

To:

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CC:

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Project name:

Camp Grayling - Lake Margrethe

Project ref: 60563409

From:

Lauren McNeely, AECOM

Date:

April 22, 2019

Memo

Subject: Camp Grayling - Lake Margrethe PFAS Remedial Investigation

Introduction 1.

AECOM has prepared this Technical Memorandum (TM) to present the results of the Remedial Investigation (RI) performed at the Camp Grayling - Lake Margrethe PFAS Site. The RI Investigation Area is located near the southeast corner of Lake Margrethe, near Camp Grayling, in Grayling, Michigan (Figure 1).

AECOM understands that the Michigan Department of Environmental Quality (MDEQ) is the regulatory authority in charge of protection of human health and the environment with regard to contamination present in and migrating from the Investigation Area. The MDEQ requested AECOM perform an RI to delineate the degree and extent of Per- and Polyfluoroalkyl Substances (PFAS) contamination potentially present in groundwater within the Investigation Area. This TM summarizes the findings of the Phase I RI completed in November, 2018.

2. **Project Background**

As a result of high concentrations of PFAS detected in foam samples collected from Lake Margrethe in Grayling, Michigan, the MDEQ requested AECOM collect residential drinking water samples around Lake Margrethe. Lake Margrethe is located approximately 3.7 miles southwest of the Grayling Army Airfield, where the South Post of Camp Grayling facilities are located. The South Post contains support facilities including barracks, range control, officers club, Post Exchange, parade grounds, athletic fields, and administrative buildings. Recreational areas and residential properties are also present along the shore of Lake Margrethe. Fire training areas and other locations where PFAS-containing, aqueous film forming foam (AFFF) was potentially released have been identified at the South Post. Additionally, a private residence, located north of the South Post facility boundary, had caught fire and foam was reportedly used to extinguish the fire. However, the type of foam (Class A or AFFF), the concentration used, and the date of the fire, are not known.

A total of 447 residential drinking water samples were collected from around Lake Margrethe during 2018 and analyzed for PFAS using USEPA Method 537 Rev 1.1. Of the 447 samples analyzed, 384 samples did not contain detections of PFAS. Sixty-one samples had detections of combined Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS) that were below the Part 201 Residential Drinking Water Criterion of 70

nanograms per liter (ng/L). Two samples contained concentrations that exceeded the Part 201 Residential Drinking Water Criterion. These two residences are located on the southeast side of Lake Margrethe, directly north of the base boundary. Based on these results, the MDEQ requested AECOM to conduct a remedial investigation to delineate PFAS in groundwater to assist in understanding the potential risk to human health and the environment.

This TM presents the results of the RI which included installation of nested groundwater monitoring wells, collection of groundwater samples, installation of a staff gauge, and collection of groundwater, surface water, and pore water samples.

3. Field Investigation

The RI included the installation of multilevel, nested groundwater monitoring wells at five (5) locations on the southeast side of Lake Margrethe, north of the Camp Grayling base boundary. Monitoring well locations are shown on **Figure 2**. The monitoring well locations were based on analytical results from residential drinking water samples and residential drinking well records.

All monitoring wells were located on private property and required MDEQ access agreements from property owners.

The RI investigation also included the installation of a staff gauge on the southeast corner of Lake Margrethe, near the property with the residential well PFAS exceedance. The staff gauge location is shown on **Figure 2**.

3.1 Monitoring Well Installation and Development

Borings at each location were drilled with a Geoprobe® Rotosonic/continuous core drill rig, owned and operated by Mateco Drilling Company. Soils were continuously logged by AECOM personnel using Environmental Sequence Stratigraphy, including lithology, grain-size, sorting, moisture, and color. Sample descriptions and monitoring well construction information were documented on boring-specific, field log sheets. Boreholes were terminated after encountering three feet of clay to avoid penetrating the competent clay layer.

Photographs of soil cores and the finished wells are provided in **Appendix A.** Soil boring logs are included in **Appendix B**. Soil samples were not collected for laboratory analyses as part of this scope of work.

Three, two-inch diameter wells were installed at four locations (CG-MW001, CG-MW002, CG-MW004, and CG-MW005) and two wells were installed at a fifth location (CG-MW003). All of the monitoring wells at each location were installed within a single borehole. In general, the wells were screened across the water table, directly above the clay and a medium depth between the shallow and deep wells. The two wells at location CG-MW003 were installed across the water table and directly above the clay. **Table 1** provides the screen interval for each of the monitoring wells.

The annular space was filled with sand pack to a minimum of 2-ft below and 1-ft above each of the well screens and sealed with hydrated bentonite chips between the well screens. The shallow wells were completed with sand pack to the surface. All monitoring wells were completed at-grade (flush mount) with a steel cover and a 2-ft by 2-ft concrete pad and sealed with a j-plug type cap.

The monitoring wells were developed no sooner than 24 hours post installation by pumping and surging using a submersible pump. The pump intake was periodically raised and lowered to develop the entire portion of the submerged screen. Water quality parameters were monitored during development and recorded at periodic intervals. Monitoring wells were considered adequately developed when the following conditions were met:

- 1. Water quality parameters stabilized;
- 2. An appropriate volume of water was removed (approximately 5 well volumes or amount equal to volume of water used during installation, whichever was greater); and
- 3. Water pumped from the monitoring well was relatively clear).

A copy of the development forms are provided in **Appendix C**. Monitoring well development water was containerized in Department of Transportation - approved 55-gallon drums and moved to a centralized storage area prior to characterization and disposal.

3.2 Staff Gauge Installation

A steel post was driven into the bottom of Lake Margrethe near the shore at Borchers Way. The top of the post was surveyed and an electronic measuring tape was used to measure the distance to surface water to determine the elevation of Lake Margrethe. The staff gauge location is shown on **Figure 2**.

3.3 Groundwater Sampling

Following monitoring well development one round of groundwater sampling was conducted. The sampling event took place at least 48 hours after monitoring well development. Prior to sampling, static water levels were measured in all wells to determine the groundwater potentiometric surface (**Table 1**). Wells were sampled using MDEQ-approved, low-flow, groundwater sampling techniques. Water quality parameters (i.e., pH, temperature, specific conductance, oxidation reduction potential [ORP], turbidity and dissolved oxygen [DO]) were monitored and recorded approximately every 5 minutes during purging. Groundwater samples were collected after water quality parameters stabilized for three consecutive readings. Stabilization parameters were as follows: depth to water drawdown <0.33 feet, pH +/-0.1, Conductivity +/- 3%, Turbidity +/- 10%, DO +/- 10%, Temperature +/- 5%, and ORP +/- 10mV. If water quality parameters did not stabilize after ten readings, the well was sampled and this deviation was documented on the groundwater sample record sheet. Groundwater Sampling Forms are included in **Appendix C**. **Table 2** presents the final water quality read prior to sampling each monitoring well.

Samples were collected in certified PFAS-free sample containers (provided by the laboratory), labeled, transferred to a cooler on ice, and submitted to the laboratory under chain-of-custody documentation for analysis. Sample collection and handling followed procedures outlined in MDEQ PFAS Sampling Guidance documents. The groundwater samples were analyzed for PFAS by Vista Analytical Laboratory (Vista) of El Dorado Hills, California using isotope dilution.

One duplicate sample was collected for every 20 ground water samples collected as part of the overall Camp Graying project. Field and equipment blanks were also collected at a rate of one per every 20 samples;

All non-dedicated equipment that came into contact with soil was decontaminated with a Liquinox-deionized water mixture. Field personnel performing the collection procedures donned a new pair of gloves prior to handling any sampling equipment, between sampling and decontamination procedures, and between sampling locations.

3.4 Surface Water/Pore Water Sampling

The MDEQ Geological Services Unit (GSU) performed pore water sampling at 9 locations and surface water sampling at 5 of those 9 locations. If a surface water sample was collect at a given location it was co-located with the corresponding pore water sample. The pore water and surface water sampling locations are shown on **Figure 3**. Note that only surface water location SW-02 and pore water locations PW-01, PW-02, PW-03, and PW-09Anom are within the investigation area.

Surface water samples were collected by gently submerging the sample bottle in the surface water and allowing the water to fill the container. Care was taken to not include floating debris. Pore water samples were collected by installing a Henry Sampler® in the sediment and purging the pore water using the low-flow sampling technique.

The pore water and surface water samples were analyzed for PFAS by Vista using isotope dilution methods.

3.5 Investigation Derived Waste

Investigation Derived Waste generated during the investigation included the following:

- Disposable material such as soil core liners, personal protective equipment (PPE), plastic sheeting, etc.
- Drill cuttings
- Well development water
- Purge water
- Decontamination water

Minimally-contaminated disposable sampling materials and PPE were containerized and disposed of as ordinary solid waste. Drill cuttings, excess soil from sampling, well development water, purge water, and decontamination water were containerized in 55-gallon drums and transported by Clean Harbors to a licensed facility for disposal. The waste disposal manifest is included in **Appendix D**.

3.6 Deviations from Scope of Work

The following deviations from the original scope of work occurred during the course of the project:

- Three of the monitoring well locations were adjusted due to private property owners denying access.
- An intermediate well screen was not installed in CG-MW003 due to the competent clay layer being much shallower than other monitoring well locations.
- The surface and pore water samples were collected by the MDEQ GSU instead of AECOM.

No deviations to the scope of work affected the investigation objectives.

4. Environmental Setting

4.1 Geology

The regional, surficial geology of the Investigation area consists of glacial outwash sand and gravel with postglacial alluvium. The glacial outwash sands and gravels are underlain by glacial lacustrine deposits of primarily clay in the Investigation area. Boring logs from residential wells and RI monitoring wells generally indicate fine to medium-grained, shallow sand underlain by clay. Geologic cross-sections created using boring logs from this investigation and residential well records are presented in **Figures 4** through **7**. The clay layer encountered during the RI ranged in depth between 30-feet and 45-feet below ground surface (bgs). All borings completed during this investigation stopped within the first three feet of this clay layer; however, the geologic log from the residential well installed at Borchers Way (which was installed below the bottom of the clay) indicated the clay was approximately 95-feet thick.

4.2 Surface Water Hydrology

Lake Margrethe is located adjacent to the investigation area. The lake is a large kettle lake, formed by an ice block buried in sandy, glacial outwash over clay lacustrine deposits. The lake level is set by a 1973 court order and is controlled by a lake level control structure operated seasonally by the Lake Margrethe Property Owners Association. The Lake Margrethe lake level control structure is shown on **Figure 8**. During winter months, the structure is opened and the level of the lake is dropped to prevent ice damage to the shoreline.

5. Hydrogeology

Locally, groundwater flows into Lake Margrethe from the southwest, southeast, and northeast; on the northwest side of the lake groundwater flows to the west with the lake discharge (**Figure 8**). Within the investigation area there are two distinct aquifers. The shallow phreatic aquifer flows from the east to west towards Lake Margarethe at an average horizontal gradient of approximately 0.01 feet/feet (ft/ft) (**Figure 9**). The deeper aquifer is locally under artesian conditions. Only one residential well installed in the investigation area is completed below the clay aquitard, so groundwater flow-direction is unknown but expected to be similar to the shallow aquifer, toward Lake Margrethe.

6. Monitoring Well Sampling Results

Groundwater analytical results ranged from below detection limits for all 24 PFAS analytes (CG-MW0005-25.0 and CG-MW0005-43.0) to a maximum of 432 ng/L total PFAS in CG-MW0001-20.0. The analytical results are described in further detail below and are summarized in **Table 3**. Laboratory analytical reports are included as **Appendix E**.

Total PFAS concentrations detected in the monitoring well samples are summarized below:

- CG-MW001-12.0 (181.9 ng/L)
- CG-MW001-20.0 (432.1 ng/L)
- CG-MW001-40.0 (119.4 ng/L)
- CG-MW002-14.0 (302.6 ng/L)
- CG-MW002-25.0 (141.5 ng/L)
- CG-MW002-35.0 (112.8 ng/L)
- CG-MW003-14.0 (26.7 ng/L)
- CG-MW003-32.0 (3.9 ng/L)
- CG-MW004-14.0 (314.9 ng/L)
- CG-MW004-30.0 (268.1 ng/L)
- CG-MW004-40.0 (49.3 ng/L)
- CG-MW005-12.0 (7.5 ng/L)

No criterion exists for Total PFAS.

PFOA + PFOS exceeded the Part 201 Drinking Water Criterion of 70 ng/L in the following locations:

- CG-MW001-20.0 (134.3 ng/L)
- CG-MW002-14.0 (119.8 ng/L)
- CG-MW004-14.0 (104.4 ng/L)

The extent of PFAS impact is defined to the east by CG-MW0005 and CG-MW0003 as shown in **Figure 10**. Total PFAS concentrations decrease with depth at locations CG-MW0002 and CG-MW0004; however, the maximum PFAS concentration is detected in the intermediate well screen at CG-MW0001. **Figures 11** through **14** superimpose the PFAS concentrations on the geologic cross sections.

The Part 201 Residential Drinking Water Criterion for PFOS + PFOA is exceeded at locations CG-MW0001, CG-MW0002, and CG-MW0004. The Criterion is exceeded in the shallow well screen interval at CG-MW0002 and CG-MW0004, and the intermediate well screen interval at CG-MW0001.

Perfluorohexanesulfonic acid (PFHxS) is the primary contributor to Total PFAS in the Study Area. PFHxS is found in AFFF and is commonly detected both in and downgradient of areas where AFFF has been historically applied.

Based on the vertical distribution of the PFAS data, the shallow Criterion exceedances suggest that the PFAS source is in close proximity to the monitoring wells. However, the well interval with the maximum concentration, CG-MW0001, is located at depth within a gravel layer (**Figure 11**). In addition, the monitoring well locations are located upgradient of the residential wells (**Figure 9**), including the residence that potentially had AFFF used to extinguish a house fire.

7. Surface Water/Pore Water Sampling Results

The surface water data ranges from 13 ng/L total PFAS in SW-04 to a maximum of 420 ng/L in SW-02 (**Table 4** and **Figure 15**). The pore water data ranges from non-detect total PFAS in PW-01, PW-04, PW-06, and PW-07 to a maximum of 500 ng/L in PW-03.

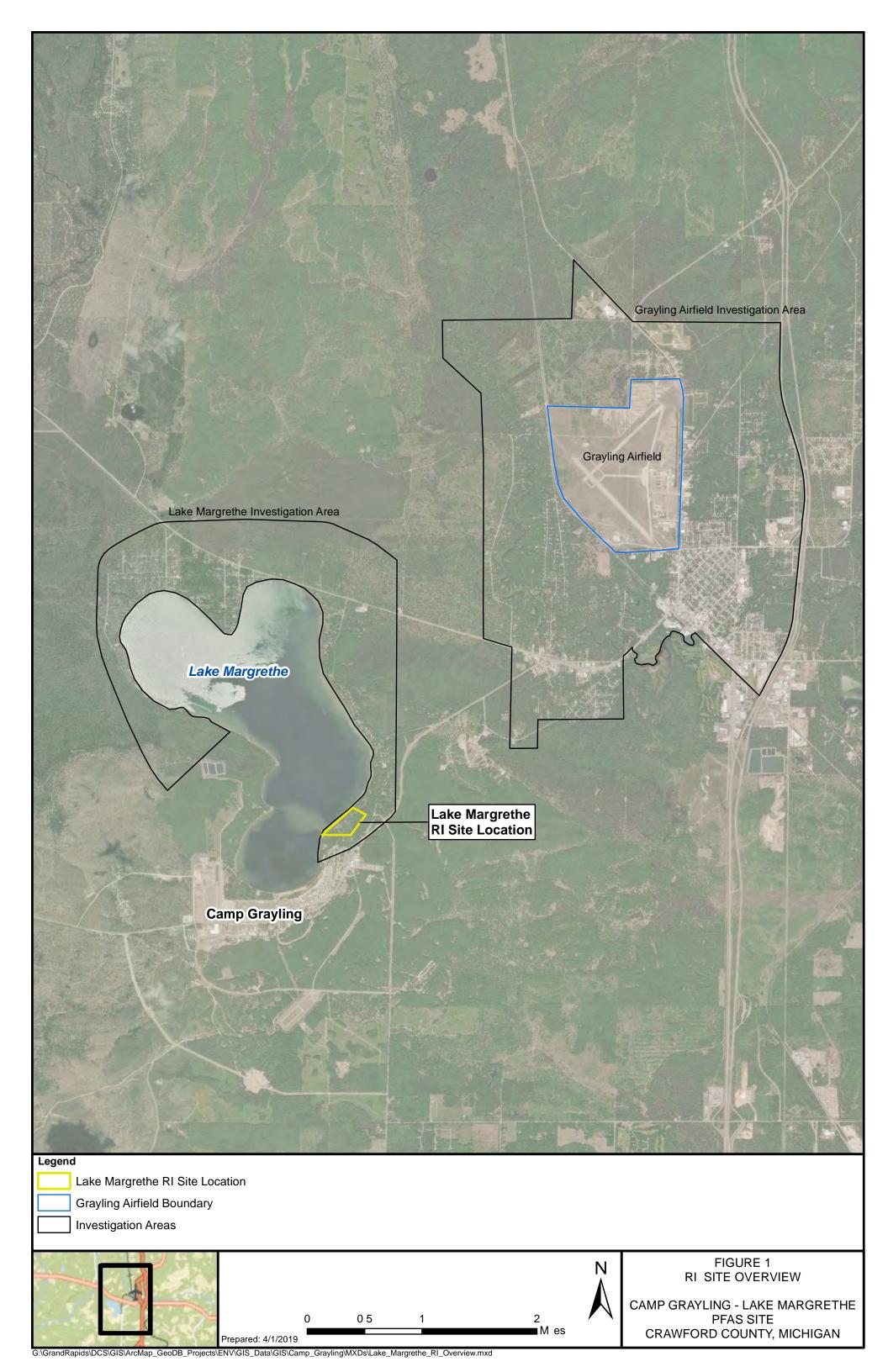
The Part 201 Groundwater Surface Water Interface (GSI) Criterion for PFOS (12 ng/L) is exceeded at SW-02 and PW-03. The extent of PFAS impact based on the surface water and pore water data corroborates well the groundwater data from the residential and monitoring wells.

8. Conclusions and Recommendations

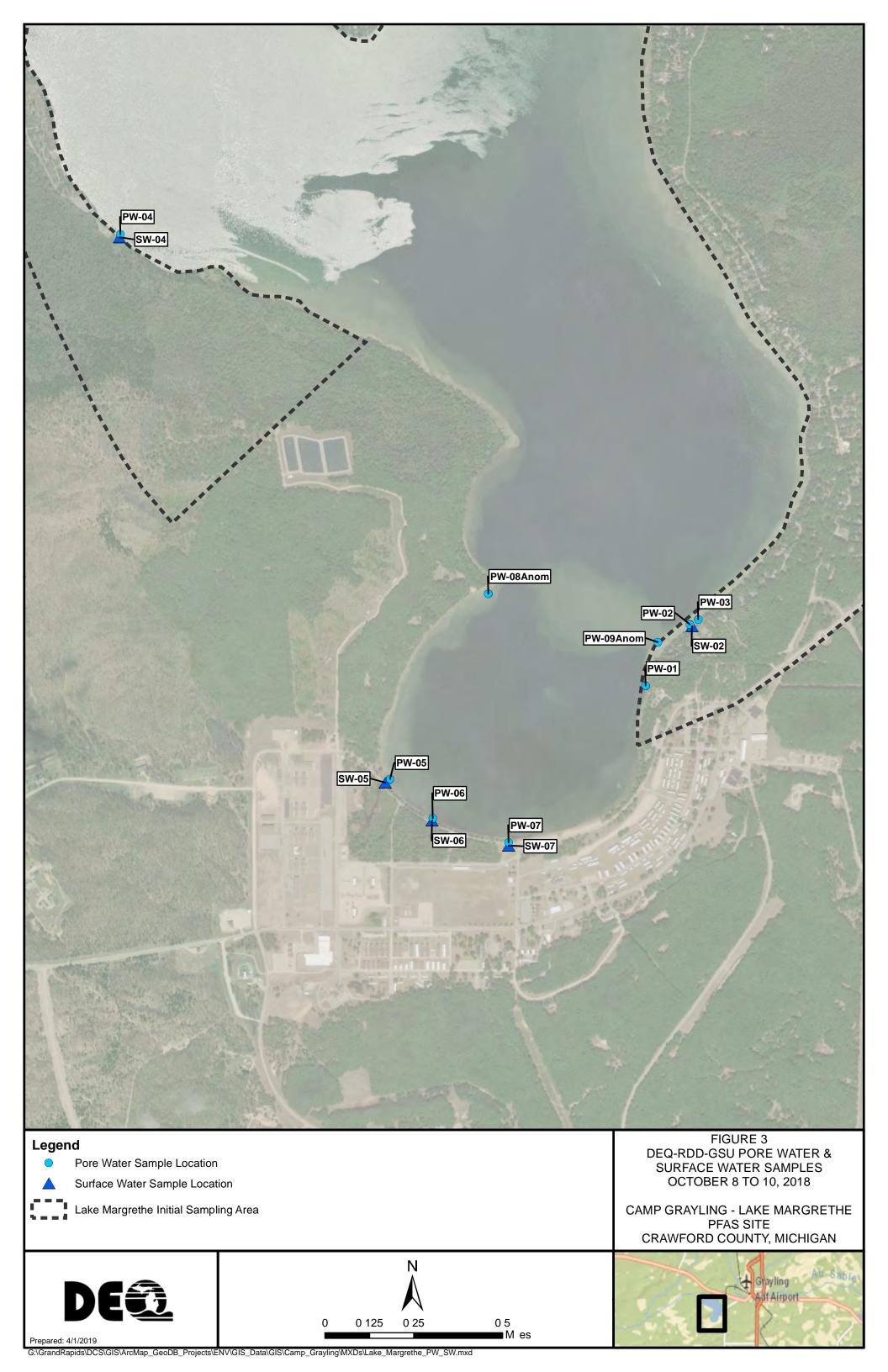
The combination of monitoring well, residential groundwater, pore water, and surface water data collected to date appear to have defined the general extent of PFAS impact to groundwater within the RI investigation area in the east and west directions. However, the upgradient (southern) extent of groundwater impact has not been defined based on PFAS and PFOS concentrations that exceed Part 201 Residential Drinking Water Criterion in monitoring wells CG-MW001 and CG-MW002. The maximum PFAS and PFOS concentrations detected in the intermediate well screen interval in monitoring well CG-MW001 suggests that an upgradient source is possible. The northern extent of groundwater impact has not been defined based on PFAS and PFOS concentrations detected in CG-MW004.

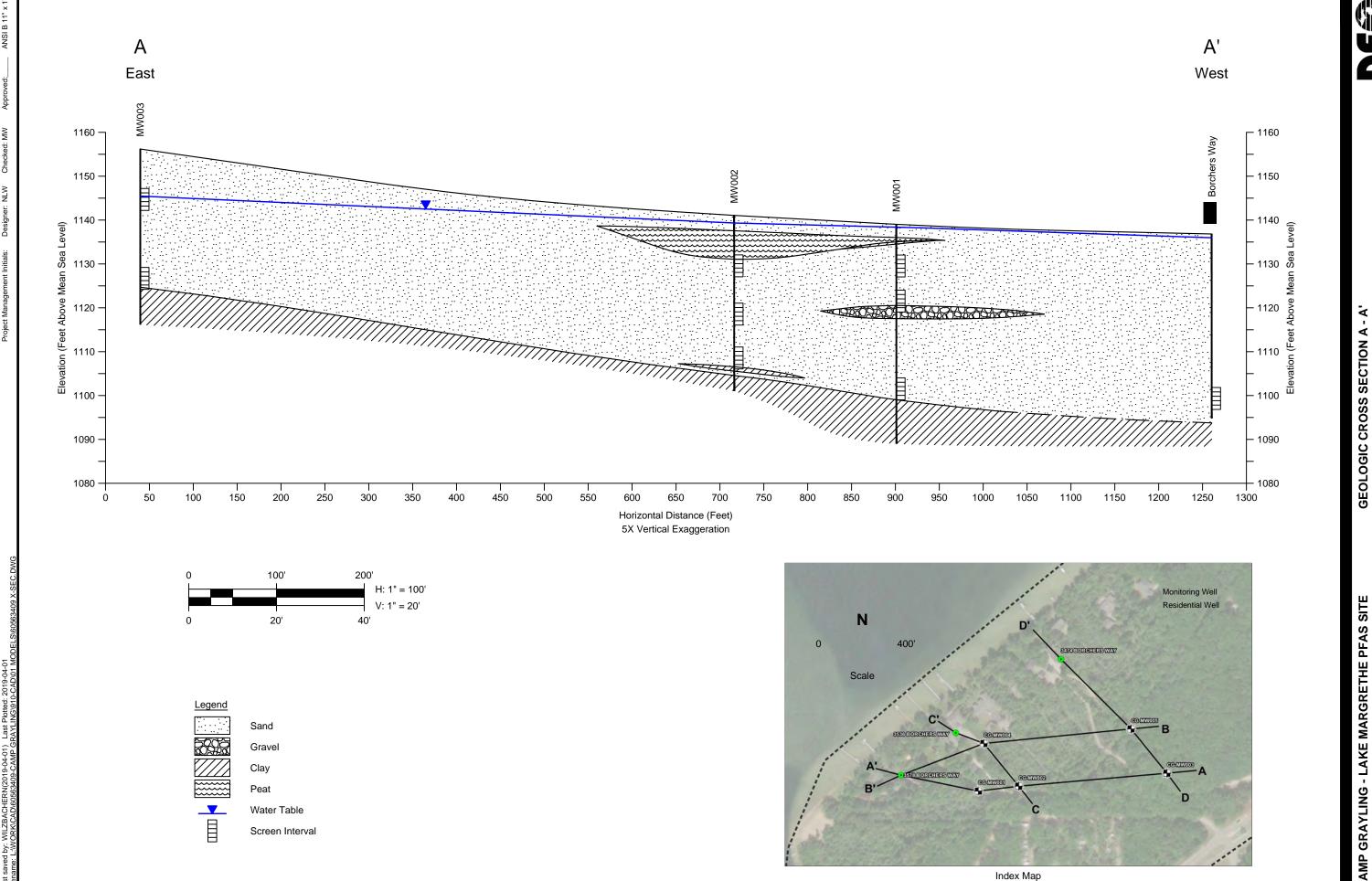
Further investigation of this area is recommended, including the installation of additional monitoring wells to the south and north of the initial investigation area, and quarterly sampling of existing groundwater monitoring wells and select residential wells. This additional work will more accurately delineate the extent of PFAS in the groundwater, determine if there is seasonal variation in PFAS groundwater concentrations, identify additional potential source areas to the south, and determine the presence and orientation of a potential preferential pathway.

Figures









CAMP GRAYLING - LAKE MARGRETHE PFAS SITE CRAWFORD COUNTY, MICHIGAN

Date: 2019-04-01 Project No.: 60563409



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- 1150

1120

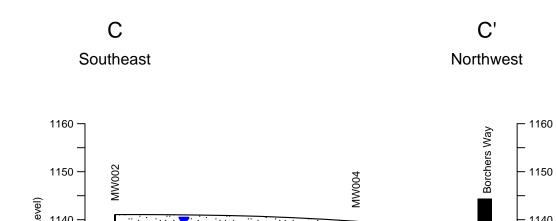
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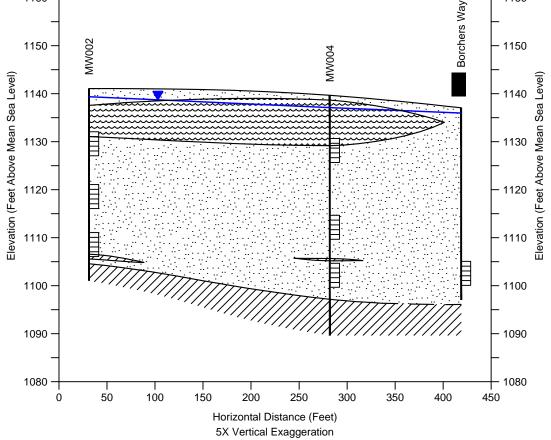
1080

Monitoring Well

Residential Well





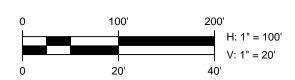


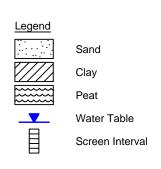
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Scale

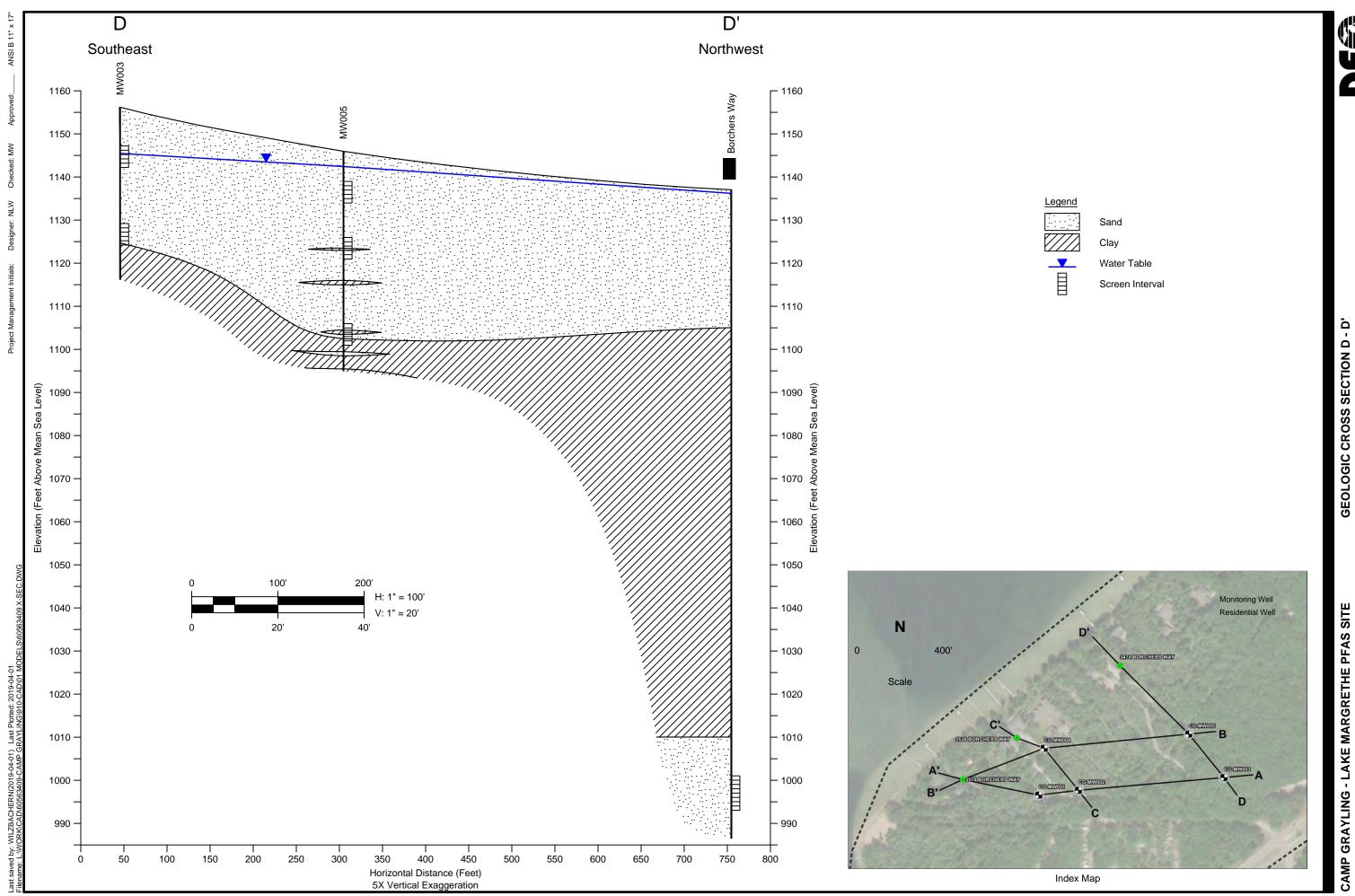
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Index Map





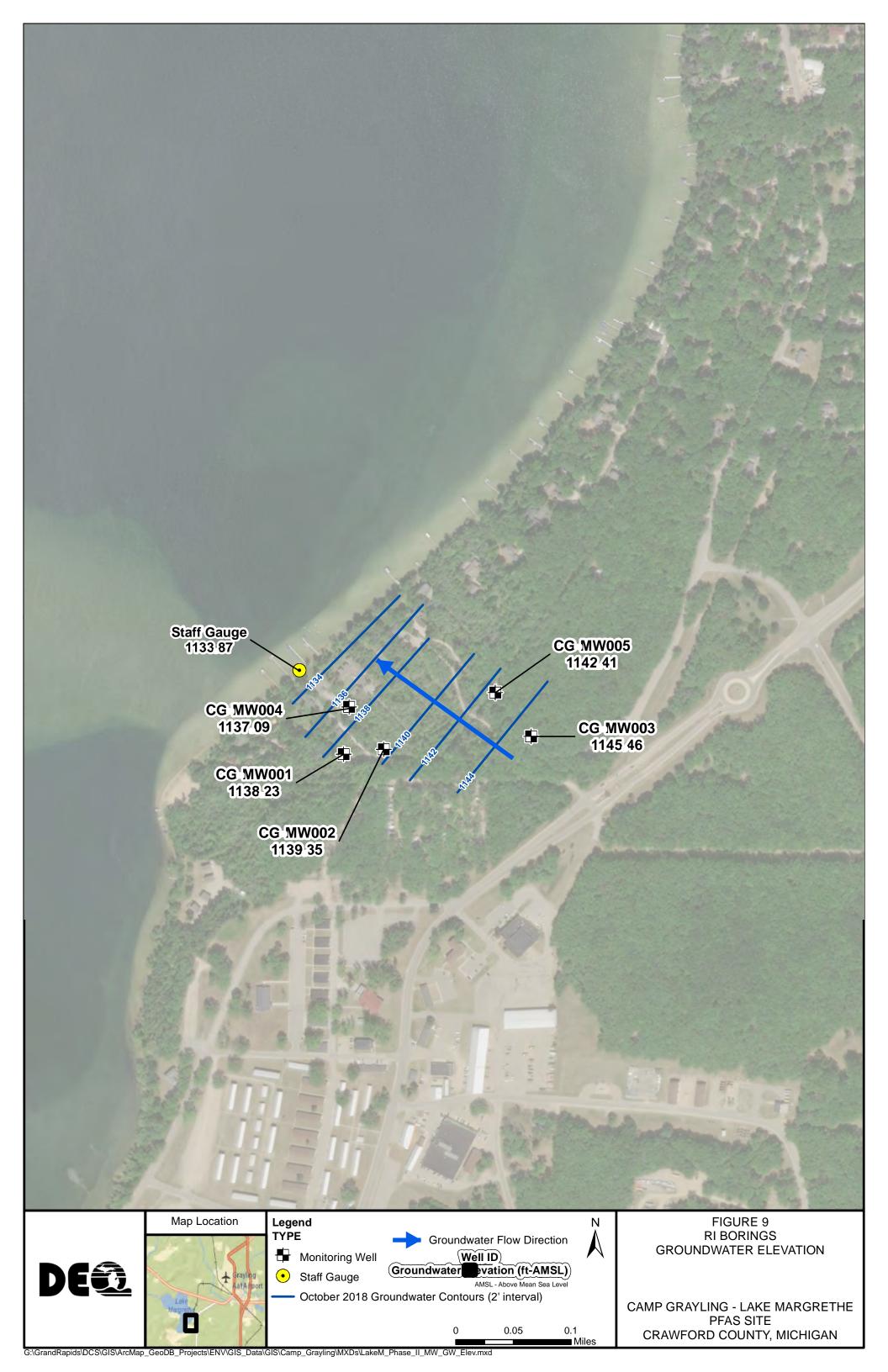


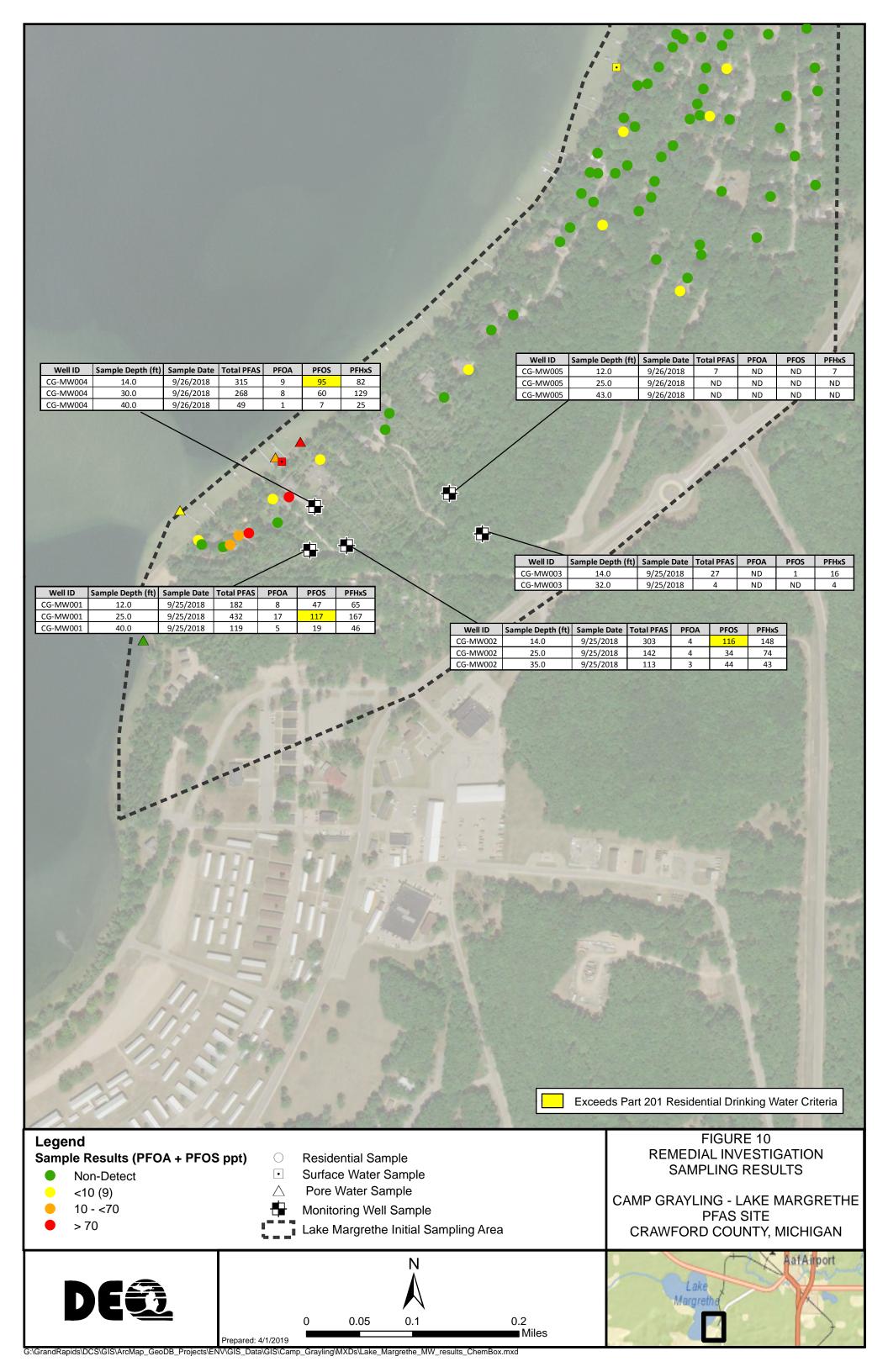


CAMP GRAYLING - LAKE MARGRETHE PFAS SITE CRAWFORD COUNTY, MICHIGAN

Project No.: 60563409 Date: 2019-04-01







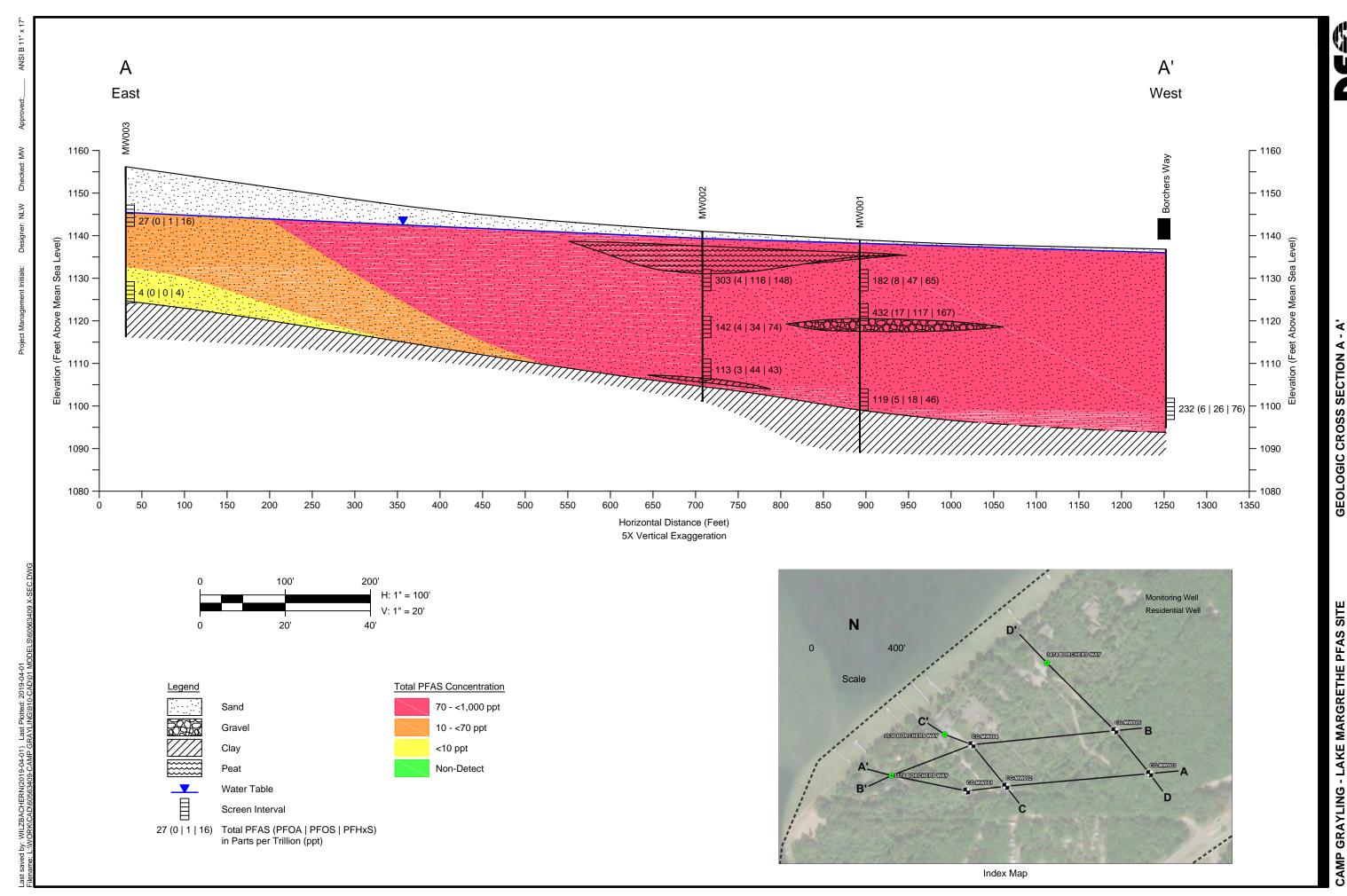


Figure:11

CAMP GRAYLING - LAKE MARGRETHE PFAS SITE CRAWFORD COUNTY, MICHIGAN

Date: 2019-04-01

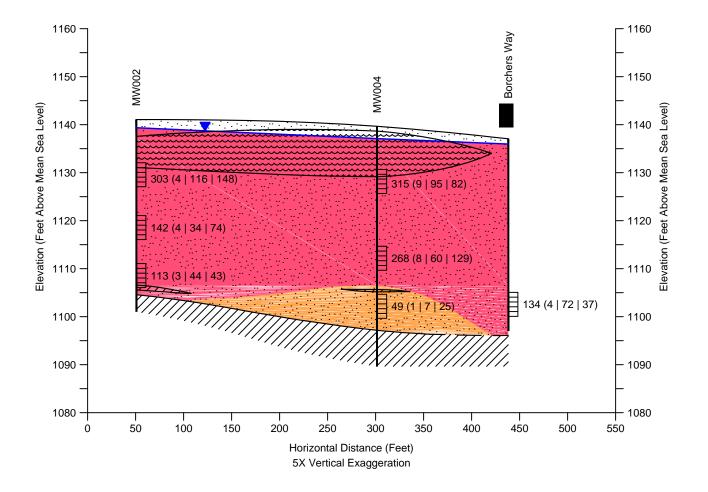
Project No.: 60563409

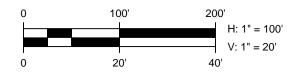


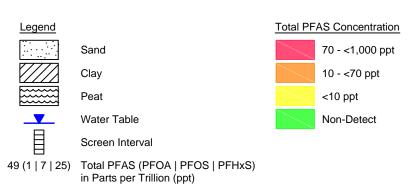
GEOLOGIC CROSS SECTION B - B'

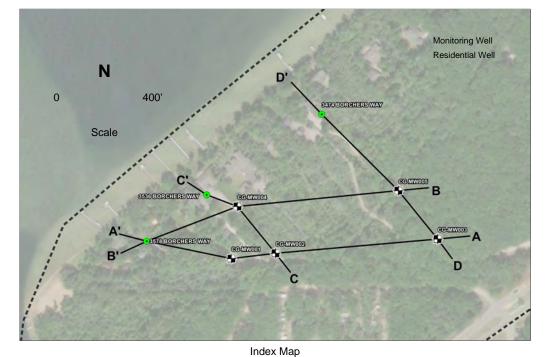
Date: 2019-04-01 Project No.: 60563409











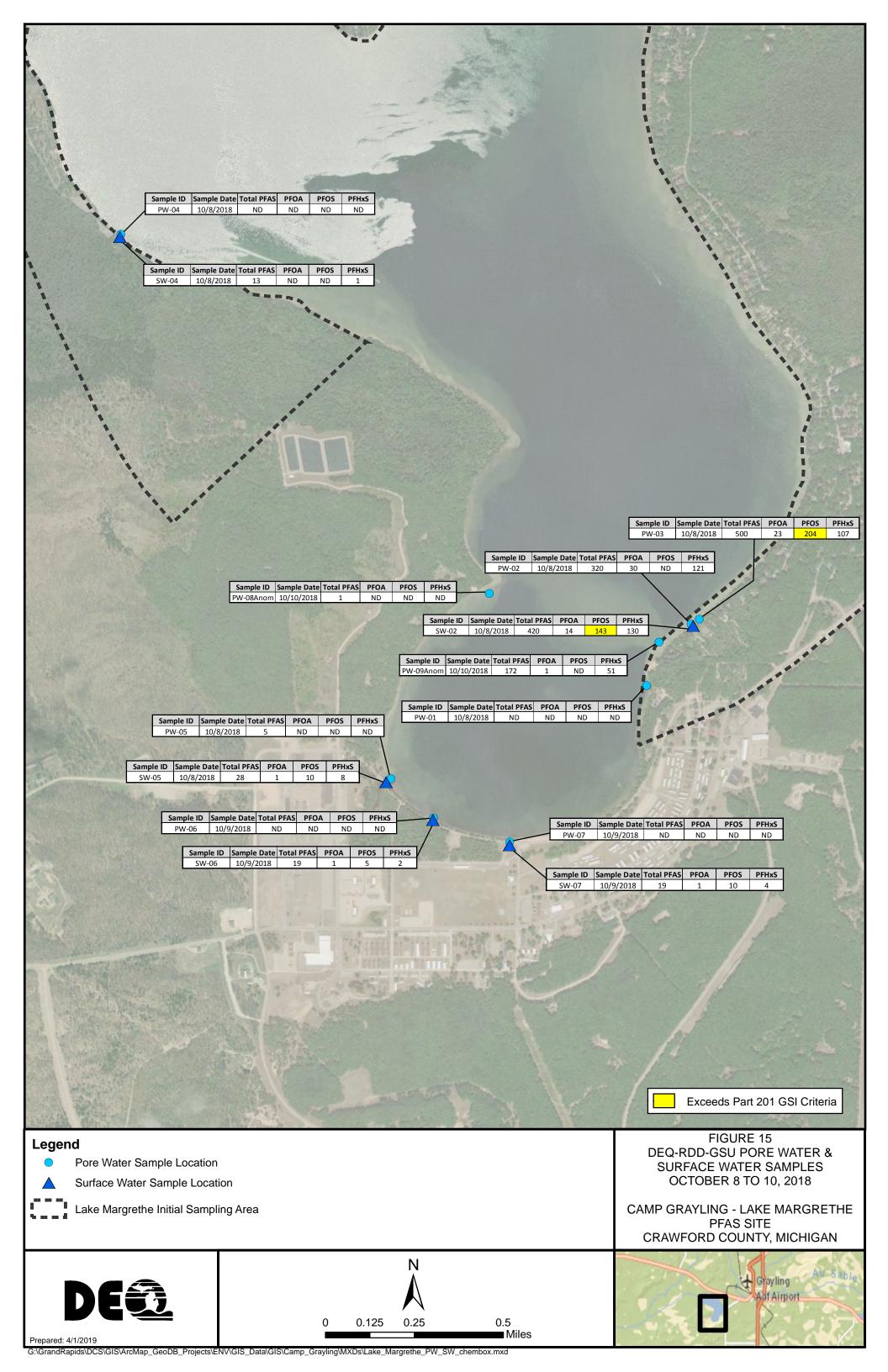
Project No.: 60563409



GEOLOGIC CROSS SECTION D - D'

CAMP GRAYLING - LAKE MARGRETHE PFAS SITE CRAWFORD COUNTY, MICHIGAN

Project No.: 60563409



Tables

Table 1 - Groundwater Elevations
Camp Grayling - Lake Margrethe
Grayling, Crawford County, Michigan

Location	Monitoring Well	Screened Interval	Υ	х	TOC Elevation	Ground Elevation	*DTW (ft below TOC) September 2018	Groundwater Elevation September 2018
	CG-MW001-12	7-12	480723.345	19577990.25	1138.83	1138.6	0.6	1138.23
CG-MW001	CG-MW001-20	15-20	480723.345	19577990.25	1138.90	1138.6	0.8	1138.10
	CG-MW001-40	35-40	480723.345	19577990.25	1138.88	1138.6	1.6	1137.28
	CG-MW002-14	9-14	480745.398	19578173.34	1140.66	1141	1.31	1139.35
CG-MW002	CG-MW002-25	20-25	480745.398	19578173.34	1140.55	1141	1.19	1139.36
1	CG-MW002-35	30-35	480745.398	19578173.34	1140.70	1141	1.34	1139.36
CC MM/003	CG-MW003-14	9-14	480804.737	19578848.03	1153.43	1153.5	7.97	1145.46
CG-MW003	CG-MW003-32	27-32	480804.737	19578848.03	1153.50	1153.5	7.96	1145.54
	CG-MW004-14	9-14	480939.7	19578015.2	1139.33	1139.6	2.24	1137.09
CG-MW004	CG-MW004-30	25-30	480939.7	19578015.2	1139.29	1139.6	2.26	1137.03
[CG-MW004-40	35-40	480939.7	19578015.2	1139.34	1139.6	2.26	1137.08
	CG-MW005-12	7-12	481005.651	19578684.25	1145.86	1146	3.45	1142.41
CG-MW005	CG-MW005-25	20-25	481005.651	19578684.25	1145.95	1146	3.44	1142.51
ĺ	CG-MW005-43	38-43	481005.651	19578684.25	1145.85	1146	2.75	1143.10
RI Staff Gauge	NA	NA	481156.921	19577851.2	1136.07	NA	2.2	1133.87
Lake Margrethe Control Structure	NA	NA	489958.901	19567498.83	1133.35	NA	3.96	1129.39

^{*}DTW - Depth to Water measured from Top of Casing (TOC)

ft = feet

NA = Not applicable

RI = Remedial Investigation

^{*}TOC - Top of Casing

^{*}Total Depth and Screen Elevation are measured from TOC

^{*}Wells surveyed in reference to the North American Datum (NAD) 1983 State Plane Michigan Zone 2112

Table 2 - Stablized Water Quality Parameters Camp Grayling - Lake Margrethe Grayling, Crawford County, Michigan

Well ID	Dete	Sample Interval	Time Collected	рΗ	Specific Cond.	Turbidity	D.O.	Temp	ORP
Well ID	Date	ft	24hr	SU	uS/cm	NTU	mg/L	°C	mV
CG-MW001-12.0	9/25/2018	7-12	10:40	7.22	754	1.14	1.57	12.92	-70.4
CG-MW001-20.0	9/25/2018	15-20	11:35	8.1	603	1.43	6.06	11.41	76.5
CG-MW001-40.0	9/25/2018	35-40	12:30	8.02	368	1.35	6.3	10.95	133.5
CG-MW002-14.0	9/25/2018	9-14	12:15	6.76	550	0.33	3.04	12.5	30.2
CG-MW002-25.0	9/25/2018	20-25	12:50	7.32	474	4.57	9.55	10.4	64
CG-MW002-35.0	9/25/2018	30-35	15:55	7.42	352	3.65	12.43	10.4	102.2
CG-MW003-14.0	9/25/2018	9-14	14:45	7.58	570	1.29	9.22	12.5	-54.6
CG-MW003-32.0	9/25/2018	27-32	16:35	8.07	369	1.64	8.51	10.54	73.4
CG-MW004-14.0	9/26/2018	9-14	11:30	6.65	560	2.07	3.04	10.7	-51.4
CG-MW004-30.0	9/26/2018	25-30	10:45	7.55	482	81.5	3.8	10	-163.5
CG-MW004-40.0	9/26/2018	35-40	9:40	7.35	340	0.91	9.22	10.2	53.1
CG-MW005-12.0	9/26/2018	7-12	10:30	7.76	548	1.32	5.53	11.3	-15.2
CG-MW005-25.0	9/26/2018	20-25	11:30	7.85	322	0.2	5.59	8.65	-17
CG-MW005-45.0	9/26/2018	40-45	12:15	8.13	300	5.86	1.4	8.76	-78.9

Notes:

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

DO = Dissolved Oxygen

ft = Feet

mg/L = Milligrams/Liter

mV = Millivolt

MW = Monitoring Well Sample

NTU = Nephelometric Turbidity Units

°C = Degrees Celsius

ORP = Oxidation Reduction Potential

SU = Standard Unit

uS/cm = Microsiemens/centimeter

Table 3 - Phase I RI Groundwater PFAS Results Camp Grayling - Lake Margrethe Grayling, Crawford County, Michigan

-						Graying, Cre	iwioru County,	wiicingan						
Location		CG-MW001		CG-MW002			CG-MW003		CG-MW004			CG-MW005		
LOCATION	CG-MW001-12.0	CG-MW001-20.0	CG-MW001-40.0	CG-MW002-14.0	CG-MW002-25.0	CG-MW002-35.0	CG-MW003-14.0	CG-MW003-32.0	CG-MW004-14.0	CG-MW004-30.0	CG-MW004-40.0	CG-MW005-12.0	CG-MW005-25.0	CG-MW005-43.0
Sample ID	GW1809251040MK	GW1809251135MK	GW1809251230MK	GW1809251215KE	GW1809251250KE	GW1809251555KE	GW1809251545MK	GW1809251635MK	GW1809261130KE	GW1809261045KE	GW1809260940KE	GW1809261030MK	GW1809261130MK	GW1809261215MK
Date Collected	9/25/2018	9/25/2018	9/25/2018	9/25/2018	9/25/2018	9/25/2018	9/25/2018	9/25/2018	9/26/2018	9/26/2018	9/26/2018	9/26/2018	9/26/2018	9/26/2018
Units	ng/l													
Report	1803179	1803179	1803179	1803179	1803179	1803179	1803179	1803179	1803179	1803179	1803179	1803179	1803179	1803179
PFBA	8.32	11.7	4.12	1.55J	2.45J	1.24J	2.33J	0.37J	13.4	6.80	1.31J	0.62J	< 4.02	< 4.04
PFPeA	15.3	34.7	13.0	3.66J	4.94	4.05	< 3.98	< 3.92	44.6	14.4	3.57J	< 3.87	< 4.02	< 4.04
PFHxA	18.5	38.5	14.9	7.41	6.94	5.12	< 3.98	< 3.92	36.2	19.4	4.66	< 3.87	< 4.02	< 4.04
PFHpA	7.68	18.5	5.61	4.02	5.32	7.10	< 3.98	< 3.92	18.3	15.9	3.33J	< 3.87	< 4.02	< 4.04
PFOA	7.70	17.3	4.62	3.76J	3.58J	2.65J	< 3.98	< 3.92	9.25	8.09	1.18J	< 3.87	< 4.02	< 4.04
PFNA	< 3.99	0.74J	< 3.95	0.743J	< 4.14	0.410J	< 3.98	< 3.92	1.36J	0.70J	< 3.84	< 3.87	< 4.02	< 4.04
PFDA	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	< 4.20	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
PFUnDA	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	< 4.20	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
PFDoDA	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	< 4.20	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
PFTrDA	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	< 4.20	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
PFTeDA	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	< 4.20	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
PFBS	2.88	3.40J	1.87J	2.53J	2.03J	0.984J	4.27	< 3.92	3.63J	2.62J	1.08J	< 3.87	< 4.02	< 4.04
PFPeS	6.88	14.1	6.47	11.8	4.83	2.52J	3.55J	< 3.92	6.25	9.57	2.33J	< 3.87	< 4.02	< 4.04
PFHxS	65.3	167	45.7	148	74.4	43.3	15.7	3.51J	81.7	129	24.9	6.85	< 4.02	< 4.04
PFHpS	2.71	9.15	4.57	3.16J	2.65J	1.14J	< 3.98	< 3.92	1.67J	1.84J	< 3.84	< 3.87	< 4.02	< 4.04
PFOS	46.7	117	18.5	116	34.4	44.3	0.852J	< 3.92	95.1	59.8	6.98	< 3.87	< 4.02	< 4.04
PFNS	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	< 4.20	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
PFDS	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	< 4.20	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
PFOSA	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	< 4.20	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
4:2 FTS	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	< 4.20	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
6:2 FTS	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	3.46J	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
8:2 FTS	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	< 4.20	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
EtFOSAA	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	< 4.20	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
MeFOSAA	< 3.99	< 3.91	< 3.95	< 4.01	< 4.14	< 4.00	< 3.98	< 3.92	< 4.20	< 4.00	< 3.84	< 3.87	< 4.02	< 4.04
Total PFAS	181.97	432.1	119.36	302.63	141.54	112.81	26.7	3.88J	314.92	268.12	49.34	7.47	ND	ND
PFOA + PFOS	54.4	134.3	23.12	119.76	37.98	46.95	0.85	ND	104.35	67.89	8.16	ND	ND	ND

Concentrations are reported as ng/L or ppt

"--" = Analyte not sampled

DWC = Drinking Water Criteria (*70ppt combined or individual PFOA + PFOS)

GSIC = Groundwater Surface Water Interface Criteria

FAV = Final Acute Value

Perfluoroalkyl Carboxylic Acids (PFCAs)
Perfluoroalkane Sulfonic Acids (PFSAs)
Perfluoroalkane Sulfonamides (FASAs)
Fluorotelomer Sulfonic Acids (FTSAs)
N-Ethyl Perfluoroalkane Sulfonamidoacetic Acids (EtFASAAs)
N-Methyl Perfluoroalkane Sulfonamidoacetic Acids (MeFASAAs)

Contaminant exceeds GSIC
Contaminant exceeds DWC & GSIC
Contaminant exceeds FAV
Shaded values indicate criteria exceedance

Criteria (ppt)	PFOS	PFOA
GSIC	12	12,000
DWC	70	70
FAV	1,600,000	15,000,000

PFBA = Perfluorobutanoic acid
PFPeA = Perfluoropentanoic acid
PFPeS = Perfluoropentane sulfonic acid
PFHxA = Perfluorohexanoic acid
PFHpA = Perfluoroheptanoic acid
PFOA = Perfluorooctanoic acid
PFNA = Perfluorononanoic acid
PFDA = Perfluorodecanoic acid
PFUNDA = Perfluoroundecanoic acid

PFDoDA = Perfluorododecanoic acid
PFTrDA = Perfluorotridecanoic acid
PFTeDA = Perfluorotetradecanoic acid
PFBS = Perfluorobutane sulfonic acid
PFHxS = Perfluorohexane sulfonic acid
PFHpS = Perfluoroheptane sulfonic acid
PFNS = Perfluorononane sulfonic acid
PFOS = Perfluorooctane sulfonic acid
PFDS = Perfluorodecane sulfonic acid

4:2 FTSA = 4:2 Fluorotelomer sulfonic acid 6:2 FTSA = 6:2 Fluorotelomer sulfonic acid 8:2 FTSA = 8:2 Fluorotelomer sulfonic acid PFOSA = Perfluorooctane sulfonamide

EtFOSAA - N-Ethyl Perfluorooctane sulfonamindoacetic acid MeFOSAA = N-Methyl Perfluorooctane sulfonamide

Table 4 - Phase I RI Pore Water and Surface Water PFAS Results Camp Grayling - Lake Margrethe Grayling, Crawford County, Michigan

	Porewater									Surface Water				
Location	PW-01	PW-02	PW-03	PW-04	PW-05	PW-06	PW-07	PW-08	PW-09	SW-02	SW-04	SW-05	SW-06	SW-07
Sample ID	PW-01-181008	PW-02-181008	PW-03-181008	PW-04-181008	PW-05-181008	PW-06-181009	PW-07-181009	PW-08ANOM-181010	PW-09ANOM-181010	SW-02-181008	SW-04-181008	SW-05-181008	SW-06-181009	SW-07-181009
Date Collected	10/8/2018	10/8/2018	10/8/2018	10/8/2018	10/8/2018	10/9/2018	10/9/2018	10/10/2018	10/10/2018	10/8/2018	10/8/2018	10/8/2018	10/9/2018	10/9/2018
Units	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l							
Report	1803320	1803320	1803320	1803320	1803320	1803320	1803320	1803320	1803320	1803320	1803320	1803320	1803320	1803320
PFBA	< 3.89	14.2	13.2	< 3.85	0.84J	< 4.01	< 4.01	0.896J	10.6	11.6	2.28	1.79J	2.15J	1.06J
PFPeA	< 3.89	46.5	34.2	< 3.85	2.16J	< 4.01	< 4.01	< 3.91	31.4	30.8	10.2	2.68J	3.49J	0.907J
PFHxA	< 3.89	47.1	33.1	< 3.85	1.64J	< 4.01	< 4.01	< 3.91	41.9	30.8	< 4.49	2.49J	3.26J	1.31J
PFHpA	< 3.89	51.0	63.3	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	5.99	38.4	< 4.49	1.12J	1.14J	0.616J
PFOA	< 3.89	29.6	23.1	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	1.40J	13.8	< 4.49	1.15J	1.05J	1.08J
PFNA	< 3.89	< 4.00	3.65J	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	3.02J	< 4.49	< 4.13	< 3.89	< 3.94
PFDA	< 3.89	< 4.00	< 3.78	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	< 4.03	< 4.49	< 4.13	< 3.89	< 3.94
PFUnDA	< 3.89	< 4.00	< 3.78	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	< 4.03	< 4.49	< 4.13	< 3.89	< 3.94
PFDoDA	< 3.89	< 4.00	< 3.78	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	< 4.03	< 4.49	< 4.13	< 3.89	< 3.94
PFTrDA	< 3.89	< 4.00	< 3.78	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	< 4.03	< 4.49	< 4.13	< 3.89	< 3.94
PFTeDA	< 3.89	< 4.00	< 3.78	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	< 4.03	< 4.49	< 4.13	< 3.89	< 3.94
PFBS	< 3.89	3.21J	3.55J	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	13.2	6.39	< 4.49	1.30J	0.897J	< 3.94
PFPeS	< 3.89	7.03	2.94J	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	16.1	8.64	< 4.49	< 4.13	< 3.89	< 3.94
PFHxS	< 3.89	121	107	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	50.9	130	0.608J	7.73	2.33J	3.95
PFHpS	< 3.89	< 4.00	1.41J	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	2.49J	< 4.49	< 4.13	< 3.89	< 3.94
PFOS	< 3.89	< 4.00	204	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	143	< 4.49	9.71	4.82	10.3
PFNS	< 3.89	< 4.00	< 3.78	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	< 4.03	< 4.49	< 4.13	< 3.89	< 3.94
PFDS	< 3.89	< 4.00	< 3.78	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	< 4.03	< 4.49	< 4.13	< 3.89	< 3.94
PFOSA	< 3.89	< 4.00	< 3.78	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	< 4.03	< 4.49	< 4.13	< 3.89	< 3.94
4:2 FTS	< 3.89	< 4.00	< 3.78	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	< 4.03	< 4.49	< 4.13	< 3.89	< 3.94
6:2 FTS	< 3.89	< 4.00	6.01	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	1.27J	< 4.49	< 4.13	< 3.89	< 3.94
8:2 FTS	< 3.89	< 4.00	4.27	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	< 4.03	< 4.49	< 4.13	< 3.89	< 3.94
EtFOSAA	< 3.89	< 4.00	< 3.78	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	< 4.03	< 4.49	< 4.13	< 3.89	< 3.94
MeFOSAA	< 3.89	< 4.00	< 3.78	< 3.85	< 3.75	< 4.01	< 4.01	< 3.91	< 3.77	< 4.03	< 4.49	< 4.13	< 3.89	< 3.94
Total PFAS	0	319.64	499.73	0	4.641	0	0	0.896	171.49	420.21	13.09	27.97	19.137	19.22

Concentrations are reported as ng/L or ppt

"--" = Analyte not sampled

GSIC = Groundwater Surface Water Interface Criteria

Perfluoroalkyl Carboxylic Acids (PFCAs)
Perfluoroalkane Sulfonic Acids (PFSAs)
Perfluoroalkane Sulfonamides (FASAs)
Fluorotelomer Sulfonic Acids (FTSAs)
N-Ethyl Perfluoroalkane Sulfonamidoacetic Acids (EtFASAAs)
N-Methyl Perfluoroalkane Sulfonamidoacetic Acids (MeFASAAs)

Contaminant exceeds GSIC
Shaded values indicate criteria

Criteria (ppt)	PFOS	PFOA
GSIC	12	12,000

PFPeA = Perfluoropentanoic acid
PFPeS = Perfluoropentane sulfonic acid
PFHxA = Perfluorohexanoic acid
PFHpA = Perfluoroheptanoic acid
PFOA = Perfluorooctanoic acid
PFNA = Perfluorononanoic acid
PFDA = Perfluorodecanoic acid
PFUnDA = Perfluoroundecanoic acid

PFBA = Perfluorobutanoic acid

4:2 FTSA = 4:2 Fluorotelomer sulfonic acid 6:2 FTSA = 6:2 Fluorotelomer sulfonic acid 8:2 FTSA = 8:2 Fluorotelomer sulfonic acid PFOSA = Perfluorooctane sulfonamide

EtFOSAA - N-Ethyl Perfluorooctane sulfonamindoacetic acid MeFOSAA = N-Methyl Perfluorooctane sulfonamide

PFDoDA = Perfluorododecanoic acid
PFTrDA = Perfluorotridecanoic acid
PFTeDA = Perfluorotetradecanoic acid
PFBS = Perfluorobutane sulfonic acid
PFHxS = Perfluorohexane sulfonic acid
PFHpS = Perfluoroheptane sulfonic acid
PFNS = Pefluorononane sulfonic acid
PFOS = Perfluoroctane sulfonic acid
PFOS = Perfluorodecane sulfonic acid

Appendix A – Photo Log



Project Name: MDEQ Lake Margrethe

Site Location: Grayling, MI

Project No. 60563409

Photo No.

1

Date: 08/22/18

Direction Photo Taken:

N/A

Description:

B-002



Photo No.

2

Date: 08/22/18

Direction Photo Taken:

N/A

Description:

B-004





Project Name: MDEQ Lake Margrethe

Site Location: Grayling, MI

Project No. 60563409

Photo No.

Date: 08/22/18

Direction Photo Taken:

N/A

Description:

B-005



Photo No.

Date: 08/07/18

Direction Photo Taken:

N/A

Description:

B-004 Drilling Location





Project Name: MDEQ Lake Margrethe

Site Location: Grayling, MI

Project No. 60563409

Photo No.

Date: 08/10/18

Direction Photo Taken:

N/A

Description:

B-004 Developing/surging well with stainless steel bailer.



Photo No.

Date: 08/07/18

Direction Photo Taken:

N/A

Description:

B-004 5-9'





Project Name: MDEQ Lake Margrethe

Site Location: Grayling, MI

Project No. 60563409

Photo No.

Date: 08/08/18

Direction Photo Taken:

N/A

Description:

B-002 35-40'



Photo No.

Date: 08/14/18

Direction Photo Taken:

N/A

Description:

B-001 40-45' (right side)





Project Name:MDEQ Lake Margrethe

Site Location: Grayling, MI

Project No. 60563409

Photo No.

Date: 08/14/18

Direction Photo Taken:

N/A

Description:

B-001 (left side) 45-50'



Photo No.

Date: 08/16/18

Direction Photo Taken:

N/A

Description:

B-005 40-45' Sand pack at 43'





Project Name: MDEQ Lake Margrethe

Site Location: Grayling, MI

Project No. 60563409

Photo No.

Date: 08/02/18

Direction Photo Taken:

N/A

Description:

B-003 30-35' (left side) Sand pack at 32'



Photo No. 12

Date: 08/02/18

Direction Photo Taken:

N/A

Description:

B-003 30-35' (right side)





Project Name: MDEQ Lake Margrethe

Site Location: Grayling, MI

Project No. 60563409

Photo No.

Date: 08/02/18

Direction Photo

Taken:

N/A

Description:

B-003 35-40'



Photo No. 14

Date: 8/02/18

Direction Photo Taken:

N/A

Description:

B-003 35-40'



Appendix B – Boring Logs

BOREHOLE NO: **CG-MW001** A=COM FIELD BOREHOLE LOG TOTAL DEPTH: 50' PROJECT INFORMATION DRILLING INFORMATION Mateco CONTRACTOR: Camp Grayling - Lake Margrethe PROJECT: CREW CHIEF: J. Croel Grayling, MI SITE LOCATION: Geoprobe 8140DT DRILL RIG TYPE: 60563409 PROJECT NO .: DRILLING METHOD: PROJECT MANAGER: John Cuthbertson HOLE DIAMETER: 8" DATE START: 8/14/18 LOGGED BY: Stanley Krenz DATE END: 8/14/18 CREATED BY: Kaitlyn Eicholtz SAMPLETYPE RECOVERY SOIL WELL ATTEMPT DEPTH PID (ppm) SOIL DESCRIPTION CONSTRUCTION uscs 0 Topsoil, grass, roots, and organics 0 SM: 10YR 4/4 MEDIUM WELL SORTED SILTY SAND; non plastic, SM sub rounded sand grains, 30% silt, 25% fine sand, 45% medium sand, SM SM: 10YR 6/4 MEDIUM WELL SORTED SILTY SAND; non plastic, sub rounded sand grains, 15% silt, 25% fine sand, 60% medium sand, Hand Auger trace coarse sand, moist Peat: 10YR 2/2 WELL SORTED PEAT; non plastic, 100% silt, peat, Peat organics, wood debris, wet -3 Peat: 10 YR 2/2 WELL SORTED PEAT with CLAY; non plastic, 50% Peat clay, 50% silt, peat with clay; organics SM: 10YR 5/4 FINE WELL SORTED SILTY SAND; non plastic, sub 5 rounded sand grains, 25% silt, 60% fine sand, 15% medium sand, wet SM SM: 10YR 6/3 MEDIUM WELL SORTED SI_TY SAND; non plastic, sub rounded sand grains, 25% silt, 15% fine sand, 60% medium sand, 6 trace coarse sand, wet, coarsening downward SM Sand Pack SM: 10YR 6/3 MEDIUM WELL SORTED SILTY SAND; non plastic, sub rounded sand grains, 15% silt, 20% fine sand, 60% medium sand, 8 SM 5% coarse sand, wet 9 No Recovery CG-MW001-12.0 Sonic 10 10 SM: 10YR 6/4 FINE WELL SORTED SILTY SAND; non plastic, sub rounded sand grains with sub rounded to sub angular gravel, 25% silt, 55% fine sand, 20% medium sand, trace coarse sand, trace fine 11 gravel (ranges 7 to 15mm), wet SM 12 SM: 10YR 6/4 MEDIUM WELL SORTED SILTY SAND; non plastic, sub rounded sand grains with sub rounded to sub angular gravel, 15% 13 silt, 40% fine sand, 45% medium sand, trace coarse sand, trace fine gravel (ranges 8 to 14mm), wet 14 No Recovery 15 15 SM: 10YR 6/4 FINE WELL SORTED SILTY SAND; non plastic, sub rounded sand grains with sub rounded to sub angular gravel, 25% silt, 55% fine sand, 20% medium sand, trace coarse sand, trace fine gravel (ranges 3 to 7mm), wet 16 Bentonite SM 17

						FIELD	BOREHOLE LOG BOREHOLE TOTAL DE		CG-MW001 50'	
рертн	SAMPLETYPE	ATTEMPT	RECOVERY	SOIL	nscs	PID	SOIL DESCRIPTION		WELL CONSTRUCTIO	N SAMP
					SW		SW: 10YR 6/4 MEDIUM POORLY SORTED SAND; non plar rounded sand grains and gravel, 5% silt, 15% fine sand, 25% sand, 20% coarse sand, 35% fine gravel (ranges 5 to 19mm coarse gravel (ranges to a max of 20mm)	% medium	- 19	•
20 -	Sonic						No Recovery		-20	
207	S				SW		SW: 10YR 6/14 COARSE POORLY SORTED SAND with G nor plastic, sub rounded sand grains and gravel, 5% silt, 15 sand, 20% medium sand, 25% coarse sand, 30% fine grave 5 to 19 mm), 5% coarse gravel (ranges to a max of 30mm),	5% fine el (ranges	-21 -22 -23 -24	
-							SM: 10YR 6/4 FINE WELL SORTED SILTY SAND; non plas rounded sand grains, 15% silt, 45% fine sand, 30% medium 10% coarse sand, wet		-22	CG-MW001- 20.0
					SM				-23 E:	Sand Pack
25 -							No Recovery SM: 10YR 6/4 FINE WELL SORTED SILTY SAND; non plass rounded sand grains, 5% clay, 20% silt, 50% fine sand, 25% sand, wet			
1		1/			SM				-26	
1					SM		SM: 10YR 6/4 FINE WELL SORTED SILTY SAND; non plas rounded sand grains, 25% silt, 60% fine sand, 15% medium trace coarse sand, wet, fining downward		-27	
					SW- SM		SW-SM: 10YR 6/4 MEDIUM MODERATELY SORTED SANI SILT; non plastic, sub rounded sand grains and gravel, 10% fine sand, 50% medium sand, trace coarse sand, 10% fine g	silt, 30% gravel	-28	
1					SIM		(ranges 5 to 19mm), trace coarse gravel (ranges 19 to 38mi	m), wet	-29	
30 -	Sonic						No Recovery		-30	Bentonite
3									-31	Demonito
-									-32	
									-33	
								11	-34	
200		1								
35 -			1/	::::::::::::::::::::::::::::::::::::::			SW: 10YR 6/4 MEDIUM MODERATELY SORTED SAND; no		-35	
					SW		sub rounded sand grains with sub rounded to sub angular g trace silt, 15% fine sand, 60% medium sand, 10% coarse sa fine gravel (ranges 5 to 19mm), 5% coarse gravel (ranges 1 27mm), wet	and, 10%	- 36	
1	9	//							-37	00 10100
	Sonic		//:							CG-MW001- 40.0
					SW		SW: 10YR 6/4 MEDIUM MODERATELY SORTED SAND; in sub-rounded sand grains and gravel, trace silt, 10% fine sar medium sand, 15% coarse sand, 5% fine gravel (ranges 8 to 5% coarse gravel (ranges 19 to 25mm), cobble at 38.6' (67 in size), wet	nd, 65% o 19mm),	-36 -37 -38 -39	Sand Pack
40_		1	11				No Recovery		1 1	
40 -		1/	1						<u>-40</u>	

						FIEL	D BOREHOLE LOG	BOREHOLE NO: TOTAL DEPTH:	CG-MW001 50'	
DEРТН	SAMPLETYPE	ATTEMPT	RECOVERY	SOIL	nscs	QIA	SOIL DESCRIPTION	ON	WELL CONSTRUCTION	SAMPLE
		1			СН		CH: 10YR 6/1 MODERATELY SORTED FA 50% clay, 50% silt, moist, stiff	T CLAY; high plasticity,		
45 -	Sonic				СН		CH: 10YR 6/1 WELL SORTED FAT CLAY; moist, stiff, fine sand with silt seam at 43.8'	high plasticity, 100% clay, (0.1' in thickness)	- 42 - 43 - 44 - 45 - 46	
-									- 47 - 48	
,									- 49	
₅₀ \perp		//							₅₀	

			PRO	JECT I	NFO	RMATION		DRILLING INFO	RMATION
ROJE ROJE OGG	ECT: OCAT ECT NO ECT M ED BY	O.: ANAG	BER:	Gray 60563 John Stanl	ling, M 3409	oertson enz	CONTRACTO CREW CHIE DRILL RIG T DRILLING M HOLE DIAME DATE STAR	F: J. Croel YPE: Geoprobe ETHOD: N/A ETER: 8"	e 8140DT
ОЕРТН	SAMPLETYPE	ATTEMPT	RECOVERY	SYMBOLS	nscs	PID (ppm)	SOIL DESCRIP	TION	WELL CONSTRUCTION
0		1			SM		SM: Topsoil, 10YR 4/2 FINE WELL SOR rounded sand grains and gravel, 50% fin		0
					SM		trace coarse gravel, moist SM: 10YR 4/2 FINE MODERATELY SOF plastic, sub rounded sand grains and gra		<u></u>
	räer				SP-		fine sand, 40% medium sand, trace coar 20mm max in size), moist	se gravel, frace cobble (50 by	
	Hand Auger				SM		SP-SM: 10YR 4/4 MEDIUM WELL SORT plastic, sub rounded sand grains and gra 45% medium sand, 5% coarse sand, 10	evel, 10% silt, 25% fine sand,	_3
	1			11 11			7mm), 5% coarse gravel, cobble at 1.8' (Peat: 10YR 2/2 SANDY PEAT; non plast	55 by 38mm in size), moist ic, sub rounded sand grains,	-1 1 1
				11 11	8		65% peat, 35% medium sand, peat dom most, wet from 3.5	inately organics, wood debris	. -4
5-	1		11 11					-5	
				11					-6
				<u> </u>	Peat				
				11 11					
1				11					-8 Sand Pack
				# #					-9
10 -	Sonic						SM: 10YR 6/3 FINE WELL SORTED SIL rounded sand grains, 15% silt, 85% fine		-10
	0,				SM				
									CG-MW00
-							SM: 10YR 6/4 MEDIUM WELL SORTED rounded sand grains, 15% silt, 40% fine	SAND; non plastic, sub sand, 45% medium sand, we	12
1									-13
		//							_14 <mark>-14</mark>
15 -					SM				_ 15
15									
									16
		1					SM: 10YR 6/4 MEDIUM WELL SORTED rounded sand grains and gravel, trace of 40% medium sand, 5% coarse sand, tra	ay, 20% silt, 35% fine sand,	-17
		11			SM		9mm), wet		Bentonite 18

		ľ	T		1 1	FIEL	D BOREHOLE LOG TOTAL DEPTH:	40'	
рертн	SAMPLETYPE	ATTEMPT	RECOVERY	SOIL	nscs	OIA	SOIL DESCRIPTION	WELL CONSTRUCTION	ON SAMPI
									i i
		1					No Recovery	- 19	
20 -	Sonic		1	::::::::::::::::::::::::::::::::::::::			SW-SM: 10YR 6/4 MEDIUM POORLY SORTED SAND with SILT; non plastic, sub rounded sand grains and gravel, 10% silt, 25% fine sand,	-20	
					-22		50% medium sand, 5% coarse sand, 10% fine gravel (ranges 2 to 9mm), trace coarse gravel, wet	-21	
					SW- SM			-21 -22 -23 -24	
								- 23	CG-MW002- 25.0
							SP: 10YR 6/4 MEDIUM WELL SORTED SAND; non plastic, sub rounded sand grains and gravel, 5% silt, 25% fine sand, 70% medium sand, trace fine gravel, wet		Sand Pack
		//			SP			-24	
25 -		1					SM: 10 6/4 FINE WELL SORTED SILTY SAND; non plastic, sub rounded sand grains, 5% clay, 15% silt, 35% fine sand, 35% medium	- 25 · · · ·	
							sand, trace coarse sand, wet	- 26	
					SM			-27	
								-28	Bentonite
								- 29	
	, <u>o</u>						SP-SM: 10YR 6/4 MEDIUM WELL SORTED SAND with SILT; non plastic, sub rounded sand grains and gravel, 10% silt, 35% fine sand, 55% medium sand, trace coarse sand, trace fine gravel, wet		
30 -	Sonic							-30	
					SP- SM			-31	
-								-32	CG-MW002-
		//					SP: 10YR 6/8 MEDIUM WELL SORTED SAND; non plastic, sub	-33	35.0 Sand Pack
					SP		rounded sand grains and gravel, 5% silt, 25% fine sand 65% medium sand, 5% coarse sand, trace fine gravel, wet CL: 10YR 6/3 MODERATELY SORTED LEAN CLAY with SAND, low to	-32 -33 -34	
35 -					CL SP		moderate plasticity, sub rounded sand grains, 75% clay, 25% medium sand, moist, stiff	-35	
50		//					SP: 10YR 6/8 FINE WELL SORTED SAND; non plastic, sub rounded sand grains and gravel, 5% silt, 25% fine sand, 65% medium sand, 5% coarse sand, trace fine gravel, wet		
							CH: 10YR 6/1 WELL SORTED FAT CLAY; high plasticity, 100% clay, mo-st, stiff	- 36	
	Sonic	//			СН			-37	
	Š							- 38	
		//						-39	
40		11						L ₄₀	

BOREHOLE NO: CG-MW003 A=COM FIELD BOREHOLE LOG TOTAL DEPTH: 40' PROJECT INFORMATION DRILLING INFORMATION Mateco CONTRACTOR: Camp Grayling - Lake Margrethe PROJECT: CREW CHIEF: J. Croel Grayling, MI SITE LOCATION: Geoprobe 8140DT DRILL RIG TYPE: 60563409 PROJECT NO .: DRILLING METHOD: PROJECT MANAGER: John Cuthbertson HOLE DIAMETER: DATE START: 8/20/18 LOGGED BY: Stanley Krenz 8/20/18 DATE END: CREATED BY: Kaitlyn Eicholtz SAMPLETYPE RECOVERY SOIL WELL ATTEMPT DEPTH PID (ppm) SOIL DESCRIPTION CONSTRUCTION uscs 0 SM: Topsoil, 10YR 4/3 FINE WELL SORTED SILTY SAND; non SM plastic, sub rounded sand grains and gravel, 30% silt, 70% fine sand, trace coarse sand, trace fine gravel, dry, with roots, leaves, twigs, sharp color change below SM: 10YR 5/6 FINE WELL SORTED SILTY SAND; non plastic, sub rounded sand grains and gravel, 30% silt, 70% fine sand, trace coarse SM Hand Auger sand, trace fine gravel, dry, roots 2 -3 SM: 10YR 6/6 FINE WELL SORTED SILTY SAND; non plastic, sub rounded sand grains and gravel, 25% silt, 75% fine sand, strace coarse sand, trace fine gravel, dry, moist from 4' SM 4 5 5 SM: 10YR 4/4 FINE MODERATELY SORTED SILTY SAND; non plastic, sub rounded sand grains with sub rouned to sub angular gravel, 15% silt, 70% fine sand, 15% medium sand, trace coarse SM sand, trace fine gravel (ranges 6 to 17mm), a cobble (68 by 32mm), 6 most No Recovery -7 8 Sand Pack 9 Sonic 10 10 SP-SM: 10YR 6/4 MEDIUM WELL SORTED SAND with SILT; non plastic, sub rounded sand grains with sub rounded to sub angular gravel, 10% silt, 20% fine sand, 60% medium sand, 10% coarse sand, 11 trace fine and coarse gravel, moist CG-MW003-SM 14.0 12 13 W SW-SM: 10YR 6/4 MEDIUM MODERATELY SORTED SAND with SILT; non plastic sub rounded sand grains with sub rounded to sub angular gravel, 10% silt, 20% fine sand, 50% medium sand, 10% 14 coarse sand, 5% fine gravel, 5% coarse gravel, gravel ranges 11 to SM 25mm wet 15 15 SW-SM: 10YR 6/4 MEDIUM POORLY SORTED SAND with SILT; non plastic, sub rouned sand grains with sub rounded to sub angular gravel, 10% silt, 10% fine sand, 50% medium sand, 15% coarse sand, 5% fine gravel, 10% coarse gravel, gravel ranges 5 to 26mm, one SW-16 cobble (50 by 25mm), wet

SW-

(ranges 19 to 38mm), wet

SW-SM: 10YR 4/4 MEDIUM POORLY SORTED SAND with SILT and GRAVEL; non plastic, sub rounded sand grains with sub rounded to

sub angular gravel, 10% silt, 10% fine sand, 40% medium sand, 15% coarse sand, 10% fine gravel (ranges 5 to 19mm), 15% coarse gravel

17

						FIELD	BOREHOLE LOG BOREHOLE N TOTAL DEPTH		CG-N 40'	/W003	
DЕРТН	SAMPLETYPE	ATTEMPT	RECOVERY	SOIL	nscs	DID	SOIL DESCRIPTION		The second secon	VELL RUCTION	SAMPL
	- 0,				SP		SP: 10YR 6/4 MEDIUM WELL SORTED SAND; non plastic, sub rounded sand grains with sub rounded to sub angular gravel, 5% s 10% fine sand, 60% medium sand, 20% coarse sand, 5% fine gratrace coarse gravel, gravel range 3 to 14mm		- 19		*
20 -	Sonic				SW- SM		No Recovery SW-SM: 10YR 6/4 MEDIUM MODERATELY SORTED SAND with SILT; non plastic sub rounded sand grains with sub rounded to su anular gravel, 10% silt, 15% fine sand, 60% medium sand, 5% coarse sand, 5% fine gravel, 5% coarse gravel, gravel ranges 5 to 21mm, one cobble (65 by 32mm), wel	ub	-20 -21 -22	Ве	ntonite
					SW	n Z	SW: 10YR 6/4 MEDIUM POORLY SORTED SAND with GRAVEL; plastic, sub rounded sand grains with sub rounded to sub angular gravel, trace silt, 10% fine sand, 55% medium sand, 15% coarse sand, 10% fine gravel (ranges 4 to 16mm), 10% coarse gravel (ranges 4 to 16mm),	r	-23 -24		
25 -					SW		22 to 31mm), wet SW: 10YR 6/4 MEDIUM MODERATELY SORTED SAND; non pla sub rounded sand grains and gravel, trace silt, 15% fine sand, 70 medium sand, 15% coarse sand, trace fine and coarse gravel, we SW: 10YR 6/6 MEDIUM POORLY SORTED SAND; non plastic, si rounded sand grains and gravel, trace silt, 15% fine sand, 70% medium sand, 15% coarse sand, trace fine gravel (ranges 3 to 5m	astic, % et sub	25 26		
					SW		trace coarse gravel, wet cobble seam at 27 (ranges 25 to 45mm [0.2']), fine gravel lens at 27.8 to 28.0', clay lens at 28.6' (0.05 in thickness)		- 27 - 28 29		
30 -	Sonic				SP		No Recovery SP: 10YR 6/4 MEDIUM WELL SORTED SAND; non plastic, sub-rounded sand grains, 5% silt, 25% fine sand, 70% medium sand,		30 31	Sa CC 32	nd Pack S-MW003- .0
					SP		SP: 10YR 5/6 FINE WELL SORTED CLAYEY SAND; non plastic, rounded sand grains, 30% clay, 30% silt, 25% fine sand, 15% mer sand, wet CH: 10YR 6/1 WELL SORTED FAT CLAY; high plasticity, 100% of moist, stiff	edium	-32 -33		
35 -									- 34 - 35		
	īc				СН				-36 -37		
	Sonic								-38 -39		
40 I		//							40		

BOREHOLE NO: **CG-MW004 AECOM** FIELD BOREHOLE LOG TOTAL DEPTH: 50' PROJECT INFORMATION DRILLING INFORMATION Mateco CONTRACTOR: Camp Grayling - Lake Margrethe PROJECT: CREW CHIEF: J. Croel Grayling, MI SITE LOCATION: Geoprobe 8140DT DRILL RIG TYPE: 60563409 PROJECT NO .: DRILLING METHOD: PROJECT MANAGER: John Cuthbertson HOLE DIAMETER: 8" DATE START: 8/7/18 LOGGED BY: Stanley Krenz DATE END: 8/7/18 CREATED BY: Kaitlyn Eicholtz SAMPLETYPE RECOVERY SOIL WELL ATTEMP DEPTH PID (ppm) SOIL DESCRIPTION CONSTRUCTION uscs 0 SP: 10YR 4/4 MEDIUM WELL SORTED SAND; non plastic, sub-SP rounded sand grains and gravel, trace silt, 15% fine sand, 85% medium sand, trace fine gravel, trace coarse gravel, gravel ranges 5 ML to 20mm, dry ML: 10YR 2/2 SILTY PEAT with SAND; non plastic, sub rounded sand grains, trace clay, 80% silt (PEAT), 20% medium sand, wet, with Hand Auger organics and woody debris (located at 3.5' and 4.0'); sharp contact 2 ML: 10YR 2/2 SILTY PEAT with SAND; non plastic, sub rounded sand grains, trace clay, 75% silt (PEAT), 25% medium sand, wet, with -3 organics and woody debris (located at 3.5' and 4.0'); sharp contact 4 5 5 6 8 Sand Pack SP: 10YR 4/1 MEDIUM WELL SORTED SAND; non plastic, subin rounded sand grains, 5% silt, 15% fine sand, 80% medium sand, wet SP 9 No Recovery Sonic 10 10 SP: 10YR 4/1 MEDIUM WELL SORTED SAND; non plastic, sub rounded sand grains, 5% silt, 15% fine sand, 80% medium sand, wet SP 11 SP: 10YR 6/2 MEDIUM WELL SORTED SAND; non plastic, sub CG-MW004rounded sand grains, 20% fine sand, 80% medium sand, wet 14.0 SP 12 SP: 10YR 6/2 MEDIUM WELL SORTED SAND; non plastic, sub rounded sand grains, 15% fine sand, 70% medium sand, 15% coarse SP sand, wet 13 SP: 10YR 6/3 COARSE WELL SORTED SAND; non plastic, sub rounded sand grains, 40% medium sand, 60% coarse sand, wet, at 14' color stain of 7.5YR 5/6 SP 14 SP-SM: 10YR 6/4 MEDIUM WELL SORTED SAND with SILT; non plastic, sub rounded sand grains, 10% silt, 15% fine sand, 75% 15 15 medium sand, trace coarse sand, wet, at 15.2' lens of color stain of SP. 7,5YR 5/6 (0.1' in thickness) SM 16 SW: 10YR 6/4 MEDIUM MODERATELY SORTED SAND; non plastic, sub rounded sand grains and gravel, 5% silt, 25% fine sand, 40% medium sand, 25% coarse sand, 5% fine gravel (ranges 8 to 19mm), 17 SW trace coarse gravel (ranges 19 to 20mm), wet, SM: 10YR 6/4 FINE WELL SORTED SAND with SILT; non plastic, sub

						FIELD	BOREHOLE LOG BOREHOLE NO: TOTAL DEPTH:	CG-MW004 50'
рертн	SAMPLETYPE	ATTEMPT	RECOVERY	SOIL	nscs	DID	SOIL DESCRIPTION	WELL CONSTRUCTION SAMPI
	· · ·	1	7		SM		rounded sand grains, 15% silt, 65% fine sand, 20% medium sand, wet	
							No Recovery	- 19
20 -	Sonic				SP- SM		SP-SM: 10YR 6/4 FINE WELL SORTED SAND with SILT; non plastic, sub-rounded sand grains and gravel, 10% silt, 75% fine sand, 15% medium sand, trace fine gravel (ranges 2 to7mm), trace coarse gravel (ranges to a max of 30mm), wet	-20 Bentonite
					SP		SP: 10YR6/4 FINE WELL SORTED SAND; non plastic, sub rounded sand grains, 5% silt, 60% fine sand, 20% medium sand, 15% coarse	22
							sand, wet, fining upward SP: 10YR 6/4 MEDIUM WELL SORTED SAND; non plastic, sub rounded sand grains, 5% silt, 30% fine sand, 50% medium sand, 15%	-23
					SP		coarse sand, wet	- 24
25 -					SM		SM: 10YR 6/4 FINE WELL SORTED SAND with SILT; non plastic, sub- rounded sand grains, 15% silt, 60% fine sand, 15% medium sand, 10% coarse sand, wet	- 25
j					SW-		SW-SM: 10YR 6/4 FINE WELL SORTED SAND with SILT; non plastic, sub-rounded sand grains and gravel, 10% silt, 45% fine sand, 35% medium sand, 10% coarse sand, trace fine gravel (ranges 3 to	-25 -26 -27 -28
					SM		19mm), wet	CG-MW004- 30.0
i							No Recovery	Sand Pack
1	ic							- 29
30 -	Sonic						SP-SM: 10YR 6/4 MEDIUM WELL SORTED SAND with SILT; non plastic, sub rounded sand grains, trace clay, 15% silt, 25% fine sand, 55% medium sand, 5% coarse sand, wet	-30 F
-					SP- SM			-32
								-33 Bentonite
					CL		CL: 10YR 6/2 WELL SORTED LEAN CLAY with SILT; non plastic, 60% clay, 40% silt, dry SW: 10YR 6/4 MEDIUM MODERATELY SORTED SAND; non plastic,	-34
35 -					SW		sub rounded sand grains and gravel, 5% sitt, 15% fine sand, 75% medium sand, 5% coarse sand, trace fine gravel (ranges 4 to 9mm), wet,	-35
							SP: 10YR 6/4 MEDIUM WELL SORTED SAND; non plastic, sub rounded sand grains, 5% silt, 15% fine sand, 70% medium sand, 10% coarse sand, wet	−36
	Sonic				SP			CG-MW004- 40.0 — 38 Sand Pack
			//:				No Recovery	-39 · · ·
40_								40

						FIEL	D BOREHOLE LOG	BOREHOLE NO: TOTAL DEPTH:	CG-MW004 50'	
рертн	SAMPLETYPE	ATTEMPT	RECOVERY	SOIL	nscs	Q.	SOIL DESCRIP	TION	WELL CONSTRUCTION	SAMPLE
-					SP		SP: 10YR 6/4 MEDIUM WELL SORTED 3 rounded sand grains, trace silt, 10% fine 10% coarse sand, wet, occasional 7.5YR	sand, 80% medium sand,	-41	*
-					CL		CL: 10YR 6/1 WELL SORTED LEAN CLA 65% clay, 35% silt, moist, occasional 7.5	AY with SILT; low plasticity, YR 5/6 staining	√-42 ∷	
							CH: 10YR 6/1 WELL SORTED FAT CLA' moist, stiff	Y; high plasticity, 100% clay,	- 43	
									- 44	
45 -	Sonic								– 45	
					СН				- 46	
1									- 47	
-									- 48	
									- 49	
50										

BOREHOLE NO: **CG-MW005 AECOM** FIELD BOREHOLE LOG TOTAL DEPTH: 50.3 DRILLING INFORMATION PROJECT INFORMATION Mateco CONTRACTOR: Camp Grayling - Lake Margrethe PROJECT: CREW CHIEF: J. Croel Grayling, MI SITE LOCATION: Geoprobe 8140DT DRILL RIG TYPE: 60563409 PROJECT NO .: DRILLING METHOD: PROJECT MANAGER: John Cuthbertson HOLE DIAMETER: 8" DATE START: 8/15/18 LOGGED BY: Stanley Krenz DATE END: 8/16/18 CREATED BY: Kaitlyn Eicholtz SAMPLETYPE RECOVERY SOIL WELL ATTEMPT DEPTH PID (ppm) SOIL DESCRIPTION CONSTRUCTION uscs SM: 10YR 4/2 FINE WELL SORTED SILTY SAND; non plastic, sub 0 rounded sand grains, 40% silt, 60% sand, dry, with occasional roots SM SP: 10YR 4/4 FINE WELL SORTED SAND; non plastic, sub rounded sand grains and gravel, 5% silt, 95% fine sand, trace coarse sand, SP trace fine gravel, dry, coarsening downward SP: 10YR 5/8 FINE WELL SORTED SAND; non plastic, sub rounded Hand Auger 2 sand grains and gravel, 5% silt, 65% fine sand, 30% medium sand, trace coarse sand, dry SP -3 SW: 10YR 6/4 MEDIUM MODERATELY SORTED SAND; non plastic, sub rounded sand grains and gravel, 5% silt, 40% fine sand, 50% medium sand, trace coarse sand, 5% fine gravel (ranges 5 to 13mm), 4 SW trace coarse gravel (ranges to max of 21mm), wet 5 5 SM: 10YR 6/4 FINE MEDIUM MODERATELY SORTED SAND with SILT; non plastic, sub rounded sand grains and gravel, 15% silt, 60% fine sand, 15% medium sand, trace coarse sand, 5% fine gravel SM (ranges 6-15mm), 5% coarse gravel (ranges to a max of 30mm), wet 6 Sand Pack SM: 10YR 6/4 FINE WELL SORTED SILTY SAND; non plastic, sub rounded sand grains and gravel, 30% silt, 50% fine sand, 10% medium sand, trace coarse sand, 5% fine gravel (ranges 2-11mm), 5% coarse gravel, few cobbles (max of 46mm in size), wet 8 SM 9 No Recovery CG-MW005-12.0 Sonic 10 10 SW: 10YR 6/4 MEDIUM POORLY SORTED SAND; non plastic, sub rounded sand grains and gravel, trace silt, 25% fine sand, 60% medium sand, 5% coarse sand, 5% fine gravel, 5% coarse gravel, 11 SW wet, coarsening downward 12 SW: 10YR 6/4 MEDIUM POORLY SORTED SAND with GRAVEL, non plastic, sub rounded sand grains and gravel, trace silt, 20% fine sand, 55% medium sand, 10% coarse sand, 5% fine gravel (ranges 7 to 13 19mm), 10% coarse gravel (ranges 19 to 32mm), few cobbles (max of 62mm), wet 14 SW 15 15 16 SP-SM: 10YR 6/4 MEDIUM WELL SORTED SAND with SILT; non

plastic, sub rounded sand grains and gravel, 10% silt, 20% fine sand,

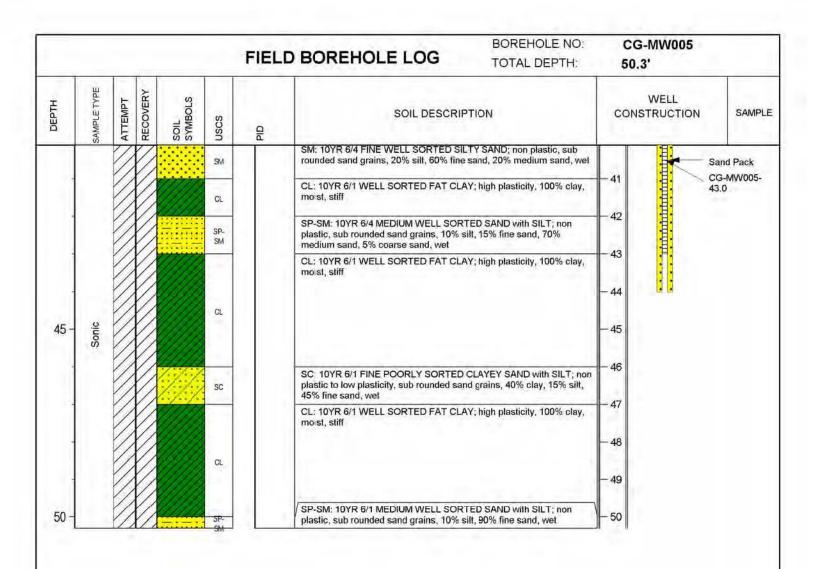
19mm), 5% coarse gravel (ranges to a max of 21mm), trace cobbles,

60% medium sand, trace coarse sand, 5% fine gravel (ranges 7 to

17

Bentonite

						FIELD	BOREHOLE LOG BOREHOLE NO: TOTAL DEPTH:	CG-MW005 50.3'	
рертн	SAMPLETYPE	ATTEMPT	RECOVERY	SOIL	nscs	PID	SOIL DESCRIPTION	WELL CONSTRUCTION	SAMPL
20 -	Sanic				SP- SM		SP-SM: 10YR 6/6 MEDIUM WELL SORTED SAND with SILT; non plastic, sub rounded sand grains and gravel, 10% silt, 20% fine sand, 70% medium sand, trace coarse sand, trace fine gravel, wet SP: 10YR 6/4 MEDIUM WELL SORTED SAND; non plastic, sub	-19 -20	
	S				SP		rounded sand grains and gravel, 5% silt, 20% fine sand, 60% medium sand, 10% coarse sand, trace fine gravel (ranges 10 to 19mm), 5% coarse gravel (ranges to a max of 42mm), wet	-20 -21 -22 -23 -24 -24	
1					CL		CL: 10YR 6/3 WELL SORTED FAT CLAY; high plasticity, 100% clay, moist, stiff	-22 CG	-MW005-
-					SP		SP: 10YR 6/4 MEDIUM WELL SORTED SAND; non plastic, sub- rounded sand grains and gravel, 5% silt, 15% fine sand, 65% medium sand, 15% coarse sand, trace fine gravel, wet	— 23 — 25. Sar	
-					SP			-24	
25 -							SP: 10YR 6/4 MEDIUM WELL SORTED SAND; non plastic, sub rounded sand grains and gravel, trace silt, 15% fine sand, 65% medium sand, 15% coarse sand, trace fine and coarse gravel (ranges	- 25	
1							6 to 27mm), wet	- 26	
ì					SP			- 27	
-		1						-28	
-								- 29	
30 -	Sonic		1	 	GL		CL: 10YR 6/4 WELL SORTED LEAN CLAY with SILT; non plastic, 50% clay, 50% silt, moist No Recovery	-30	
								-31	
-								-32 Ber	ntonite
								-33	
			//	1.1.1.1.1.1			SW: 10YR 6/4 MEDIUM MODERATELY SORTED SAND; non plastic,	-34	
35 -							sub rounded sand grains and gravel, 5% silt, 15% fine sand, 70% medium sand, 10% coarse sand, trace fine gravel (ranges +5 to 12mm), trace coarse gravel (ranges to a max of 21mm)	-35	
								-36	
1	Sonic				SW			-37	
	S							_38 	
					SW		SW: 10YR 6/4 MEDIUM POORLY SORTED SAND; non plastic, sub rounded sand grains and gravel, 5% silt, 15% fine sand, 60% medium sand, 10% coarse sand, trace fine gravel (ranges 10 to 19mm), 10%	−39 −40	
40_	ES:	1/	1				coarse gravel (ranges 19 to 40mm), wet	40 :	



Appendix C – Field Forms

Well/Piezometer Development Record

		1101111 10201110101 20		
Client: Project No:	MDEQ 8051852 8 606163409	Lake M Site Location: Date: 8-22-18	argrethe, Grayling, m2 Wurtsmith, Oscoda, MI Developer Star	Well/Piez. ID: B-co/ MW-1 nley Krenz
WELL/PIE	ZOMETER DATA			
Well :X_	_	Piezometer:	Diameter2	MaterialPVC
Depth to Bo	op of Screen (ft.)	7.12' 12.12' 12.12'		opment Completion 1650 225
Total Well I	Depth (ft.) tatic Water Level (ft.)	1.44'	Calculated Pur	•
DEVELOP	MENT METHOD	Submersible Pump		
Min. Purge OTHER CF Total Gallor		lumes) or <u>930 g</u> allons DPMENT: <u>930 gal fotal Ou</u> 006	Has required volume been remo	C-71-18
Signature 32 28		/z 10		

			G	allons	of Wate	er in W	ell			
0	1	2	3	4	5	6	7	8	9	1
0				-	_					_
4										
8 - //	1/	//	/	_					6" 10	2
. 1 /	// /	//	/ /							
12 -		/	/	/				_		-
16 -	11/	/	/	/		/			4"	2
20 -	11		/	-	/		/			
24 -	1	//		/		/	2%" ID		3"	ID
28 -	1	/"/	/ 10	/	/2" ID		/			
	/1	11%	/1½" ID		/					- 1

Volume /	Linear Ft. of	Pipe
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600
7	1.9992	7.5678
8	2.6112	9.8844

Well/Piezometer Development Record

Well/Piez. ID:

0	liant.
	nem.

Lake margrethe, Grayling, ma Site Location:

0 W-2 B-00)

MDEQ

8-22-18

Developer Stanley Krenz

60563409

WELL/PIEZOMETER DATA

Project No: 60518528

Well:_X_

Piezometer:

Diameter _

PVC Material

Depth to Top of Screen (ft.)

Depth to Bottom of Screen (ft.)

Time of Development Completion

Total Well Depth (ft.)

Calculated Purge Volume (gal.)

Depth to Static Water Level (ft.)

gallons

Disposal Method

55 Gallon Drum

DEVELOPMENT METHOD

Submersible Pump

ACCEPTANCE CRITERIA (from workplan)
Min. Purge Volume (_____ well volumes) or 900

Has required volume been removed?

From 3 Wells

OTHER CRITERIA FOR DEVELOPMENT: 930

Total Gallons of Development Wat

gallons total

Signature

Date:

0	1	2	3	4	5	6 erin W	7	8	9
o #						_			- [
4-1/			/						-
8-	11/	//	/						6"
12 -	III		/						
20 -	11/	/-/	/-	/		/			4"
20 -	11	1	/	-	/				
24 -	1	//		/		/	21/3" ID		3
28 -) 11% ID	ID.	/	/2' ID		/		
	/10								

Volume /	Linear Ft. of	Pipe
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600
7	1.9992	7.5678
8	2.6112	9.8844

Well/Piezometer Development Record

Well/Piez	. ID:
B-001	mw-3

Client:

Lake Margathe, Grayling, MI Site Location:

MDEQ

8-27-18

Developer Stanley Krenz

Project No: 89518528

WELL/PIEZOMETER DATA

Well: X Piezometer:_ Diameter ___

Material _ **PVC**

Depth to Top of Screen (ft.)

Depth to Bottom of Screen (ft.)

Time of Development Completion

Total Well Depth (ft.)

Calculated Purge Volume (gal.)

Depth to Static Water Level (ft.)

Disposal Method

55 Gallon Drum

DEVELOPMENT METHOD

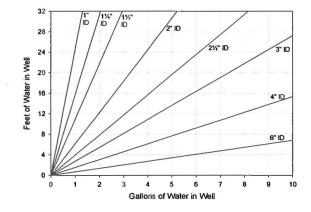
Submersible Pump

ACCEPTANCE CRITERIA (from workplan)
Min. Purge Volume (_____ well volumes) or ____ gallons

Has required volume been removed?

OTHER CRITERIA FOR DEVELOPMENT: 930 gellons total from 3 wells

Signature



Volume	/ Linear Ft. o	f Pipe
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600
7	1.9992	7.5678
8	2.6112	9.8844

Well/Piezometer Development Record

Well/Piez.	ID:
B-002	mhs-1

Client:

Lake M., Grayling, MI Wartsmith, Oscoda, MI

MDEQ

Site Location:

Project No: 69518528

60563409

8-10-18 Date:

Developer Stanley Krenz

Mateco

WELL/PIEZOMETER DATA

Well: X_

Piezometer:_

Diameter ____

PVC Material ____

Depth to Top of Screen (ft.)

Time of Development Completion

Depth to Bottom of Screen (ft.)

Depth to Static Water Level (ft.)

Calculated Purge Volume (gal.)

Total Well Depth (ft.)

Disposal Method

55 Gallon Drum

DEVELOPMENT METHOD

Submersible Pump

ACCEPTANCE CRITERIA (from workplan)

Min. Purge Volume (_____ well volumes) or @ gallons

Has required volume been removed? (Ves) No N/A



3 wens OTHER CRITERIA FOR DEVELOPMENT: 600 9011005 60 12001

Signature

8-10-18

0	1	2	3	4	5	6	7	8	9	_
4		/							6" 1	D
8 /	$\parallel \parallel \parallel$	//	//	/				J		
12 -	11/		/	/ ,	/			_		_
20 -	11,	/	/	/	_	/			4"	D.
20	11	/	/	/	/	-	/			
24 -	1,	//		/		/	2%" ID		3	" 1
28 -	- /	/ /		/	/2" ID		/			,

Volume / I	Linear Ft. of	Pipe
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600
7	1.9992	7.5678
8	2.6112	9.8844

Well/Piezometer Development Record

Well/Piez, ID: B-002 MW-2

Client:

Lake M, Grayling, MI: Wartsmith, Ossada, MI

MDEQ

Site Location:

Project No: 60518528

60563409

8-13-18

Developer Stanley Kronz.

Mateco

WELL/PIEZOMETER DATA

Well:_X_

Piezometer:_

Diameter ___

Material _ **PVC**

Depth to Top of Screen (ft.)

Total Well Depth (ft.)

Depth to Bottom of Screen (ft.)

Calculated Purge Volume (gal.)

Time of Development Completion

Depth to Static Water Level (ft.)

Disposal Method

55 Gallon Drum

DEVELOPMENT METHOD

Submersible Pump

ACCEPTANCE CRITERIA (from workplan)

Min. Purge Volume (_____ well volumes) or 600 gallons

Has required volume been removed? (Yes) No N/A

OTHER CRITERIA FOR DEVELOPMENT: 600 9 9 110 15 to tal Needs to be removed from 3 wills

Total Gallons of Development Water

Signature

8-13-18

			G	allons	of Wate	er in W	ell			
0	1	2	3	4	5	6	7	8	9	11
0	_						_			
4	1//						-			
1//	1//	//		_						_
8 - /	11/	//	/				-		6" 1	0
12 -	1//		/	/				_		
16	11/	/	/	/		/			4"	0
20 -	11	/	/	-	/	-	/			-
24 -	11	/		/		/	277 10	/	3	"ID
	1	/ /	/	/	'	,	2%" ID		/2	/
28 -	/IC	11%	11½°		2. ID		/			
32 T										

Volume /	Volume / Linear Ft. of Pipe						
ID (in)	Gallon	Liter					
0.25	0.0025	0.0097					
0.375	0.0057	0.0217					
0.5	0.0102	0.0386					
0.75	0.0229	0.0869					
1	0.0408	0.1544					
1.25	0.0637	0.2413					
1.5	0.0918	0.3475					
2	0.1632	0.6178					
2.5	0.2550	0.9653					
3	0.3672	1.3900					
4	0.6528	2.4711					
6	1.4688	5.5600					
7	1.9992	7.5678					
8	2.6112	9.8844					

Well/Piezometer Development Record

Well/Piez. ID:

Client:

MDEQ

Lake M., Grayling, MI Site Location: Wartsmith, Oscoda, ML

Project No: 60516528

60663409

8-13-18

Developer Stanley Krens Martec o

WELL/PIEZOMETER DATA

Well	:_	X	

Piezometer:

Diameter 2

PVC Material

Depth to Top of Screen (ft.)

Depth to Bottom of Screen (ft.)

Time of Development Completion

Calculated Purge Volume (gal.)

Total Well Depth (ft.)

Disposal Method

55 Gallon Drum

DEVELOPMENT METHOD

Depth to Static Water Level (ft.)

Submersible Pump

ACCEPTANCE CRITERIA (from workplan)
Min. Purge Volume (_____ well volumes) or gallons

Has required volume been removed?

other Criteria for Development: 250 gallons Pulled from MW-1; 600 gas total needed

Total Gallons of Development Water

Date:

			Gall	ons o	Water	in We	eŭ.			
0	1	2	3	4	5	6	7	8	9	1
0 4				-						
4-										
8 -	11//	//	/_	_					6"	_
12 -	1//	//	//	/						
16 -	1//	/	/		/				4"1	2
20 -	11	/	/	1			/			
	11		/	/	/			/		
24 -		//		/		/	5%" ID		3	ID
28 -	/"	, / lb /	/1½" ID	/	2" ID		/			
32 T	/1 HE	11/4" ID /	/11/3"		/			/		

Volume /	Linear Ft. of	Pipe
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600
7	1.9992	7.5678
8	2.6112	9.8844

Well/Piezometer Development Record

Client:

Lake margrethe, Grayling, not

MDEQ

Project No: 60518528-

60563409

Developer. Stanley Krenz Matero

WELL/PIEZOMETER DATA

Well: X

Piezometer:

Diameter ____

PVC Material_

Depth to Top of Screen (ft.)

Depth to Bottom of Screen (ft.)

Total Well Depth (ft.)

Depth to Static Water Level (ft.)

Time of Development Completion

Calculated Purge Volume (gal.)

55 Gallon Drum

DEVELOPMENT METHOD

Submersible Pump

ACCEPTANCE CRITERIA (from workplan)

Min. Purge Volume (_____ well volumes) or 500 gallons

Has required volume been removed?

OTHER CRITERIA FOR DEVELOPMENT:_

Total Gallons of Development Wate

Signature

350 gallons total (min)

Disposal Method

8-10-18

			ell	r in We	f Wate	allons	G			
	9	8	7	6	5	4	3	2	1	0
				-	-		-			0
								_		4
									1//	. ///
6" ID	6"				_	1	/	/	1/	8 - //
						/	/	/	//	12 -
					/		/		III	
4" 10_	4			/	4	/	/	· ,	111	16 -
								/	11	
					/	_	/	/_	11	20
3" ID	/	/	2%" ID	/		/		/	1/	24 -
/			/			/		/ /	/	
			/		2' ID		/1½* ID	/1½"	/1°	28 -
								1.00	fire	- 1

Volume / I	Linear Ft. of	Pipe
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600
7	1.9992	7.5678
8	2.6112	9.8844

Well/Piezometer Development Record

Lake Margrethe, Gray ling, IN Z Site Location: Wurtsmith, Oscoda, MI

Project No: 60518528

Client:

60563409

Date: <u>4-9-18</u>

Developer Stanley Krenz

mateco

MAICI	I (DIE	ZOME	TED F	ATA
VVEL	LIPIE		ICKL	JAIA

MDEQ

Well :X	Piezometer:	Diameter2	Material	PVC
	sk			
Depth to Top of Screen (ft.)	25 24.79			
Depth to Bottom of Screen (ft.)	29.79	Time of Develo	pment Completion	17
Total Well Depth (ft.)	29,79'	Calculated Purg	ge Volume (gal.)	30
Denth to Static Water Level (ft.)	2,94'	Disposal Metho	nd 55 Gallor	Drum

DEVELOPMENT METHOD

Submersible Pump

300

ACCEPTANCE CRITERIA (from workplan)
Min. Purge Volume (_____ well volumes) or 500 gallons

Has required volume been removed?

500 gallons between 3 well 5 OTHER CRITERIA FOR DEVELOPMENT:

Total Gallons of Development Water

			G	allons	of Wate	er in W	ell			
0	1	2	3	4	5	6	7	8	9	1
0				-	-,-	_				_
4										
8		//							6")
12 -			/				_	_		
16	111	/	/	/		/			4"1	2
20 -	1/	/	/	/	/		/			
24 -	1	//		/		/	21/3" ID		3	ID
28 -	/"		/ ID	/	/2º ID		/		Ť.	/
32 T	/10	11/4°	1½" ID					/		

Volume /	Linear Ft. of	Pipe
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600
7	1.9992	7.5678
8	2.6112	9.8844

Well/Piezometer Development Record

MW-3

Client:

MDEQ

Site Location:

Lake Margrethe, 9 Myling, M.I.

Project No: 60516528

60563409

8-9-18

Developer Stanley Krenz

Mateco

WELL/PIEZOMETER DATA

Well:_X_

Piezometer:

Diameter 2

PVC Material

Depth to Top of Screen (ft.)

Time of Development Completion

Total Well Depth (ft.)

Calculated Purge Volume (gal.)

Disposal Method

55 Gallon Drum

Depth to Static Water Level (ft.)

Depth to Bottom of Screen (ft.)

Submersible Pump

DEVELOPMENT METHOD

ACCEPTANCE CRITERIA (from workplan)
Min. Purge Volume (_____ well volumes) or 500 gallons

Has required volume been removed?

OTHER CRITERIA FOR DEVELOPMENT: 500 941 BETWEEN 3 wells

Total Gallons of Development Water

			G	allons	of Wate	er in W	ell			
0	1	2	3	4	5	6	7	8	9	1
o 🖊			•			-				_
4-	1//									
8 -		//	/					1000	6" 10	_
	11/	//	/,							
12 -	11/	/	/	/	/					
16 -	11/	/	/	/		/			4" 10)_
20 -	-/-/-	/	/	/	/					
24 -	11	//		/		/	2%" ID		3"	ID
28 -	1	//		/	/2" ID					/
	10	/1¼" ID	/1½" ID		la in		/			

Volume /	Linear Ft. of	Pipe
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600
7	1.9992	7.5678
8	2.6112	9.8844

Well/Piezometer Development Record

Well/Piez. ID:

Client:

Lake Margrethe, grayling, mit

MW-1

MDEQ

Site Location:

Project No: 60518528

60563409

Date: 8-21-18

Developer Stanley Krenz

WELL/PIEZOMETER DATA

Well:_X_

Piezometer:_

Diameter _

Material **PVC**

Depth to Top of Screen (ft.)

Calculated Purge Volume (gal.)

Time of Development Completion

Total Well Depth (ft.)

Depth to Static Water Level (ft.)

Depth to Bottom of Screen (ft.)

Disposal Method

55 Gallon Drum

DEVELOPMENT METHOD

Submersible Pump

100

ACCEPTANCE CRITERIA (from workplan),

Min. Purge Volume (____ well volumes) or 6 70 gallons

Has required volume been removed?

OTHER CRITERIA FOR DEVELOPMENT: 640 gal to be removed from 3 wens Lto Fal

Total Gallons of Development Water

Signature

8-2118

			G	allons	of Wate	er in W	eli			
0	1	2	3	4	5	6	7	8	9	1
0					-			-	_	
4	1//	_								
	1//	//		_						-
8 - /	11/	//	/			_	-		6" 10	
12 -	1//		/	/						
16 -	1//	/	/	/					4"	2
20	11	/	/		/		/			
27	11	//			,			/		
24 -		/ /				/	21/2" ID		3	D
28 -	/"	/	/ ID	,	/2' ID		/			
32	/1	11/4"	/1½" ID		/			/		

Volume /	Linear Ft. of	Pipe
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600
7	1.9992	7.5678
8	2.6112	9.8844

Well/Piezometer Development Record

Well/Piez. ID:

Client:

Lake margiethe, Grayling, MI Site Location: Wartsmith, Oscoda, MI

B-005 MW-2

MDEQ

60563409

8-2118

Developer Stanley Krenz

WELL/PIEZOMETER DATA

Project No: 69518528

Well: X

Piezometer:

Diameter 2

Material_ **PVC**

Depth to Top of Screen (ft.)

Time of Development Completion

Total Well Depth (ft.)

Calculated Purge Volume (gal.)

Depth to Static Water Level (ft.)

Depth to Bottom of Screen (ft.)

Disposal Method

55 Gallon Drum

DEVELOPMENT METHOD

Submersible Pump

ACCEPTANCE CRITERIA (from workplan)

Min. Purge Volume (_____ well volumes) or 440

gallons

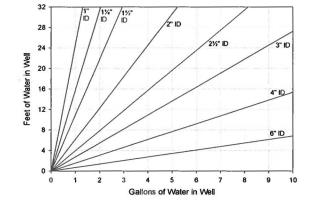
Has required volume been removed?

OTHER CRITERIA FOR DEVELOPMENT: LEWO TOTAL FROM

Total Gallons of Development Water

Signature

Date:



Volume /	Volume / Linear Ft. of Pipe						
ID (in)	Gallon	Liter					
0.25	0.0025	0.0097					
0.375	0.0057	0.0217					
0.5	0.0102	0.0386					
0.75	0.0229	0.0869					
1	0.0408	0.1544					
1.25	0.0637	0.2413					
1.5	0.0918	0.3475					
2	0.1632	0.6178					
2.5	0.2550	0.9653					
3	0.3672	1.3900					
4	0.6528	2.4711					
6	1.4688	5.5600					
7	1.9992	7.5678					
8	2.6112	9.8844					

Well/Piezometer Development Record

Well/Piez. ID:

01	
1 .1	ient:

MDEQ

Lake margrethe, brayling, mI Site Location: Warrsmith, Oscada, MF

Project No: 60518528

60563409

8-21-18

Developer Stanley Krenz

WELL/PIEZOMETER DATA

Well: X

Piezometer:

Diameter ____

PVC Material ____

55 Gallon Drum

Depth to Top of Screen (ft.)

Time of Development Completion

Total Well Depth (ft.)

Calculated Purge Volume (gal.)

Disposal Method

Depth to Static Water Level (ft.)

DEVELOPMENT METHOD

Depth to Bottom of Screen (ft.)

Submersible Pump

ACCEPTANCE CRITERIA (from workplan),
Min. Purge Volume (_____ well volumes) or UO gallons

Has required volume been removed?

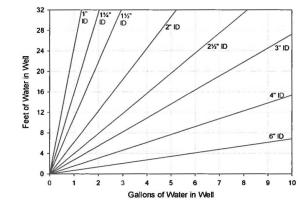
OTHER CRITERIA FOR DEVELOPMENT: 640 total 6 etween 3 wens

Total Gallons of Development Water

Signature

Date:

8-21-18



Volume /	Linear Ft. of	Pipe
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600
7	1.9992	7.5678
8	2.6112	9.8844

Low Flow Ground Water Sample Collection Record

MDEQ
Westernist, Oscoda, MI Lake M., grayling, MT
69548328

Client:
Project:
Project #:

INSPECTION											
Label on well?		YES	(NO)	NA	Is cap locked?		YES 🕡	NA .			
Is reference mark vis	sible?	YES	(No)	NA	Standing water p	resent?	YES (NO	NA			
Condition of well		surface runoff in well?	YES 160	NA							
Weather	9.	Suni	14		Air Temperature:		70'3				
Notes:					350			_			
		1011		01 0100	<u> </u>		_				
1		NAC	COON	COMIC	IT		_				
1				- 1			_				
STATIC WATER LE	VEL DRIO	TO DI IDCINO			4-11-0			SIV.			
1 0/ 01.	-18	Time: 07)	AM/PM								
0 0	1 0	Line: Up	Alyl/Pivi	Measured	ith.	Electronia Tona	Challe 9 Steel Tone				
Depth to Water:	: -	1774	1/			Electronic Tape	Chalk & Steel Tape				
Length of Well:		10- Va	<u>~·</u>	Decontam	ination.	Pre Steam Cleaned	DI Water Other				
WELL PURGING		***		12.			Submers 1614				
				1524							
Date:			Begin Time:	1009	AM/(M)	Purging Equipment:	Peristaltic Pump	,			
			End Time:		AM/PM	Decontamination:	Pre Steam Cleaned	DI Water Other			
CALCUL ATION OF	1.040110	VOLUME	•				New Tubing				
CALCULATION OF 1 CASING VOLUME 1											
1000	_										
	ft depth of water (before purge start) If low, recovery time:										
10.68 H.		of water column				100					
		sion factor (2" v	vell) 0.16		Actual volume pu		_gallons				
Gal.		g volume			Actual purge flow	rate	- normin ergan/m	11			
Notes D	eciclina	3 taken	as grab	readings			Estilli, O. L. C.	, , ,			
_											
						•					
Time	Volume	Depth to	pН	Conductivity	Turbidity	D.O.	Temp	ORP			
	(gallons)	Water	(SU)	(mS/cm)	(NTU)	(mg/L)	(°C)				
28		(Feet) <0.33'	+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV			
Start:											
1640		_	8-20	0.818	7	12,12	13.24	-145			
1645		_	817	0.829	a	12,41	11.78	-153			
1450	~	~	8,5	0.009	i i	11.02	11117	146			
1470			8 1 /	0.001		77.500	10.1	-110			
			 				1				
		-	 		 		 				
			 	-	1		1				
							1	1			
						1		1			
Final											
Final:	ION										
Final: SAMPLE COLLECT		Time:	AM/PM	Method	Peristaltic Pump						
SAMPLE COLLECT Date:	_	Time;	AM/PM								
SAMPLE COLLECT	_	Time:	AM/PM		Peristaltic Pump		01				
SAMPLE COLLECT Date: Appearance of Sam	ple:			Actual Sa			or				
SAMPLE COLLECT Date:	ple:		AM/PM ML HDPE troop	Actual Sa			or				
SAMPLE COLLECT Date: Appearance of Sam	ple <u>:</u>			Actual Sa			or				
SAMPLE COLLECT Date: Appearance of Sample BOTTLE CO	ple: COLLECTE			Actual Sa	mple Flow Rate:		6				

Name Stanley Krenz

Low Flow Ground Water Sample Collection Record

Client: MDEQ Project: Wertsmith, Project #: 00516528	oscols, Mi lake m	Well ID: Bro	NE ME	2		
INSPECTION Label on well? Is reference mark visible? Condition of well Weather Notes:	YES POPEL + SunWy	NA NA	Is cap locked? Standing water pro		YES MB YES MB YES MB	NA NA NA
	Jell Bevelo	pment			- - -	
Date: &-22 - 1 & Depth to Water: Length of Well:	Time: 0725 AMPN 1.60' 35.25'	Measured Decontam		Effectionic Tape Pre Steam Cleaned	Chalk & Steel Tape DI Water OTher	
WELL PURGING Date: 8-22-18	Begin Time: End Time:	1/15	А Э/РМ АМ/РМ	Purging Equipment: Decontamination:	Peristaltic Pump Pre Steam Cleaned	Di Water Other
ft depth ft. = length x conv. Gal. = 1 cas	of well of water (before purge start) of water column ersion factor (2" well) 0.16	Neading S	Yield: If low, recovery tin Actual volume pur Actual purge flow	ged 375	gallons Thin To gal/M	in
Time Volume (gallons)	Depth to pH Water (SU) (Feet) <0.33' +/- 0.1	Conductivity (mS/cm) +-3%	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/- 5%	ORP +/- 10 mV
Start: 1435 1436 1435	- 3.20 - 8.14 8.07	0.632	7	2161 18:11 14:35	12.37	47 -10 -36
Final:						
SAMPLE COLLECTION Date: Appearance of Sample: SAMPLE BOTTLE COLLECTION	Time: AM/PM ED: 2-250 ML HDPE (no p	Actual Sar	Peristaltic Pump	ml∕ <u>min</u> L∕min	or	

Company:

AECOM

Low Flow Ground Water Sample Collection Record

Cllent:	
Project:	

MDEQ WHITETHINH, OSCOMS, MILAKE MAIGRETHE, Gray King, MZ 605165200 (20563409

Project #:

INSPECTION								
Label on well?	bel on well? YES 🔞 1				NA Is cap locked?			NA
Is reference mar					Standing water pr	resent?	YES (NO)	NA
Condition of well	well PtHect Any indication of surface runoff in well?						YES, NO	NA
Weather	· ·	Supro	\vee		Air Temperature:		1005	_
Notes:		99	_					
	10	0//	10,10	1000000		0.74-0	-	
1	-V	1000	DOVE	wp wertt			_	
1	-						- /	
STATIC WATER	LEVEL PRIO	R TO PURGING				, ,	-	
Date: 8-22	-18	Time 2725	MANA	ſ				
Depth to Water:		9068	, 0	Measured	with:	Electronic Tape	Chalk & Steel Tape	
Length of Well:		40.00	2	Decontam		Pre Steam Cleaned	DI Water Other	
		•		30 300 San Carlotte		ST VICE REPORTED AND ADDRESS OF THE STATE OF		
WELL PURGING								
Date: 8-2	1-18		Begin Time:	0730	AN/PM	Purging Equipment:	Peristaltic Pump	
,			End Time:		AM/PM	Decontamination:	Pre Steam Cleaned	DI Water Other
							New Tubing	
CALCULATION						0		
40° f			100	45	Yield:	HIGH LOW		
7-67 f	t depth o	of water (before	purge start)	e .	If low, recovery tin	me:	-	
38. 22 f	t. =length	of water column				175 375		
1 12		rsion factor (2" w		te.	Actual volume pu		gallons	
		ig volume 🗶 🗠			Actual purge flow		salmin or gal/n	a · a
Notes	reading	5 take	n as gr	ab readings	s due to	o hrigh	Joe 1/11	1741
	777	rafe	,					
Time	Volume	Depth to	pН	Conductivity	Turbidity	D.O.	Temp	ORP
1	(gallons)	Water (Feet)	(SU)	(mS/cm)	(NTU)	(mg/L)	(°C)	
		<0.33'	+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
Start:								
1055	_	_	8.11	0.437	4	19.68	11.41	83
1100)	8.13	0,439	2	18.99	11.17	(00)
1105			8.10	0.437	10	17.70	10.60	32
				•				·
					-	ļ		-
					-			
	-							
Final: SAMPLE COLLE	ECTION	*****	l		L	1		11
Date:		Time:	AM/PM	Method	Peristaltic Pump			
Appearance of S	Sample:			Actual Sar	nple Flow Rate:	ml/min L/min	or	
SAMPLE BOTTL	E COLLECTE	ח- ס₋סבּח	ML-HDPE (no p	reservative)				
		0. 2-250	איב חטרב (ווס p	icoci valive)	_			
SAMPLING PER	RSONNEL							
Name Stanley Ki	renz			Company:		AECOM		
January Na				, Jan.,				

Low Flow Ground Water Sample Collection Record

MW-1

Well ID: B-002

Client: Project: Project #:	MDEQ Wurtsmith. 60518528	8006634	·LaKe M	1, gray1;119	THE I			
INSPECTION Label on well? Is reference man Condition of wel Weather Notes:		YES Perfec Sunn	*	NA NA DPMEN+	Is cap locked? Standing water p Any indication of Air Temperature:	f surface runoff in well?	YES NO YE	NA NA NA
Date: 8-10 Depth to Water: Length of Well:	-18	Time: 1050	AM/PM	Measured Decontam		Electronic Tape Pre Steam Cleaned	Chalk & Steel Tape DI Water other	
1	OF 1 CASING ft. Length ft depth	S VOLUME of well of water (before	Begin Time: End Time:	1055	AM/PM AM/PM Yield: If low, recovery to	Purging Equipment: Decontamination:	SwoMl(3:61C <u>Baristallie Pump</u> Pre Steam Cleaned New Tubing	DI Water Other
	x conve Gal. =1 casir B		nts coll	ected as flow rate	Actual volume pu Actual purge flow		_gallons _mmin_or Ge(/	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
1215 1220 1225 1230	() /)) < 1 ,	7.58 9.65 7.65 7.55	0.938 0.949 0.952 0.957	17	14.41 13.65 13.43 11.29	13.02 12.69 12.58 12.41	-108 -105 -107 -107
Final: SAMPLE COLL Date:	ECTION	Time:	AM/PM	Method	Peristaltic Pump			
Appearance of S		ED: 2-250	ML-HDPE (no pr		mple Flow Rate:	ml/min L/min		
SAMPLING PER				Company:		AECOM		

Client: Project: Project #:

Low Flow Ground Water Sample Collection Record

Well ID: B-002 MW-2 MDEQ
Wurtemith, Decode, MILAKE M, Grayling, MI
605185280 60563409

INSPECTION								
Label on well? YES (NO) NA Is cap locked?							YES (NO)	NA
Is reference mar	k visible?	YES	(day	NA	A Standing water present?			NA
Condition of well		Perfect				surface runoff in well?	YES (6)	NA
Weather								***************************************
Notes:			/		,		80'8	-
TVOICS.		10.41	10-011	N 4000 1			-	
		PEIL O	revero	mon-			=	
STATIC WATER	I EVEL PRIC	R TO PURGING					_	
Date: 4-13		Time: 1400)				
Depth to Water:	7.5	1.67	2	Measured	L with:	Electronic Tape	Chalk & Steel Tape	
Length of Well:			.b '	Decontam		Pre Steam Cleaned	DI Water Othe	_
Length of Well.		- di=110		Decoman	imation.	rie Steam Cleaneu	Di vvalei Zolile)
WELL PURGING								
Date:	13-18		Begin Time:	1405	AMPM	Purging Equipment:	Peristaltic Pump	
			End Time:		AM/PM	Decontamination:	Pre Steam Cleaned	DI Water Other
CALCULATION					ve 11	(5)		
	t. Length				Yield:	AIGH LOW		
<u> </u>	t depth	of water (before	purge start)		If low, recovery t	ime:	_	
	t. =length	of water column						
	x conve	rsion factor (2" w	vell) 0.16		Actual volume p	urged	gallons	
	Gal. =1 casi	ng volume			Actual purge flov	v rate	ml/min or	
Notes	reading	5 Julen	45 0 M	6 reading	s due to	2 high	L/min	
-	Flori	2000 po	Lina Na	6 reading	endings	2 10/10/		
-	7.00	1478 471	17 Rej vaj	14016	evarings			
-					4.44			
Time	Volume	Depth to	pН	Conductivity	Turbidity	D.O.	Temp	ORP
	(gallons)	Water	(SU)	(mS/cm)	(NTU)	(mg/L)	(°C)	123
]		(Feet) <0.33'	+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
	 	~0.33	47-0.1	T-370	7-10%	+/- 1076	+1- 376	7/- 10111
Start:			7.34	0.625	8	45.45	1270	-7-1
1545					0		14.67	-61
1550			7.46	0.609	6	17.41		-58
1555			675	0-602	Ψ	14.81	12.55	-60
							+	
Final:		-			2 200 2 2 2			
SAMPLE COLL	ECTION							
Date:		Time:	AM/PM	Method	Peristattic Pump			
Appearance of S	Sample:			Actual Sa	mple Flow Rate:	ml/mi		
SAMPLE BOTTI	E COLLECTE	D: 2-250	ML HDPE (no p	reservative)			l.	
SAMPLING BE	SONNEL					\		
						AFCOM		

SAMPLING PERSONNEL
Name Stanley Krenz

Low Flow Ground Water Sample Collection Record

Well ID: 13-002 MW-3

Client: Project: Project #:	MDEQ Wurtsmith, 00518528-	Gooda, MI Lo	ke m.,6	rayling, MI				
INSPECTION	*		_					
Label on well?		YES	60	NA	Is cap locked?		YES 🐠	NA
ls reference mar	k visible?	(ES)	NÓ	NA	Standing water pr	esent?	YES (NO	NA
Condition of well	l.	portect			Any indication of	surface runoff in well?	YES (No)	NA
Weather		Sunn	Y		Air Temperature:		70'5	_
Notes:			<u> </u>				-	
	<u> </u>	iell be	velop1	nent			- - -	
		OR TO PURGING						
Date: 8-13	78	Time: 104	O ATOYPIN	!				
Depth to Water:		1,40		Measured	with:	Electronic Tape	Chalk & Steel Tape	
Length of Well:		34.3	<u>3 ′</u>	Decontam	ination:	Pre Steam Cleaned	DI Water Officer)
WELL PURGING	3	WWW.			*/	-		1 0
Date: _ &-1	3-18		Begin Time:	1100	Мурм	Purging Equipment:	wbmers, 61e f	ump
			End Time:		AM/PM	Decontamination:	Pre Steam Cleaned	DI Water Other
CALCULATION	OF 1 CASING	VOLUME				A	9	
f	t. Length	of well			Yield:	HIGH LOW		
f	t. <u>- depth</u>	of water (before	purge start)	. ,	If low, recovery tir	ne:	_	
f	t. =lengti	of water column						
	x conv	ersion factor (2" w	/ell) 0.16		Actual volume pur	rged	gallons	
	Sal. =1 cas	ing volume			Actual purge flow	rate	_ml/min or	
Notes _	readi.	Ms are	Jaken W rate	as Grab	Leadings Table New	ding	L/min	
_				, ,				
Time	Volume	Depth to	рΗ	Conductivity	Turbidity	D.O.	Temp	ORP
l	(gallons)	Water (Feet)	(SU)	(mS/cm)	(NTU)	(mg/L)	(°C)	
		(Feet) <0.33'	+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
Start:								
1240			2.11	10.488	8.5	15.47	11.55	-23
1143			7414	0.498	82	15.48	1100	-28
1250			7.17	0.500	16	15.210	10.19	~33
			1 1 1					
				19.				
Final:								
SAMPLE COLLE	ECTION	Time:	AM/PN	l Method	Peristaltic Pump			
	ample	. mio.	AWIFIY					
Appearance of S	ample:				mple Flow Rate:	L/min	Of	
SAMPLE BOTTL	E COLLECT	ED: <u>2-250</u>	ML HDPE (no p	reservative)				

Company:

AECOM

Low Flow Ground Water Sample Collection Record

Client: Project:

MDEQ Wurtsmith, Oscoda, MI 60518528

Project #:

INSPECTION								
Label on well?		YES	(60)	NA	Is cap locked?		YES (NO)	NA
Is reference mar	k visible?	YES	. (10)	NA Standing water present?			YES (NO)	NA
Condition of well		Pertec	f		Any indication of	surface runoff in well?	YES (NO)	NA
Weather		Suni	1 7	_	Air Temperature:		60'5	_
Notes:			,					_
	1.	9011	10	100 000	1. /		_	
1	\overline{V}		DEAL	ושוורשטו	7		_	
							_	
	1 51/51 5516				45.00			
STATIC WATER	LEVEL PRIC	R TO PURGING						
Date: 8-10	18	Time: 0805	MPN	5 U.S.		7		
Depth to Water:		3:13		Measured		Electronic Tape	Chalk & Steel Tape	
Length of Well:		13-1	<u> </u>	Decontar	nination:	Pre Steam Cleaned	DI Water Other	•
WELL PURGING	3				****			
Date: 8-/	1-18		Begin Time:	0805	AMPM .	Purging Equipment:	Peristaltic Pump	
	, , ,							
			End Time:		AM/PM	Decontamination:	Pre Steam Cleaned	DI Water Other
CALCULATION	OF 1 CASING	VOLUME					THEW TUDATE	
f	t. Length	of well			Yield:	HIGH LOW		
f	t depth	of water (before	purge start)		If low, recovery ti	me:		
f		of water column		•	500 Marian (Marian Marian)		_	
<u> </u>		ersion factor (2" v			Actual volume pu	urand	gallons	
١,		ng volume	veil) 0.10	•	Actual purge flow			
	- 4						- until ga)/m	ว์ก
Notes	fr/leasur	rements	are ta	Ken by h	Iling flo	W Cell		• 1
	to tak	le grab 1	neasuren	nents due	to high	Flow		
1	Cate a	iving 14	artable	readings	, , ,			
_	· · · · · ·	,				*		
Time	Volume	Depth to	pН	Conductivity	Turbidity	D.O.	Temp	ORP
	(gallons)	Water	(SU)	(mS/cm)	(NTU)	(mg/L)	(°C)	
		(Feet) <0.33'	+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
04-4		40.00	17-0.1	1-370	1-10%	17-1070	11-070	17-101114
Start:			712	0 360	-	16/0-7	10.30	
0045	-		7.63	0.757	5	15.67		-12
0448			1-16	O.T.	2	15.58	10.27	-()
	-				 			
					1			
						-		-
					1			
Final:		L						
SAMPLE COLL	ECTION	-			B - 1 - 1 - 1 - 2			
Date:		Time:	AM/PN	Method	Peristaltic Pump			
Appearance of S	ample:			Actual Sa	mple Flow Rate:	ml/mir	or	8
						L/min		
SAMPLE BOTTL	E COLLECTI	D: <u>2-250</u>	ME HORE (no p	reservative)	_			
SAMDI INC DES	CONNE							
SAMPLING PER	SONNEL							
Name Stanley Kr	renz			Company		AECOM		

Low Flow Ground Water Sample Collection Record

Well ID: B-004 MW-3

Client: Project: Project #:

MDEQ Wortemith, Occoder MI Lake Margrethe, Grayling, MI 60548628- 60563409

INSPECTION								
Label on well?	abel on well? YES (15) N		NA	A Is cap locked?			NA	
Is reference mar				NA	Standing water	present?	YES 🐠	NA
Condition of well		Perfect			Any indication o	f surface runoff in well?	YES (NA
Weather		Sunny			Air Temperature	:	80'5	_
Notes:							_	
1	11)	011	levelo	DMDAZ			_	
ľ		CLUC	revelo	MALL	· ·		-	
	_			0.5747/Sc.			_	
STATIC WATER	LEVEL PRIO	R TO PURGING)					
Date: 8-9 1	8	Time: 1715	AM/PN	0				
Depth to Water:		2.99	,	Measured	with:	Electronic Tape	Chalk & Steel Tape	
Length of Well:		34.88	5′	Decontam	ination:	Pre Steam Cleaned	DI Water Other	
WELL PURGING	3							
0-0	1-18			1725			Submersible P.	mp
Date:	(10		Begin Time:	1100	AM/PM	Purging Equipment:	Rerietaltic Pump	
			End Time:		AM/PM	Decontamination:	Pre Steam Cleaned	DI Water Other
CALCULATION	OF 1 CASING	VOLUME					New Tubing	
	t. Length				Yield:	AIGH)LOW		
	t depth	of water (before	purge start)		If low, recovery		_	
f	t. =length	of water column	1					
	x conve	rsion factor (2" v	vell) 0.16		Actual volume p	urged	gallons	
	Gal. =1 casi			•	Actual purge flo	w rate	rel/min-or-de-1/	
	Markers	manale	rre take	in he Cil	in the	Flow CPII	-relimin or gal/m;	7
Notes _			measurer		to bind	Class and		
-	<u>as</u>	Pounp	ואוינמסעונן	went, due	TO MEN	FIOH VATE		
-	0	raunis	-					
Time	Volume	Depth to	рН	Conductivity	Turbidity	D.O.	Temp	ORP
	(gallons)	Water	(SU)	(mS/cm)	(NTU)	(mg/L)	(°C)	
		(Feet) <0.33'	+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
Start:		40.55	11-0.1	1-576	1-10%	11-1070	17- 376	77-101110
1825			4.58	8.192	90	16.39	11.0	-607
1830		-	4.70	0,563	20	7.95	14.23	601
1825			4.57	0.572	20	7.65	17.50	C52
1840			4.66	0.585	20	7.34	19.33	-5)
1010			1,00	0.005	- 0.0	1 1 1 1	12-00	- 57
	†	·						
	T			7.7.				
Final:								
SAMPLE COLL	ECTION	*** *** *** *** ***	*	· · · · · · · · · · · · · · · · · · ·				
Date:		Time:	AM/PN	Method	Peristaltic Pump)		
Appearance of S	Sample:			Actual Sa	mple Flow Rate:	ml/min	0	
				7,0,00,00		L/min	t and	
SAMPLE BOTTI	E COLLECTE	D: <u>2-250</u>	ML HDPE (no p	reservative)				
SAMPLING PER	SONNEI							
Name Stanley K	renz (Company	: <u> </u>	AECOM	\	_
							· · · · · · · · · · · · · · · · · · ·	

Low Flow Ground Water Sample Collection Record

Well ID: B. 005 MW-1

Client: Project: Project #:

MDEQ William Decode, MI Lake margethe, grayling, NOT 50518598 (0863409

INSPECTION								
Label on well?		YES NA Is cap locked?					YES NO	NA
ls reference mar	k visible?	YES	60	NA Standing water present?			YES MO	NA
Condition of well	I	Perfect			Any indication of	surface runoff in well?	YES (15)	NA
Weather		MIN			Air Temperature:		_ US	_
Notes:							_	
1	-	0011	NO 1/2 1	of ment	<u></u>		_	
÷*		VOU	gever	of men		· · · · · · · · · · · · · · · · · · ·	-	
l	-						-	
STATIC WATER	LEVEL PRIO	R TO PURGING			100		, 5.	
Date: 4-2	1-18	Time: 0837	AM/PM					
Depth to Water:		5.01		Measured		Electronic Tape	Chalk & Steel Tape	ę.
Length of Well:		12.1	<u>6</u>	Decontam	ination:	Pre Steam Cleaned	Water Other	
WELL PURGING		,						
Date: 6	71-18		Begin Time:	0840	(M)PM	Purging Equipment:	Peristaltic Pump	
			End Time:	0840 1015	АМУРМ	Decontamination:		DI Water Other
			cilu filine:	1019	CIVIPIVI	Decontamination:	Pre Steam Cleaned New Tubing	Dr vvaler Other
CALCULATION								
12.16					Yield:	HIGH COW		
	t. <u>- depth</u>	of water (before	purge start)		If low, recovery tir	me:	_	
7.15	t. =length	of water column				100		
1 1	x conve	rsion factor (2" v	vell) 0.16		Actual volume pur	V A	_gallons	
1.1	Gal. =1 casir	ng volume ⊭ 1	0= 11,4	1 ga/	Actual purge flow	rate <u>Jg67</u>	- munitor 991/Min	7
Notes	reading.	s taken	as grad	readings di	ne to in	consistent	OTTINI .	
_		ate	•					
1 -	-							
Time	Volume	Depth to	pН	Conductivity	Turbidity	D.O.	Temp	ORP
ľ	(gallons)	Water (Feet)	(SU)	(mS/cm)	(NTU)	(mg/L)	(°C)	
		<0.33'	+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
Start:								
1005			8-04	0.528	42	16.24	12.15	-50
1010			8.03	0.529	13	15.82	11.73	-63
1015			8.01	0,538	12	25.57	11.12	c81
Final:	ECTION					<u> </u>		
SAMPLE COLLI Date:	ECHON	Time:	AM/PM	Method	Peristaltic Pump			
Date.	_	Tario.	VIAIL LAI	Metriod	. onstante Fump			
Appearance of S	Sample:			Actual Sar	mple Flow Rate:	ml/min	or	
CAMBLE BOTT	E COLLECTE	D: 0.050	ML HDPE (no p	near rative)		L/min		
SAMPLE BOTTL		D: <u>2-250</u>	ML HUBE (NO P	CONTRAINE)				
SAMPLING PER	RSONNEL							
Name Stanley K	renz			Company:		AECOM		

Low Flow Ground Water Sample Collection Record

Well ID: 6005 mw-2

Client:	
Project:	

MDEQ WHITEMILLI, Goode, MI Cake Margietle, Grayling, ME 80640528 60563409

Project.

INSPECTION Label on well? Is reference mark visible? Condition of well Weather Notes:		H/rain Develop	men+	Is cap locked? Standing water pro Any indication of s Air Temperature:	esent? surface runoff in well?	YES (O) YES YES (O) YES	NA NA NA		
STATIC WATER LEVEL PRI Date: 8-21-18 Depth to Water: Length of Well:	Time: 1611	AMAM)	Measured Decontan		Electronic Tape Pre Steam Cleaned	Chalk & Steel Tape DI Water Other			
Date: 8-71-18 Begin Time: 1515 AM/PM Purging Equipment: Resistable Fump End Time: AM/PM Decontamination: Pre Steam Cleaned New Tubing CALCULATION OF 1 CASING VOLUME 25-24 ft. Length of well 4.11 ftdepth of water (before purge start) 11.15 ft. =length of water column x conversion factor (2" well) 0.16 Actual volume purged Actual volume purged Actual purge flow rate Pre Steam Cleaned DI Water Other New Tubing Submers: 61e fumf Resistable Fump Pre Steam Cleaned New Tubing Begin Time: AM/PM Decontamination: Pre Steam Cleaned New Tubing Actual volume purged Actual volume purged Actual purge flow rate Pre Steam Cleaned New Tubing Actual volume purged Actual volume purged Actual purge flow rate Pre Steam Cleaned DI Water Other New Tubing									
Start:	Depth to Water (Feet) <0.33'	pH (SU) +/- 0.1	Conductivity (mS/cm) +-3% 0 · 3 i &	Turbidity (NTU) +-10%	D.O. (mg/L) +/- 10%	Temp (°C) +/-5%	ORP +/- 10 mV		
Final:			U. 26.1		11.03	70.50	-60		
SAMPLE COLLECTION Date: Appearance of Sample: SAMPLE BOTTLE COLLECT SAMPLING PERSONNEL	Time: 2-250	AM/PM ML HDPE (no pre		Peristaltic Pump	m/min				
Name Stanley Krepz: Company: AECOM									

Low Flow Ground Water Sample Collection Record

Well ID: 15-005 MW-3

Client:	** MDEQ	
Project:	Jurtsmith, Occoda, MI Call	Margrethe, grayling, ma
Project #	00018528- 605/02409	

INSPECTION			~					
Label on well?		YES	(N)	NA	Is cap locked?		YES (NO)	NA
is reference ma	ırk visible?	YES	(6)	NA	Standing water p	resent?	YES (60)	NA
Condition of we	ı	perfect			Any indication of	surface runoff in well?	YES (S)	NA
Weather		fair)		Air Temperature	:	40'5	
Notes:								
		1011	Λ., .	. 0	2 1		_	
2		VELC	119/0	WY MIDI	17		_	
				1 1-10-			_	
					t-d-			
STATIC WATER	R LEVEL PRIC	Time: 70 7	<i>*</i>					
Date: 0 0	1-10					~		
Depth to Water:	:	3.14	, —	Measur	ed with:	Electronic Tape	Chalk & Steel Tape	
Length of Well:		43.12		Deconta	amination:	Pre Steam Cleaned	DI Water officer	9
WELL PURGIN	10							
		201						
Date:	8-21-	18	Begin Time:	1030	AM/PM	Purging Equipment:	Peristattic Pump	
			-				****	
			End Time:		AM/PM	Decontamination:	Pre Steam Cleaned New Tubing	DI Water Other
CALCULATION	OF 1 CASING	VOLUME					Con rubing	
	ft. Length				Yield:	HIGH LOW		
1 10.		of water (before	purge start)		If low, recovery t			
39,00		of water column					_	
71.00		ersion factor (2" v			Actual volume p	urged 350	gallons	
6.39	Col =1 ansi	ersion factor (2	veii) 0.10	1				
10001	Gal. =1 casi	ng volume χ	0 = 43.9	ke our	Actual purge flow	v rate	- mumin or gal/11)	VI
Notes	Sample	s luken	as arab 3	samples			J	
		* * *						
Time	Volume	Depth to	pH	Conductivity	Turbidity	D.O.	Temp	ORP
	(gallons)	Water	(SU)	(mS/cm)	(NTU)	(mg/L)	(°C)	
d):		(Feet)		. 00/	. 400/	400/	., 50/	1/ 40 = 1/
	+	<0.33'	+/- 0.1	+3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
Start:			2 4 4	22.0	A	7 . 1/	14.45	-
1405	-	-	7.92	0.319	127	38.16	11.57	6
1410	-	~	8.00	0.314	124	21.55	10.59	-31
1415	-		8-02	0.317	9-5	13.96	9,51	-60
1 10 200							. I	
		T						
Final:	1	1						
SAMPLE COLL	ECTION							
Date:		Time:	AM/PM	Method	Peristaltic Pump			
Appearance of	Sample:			Actual S	Sample Flow Rate:	ml/min	LOF	
			141			L/min		
SAMPLE BOTT	LE COLLECTE	ED: 2-250	ML HDRE (no p	reservative)				
SAMPLING PE	RSONNEL			_				
I								
Name Stanley k	Krenz			Compar	ny:	AECOM		

Low Flow Ground Water Sample Collection Record

Well ID: CG-MLOOI \$ (12.0)

Label on well?		YES	(NO)		Is cap locked?		ES NO	
Is reference mark	visible?	YES	NO		Standing water	present?		
Condition of well		GB,	n)			f surface runoff in well?	YES YES	
Weather	•	Cleo		K	Air Temperature		65	
Notes:		0,10						-
110100.	0						-	
		***					_	
					3 10			
STATIC WATER	LEVEL BRIG	D TO BURGING						
STATIC WATER	1		-					
Date: 09 25	118	Time: 0931	& AM/PM	š	. 000			
Depth to Water:		1.14		Measured		Electronic Tape	Chalk & Steel Tape	
Length of Well:	Length of Well:				nination:	Pre Steam Cleaned	Other Other	
WELL PURGING	1		7776	* ***				
- 2012	5/18			Caur			0 11	
Date: 09 2	2/16		Begin Time:	0945	AM/PM	Purging Equipment:	Perstill	
			End Time:	1040	AM/PM_	Decontamination:	Pre Steam Cleaned	DI Water Other
CALCULATION O	OF 1 CASING	VOLUME		(2)			New Tubing	
11.95 ft					Yield:	(HIGH) LOW		
1.14 ft		of water (before	purge start)		If low, recovery			
			70,700,000	•	ii low, recovery		_	
ft		of water column			A -411	ourged 5.2		
		rsion factor (2" v	vell) 0.16		Actual volume p		_gallons	
G	Sal. =1 casir	ng volume			Actual purge flo	w rate <u>30-1</u>	_ml/min or L/min	
Notes _								
_								
_								
							9	
Time	Volume	Depth to Water	pH (SU)	Conductivity	Turbidity (NTU)	D.O.	Temp	ORP
	(gallons)	(Feet)	(30)	(mS/cm)	(1410)	(mg/L)	(°C)	
			+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
		<0.33'						
Start: 1015	3.8	(.17	6.82	0.758	2.90	1.80	12.80	-32.9
Start: 1015	4.2	1.17	6.95	0.757	2.90	1.83	12.82	-32.9 -48.5
		1.17	6.82		1.74		12.82	
1020	4.2 4.6 5.0	1.17	6.82 6.95 7.09	0.757	1.74 1.26 1.41	1.83 1.59 1.63	12.82	-48.5 -59.4 -67.2
1020	4.2	1.17	6.82 6.95 7.09	0.757	1.74	1.83	12.82	~48.5 -59.4
1020 1030	4.2 4.6 5.0	1.17	6.82 6.95 7.09	0.757	1.74 1.26 1.41	1.83 1.59 1.63	12.82	-48.5 -59.4 -67.2
1020 1030	4.2 4.6 5.0	1.17	6.82 6.95 7.09	0.757	1.74 1.26 1.41	1.83 1.59 1.63	12.82	-48.5 -59.4 -67.2
1020 1030	4.2 4.6 5.0	1.17	6.82 6.95 7.09	0.757	1.74 1.26 1.41	1.83 1.59 1.63	12.82	-48.5 -59.4 -67.2
1020 1030	y.2 y.6 S.0	1.17	6.82 6.95 7.09	0.757	1.74 1.26 1.41	1.83 1.59 1.63	12.82	-48.5 -59.4 -67.2
1020 1030	y.2 y.6 S.0	1.17	6.82 6.95 7.09	0.757	1.74 1.26 1.41	1.83 1.59 1.63	12.82	-48.5 -59.4 -67.2
1020 1035 1030 1035	4.2 4.6 5.0 5.2	1.17	6.82 6.95 7.09	0.757	1.74 1.26 1.41	1.83 1.59 1.63	12.82	-48.5 -59.4 -67.2
1030 1035 1035 1035 Final:	4.2 4.6 5.0 5.2	[.[7 .[7 .[7 .[7	6.82 6.95 7.09 7.15 7.22	0.757 0.756 0.757 0.754	1.74 1.26 1.41 1.14	1.83 1.59 1.63 1.57	12.82 12.89 12.93 12.92	-48.5 -59.4 -67.2 -70.2
1020 1035 1030 1035	4.2 4.6 5.0 5.2	[.[7 .[7 .[7 .[7	6.82 6.95 7.09 7.15 7.22	0.757 0.756 0.757 0.754	1.74 1.26 1.41	1.83 1.59 1.63 1.57	12.82	-48.5 -59.4 -67.2 -70.2
1030 1035 1035 1035 Final:	4.2 4.6 5.0 5.2	[.[7 .[7 .[7 .[7	6.82 6.95 7.09 7.15 7.22	0.757 0.756 0.757 0.754	1.74 1.26 1.41 1.14	1.83 1.59 1.63 1.57	12.82 12.89 12.93 12.92	-48.5 -59.4 -67.2 -70.2
1020 1035 1030 1035 Final: SAMPLE COLLEDate: 09/25	4.2 4.6 5.0 5.2	1.17 1.17 1.17 1.17	6.82 6.95 7.09 7.15 7.22	0.757 0.756 0.757 0.754 Method	1.74 1.26 1.42 1.14	1.83 1.59 1.63 1.57	12.82 12.89 12.93 12.92	-48.5 -59.4 -67.2 -70.2
1020 1035 1030 1035 Final: SAMPLE COLLEDate: 09/25	4.2 5.0 5.2 5.2	1.17 1.17 1.17 1.17	6.82 6.95 7.09 7.15 7.22	0.757 0.756 0.757 0.754 Method	1.74 1.26 1.42 1.14	1.83 1.59 1.63 1.57 Purp 300 ml/mir	12.82 12.89 12.93 12.92	-48.5 -59.4 -67.2 -70.2
Final: SAMPLE COLLEDate: 09/25	U.Z U.S S.O 5.Q 5.Q ample:	1.17 1.17 1.17 1.17	6.82 6.95 7.09 7.15 7.22	0.757 0.756 0.757 0.754 Method	1.74 1.26 1.42 1.14	1.83 1.59 1.63 1.57 Purp 300 ml/mir	12.82 12.89 12.93 12.92	-48.5 -59.4 -67.2 -70.2
Final: SAMPLE COLLEDate: 09/25 Appearance of SAMPLE BOTTL SAMPLING PER	GCTION SONNEL	1.17 1.17 1.17 1.17 1.17	6.82 6.95 7.09 7.15 7.22	0.757 0.756 0.757 0.754 Method Actual Sa	Pc125+altho	1.83 1.59 1.63 1.57 Ang 300 ml/min	12.82 12.89 12.93 12.92	-48.5 -59.4 -67.2 -70.2
Final: SAMPLE COLLEDate: 09/25 Appearance of SAMPLE BOTTL SAMPLING PER	U.Z U.S S.O 5.Q 5.Q ample:	1.17 1.17 1.17 1.17 1.17	6.82 6.95 7.09 7.15 7.22	0.757 0.756 0.757 0.754 Method	Pc125+altho	1.83 1.59 1.63 1.57 Purp 300 ml/mir	12.82 12.89 12.93 12.92	-48.5 -59.4 -67.2 -70.2

Low Flow Ground Water Sample Collection Record

Well ID: CG - MWOOI - 20.0

Label on well? Is reference mark visible? Condition of well Weather Notes:	reference mark visible? ondition of well VES VES VES VES VES VES VES V			Is cap locked? Standing water p Any indication of Air Temperature	YES NO YES NO YES NO	-	
Date: 65 25 1% Depth to Water: Length of Well:	Time: 0135	AM/PM	Measured Decontarr		Electronic Tape Pre Steam Cleaned	Chalk & Steel Tape	
CALCULATION OF 1 CASI 25.01 ft. Leng 1-20 ftdep		Begin Time: End Time: ourge start)	1050	AM/PM AM/PM Yield: If low, recovery t	Purging Equipment: Decontamination: Gigh Low	Penstult, Pune	DI Water Other
x co	nversion factor (2" w asing volume	rell) 0.16		Actual volume p	7411	_ gallons _ ml/min or _ L/min	
Time Volume (gallons) Start: 05 3.8 0 4.6	(Feet) (Vater (Feet) (0.33' (1.25) (1.25) (1.25)	pH (SU) +/- 0.1 7.81 7.84 7.92 8.03	Conductivity (ms/cm) +-3% Ö 609 O -606 O 607 O 605	Turbidity (NTU) +-10% 1.30 1.65 0.90 1.03	D.O. (mg/L) +/- 10% 6 . 5 % 6 . 5 3 6 . 4 8 6 . 3 7	Temp (°C) +/- 5% , 53 , 51 , 53	+/- 10 mV 90 6 94 0 97 3 85 9
N25 5.3	1-26	8.04	0.603	1.43	6.06	11.61	83.2 76.5
Date: 05\25\8 Appearance of Sample: SAMPLE BOTTLE COLLE	Time: 1135 Clear	250 ml	Actual Sa	Penst-the ample Flow Rate:	300 ml/min	Or) 8092211	35 hk
Name: Michal	Rosciaz		Company	r	AECOM		

Low Flow Ground Water Sample Collection Record

Well ID: CG - MWOOI - 40,0

Label on well? Is reference mark Condition of well Weather Notes	reference mark visible? redition of well relather YES NO			Is cap locked? Standing water Any indication o Air Temperature	f surface runoff in well?	YES YES YES NO	-	
Date: O Z Depth to Water: Length of Well:	18	R TO PURGING Time: 0930 24 39.69		Measure Decontar		Stactronic Tape Pre Steam Cleaned	Chalk & Steel Tape Of Water Other	
CALCULATION C 29.6C ft 1.20 ft R Notes	DF 1 CASING Length depth length x conve		1	45 230	AM/PM Yield: If low, recovery Actual volume pactual purge flo	ourged 3.9	Perst H. Pu., Pre Steam Cleaned New Tubbag gallons ml/min or L/min	P DI Water Other
Start: 1000 1205 1210 1215 1220	Volume (gallons) 2.5 2.7 3.0 3.3 3.6 3.9	Depth to Water (Feet) <0.33' .24 .24 .24 .24 .25	pH (SU) +/-0.1 7.93 7.91 7.90 8.05 8.05	Conductivity (mS/cm) +-3% 0.371 0.368 0.368 0.368 0.368	Turbidity (NTU) +-10% 3.73 3.87 2.14 7.56 1.64 1.35	D.O. (mg/L) +/-10% 6.30 6.31 6.23 6.23 6.29	Temp (°C) +/-5% 11.38 11.12 11.24 11.09 10.95	ORP +/- 10 mV 16 122 8 130 125 128 133 133
Final: SAMPLE COLLE Date: 01 25 1 Appearance of S. SAMPLE BOTTL	ample: C	Time: 1230 Necr ED: 2) AM/PN	Actual S	Pers Litre	Purp ml/min		
Name: Mic	hal Kus	Ciaz		Compan	y:	AECOM		

Low Flow Ground Water Sample Collection Record

Well ID: CG-MW 002-14.0

Client: DEQ Location: Gray Ing. NT Project #: 645634 09 -02

INSPECTION		_			~	2 .(-		
Label on well?		YES	NO		Is cap locked?	Boits	YES NO	
Is reference mar	k visible?	ES	NO		Standing water pre	esent?	YES NO	
Condition of well		Groot	0		Any indication of se	urface runoff in well?	YES (
Weather		Sinne			Air Temperature:	73 of 100		
Notes:			l .				_	
							_	
	Ş .						_	
1	-						_	
STATIC WATER	LEVEL PRIO	R TO PURGING	1					
Date: 9/25	118	Time: 144	2 M PM					
Depth to Water:		P 1.5		Measured	d with:	Electronic Tape	Chalk & Steel Tape	
Length of Well:		14.0		Decontan		Pre Steam Cleaned	DI Water Other	
WELL PURGING	3							
Date:	1/25/12		Begin Time:	1140	AM)PM	Purging Equipment:	Peristaltic	
Date:	100110			*	~			
			End Time:	1215	AM/6M	Decontamination:	Pre Steam Cleaned New Tubing	DI Water Other
CALCULATION	OF 1 CASING	VOLUME					How I doing	
14.04	ft. Length	of well			Yield:	HIGH LOW		
1.53	ft depth	of water (before	purge start)		If low, recovery tim	ne: NA		
12.51	ft. =length	of water column	i			10.000		
	х сопуе	rsion factor (2" v	vell) 0.16		Actual volume pur	ged 1.7	gallons	
2.0	Gal. =1 casi	ng volume			Actual purge flow r	rate 35\$	(ml/min)or	
N							L/min	
Notes _			·····			· · · · · · · · · · · · · · · · · · ·		
1 -								
-								
Time	Volume	Depth to	pH	Conductivity	Turbidity	D.O.	Temp	ORP
	(gallons)	Water	(SU)	(mS/cm)	(NTU)	(mg/L)	(°C)	
l		(Feet) <0.33'	+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
Start: 1150	0.3	1.100	6.67	0.55	0.21	3.71	12.6	+92.9
1155	0.6	1.00	6.72	0.55	0.37	3.33	12.6	+645
1200	0.9	1.60	(0.77	0.55	0.34	3.26	12.6	153.1
1205	1.2	1.100	1074	0.55	0.36	3.18	12.4	144.1
1210	1.3		0.75	0.55	0.423	3.83	12.6	+35.1
1215	11.2	1.60	6.76	0.55	0.33	3.63		+302
1612	1.4	1.00	W. 10	0.35	0.55	3.04	12.5	4505
-	1						+	***
			+ +					
	+			~			+	
Final:								+
SAMPLE COLL	ECTION	<u> </u>			0			
Date: 9 2	5/18	Time;	AM/PM	Method	Peristat	ic		
		lear						
Appearance of	sample:				ample Flow Rate:	350 ml/mir	n pr	
SAMPLE BOTT	LE COLLECTI	ED: 2	-250m			211111		
SAMPLING PE		. 1						
Name: V	ticho	Ite		Company	/-	AECOM		
						- dilina		

Low Flow Ground Water Sample Collection Record

Well ID: CG-MW 002 - 25.0

Client: DEQ Location: Gray ling, M7 Project #: 6563469. \$2

INSPECTION		,					2.14	
Label on well?		VES	NO		Is cap locked?		WES BOILS NO	
Is reference mark	visible?	FES) NO		Standing water	present?	YES NO	
Condition of well		Good	9		Any indication of	f surface runoff in well?	73 0 F	
Weather		Sunni	4		Air Temperature	73 of		
Notes:			1		* ************************************			
							_	
							_	*
							_	
STATIC WATER I	EVEL DOLO	D TO BURCING	,					
Date: 9/25/1		Time: 1445						
	0	1.44	BD//PIV	-	ale.	Flantania Tana	Challe 9 Charl Tana	
Depth to Water:		25.19	1	Measured		Electronic Tape	Chalk & Steel Tape Of Water Other	
Length of Well:		25.1		Decontarr	ination:	Pre Steam Cleaned	Other Other	
WELL PURGING								
9/20	5/18			1226	·mc		Periode to	
Date:	3/10		Begin Time:	1220	MANNEM	Purging Equipment:	Tatsium	
			End Time:	1254	AM/PM)	Decontamination:	Pre Steam Cleaned	DI Water Other
CALCULATION O	E 1 CASING	VOLUME					New Tubing	1
25.19 ft.	Length				Yield:	FIGH LOW		
1.44 ft		of water (before	nurne start)		If low, recovery	. 14		
2225					ii iow, icoovery	unio.	-	
43.1) II		of water column			Actual values	27.7	collogs	
3.9		ersion factor (2" v	veii) 0.16	-	Actual volume		gallons	
5.0 G	al. =1 casi	ng volume			Actual purge flo	w rate <u>3.50</u>	_n(/min or L/min	
Notes			0.646.009	-				
_					-			
_								
Time	Volume	Depth to	pH	Conductivity	Turbidity	D.O.	Temp (°C)	ORP
1	(gallons)	Water (Feet)	(SU)	(mS/cm)	(NTU)	(mg/L)	()	
	0.5	<0.33'	+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
Start: 1230	Ø.8	1.59	7.20	0.481	25.0	14.21	14.2	450.8
1235	1.1	1.59	7.27	0.472	10.7	10.36	14.4	+56.6
HO FRE BASH	1.4	1.59	7.29	0.472	6.84	10.34	Ψ.Φ	+58.8
1245	1.7	1.59	7.30	0.477	5.89	9.84	10.4	+61.5
1254	2.4	1.59	7.32	0.474	4.57	9.55	10.4	+64.0
1								
						*		
					1			
Final:								
SAMPLE COLLE	CTION	10			0 1	1		
Date: 9 25		Time: 124	AMIPA	Method	Peristo	11tic		
Annogrance of C	ample:	clear			mple Flow Rate:	2-1	NOT.	
Appearance of Sa	ampie:				imple rlow Rate:	350 ml/min	, ui	
SAMPLE BOTTL	E COLLECT	ED: 7	- 250	ML				
					-			
					NEOPOLIC CONTRACTOR			
SAMPLING PER	SONNEL	11.						
SAMPLING PER	SONNEL	olte	-1	Company		AECOM		

Low Flow Ground Water Sample Collection Record

Well ID: (G-MWØØ2- 35.0)

Client: DEQ Location: Grayling, M7 Project #: 6563409.02

INSPECTION		p 1.00	artis-			· · · · · · · · · · · · · · · · · · ·	0 16	
Label on well?		YES	NO	Is cap locked?			Bolts NO	
ls reference mark	visible?	YES	NO		Standing water present?			
Condition of well		Cros		Any indication of surface runoff in well?			YES NO	
Weather	,	Sinny		Air Temperature:			75°F	
Notes:		ala e			, (o p o o			_
			A. 1749-144					
								The same
		_						
STATIC WATER	LEVEL DRIO	P TO BURCING		17.80				
Date: 9 25		Time: 695 8						
1	סו		AMIPM				0	
Depth to Water:		1.63		Measured		Electronic Tape	Chalk & Steel Tape	
Length of Well:		34.4φ		Decontami	ination:	Pre Steam Cleaned	DI-Wester Other	
WELL PURGING								
al	relia		s 1 =	15:25			Pane la lic	
Date:	Colles		Begin Time:		AM/PM)	Purging Equipment:	- raistaine	-
			End Time:	15:55	AM/PM)	Decontamination:	Pre Steam Cleaned	DI Water Other
CALCULATION C	OF 1 CASING	VOLUME					New Tubing	
34.40 ft					Yield:	HIGH LOW		
1.63 ft		of water (before)	ourge start)		If low, recovery	- 11		
32.77 ft			barge start,		,		_	
30.17		of water column			A = 1= 1= -	2.4		
5.2 G		rsion factor (2" w	/ell) U.16		Actual volume p	1 . (-1	gallons	
G	Sal. =1 casir	ng volume			Actual purge flor	w rate	or L/min	
Notes								
_								
_				- m				
ago)		5						
Time	Volume (gallons)	Depth to Water	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	D.O. (mg/L)	Temp (°C)	ORP
		(Feet)	(00)	(1110/011)	(1110)	(111972)	()	
	0.5	<0.33'	+/- 0.1	+-3%	+-10%_	+/- 10%	+/- 5%	+/- 10 mV
Start+ 1535	(CO)00°		7.25	0.367	24.3	14.47	19.5	41082
1540	B 1.3	1.70	7-35	0.364	13.7	13.46	10.7	+106.8
1545	1.10	1.70	7.38	0.361	7.31	12.99	14.60	+ 105.5
1550	1.9	1.70	7.40	ø.355	4.48	12.73	10.6	+103.5
1555	2.1	1.70	7.42	Ø.352	3.45	12.43	10.4	+102.2
		,				0		
						en CX		
Final: 1555	7.1	1.70	7:42	0.352	3.65	1243	10.4	+102-2
Date: 9 2	CTION	Time: 15.5	55	n	Perist	altic	*	
Date:	عال د		AM/PN	Method	1010	,		
Appearance of Sa	ample:	clear		Actual Sar	mple Flow Rate:	3 ØØ @I/m	or	
		7	- 250/			L/min		
SAMPLE BOTTL	E COLLECTE	D:	- 6301	110	-			
SAMPLING PER	SONNEL	1/					-	
The second control of		1/2				700 m - 100 m		
Name:	. Gicho	17		Company:	-	AECOM		

Low Flow Ground Water Sample Collection Record

Well ID: CG-MH003-14.0

INSPECTION Label on well? Is reference mark Condition of well Weather Notes:	n well? Pence mark visible? The point of well Th			Is cap locked? Standing water p Any indication of Air Temperature	f surface runoff in well?	YES NO YES NO	-	
STATIC WATER Date: 09 25 Depth to Water: Length of Well:	, 18	R TO PURGING Time: 103 8.26		Measured Decontam		Electronic Tape Pre Steam Cleaned	Chalk & Steel Tape DI Water Other	
Date: O9 C	25 18 DF 1 CASING		Begin Time:	1505	AM/PM AM/PM Yield:	Purging Equipment: Decontamination:	Pre Steam Cleaned New Tubing	DI Water Other
8.20 ft	- depth o	of water (before of water column rsion factor (2" v ng volume	يعيا	· · · · · · · · · · · · · · · · · · ·	If low, recovery Actual volume p	time:	gallons ml/min or _L/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: 1520 1525 1536 1536 1536	1.5	\$.22 \$.22 \$.22 \$.32	7.74 7.58 7.58	0.570 0.575 0.575 0.571	2.87 2.85 1.95 1.41	7.51 8.72 8.80 8.96 9.22	12.51 12.59 12.33 12.38 12.50	-61.7 -59.1 -54.1 -52.9 -54.6
Final: SAMPLE COLLE Date: () q 25	18	Time: 1545		Actual Sa	Ponst-Hic	Aury 300 ml/m		
SAMPLING PER Name: Mic	SONNEL	scio	250 NL	Seagle betty	_	AECOM		

Low Flow Ground Water Sample Collection Record

Well ID: CG-MN0003-32.0

Label on well? Is reference mark Condition of well Weather Notes:	pel on well? eference mark visible? Indition of well eather			Is cap locked? Standing water Any indication o Air Temperature	f surface runoff in well?	YES (O) YES NO YES 70	-	
STATIC WATER Date: GA 25 Depth to Water: Length of Well:	18	Time: 103°		! Measure Decontai		Slectronic Tape Pre Steam Cleaned	Chalk & Steel Tape Ol Water Other	
CALCULATION (OF 1 CASING Length Length Length Length Length Length			1600 1635	AM/PM Yield: If low, recovery Actual volume pactual purge flo	ourged 2.4	Pre Steam Cleaned New Tubing V gallons ml/min or L/min	r <u>√</u> P DI Water Other
Start: 1615 \620 \625	Volume (gallons)	Depth to Water (Feet) <0.33' %-12 %-12 %-12 %-12	pH (sU) +/- 0.1 7.98 7.99 8.07 8.07	Conductivity (mS/cm) +-3% O . 369 O . 369 O . 369	Turbidity (NTU) +-10% \$ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	D.O. (mg/L) +/- 10% 8.42 9.61 8.53	Temp (°C) +/- 5% 10 - 64 10 - 53 10 - 54	0RP +/- 10 mV 61.1 66 \$ 70.9 73.4
Final: SAMPLE COLLE Date: 0 \ 2 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	ample:	Time: 1635 Clee ED: 2	5 AM/PN	Actual S	Peristeltx ample Flow Rate:	2	nin or	
SAMPLING PER		٩.		Compan	y:	AECOM		

Low Flow Ground Water Sample Collection Record

Well ID: CG-MW 004-14.0

Client: DEQ Location: Grayling, MT Project #: 60563409

INSPECTION							Bolts	
Label on well?		YES	NO		Is cap locked?	YES NO		
Is reference mark	visible?	(ES)	NO		Standing water pre	esent?	YES 💮	
Condition of well		Good.			Any indication of s	surface runoff in well?	YES _ (10)	
Weather		Rany /	mercast		Air Temperature:		54.6	_
Notes:		()					_	
- "I							_	
				***************************************		1.4	_	
							_	
STATIC WATER	I EVEL PRIC	R TO PURGING						
Date: 9/24	The second secon	Time: /0/9						
Depth to Water:		2.89	GJA/T IVI	Measured	with.	Electronic Tape	Chalk & Steel Tape	
Length of Well:		13.74	1	Decontam		Pre Steam Cleaned	DI Water Other	
Length of Well.			<u> </u>	Decontain	mattori.	The Oteam Gleaned	Office Office	
WELL PURGING							1	
Date: 9	1210115	3	Begin Time:	1055	(AM)PM	Purging Equipment:	Peristaltic	
Date:	100/10		begin Time:	-,	100	Purging Equipment		· ·
			End Time:	1134	AMPM	Decontamination:	Pre Steam Cleaned	DI Water Other
CALCULATION	OF 1 CASING	VOLUME					New Tursing	
13.74 ft					Yield:	HIGH LOW		
2.89 ft		of water (before	purge start)		If low, recovery tin			
14.85 A	* -	of water column			,,		_	
17.00		ersion factor (2" v			Actual volume pur	rand	gallons	
1.7		ng volume	rell) 0, 10		Actual purge flow	11.1.1	gallons ml/mipor	
7.1	oal. → i casi	ng volume			Actual purge flow	rate 199	L/min	
Notes _	A &			*				
_								
-				-0.	9.00			
							T	
Time	Volume (gallons)	Depth to Water	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	D.O. (mg/L)	Temp (°C)	ORP
	(galloris)	(Feet)	(30)	(mozem)	(1410)	(mg/c)	(0)	
		<0.33'	+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
Start: 1/65	0.8	2.93	6.76	Ø.56	3.28	3.41	16.4	-50.4
1116	1.2	2.93	6.68	Ø·55	3.17	4.00	10.5	- 50.6
1115	1.60	2.73	6.68	0.55	1.98	3.49	10.5	-51.3
1120	2.0	2.93	6-66	6.56	1.37	3.49	10.6	-51.3
1125	2.3	2.93	10.67	めいい	1.29	3.09	10.6	-51.6
1130	2.7	2.93	6.65	9.56	2.07	3.04	10.7	-51.4
7								
			_					
Final: 1/30	2-7	2.93	6.65	6.56	2.07	3.04	10.7	-51.4
SAMPLE COLL	ECTION				1 1	1	•	
Date: 9/2	18	Time: 1/3	ATYPM	Method	Perista !	HC		
Appearance of S	sample:	clear		Actual Sa	mple Flow Rate:	400 m/mi	Por	
, appearance of o				•		4 Ø Ø II/min	-	
SAMPLE BOTTL	LE COLLECT	ED: 7	250	MLS	_			
								
SAMPLING PER		1						
Name:	. Gick	10/12		Company		AECOM		

Low Flow Ground Water Sample Collection Record

Well ID: CG-MW 004 - 30.0

Client: DEQ Location Grayling MT Project #: 60563409

INSPECTION							YES BOHS NO	
Label on well?		(YES)	NO		Is cap locked?	YES NO		
Is reference mark	visible?	FES	NO		Standing water pr	resent?	YES (%)	
Condition of well		6100	d		Any indication of	YES KO	- 1	
Weather		Rainer	luer ca:	+	Air Temperature:		530F	
Notes:			1					-
							_	
							_	
							_	
STATIC WATER	LEVEL DRIC	DR TO DURGING						
THE RESIDENCE AND ADDRESS OF	5/18	Time: 1621						
Depth to Water:	Olio	0 74	Z WI/FIVI	Measured	swith:	Electronic Tape	Chalk & Steel Tape	
Length of Well:		29.72	-	Decontam		Pre Steam Cleaned	DI Water Other	
Length of Well.		17 1 2		Decomani	mation.	rie Steam Cleaneu	Other Other	
WELL PURGING	}						1.1	
Date: Orla	10/10		Pagin Time:	0945	AD/PM	Duraina Carrianna	Peristalhic	
Date:	حااله		Begin Time:		WW/PIVI	Purging Equipment:		
			End Time:	1945	AM/PM	Decontamination:	Pre Steam Cleaned	DI Water Other
CALCULATION	OF 1 CASING	VOLUME					New Tubing	
29.72 H					Yield:	(HIGH) LOW		
2.74 #		of water (before	purge start)		If low, recovery tin			
26.98 ft	t =length	of water column					_	
-0		ersion factor (2" w			Actual volume pu	urged 4.3	gallons	
4.3		ing volume	VCII) 0. 10		Actual purge flow		ml/mip or	
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Jai 1 Cas			<u>.</u>	1		L/min	
Notes _	Nearl	1 stabilit	red @ 1010		tw bidij	y increased.		
1 -		sample	7 hour	from beg	inning of	proge / Afte	r	
- 1	10 Rea	dungs.						
Time	Volume	Depth to	pH	Conductivity	Turbidity	D.O.	Temp	ORP
Time	(gallons)	Water	(SU)	(mS/cm)	(NTU)	(mg/L)	(°C)	J ON
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(Feet)						
Mark	0.8	<0.33'	7.55	+-3%	+-10%	+/- 10% 3 . 9.4	+/- 5%	+/- 10 mV
Start: /000	10.0	2.95		0.472	10.4	1	9.9	-116.6
1695	1.1	2.95	7.59	0.46+	9.805	3.55	9.9	-116.4
1010	1.4	2.95	7.57	0.464	7.1+	3.48		7136.4
1015	1. 1	7.75	7.56	Ф·477	11.5	3.84	9.8	-196.0
10/20	2.4	6.95	7:57	0.466	10-1	3.87	9.8	-154.7
1025	2.7	2.95	7.54	8.489	14.1	3.88	9.9	-154.1
1034		2.95	7.58	6.458	24.2		10.0	-186.0
1435	3.0	2.95	7.56	6.466	12.7	3.88	10.0	-164.8
1940	3.3	7.95	7.55	6.474	42.6	3.86	145.0	-161.6
1945	3.7	2.95	7.55	6.482	81.5	3.80	10-0	-163.5
Final: 1045 SAMPLE COLLI		295	7.55	B.482	81-5	3.80	10-4	-143.5
Date: 7/24		Time: 104	5 AMYPN	l Method	Perista/h	'c		
							National Control	
Appearance of S	Sample:	Clear		. Actual Sar	mple Flow Rate:	3¢¢ ml/m	n or	
SAMPLE BOTTI	I E COLLECT	FD:	2-250M	J		Dilli		
SAIVIFLE BOTTL	LL COLLECT							
SAMPLING PER								1
Name K.6	icholt	7		Company:		AECOM		

Low Flow Ground Water Sample Collection Record

Well ID: CG-MWDQ4-400

Client: DEQ Location: Grayling, MI Project #: 60563469

INSPECTION					-		0 11-	
Label on well?			is cap locked?			RES BOLTS NO		
Is reference mark	visible?	YES	NO	Standing water present?			YES (NO)	
Condition of well					Any indication of surface runoff in well?			
Weather		Charcas	110	Air Temperature:			52°F	
Notes:			7		7 III Tomporatare.			_
							- -	
							_ -	
							_	
STATIC WATER	LEVEL DOI	OP TO BURGING						
1 116		101	1 I					
	110	7 7 4	AM/PM	Managed		Electronic Tape	Challe 9 Charl Tana	
Depth to Water:		29 95		Measured			Chalk & Steel Tape Of Water Other	
Length of Well:		54.03		Decontam	iination:	Pre Steam Cleaned	Of Water Other	
WELL PURGING							1 11	
9/	210/12	D ,	Design Times	0855	ANDM.	Duraina Equipment	Revistalti	
Date:	call.		Begin Time:	day	AM/PM	Purging Equipment:	100.319(1)[
			End Time:	9749	AMAPM	Decontamination:	Pre Steam Cleaned	DI Water Other
CALCULATION (OF 1 CASING	G VOLUMF					New Tubing	
39.85 ft		of well			Yield:	HIGH LOW		
2.74 ft		of water (before	purge start)		If low, recovery t	- 114		
37.11 ft		h of water column					<u> </u>	
3/61 / "		ersion factor (2" v			Actual volume p	2. Ø	gallons	
5.9 G			veii) 0.16			2-4	gallons gallons or	
5. 1 6	Sal. =1 cas	ing volume			Actual purge flow	wrate <u>55</u>	L/min	
Notes _		-						
<u> </u>					**			
_								
T	1 1/-1	Double to	1 -11 1	Candinatinit	To substation a	D.O.	T	ORP
Time	Volume (gallons)	Depth to Water	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	(mg/L)	Temp (°C)	OKF
	(30)	(Feet)						
do		<0.33'	+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
Start: 0920	0.5	2.95	7.31	Ø.337	1.00	9.92	10.0	+118.9
0925	0.8	2.95	7.32	Ø.334	Ø.106	9.70	9.9	+96.9
Ø93Ø	1.1.	2.95	7.32	0.335	1.67	9.58	9,9	+70.9
0935	1.4	2.95	7.34	0.339	0.91	9.23	10.1	+62.5
Ø948	1.7	2.95	7.35	Ø.34d	(D91	9.22	19.2	+53.1
					ļ	<u>_</u>		
		1		•	1			
							-	
	ļ				-		W. C.	-
	L			40	4		162	1.55
Final: 144	1.7	2.95	7.35	Ø.34 Ø	0.91	11 9.22	10.2	+53.1
	1/18	Time:	AM/PM	Method	Penie.	faltic		
Date. 1/2	VII O		ANTI PIVI					
Appearance of S	ample:	clear		Actual Sa	mple Flow Rate:	350 01/11	or	
	E 00: : E ==	ren.	2-21	Dut		/ L/min		
SAMPLE BOTTL	LE COLLECT	IED:	L- U	DML 1choltz				
SAMPLING PER	RSONNEL		11 1	a loal by				***************************************
14	a H	784	N 4.6	1CVIOI1 &		AECOM		
Name:		U	$\overline{}$	Company	3	AECOM		

Low Flow Ground Water Sample Collection Record

Well ID: C(5 - MH065 -12.0

INSPECTION								
Label on well?		(E)	NO		Is cap locked?		(ES) NO	
Is reference mark visible?					Standing water present?			
Condition of well				Standing water present? Any indication of surface runoff in well?				
Weather				•	Air Temperature		YES PO YES W	
Notes:		0,000	1	•	All Temperature	•		_
Notes:					-		_	
						<u> </u>	_	
STATIC WATER	LEVEL PRIC			m65				
Date: 09 25	118	Time: 102	L& AM/PA	1				
Depth to Water:		3.63		Measured	with:	Electronic Tape	Chalk & Steel Tape	
Length of Well:	11 1-			Decontamination:		Pre Steam Cleaned	Deveter Othe	
WELL PURGING	j							
Date: 09 26	12		Begin Time:	0950	AM/PM	Purging Equipment	Perstilling Prip	
Date.	110			1030		r diging Equipment.		
			End Time:	10 30	AM/PM	Decontamination:	Pre Steam Cleaned New Tubing	DI Water Other
CALCULATION (N CONTURNING			Viald-	(101)		
2 62					Yield:	(HIGH) LOW		
		of water (before		-	If low, recovery t	ime:	_	
fi		of water column				-		
		ersion factor (2"	well) 0.16	-	Actual volume p	2.4	_ gallons	
	Gal. =1 cas	ing volume			Actual purge flow	w rate	ml/min or	
Notes							L/min	
						,		
_			200					
Time	Volume	Depth to	pH	Conductivity	Turbidity	D.O.	Temp	ORP
	(gallons)	Water	(SU)	(mS/cm)	(NTU)	(mg/L)	(°C)	8.5 %
		(Feet)	1/ 04	1 30/	+ 100/	1/ 100/		+/ 40
Start: 1000	4.0	<0.33'	+/- 0.1	0.560	+-10%	+/- 10% 5.50	+/- 5%	+/- 10 mV
			7.10	0.554	1,43	5.73		1.04
7001	4.3	3.82	7.37				11 26	164
1010	4.7	3.82	7.49	0.556	1.77	5.67	11.25	
1015	5.0	3-82	7.62	0-552	1.29	5.72	11.31	-6.2
1020	5.3	3.82	7.72	0-22)	171	5.60	11.33	-14.5
1025	5.5	3.82	7.76	0.348	1.32	5.53	11.30	-15.2
								-
Final:						36		
SAMPLE COLLI		1.0			Pc. stothe	0		
Date: 0 9 26	118	Time: 103	AM/PN	Method	LG. 12 mg	dr.		
Appearance of S	Sample:	Teo		Actual Sa	mple Flow Rate:	Im/mim UOE	n or	
med necessary			2==	-	negues y made literation	L/min	10 mm	
SAMPLE BOTTI	LE COLLECT	ED: <u>3</u>	250 ml	- payila	_			
SAMPLING PER		1			1 100 4 100	-		
Name: V	lich1	losci.		Company	,	AECOM		
	_						· · · · · · · · · · · · · · · · · · ·	

Low Flow Ground Water Sample Collection Record

Well ID: CG-MW005,25.0

Label on well?							(ES) NO	
Label Oil Well?	pel on well? YES NO				Is cap locked?			
Is reference mark	reference mark visible? (YES) NO				Standing water present?			
Condition of well				-	Any indication of surface runoff in well?			
Weather		Rainy		_	Air Temperature	: :	50°	_
Notes:							_	
							_	
	-						_	
	-							
STATIC WATER								-
Date: 04 25	118	Time: 103		<u>M</u>				
Depth to Water:		3.60		Measure	d with:	Etectronic Tape	Chalk & Steel Tape	
Length of Well:		24.70		Decontar	mination:	Pre Steam Cleaned	Other Other	г
WELL PURGING	3							
Date: Galas	elia		Danin Time:	1035	ANAIDNA	Duraina Fautiamenti	Penstellic Pun	
Date:	91,0		_Begin Time:		AM/PM	Purging Equipment:		
1			End Time:	1130	AM/PM	Decontamination:	Pre-Steam Cleaned	DI Water Other
CALCULATION (OF 1 CASING	VOLUME					New Tubing	
24.70A					Yield:	(FIGH) LOW	1	
3.60 ft		of water (before	purge start)		If low, recovery	$\overline{}$		
ft				-	,		45649111100011000	
"		of water column			A street restrees			
		rsion factor (2"	well) 0.16	-	Actual volume p	2)	gallons	
——·	Gal. =1 casi	ng volume			Actual purge flo	w rate	ml/min or L/min	
Notes								
_								
_								
Time	Volume	Depth to	рН	Conductivity	Turbidity	D.O.	Temp	ORP
_	Volume (gallons)	Water	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	D.O. (mg/L)	Temp (°C)	ORP
_		Water (Feet)	(SU)	720				ORP +/- 10 mV
Time	(gallons)	Water (Feet) <0.33'	(SU) +/- 0.1	(mS/cm) +-3%	(NTU)	(mg/L) +/- 10%	(°C) +/- 5%	+/- 10 mV
Time	(gallons)	Water (Feet) <0.33'	(SU) +/- 0.1 7.03	(mS/cm) +-3% O- 323	(NTU) +-10%	(mg/L) +/- 10% 5 . 6 J	(°C) +/- 5%	+/- 10 mV
Time Start: \050	(gallons)	Water (Feet) <0.33' 3.72	(SU) +/- 0.1 7.03 7.16	(mS/cm) +-3% O- 323 O- 322	(NTU) +-10% O. (9	(mg/L) +/- 10% 5 . 6 1 5 . 6 0	(°C) +/- 5% 	+/- 10 mV 73. Y 93.6
Start: 1050	(gallons) 3.7 3.0 3.3	Water (Feet) <0.33' 3.72 3.72	(su) +/- 0.1 7.03 7.16 7.35	(mS/cm) +-3% O- 323 O- 322 O- 322	(NTU) +-10% O. [9 O. 38 O. 17	(mg/L) +/- 10% 5 . 6 1 5 . 6 0	(°C) +/- 5% 9 - 0 1 8 - 9 7 8 - 8 4	+1- 10 mV 93.4 93.6 91.4
Start: \050 \055 \100	(gallons) 3.7 3.0 3.3 3.6	Water (Feet) <0.33' 3.72 3.72 3.72 3.72	(SU) +/- 0.1 7.03 7.16 7.35 7.56	(mS/cm) +-3% O-323 O-322 O-322 O-322	(NTU) +-10% O. [9] O. 38 O. 17 O. 15	(mg/L) +/- 10% 5 . 6 1 5 . 6 0 5 . 5 7 5 . 5 8	(°C) +/- 5% 	+/- 10 mV 93. 4 93. 6 91. 4 60.9
Start: \050 \055 \100 \105 \110	(gallons) 3.7 3.0 3.3 3.6 3.6	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.72	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64	(mS/cm) +-3% O-323 O-322 O-322 O-322 O-322	0.17 0.17 0.17 0.15	(mg/L) +/- 10% 5 . 61 5 . 60 5 . 57 5 . 58	(°C) +/- 5% 	+/- 10 mV 93.4 93.6 91.4 60.9 41.3
Start: 1050 1055 1100 1105 1110	(gallons) 2.7 3.0 3.3 3.6 3.6 4.2	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.72 3.72 3.73	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64	(mS/cm) +-3% 0-323 0-322 0-322 0-322 0-322	(NTU) +-10% O. [9 O. 38 O. 17 O. 15 O. 15	(mg/L) +/- 10% 5 . 61 5 . 60 5 . 57 5 . 58	(°C) +/- 5% (1.01 8.97 8.84 8.93 8.79	+/- 10 mV 93.4 93.6 91.4 60.9 41.3
Start: 1050 1055 1100 1105 1115	(gallons) 2.7 3.0 3.3 3.6 3.6 4.2 4.4	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.72 3.73 3.75	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64 7.74 7.74	(mS/cm) +-3% O-323 O-322 O-322 O-322 O-322 O-321 O-321	(NTU) +-10% O. [9 O. 38 O. 17 O. 15 O. 15	(mg/L) +/- 10% 5.61 5.60 5.57 5.58 5.58	(°C) +/- 5% (°C) 1 5% (°C) 8 97 8-97 8-94 8-79 8-79	+/- 10 mV 93.4 93.6 91.4 60.9 41.3 -6.1
Start: 1050 1055 1100 1105 1110	(gallons) 2.7 3.0 3.3 3.6 3.6 4.2	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.72 3.72 3.73	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64	(mS/cm) +-3% 0-323 0-322 0-322 0-322 0-322	0.17 0.17 0.17 0.15	(mg/L) +/- 10% 5 . 61 5 . 60 5 . 57 5 . 58	(°C) +/- 5% (1.01 8.97 8.84 8.93 8.79	+/- 10 mV 93.4 93.6 91.4 60.9 41.3
Start: 1050 1055 1100 1105 1115	(gallons) 2.7 3.0 3.3 3.6 3.6 4.2 4.4	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.72 3.73 3.75	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64 7.74 7.74	(mS/cm) +-3% O-323 O-322 O-322 O-322 O-322 O-321 O-321	(NTU) +-10% O. [9 O. 38 O. 17 O. 15 O. 15	(mg/L) +/- 10% 5.61 5.60 5.57 5.58 5.58	(°C) +/- 5% (°C) 1 5% (°C) 8 97 8-97 8-94 8-79 8-79	+/- 10 mV 93.4 93.6 91.4 60.9 41.3 -6.1
Start: 1050 1055 1100 1105 1110 1115 1120	(gallons) 2.7 3.0 3.3 3.6 3.6 4.2 4.4	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.72 3.73 3.75	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64 7.74 7.74	(mS/cm) +-3% O-323 O-322 O-322 O-322 O-322 O-321 O-321	(NTU) +-10% O. [9 O. 38 O. 17 O. 15 O. 15	(mg/L) +/- 10% 5.61 5.60 5.57 5.58 5.58	(°C) +/- 5% (°C) 1 5% (°C) 8 97 8-97 8-94 8-79 8-79	+/- 10 mV 93.4 93.6 91.4 60.9 41.3 -6.1
Start: 050 1055 100 110 110 115 125	(gallons) 3.7 3.0 3.3 3.6 3.6 4.2 4.9	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.72 3.73 3.75	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64 7.74 7.74	(mS/cm) +-3% O-323 O-322 O-322 O-322 O-322 O-321 O-321	(NTU) +-10% O. [9 O. 38 O. 17 O. 15 O. 15	(mg/L) +/- 10% 5.61 5.60 5.57 5.58 5.58	(°C) +/- 5% (°C) 1 5% (°C) 8 97 8-97 8-94 8-79 8-79	+/- 10 mV 93.4 93.6 91.4 60.9 41.3 -6.1
Start: 050 1055 1100 1115 1125 1125 Final: SAMPLE COLLE	(gallons) 3.7 3.0 3.3 3.6 3.6 4.2 4.9	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.74 3.75 3.75	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64 7.74 7.79 7.85	(mS/cm) +-3% 0-323 0-322 0-322 0-322 0-321 0-321 0-321 0-321	(NTU) +-10% O. 19 O. 38 O. 17 O. 15 O. 15 O. 11 O. 13 O. 20	(mg/L) +/- 10% 5.61 5.60 5.57 5.58 5.76 5.76 5.76	(°C) +/- 5% (°C) 1 5% (°C) 8 97 8-97 8-94 8-79 8-79	+/- 10 mV 93.4 93.6 91.4 60.9 41.3 -6.1
Start: 050 1055 100 110 110 115 125	(gallons) 2.7 3.0 3.3 3.6 3.6 4.2 4.9 4.9	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.72 3.72 3.72 3.75 3.75	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64 7.74 7.79 7.85	(mS/cm) +-3% 0-323 0-322 0-322 0-322 0-321 0-321 0-321 0-321	(NTU) +-10% O. [9 O. 38 O. 17 O. 15 O. 15	(mg/L) +/- 10% 5.61 5.60 5.57 5.58 5.76 5.76 5.58	(°C) +/- 5% (°C) 1 5% (°C) 8 97 8-97 8-94 8-79 8-79	+/- 10 mV 93.4 93.6 91.4 60.9 41.3 -6.1
Start: 050 1055 1100 1115 1125 1125 Final: SAMPLE COLLE	(gallons) 3.7 3.0 3.3 3.6 3.6 4.2 4.4 4.9	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.74 3.75 3.75	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64 7.74 7.79 7.85	(mS/cm) +-3% 0-323 0-322 0-322 0-322 0-321 0-321 0-321 0-321	(NTU) +-10% O. 19 O. 38 O. 17 O. 15 O. 15 O. 11 O. 13 O. 20	(mg/L) +/-10% 5.61 5.60 5.57 5.58 5.58 5.56 5.58 5.59	(°C) +/-5% 	+/- 10 mV 93.4 93.6 91.4 60.9 41.3 -6.1
Start: 050 1055 1100 1115 1125	(gallons) 3.7 3.0 3.3 3.6 3.6 4.2 4.9 4.9 6.6 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.72 3.72 3.75 3.76	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64 7.74 7.74 7.79 7.85	(mS/cm) +-3% 0-323 0-322 0-322 0-322 0-321 0-321 0-322 0-321 0-322	(NTU) +-10% O. 19 O. 38 O. 17 O. 15 O. 15 O. 11 O. 13 O. 20 Penst-Hic	(mg/L) +/- 10% 5.61 5.60 5.57 5.58 5.76 5.76 5.58	(°C) +/-5% 	+/- 10 mV 93.4 93.6 91.4 60.9 41.3 -6.1
Start: 1050 1055 1100 1105 1115 1120 1125 Final: SAMPLE COLLEDate: Us 26	(gallons) 3.7 3.0 3.3 3.6 3.6 4.2 4.9 4.9 6.6 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7 6.7	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.72 3.72 3.75 3.76	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64 7.74 7.79 7.85	(mS/cm) +-3% 0-323 0-322 0-322 0-322 0-321 0-321 0-322 0-321 0-322	(NTU) +-10% O. 19 O. 38 O. 17 O. 15 O. 15 O. 11 O. 13 O. 20 Penst-Hic	(mg/L) +/-10% 5.61 5.60 5.57 5.58 5.58 5.56 5.58 5.59	(°C) +/-5% 	+/- 10 mV 93.4 93.6 91.4 60.9 41.3 -6.1
Start: 050 1055 1100 1115 1125	(gallons) 2.7 3.0 3.3 3.6 3.6 4.2 4.4 4.9 4.9 ECTION Sample:	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.72 3.72 3.75 3.76	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64 7.74 7.74 7.79 7.85	(mS/cm) +-3% 0-323 0-322 0-322 0-322 0-321 0-321 0-322 0-321 0-322	(NTU) +-10% O. 19 O. 38 O. 17 O. 15 O. 15 O. 11 O. 13 O. 20 Penst-Hic	(mg/L) +/-10% 5.61 5.60 5.57 5.58 5.58 5.56 5.58 5.59	(°C) +/-5% 	+/- 10 mV 93.4 93.6 91.4 60.9 41.3 -6.1
Start: 1050 1055 1100 1105 1110 1115 1120 1125 Final: SAMPLE COLLE Date: US 26 Appearance of S SAMPLE BOTTL SAMPLING PER	(gallons) 2.7 3.0 3.3 3.6 3.6 4.2 4.4 4.9 4.9 ECTION Sample:	Water (Feet) <0.33' 3.72 3.72 3.72 3.72 3.72 3.72 3.75 3.75 3.76	(SU) +/-0.1 7.03 7.16 7.35 7.56 7.64 7.74 7.74 7.79 7.85	(mS/cm) +-3% 0-323 0-322 0-322 0-322 0-321 0-321 0-322 0-321 0-322	(NTU) +-10% O. 19 O. 38 O. 17 O. 15 O. 15 O. 11 O. 13 O. 20 Penstaltic ample Flow Rate:	(mg/L) +/-10% 5.61 5.60 5.57 5.58 5.58 5.56 5.58 5.59	(°C) +/-5% 	+/- 10 mV 93.4 93.6 91.4 60.9 41.3 -6.1

Low Flow Ground Water Sample Collection Record

Well ID: CG-MLOOS-45,0

INSPECTION							0	
abel on well? s reference mark visible? Condition of well NO NO		Is cap locked? Standing water present?			(YES) NO			
					YES W			
		-	Any indication of surface runoff in well?					
Weather		Rain		-	Air Temperatur	e:	50	_
Notes:							<u> </u>	
							_	
		-					-	
	-		***	is the				
STATIC WATER							7	
Date: 09 25	118	Time: 1037	AM/PN	1				
Depth to Water:	1			Measure	d with:	Electronic Tape	Chalk & Steel Tape	
Length of Well:				Decontai	mination:	Pre Steam Cleaned	Q Water Other	
WELL PURGING			****					
Oala				Illia			Penstallic Purp	
Date:	.01'0		Begin Time:	1140	AM/PM	Purging Equipment:	renstatic rup	
*			End Time:	1215	AM/PM	Decontamination:	Pre Steam Cleaned	DI Water Other
CALCULATION C	F 1 CASING	VOLUME					New Tubing	
42.81 ft.					Yield:	HIGH) LOW		
2.92 ft.		of water (before j	purge start)	_	If low, recovery			
ft.		of water column	A	-	, ,		Manual .	
	80m = 2 0	rsion factor (2" w			Actual volume	purged 5.2	gallons	
G	-	ng volume		-	Actual purge flo	0	gallons gallons	
					, iotali parga iii		L/min	
Notes						-		
_								
-								
Time	Volume	Depth to	pН	Conductivity	Turbidity	D.O.	Temp	ORP
	(gallons)	Water	(SU)	(mS/cm)	(NTU)	(mg/L)	(°C)	
		(Feet) <0.33'	+/- 0.1	+-3%	+-10%	+/- 10%	+/- 5%	+/- 10 mV
Starf: \\55	9.0	3.00	8.11	0.302	33.2	1.75	8.83	8.08
1200	4.4	3.00	3.24	0.304	8.83	1.41	9.80	-96.3
1205	8.1	3.02	8.23	0-298	6.60	(di	8,70	-84.9
1910	5.2	3.02	8,13	0.300	5.86	1,40	3F.8	-78 A
/~10	0.2		ر ۱۰۰۰	0.500	3.40	1,70	U TO	10,1
		- 1	192					Secret St.
					g 8 5apr 1	-		
Final:								
SAMPLE COLLE	CTION	LOUT			0	n		
Date: 09 26	18	Time: 1215	AM/PN	Method	Penshltic	Purp		
Appearance of Sa	ample: (1/e-		Actual S	ample Flow Rate:	306 ml/mi	n or	
	The state of the s		`		Property of the second	L/min		
SAMPLE BOTTL	E COLLECTI	≣D: <u>⊿</u>	250 NL 1	2dHv	_			
SAMPLING PER	SONNEL							
CALIFORNIA SECTION OF SECURITION OF SECURITI	hal Kusa			-				
Name: Mic	11.020	• 5		_ Compan	y:	AECOM	***	

Appendix D – Waste Manifest

Appendix E – Laboratory Analytical Results