

To: Rex Vaughn, Chairman
Cedar Lake Improvement Board

Date: March 23, 2022

From: Mark Kieser, Kieser & Associates

cc: Doug Pullman, Aquest

RE: Cedar Lake Sediment Chemistry Assessment

Background & Purpose

Kieser & Associates (K&A) was retained by the Cedar Lake Improvement Board (CLIB) to conduct sampling of surficial lake bottom sediments in select locations in Cedar Lake. Laboratory analysis of samples was to include Michigan-10 metals, polynuclear aromatic hydrocarbons (PAHs), and PFAS compounds. K&A also conducted additional field assessments including sediment thickness and compression mirroring K&A's May 2019 assessment. This included visual descriptions and measures of a manual-push sediment core tube at each of eight (8) sampling stations. Sampling stations were chosen to reflect more-shoreward areas of the lake bottom regions assessed during the 2019 effort. The purpose of this overall sampling and assessment effort was to initially identify any pollutant factors or sediment characteristics which would limit potential future dredging efforts or increase costs associated with contaminated sediment disposal.

Section 1 of this Technical Memorandum describes the sediment sampling and assessment locations and methods. Section 2 provides the field assessment data and characterizes sediments based on field collection efforts. Section 3 provides analytical methods and results with comparison of lab results Michigan EGLE screening guidelines for dredging projects. Section 4 discusses the results and implications sampling results which Section 5 identifies K&A recommendations and next steps if some form of dredging was pursued. Attachment A provides the laboratory analytical reports.

1.0. Sediment Sampling & Assessment

1.1. Sampling Locations

Figure 1 maps the Cedar Lake sediment sampling and assessment locations from 8/25/21.



Figure 1. Cedar Lake sediment sampling and assessment locations, 8/25/21.

1.2. Sampling & Assessment Methods

1.1. Sediment Compression & Thickness Assessment Methods

The methods used in this assessment are summarized as follows.

A. Water depth (Sonar): Measured using a Lowrance Elite-7ti sonar depth finder unit with an HDI 83/200kHz transducer.

B. Manual water depth: Measured by gently lowering a Secchi disk to the lake bottom and recording the depth from the water surface. The purpose of this assessment is to confirm the sonar depth reading at the specific location used to assess the amount of loose, flocculent sediment on the lake bottom under the following methods.

C. Sediment compression: Measured by lowering a 5-lb conical steel weight to 1 ft above the lake bottom, then allowing the tool to free-fall, thereby compressing the organic sediment, and recording the depth from the water surface to compute penetration in relation to the sediment surface. The purpose of this assessment is to understand how the top layer of organic muck sediment responds to the force of compression, a valuable metric for assessing the feasibility of certain management options. Anecdotally, this method provides some insight as to the question: “If someone stepped onto the lake bottom here, how far down might they sink into the muck?”

D. Sediment thickness: Measured by penetrating the lake bottom with a thin, metered aluminum rod of 12-ft length until it reached the “hard pan” below the organic sediment layer and recording the depth from the water surface. The purpose of this assessment is to understand the total thickness of organic sediment accumulation above a more impenetrable sand or clay till layer reflective of a glacial hard pan. This method is important for any future calculations of sediment volumes in Cedar Lake and for determining the feasibility and potential need for future sediment management strategies.

1.2. Sediment Core Collection Method

Sediment cores were collected by manually pushing a 2-inch diameter clear plastic core tube of 12-ft length into the lake bottom sediment until a semi-solid plug was felt, or as far as considered safely possible to ensure intact extraction of core tube contents. The exposed end of the tube was capped and the core was slowly raised from the water. Care was taken in this process to retain any sediment layering within the tube. Core tubes were photographed and any visually apparent layering of sediments was measured, described, and recorded.

1.3. Sediment Grab Sampling Methods

Sediment grab sampling involves collecting a discrete grab sample of a top layer of sediment using a Petite Ponar dredge slowly lowered into the top layer of sediment and quickly snapped closed. For this sampling effort, each sample grab collected a 6-inch vertical layer of sediment, with the top of the sampler positioned at 3-6 inches below the top-most flocculent layer of lake bottom sediment as estimated through visual assessment of the manual sediment core. The Ponar dredge was thoroughly decontaminated with deionized water and Liquinox non-phosphate soap and a natural-fiber brush between sampling sites.

2.0. Sediment Characterization

This section provides tables and graphs illustrating the Cedar Lake sediment assessment field data collected by K&A on 8-25-21. Appendix B contains photographs of each sediment core tube and sediment grab sample assessed. Table 1 provides the sediment compression and sediment total thickness averages for the 8-25-21 sampling event at S1-S8. These data are graphed in Figure 2.

Table 1. Sediment compression and total thickness site averages and water depth.

Site ID	Water Depth (ft)	AVG Sediment Compression (ft)	AVG Sediment Thickness (ft)
S1	1.9	1.5	7.8
S2	2.1	1.2	8.5
S3	3.6	1.4	6.3
S4	4.8	1.8	>7.2
S5	2.5	2.5	6.4
S6	3.0	1.4	8.6
S7	2.4	2.2	9.5
S8	2.1	1.2	8.4

Three distinct layers were identified within each manual sediment core collected at each station: a loose flocculent layer (top of sediment), an unconsolidated sediment layer below the flocculent surface layer, and a consolidated layer which formed the sediment core tube “plug.” An in-tact core tube could not be retrieved at S3 due to the uniformly unconsolidated nature of the second and third sediment layer. Table 2 provides the measurement core layer measurements for each manual core observed. These data are graphed for comparison to sediment compression and thickness measurements in Figure 2.

Table 2. Sediment core tube measurements of visible sediment layers.

Site ID	Water Depth (ft)	Total Length of Sediment Retrieved in Core Tube (ft)	Flocculent Layer Thickness (ft)	Unconsolidated Sediment Layer Thickness below Flocculence (ft)	Consolidated "Plug" Layer below Loose Sed (ft)
S1	1.9	3.08	0.33	2.00	0.75
S2	2.1	1.91	0.33	0.58	1.00
S3	3.6	--	--	--	--
S4	4.8	1.74	0.50	0.58	0.66
S5	2.5	1.91	0.25	0.66	1.00
S6	3.0	2.17	0.25	0.75	1.17
S7	2.4	2.84	0.42	1.50	0.92
S8	2.1	2.34	0.67	0.67	1.00

Table 3 provides descriptions of sediment grab samples at each sampling site. The sediment grab sample approximate depths are also graphed in Figure 2.

Site ID	Water Depth (ft)	Sediment Grab Sample Approximate Depth Range Below Water Surface (ft)	Sediment Grab Sample Description
S1	1.9	2.2 – 2.7	Viscous, lumpy, sandy, grey/brown, some organic matter (OM), moderate organic smell
S2	2.1	2.5 – 3.0	Loose, smooth, grey/tan, sandy, minor OM, dark brown flecks, moderate organic smell
S3	3.6	4.0 – 4.5	Loose, smooth, fine sand, no coagulation, grey/brown, minor OM, strong organic odor
S4	4.8	5.2 – 5.7	Viscous, loose, gelatinous globs, grey brown w/ green/tan mottling, some OM, strong organic smell
S5	2.5	2.9 – 3.4	Loose, sandy, gelatinous solids, brown grey, some OM, minor smell
S6	3.0	3.6 – 4.1	Very loose, sandy, grey/tan, mostly smooth, minor OM, moderate organic odor
S7	2.4	2.8 – 3.3	Loose with gelatinous layer, viscous, plant and algal OM bits, dark brown/grey, mild organic smell
S8	2.1	2.4 – 2.9	Very fine sand, very loose, smooth uniform, brown/tan, some OM, minor odor

Figure 2 shows how the measured sediment compression and total thickness compare to the approximate measurements of sediment layering based on visual observations of the sediment core tubes. Sediment grab samples at all sites were collected within the measured compressed layer and the corresponding unconsolidated top layer as measured in the core tube. The exception is S8, collected within the compressible layer and the corresponding flocculent layer as measured in the core tube.

As mentioned previously, an in-tact core could not be collected at S3 due to the uniformly unconsolidated nature of the sediment. At S2, S6, S7, and S8, the sediment compression layer related closely (within 0.4-ft) to the sum of the flocculent and unconsolidated top layer of sediments as measured within the core tube. At S1, S4, and S5, measurement of these layers differed considerably. At S1, the unconsolidated core tube layer was identified as well below the compression layer, while at S4 and S5, the unconsolidated core tube layer was identified as transitioning to a consolidated layer well-within the compression layer. At S4, sediment total thickness from the water’s surface was measured as greater than the total length of the measuring device (12-ft), represented by an orange arrow in Figure 2.

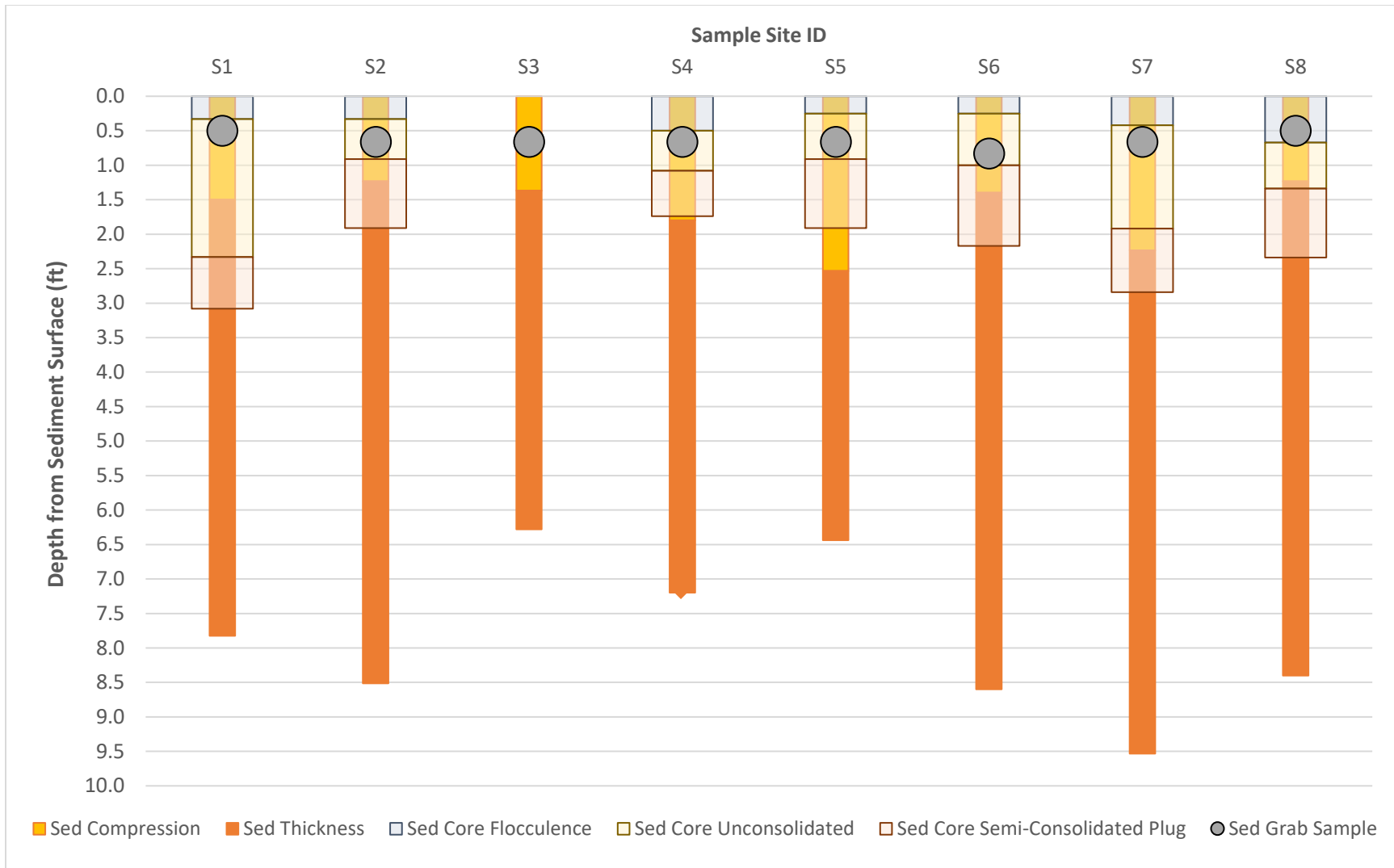


Figure 2. Cedar Lake sediment compression and total thickness overlaid with measured visual assessment of sediment core layers and approximate sediment grab sample depth.

3.0. Analytical Results

3.1. Analytical Methods

Analytical laboratory parameters were analyzed by Merit Laboratory, of Lansing, MI. Table 3 provides details for the laboratory analytical parameters.

Table 3. Analytical parameters, parameter type, units, and analytical laboratory reporting limits and methods for the 2020 Asylum Lake stormwater monitoring program.

Analytical Parameter	Analytical Laboratory	Unit	Analytical Method
MI-10-Metals	Merit	mg/kg	SW6020A (Metals) SW3050B (Metals Digestion) SW7471B (Mercury & Digestion)
Polyaromatic Hydrocarbons (PAHs)	Merit	µg/kg	SW8270D
PFAS	Merit	ng/kg	ASTM D7968-17M
Total Solids	Merit	%	SM2540B

3.2. Analytical Results

Tables 4, 5, and 6 provide the analytical laboratory results for MI-10-Metals, PAHs, and PFAS compounds, respectively. Each table also provides the total percent solids for each sample set. Tables 4 and 5 compare results to the MI EGLE 2018 Sediment Testing for Dredging Projects WRD-048 policy and procedure table providing aquatic life and wildlife screening guidelines.¹ For each table, any analyte detected above the WRD-048 screening guideline for that specific parameter is emboldened and highlighted in red. Analytes reported as below the laboratory analytical reporting limit, which have a less-than sign, but above the WRD-048 screening guideline, were reported at a relatively high detection limit due to their low percentage of total solids. These sample analytes were re-analyzed by Merit Laboratories as replicate samples using wet-weight analyses, at K&A's request, and the replicate wet-weight sample results for those analytes are included beneath the dry-weight results in the results tables below.

Analytical parameters for MI-10-Metals (Table 4), were the only analytes detected above the laboratory reporting limit for all sample sets. Two samples, S5 and S7, were found to be above the WRD-048 screening guideline for lead. All samples analyzed for selenium were found to be below the laboratory reporting limit but above the WRD-048 screening guideline for selenium, so a wet-weight replicate result is included.

All sediment samples for PAHs and PFAS were found to be below the analytical laboratory reporting limit, as shown in Tables 5 and 6. Several PAH sample results were below the reporting limit but above the WRD-048 screening guideline, so replicate wet-weight results are included for anthracene, benzo(a)anthracene, chrysene, fluorene, naphthalene, and phenanthrene.

¹ Michigan Department of Environmental Quality. (13 April 2018). "Subject: Sediment Testing for Dredging Projects." *Water Resources Division Policy and Procedure*. Number: WRD-048.

Table 4. Sediment sample results for MI-10-Metals, relative to EGLE Water Resource Division Policy and Procedure # WRD-048, Sediment Testing for Dredging Projects (data in units of mg/kg).

Sampling Location: Metals Analyte	Laboratory Reported Results								Aquatic Life and Wildlife Screening Guidelines ¹
	S1	S2	S3	S4	S5	S6	S7	S8	
Total Solids (%)	4.5	5.0	3.6	3.5	2.4	2.9	1.8	2.2	NA
Arsenic (Al)	6.87	4.90	10.7	8.69	13.4	7.05	12.1	4.94	33.00
Barium (Ba)	60.4	47.2	60.5	62.8	85.1	55.3	94.0	69.3	NA
Cadmium (Cd)	1.35	1.22	2.17	1.64	4.62	1.06	3.57	2.74	4.98
Chromium (Cr)	10.3	8.57	10.5	11.0	19.4	11.1	27.3	17.9	111.00
Copper (Cu)	33.0	22.0	46.6	27.8	65.0	27.1	65.8	42.2	149.00
Lead (Pb)	49.5	39.0	78.5	57.2	161	29.1	128	64.2	128.00
Mercury (Hg)	0.116	0.091	0.145	0.102	0.269	<0.100	0.323	0.209	1.06
Selenium (Se)	<5.0	<4.0	<6.0	<5.0	<8.0	<6.0	<11.0	<8.0	1.90
Selenium (<i>Wet-Weight Replicate</i>)	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	1.90
Silver (Ag)	<0.25	<0.20	<0.30	<0.25	<0.40	<0.30	<0.55	<0.40	NA
Zinc (Zn)	110	89.3	155	119	286	84.8	282	185	459.00

¹ Michigan Department of Environmental Quality. (13 April 2018). "Subject: Sediment Testing for Dredging Projects." *Water Resources Division Policy and Procedure*. Number: WRD-048. Page 8 of 9.

Table 5. Sediment sample results for PAHs, EGLE Water Resource Division Policy and Procedure # WRD-048, Sediment Testing for Dredging Projects (data in units of µg/kg).

Sampling Location: PAH Analyte	Laboratory Reported Results								Aquatic Life and Wildlife Screening Guidelines ¹
	S1	S2	S3	S4	S5	S6	S7	S8	
Total Solids (%)	4.5	5.0	3.6	3.5	2.4	2.9	1.8	2.2	NA
Acenaphthene	<500	<500	<700	<700	<1000	<800	<1400	<1100	NA
Acenaphthylene	<500	<500	<700	<700	<1000	<800	<1400	<1100	NA
Anthracene	<500	<500	<700	<700	<1000	<800	<1400	<1100	845
Anthracene (Wet-Weight Replicate)	<300	<300	<300	<300	<300	<300	<300	<300	845
Benzo(a)anthracene	<500	<500	<700	<700	<1000	<800	<1400	<1100	1,050
Benzo(a)anthracene (Wet-Weight Replicate)	<300	<300	<300	<300	<300	<300	<300	<300	1,050
Benzo(a)pyrene	<500	<500	<700	<700	<1000	<800	<1400	<1100	1,450
Benzo(b)fluoranthene	<500	<500	<700	<700	<1000	<800	<1400	<1100	NA
Benzo(k)fluoranthene	<500	<500	<700	<700	<1000	<800	<1400	<1100	NA
Benzo(ghi)perylene	<500	<500	<700	<700	<1000	<800	<1400	<1100	NA
Chrysene	<500	<500	<700	<700	<1000	<800	<1400	<1100	1,290
Chrysene (Wet-Weight Replicate)	<300	<300	<300	<300	<300	<300	<300	<300	1,290
Dibenzo(ah)anthracene	<500	<500	<700	<700	<1000	<800	<1400	<1100	NA
Fluoranthene	<500	<500	<700	<700	<1000	<800	<1400	<1100	2,230
Fluorene	<500	<500	<700	<700	<1000	<800	<1400	<1100	536
Fluorene (Wet-Weight Replicate)	<300	<300	<300	<300	<300	<300	<300	<300	536
Indeno(1,2,3-cd)pyrene	<500	<500	<700	<700	<1000	<800	<1400	<1100	NA
Naphthalene	<500	<500	<700	<700	<1000	<800	<1400	<1100	561
Naphthalene (Wet-Weight Replicate)	<300	<300	<300	<300	<300	<300	<300	<300	561
Phenanthrene	<500	<500	<700	<700	<1000	<800	<1400	<1100	1,170
Phenanthrene (Wet-Weight Replicate)	<300	<300	<300	<300	<300	<300	<300	<300	1,170
Pyrene	<500	<500	<700	<700	<1000	<800	<1400	<1100	1,520
2-Methylnaphthalene	<500	<500	<700	<700	<1000	<800	<1400	<1100	NA
1-Methylnaphthalene	<500	<500	<700	<700	<1000	<800	<1400	<1100	NA

¹Michigan Department of Environmental Quality. (13 April 2018). "Subject: Sediment Testing for Dredging Projects." *Water Resources Division Policy and Procedure*. Number: WRD-048. Page 8 of 9.

Table 6. Sediment sample results for PFAS (data in units of ng/kg).

Sampling Location: PFAS Parameter	Laboratory Reported Results							
	S1	S2	S3	S4	S5	S6	S7	S8
Total Solids (%)	7.4	6.6	5.2	5.6	4.8	5.0	4.5	4.6
PFBA	<630	<690	<1200	<780	<1200	<1300	<1700	<1100
PFPeA	<310	<340	<610	<390	<590	<640	<830	<550
4:2 FTSA	<310	<340	<610	<390	<590	<640	<830	<550
PFHxA	<310	<340	<610	<390	<590	<640	<830	<550
PFBS	<310	<340	<610	<390	<590	<640	<830	<550
PFHpA	<310	<340	<610	<390	<590	<640	<830	<550
PFPeS	<310	<340	<610	<390	<590	<640	<830	<550
6:2 FTSA	<310	<340	<610	<390	<590	<640	<830	<550
PFOA	<310	<340	<610	<390	<590	<640	<830	<550
PFHxS	<310	<340	<610	<390	<590	<640	<830	<550
PFHxS-LN	<310	<340	<610	<390	<590	<640	<830	<550
PFHxS-BR	<310	<340	<610	<390	<590	<640	<830	<550
PFNA	<310	<340	<610	<390	<590	<640	<830	<550
8:2 FTSA	<310	<340	<610	<390	<590	<640	<830	<550
PFHpS	<310	<340	<610	<390	<590	<640	<830	<550
PFDA	<310	<340	<610	<390	<590	<640	<830	<550
N-MeFOSAA	<310	<340	<610	<390	<590	<640	<830	<550
EtFOSAA	<310	<340	<610	<390	<590	<640	<830	<550
PFOS	<310	<340	<610	<390	<590	<640	<830	<550
PFOS-LN	<310	<340	<610	<390	<590	<640	<830	<550
PFOS-BR	<310	<340	<610	<390	<590	<640	<830	<550
PFUnDA	<310	<340	<610	<390	<590	<640	<830	<550
PFNS	<310	<340	<610	<390	<590	<640	<830	<550
PFDoDA	<310	<340	<610	<390	<590	<640	<830	<550
PFDS	<310	<340	<610	<390	<590	<640	<830	<550
PFTTrDA	<310	<340	<610	<390	<590	<640	<830	<550
FOSA	<310	<340	<610	<390	<590	<640	<830	<550
PFTeDA	<310	<340	<610	<390	<590	<640	<830	<550
11Cl-PF3OUdS	<310	<340	<610	<390	<590	<640	<830	<550
9Cl-PF3ONS	<310	<340	<610	<390	<590	<640	<830	<550
ADONA	<310	<340	<610	<390	<590	<640	<830	<550
HFPO-DA	<310	<340	<610	<390	<590	<640	<830	<550

4.0. Discussion

Based on sediment testing results, lead samples from S5 and S7 (Table 4) are at or above EGLE's Aquatic Life and Wildlife Screening Guidelines. This suggests that 25% of sediment that might be targeted for a lake-wide dredging effort could require special handling and disposal restrictions. In the previous 2019 K&A Technical Memorandum that examined potential quantities of dredged sediments, K&A denoted that average, low-cost dredging operations where there is no sediment contamination may cost about \$1/cubic yard.² If there were ample land disposal opportunities adjacent to the lake, and sediments required no special handling, K&A forecasted a most generous cost estimate of \$0.50/cubic yard.

For Cedar Lake, dredge quantities to deepen the lake by approximately 5 feet would yield an estimated 6.5 million cubic yards of dredge spoils. At best-case costs, such a project could range from \$3.25-6.5M. Costs to otherwise specially handle 25% of lead-contaminated dredge spoils could range from \$30-60/cubic yard. This could increase potential costs to well over \$50M.

5.0 Recommendations

With the presence of lead in a portion of sediment that could be dredged, and the resultant cost increase for a large-scale, lake-wide operation, projected costs suggest that such a dredging effort is cost infeasible for Cedar Lake. Selective dredging of areas that do not exceed state guidelines is possible, however, substantial sediment sampling would be necessary to assess the feasibility of this option. For any dredging operation, upfront preparation, design, permitting and oversight costs need to be considered in any efforts. A 12% cost of actual dredging is a reasonable consideration for such support costs.

² K&A, 2019. Technical Memorandum: Bathymetric Mapping and Sediment Assessment Survey. Submitted to Rex Vaughn, Cedar Lake Improvement Board, August 22, 2019, 32 pp. See: <https://img1.wsimg.com/blobby/go/a080ee0a-11db-41bd-8830-a064f9457faa/downloads/Cedar%20Lake%20Bathymetry-Sediment%20Final%20Memorandu.pdf?ver=1647356532177>

Appendix A

Laboratory Analytical Results



Report ID: S27504.01(02)
Generated on 09/27/2021
Replaces report S27504.01(01) generated on 09/02/2021

Report to

Attention: Josh Kieser
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Report Summary

Lab Sample ID(s): S27504.01-S27504.08
Project: Cedar Lake
Collected Date(s): 08/25/2021
Submitted Date/Time: 08/25/2021 15:30
Sampled by: Josh Kieser
P.O. #:

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Maya Murshak
Technical Director



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Report Narrative

Selenium and PNA reported with and without the total solids correction per client request



Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
SM2540B	Standard Method 2540 B 2011
SW3050B	SW 846 Method 3050B Revision 2 December 1996
SW3546	SW 846 Method 3546 Revision 0 February 2007
SW6020A	SW 846 Method 6020A Revision 1 February 2007
SW7471B	SW 846 Method 7471B Revision 2 February 2007
SW8270D	SW 846 Method 8270D Revision 4 February 2007



Sample Summary (8 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S27504.01	S1	Sludge	08/25/21 08:45
S27504.02	S2	Sludge	08/25/21 09:00
S27504.03	S3	Sludge	08/25/21 09:25
S27504.04	S4	Sludge	08/25/21 09:45
S27504.05	S5	Sludge	08/25/21 10:05
S27504.06	S6	Sludge	08/25/21 10:20
S27504.07	S7	Sludge	08/25/21 10:35
S27504.08	S8	Sludge	08/25/21 10:50



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S27504.01

Sample Tag: S1

Collected Date/Time: 08/25/2021 08:45

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	1L Amber	None	Yes	9.6	IR
1	125ml Plastic	HNO3	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	09/02/21 10:30	CCM	
PNA Extraction*	Completed	SW3546	08/26/21 12:00	JWR	
Mercury Digestion	Completed	SW7471B	09/02/21 10:45	JRH	

Inorganics

Method: SM2540B, Run Date: 08/31/21 13:45, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	4.5	1		%	1		

Metals

Method: SW6020A, Run Date: 09/02/21 12:27, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	6.87	2.5		mg/kg	2258	7440-38-2	
Barium	60.4	2.5		mg/kg	2258	7440-39-3	
Cadmium	1.35	0.25		mg/kg	2258	7440-43-9	
Chromium	10.3	2.5		mg/kg	2258	7440-47-3	
Copper	33.0	2.5		mg/kg	2258	7440-50-8	
Lead	49.5	1.25		mg/kg	2258	7439-92-1	
Selenium	Not detected	5.0		mg/kg	2258	7782-49-2	
Selenium (Replicate 01)	Not detected	0.40		mg/kg	102		T
Silver	Not detected	0.25		mg/kg	2258	7440-22-4	
Zinc	110	2.5		mg/kg	2258	7440-66-6	

Method: SW7471B, Run Date: 09/02/21 14:25, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	0.116	0.065		mg/kg	641	7439-97-6	

Organics - Semi-Volatiles

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 20:20, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	500		ug/kg	1	83-32-9	K
Acenaphthylene	Not detected	500		ug/kg	1	208-96-8	K
Anthracene	Not detected	500		ug/kg	1	120-12-7	K
Benzo(a)anthracene	Not detected	500		ug/kg	1	56-55-3	K
Benzo(a)pyrene	Not detected	500		ug/kg	1	50-32-8	K
Benzo(b)fluoranthene	Not detected	500		ug/kg	1	205-99-2	K
Benzo(k)fluoranthene	Not detected	500		ug/kg	1	207-08-9	K
Benzo(ghi)perylene	Not detected	500		ug/kg	1	191-24-2	K
Chrysene	Not detected	500		ug/kg	1	218-01-9	K

T-No correction for total solids

K-Elevated reporting limit due to low total solids



Lab Sample ID: S27504.01 (continued)

Sample Tag: S1

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 20:20, Analyst: PL (continued)

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Lists various polynuclear aromatic compounds and their detection status.

Polynuclear Aromatics (Replicate 01), Method: SW8270D, Run Date: 08/27/21 20:20, Analyst: PL

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Lists various polynuclear aromatic compounds and their detection status for replicate 01.

K-Elevated reporting limit due to low total solids

T-No correction for total solids



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S27504.02

Sample Tag: S2

Collected Date/Time: 08/25/2021 09:00

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	1L Amber	None	Yes	9.6	IR
1	125ml Plastic	HNO3	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	09/02/21 10:30	CCM	
PNA Extraction*	Completed	SW3546	08/26/21 12:00	JWR	
Mercury Digestion	Completed	SW7471B	09/02/21 10:45	JRH	

Inorganics

Method: SM2540B, Run Date: 08/31/21 13:45, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	5.0	1		%	1		

Metals

Method: SW6020A, Run Date: 09/02/21 12:31, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	4.90	2.0		mg/kg	1852	7440-38-2	
Barium	47.2	2.0		mg/kg	1852	7440-39-3	
Cadmium	1.22	0.20		mg/kg	1852	7440-43-9	
Chromium	8.57	2.0		mg/kg	1852	7440-47-3	
Copper	22.0	2.0		mg/kg	1852	7440-50-8	
Lead	39.0	1.0		mg/kg	1852	7439-92-1	
Selenium	Not detected	4.0		mg/kg	1852	7782-49-2	
Selenium (Replicate 01)	Not detected	0.40		mg/kg	93		T
Silver	Not detected	0.20		mg/kg	1852	7440-22-4	
Zinc	89.3	2.0		mg/kg	1852	7440-66-6	

Method: SW7471B, Run Date: 09/02/21 14:27, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	0.091	0.055		mg/kg	532	7439-97-6	

Organics - Semi-Volatiles

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 20:37, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	500		ug/kg	1	83-32-9	K
Acenaphthylene	Not detected	500		ug/kg	1	208-96-8	K
Anthracene	Not detected	500		ug/kg	1	120-12-7	K
Benzo(a)anthracene	Not detected	500		ug/kg	1	56-55-3	K
Benzo(a)pyrene	Not detected	500		ug/kg	1	50-32-8	K
Benzo(b)fluoranthene	Not detected	500		ug/kg	1	205-99-2	K
Benzo(k)fluoranthene	Not detected	500		ug/kg	1	207-08-9	K
Benzo(ghi)perylene	Not detected	500		ug/kg	1	191-24-2	K
Chrysene	Not detected	500		ug/kg	1	218-01-9	K

T-No correction for total solids

K-Elevated reporting limit due to low total solids



Lab Sample ID: S27504.02 (continued)

Sample Tag: S2

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 20:37, Analyst: PL (continued)

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Lists various polynuclear aromatic compounds and their detection status.

Polynuclear Aromatics (Replicate 01), Method: SW8270D, Run Date: 08/27/21 20:37, Analyst: PL

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Lists various polynuclear aromatic compounds and their detection status.

K-Elevated reporting limit due to low total solids

T-No correction for total solids



Lab Sample ID: S27504.03

Sample Tag: S3

Collected Date/Time: 08/25/2021 09:25

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	1L Amber	None	Yes	9.6	IR
1	125ml Plastic	HNO3	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	09/02/21 10:30	CCM	
PNA Extraction*	Completed	SW3546	08/26/21 12:00	JWR	
Mercury Digestion	Completed	SW7471B	09/02/21 10:45	JRH	

Inorganics

Method: SM2540B, Run Date: 08/31/21 13:45, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	3.6	1		%	1		

Metals

Method: SW6020A, Run Date: 09/02/21 12:34, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	10.7	3.0		mg/kg	2516	7440-38-2	
Barium	60.5	3.0		mg/kg	2516	7440-39-3	
Cadmium	2.17	0.30		mg/kg	2516	7440-43-9	
Chromium	10.5	3.0		mg/kg	2516	7440-47-3	
Copper	46.6	3.0		mg/kg	2516	7440-50-8	
Lead	78.5	1.5		mg/kg	2516	7439-92-1	
Selenium	Not detected	6.0		mg/kg	2516	7782-49-2	
Selenium (Replicate 01)	Not detected	0.40		mg/kg	91		T
Silver	Not detected	0.30		mg/kg	2516	7440-22-4	
Zinc	155	3.0		mg/kg	2516	7440-66-6	

Method: SW7471B, Run Date: 09/02/21 14:28, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	0.145	0.070		mg/kg	694	7439-97-6	

Organics - Semi-Volatiles

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 20:54, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	700		ug/kg	1	83-32-9	K
Acenaphthylene	Not detected	700		ug/kg	1	208-96-8	K
Anthracene	Not detected	700		ug/kg	1	120-12-7	K
Benzo(a)anthracene	Not detected	700		ug/kg	1	56-55-3	K
Benzo(a)pyrene	Not detected	700		ug/kg	1	50-32-8	K
Benzo(b)fluoranthene	Not detected	700		ug/kg	1	205-99-2	K
Benzo(k)fluoranthene	Not detected	700		ug/kg	1	207-08-9	K
Benzo(ghi)perylene	Not detected	700		ug/kg	1	191-24-2	K
Chrysene	Not detected	700		ug/kg	1	218-01-9	K

T-No correction for total solids

K-Elevated reporting limit due to low total solids

Lab Sample ID: S27504.03 (continued)

Sample Tag: S3

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 20:54, Analyst: PL (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Dibenzo(ah)anthracene	Not detected	700		ug/kg	1	53-70-3	K
Fluoranthene	Not detected	700		ug/kg	1	206-44-0	K
Fluorene	Not detected	700		ug/kg	1	86-73-7	K
Indeno(1,2,3-cd)pyrene	Not detected	700		ug/kg	1	193-39-5	K
Naphthalene	Not detected	700		ug/kg	1	91-20-3	K
Phenanthrene	Not detected	700		ug/kg	1	85-01-8	K
Pyrene	Not detected	700		ug/kg	1	129-00-0	K
2-Methylnaphthalene	Not detected	700		ug/kg	1	91-57-6	K
1-Methylnaphthalene	Not detected	700		ug/kg	1	90-12-0	K

Polynuclear Aromatics (Replicate 01), Method: SW8270D, Run Date: 08/27/21 20:54, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	300		ug/kg	1	83-32-9	T
Acenaphthylene	Not detected	300		ug/kg	1	208-96-8	T
Anthracene	Not detected	300		ug/kg	1	120-12-7	T
Benzo(a)anthracene	Not detected	300		ug/kg	1	56-55-3	T
Benzo(a)pyrene	Not detected	300		ug/kg	1	50-32-8	T
Benzo(b)fluoranthene	Not detected	300		ug/kg	1	205-99-2	T
Benzo(k)fluoranthene	Not detected	300		ug/kg	1	207-08-9	T
Benzo(ghi)perylene	Not detected	300		ug/kg	1	191-24-2	T
Chrysene	Not detected	300		ug/kg	1	218-01-9	T
Dibenzo(ah)anthracene	Not detected	300		ug/kg	1	53-70-3	T
Fluoranthene	Not detected	300		ug/kg	1	206-44-0	T
Fluorene	Not detected	300		ug/kg	1	86-73-7	T
Indeno(1,2,3-cd)pyrene	Not detected	300		ug/kg	1	193-39-5	T
Naphthalene	Not detected	300		ug/kg	1	91-20-3	T
Phenanthrene	Not detected	300		ug/kg	1	85-01-8	T
Pyrene	Not detected	300		ug/kg	1	129-00-0	T
2-Methylnaphthalene	Not detected	300		ug/kg	1	91-57-6	T
1-Methylnaphthalene	Not detected	300		ug/kg	1	90-12-0	T

K-Elevated reporting limit due to low total solids

T-No correction for total solids



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S27504.04

Sample Tag: S4

Collected Date/Time: 08/25/2021 09:45

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	1L Amber	None	Yes	9.6	IR
1	125ml Plastic	HNO3	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	09/02/21 10:30	CCM	
PNA Extraction*	Completed	SW3546	08/26/21 12:00	JWR	
Mercury Digestion	Completed	SW7471B	09/02/21 10:45	JRH	

Inorganics

Method: SM2540B, Run Date: 08/31/21 13:45, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	3.5	1		%	1		

Metals

Method: SW6020A, Run Date: 09/02/21 12:37, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	8.69	2.5		mg/kg	2405	7440-38-2	
Barium	62.8	2.5		mg/kg	2405	7440-39-3	
Cadmium	1.64	0.25		mg/kg	2405	7440-43-9	
Chromium	11.0	2.5		mg/kg	2405	7440-47-3	
Copper	27.8	2.5		mg/kg	2405	7440-50-8	
Lead	57.2	1.25		mg/kg	2405	7439-92-1	
Selenium	Not detected	5.0		mg/kg	2405	7782-49-2	
Selenium (Replicate 01)	Not detected	0.40		mg/kg	84		T
Silver	Not detected	0.25		mg/kg	2405	7440-22-4	
Zinc	119	2.5		mg/kg	2405	7440-66-6	

Method: SW7471B, Run Date: 09/02/21 14:30, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	0.102	0.085		mg/kg	833	7439-97-6	

Organics - Semi-Volatiles

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 21:11, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	700		ug/kg	1	83-32-9	K
Acenaphthylene	Not detected	700		ug/kg	1	208-96-8	K
Anthracene	Not detected	700		ug/kg	1	120-12-7	K
Benzo(a)anthracene	Not detected	700		ug/kg	1	56-55-3	K
Benzo(a)pyrene	Not detected	700		ug/kg	1	50-32-8	K
Benzo(b)fluoranthene	Not detected	700		ug/kg	1	205-99-2	K
Benzo(k)fluoranthene	Not detected	700		ug/kg	1	207-08-9	K
Benzo(ghi)perylene	Not detected	700		ug/kg	1	191-24-2	K
Chrysene	Not detected	700		ug/kg	1	218-01-9	K

T-No correction for total solids

K-Elevated reporting limit due to low total solids



Lab Sample ID: S27504.04 (continued)

Sample Tag: S4

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 21:11, Analyst: PL (continued)

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Lists various polynuclear aromatic compounds and their detection status.

Polynuclear Aromatics (Replicate 01), Method: SW8270D, Run Date: 08/27/21 21:11, Analyst: PL

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Lists various polynuclear aromatic compounds and their detection status for replicate 01.

K-Elevated reporting limit due to low total solids

T-No correction for total solids



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S27504.05

Sample Tag: S5

Collected Date/Time: 08/25/2021 10:05

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	1L Amber	None	Yes	9.6	IR
1	125ml Plastic	HNO3	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	09/02/21 10:30	CCM	
PNA Extraction*	Completed	SW3546	08/26/21 12:00	JWR	
Mercury Digestion	Completed	SW7471B	09/02/21 10:45	JRH	

Inorganics

Method: SM2540B, Run Date: 08/31/21 13:45, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	2.4	1		%	1		

Metals

Method: SW6020A, Run Date: 09/02/21 12:39, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	13.4	4.0		mg/kg	3700	7440-38-2	
Barium	85.1	4.0		mg/kg	3700	7440-39-3	
Cadmium	4.62	0.40		mg/kg	3700	7440-43-9	
Chromium	19.4	4.0		mg/kg	3700	7440-47-3	
Copper	65.0	4.0		mg/kg	3700	7440-50-8	
Lead	161	2.0		mg/kg	3700	7439-92-1	
Selenium	Not detected	8.0		mg/kg	3700	7782-49-2	
Selenium (Replicate 01)	Not detected	0.40		mg/kg	89		T
Silver	Not detected	0.40		mg/kg	3700	7440-22-4	
Zinc	286	4.0		mg/kg	3700	7440-66-6	

Method: SW7471B, Run Date: 09/02/21 14:32, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	0.269	0.120		mg/kg	1191	7439-97-6	

Organics - Semi-Volatiles

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 21:29, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	1,000		ug/kg	1	83-32-9	K
Acenaphthylene	Not detected	1,000		ug/kg	1	208-96-8	K
Anthracene	Not detected	1,000		ug/kg	1	120-12-7	K
Benzo(a)anthracene	Not detected	1,000		ug/kg	1	56-55-3	K
Benzo(a)pyrene	Not detected	1,000		ug/kg	1	50-32-8	K
Benzo(b)fluoranthene	Not detected	1,000		ug/kg	1	205-99-2	K
Benzo(k)fluoranthene	Not detected	1,000		ug/kg	1	207-08-9	K
Benzo(ghi)perylene	Not detected	1,000		ug/kg	1	191-24-2	K
Chrysene	Not detected	1,000		ug/kg	1	218-01-9	K

T-No correction for total solids

K-Elevated reporting limit due to low total solids

Lab Sample ID: S27504.05 (continued)

Sample Tag: S5

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 21:29, Analyst: PL (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Dibenzo(ah)anthracene	Not detected	1,000		ug/kg	1	53-70-3	K
Fluoranthene	Not detected	1,000		ug/kg	1	206-44-0	K
Fluorene	Not detected	1,000		ug/kg	1	86-73-7	K
Indeno(1,2,3-cd)pyrene	Not detected	1,000		ug/kg	1	193-39-5	K
Naphthalene	Not detected	1,000		ug/kg	1	91-20-3	K
Phenanthrene	Not detected	1,000		ug/kg	1	85-01-8	K
Pyrene	Not detected	1,000		ug/kg	1	129-00-0	K
2-Methylnaphthalene	Not detected	1,000		ug/kg	1	91-57-6	K
1-Methylnaphthalene	Not detected	1,000		ug/kg	1	90-12-0	K

Polynuclear Aromatics (Replicate 01), Method: SW8270D, Run Date: 08/27/21 21:29, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	300		ug/kg	1	83-32-9	T
Acenaphthylene	Not detected	300		ug/kg	1	208-96-8	T
Anthracene	Not detected	300		ug/kg	1	120-12-7	T
Benzo(a)anthracene	Not detected	300		ug/kg	1	56-55-3	T
Benzo(a)pyrene	Not detected	300		ug/kg	1	50-32-8	T
Benzo(b)fluoranthene	Not detected	300		ug/kg	1	205-99-2	T
Benzo(k)fluoranthene	Not detected	300		ug/kg	1	207-08-9	T
Benzo(ghi)perylene	Not detected	300		ug/kg	1	191-24-2	T
Chrysene	Not detected	300		ug/kg	1	218-01-9	T
Dibenzo(ah)anthracene	Not detected	300		ug/kg	1	53-70-3	T
Fluoranthene	Not detected	300		ug/kg	1	206-44-0	T
Fluorene	Not detected	300		ug/kg	1	86-73-7	T
Indeno(1,2,3-cd)pyrene	Not detected	300		ug/kg	1	193-39-5	T
Naphthalene	Not detected	300		ug/kg	1	91-20-3	T
Phenanthrene	Not detected	300		ug/kg	1	85-01-8	T
Pyrene	Not detected	300		ug/kg	1	129-00-0	T
2-Methylnaphthalene	Not detected	300		ug/kg	1	91-57-6	T
1-Methylnaphthalene	Not detected	300		ug/kg	1	90-12-0	T

K-Elevated reporting limit due to low total solids

T-No correction for total solids



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S27504.06

Sample Tag: S6

Collected Date/Time: 08/25/2021 10:20

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	1L Amber	None	Yes	9.6	IR
1	125ml Plastic	HNO3	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	09/02/21 10:30	CCM	
PNA Extraction*	Completed	SW3546	08/26/21 12:00	JWR	
Mercury Digestion	Completed	SW7471B	09/02/21 10:45	JRH	

Inorganics

Method: SM2540B, Run Date: 08/31/21 13:45, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	2.9	1		%	1		

Metals

Method: SW6020A, Run Date: 09/02/21 12:42, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	7.05	3.0		mg/kg	2903	7440-38-2	
Barium	55.3	3.0		mg/kg	2903	7440-39-3	
Cadmium	1.06	0.30		mg/kg	2903	7440-43-9	
Chromium	11.1	3.0		mg/kg	2903	7440-47-3	
Copper	27.1	3.0		mg/kg	2903	7440-50-8	
Lead	29.1	1.5		mg/kg	2903	7439-92-1	
Selenium	Not detected	6.0		mg/kg	2903	7782-49-2	
Selenium (Replicate 01)	Not detected	0.40		mg/kg	84		T
Silver	Not detected	0.30		mg/kg	2903	7440-22-4	
Zinc	84.8	3.0		mg/kg	2903	7440-66-6	

Method: SW7471B, Run Date: 09/02/21 14:34, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.100		mg/kg	1000	7439-97-6	

Organics - Semi-Volatiles

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 21:46, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	800		ug/kg	1	83-32-9	K
Acenaphthylene	Not detected	800		ug/kg	1	208-96-8	K
Anthracene	Not detected	800		ug/kg	1	120-12-7	K
Benzo(a)anthracene	Not detected	800		ug/kg	1	56-55-3	K
Benzo(a)pyrene	Not detected	800		ug/kg	1	50-32-8	K
Benzo(b)fluoranthene	Not detected	800		ug/kg	1	205-99-2	K
Benzo(k)fluoranthene	Not detected	800		ug/kg	1	207-08-9	K
Benzo(ghi)perylene	Not detected	800		ug/kg	1	191-24-2	K
Chrysene	Not detected	800		ug/kg	1	218-01-9	K

T-No correction for total solids

K-Elevated reporting limit due to low total solids



Lab Sample ID: S27504.06 (continued)

Sample Tag: S6

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 21:46, Analyst: PL (continued)

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Lists various polynuclear aromatic compounds and their detection status.

Polynuclear Aromatics (Replicate 01), Method: SW8270D, Run Date: 08/27/21 21:46, Analyst: PL

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Lists various polynuclear aromatic compounds and their detection status for replicate 01.

K-Elevated reporting limit due to low total solids

T-No correction for total solids



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S27504.07

Sample Tag: S7

Collected Date/Time: 08/25/2021 10:35

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	1L Amber	None	Yes	9.6	IR
1	125ml Plastic	HNO3	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	09/02/21 10:30	CCM	
PNA Extraction*	Completed	SW3546	08/26/21 12:00	JWR	
Mercury Digestion	Completed	SW7471B	09/02/21 10:45	JRH	

Inorganics

Method: SM2540B, Run Date: 08/31/21 13:45, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	1.8	1		%	1		

Metals

Method: SW6020A, Run Date: 09/02/21 12:45, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	12.1	5.5		mg/kg	5041	7440-38-2	
Barium	94.0	5.5		mg/kg	5041	7440-39-3	
Cadmium	3.57	0.55		mg/kg	5041	7440-43-9	
Chromium	27.3	5.5		mg/kg	5041	7440-47-3	
Copper	65.8	5.5		mg/kg	5041	7440-50-8	
Lead	128	2.75		mg/kg	5041	7439-92-1	
Selenium	Not detected	11.0		mg/kg	5041	7782-49-2	
Selenium (Replicate 01)	Not detected	0.40		mg/kg	91		T
Silver	Not detected	0.55		mg/kg	5041	7440-22-4	
Zinc	282	5.5		mg/kg	5041	7440-66-6	

Method: SW7471B, Run Date: 09/02/21 14:36, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	0.323	0.160		mg/kg	1563	7439-97-6	

Organics - Semi-Volatiles

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 22:03, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	1,400		ug/kg	1	83-32-9	K
Acenaphthylene	Not detected	1,400		ug/kg	1	208-96-8	K
Anthracene	Not detected	1,400		ug/kg	1	120-12-7	K
Benzo(a)anthracene	Not detected	1,400		ug/kg	1	56-55-3	K
Benzo(a)pyrene	Not detected	1,400		ug/kg	1	50-32-8	K
Benzo(b)fluoranthene	Not detected	1,400		ug/kg	1	205-99-2	K
Benzo(k)fluoranthene	Not detected	1,400		ug/kg	1	207-08-9	K
Benzo(ghi)perylene	Not detected	1,400		ug/kg	1	191-24-2	K
Chrysene	Not detected	1,400		ug/kg	1	218-01-9	K

T-No correction for total solids

K-Elevated reporting limit due to low total solids

Lab Sample ID: S27504.07 (continued)

Sample Tag: S7

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 22:03, Analyst: PL (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Dibenzo(ah)anthracene	Not detected	1,400		ug/kg	1	53-70-3	K
Fluoranthene	Not detected	1,400		ug/kg	1	206-44-0	K
Fluorene	Not detected	1,400		ug/kg	1	86-73-7	K
Indeno(1,2,3-cd)pyrene	Not detected	1,400		ug/kg	1	193-39-5	K
Naphthalene	Not detected	1,400		ug/kg	1	91-20-3	K
Phenanthrene	Not detected	1,400		ug/kg	1	85-01-8	K
Pyrene	Not detected	1,400		ug/kg	1	129-00-0	K
2-Methylnaphthalene	Not detected	1,400		ug/kg	1	91-57-6	K
1-Methylnaphthalene	Not detected	1,400		ug/kg	1	90-12-0	K

Polynuclear Aromatics (Replicate 01), Method: SW8270D, Run Date: 08/27/21 22:03, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	300		ug/kg	1	83-32-9	T
Acenaphthylene	Not detected	300		ug/kg	1	208-96-8	T
Anthracene	Not detected	300		ug/kg	1	120-12-7	T
Benzo(a)anthracene	Not detected	300		ug/kg	1	56-55-3	T
Benzo(a)pyrene	Not detected	300		ug/kg	1	50-32-8	T
Benzo(b)fluoranthene	Not detected	300		ug/kg	1	205-99-2	T
Benzo(k)fluoranthene	Not detected	300		ug/kg	1	207-08-9	T
Benzo(ghi)perylene	Not detected	300		ug/kg	1	191-24-2	T
Chrysene	Not detected	300		ug/kg	1	218-01-9	T
Dibenzo(ah)anthracene	Not detected	300		ug/kg	1	53-70-3	T
Fluoranthene	Not detected	300		ug/kg	1	206-44-0	T
Fluorene	Not detected	300		ug/kg	1	86-73-7	T
Indeno(1,2,3-cd)pyrene	Not detected	300		ug/kg	1	193-39-5	T
Naphthalene	Not detected	300		ug/kg	1	91-20-3	T
Phenanthrene	Not detected	300		ug/kg	1	85-01-8	T
Pyrene	Not detected	300		ug/kg	1	129-00-0	T
2-Methylnaphthalene	Not detected	300		ug/kg	1	91-57-6	T
1-Methylnaphthalene	Not detected	300		ug/kg	1	90-12-0	T

K-Elevated reporting limit due to low total solids

T-No correction for total solids



Lab Sample ID: S27504.08

Sample Tag: S8

Collected Date/Time: 08/25/2021 10:50

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	1L Amber	None	Yes	9.6	IR
1	125ml Plastic	HNO3	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	09/02/21 10:30	CCM	
PNA Extraction*	Completed	SW3546	08/26/21 12:00	JWR	
Mercury Digestion	Completed	SW7471B	09/02/21 10:45	JRH	

Inorganics

Method: SM2540B, Run Date: 08/31/21 13:45, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	2.2	1		%	1		

Metals

Method: SW6020A, Run Date: 09/02/21 12:48, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Arsenic	4.94	4.0		mg/kg	3905	7440-38-2	
Barium	69.3	4.0		mg/kg	3905	7440-39-3	
Cadmium	2.74	0.40		mg/kg	3905	7440-43-9	
Chromium	17.9	4.0		mg/kg	3905	7440-47-3	
Copper	42.2	4.0		mg/kg	3905	7440-50-8	
Lead	64.2	2.0		mg/kg	3905	7439-92-1	
Selenium	Not detected	8.0		mg/kg	3905	7782-49-2	
Selenium (Replicate 01)	Not detected	0.40		mg/kg	86		T
Silver	Not detected	0.40		mg/kg	3905	7440-22-4	
Zinc	185	4.0		mg/kg	3905	7440-66-6	

Method: SW7471B, Run Date: 09/02/21 14:37, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	0.209	0.135		mg/kg	1316	7439-97-6	

Organics - Semi-Volatiles

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 22:20, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	1,100		ug/kg	1	83-32-9	K
Acenaphthylene	Not detected	1,100		ug/kg	1	208-96-8	K
Anthracene	Not detected	1,100		ug/kg	1	120-12-7	K
Benzo(a)anthracene	Not detected	1,100		ug/kg	1	56-55-3	K
Benzo(a)pyrene	Not detected	1,100		ug/kg	1	50-32-8	K
Benzo(b)fluoranthene	Not detected	1,100		ug/kg	1	205-99-2	K
Benzo(k)fluoranthene	Not detected	1,100		ug/kg	1	207-08-9	K
Benzo(ghi)perylene	Not detected	1,100		ug/kg	1	191-24-2	K
Chrysene	Not detected	1,100		ug/kg	1	218-01-9	K

T-No correction for total solids

K-Elevated reporting limit due to low total solids

Lab Sample ID: S27504.08 (continued)

Sample Tag: S8

Polynuclear Aromatics, Method: SW8270D, Run Date: 08/27/21 22:20, Analyst: PL (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Dibenzo(ah)anthracene	Not detected	1,100		ug/kg	1	53-70-3	K
Fluoranthene	Not detected	1,100		ug/kg	1	206-44-0	K
Fluorene	Not detected	1,100		ug/kg	1	86-73-7	K
Indeno(1,2,3-cd)pyrene	Not detected	1,100		ug/kg	1	193-39-5	K
Naphthalene	Not detected	1,100		ug/kg	1	91-20-3	K
Phenanthrene	Not detected	1,100		ug/kg	1	85-01-8	K
Pyrene	Not detected	1,100		ug/kg	1	129-00-0	K
2-Methylnaphthalene	Not detected	1,100		ug/kg	1	91-57-6	K
1-Methylnaphthalene	Not detected	1,100		ug/kg	1	90-12-0	K

Polynuclear Aromatics (Replicate 01), Method: SW8270D, Run Date: 08/27/21 22:20, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Acenaphthene	Not detected	300		ug/kg	1	83-32-9	T
Acenaphthylene	Not detected	300		ug/kg	1	208-96-8	T
Anthracene	Not detected	300		ug/kg	1	120-12-7	T
Benzo(a)anthracene	Not detected	300		ug/kg	1	56-55-3	T
Benzo(a)pyrene	Not detected	300		ug/kg	1	50-32-8	T
Benzo(b)fluoranthene	Not detected	300		ug/kg	1	205-99-2	T
Benzo(k)fluoranthene	Not detected	300		ug/kg	1	207-08-9	T
Benzo(ghi)perylene	Not detected	300		ug/kg	1	191-24-2	T
Chrysene	Not detected	300		ug/kg	1	218-01-9	T
Dibenzo(ah)anthracene	Not detected	300		ug/kg	1	53-70-3	T
Fluoranthene	Not detected	300		ug/kg	1	206-44-0	T
Fluorene	Not detected	300		ug/kg	1	86-73-7	T
Indeno(1,2,3-cd)pyrene	Not detected	300		ug/kg	1	193-39-5	T
Naphthalene	Not detected	300		ug/kg	1	91-20-3	T
Phenanthrene	Not detected	300		ug/kg	1	85-01-8	T
Pyrene	Not detected	300		ug/kg	1	129-00-0	T
2-Methylnaphthalene	Not detected	300		ug/kg	1	91-57-6	T
1-Methylnaphthalene	Not detected	300		ug/kg	1	90-12-0	T

K-Elevated reporting limit due to low total solids

T-No correction for total solids

Merit Laboratories Login Checklist

Lab Set ID:S27504

Client:KIESER (Kieser & Associates)

Project: Cedar Lake

Submitted:08/25/2021 15:30 Login User: PFD

Attention: Josh Kieser

Address: Kieser & Associates
536 E. Michigan Ave. Ste 300
Kalamazoo, MI 49007

Phone: 269-344-7117 FAX:
Email: JKieser@kieser-associates.com

Selection	Description	Note
Sample Receiving		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 9.6
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to:
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs) Preserved bottles will not be used
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S27504 Submitted: 08/25/2021 15:30

Client: KIESER (Kieser & Associates)

Project: Cedar Lake

Initial Preservation Check: 08/31/2021 09:05 MMC

Preservation Recheck (E200.8): N/A

Attention: Josh Kieser

Address: Kieser & Associates
536 E. Michigan Ave. Ste 300
Kalamazoo, MI 49007

Phone: 269-344-7117

FAX:

Email: JKieser@kieser-associates.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S27504.01	125ml Plastic HNO3	<2			
S27504.02	125ml Plastic HNO3	<2			
S27504.03	125ml Plastic HNO3	<2			
S27504.04	125ml Plastic HNO3	<2			
S27504.05	125ml Plastic HNO3	<2			
S27504.06	125ml Plastic HNO3	<2			
S27504.07	125ml Plastic HNO3	<2			
S27504.08	125ml Plastic HNO3	<2			



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # _____ OF _____ 139655

REPORT TO

CHAIN OF CUSTODY RECORD

INVOICE TO

CONTACT NAME: Josh Kieser
 COMPANY: Kieser & Associates
 ADDRESS: 536 E Michigan Ave
 CITY: Kalamazoo STATE: MI ZIP CODE: 49007
 PHONE NO. (269) 344-7117 FAX NO. _____ P.O. NO. _____
 E-MAIL ADDRESS: jkieser@kieser-associates.com QUOTE NO. _____

CONTACT NAME: SAME
 COMPANY: _____
 ADDRESS: _____
 CITY: _____ STATE: _____ ZIP CODE: _____
 PHONE NO. _____ E-MAIL ADDRESS: _____

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

PROJECT NO./NAME: Cedar Lake SAMPLER(S) - PLEASE PRINT/SIGN NAME: Josh Kieser
 TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER _____
 DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER _____

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

Containers & Preservatives

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO ₃	H ₂ SO ₄	NaOH	MgOH	OTHER	PFAS	MI-10-Metals	PAH'S	Certifications		Project Locations		Special Instructions	
	DATE	TIME														<input type="checkbox"/> OHIO VAP	<input type="checkbox"/> Drinking Water	<input type="checkbox"/> DoD	<input type="checkbox"/> NPDES		<input type="checkbox"/> Detroit
27504.01	8-25-21	8:45A	S1	S	6	5		1					X	X	X						27505(PFAS).01
.02		9:00A	S2	S	6	5		1					X	X	X						.02
.03		9:25A	S3	S	6	5		1					X	X	X						.03
.04		9:45A	S4	S	6	5		1					X	X	X						.04
.05		10:05A	S5	S	6	5		1					X	X	X						.05
.06		10:20A	S6	S	6	5		1					X	X	X						.06
.07		10:35A	S7	S	6	5		1					X	X	X						.07
.08		10:50A	S8	S	6	5		1					X	X	X						.08

RELINQUISHED BY: Zach Harmon Sampler DATE: 8-25-21 TIME: 3:00P
 RECEIVED BY: Pat DATE: 8/29/21 TIME: 5:30

RELINQUISHED BY: _____ DATE: _____ TIME: _____
 RECEIVED BY: _____ DATE: _____ TIME: _____
 SEAL NO. SEAL INTACT YES NO INITIALS _____
 SEAL NO. SEAL INTACT YES NO INITIALS _____
 NOTES: TEMP. ON ARRIVAL 9.6



Analytical Laboratory Report

Report ID: S27505.01(01)
Generated on 09/16/2021

Report to

Attention: Josh Kieser
Kieser & Associates
536 E. Michigan Ave. Ste 300
Kalamazoo, MI 49007

Phone: 269-344-7117 FAX:
Email: JKieser@kieser-associates.com

Additional Contacts: Doug Ervin, Becky Hough

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S27505.01-S27505.08
Project: Cedar Lake
Collected Date(s): 08/25/2021
Submitted Date/Time: 08/25/2021 15:30
Sampled by: Josh Kieser
P.O. #:

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Maya Murshak
Technical Director



Analytical Laboratory Report

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Report Narrative

There is no additional narrative for this analytical report



Analytical Laboratory Report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Analytical Laboratory Report

Method Summary

Method	Version
ASTM D7968-17M	ASTM Method D7968 - 17 Modified (Isotopic Dilution)
SM2540B	Standard Method 2540 B 2011

Parameter Summary

Parameter	Synonym	Cas #
PFBA	Perfluorobutanoic Acid	375-22-4
PFPeA	Perfluoropentanoic Acid	2706-90-3
4:2 FTSA	4:2 Fluorotelomer Sulfonic Acid	757124-72-4
PFHxA	Perfluorohexanoic Acid	307-24-4
PFBS	Perfluorobutane sulfonic Acid	375-73-5
PFHpA	Perfluoroheptanoic Acid	375-85-9
PFPeS	Perfluoropentane Sulfonic Acid	2706-91-4
6:2 FTSA	6:2 Fluorotelomer Sulfonic Acid	27619-97-2
PFOA	Perfluorooctanoic Acid	335-67-1
PFHxS	Perfluorohexane Sulfonic Acid	355-46-4
PFHxS-LN	Perfluorohexane Sulfonic Acid - LN	355-46-4-LN
PFHxS-BR	Perfluorohexane Sulfonic Acid - BR	355-46-4-BR
PFNA	Perfluorononanoic Acid	375-95-1
8:2 FTSA	8:2 Fluorotelomer Sulfonic Acid	39108-34-4
PFHpS	Perfluoroheptane Sulfonic Acid	375-92-8
PFDA	Perfluorodecanoic Acid	335-76-2
N-MeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid	2355-31-9
EtFOSAA	N-Ethyl Perfluorooctane Sulfonamidoacetic Acid	2991-50-6
PFOS	Perfluorooctane Sulfonic Acid	1763-23-1
PFOS-LN	Perfluorooctane Sulfonic Acid - LN	1763-23-1-LN
PFOS-BR	Perfluorooctane Sulfonic Acid - BR	1763-23-1-BR
PFUnDA	Perfluoroundecanoic Acid	2058-94-8
PFNS	Perfluorononane Sulfonic Acid	68259-12-1
PFDoDA	Perfluorododecanoic Acid	307-55-1
PFDS	Perfluorodecane Sulfonic Acid	335-77-3
PFTTrDA	Perfluorotridecanoic Acid	72629-94-8
FOSA	Perfluorooctane Sulfonamide	754-91-6
PFTeDA	Perfluorotetradecanoic Acid	376-06-7
11Cl-PF3OUdS	11-chloroeicosafuoro-3-oxaundecane-1-sulfonic acid	763051-92-9
9Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanone1-sulfonic acid	756426-58-1
ADONA	4,8-dioxa-3H-perfluorononanoic acid	919005-14-4
HFPO-DA	Hexafluoropropylene oxide dimer	13252-13-6



Analytical Laboratory Report

Sample Summary (8 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S27505.01	S1	Sludge	08/25/21 08:45
S27505.02	S2	Sludge	08/25/21 09:00
S27505.03	S3	Sludge	08/25/21 09:25
S27505.04	S4	Sludge	08/25/21 09:45
S27505.05	S5	Sludge	08/25/21 10:05
S27505.06	S6	Sludge	08/25/21 10:20
S27505.07	S7	Sludge	08/25/21 10:35
S27505.08	S8	Sludge	08/25/21 10:50



Analytical Laboratory Report

Lab Sample ID: S27505.01

Sample Tag: S1

Collected Date/Time: 08/25/2021 08:45

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	15ml Centrifuge Tube	None	Yes	9.6	IR
1	250ml Plastic	None	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Initial wt. (g) / Final wt. (g) / Volume (ml)*	11.30/6.98/10	ASTM D7968-17M	09/09/21 15:00	KCV	

Inorganics

Method: SM2540B, Run Date: 08/27/21 17:20, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	7.4	1		%	1		

Organics

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/11/21 22:05, Analyst: KCV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PFBA*	Not detected	630		ng/kg	31.3	375-22-4	
PFPeA*	Not detected	310		ng/kg	31.3	2706-90-3	
4:2 FTSA*	Not detected	310		ng/kg	31.3	757124-72-4	
PFHxA*	Not detected	310		ng/kg	31.3	307-24-4	
PFBS*	Not detected	310		ng/kg	31.3	375-73-5	
PFHpA*	Not detected	310		ng/kg	31.3	375-85-9	
PFPeS*	Not detected	310		ng/kg	31.3	2706-91-4	
6:2 FTSA*	Not detected	310		ng/kg	31.3	27619-97-2	
PFOA*	Not detected	310		ng/kg	31.3	335-67-1	
PFHxS*	Not detected	310		ng/kg	31.3	355-46-4	
PFHxS-LN*	Not detected	310		ng/kg	31.3	355-46-4-LN	
PFHxS-BR*	Not detected	310		ng/kg	31.3	355-46-4-BR	
PFNA*	Not detected	310		ng/kg	31.3	375-95-1	
8:2 FTSA*	Not detected	310		ng/kg	31.3	39108-34-4	
PFHpS*	Not detected	310		ng/kg	31.3	375-92-8	
PFDA*	Not detected	310		ng/kg	31.3	335-76-2	
N-MeFOSAA*	Not detected	310		ng/kg	31.3	2355-31-9	I
EtFOSAA*	Not detected	310		ng/kg	31.3	2991-50-6	
PFOS*	Not detected	310		ng/kg	31.3	1763-23-1	
PFOS-LN*	Not detected	310		ng/kg	31.3	1763-23-1-LN	
PFOS-BR*	Not detected	310		ng/kg	31.3	1763-23-1-BR	
PFUnDA*	Not detected	310		ng/kg	31.3	2058-94-8	
PFNS*	Not detected	310		ng/kg	31.3	68259-12-1	
PFDODA*	Not detected	310		ng/kg	31.3	307-55-1	I
PFDS*	Not detected	310		ng/kg	31.3	335-77-3	
PFTTrDA*	Not detected	310		ng/kg	31.3	72629-94-8	I
FOSA*	Not detected	310		ng/kg	31.3	754-91-6	
PFTeDA*	Not detected	310		ng/kg	31.3	376-06-7	I1
11Cl-PF3OUdS*	Not detected	310		ng/kg	31.3	763051-92-9	

I-Matrix interference with internal standard

1-IS recovery < 10%



Analytical Laboratory Report

Lab Sample ID: S27505.01 (continued)

Sample Tag: S1

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/11/21 22:05, Analyst: KCV (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
9CI-PF3ONS*	Not detected	310		ng/kg	31.3	756426-58-1	
ADONA*	Not detected	310		ng/kg	31.3	919005-14-4	
HFPO-DA*	Not detected	310		ng/kg	31.3	13252-13-6	



Analytical Laboratory Report

Lab Sample ID: S27505.02

Sample Tag: S2

Collected Date/Time: 08/25/2021 09:00

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	15ml Centrifuge Tube	None	Yes	9.6	IR
1	250ml Plastic	None	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Initial wt. (g) / Final wt. (g) / Volume (ml)*	11.49/7.08/10	ASTM D7968-17M	09/09/21 15:00	KCV	

Inorganics

Method: SM2540B, Run Date: 08/27/21 17:20, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	6.6	1		%	1		

Organics

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/11/21 22:25, Analyst: KCV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PFBA*	Not detected	690		ng/kg	34.4	375-22-4	
PFPeA*	Not detected	340		ng/kg	34.4	2706-90-3	
4:2 FTSA*	Not detected	340		ng/kg	34.4	757124-72-4	
PFHxA*	Not detected	340		ng/kg	34.4	307-24-4	
PFBS*	Not detected	340		ng/kg	34.4	375-73-5	
PFHpA*	Not detected	340		ng/kg	34.4	375-85-9	
PFPeS*	Not detected	340		ng/kg	34.4	2706-91-4	
6:2 FTSA*	Not detected	340		ng/kg	34.4	27619-97-2	
PFOA*	Not detected	340		ng/kg	34.4	335-67-1	
PFHxS*	Not detected	340		ng/kg	34.4	355-46-4	
PFHxS-LN*	Not detected	340		ng/kg	34.4	355-46-4-LN	
PFHxS-BR*	Not detected	340		ng/kg	34.4	355-46-4-BR	
PFNA*	Not detected	340		ng/kg	34.4	375-95-1	
8:2 FTSA*	Not detected	340		ng/kg	34.4	39108-34-4	
PFHpS*	Not detected	340		ng/kg	34.4	375-92-8	
PFDA*	Not detected	340		ng/kg	34.4	335-76-2	
N-MeFOSAA*	Not detected	340		ng/kg	34.4	2355-31-9	
EtFOSAA*	Not detected	340		ng/kg	34.4	2991-50-6	
PFOS*	Not detected	340		ng/kg	34.4	1763-23-1	
PFOS-LN*	Not detected	340		ng/kg	34.4	1763-23-1-LN	
PFOS-BR*	Not detected	340		ng/kg	34.4	1763-23-1-BR	
PFUnDA*	Not detected	340		ng/kg	34.4	2058-94-8	
PFNS*	Not detected	340		ng/kg	34.4	68259-12-1	
PFDODA*	Not detected	340		ng/kg	34.4	307-55-1	
PFDS*	Not detected	340		ng/kg	34.4	335-77-3	
PFTDA*	Not detected	340		ng/kg	34.4	72629-94-8	
FOSA*	Not detected	340		ng/kg	34.4	754-91-6	
PFTeDA*	Not detected	340		ng/kg	34.4	376-06-7	I1
11Cl-PF3OUdS*	Not detected	340		ng/kg	34.4	763051-92-9	
9Cl-PF3ONS*	Not detected	340		ng/kg	34.4	756426-58-1	

I-Matrix interference with internal standard 1-IS recovery < 10%



Analytical Laboratory Report

Lab Sample ID: S27505.02 (continued)

Sample Tag: S2

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/11/21 22:25, Analyst: KCV (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
ADONA*	Not detected	340		ng/kg	34.4	919005-14-4	
HFPO-DA*	Not detected	340		ng/kg	34.4	13252-13-6	



Analytical Laboratory Report

Lab Sample ID: S27505.03

Sample Tag: S3

Collected Date/Time: 08/25/2021 09:25

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	15ml Centrifuge Tube	None	Yes	9.6	IR
1	250ml Plastic	None	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Initial wt. (g) / Final wt. (g) / Volume (ml)*	10.17/6.99/10	ASTM D7968-17M	09/09/21 15:00	KCV	

Inorganics

Method: SM2540B, Run Date: 08/27/21 17:20, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	5.2	1		%	1		

Organics

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/12/21 19:24, Analyst: KCV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PFBA*	Not detected	1,200		ng/kg	60.5	375-22-4	
PFPeA*	Not detected	610		ng/kg	60.5	2706-90-3	
4:2 FTSA*	Not detected	610		ng/kg	60.5	757124-72-4	
PFHxA*	Not detected	610		ng/kg	60.5	307-24-4	
PFBS*	Not detected	610		ng/kg	60.5	375-73-5	
PFHpA*	Not detected	610		ng/kg	60.5	375-85-9	
PFPeS*	Not detected	610		ng/kg	60.5	2706-91-4	
6:2 FTSA*	Not detected	610		ng/kg	60.5	27619-97-2	
PFOA*	Not detected	610		ng/kg	60.5	335-67-1	
PFHxS*	Not detected	610		ng/kg	60.5	355-46-4	
PFHxS-LN*	Not detected	610		ng/kg	60.5	355-46-4-LN	
PFHxS-BR*	Not detected	610		ng/kg	60.5	355-46-4-BR	
PFNA*	Not detected	610		ng/kg	60.5	375-95-1	
8:2 FTSA*	Not detected	610		ng/kg	60.5	39108-34-4	
PFHpS*	Not detected	610		ng/kg	60.5	375-92-8	
PFDA*	Not detected	610		ng/kg	60.5	335-76-2	
N-MeFOSAA*	Not detected	610		ng/kg	60.5	2355-31-9	
EtFOSAA*	Not detected	610		ng/kg	60.5	2991-50-6	
PFOS*	Not detected	610		ng/kg	60.5	1763-23-1	
PFOS-LN*	Not detected	610		ng/kg	60.5	1763-23-1-LN	
PFOS-BR*	Not detected	610		ng/kg	60.5	1763-23-1-BR	
PFUnDA*	Not detected	610		ng/kg	60.5	2058-94-8	
PFNS*	Not detected	610		ng/kg	60.5	68259-12-1	
PFDODA*	Not detected	610		ng/kg	60.5	307-55-1	
PFDS*	Not detected	610		ng/kg	60.5	335-77-3	
PFTTrDA*	Not detected	610		ng/kg	60.5	72629-94-8	
FOSA*	Not detected	610		ng/kg	60.5	754-91-6	
PFTeDA*	Not detected	610		ng/kg	60.5	376-06-7	
11Cl-PF3OUdS*	Not detected	610		ng/kg	60.5	763051-92-9	
9Cl-PF3ONS*	Not detected	610		ng/kg	60.5	756426-58-1	
ADONA*	Not detected	610		ng/kg	60.5	919005-14-4	



Analytical Laboratory Report

Lab Sample ID: S27505.03 (continued)

Sample Tag: S3

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/12/21 19:24, Analyst: KCV (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
HFPO-DA*	Not detected	610		ng/kg	60.5	13252-13-6	



Analytical Laboratory Report

Lab Sample ID: S27505.04

Sample Tag: S4

Collected Date/Time: 08/25/2021 09:45

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	15ml Centrifuge Tube	None	Yes	9.6	IR
1	250ml Plastic	None	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Initial wt. (g) / Final wt. (g) / Volume (ml)*	11.73/7.13/10	ASTM D7968-17M	09/09/21 15:00	KCV	

Inorganics

Method: SM2540B, Run Date: 08/27/21 17:20, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	5.6	1		%	1		

Organics

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/11/21 23:04, Analyst: KCV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PFBA*	Not detected	780		ng/kg	38.8	375-22-4	
PFPeA*	Not detected	390		ng/kg	38.8	2706-90-3	
4:2 FTSA*	Not detected	390		ng/kg	38.8	757124-72-4	
PFHxA*	Not detected	390		ng/kg	38.8	307-24-4	
PFBS*	Not detected	390		ng/kg	38.8	375-73-5	
PFHpA*	Not detected	390		ng/kg	38.8	375-85-9	
PFPeS*	Not detected	390		ng/kg	38.8	2706-91-4	
6:2 FTSA*	Not detected	390		ng/kg	38.8	27619-97-2	
PFOA*	Not detected	390		ng/kg	38.8	335-67-1	
PFHxS*	Not detected	390		ng/kg	38.8	355-46-4	
PFHxS-LN*	Not detected	390		ng/kg	38.8	355-46-4-LN	
PFHxS-BR*	Not detected	390		ng/kg	38.8	355-46-4-BR	
PFNA*	Not detected	390		ng/kg	38.8	375-95-1	
8:2 FTSA*	Not detected	390		ng/kg	38.8	39108-34-4	
PFHpS*	Not detected	390		ng/kg	38.8	375-92-8	
PFDA*	Not detected	390		ng/kg	38.8	335-76-2	
N-MeFOSAA*	Not detected	390		ng/kg	38.8	2355-31-9	
EtFOSAA*	Not detected	390		ng/kg	38.8	2991-50-6	
PFOS*	Not detected	390		ng/kg	38.8	1763-23-1	
PFOS-LN*	Not detected	390		ng/kg	38.8	1763-23-1-LN	
PFOS-BR*	Not detected	390		ng/kg	38.8	1763-23-1-BR	
PFUnDA*	Not detected	390		ng/kg	38.8	2058-94-8	
PFNS*	Not detected	390		ng/kg	38.8	68259-12-1	
PFDODA*	Not detected	390		ng/kg	38.8	307-55-1	
PFDS*	Not detected	390		ng/kg	38.8	335-77-3	
PFTTrDA*	Not detected	390		ng/kg	38.8	72629-94-8	
FOSA*	Not detected	390		ng/kg	38.8	754-91-6	
PFTeDA*	Not detected	390		ng/kg	38.8	376-06-7	
11Cl-PF3OUdS*	Not detected	390		ng/kg	38.8	763051-92-9	
9Cl-PF3ONS*	Not detected	390		ng/kg	38.8	756426-58-1	
ADONA*	Not detected	390		ng/kg	38.8	919005-14-4	



Analytical Laboratory Report

Lab Sample ID: S27505.04 (continued)

Sample Tag: S4

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/11/21 23:04, Analyst: KCV (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
HFPO-DA*	Not detected	390		ng/kg	38.8	13252-13-6	



Analytical Laboratory Report

Lab Sample ID: S27505.05

Sample Tag: S5

Collected Date/Time: 08/25/2021 10:05

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	15ml Centrifuge Tube	None	Yes	9.6	IR
1	250ml Plastic	None	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Initial wt. (g) / Final wt. (g) / Volume (ml)*	10.57/7.03/10	ASTM D7968-17M	09/09/21 15:00	KCV	

Inorganics

Method: SM2540B, Run Date: 08/27/21 17:20, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	4.8	1		%	1		

Organics

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/12/21 19:43, Analyst: KCV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PFBA*	Not detected	1,200		ng/kg	58.9	375-22-4	
PFPeA*	Not detected	590		ng/kg	58.9	2706-90-3	
4:2 FTSA*	Not detected	590		ng/kg	58.9	757124-72-4	
PFHxA*	Not detected	590		ng/kg	58.9	307-24-4	
PFBS*	Not detected	590		ng/kg	58.9	375-73-5	
PFHpA*	Not detected	590		ng/kg	58.9	375-85-9	
PFPeS*	Not detected	590		ng/kg	58.9	2706-91-4	
6:2 FTSA*	Not detected	590		ng/kg	58.9	27619-97-2	
PFOA*	Not detected	590		ng/kg	58.9	335-67-1	
PFHxS*	Not detected	590		ng/kg	58.9	355-46-4	
PFHxS-LN*	Not detected	590		ng/kg	58.9	355-46-4-LN	
PFHxS-BR*	Not detected	590		ng/kg	58.9	355-46-4-BR	
PFNA*	Not detected	590		ng/kg	58.9	375-95-1	
8:2 FTSA*	Not detected	590		ng/kg	58.9	39108-34-4	
PFHpS*	Not detected	590		ng/kg	58.9	375-92-8	
PFDA*	Not detected	590		ng/kg	58.9	335-76-2	
N-MeFOSAA*	Not detected	590		ng/kg	58.9	2355-31-9	
EtFOSAA*	Not detected	590		ng/kg	58.9	2991-50-6	
PFOS*	Not detected	590		ng/kg	58.9	1763-23-1	
PFOS-LN*	Not detected	590		ng/kg	58.9	1763-23-1-LN	
PFOS-BR*	Not detected	590		ng/kg	58.9	1763-23-1-BR	
PFUnDA*	Not detected	590		ng/kg	58.9	2058-94-8	
PFNS*	Not detected	590		ng/kg	58.9	68259-12-1	
PFDODA*	Not detected	590		ng/kg	58.9	307-55-1	
PFDS*	Not detected	590		ng/kg	58.9	335-77-3	
PFTTrDA*	Not detected	590		ng/kg	58.9	72629-94-8	
FOSA*	Not detected	590		ng/kg	58.9	754-91-6	
PFTeDA*	Not detected	590		ng/kg	58.9	376-06-7	
11Cl-PF3OUdS*	Not detected	590		ng/kg	58.9	763051-92-9	
9Cl-PF3ONS*	Not detected	590		ng/kg	58.9	756426-58-1	
ADONA*	Not detected	590		ng/kg	58.9	919005-14-4	



Analytical Laboratory Report

Lab Sample ID: S27505.05 (continued)

Sample Tag: S5

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/12/21 19:43, Analyst: KCV (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
HFPO-DA*	Not detected	590		ng/kg	58.9	13252-13-6	



Analytical Laboratory Report

Lab Sample ID: S27505.06

Sample Tag: S6

Collected Date/Time: 08/25/2021 10:20

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	15ml Centrifuge Tube	None	Yes	9.6	IR
1	250ml Plastic	None	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Initial wt. (g) / Final wt. (g) / Volume (ml)*	10.18/7.05/10	ASTM D7968-17M	09/09/21 15:00	KCV	

Inorganics

Method: SM2540B, Run Date: 08/27/21 17:20, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	5.0	1		%	1		

Organics

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/11/21 23:43, Analyst: KCV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PFBA*	Not detected	1,300		ng/kg	63.9	375-22-4	
PFPeA*	Not detected	640		ng/kg	63.9	2706-90-3	
4:2 FTSA*	Not detected	640		ng/kg	63.9	757124-72-4	
PFHxA*	Not detected	640		ng/kg	63.9	307-24-4	
PFBS*	Not detected	640		ng/kg	63.9	375-73-5	
PFHpA*	Not detected	640		ng/kg	63.9	375-85-9	
PFPeS*	Not detected	640		ng/kg	63.9	2706-91-4	
6:2 FTSA*	Not detected	640		ng/kg	63.9	27619-97-2	I
PFOA*	Not detected	640		ng/kg	63.9	335-67-1	
PFHxS*	Not detected	640		ng/kg	63.9	355-46-4	
PFHxS-LN*	Not detected	640		ng/kg	63.9	355-46-4-LN	
PFHxS-BR*	Not detected	640		ng/kg	63.9	355-46-4-BR	
PFNA*	Not detected	640		ng/kg	63.9	375-95-1	
8:2 FTSA*	Not detected	640		ng/kg	63.9	39108-34-4	
PFHpS*	Not detected	640		ng/kg	63.9	375-92-8	
PFDA*	Not detected	640		ng/kg	63.9	335-76-2	
N-MeFOSAA*	Not detected	640		ng/kg	63.9	2355-31-9	
EtFOSAA*	Not detected	640		ng/kg	63.9	2991-50-6	
PFOS*	Not detected	640		ng/kg	63.9	1763-23-1	
PFOS-LN*	Not detected	640		ng/kg	63.9	1763-23-1-LN	
PFOS-BR*	Not detected	640		ng/kg	63.9	1763-23-1-BR	
PFUnDA*	Not detected	640		ng/kg	63.9	2058-94-8	
PFNS*	Not detected	640		ng/kg	63.9	68259-12-1	
PFDODA*	Not detected	640		ng/kg	63.9	307-55-1	
PFDS*	Not detected	640		ng/kg	63.9	335-77-3	
PFTTrDA*	Not detected	640		ng/kg	63.9	72629-94-8	
FOSA*	Not detected	640		ng/kg	63.9	754-91-6	
PFTeDA*	Not detected	640		ng/kg	63.9	376-06-7	
11Cl-PF3OUdS*	Not detected	640		ng/kg	63.9	763051-92-9	
9Cl-PF3ONS*	Not detected	640		ng/kg	63.9	756426-58-1	

I-Matrix interference with internal standard



Analytical Laboratory Report

Lab Sample ID: S27505.06 (continued)

Sample Tag: S6

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/11/21 23:43, Analyst: KCV (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
ADONA*	Not detected	640		ng/kg	63.9	919005-14-4	
HFPO-DA*	Not detected	640		ng/kg	63.9	13252-13-6	



Analytical Laboratory Report

Lab Sample ID: S27505.07

Sample Tag: S7

Collected Date/Time: 08/25/2021 10:35

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	15ml Centrifuge Tube	None	Yes	9.6	IR
1	250ml Plastic	None	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Initial wt. (g) / Final wt. (g) / Volume (ml)*	9.67/6.99/10	ASTM D7968-17M	09/09/21 15:00	KCV	

Inorganics

Method: SM2540B, Run Date: 08/27/21 17:20, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	4.5	1		%	1		

Organics

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/12/21 20:22, Analyst: KCV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PFBA*	Not detected	1,700		ng/kg	82.9	375-22-4	
PFPeA*	Not detected	830		ng/kg	82.9	2706-90-3	
4:2 FTSA*	Not detected	830		ng/kg	82.9	757124-72-4	
PFHxA*	Not detected	830		ng/kg	82.9	307-24-4	
PFBS*	Not detected	830		ng/kg	82.9	375-73-5	
PFHpA*	Not detected	830		ng/kg	82.9	375-85-9	
PFPeS*	Not detected	830		ng/kg	82.9	2706-91-4	
6:2 FTSA*	Not detected	830		ng/kg	82.9	27619-97-2	
PFOA*	Not detected	830		ng/kg	82.9	335-67-1	
PFHxS*	Not detected	830		ng/kg	82.9	355-46-4	
PFHxS-LN*	Not detected	830		ng/kg	82.9	355-46-4-LN	
PFHxS-BR*	Not detected	830		ng/kg	82.9	355-46-4-BR	
PFNA*	Not detected	830		ng/kg	82.9	375-95-1	
8:2 FTSA*	Not detected	830		ng/kg	82.9	39108-34-4	
PFHpS*	Not detected	830		ng/kg	82.9	375-92-8	
PFDA*	Not detected	830		ng/kg	82.9	335-76-2	
N-MeFOSAA*	Not detected	830		ng/kg	82.9	2355-31-9	
EtFOSAA*	Not detected	830		ng/kg	82.9	2991-50-6	
PFOS*	Not detected	830		ng/kg	82.9	1763-23-1	
PFOS-LN*	Not detected	830		ng/kg	82.9	1763-23-1-LN	
PFOS-BR*	Not detected	830		ng/kg	82.9	1763-23-1-BR	
PFUnDA*	Not detected	830		ng/kg	82.9	2058-94-8	
PFNS*	Not detected	830		ng/kg	82.9	68259-12-1	
PFDODA*	Not detected	830		ng/kg	82.9	307-55-1	
PFDS*	Not detected	830		ng/kg	82.9	335-77-3	
PFTTrDA*	Not detected	830		ng/kg	82.9	72629-94-8	
FOSA*	Not detected	830		ng/kg	82.9	754-91-6	
PFTeDA*	Not detected	830		ng/kg	82.9	376-06-7	
11Cl-PF3OUdS*	Not detected	830		ng/kg	82.9	763051-92-9	
9Cl-PF3ONS*	Not detected	830		ng/kg	82.9	756426-58-1	
ADONA*	Not detected	830		ng/kg	82.9	919005-14-4	



Analytical Laboratory Report

Lab Sample ID: S27505.07 (continued)

Sample Tag: S7

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/12/21 20:22, Analyst: KCV (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
HFPO-DA*	Not detected	830		ng/kg	82.9	13252-13-6	



Analytical Laboratory Report

Lab Sample ID: S27505.08

Sample Tag: S8

Collected Date/Time: 08/25/2021 10:50

Matrix: Sludge

COC Reference: 139655

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	15ml Centrifuge Tube	None	Yes	9.6	IR
1	250ml Plastic	None	Yes	9.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Initial wt. (g) / Final wt. (g) / Volume (ml)*	11.07/7.09/10	ASTM D7968-17M	09/09/21 15:00	KCV	

Inorganics

Method: SM2540B, Run Date: 08/27/21 17:20, Analyst: ELR

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	4.6	1		%	1		

Organics

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/12/21 00:22, Analyst: KCV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
PFBA*	Not detected	1,100		ng/kg	54.6	375-22-4	
PFPeA*	Not detected	550		ng/kg	54.6	2706-90-3	
4:2 FTSA*	Not detected	550		ng/kg	54.6	757124-72-4	
PFHxA*	Not detected	550		ng/kg	54.6	307-24-4	
PFBS*	Not detected	550		ng/kg	54.6	375-73-5	
PFHpA*	Not detected	550		ng/kg	54.6	375-85-9	
PFPeS*	Not detected	550		ng/kg	54.6	2706-91-4	
6:2 FTSA*	Not detected	550		ng/kg	54.6	27619-97-2	
PFOA*	Not detected	550		ng/kg	54.6	335-67-1	
PFHxS*	Not detected	550		ng/kg	54.6	355-46-4	
PFHxS-LN*	Not detected	550		ng/kg	54.6	355-46-4-LN	
PFHxS-BR*	Not detected	550		ng/kg	54.6	355-46-4-BR	
PFNA*	Not detected	550		ng/kg	54.6	375-95-1	
8:2 FTSA*	Not detected	550		ng/kg	54.6	39108-34-4	I
PFHpS*	Not detected	550		ng/kg	54.6	375-92-8	
PFDA*	Not detected	550		ng/kg	54.6	335-76-2	
N-MeFOSAA*	Not detected	550		ng/kg	54.6	2355-31-9	
EtFOSAA*	Not detected	550		ng/kg	54.6	2991-50-6	
PFOS*	Not detected	550		ng/kg	54.6	1763-23-1	
PFOS-LN*	Not detected	550		ng/kg	54.6	1763-23-1-LN	
PFOS-BR*	Not detected	550		ng/kg	54.6	1763-23-1-BR	
PFUnDA*	Not detected	550		ng/kg	54.6	2058-94-8	
PFNS*	Not detected	550		ng/kg	54.6	68259-12-1	
PFDODA*	Not detected	550		ng/kg	54.6	307-55-1	
PFDS*	Not detected	550		ng/kg	54.6	335-77-3	
PFTDA*	Not detected	550		ng/kg	54.6	72629-94-8	
FOSA*	Not detected	550		ng/kg	54.6	754-91-6	
PFTeDA*	Not detected	550		ng/kg	54.6	376-06-7	
11Cl-PF3OUdS*	Not detected	550		ng/kg	54.6	763051-92-9	
9Cl-PF3ONS*	Not detected	550		ng/kg	54.6	756426-58-1	

I-Matrix interference with internal standard



Analytical Laboratory Report

Lab Sample ID: S27505.08 (continued)

Sample Tag: S8

28 PFAs, Method: ASTM D7968-17M, Run Date: 09/12/21 00:22, Analyst: KCV (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
ADONA*	Not detected	550		ng/kg	54.6	919005-14-4	
HFPO-DA*	Not detected	550		ng/kg	54.6	13252-13-6	

Merit Laboratories Login Checklist

Lab Set ID:S27505

Client:KIESER (Kieser & Associates)

Project: Cedar Lake

Submitted:08/25/2021 15:30 Login User: PFD

Attention: Josh Kieser

Address: Kieser & Associates
536 E. Michigan Ave. Ste 300
Kalamazoo, MI 49007

Phone: 269-344-7117 FAX:
Email: JKieser@kieser-associates.com

Selection	Description	Note
-----------	-------------	------

Sample Receiving

- | | | |
|-----|--|--|
| 01. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples are received at 4C +/- 2C Thermometer # IR 9.6 |
| 02. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Received on ice/ cooling process begun |
| 03. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples shipped |
| 04. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples left in 24 hr. drop box |
| 05. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Are there custody seals/tape or is the drop box locked |

Chain of Custody

- | | | |
|-----|--|--|
| 06. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC adequately filled out |
| 07. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC signed and relinquished to the lab |
| 08. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sample tag on bottles match COC |
| 09. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Subcontracting needed? Subcontracted to: |

Preservation

- | | | |
|-----|--|---|
| 10. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Do sample have correct chemical preservation |
| 11. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Completed pH checks on preserved samples? (no VOAs) |
| 12. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Did any samples need to be preserved in the lab? |

Bottle Conditions

- | | | |
|-----|--|---|
| 13. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | All bottles intact |
| 14. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Appropriate analytical bottles are used |
| 15. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Merit bottles used |
| 16. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sufficient sample volume received |
| 17. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples require laboratory filtration |
| 18. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples submitted within holding time |
| 19. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Do water VOC or TOX bottles contain headspace |

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____



Merit
Laboratories, Inc.

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # _____ OF _____

139655

REPORT TO

CHAIN OF CUSTODY RECORD

INVOICE TO

CONTACT NAME: Josh Kieser
 COMPANY: Kieser & Associates
 ADDRESS: 536 E Michigan Ave
 CITY: Kalamazoo STATE: MI ZIP CODE: 49007
 PHONE NO. (269) 344-7117 FAX NO. P.O. NO. QUOTE NO.
 E-MAIL ADDRESS: jkieser@kieser-associates.com

CONTACT NAME: SAME
 COMPANY:
 ADDRESS:
 CITY: STATE: ZIP CODE:
 PHONE NO. E-MAIL ADDRESS:

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

PROJECT NO./NAME: Cedar Lake SAMPLER(S) - PLEASE PRINT/SIGN NAME: Josh Kieser
 TURNAROUND TIME REQUIRED: 1 DAY 2 DAYS 3 DAYS STANDARD OTHER
 DELIVERABLES REQUIRED: STD LEVEL II LEVEL III LEVEL IV EDD OTHER

Certifications
 OHIO VAP Drinking Water
 DoD NPDES
 Project Locations
 Detroit New York
 Other
 Special Instructions

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

Containers & Preservatives

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	OTHER	PFAS	MI-10-Metals	PAH'S								
	DATE	TIME																					
27504.01	8-25-21	8:45A	S1	S	6	5		1					X	X	X								
.02		9:00A	S2	S	6	5		1					X	X	X								
.03		9:25A	S3	S	6	5		1					X	X	X								
.04		9:45A	S4	S	6	5		1					X	X	X								
.05		10:05A	S5	S	6	5		1					X	X	X								
.06		10:20A	S6	S	6	5		1					X	X	X								
.07		10:35A	S7	S	6	5		1					X	X	X								
.08		10:50A	S8	S	6	5		1					X	X	X								

27505(PFAS).01
 .02
 .03
 .04
 .05
 .06
 .07
 .08

RELINQUISHED BY: Zach Harmon Sampler DATE: 8-25-21 TIME: 3:00P
 RECEIVED BY: Pat DATE: 8/29/21 TIME: 5:30
 RELINQUISHED BY: DATE: TIME:
 RECEIVED BY: DATE: TIME:

RELINQUISHED BY: DATE: TIME:
 RECEIVED BY: DATE: TIME:
 SEAL NO. SEAL INTACT YES NO INITIALS
 SEAL NO. SEAL INTACT YES NO INITIALS
 NOTES: TEMP. ON ARRIVAL: 9.6