236.9
15:30	327.15	6.65	7.15	584.3	20	1.49	9.49	-243.7
15:35	327.50	6.65	7.15	590.1	18	1.45	9.49	-252.3
15:40	327.9	6.65	7.15	591.3	19	1.51	9.45	-251.6
Final:								

SAMPLE COLLECTION

Date: 1/21/17 Time: 15:40 AM/PM Method: PERISTALTIC PUMP
Appearance of Sample: CLEAR Actual Sample Flow Rate: 268 ml/min or L/min

SAMPLE BOTTLE COLLECTED: x2 250ML HDPE PFC SCREW

SAMPLING PERSONNEL

Name: Jim Brzall Company: AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC B14 19-21FT

Client:
Location:
Project #:

INSPECTION

Label on well? YES ~~NO~~
Is reference mark visible? YES ~~NO~~
Condition of well N/A
Weather Overcast
Notes:
Is cap locked? YES ~~NO~~
Standing water present? YES ~~NO~~
Any indication of surface runoff in well? YES ~~NO~~
Air Temperature: 35°F

STATIC WATER LEVEL PRIOR TO PURGING

Date: 1/19/17 Time: 11:34 AM/PM

Depth to Water: 16.6 BGS

Length of Well: 21

Measured with:

Electronic Tape

Chalk & Steel Tape

Decontamination:

Pre Steam Cleaned

DI Water Other

WELL PURGING

Date: 1/19/17 Begin Time: 10:36 AM/PM Purging Equipment: PERISTALTIC
End Time: 11:55 AM/PM Decontamination: Pre Steam Cleaned DI Water Other

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

2 gallons

Actual purge flow rate

360 ml/min or L/min

Notes:

Collected FBI - 011917 - JB

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: 11:40	0.5	16.8	7.07	649.1	6135	0.44	11.72	-585
11:45	1.25	16.8	7.65	656.5	3003	0.63	11.62	-459.6
11:50	1.60	16.8	7.76	645.0	1801	0.26	11.50	-402
11:55	2.00	16.8	7.76	639	1144	1.53	11.48	-380
Final:								

SAMPLE COLLECTION

Date: 1/19/17 Time: 11:55 AM/PM

Method:

PERISTALTIC

Appearance of Sample: Cloudy + Brown

Actual Sample Flow Rate:

360

ml/min or L/min

SAMPLE BOTTLE COLLECTED:

x2 HDPE 250ml PFC SCAN

SAMPLING PERSONNEL

Name: Jim Borzell

Company:

AECOM



Low Flow Ground Water Sample Collection Record

Well ID: PC B14 28-30Ft

Client:
Location:
Project #:

INSPECTION

Label on well? YES ~~NO~~
Is reference mark visible? YES ~~NO~~
Condition of well N/A
Weather OVERCAST
Is cap locked? YES ~~NO~~
Standing water present? YES ~~NO~~
Any indication of surface runoff in well? YES ~~NO~~
Air Temperature: 35°F

Notes:

STATIC WATER LEVEL PRIOR TO PURGING

Date: 1/19/16 Time: 15:38 AM/PM

Depth to Water: 16.80

Length of Well: 30

Measured with:

Electronic Tape

Chalk & Steel Tape

Decontamination:

Pre Steam Cleaned

DI Water Other

WELL PURGING

Date: 1/19/17 Begin Time: 13:35 AM/PM Purging Equipment: MEGA NANOON XL / PERISTALTIC
End Time: 16:00 AM/PM 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 150 gallons

Actual purge flow rate 4.45 ml/min or L/min

Notes: WASHED OUT BOREHOLE WITH 275 GALLONS OF WATER, PURGE
150 GALLONS BEFORE CALCULATING RECORDING MEASUREMENTS

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: 15:40	150.1	16.80	8.02	402.2	27.7	11.06	9.96	-30.3
15:45	150.25	16.80	7.98	418.1	55.7	10.54	10.05	-31.0
15:50	150.50	16.80	7.98	419.1	20.2	10.21	10.26	-31.8
15:55	151.0	16.80	8.01	419.9	21.14	10.01	10.01	-34.4
16:00	151.5	16.80	8.03	419.6	20.82	9.86	10.19	-37.2
Final:								

SAMPLE COLLECTION

Date: 1/19/17 Time: 16:00 AM/PM

Method PERISTALTIC

Appearance of Sample: CLEAR

Actual Sample Flow Rate: 316 ml/min or L/min

SAMPLE BOTTLE COLLECTED: 2 250ML HDPE PFC SCAN

SAMPLING PERSONNEL

Name: Jim Brill

Company: AECOM

Appendix D

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/10/17

Location B10

Day ☐ S ☐ M ☒ T ☐ W ☐ TH ☐ F ☐ S

Contractor CASCADE

Weather/Temp HEAVY SNOW 20's

Equipment Onsite:

MINI SONIC SUPPORT TRUCK
SKID STEER

Personnel Onsite:

MIKE WOLF - AECOM
DAN DRIVER > CASCADE
2 HELPERS

Work Performed (summary of services performed, including field work):

ARRIVE AT B10 ~ 8:00
USED SKID STEER TO CLEAR SNOW FROM 2-TRAIL AND DRILLING
LOCATION. MOBBED RIG TO B10
NEED TO GET WATER FROM DIFFERENT SOURCE OTHER THAN
OSCODA MUNICIPAL WATER - POTENTIALLY IMPACTED
LOOKED AT FIRE ACCESS ON FOOTB LAKE BUT COULD NOT
LIFT WATER HIGH ENOUGH.
USE AU GRES VILLAGE WATER. FILL 250 GAL TOTE IN THE
MORNING.
HIGH WIND / BLOWING SNOW ADVISORY. LEAVE SITE ~ 11:30
COMPLETE PAPERWORK, PREP FOR NEXT DAY.
ATTEMPT TO CALIBRATE YSI METER. WOULD NOT CALIBRATE.
HAD YSI SHIPPED FROM GEOTECH FOR TOMORROW DELIVERY.

Signed: _____

M. Wolf

Sheet 1 of 1

Field Activity Log



Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/18/11

Location B10

Day ☐ S ☐ M ☐ T ☒ W ☐ TH ☐ F ☐ S

Contractor CASCADE

Weather/Temp Cloudy 20's-30's

VERY ILY CONDITIONS

Equipment Onsite: **MINI SONIC SUPPORT TRUCK**
SKID STEER

Personnel Onsite: MIKE WOLF - AELCOM
DAN DRILLER > CASCADE
2 HELPERS

Work Performed (summary of services performed, including field work):

PURCHASED YAK TRAKS ON WAY TO SITE DUE TO ICE.

ARRIVED AT TSPW 8:00 SAFETY MTG. Discuss WORK ACTIVITIES

DRILLED BORING B10 AND COLLECTED 2 GW SAMPLES

COMPLETED BORING AND PREP'D RIG FOR MOB TO BIL TOMORROW

OFF SITE ~ 5:00 PAPERWORK AND PREP FOR TOMORROW.

YSI ARRIVED FROM GEOTECH

Signed:

Sheet 1 of 1
Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/12/17

Location ASCUDA, MI

Day ☐ SO ☐ MO ☐ TU ☐ W ☒ TH ☐ FR ☐ SA

Contractor CASCADE DRILLING

Weather/Temp OVERCAST 25°F

Equipment Onsite:

YSI EXO (GEOTECH); Chevy 2014 + 2006; x2 PERISTALTIC PUMPS; WATER TAPE; YSI PRODS (AECOM)

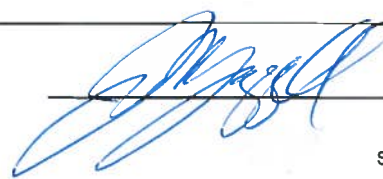
Personnel Onsite:

Jim Buzzell, Mike Wolf, Arlen Little, Dan Omara, Jon Adelsperger, Dale Coes

Work Performed (summary of services performed, including field work):

- 8:05 - ARRIVE AT DEPARTMENT OF PUBLIC WORKS (DPW)
- 8:15 - HELD TAILGATE SAFETY MEETING WITH CASCADE DRILLING AND DALE
- 8:25 - DAN (DRILLER) OFFSITE TO PICK UP EQUIPMENT FROM HARDWARE STORE
- 9:10 - DAN BACK ONSITE; PREPARING TO BRING EQUIPMENT AND SUPPLIES TO SITE PC B11
- 9:17 - ICE INHIBITING BOBCAT FROM LOCKING INTO BUCKET ATTACHMENT, CASCADE DRILL CREW OFFSITE TO PURCHASE MINI BLOW TORCH AND PROPANE TANK. TO DE-ICE EQUIPMENT.
- 9:40 - CASCADE DRILLING BACK ONSITE; BEGIN DE-ICING EQUIPMENT; MIKE WOLF OFFSITE (RETURN TO C.A)
- 10:35 - PERFORM EQUIPMENT INSPECTION
- 11:05 - BEGIN DRILLING PC B11 (ARLEN LITTLE - TRAINING)
- 12:05 - BREAK FOR LUNCH
- 12:50 - JIM BUZZELL BACK ONSITE; CASCADE DRILLERS STOPPED AT HARDWARE STORE
- 13:10 - CASCADE DRILLING ON SITE; PREPARE FOR VAS SAMPLING
- 14:25 - SCREEN SET FROM 10-15' BGS; REQUIRED WATER TO BE PUMPED DOWN HOLE TO SET SCREEN; MUST PUMP 150 GALL BEFORE SAMPLE COLLECTION
- 14:30 - BEGIN PUMPING WITH ~~HORIZONTAL~~ ^{MANUSION XL} PUMP
- 14:40 - CALLED DRAIN TO DISCUSS PUMPING ISSUE, TOO HIGH OF A POSSIBILITY OF CONTAMINATION OR DILUTION DUE TO WATER BEING PUMPED DOWN HOLE TO CLEAR HEAVY SANDS TO SET SCREEN; DECISION WAS MADE TO PULL OUT MOVE ³⁰20 FT AND DRILL NEW HOLE
- 16:45 - COLLECTED VAS SAMPLE FROM PC B11 10-15' WITH PERISTALTIC PUMP
- 17:02 - OFFSITE

Signed: _____



Sheet 1 of 1

Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/13/17

Location PC B11 / OSCOLA, ME

Day ☐ SO ☐ MO ☐ TO ☐ WO ☐ TH ☒ FR ☐ SA

Contractor CASCADE DRILLING

Weather/Temp PARTLY CLOUDY 13°F

Equipment Onsite:

YSI EXO (GEOTECH); #2 PERISTALTIC PUMPS; CHEVY 2014; WATER LEVEL TAPE

Personnel Onsite:

Jim Fozzell - AECOM; Dan O'Hara, Arlen Little; Jon Adelberger - CASCADE; Dale GRS1 - DLZ

Work Performed (summary of services performed, including field work):

8:00 - ARRIVE AT DPW; CASCADE DRILLING ON SITE

8:10 - ARLEN LITTLE ARRIVED WITH WATER (MUNICIPAL) FROM AL GREE, ME

8:20 - DALE GRS1 ARRIVED, HELD TAILGATE SAFETY MEETING

8:30 - BEGIN PREPARATIONS TO FINISH DRILLING PC B11

9:25 - RESUME DRILLING AHEAD AT PC B11

9:45 - SETTING UP DRILL STRING FOR PUSH-HEAD SCREEN FOR VAS SAMPLING

9:50 - PUSH AHEAD POINT ENCOUNTERED HARD SPOT AT ~21 FT BGS, PREPARE FOR SAMPLING

*PC B11 21 FT

10:35 - UNABLE TO SUSTAIN FLOW WITH PERISTALTIC PUMP, GOING TO USE ^{JUNT} DROP SCREEN AND EXPOSE ONLY 2 FT OF SCREEN FOR SAMPLE COLLECTION.

11:05 - DROP POINT SCREEN CAVED WITH FROZEN SEDIMENT, DRILL CREW ATTEMPTED TO BLOW TORCH AND WASH OUT SCREEN; CLEANING WAS UNSUCCESSFUL AND THE OVERALL CONDITION OF THE SCREEN WAS NOT SATISFACTORY FOR USE

11:45 - CONTINUE DRILLING AHEAD TO 35 FT BGS, TILL ENCOUNTERED AT 25 FT BGS. NO VAS SAMPLE COLLECTED; SET CASING AND WILL SAMPLE FIRST THING MONDAY 1/16

12:35 - TO WELL BORING AT 35 FT BGS; BREAK DOWN EQUIPMENT

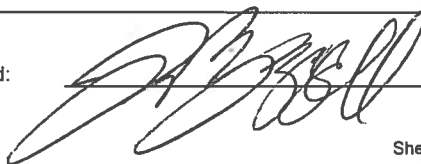
13:00 - DEPART SITE; ARRIVE AT FAMILY FARE TO BUY PACKING TAPE AND GARBAGE BAGS FOR SAMPLE COOLER. BREAK FOR LUNCH.

16:00 - ARRIVE AT FED EX SHIP CENTER NEAR MBS INTERNATIONAL AIRPORT AND SHIPPED SAMPLES OVERNIGHT TO VISTA LABORATORIES.

- 2 COCS, 1 OF 2 CONTAINS DRILL WATER 7 DAY PUSH SAMPLE; 2 OF 2 HAS PC B10 14-19 FT, PC B10 22 FT, PC B11 10-15 FT, + FB1-011317-5B.

19:00 - ARRIVE IN GRAND RAPIDS

Signed: _____



Sheet 1 of 1

Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/16/17

Location PC B11 - OSCODA, MI

Day ☐ SO ☒ MO ☐ TU ☐ WO ☐ TH ☐ FR ☐ SA

Contractor CASCADE DRILLING

Weather/Temp Mostly Cloudy / 21°F

Equipment Onsite:

2014 SILVERADO, Yuma 2, x2 PERISTALTIC PUMPS, YSE EXO (GEOTECH), TURBIDITY RACH

Personnel Onsite:

Jim Buzzell - AECOM; DAN O'MARA, ARLEN LITTLE, JON ADELSPERGER - CASCADE

Work Performed (summary of services performed, including field work):

5:00 - CALIBRATE YSE EXO

5:30 - PICK UP TUBING AND MASTERFLEX FROM GARAGE

6:00 - BEGIN TRAVEL TO PC B11 - OSCODA, MI

9:45 - ARRIVE AT AMERICINN LODGE AND SUITES; RECEIVED TEXT FROM DAN O'MARA WITH NOTIFICATION THAT THEY WERE HELD UP AND WOULD NOT BE ARRIVING UNTIL 11:30-12:00

12:10 - CASCADE DRILLING ARRIVED AT DPW

12:30 - TAILGATE SAFETY MEETING

13:05 - WHILE PREPARING EQUIPMENT/MATERIALS DRILLERS DISCOVERED THAT THEY BROUGHT THE INCORRECT KEY FOR THE RIG.

13:30 - FOUND CORRECT KEY ON A SET OF KEYS BORROWED FROM A DPW EMPLOYEE. DAN AND JON OFFSITE TO MAKE COPY OF KEY.

14:10 - DAN AND JON BACK ON SITE

14:25 - BEGIN SETTING SCREEN FOR VAS SAMPLING 20-25' BGS

15:20 - VAS COLLECTED PC B11 20-25ft * DAN GOING TO ~~FREE~~ PICK UP 10ft CORE BARREL

15:25 - RIG DOWN AND MOVE TO PC B12 NEED TO CONFIRM WITH DORIN/JOHN WHETHER OR

16:00 - STABILIZE/LEVEL RIG ON SITE PC B12 NOT WE WANT TO HAVE THEM ORDER A 2ft SCREEN.

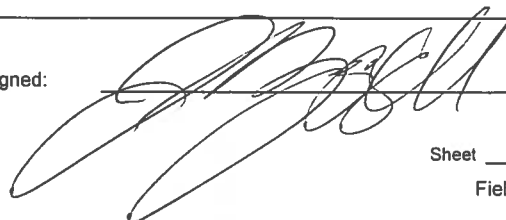
16:10 - BEGIN DRILLING B12

16:25 - WATER TABLE ~ 8ft

16:50 - WELL PREPARED FOR WATER SAMPLING, SHUT DOWN RIG CLEAN SITE

17:00 - OFFSITE

Signed: _____



Sheet 1 of 1

Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/18/17

Location B12

Day ☐ SO ☐ MO ☐ TU ☒ WE ☐ THU ☐ FRI ☐ SAT

Contractor CASCADE

Weather/Temp CLOUDY 34°F

Equipment Onsite:

204 SILVERADO; YSI-EXO (GEOTECH); X2 PERISTALTIC PUMP;

Personnel Onsite:

JIM BAZZELL - AECOM; ARLEN LITTLE, DAN O'NEAL; JON ADELSPERGER - CASCADE;

Work Performed (summary of services performed, including field work):

7:00 - BEGIN CALIBRATING YSI EXO

7:30 - FINISH CALIBRATION COMPLETE

7:55 - ARRIVED ON SITE AT STAGING AREA IN DPW PARKING LOT.

8:10 - TAILGATE SAFETY MEETING | DALE CORSI ARRIVED

8:15 - DALE OFFSITE TO CHECK IN WITH DAVE WEST

8:52 - INSTALLING 30" SCREEN FOR VAS SAMPLE PC B12

- UNSCREW POINT AND BURN OFF TEFLON THREAD TAPE

- COLLECT SUNL DRILL WATER / DECON WATER.

BORING
* WELL LOCATION IS NOW IN 2.5"

09:05 - DAN O'NEAL OFFSITE TO BUY BUSHING FOR 30" SCREEN.

OF STANDING WATER FROM SNOW MELT

09:20 - DAN BACK ON SITE.

09:23 - SCREEN SET

09:50 - DALE AND BOB DELIVERY ONSITE.

10:05 - COLLECT VAS PC B12 7.5-10FT AND DUPLICATE 1

10:15 - REMOVE SCREEN CONTINUE DRILLING

10:25 - INSTALL CASING TO 20FT BGSS

11:30 - PREPPING BORING FOR VAS SAMPLING 17.5-20 FT

11:45 - CASING SET PUMPED ^{~100} ~~~75~~ GALS OF WATER TO CLEAN HOLE DO TO SWABBING EFFECT CAUSING THE HOLE A COLLAPSE -

- LOST BIT DOWN HOLE

11:50 - SET SCREEN BEGIN P

12:03 - BEGIN PUMPING 200GALS @ 0.75 - 1 gal/min 16:00 - DALE RECEIVED CONFIRMATION FROM PROPERTY

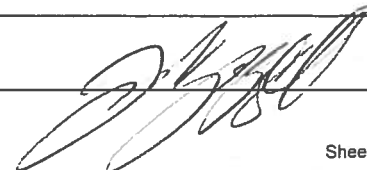
17:00 - COLLECTED VAS PC B12 17.5-20FT

OWNERS, THAT WE MAY DRILL B13 ON THEIR

17:10 - OFFSITE

PROPERTY.

Signed: _____



Sheet 1 of 1

Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/19/17

Location WURTSMITH PCB12

Day ☐ S ☐ M ☐ T ☐ W ☒ TH ☐ F ☐ S

Contractor CASCADE

Weather/Temp OVERCAST

Equipment Onsite:

2014 SILVERADO, x2 PERISTALTIC PUMPS, YSE EKO (GEOTECH)

Personnel Onsite:

Jim Buzzell - AECOM; Don O'Mara, Alden Little, Jon Adelsperger - CASCADE; Dale Corsi - DLZ

Work Performed (summary of services performed, including field work):

8:00 - ATTEMPTED YSE CALIBRATION RESULTED IN ERROR, CALLED GEOTECH.

8:00 - ONSITE HOLD TAILGATE SAFETY MEETING

8:10 - DRIVE WITH DALE TO SEE SITE FOR B14 AND BS-9

9:00 - DRILL TO 30 FT BGS;

- TAPPED TILL AT 28 FT BGS AND RETRIEVED DRILL SHOE.

9:30 - FILL HOLE AND BEGIN MOVING EQUIPMENT TO NEXT BORING LOCATION PCB14

9:40 - REPLACED BATTERIES IN YSE EKO SONDE AND PERFORMED HARD RESET; PARAMETERS HAVE BEEN RECOVERED.

10:20 - YSE EKO CALIBRATED

10:30 - BEGIN DRILLING PCB14

11:35 - BEGIN PUMPING FOR PCB14 19-21 FT

11:45 - CASCADE AND DALE OFFSITE FOR LUNCH

11:55 - COLLECT SAMPLE PCB14 19-21 FT AND FBI-011917-38

12:12 - CASCADE BACK ON SITE

12:17 - DALE CORSI BACK ONSITE - UNLIKELY THAT MIKE JURY WILL BE ABLE TO GET SIGNED AGREEMENT UNTIL MONDAY 1/23/17, AFTER B14 WILL CONTINUE WITH B9.

12:21 - REMOVE SCREEN AND CLEAN OUT 21-30 FT RAT HOLE

16:00 - ~~COLLECTED VAS~~

17:35 - BEGIN PURGING BORE HOLE 150 GAL (75 GALS PUMPED WASHING DOWN)

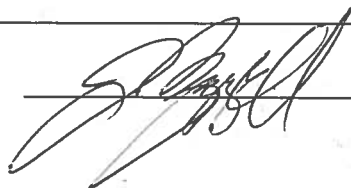
16:00 - COLLECTED SAMPLES AFTER PARAMETERS STABILIZED VAS - PCB14 28-30 FT

16:05 - REMOVE SCREEN FROM HOLE

16:30 - TOP OF TILL/CLAY AT 33 FT BGS, EOB AT 40 FT BGS

17:00 - RIGGED DOWN, RETURN EQUIPMENT TO STAGING AREA.

Signed: _____



Sheet 1 of 1

Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/20/17

Location B13 - Oscoda, MI

Day ☐ S ☐ M ☐ T ☐ W ☐ TH ☒ F ☐ S

Contractor CASCADE DRILLING

Weather/Temp Overcast / 35°F

Equipment Onsite:

Y5I EXO (GROTECH); X2 PERISTALTIC PUMPS; TURBIDITY HATCH; SILVERADO 2014

Personnel Onsite:

Jim Brill - AECOM; DAN OMARA, ALDEN LITTLE, + JON ADELSPERGER - CASCADE

Work Performed (summary of services performed, including field work):

9:00 - RECEIVED ACCESS AGREEMENT VIA EMAIL

9:30 - FRANK CURREY SIGNED ACCESS AGREEMENT

10:10 - RIG NOT STARTING DUE TO DRAINED BATTERIES, JUMPER CABLES BAD - CASCADE OFFSITE

10:35 - CASCADE BACK ONSITE WITH NEW JUMPER CABLES

10:45 - HOLD TAILGATE SAFETY MEETING

10:53 - SUCCESSFULLY STARTED RIG, MOBILIZE TO B13

11:25 - BEGIN DRILLING PC B13

11:47 - BEGIN PURGING BORE HOLE

12:30 - COLLECT GAS FROM PC B13 46-10 FT

12:37 - REMOVE SCREEN FROM HOLE, ~~AND~~ DECONTAMINATE, BREAK FOR LUNCH

13:05 - JIM BRILL ONSITE

13:25 - CASCADE ONSITE

13:30 - RE-FUEL RIG PREPARE TO CONTINUE DRILLING

13:40 - CONTINUE DRILLING PC B13 10-20 FT

14:38 - RIG EXHIBITING PRESSURE ISSUES, BATTERY DIED WHILE TROUBLESHOOTING PRESSURE ISSUE WHILE CLEANING OUT CASING.

15:10 - CASCADE OFFSITE TO BUY NEW BATTERIES FOR RIG

Signed: _____

Sheet _____ of _____

Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/21/17

Location B13 - Oscoda, MI

Day ☐ SO ☐ MO ☐ TU ☐ WE ☐ TH ☐ FR ☒ SA

Contractor CASCADE

Weather/Temp. OVERCAST, FOGGY

Equipment Onsite:

YSI EXO (GEOTECH); WATERTAPE; x2 PERISTALTIC PUMPS; 2014 SILVERADO

Personnel Onsite:

Jim Buzzell - AECOM; Dan O'Hara, Andrew Little; Jon Adelsperger - CASCADE

Work Performed (summary of services performed, including field work):

4:00 - Onsite, CASCADE INSTALLING NEW BUTTERFLIES

8:09 - FIRST ENGINE TEST FAILED, CONTINUE TROUBLESHOOTING

10:15 - SUCCESSFULLY STARTED RG; VIBRATION AND ROTATION NOT ENGAGING

10:44 - ROTATION AND VIBRATION ENGAGED, TESTING VOLTAGES WITH VOLTMETER TO OBSERVE ANY FLUCTUATIONS

11:30 - CASING SET AT 20 FT, PUMPED 175 GALS TO CLEAN HOLE

11:43 - BEGIN PURGING 325 GALS

MEGA MONSOON - 5 gal/3.5 min

~~325 gal~~ ³⁵

PERISTALTIC - 650 mL/min = .68 L/min \div 3.785 L/gal = 0.18 gal/min

$1.429 \text{ gal/min} + 0.18 \text{ gal/min} = 1.60 \text{ gal/min}$

$\frac{325 \text{ gal}}{1.60 \text{ gal/min}} = 203.13 \text{ mins} = 3.38 \text{ HRS}$

1.60 gal/min

3:22 UNTIL PURGED

15:05 - 325 WILL HAVE BEEN PUMPED

15:05 - PURGED 325 GALS BEGIN RECORDING PARAMETERS FOR LOW FLOW STABILIZATION

15:40 - COLLECT VAS PC B13 18-20 FT AFTER ²⁰

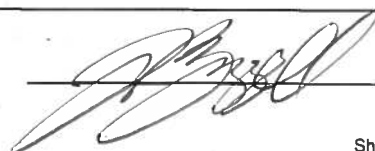
15:45 - PULL OUT SCREEN/SAMPLING ASSEMBLY

15:56 - BEGIN DRILLING 20-30 FT TOP OF CLAY AT 26 FT DGS

16:55 - OFFSITE CASCADE PREPARE EQUIPMENT FOR RELOCATION TO B5-9

17:00 - JON ADELSPERGER REQUIRED ON DIFFERENT JOB, DAN DROVE JON TO FLINT.

Signed: _____



Sheet 1 of 1

Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/22/17

Location B9 OSCODA, MI

Day SA ☐ MO ☐ TO ☐ WO ☐ TH ☐ FO ☐ SO ☐

Contractor CASCADE DRILLING

Weather/Temp FOG / 37°F

Equipment Onsite:

SILVERADO 2014, x2 PERISTALTIC PUMPS, YSI EXO (HEUTECH), TURBIDITY NACH

Personnel Onsite:

Jim Borell - AECOM ; Dan Omara + Arlen Little - CASCADE

Work Performed (summary of services performed, including field work):

8:00 - Onsite Hold Tailgate Safety Meeting

8:10 - Tie Down and Begin Moving Equipment to B9

8:15 - B9s Exact Well Locations w/ Top of Clay Depth.

B10 - 25ft BH - 25ft B12 - 28ft B13 - 26ft B14 - 33

11:30 - Site Prepared For Drilling B9 (Bottom Up Sampling Planned)

- Offsite For Lunch

12:00 - Back on Site

12:15 - Begin Drilling PC B9

15:20 - ^{Clearing Sluff} ~~Installing Casing~~ For TOC VAS Sample B9-41 ft BGS

15:53 - ~~Install~~ Screen and Move Casing up to Expose Screen at B9-41 ft BGS

16:04 - 22.9 - 3.4 Static Water 19.5 ft BGS Begin Pumping 1.5 gal/min at 16:10

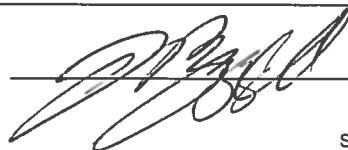
16:45 - 52.5 Gals Pumped Begin Low Flow 340 mL/min

17:15 - Collect VAS PC B9 39-41 ft

17:20 - Rig Down and Decom Water Tape

17:30 - Offsite

Signed: _____



Sheet 1 of 1

Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/23/19

Location B9 OSCODA, MI

Day ☐ SO ☒ MON ☐ TUE ☐ WED ☐ THU ☐ FRI ☐ SAT

Contractor CASCADE

Weather/Temp Overcast 37°F

Equipment Onsite:

SILLERADO 2014, x2 PERISTALTIC PUMPS, TURB. MACH, YSC EXO (GEOTECH)

Personnel Onsite:

Jim Burrell - AECOM; Dan O'Hara + Arlen Little - CASCADE

Work Performed (summary of services performed, including field work):

7:45 - ONSITE HOLD TAILGATE SAFETY MEETING AND REVIEW TIA

8:15 - PULL CASING UP TO 34-36' BGS FOR VAS

8:45 - BEGIN PURGING 50 gals AT ~2 gallons/minute

9:55 - COLLECTED VAS PC B9 34-36 FT

10:05 - MOVE SCREEN/CASING UP TO 28-30 FT INTERVAL

10:30 - BEGIN PURGING 400 gals @ 2.12 gals/min ~ 188 mins = 3:23 HRS BEGIN LOW FLOW AT 13:53

10:43 - PUMPED BORE HOLE TRY: REMOVE PUMP, SHAKE SCREEN TO CLEAN ANY POSSIBLE PLUGGING. MOVED CASING UP HIGHER IN BORE HOLE, MAY HAVE BEEN INTERFERING WITH SCREEN

10:53 - BEGIN PURGING BORE HOLE @ 2.5 gals/min - SCREEN SET AT 27-29 FT BGS

SCREEN WAS INSIDE CASING PREVIOUSLY.

300 gals @ 2.59 gals/min = 150.5 mins = 2:30 HRS BEGIN LOW FLOW AT 13:25

11:25 - Jim Burrell OFFSITE FOR LUNCH

11:54 - Jim Burrell BACK ON SITE AT B9

12:00 - CASCADE OFFSITE FOR LUNCH

12:23 - CASCADE ONSITE

13:45 - COLLECTED VAS PC B9 27-29 FT

13:56 - PULL CASING + SCREEN UP TO 18-20 FT FOR ~~PC B9~~ TOP OF WATER TABLE SAMPLE

14:30 - BEGIN PURGING PC B9 19-21 FT

15:10 - COLLECT VAS PC B9 19-21 FT

15:35 - SETTING UP AT BORING LOCATION PC B8

16:20 - BEGIN DRILLING PC B8

17:20 - OFFSITE

Signed: _____

Sheet 1 of 1

Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/24/17

Location B8 / OSCADA, MI

Day ☐ SO ☐ MO ☒ TU ☐ WO ☐ TH ☐ FR ☐ SO

Contractor CASCADE

Weather/Temp RAINING / 36°F

Equipment Onsite:

SILVERADO 2014, X2 PERISTALTIC PUMPS, TURB. HULL, VSE EXO (GEOTECH), YUMA 2

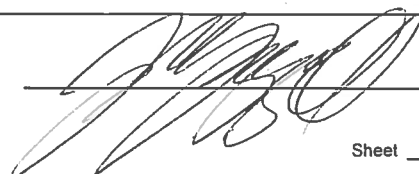
Personnel Onsite:

Jim Buzzell - AECOM ; DAN O'MARA + ARLEN LITTLE - CASCADE

Work Performed (summary of services performed, including field work):

- 7:45 - ONSITE HOLD TAILGATE SAFETY MEETING
- 8:15 - RIG REQUIRES JUMP START TO START ENGINE
- 8:30 - RIG STARTED, FULLY FUNCTIONAL E-STOPPS REBORN
- 8:40 - BEGIN DRILLING 20-30 FT BGS
- 9:10 - INNER DRILL STRING STUCK INSIDE OUTER DRILL STRING DUE TO HEAVING SANDS, UNABLE TO CLEAN OUT WITH WATER, PSI TOO HIGH SHUT DOWN RIG BLEED PRESSURE TRY AGAIN.
- WHILE ATTEMPTING TO REMOVE OUTER DS, INNER DS PULLED UP WITH IT MAKING IT IMPOSSIBLE TO REMOVE OUTER DS CONVENTIONALLY.
- 9:40 - RIG REQUIRES JUMP START. STOP AND DISCUSS PLAN FORWARD.
- 10:54 - RIG STARTED - FOUND BLOWN FUSE, REPLACED PART AND SUCCESSFULLY STARTED RIG
- 12:30 - CASCADE OFFSITE FOR LUNCH, RE-FUEL, AND RE-FILL DRILL WATER TOTE
- 13:25 - BACK ON SITE, PREPARE TO DRILL TO 80 FT BGS.
- 14:09 - CLEAN HOLE SET CASING AT 35 FT BGS RIG UP SAMPLING SCREEN FOR SAMPLE COLLECTION AT TOP OF CLAY. NOT ENOUGH DRILL WATER ON SITE TO DRILL TO 80 FT WILL SAMPLE FIRST THEN DRILL TOMORROW 1/25/17.
- 14:33 - BEGIN PURGING PCBs 30-32 FT @ 1.2 gal/min, SINCE DRILL WATER WAS USED IN SECTION ABOVE SAMPLING POINT. PURGE > 50 gal. THEN BEGIN LOW FLOW UNTIL PARAMETER STABILIZATION - BEGIN LOW FLOW AT 15:15
- 15:50 - COLLECT VAS PCBs 30-32 FT
- 16:00 - MOVE CASING AND SCREEN UP FOR NEXT SAMPLE 24-26 FT
- 16:13 - BEGIN PURGING PCBs 24-26 FT @ 1.5 gal/min
- 17:00 - PUMPED BORING DRY LET RECHARGE OVERNIGHT AND CONTINUE PURGING IN MORNING
- PUMPED 70.56 GALLONS TOTAL

Signed: _____



Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/25/17

Location B8, OSCODA, MI

Day ☐ SO ☐ MO ☐ TU ☒ WE ☐ TH ☐ FR ☐ SA

Contractor CASCADE DRILLING LLC

Weather/Temp Overcast Mostly Cloudy / 31°F

Equipment Onsite:

SILVERADO 2014, 2 PERISTALTIC PUMPS, YSE EXO (GEOTECH), YUMA2

Personnel Onsite:

Jim Buzzell - AECOM; Dan O'HARA + ARLEN LITTLE - CASCADE

Work Performed (summary of services performed, including field work):

07:40 - ONSITE HOLIDAY TAILGATE SAFETY MEETING

07:45 - RIG REQUIRES JUMP START

07:53 - RIG STARTED, PREPARE PURGING EQUIPMENT.

08:03 - BEGIN PURGING 330 gals FOR TOTAL OF 400gal PURGED F20 20-30 FT SECTION
1.5 gals/min - 3 HRS 40 MINS BEGIN LOW FLOW AT 11:43

11:43 - BEGIN LOW FLOW

12:10 - COLLECTED VAS PC B8 24-26 FT

12:20 - PULL SCREEN ASSEMBLY UP TO 19-21 FT FOR WATER TABLE SAMPLE.

13:30 - COLLECTED VAS PC B8 19-21 FT AND FBZ-D12517-JB

14:52 - DRILLED 35-40

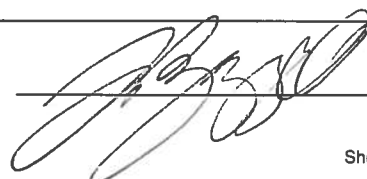
16:20 - DRILLED 50-60 FT

16:30 - OFFSITE

17:15 - COLLECT AV GRES WATER TOWER SAMPLE

17:20 - BEGIN TRIP FROM AV GRES TO GRAND RAPIDS

Signed: _____



Sheet 1 of 1

Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/30/17

Location B6

Day ☐ S ☒ M ☐ T ☐ W ☐ TH ☐ F ☐ S

Contractor CASCADE

Weather/Temp SUNNY / 19°F

Equipment Onsite:

SILVERADO 2014, #2 PERISTALTICS, Yuma 2, YSI EXO (GEOTECH), TURBIDITY MACH

Personnel Onsite:

JIM BURELL - AECOM; DAN O'NARA, JON ADELSPERGER, ARLEN LITTLE - CASCADE

Work Performed (summary of services performed, including field work):

6:30 - DEPART AECOM GARAGE

10:35 - ARRIVE ONSITE AT B6 IN OSCODA, MI

10:45 - CASCADE ONSITE - CONDUCT TAILGATE SAFETY AND BEGIN JUMPSTARTING RIG

11:30 - OFFSITE FOR LUNCH AND PICK UP PORTAL GENERATOR

12:25 - CASCADE BACK ONSITE, CONTINUE TROUBLESHOOTING RIG

13:07 - PROBLEM MOST LIKELY EXISTS WITH THE CONTROL PANEL, TESTING VOLTAGES AND CHECKING FUSES, CONTINUE TROUBLESHOOTING.

13:17 - RIG SUCCESSFULLY STARTED

13:40 - ~~BEGIN DRILLING 60-70FT DO~~ INSTALL CASING 60-70FT DRILL 60-70FT

13:58 - IDENTIFIED ^{LEAKING} HYDRAULIC LINE WITH LEAK¹ REPAIRED QUICKLY AND CONFIRMED THAT THE LEAK STOPPED, CONTINUE CASING INSTALLATION, PIPE OVERTHREADED / STUCK - REQUIRES HAMMERING WITH MINI SLEDGED TO BREAK CONNECTION

14:01 - PIPE UNSCREWED - CONTINUE BRUSH OUT THREADS

14:07 - BREAK-OUT SAW TEETH WORN OUT DAN AND ARLEN DRIVE TO TRAILER AT DPW TO RETRIEVE REPLACEMENT.

14:39 - TRIP OUT OF HOLE WITH CORE 60-70FT

17:30 - OFFSITE

DOWN TIME:

10:50 - 13:17 : 2h 27m

14:07 - 14:39 : 32m

2h 59m

Signed: _____

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/31/17

Location Oscoda, MI - B8

Day ☐ SO ☐ MO ☒ TU ☐ W ☐ TH ☐ F ☐ SA

Contractor CASCADE

Weather/Temp OVERCAST | 28°F

Equipment Onsite:

SILVERADO 2014, Yuma 2, TURBIDITY INCH, x2 PERISTALTIC PUMPS, YSE EXO (GEOTECH)

Personnel Onsite:

Jim Buzzell - AECOM; Dan O'Mara, Jon Adelsperger, Alden Little - CASCADE; Dale Corbi - DLZ

Work Performed (summary of services performed, including field work):

7:30 - ONSITE (Jim Dan Jon Dale)

7:50 - ALDEN LITTLE ONSITE HOLD TAILGATE SAFETY MEETING WHILE JUMPING RIG

8:15 - RIG JUMPED

8:30 - PREPARE TO TRIP IN HOLE TO DRILL 110-120 BGS TO CONFIRM CLAY

8:33 - PIPE HANDLER MALFUNCTIONING - TIGHTEN BOLTS

8:40 - PIPE HANDLER FUNCTIONING PROPERLY - DAN RECEIVED CALL FROM CASCADE OFFICE, SOMEONE IS COMING UP TO PICK UP TRAILER

8:50 - CASCADE OFFSITE TO PREPARE/EMPTY TRAILER, DAN WAS UNAWARE THAT THIS PICKUP WAS GOING TO BE TAKING PLACE. REQUIRES TWO PEOPLE AND BOBCAT

9:40 - CASCADE BACK ONSITE

9:55 - DRILLED 110-120

10:05 - CASING INSTALLED

10:30 - DRILLED 120-130

10:40 - CASING INSTALLED; DALE OFFSITE TO PICK UP MIKE JURY.

11:51 - DRILLED 140-150; NO DRILL WATER USED

12:25 - OFFSITE LUNCH

13:00 - JIM BACK ONSITE

13:15 - CASCADE, DALE + MIKE ON SITE

13:20 - DALE + MIKE OFFSITE

13:25 - CASCADE OFFSITE TO DPW TO PICK UP ADDITIONAL PUCKER FOR BETTER SEAL WHEN SAMPLING BOTTOM UP

13:58 - CASCADE ON SITE BEGAN TESTING DRILL WATER

Downtime:

WATER QUALITY W/ YSE WHILE CASCADE INSTALLS

8:40 - 9:40 - 1h

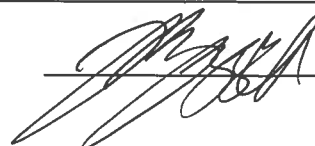
SAMPLING ASSEMBLY

14:19 - BEGIN PURGING PC B8 141-143 FT

15:35 - COLLECTED VAS PC B8 141-143 FT AFTER 15 gals purged

16:17 - SETTING SAMPLING ASSEMBLY AT 116-118

Signed: _____



Sheet 1 of 2

Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 1/31/17

Location OSCODA, MI - BS

Day ☐ S ☐ M ☒ T ☐ W ☐ TH ☐ F ☐ S

Contractor CASCADE

Weather/Temp SNOWING / 28°F

Equipment Onsite:

SILVERADO 2014, YUMA 2

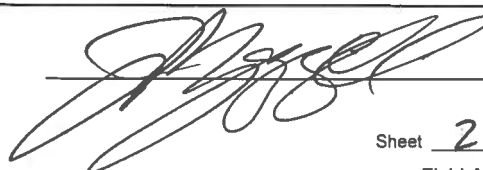
Personnel Onsite:

Jim Burrell, Devin Bogan - AECOM ; Jon, Dan, ALDEN - CASCADE

Work Performed (summary of services performed, including field work):

- 16:27 - BEGIN PURGING 60 GAL FROM PC BS 116-118
- 16:41 - PUMP FAILURE, PULL PUMP (MEGA Monsoon XL) OUT OF HOLE TO TROUBLESHOOT
- 16:45 - RUN WATER FROM CATCH BUCKET THROUGH YSI EXO TO CHECK PARAMETERS
 - SPEC CON: 5123 ug/cm
 - CON: ~~3534~~ ³⁸ 3514 ug/cm
 - TDS: 3338 mg/L
- 17:39 - INSTALL NEW PUMP
- 17:29 - BEGIN PURGING
- 17:30 - COLLECT VAS PC BS 116-118 FT A @ 17:30 5 gal PURGED TOTAL
- 18:00 - COLLECT VAS PC BS 116-118 FT B @ 18:00 17.5 gal PURGED TOTAL
 - (PUMP QUIT AT 17:58, ABLE TO RE-PRIME AND RESUME PUMPING LONG ENOUGH FOR SAMPLE COLLECTION)
- 18:07 - OFFSITE

Signed: _____



Sheet 2 of 2

Field Activity Log

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 2/1/17

Location Oscoda, MI B6

Day ☐ SO ☐ MO ☐ TU ☒ WE ☐ TH ☐ FR ☐ SA

Contractor CASCADE

Weather/Temp Clear / 26°F

Equipment Onsite:

SILVERADO 2014, Yuma 2, x2 PERISTALTICS, YSI EXO, TURBIDITY HACH

Personnel Onsite:

Jim Burrell - AECOM; Dan O'Hara, Jon Adelsperger, Alden Little - CASCADE

Work Performed (summary of services performed, including field work):

7:30 - ARRIVED ON SITE, CASCADE JUMPING RIG

7:55 - HELD TAILGATE SAFETY MEETING AND REVIEW THAS

8:00 - ~~MOVE~~ PULL SAMPLING ASSEMBLY UP TO 106-108 FT INTERVAL

8:41 - INSTALL MEGA MONSOON XL PREPARE TO PURGE LOGG.

12:10 - COLLECTED VAS PC B6 106-108 FT

12:15 - COLLECTED EBI-020117-JB THROUGH MEGA MONSOON XL PUMP FROM TOTE #2

12:20 - BEGIN PULLING SAMPLING ASSEMBLY AND CASING OUT OF HOLE

- NEW RIG ARRIVED IN OSCODA ALONG WITH PALETT OF HOLE PLUG

- PLANNING TO SPREAD SEDIMENTS WHEN THEY HAVE THAWED ON UNDEVELOPED PROPERTY

12:45 - OFFSITE FOR LUNCH

13:05 - ON SITE

13:30 - CASCADE ONSITE BEGIN REMOVING CASING, DECON PIPES AND FILL HOLE WITH HOLE PLUG AS THEY COME UP.

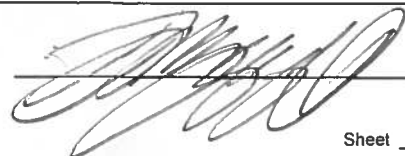
14:40 - FINISHED PULLING OUT OF HOLE, HOLE FILLED, BEGIN MOVING TO NEXT LOCATION PC B7

16:21 - ISSUES WITH NEW RIG, GOING TO BEGIN HOLE B7 WITH ORIGINAL RIG

16:30 - BEGIN DRILLING PC B7

16:00 - OFFSITE DRILLED TO 40 FT BGS

Signed: _____



Field Activity Log

Project Name WDEB WARSWICK

Project No. 60514528

Client WDEB

Date 2/2/17

Location OSCODA, MI B7

Day ☐ S ☐ M ☐ T ☐ W ☐ TH ☐ F ☐ S

Contractor CASCADE

Weather/Temp CLEAR / 16°F

Equipment Onsite:

SILVERADO 2014, #2 PERISTALTIC PUMPS, YUMA 2, YSI EXO, TURBIDITY MACH

Personnel Onsite:

Jim Farrell - AECOM; Dan O'Hara, Jon Adelsperger, Alden Little - CASCADE

Work Performed (summary of services performed, including field work):

8:00 - ARRIVED ONSITE JUMPSTARTING RIG

8:30 - RIG STARTED

8:45 - HOLD TAILGATE SAFETY MEETING AND REVIEW TIME

9:06 - BEGIN DRILLING

10:40 - WDEB AND DALE ARRIVE ONSITE

11:00 - MDX 2 AND DALE DEPART

11:20 - OFFSITE FOR LUNCH

12:15 - ONSITE DISCUSS VAS INTERVALS

71-73' BGS

63-65' BGS

56-58' BGS

33-35' BGS

12:45 - INSTALL SAMPLING ASSEMBLY AT 71-73 BGS

13:15 - MONSOON PUMP INSTALLED

STATIC WATER LEVEL 8.60 - 1.60 = 7.00 FT BGS

15:00 - COLLECT VAS PC B7 71-73 FT AFTER 20 gal PURGED

15:20 - PICK SAMPLING ASSEMBLY UP TO 63-65 FT

15:42 - 10.33 - 3.6 = 6.73 FT BGS DTW

16:40 - COLLECT VAS PC B7 63-65 FT + DUPLICATE

16:54 - PULL SAMPLING ASSEMBLY UP TO 56-58' BGS

17:03 - DIFFICULTIES BREAKING PIPE CONNECTIONS WHILE PULLING UP.

17:08 - SAMPLING ASSEMBLY INSTALLED AT 56-58'

17:20 - OFFSITE

Signed: _____

Field Activity Log

Project Name MDEQ WURTSMITH
 Client MDEQ
 Location OSCODA, MI - B7
 Contractor CASCADE

Project No. 60518528
 Date 2/3/17
 Day ☐ SO ☐ MO ☐ TU ☐ WO ☐ TH ☐ FR ☐ SO
 Weather/Temp Mostly Cloudy / 15 F

Equipment Onsite:

SILVERADO 2014, x2 PERISTALTIC PUMPS, YUMA 2, YSE EKO, TURBIDITY HACH

Personnel Onsite:

Jim Burrell - AECOM; Dan O'Hara, Jon Adelsperger, Arlen Little - CASCADE

Work Performed (summary of services performed, including field work):

7:45 - ONSITE, DAN AND JON JUMPSTARTING RIG
 8:42 - RIG STARTED PERFORM RIG INSPECTION AND HOLD SAFETY MEETING
 8:57 - INSTALL MEGA KENSON XL SWL: 6.5-1.6 = 4.9 FT
 9:30 - 10 GL PURGED COLLECTED PC B7 56-58 FT
 9:40 - PULL SAMPLING ASSEMBLY UP TO 33-35 FT INTERVAL TO ATTEMPT VAS
 10:30 - COLLECTED VAS PC B7 33-35 FT
 10:56 - PULL SAMPLING ASSEMBLY OUT OF HOLE
 11:15 - BEGIN TRIPPING IN HOLE WITH CORE BARREL TO CONTINUE DRILLING 80-150
 SAMPLE COLLECTION VAS WAS WE ENCOUNTER SAND.
 11:27 - BEGIN DRILLING 80-90 INTERVAL JB
 11:45 - BACK ON BOTTOM
 11:47 - OFFSITE FOR LUNCH, DAN PICKING UP PACKAGE OF PARTS FOR NEW RIG FROM HOTEL
 12:40 - BACK ONSITE
 12:46 - BEGIN DRILLING 90-90 FT BGS
 13:48 - WHILE PULLING OUT CORE BARREL FROM 100-110, HYDRAULIC HOSE RUPTURED. QUICKLY PUT ABSORBENT PADS IN PLACE AND SHUT DOWN RIG. P
 13:55 - REMOVED RUPTURED LINE
 14:00 - CASCADE OFFSITE TO PICK UP REPLACEMENT
 14:49 - CASCADE BACK ON SITE
 - PINHOLE RUPTURE DEVELOPED IN HYDRAULIC HOSE, DRILLERS HAND NOTICED THE LINE WAS MISSING AND IMMEDIATELY CALLED AN ALL STOP. ABSORBENT PADS WERE QUICKLY PUT IN PLACE CATCHING MOST OF THE LEAKED FLUID AS ONE LINE WAS REMOVED (1-2 TABLESPOONS ESTIMATED)
 14:54 - HYDRAULIC LINE REPLACED, START RIG AND OBSERVE FOR LEAKS AT THE CONNECTIONS
 14:57 - ALL CLEAR, RESUME OPERATION
 15:05 - SAND CONFIRMED AT 403 FT BGS MED GRAN SANDS 107.5 TO 110 BEGIN RUNNING IN HOLE WITH SAMPLING ASSEMBLY TO 106-110.

Signed: _____

Field Activity Log

Project Name Wurtsmith AFB - State

Project No. 60518528

Client MDEQ

Date 2/3/17

Location OSCODA, MI - 67

Day ☐ S ☐ M ☐ T ☐ W ☐ TH ☒ F ☐ S

Contractor CASCADE

Weather/Temp Mossy Cloudy / 15°

Equipment Onsite:

Personnel Onsite:

Jim Borrell ; Dan O'Mara, Jim ADEESPERGER, ALEN LITTLE - CASCADE

Work Performed (summary of services performed, including field work):

15:28 - ~~Second~~ ^{ANOTHER} HYDRAULIC LINE OBSERVED MISSING OUT OF PINHOLE CRACK CONNECTED TO THE PIPE HANDLER. SHUT DOWN RIG AND REPLACE LINE WITH SPARE FROM SECOND RIG. FEW DROPLETS OF OIL REMAINED ON TOP OF ICE, QUICKLY CLEANED WITH ABSORBENT PADS

15:47 - CONTINUE RIG WITH SAMPLING ASSEMBLY

16:00 - PUMP INSTALLED IN HOLE SWL: 5.15 - 4 = 1.15 BGS

17:35 - COLLECT VAS PC 37 108-110

Signed: _____

Sheet 2 of 2

Field Activity Log

Field Activity Log

Project Name MADEA WURTSMITH Project No. 60518528
 Client MADEA Date 2/4/17
 Location OSCODA, MI - B7 Day ☐ S ☐ M ☐ T ☐ W ☐ TH ☐ F ☒ SA
 Contractor CASCADE Weather/Temp PARTLY CLOUDY / 26°F

Equipment Onsite:

SILVERADO 2014, x2 PERISTALTIC PUMPS, YUMA 2, TURBIDITY RACH, YSE PRO DDS (GEOTECH)

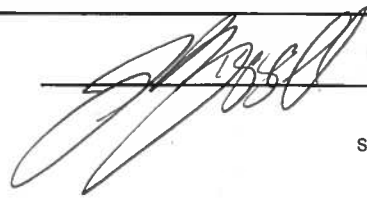
Personnel Onsite:

Jim Burrell - AECOM; Dan O'Mara, Jim Adelsperger, Arlen Little - CASCADE

Work Performed (summary of services performed, including field work):

- 8:00 - MEET IN ROGERS PARKING LOT DRIVE TO HARRISVILLE & FIND ALTERNATIVE SOURCE OF DRILL WATER
- 8:30 - ARRIVED AT HARRISVILLE WELL #2 ALONG N MILL CREEK ROAD
 LAT: 44.66891
 LONG: -83.30279
 - UNABLE TO CONTACT CITY OF HARRISVILLE OFFICES TO GRANT ACCESS TO WELL
 - SENT ARLEN BACK TO AV GRES TO FILL TOTES FROM WATER TOWER
- 9:00 - RETURN TO OSCODA, MI PREPARE YSE EXO FOR DELIVERY (UPS) SHIPPING MONDAY 2/6/17.
- 10:00 - JIM BURRELL ONSITE
- 11:15 - CASCADE ARRIVED ON SITE AND BEGIN JUMP STARTING RIG BATTERIES.
 - CLEAR SNOW ^{BACKING} FROM ACCESS TO B6 AND PREP SITE WITH BOBCAT WHILE WAITING FOR RIG TO START.
- 11:58 - RIG STARTED; INSPECT RIG, REVIEW THAS AND HOLD TAILGATE SAFETY MEETING
- 12:55 - BEGIN PULLING OUT SAMPLING ASSEMBLY
- 13:10 - BEGIN RUN WITH DRILLING ASSEMBLY
- 13:21 - BEGIN DRILLING 110-120
- 13:59 - COBBLE STUCK IN CORE BARREL AT 124' BGS, PUSHED ^{THROUGH} SANDY CLAY ^{WITHOUT} OUT OF CATCHING SEDIMENTS, NO RECOVERY BETWEEN 124-130 FT
- 15:30 - HOLE B7 DRILLED TO 150 FT, NO ZONES OF FURTHER INTEREST BELOW 108-110
- 16:10 - WERE ENCOUNTERED; PULL CASING AND FILL HOLE WITH HOLE PLUG WHILE PULLING OUT
- 16:54 - CASING OUT OF HOLE BEGIN CLEANING SITE AND MOVE TO B6
- 17:45 - MOVED RIG AND EQUIPMENT TO B6; DAN AND JIM STAYING ON SITE TO WORK ON RIG. JIM + ARLEN OFFSITE

Signed: _____



Field Activity Log

Project Name MDEQ WURTSMITH

Project No. 60514528

Client MDEQ

Date 2/5/13

Location OSCODA, MI - PCB6

Day SA ☐ MO ☐ TO ☐ WO ☐ TH ☐ FR ☐ SO ☐

Contractor CASCADE

Weather/Temp Overcast / 27°F

Equipment Onsite:

SILVERADO 2014, Yuma 2, YSI PRO DDS, TURBIDITY HACH, 2 PERISTALTIC PUMPS

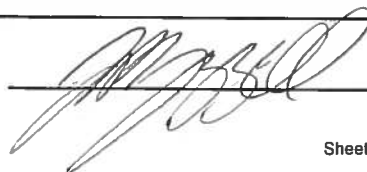
Personnel Onsite:

Jim Buzzell - AECOM; Jon Anelispenger, Dan O'Mara, Aiden Little - CASCADE

Work Performed (summary of services performed, including field work):

- 7:45 - ARRIVED ON SITE AT PCB6, CASCADE (Jim + Dan) ON SITE JUMPING RIG. USING "NEW" RIG
- 8:00 - AIDEN ONSITE WITH AUGER DRILL WATER
- 8:15 - RIG STARTED, CONTINUE SETTING UP SITE PCB6
- 8:45 - REVIEW THAS DISCUSS PLAN AND HOLD TAILGATE SAFETY MEETING
- 8:55 - RIG INSPECTION
- 9:11 - BEGAN DRILLING PCB6
- 9:28 - DAN OFFSITE TO PICK UP WELDING EQUIP FROM STAGING AREA
- 9:48 - DAN BACK ON SITE
- 9:50 - DAN BEGINNING WELDING WORK ON CASING CONNECTOR AFTER SAFETY DISCUSSION
- 10:10 - WELDING COMPLETE
- 10:30 - RESUME DRILLING OPERATIONS
- 11:35 - CASCADE OFFSITE FOR LUNCH
- 12:00 - JIM OFFSITE FOR LUNCH
- 12:30 - CASCADE AND JIM BACK ON SITE
- 12:35 - RIG WITH SAMPLING ASSEMBLY
- 12:59 - BEGIN PURGING GUGL AT 75 gpm ~ 10 L/min - REDUCE FLOW AND RECORD PARAMETERS AT 14:15
- 15:15 - COLLECTED VAS PCB6 35-37 FT
- 15:20 - PULL PUMP OUT OF HOLE, DECON PUMP AND WATER TAP
- 15:26 - PULL SAMPLING ASSEMBLY OUT OF HOLE AND DECON DRILL PIPE
- 15:55 - HOLE FILLED; BEGAN MOVING EQUIPMENT TO B5.
- 16:05 - B6 REQUIRES TREE AND BRUSH CLEARING BEFORE THE RIG AND ITS COMPONENTS WILL ALL FIT, JIM USING GREAT CLEARING SPACE FOR DRILL PIPE AND WATER TOTES.
- 17:10 - RIG SET UP AT B5 - OFFSITE

Signed: _____



Field Activity Log

Project Name MDEQ WATERSHED Project No. 60514528
 Client MDEQ Date 2/6/17
 Location OSCEOLA, MI - BS Day ☐ SO ☒ MO ☐ TU ☐ WO ☐ TH ☐ FR ☐ SA
 Contractor CASCADE Weather/Temp OVERCAST / 21°F

Equipment Onsite:

SILVERADO 2014, x2 PERISTALTIC PUMPS, TURBIDITY METER, YUMA2, YSI PRO DDS (GEOTECH)

Personnel Onsite:

Jim Buzzell - AECOM; Dan O'HARA, Jon Adelsperger; Arlen Little - CASCADE

Work Performed (summary of services performed, including field work):

7:30 - LEFT YSI EXO AT FRONT DESK OF AMERICAN FOR UPS DELIVERY
 7:45 - ARRIVE ON SITE, DAN AND JON ONSITE JUMP STARTING / WARMING UP RIG
 7:55 - ARLEN LITTLE ON SITE WITH x2 TUBES WATER FROM AUGRES
 8:05 - RIG INSPECTION, REVIEW THAS, HOLD TAILGATE SAFETY MEETING
 8:56 - BEGIN DRILLING PC BS
 9:42 - DRILLED TO 30 FT; ENCOUNTERED 10YR 5/2 SANDS / GRAVEL AT 24.5 TO 27 FT BGS
 UNDERLAIN BY SANDY CLAY / TILL FROM 27-30 FT
 11:05 - COLLECT VAS PC BS 25-27 FT
 11:15 - PULL SAMPLING ASSEMBLY OUT OF HOLE
 11:25 - OFFSITE FOR LUNCH
 12:00 - JIM BACK ONSITE
 12:42 - CASCADE BACK ONSITE
 12:50 - START RIG AND BEGIN DRILLING 30-150 FT
 14:40 - RIG DOWN, ISSUE WITH MAST
 17:00 - OFFSITE

Signed: _____

Field Activity Log

Project Name MDEQ WUPFSMITH Project No. 60518528
 Client MDEQ Date 2/7/17
 Location Oxaca, MI - BS Day ☐ SO ☐ MO ☒ TU ☐ WO ☐ TH ☐ FO ☐ SA
 Contractor CASCADE Weather/Temp RAINING / 34°F

Equipment Onsite:

SILVERADO 2014, #2 PERISTALTICS, Yuma 2, YSE DSS PRO

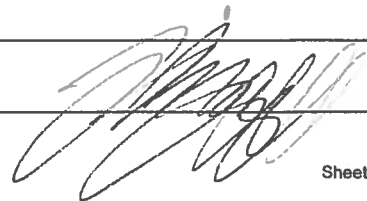
Personnel Onsite:

Jim Puzell - AECOM; Dan O'Mara, Alden Little, Jon Aldesperger - CASCADE

Work Performed (summary of services performed, including field work):

11:00 - PART RECEIVED, CASCADE ON SITE TO BEGIN REPAIRS
 12:15 - CASCADE OFFSITE TO BUY EQUIPMENT IN TAWAS
 13:20 - CASCADE BACK ON SITE, CONTINUE REPAIRS
 15:25 - BEGIN PULLING DRILL PIPE OUT OF HOLE TO TEST FUNCTIONALITY OF RIG AFTER INSTALLING NEW COMPONENTS
 15:41 - RESUME DRILLING
 15:43 - DRILLED TO 80 FT BAS
 15:54 - WHILE INSTALLING CASING FROM 70-80 FT BAS RIG UNEXPECTEDLY SHUT DOWN AND WILL NOT RESTART
 15:56 - JUMPSTARTING RIG
 16:10 - RIG SUCCESSFULLY RESTARTED; MOVE WATER TOWS BACK INTO POSITION
 16:20 - FINISH INSTALLING CASING 70-80 FT BAS
 17:30 - CASCADE OFFSITE
 17:40 - Jim OFFSITE

Signed: _____



Field Activity Log

Project Name MDEQ WURDAMIN Project No. 60518528
 Client MDEQ Date 2/6/17
 Location OSCODA, MI - B5 Day ☐ SO ☐ MO ☐ TU ☒ WE ☐ TH ☐ FR ☐ SA
 Contractor CASCADE Weather/Temp SNOWING / 23°F

Equipment Onsite:

SILVERADO 2014, x2 PERISTALTIC PUMPS, YUMA 2, TURBIDITY HATCH, YSI PRO DSS

Personnel Onsite:

Jim Barzell - AECOM, Dan O'Hara, Jon Adlesperger, Arlen Little - CASCADE

Work Performed (summary of services performed, including field work):

7:45 - Jim and Arlen arrive onsite
 8:00 - Jim and Dan arrive on site, begin jumpstarting rig
 8:30 - Rig started, review PAA, perform rig inspection and hold tailgate safety meeting
- Drill hrs. 1355.0
 9:05 - Begin RIM with CORONA Assembly to drill 90-100 ft.
 10:30 - CASCADE offsite to pick up new fitting for hydraulic hose, no LOPC, failing
fitting was identified before release could happen.
 10:41 - Jim Adlesperger offsite, driving home to Ohio.
 12:20 - Dan and Arlen back on site after lunch with new fitting and hose
 12:25 - Begin replacing hose
 12:35 - Resume drilling 110-120
 13:49 - Rig engine stalled while using vibration to snake 110-120 core out of
core barrel, CASCADE troubleshooting
 15:15 - Offsite to purchase new fuse
 15:30 - CASCADE back onsite, replace fuse and attempt restart. Rig
 15:34 - Rig won't start, charge batteries / try start rig with gas generator
 15:59 - Gas generator not supplying enough power, remove trailer with water totes and begin
jumpstarting rig with truck battery
 16:54 - Rig started, continue removing 120-130 from core barrel then winterize rig
 17:10 - offsite

Signed: _____

Field Activity Log

Project Name MDEQ WERTSMITH Project No. 60518528
 Client MDEQ Date 2/13/17
 Location OSCODA, MI B-5 Day ☐ S ☒ M ☐ T ☐ W ☐ TH ☐ F ☐ S ☐
 Contractor CASCADE Weather/Temp CLEAR

Equipment Onsite:

Chevy 2006, x2 PERISTALTICS, Yuma 2, TURBIDITY NACH, YSE PRODDY (GEOTECH)

Personnel Onsite:

Jim Burrell - AECOM, Dan O'Mara, ALDEN LITTLE, JON ADLESPEGER - CASCADE, DALE CORSI - DLZ

Work Performed (summary of services performed, including field work):

5:30 - ~~DRIVE TO~~ ^{JB} OFFICE FILL NEW TRUCK (2006) WITH EQUIPMENT
 6:00 - ARRIVE AT AECOM OFFICE PRINT FIELD FORMS AND SCAN LOGS
 6:30 - DEPART AECOM - GR - ENROUTE TO OSCODA, MI
 10:15 - ARRIVE ONSITE ~~AND~~ OSCODA, MI, JON AND ALDEN ONSITE
 11:15 - DAN O'MARA ONSITE WITH EXTRA PIPE & BACKFLOW PREVENTER (DALE ONSITE AND OFFSITE)
 12:00 - ARRIVE IN HARRISVILLE AT WELL #2 MEET WITH HARRISVILLE DPW AND BEGIN RINSING / FLUSHING OUT TUBES WITH WATER FROM HYDRANT (WATER TREATED WITH PHOSPHOROUS AND CHLORINE. COLLECTED SAMPLE X2 25ML HDPE AND GPS
 12:45 - LUNCH
 13:20 - ONSITE: JUMPSTART RIG AT B5, HOLD TAILGATE SAFETY MEETING AND REVIEW THMS
 13:30 - BEGIN RIN WITH DRILL PIPE AND CORING ASSEMBLY (1394 LBS)
 13:50 - DRILLED 130-140 FT BGS
 14:05 - DALE CORSI ONSITE
 14:20 - DRILL 140-150 FT BGS
 14:43 - RIG SHUT DOWN WHILE PULLING OUT PIPE; CHECKING CONTROL PANEL AND E-STOP
 14:48 - RIG TESTED AND FUNCTIONAL
 14:52 - 140-150 CORE ON SURFACE
 15:05 - DISASSEMBLE E-STOP CLEAN AND REPLACE PARTS
 15:36 - JUMPSTART RIG WITH BODGAT BATTERY
 16:00 - RIG SUCCESSFULLY STARTED - BEGIN INSTALLING SAMPLING SCREEN TO 135-137 FT BGS.
 16:15 - RIG SHUT DOWN BEGIN TROUBLESHOOTING; RIG SHUT DOWN WHILE TRYING TO RINCE TO BREAK CONNECTION
~~16:45 - RIG POWERS UP FOR APPROX 35~~ OF FIRST DR. 10 FT IN HOLE.
 17:00 - AFTER DISCUSSION WITH MINI RIG EXPERT IN MN. PROBLEM IS MOST LIKELY THE ECU IN THE ENGINE. GOING TO CONTACT SUPERIOR DAESEL FOR REPLACEMENT PART ^{Tonight} OR AES IN THE MORNING
 17:25 - JIM OFFSITE

Signed: _____



Field Activity Log

Project Name MRED WOODSMITH Project No. 160514524
 Client MRED Date 2/20/17
 Location OSCODA, MI - B5 Day ☐ S ☒ M ☐ T ☐ W ☐ TH ☐ F ☐ S ☐ D
 Contractor CASCADE Weather/Temp SUNNY

Equipment Onsite:

2006 Chevy; Enterprise Rental, YSE PRODDS (GEOTECH); V2 RIGISTICS; YUMA 2; TURBIDITY MACH

Personnel Onsite:

Jim Buzzell + Mike Wolf AECOM; Dan O'Mara, Jon Adlesperger; Arlen Little - CASCADE

Work Performed (summary of services performed, including field work):

6:15 - MEET MIKE WOLF AT MOBILE BUS STATION IN LANSING AND DRIVE TO OSCODA, MI
 8:30 - STOP IN BAY CITY ENTERPRISE TO ADD MIKE AS DRIVER ON RENTAL CAR (1 day)
 10:40 - ARRIVED ON SITE
 11:30 - TAILGATE SAFETY MEETING
 - DISCUSSED RECENT RECORDING ABOUT CRUSHED FINGER WHILE USING GEOPROBE
 - DISCUSSED AEC SOPS ABOUT PFAS SAMPLING - NO FOOD ON SITE OR IN CARS.
 - NEW RIG THAT REQUIRES DIFFERENT OPERATING PROCEDURES, DEFINE EXCLUSION ZONE
 - REVIEW ^{AND DISCUSS} THAS
 11:40 - BEGIN BREAKING DOWN DRILL PIPE INTO 5 FT SECTIONS
 - USING WRENCH, INSTALL 4x10 FT SECTIONS INTO HOLE THEN PULL OUT AND BREAK DOWN
 DRILL STRING INTO 5 FT SECTIONS.
 12:26 - ^{SO} BEGIN ^{SCREW INTO} PULLING OUT CASING, JON IN BURGOT BROUGHT PULLEY OF HOLE PULVER TO HOLE AND DROVE
 BACK TO BG FOR ADDITIONAL PIPE RACK.
 12:39 - BEGIN PULLING 6" CASING OUT OF HOLE.
 12:45 - OFFSITE FOR LUNCH
 13:15 - JIM + MIKE BACK ON SITE
 14:00 - CASCADE BACK ON SITE - DUMP 2 BAGS HOLE PLUG DOWN HOLE ALLOW WATER LEVEL TO SETTLE
 14:14 - CONTINUE PULLING OUT CASING. FILLING HOLE WITH 3/4" HOLE PLUG (HALLIBURTON) EVERY 10 FT
 14:15 - RUSS GORDON ONSITE FROM CASCADE - GEOPROBE TECHNICIAN / EXPERT TO HELP DRILL CREW
 FAMILIARIZE THEMSELVES WITH NEW RIG.
 15:10 - DROPPED 6" PIPE DOWN HOLE BEGIN FISHING - RIN WITH 6" CASING
 15:25 - CONTINUE PULLING 6" PIPE OUT OF HOLE
 16:06 - 6" CASING OUT OF HOLE - FILL HOLE WITH CUTTINGS BEGIN CLEANING SITE PC B5
 17:00 - OFFSITE

Signed: _____



4722

AECOM

Field Activity Log

Project Name WURTSMITH AFB

Project No. _____

Client MDEQDate 2/21/17Location OSCODA, MIDay ☐ SO ☐ MO ☒ TU ☐ WO ☐ TH ☐ FR ☐ SAContractor CASCADE DRILLINGWeather/Temp RAIN 37°

Equipment Onsite:

2006 CHEVY YSI PRO DS (GEOTECH) TUMA PERISTALTIC

Personnel Onsite:

MIKE WOLF (AECOM) DAN O'MARA ~~DON ADAMS~~, ARLENE LITTE, RUSS GORDON (CASCADE)

Work Performed (summary of services performed, including field work):

7:45 ONSITE AT B1 WAITING FOR CASCADE PAPERWORK

8:10 DAN SETTING UP ROAD SIGNS. MOBBING EQUIPMENT TO NEW LOCATION

9:30 UNLOADING EQUIPMENT SETTING UP ON HOLE

10:30 REPLACE CYLINDER ON LOWER RAM

11:30-12:15 BEGIN DRILLING AFTER LUNCH

12:20 START DRILLING B1

12:20-17:15 DRILL B1 TO 55' CLAY AT 37'

LOTS OF HEAVING SANDS BETWEEN 25-35'

UPPER RAM CYLINDER STARTED LEAKING. REPAIRED.

DROPPED 45-50' LONG BARREL DOWN HOLE -

RETRIEVED IT WITH CLAY STILL IN IT.

17:15 BOB (MDEQ) STOPPED BY AFTER WE WERE FINISHED. I SHOWED HIM THE CLAY WE ENCOUNTERED AT ~37'.

Signed: _____

Sheet 1 of 1
Field Activity Log

Field Activity Log

Project Name WDEQ WERTIMITH
 Client WDEQ
 Location OSCON, ME - B1
 Contractor CASCADE

Project No. 60518524
 Date 2/22/17
 Day ☐ SO ☐ MO ☐ TO ☒ W ☐ TH ☐ F ☐ S ☐
 Weather/Temp Foggy / 41°F

Equipment Onsite:

CARVY 2000, CHRYSLER (ENTERPRISE), VZ PERISTALTIC, YSE PRO DSS, YUMA 2, TURBIDITY HACH

Personnel Onsite:

Jim Buzzell + Mike Wolf - AECOM; Dan O'Mara, Allen Little, Russ Gordon - CASCADE

Work Performed (summary of services performed, including field work):

- 7:30 - ARRIVED ONSITE, START RIG AND PERFORM INSPECTION
- 8:00 - HOLD TAKEOFF SAFETY MEETING AND REVIEW THAS.
- WORKING IN ROAD. MAKE SURE BARRIERS ARE PROPERLY SET AND WEAR HI VIS CLOTHING, PARTICULARLY IN FOGGY CONDITIONS
 - MAKE SURE NITRILES ARE WORN WHILE HANDLING ANY EQUIPMENT THAT WILL BE GOING DOWN HOLE.
- 8:20 - PULL CASING UP TO EXPOSE FIRST VAS POINT 34-36 FT AND BEGIN RIG WITH SAMPLING ASSEMBLY (NO WATER INJECTED WHILE DRILLING 35-40 FT)
- 9:00 - PUMPED WELL DRY WITH MINGSON LET WELL RECHARGE
- 15 ft/min 2.5" DIAMETER $1.25^2 \times 17.18 \text{ ft} = 4.91 \text{ ft}^3$ $58.9 \text{ m}^3 / 16.383 \text{ m}^3 = 3.59 \text{ gal}^3$
- $58.9 \text{ m}^3 \times 16.383 \text{ m}^3 = 965 \text{ mL/min}$ RECHARGE RATE
- 9:55 - COLLECTED VAS PC B1 34-36 FT; *MIKE WOLF OFFSITE
- 10:10 - BEGIN PULLING UP CASING AND SAMPLER TO NEXT INTERVAL 26-28 FT
- 10:15 - RAIL ROAD CREW REQUIRED US TO MOVE TRUCKS TO UNBLOCK ACCESS ROAD
- 10:40 - BEGIN PURGING WITH SCREEN SET AT 26-28 FT. AT 2 gal/min ≈ 33 DRAWDOWN / 5 min
- 100 gal WAS PUMPED IN A 15 FT ZONE WHICH INCLUDES 26-28 gal. PURGING 100 gal THEN MONITOR PARAMETERS.
- 11:40 - PARAMETERS NOT STABILIZING, CONTINUE PURGING AT 2 gal/min AND MONITOR PARAMETERS.
- 11:42 - CASCADE OFFSITE FOR LUNCH
- 12:00 - CASCADE BACK ONSITE
- 12:20 - COLLECTED VAS PC B1 26-28 FT
- 12:35 - REFUEL RIG; JIM OFFSITE FOR LUNCH
- 13:05 - JIM BACK ONSITE, INSTALL CASING BACK DOWN TO 55 FT BGS
- 13:25 - ~~DRILL~~ 55 - CLEAN OUT HOLE
- 13:40 - BEGIN DRILLING
- 15:10 - DRILLED THROUGH 2.5 FT SAND SEAM FROM 77.5 - 80 FT BGS (40 gal WATER INJECTED)
- 15:35 - SET SCREEN FOR VAS AT 78-80 FT BGS

Signed: _____



Field Activity Log

Project Name MDEQ WERTSMITH Project No. 60518528
 Client MDEQ Date 2/22/17
 Location OSCODA, ME BI Day ☐ S ☐ M ☐ T ☒ W ☐ TH ☐ F ☐ S
 Contractor CASCADE Weather/Temp OVERCAST / 47°F

Equipment Onsite:

SILVERADO 200L, X2 PERISTALTICS, YUMA 2, YSI PR DDS (GEO TECH), TURBIDITY HATCH

Personnel Onsite:

Jim Russell - AECOM ; Dan O'Mara, Arlen Little, Russ GORDAN - CASCADE

Work Performed (summary of services performed, including field work):

15:55 - BEGIN PURGING 80 gal at 1.75 gal/min
 17:20 - COLLECT VAS PC BI 78-80FT AND PC BI 78-80FT TA (FOR TEST AMERICA)
 17:35 - REMOVE SCREEN FROM HOLE.
 17:45 - OFFSITE

Signed: _____



Field Activity Log

Project Name UNDER WILSONSMITH Project No. 60518528
 Client UNDER Date 2/23/17
 Location OSCODA, MI - B1 Day ☐ SO ☐ MO ☐ TO ☐ WO ☒ TH ☐ FO ☐ SA
 Contractor CASCADE Weather/Temp Clear 50°F

Equipment Onsite:

SILVERADO 2006, YUMA 2, YSI PRO DDS (HEUTECH), 2 PERISTALTIC PUMPS, TURBIDITY HACH

Personnel Onsite:

Jim Buzzell - AECOM; Don O'Hara, Arden Little, Russ Gordon - CASCADE

Work Performed (summary of services performed, including field work):

7:30 - Jim Buzzell ^{and} ~~onsite~~ CASCADE ONSITE
 7:45 - REVIEW TNAs AND HOLD TAILGATE SAFETY MEETING
 - WORKING IN ROW MAKE SURE ALL BARRIERS ARE STILL VISIBLE TO TRAFFIC AND UNDAMAGED
 - ^{IS} ~~WORK~~ NEARBY WORK ON RAILROAD TRACKS, REMOVING LARGE PILE OF DEBRIS FROM SIDE OF TRACKS.
 - STAY HYDRATED AND WATCH PINCH POINTS WHILE HANDLING PIPE OR BREAKING CONNECTIONS
 8:49 - ON BOTTOM, DRILL OUT SLUFF
 8:29 - DRILLED 85-95 FT BGS
 9:10 - DRILLED 95-105 FT BGS
 9:37 - SHUT RIG DOWN, ^{HYDRAULIC} LEAK OBSERVED ON SURFACE OF RIG BY ENGINE, NO RELEASE ONTO GROUND.
 9:47 - RIG STARTED BACK UP CONTINUING RUNNING IN HOLE
 11:40 - OFF CASCADE OFFSITE FOR LUNCH
 12:05 - Jim OFFSITE FOR LUNCH
 12:35 - Jim ONSITE
 12:40 - CASCADE ONSITE, REFUEL RIG
 13:04 - RIG TO CONTINUE DRILLING 135-145
 15:30 - DRILLED 145-150, CORE TIPPED OUT OF BARREL WHILE PULLING UP TO SURFACE
 15:50 - BACK ON BOTTOM TO RETRIEVE CORE + 1 FT; RECEIVED GATE COMBINATION FOR GOLF COURSE FROM JIM MILLS
 16:20 - BEGIN PULLING 6" CASING AND FILLING HOLE WITH BAROID HOLE PLUG
 17:40 - CASING OUT OF HOLE AND HOLE FILLED; BEGIN MOVING EQUIPMENT TO B2
 18:30 - SET UP AT B2
 18:37 - OFFSITE

Signed: _____

Field Activity Log

Project Name MDER WURTSMITH Project No. 60518528
 Client MDER Date 2/24/17
 Location OSCODA, ME - BZ Day ☐ SO ☐ MO ☐ TO ☐ WO ☐ TH ☐ FR ☒ SA ☐ SU
 Contractor CASCADE Weather/Temp RAINING / 33°F

Equipment Onsite:

SILVERADO 2006, K2 PERISTALTICS, YAMAHA 2, YSE PRODD'S (GEOTECH), TURBIDITY HACH

Personnel Onsite:

Jim Burrell - AECOM; DAN O'MARA + ALDEN LITTLE - CASCADE

Work Performed (summary of services performed, including field work):

7:30 - ONSITE, CALLED JIM MILLS TO INFORM HIM OF OUR ARRIVAL. LOCKED GATE FOR VERIZON TOWER SECURITY PURPOSES
 7:35 - FINISH MOBILIZING EQUIPMENT IS WATER TOTES AND SETTING UP DRILL PIPE BACK IN FRONT OF RIG.
 7:50 - REVIEW THAS AND HOLD TAILGATE SAFETY MEETING
 - WORKING IN COLD SLIPPERY CONDITIONS IN THE RAIN ON UNEVEN TERRAIN, WATCH YOUR STEP
 - REVIEW LIGHTNING/THUNDER PROTOCOL (LIGHTNING STRIKES 20 MILES EAST OF TAVAS)
 THUNDERSTORM POSSIBLE ALL DAY
 8:04 - LIGHTNING OBSERVED, ALL STOP 30 mins
 8:10 - LIGHTNING/THUNDER OBSERVED
 8:12 - LIGHTNING/THUNDER OBSERVED
 8:14 - LIGHTNING/THUNDER OBSERVED
 8:28 - LIGHTNING/THUNDER OBSERVED
 8:32 - LIGHTNING/THUNDER OBSERVED
 9:02 - 30mins SINCE LAST OBSERVED LIGHTNING STRIKE; HEAVY RAIN ³⁰ ~~FEARFULLY~~
 9:30 - SUSTAINED HIGH WINDS AND HEAVY RAIN/SNOW MIX
 9:45 - LIGHT RAIN, BEGIN PREPPING TO DRILL
 10:00 - PERFORM RIG INSPECTION
 10:05 - BEGIN DRILLING
 10:57 - LIGHTNING/THUNDER OBSERVED
 11:04 - LIGHTNING/THUNDER OBSERVED
 11:08 - LIGHTNING/THUNDER OBSERVED
 11:26 - OFFSITE FOR LUNCH
 12:00 - JIM ONSITE
 12:09 - CASCADE RETURN TO DPW TO PREPARE BUBCAT FOR PICKUP, REQUIRES TRAILER ATTACHMENT THAT NEEDS TO BE FOUND/PURCHASED.

Signed: _____



Field Activity Log

Project Name MTDEQ Watersheds Project No. 60516528
 Client MTDEQ Date 2/24/17
 Location Oscoda, ME - B2 Day ☐ S ☐ M ☐ T ☐ W ☐ TH ☒ F ☐ S
 Contractor CASCADE Weather/Temp LIGHT RAIN / OVERCAST | 36°F

Equipment Onsite:

SILVERADO 2006, YUMA 2, K2 PERISTALTICS, YSI PRO DDS (SCOTCH), TURBIDITY HACH

Personnel Onsite:

Jim Buzzell - AECOM; Dan O'Mara + Arlen Little - CASCADE

Work Performed (summary of services performed, including field work):

13:55 - CASCADE ONSITE

14:05 - BEGIN DRILLING 20-30 FT

15:15 - OFFSITE

17:30 - SHIP SAMPLES TO VISTA LABORATORY VIA FEDEX OVERNIGHT FOR 10AM DELIVERY

19:30 - ARRIVE IN GRAND RAPIDS

Signed: _____



Field Activity Log

Project Name MDEQ WURTSMITH
 Client MDEQ
 Location OSCODA, MI - BZ
 Contractor CASCADE

Project No. 60518528
 Date 2/27/17
 Day ☒ MON ☐ TUE ☐ WED ☐ THU ☐ FRI ☐ SAT
 Weather/Temp SUNNY / 30°F

Equipment Onsite:

SILVERADO 2006, X2 PERISTALTICS, YUMA2, CSI PRO DDS (GEOTECH), TURBIDITY HACH

Personnel Onsite:

Jim Buzzell - AECOM

Work Performed (summary of services performed, including field work):

5:45 - ARRIVED AT AECOM TO DROP OFF TEST AMERICA SAMPLE AND PERFORM VEHICLE INSPECTION
 6:00 - DEPART GRAND RAPIDS, ENROUTE TO OSCODA, MI
 9:45 - ARRIVED ONSITE AT PC BZ IN OSCODA, MI. CASCADE IN HARRISVILLE FILLING TOTES WITH DRILL WATER.
 10:15 - CASCADE ONSITE
 10:40 - CONDUCT TAILGATE SAFETY MEETING, REVIEW TRMS AND RIG INSPECTION
 - WATCH FOOTING, UNEVEN GROUND AROUND WORK AREA
 - INSPECT INTEGRITY OF PLASTIC TARP BENEATH RIG
 - INSPECT PPE AND USE PRECAUTION WHILE HANDLING PIPE.
 10:52 - BEGIN DRILLING PC BZ
 12:40 - CASCADE OFFSITE FOR LUNCH
 12:46 - Jim OFFSITE FOR LUNCH
 13:31 - ONSITE PREPARE TO DRILL 45-50FT BGS (RE-FUEL RIG)
 13:50 - ON BOTTOM, BEGIN DRILLING 45-50 FT BGS; JOHN C. AND DORIN B. ONSITE
 14:32 - DRILL PIPE SLIPPED OUT OF PIPE HANDLERS - BEGIN FISHING; DALE C. ONSITE
 14:40 - SAMPLING ASSEMBLY SET AT 33-35FT DOWN HOLE; JOHN C. AND DORIN B. OFFSITE
 15:40 - ~~DALE C.~~ COLLECTED VAS PC BZ 33-35FT
 15:56 - DECON SCREEN PULL CASING UP FOR NEXT INTERVAL
 17:20 - COLLECTED VAS PC BZ 20-22FT
 18:15 - COLLECTED VAS PC BZ 8-10FT
 18:22 - SAMPLING ASSEMBLY OUT OF HOLE - DECON
 18:30 - OFFSITE (CASING STILL IN HOLE AT BZ)

Signed: _____



Field Activity Log

Project Name MDEQ WERTSMITH Project No. 60576528
 Client MDEQ Date 2/28/17
 Location OSCODA, MI - B2/B3 Day ☐ S ☐ M ☒ T ☐ W ☐ TH ☐ F ☐ S ☐
 Contractor CASCADE Weather/Temp OVERCAST / 31°F

Equipment Onsite:

SILVERADO 2006, x2 PERISTALTICS, YUMA 2, TURBIDITY ANCH, YSI PRO DDS

Personnel Onsite:

Jim Buzzell - AECOM; Dan O'MARA + ARLEN LITTLE - CASCADE

Work Performed (summary of services performed, including field work):

7:25 - Jim and Dan on site
 7:40 - Arlen on site
 7:45 - REVIEW TMA, HOLD TAILGATE SAFETY MEETING, AND PERFORM RIG INSPECTION
 - WATCH FOOTING WHILE MOBILIZING TO NEXT LOCATION
 - PLAN ROUTE
 - WORKING IN COLD, WET CONDITIONS
 - ALWAYS WEAR NITRILE GLOVES WHILE HANDLING SAMPLING EQUIPMENT
 6:36 - CASING OUT OF HOLE, HOLE BACKFILLED WITH SEDIMENTS. CLEAN SITE AND MOVE RIG TO B3.
 6:54 - RIG ON SITE AT B3, BEGIN SETTING UP EQUIPMENT FOR DRILLING
 9:29 - REPLACE BREAK OUT JAWS
 4:41 - BEGIN DRILLING B3 250 gal WATER INJECTED BETWEEN 20-30 FT GAS
 11:30 - CASCADE OFFSITE LUNCH
 11:45 - Jim OFFSITE LUNCH
 12:10 - Jim BACK ON SITE
 12:25 - CASCADE ON SITE
 12:40 - PULL CASING B/P FOR VAS PC B3 28-30 FT
 15:05 - Jim OFFSITE TO PICK UP PACKAGE FROM HOTEL; BEGAN PURGING PC B3 20-22 FT AT 15:01
 15:35 - Jim ON SITE
 16:00 - HEAVY RAIN BEGINS; STORM ^{FORECASTED AT} ~~ARRIVING~~ BY 17:00
 16:20 - COLLECTED VAS PC B3 20-22 FT
 16:29 - PULL CASING AND SCREEN UP FOR VAS PC B3 7-9 FT
 17:05 - CASCADE TRUCK STUCK IN FIELD, UNABLE TO PULL OUT WITH BOBCAT
 17:25 - COLLECTED VAS PC B3 7-9 FT
 17:45 - ATTEMPTING TO PULL TRUCK OUT WITH RIG
 18:00 - Jim OFFSITE - UNABLE TO REMOVE CASCADE TRUCK FROM SITE.

Signed: _____

[Signature]

Field Activity Log

Project Name MDEQ WATSMITH
 Client MDEQ
 Location OSCONA, ME - B3
 Contractor CASCADE

Project No. 60514528
 Date 3/1/17
 Day ☐ S ☐ M ☐ T ☒ W ☐ TH ☐ F ☐ S ☐
 Weather/Temp RAIN / SNOW 40-20°F

Equipment Onsite:

SILVERADO 2006, K2 PERISTALTICS, TURBIDITY MACH, YSI PRO DDS (GEOTECH), YUMA 2

Personnel Onsite:

Jim Buzzell - AECOM; Dan O'Mara, Arlen Little - CASCADE

Work Performed (summary of services performed, including field work):

- 7:30 - CASCADE ONSITE TO ASSESS CONDITIONS AROUND TRUCK. BEGIN CLEANING SITE
ORGANIZING EQUIPMENT AND SHOOTING OUT GROUND
- 9:30 - DAN OFFSITE TO PICK UP DOZER FROM SAGINAW
ARLEN MOBILIZE TO B3-5 TO CLEAN SEDIMENT PILES AND
- 12:00 - ARLEN AT B3 MOVING EQUIPMENT OFF OF SOFT GROUND.
- 16:30 - DAN ARRIVES ON SITE WITH DOZER IN HEAVY SNOW; HOLD SAFETY DISCUSSION AND
PLAN WHAT NEEDS TO BE DONE AND HOW IN ORDER TO DISLodge THE CASCADE TRUCK AND
RETURN TO GATE ENTRANCE WHILE MINIMIZING DAMAGE TO GROUNDS
- 17:00 - DRIVE DOZER BACK TO B3 WHERE CASCADE TRUCK IS STUCK.
- 17:34 - SUCCESSFULLY RECOVERED CASCADE'S TRUCK
- BEGIN CLEANING DIVOTS LEFT BY DOZER AND TRUCK.
- 18:00 - DRIVE RIG TO GOLF COURSE ENTRANCE FOR REFUELING, ~~REPAIRING~~ ^{SB}
CLEAN MUD OF TRACKS OF DOZER, BOBCAT, AND TRUCK.
- 18:30 - OFFSITE.

Signed: _____



Field Activity Log

Project Name WDEQ WILTSWITA
 Client WDEQ
 Location OSCON, ME - B3
 Contractor CASCADE

Project No. 60516528
 Date 3/2/17
 Day ☐ S ☐ M ☐ T ☐ W ☐ TH ☐ F ☐ S ☐ S
 Weather/Temp Mostly Cloudy ~~13°~~ ^{13°} F

Equipment Onsite:

SILVERADO 2006, X2 PERISTALTIC PUMPS, YSI PRO DQS, YUMA 2, TURBIDITY HACH

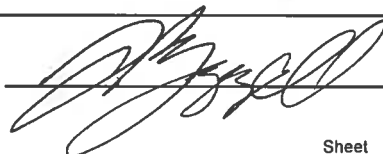
Personnel Onsite:

Jim Russell - AECOM; Dan O'Mara + Arlen Little - CASCADE

Work Performed (summary of services performed, including field work):

7:30 - ONSITE TO ASSESS CONDITIONS
 7:45 - REVIEW THAT AND MODIFY THATS + HOLD TAILGATE SAFETY MEETING
 - WORKING IN COLD < 20°F TEMPS
 - SLIP, TRIPS AND FALLS WEAR HARK TRAX
 - TAKE BREAKS IN HEATED CAB OF TRUCK.
 - PLAN ROUTE FOR TRUCKS TO REDUCE POSSIBILITY OF GETTING STUCK
 8:15 - CASCADE OFFSITE IN HARRISVILLE TO PICK UP WATER. (ARLEN ONSITE TO SET UP EQUIP AT B3)
 8:20 - BOBCAT BATTERY DIED
 8:45 - CHARGING BATTERY WITH DOZER
 9:10 - BATTERY CHARGED BEGIN SETTING UP AT B3
 11:01 - DAN ARRIVED ONSITE WITH WATER
 12:00 - SITE SET UP, PREPARED TO DRILL, CASCADE OFFSITE FOR LUNCH
 12:45 - CASCADE ON SITE
 13:00 - BEGIN DRILLING B3
 13:10 - FROZEN WATER LINES
 13:30 - CASING INSTALLED TO 40 FT BGS, BEGIN CLEANING HOLE / TRAILING
 14:40 - UNFREEZING WATER TRANSFER LINE TO REFILL TOTES FROM TRUCK.
 14:50 - CONTINUE DRILLING
 15:45 - SAMPLE 70-80 PIPE DROPPED DOWN HOLE, BEGIN FISHING.
 15:58 - CORE SUCCESSFULLY RETRIEVED ON SURFACE
 16:05 - REPLACE BOTTOM BREAK OUT TREAT
 16:43 - BEGIN RUNNING IN HOLE
 17:20 - BEGIN FISHING
 17:30 - ON SURFACE WITH 80-90 FT BGS CORE
 18:35 - OFFSITE

Signed: _____



Field Activity Log

Project Name MDEQ WATERSHED

Project No. 60519526

Client MDEQ

Date 3/3/17

Location OSGODA, MS - B3

Day ☐ SO ☐ MO ☐ TU ☐ WED ☐ TH ☐ FR ☒ SA

Contractor CASCADE

Weather/Temp Clear / 8°F

Equipment Onsite:

SILVERADO 2006, x2 PERISTALTICS, YUMA 2, YSI PRO DDS, TURBIDITY HACH

Personnel Onsite:

JIM BAZELL - AECOM; DAN O'MARA + ARLEN LITTLE - CASCADE

Work Performed (summary of services performed, including field work):

- 7:30 - JIM + ARLEN ONSITE, DAN IN NARRISVILLE FILLING TOTES WITH DRILL WATER
- 7:56 - DAN ARRIVED ON SITE; CALIBRATE YSI PRO DDS
- 8:30 - CARRY TOTES BACK TO B3 WITH BOBCAT
- 8:55 - HOLD TAILGATE SAFETY MEETING, REVIEW THAS, RIG INSPECTION &
 - WORKING IN COLD CONDITIONS 40°F; TAKE BREAKS IN HEATED TRUCK CAB, WARM HANDS AND TOES
 - GROUND IS UNEVEN AND FROZEN, WATCH STEP, WEAR YAK TRAX
 - FOLLOW ALL AECOM SOPs FOR PFAS SAMPLING
- 9:20 - BEGIN TRIPPING INTO HOLE
- 9:28 - ON BOTTOM BEGIN DRILLING 100-110
- 9:32 - FINISHED DRILLING TO 110, UNFREEZING WATER RETURN LINES
- 9:46 - WATER LINES CLEAR, BEGIN TRIPPING OUT OF HOLE WITH 100-110 CORE
- 11:45 - CASCADE OFFSITE
- 11:55 - JIM OFFSITE
- 12:20 - JIM ON SITE
- 12:36 - CASCADE ON SITE
- 12:52 - BEGIN TRIPPING IN HOLE
- 14:17 - DROPPED CORE BARREL DOWN HOLE BEGIN FISHING (PUSHED WRONG BUTTON ON CONTROL PANEL AND OPENED BOTTOM BREAK OUT SAWS DRIPPING 25 FT OF PIPE)
- 15:35 - TRIPPED OUT OF HOLE 4" PIPE 125 FT PIPE RECOVERED, UNABLE TO RETRIEVE 15 FT 4" DP + 10 FT CORE BARREL
- 15:37 - OVERDRILL WITH 6" PIPE AND ATTEMPT TO RECOVER REMAINING 4" IN HOLE.
- 16:05 - BEGIN PULLING OUT 6" PIPE
- 16:54 - TOP OF 4" PIPE AT SURFACE; LEAVE BOTTOM SAWS CLOSED AROUND 6" PIPE, PULL 4" UP, BREAK CONNECTION WITH TOP SAWS, CONNECT CABLE WRENCH TO PIPE IN HOLE LOWER BACK DOWN, BREAK OFF 5 FT SECTION OF 4" PIPE WITH TOP SAWS WHILE WRENCH HOLDS PIPE UP IN HOLE.
- 18:30 - OFFSITE

Signed: _____

