STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING

GRETCHEN WHITMER
GOVERNOR

LIESL EICHLER CLARK
DIRECTOR

September 24, 2020

**VIA E-MAIL and U.S. MAIL**

Mr. Jason El-Zein, Chief
United States Environmental Protection Agency
Region 5
Emergency Response Branch #1 (SE-5J)
Ann Arbor, Michigan 48105

Dear Mr. Jason El-Zein:

SUBJECT: Michigan Department of Environment, Great Lakes, and Energy (EGLE) request for assistance and response actions at Morrow dam impoundment, Kalamazoo, Kalamazoo County, Michigan.

The purpose of this letter is to request assistance from the United States Environmental Protection Agency (U.S. EPA) to mitigate the active, uncontrolled and documented erosion of riverbanks, and release of contaminated sediments from the Morrow dam impoundment caused by the emergency lowering of water in the impoundment. The emergency drawdown was initiated by the dam operator (Operator) in October 2019. Water levels were lowered and have been sustained at an elevation that is approximately 9-feet below the normal operating level since November 2019.

An unnatural release of contaminated materials to the environment from Morrow dam impoundment has occurred and continues to occur. Sediments and soils within the Morrow dam impoundment are known to be contaminated with polychlorinated biphenyls (PCBs), semi-volatile organic compounds, volatile organic compounds, polynuclear aromatic hydrocarbons, and metals (Table B-2a). The Morrow dam marks the furthest downstream extent of the Enbridge oil spill and the section of the Kalamazoo River below Morrow dam and extending to Lake Michigan is a U.S. EPA Superfund Site (Operable Unit 5 [OU5] of the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund site). Remedial and response actions at the Superfund site are driven by the presence of PCBs in sediments, surface water, river banks, floodplain soils, and biota. Sediments within the Morrow dam impoundment are known to exceed the 1 part-per-million (ppm) total PCB remedial action level established by Superfund for the section of river immediately below Morrow dam and the 0.33 ppm final remediation goal for OU5 of the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund site (Figure 1).

EGLE is requesting the U.S. EPA complete response actions to temporarily stabilize the banks and river channel within the Morrow dam impoundment and stop the unnatural and ongoing release of contaminated sediments until the Operator can complete gate repairs that are necessary to begin refilling the impoundment, which is anticipated to be

in late 2020 or early 2021. Discussions regarding the timing of gate repairs and refill are ongoing.

If you have any questions, please contact Mr. Daniel Peabody, Environmental Quality Analyst, Remediation and Redevelopment Division at 517-285-3924; PeabodyD@Michigan.gov; or EGLE, P.O, Box 30426, Lansing, Michigan 48909-7926

Sincerely,

Daniel Peabody
Environmental Quality Analyst
Remediation and Redevelopment Division

Enclosure
cc/enc: Ms. Megen Miller, Michigan Department of Attorney General
Mr. Paul Ruesch, U.S. EPA
Mr. Ralph Dollhopf, U.S. EPA
Mr. Matt Diana, Michigan Department of Natural Resources (MDNR)
Ms. Kesiree Thiamkeelakul, MDNR
Mr. Jay Wesley, MDNR
Mr. Chris Lantinga, EGLE
Mr. David Heywood, EGLE
Mr. David Kline, EGLE
Mr. David O'Donnell, EGLE
Mr. Derek Haroldson, EGLE
Mr. Joe Walczak, EGLE
Mr. Kyle Alexander, EGLE
Ms. Sydney Ruhala, EGLE

**TABLE B-2a**
**Summary Statistics for Morrow Lake Reference Sediment Samples**

| Analyte | Number of Detects | Number of Samples | Frequency of Detects | Minimum Detected Concentration | | Maximum Detected Concentration | | KM Mean |
|---|---|---|---|---|---|---|---|---|
| **Metals/Inorganics (mg/kg)** | | | | | | | | |
| Antimony | 104 | 251 | 41% | 0.14 | J | 3.21 | J | 0.601 |
| Arsenic | 251 | 251 | 100% | 1.3 | J | 26 | J | 11.79 |
| Barium | 251 | 251 | 100% | 11 | J | 290 | | 161.5 |
| Beryllium | 242 | 251 | 96% | 0.0523 | J | 1.1 | | 0.389 |
| Cadmium | 246 | 251 | 98% | 0.02 | J | 4 | | 1.608 |
| Chromium | 251 | 251 | 100% | 2.7 | J | 450 | | 84.89 |
| Cobalt | 251 | 251 | 100% | 0.76 | J | 10.1 | | 5.406 |
| Copper | 250 | 251 | 100% | 1.1 | | 230 | | 40.01 |
| Iron | 251 | 251 | 100% | 3100 | | 42000 | | 24563 |
| Lead | 251 | 251 | 100% | 1.7 | J | 180 | | 51.61 |
| Magnesium | 251 | 251 | 100% | 490 | | 16000 | J | 4930 |
| Mercury | 233 | 251 | 93% | 0.011 | J | 1.5 | | 0.246 |
| Molybdenum | 126 | 251 | 50% | 0.072 | J | 2.6 | J | 0.658 |
| Nickel | 266 | 266 | 100% | 1.5 | J | 117 | | 22.96 |
| Selenium | 196 | 251 | 78% | 0.14 | J | 2.9 | B | 0.988 |
| Silver | 212 | 251 | 84% | 0.049 | J | 4.3 | | 0.813 |
| Thallium | 24 | 251 | 10% | 0.4 | J | 3.22 | J | 0.637 |
| Vanadium | 266 | 266 | 100% | 2.9 | | 22 | J | 12.43 |
| Zinc | 251 | 251 | 100% | 7.7 | J | 600 | J | 209.5 |
| | | | | | | | | |
| **Semi-Volatile Organic Compounds (SVOCs) (ug/kg)** | | | | | | | | |
| 1,1'-Biphenyl | 0 | 69 | 0% | -- | | -- | | -- |
| 1,2,4-Trichlorobenzene | 0 | 586 | 0% | -- | | -- | | -- |
| 1,2-Dichlorobenzene | 0 | 586 | 0% | -- | | -- | | -- |
| 1,3-Dichlorobenzene | 0 | 586 | 0% | -- | | -- | | -- |
| 1,4-Dichlorobenzene | 4 | 590 | 1% | 10 | J | 30 | J | 3.393 |
| 2,4,5-Trichlorophenol | 0 | 315 | 0% | -- | | -- | | -- |
| 2,4,6-Trichlorophenol | 0 | 315 | 0% | -- | | -- | | -- |
| 2,4-Dichlorophenol | 0 | 315 | 0% | -- | | -- | | -- |
| 2,4-Dimethylphenol | 0 | 314 | 0% | -- | | -- | | -- |
| 2,4-Dinitrophenol | 1 | 315 | 0.3% | 1400 | J | 1400 | J | 534 |
| 2,4-Dinitrotoluene | 0 | 315 | 0% | -- | | -- | | -- |
| 2,6-Dinitrotoluene | 0 | 315 | 0% | -- | | -- | | -- |

**TABLE B-2a**
**Summary Statistics for Morrow Lake Reference Sediment Samples**

| Analyte | Number of Detects | Number of Samples | Frequency of Detects | Minimum Detected Concentration | | Maximum Detected Concentration | | KM Mean |
|---|---|---|---|---|---|---|---|---|
| 2-Chloronaphthalene | 0 | 315 | 0% | -- | | -- | | -- |
| 2-Chlorophenol | 0 | 315 | 0% | -- | | -- | | -- |
| 2-Methylnaphthalene | 29 | 586 | 5% | 11 | J | 610 | | 10.76 |
| 2-Methylphenol | 1 | 315 | 0% | 29 | J | 29 | J | 29 |
| 2-Nitroaniline | 1 | 315 | 0.3% | 230 | J | 230 | J | 121.7 |
| 2-Nitrophenol | 0 | 315 | 0% | -- | | -- | | -- |
| 3,3'-Dichlorobenzidine | 0 | 288 | 0% | -- | | -- | | -- |
| 3-Methylphenol & 4-Methylphenol | 4 | 251 | 2% | 51 | J | 140 | J | 110.3 |
| 3-Nitroaniline | 0 | 305 | 0% | -- | | -- | | -- |
| 4,6-Dinitro-2-methylphenol | 0 | 268 | 0% | -- | | -- | | -- |
| 4-Bromophenyl phenyl ether | 0 | 315 | 0% | -- | | -- | | -- |
| 4-Chloro-3-methylphenol | 0 | 315 | 0% | -- | | -- | | -- |
| 4-Chloroaniline | 0 | 315 | 0% | -- | | -- | | -- |
| 4-Chlorophenyl phenyl ether | 0 | 315 | 0% | -- | | -- | | -- |
| 4-Nitroaniline | 0 | 305 | 0% | -- | | -- | | -- |
| 4-Nitrophenol | 0 | 313 | 0% | -- | | -- | | -- |
| Acenaphthene | 87 | 315 | 28% | 12 | J | 120 | | 36.14 |
| Acenaphthylene | 202 | 315 | 64% | 11 | J | 280 | | 54.69 |
| Anthracene | 245 | 315 | 78% | 7.2 | J | 350 | | 78.33 |
| Benzaldehyde | 42 | 69 | 61% | 26 | J | 170 | J | 81.07 |
| Benzo(a)anthracene | 289 | 315 | 92% | 10 | J | 2500 | | 454.9 |
| Benzo(a)pyrene | 294 | 315 | 93% | 9.9 | J | 2500 | | 584.2 |
| Benzo(b)fluoranthene | 295 | 315 | 94% | 11 | J | 3000 | | 824.7 |
| Benzo(g,h,i)perylene | 287 | 315 | 91% | 13 | J | 1700 | | 457.8 |
| Benzo(k)fluoranthene | 288 | 315 | 91% | 11 | J | 2600 | | 405.2 |
| bis(2-chloroethoxy)methane | 0 | 315 | 0% | -- | | -- | | -- |
| bis(2-chloroethyl)ether | 1 | 315 | 0.3% | 100 | J | 100 | J | 68.29 |
| bis(2-chloroisopropyl)ether | 0 | 315 | 0% | -- | | -- | | -- |
| bis(2-ethylhexyl)phthalate | 131 | 315 | 42% | 22 | J | 3500 | | 280.8 |
| Butyl benzyl phthalate | 5 | 315 | 2% | 110 | J | 240 | | -- |
| Caprolactam | 0 | 69 | 0% | -- | | -- | | -- |
| Carbazole | 6 | 287 | 2% | 36 | J | 180 | J | 112 |
| Carbon disulfide | 6 | 319 | 2% | 1.9 | J | 40 | J | 2.497 |
| Carbon tetrachloride | 0 | 318 | 0% | -- | | -- | | -- |

**TABLE B-2a**
**Summary Statistics for Morrow Lake Reference Sediment Samples**

| Analyte | Number of Detects | Number of Samples | Frequency of Detects | Minimum Detected Concentration | | Maximum Detected Concentration | | KM Mean |
|---|---|---|---|---|---|---|---|---|
| Chlorobenzene | 0 | 318 | 0% | -- | | -- | | -- |
| Chrysene | 288 | 315 | 91% | 14 | J | 2300 | | 594.5 |
| Dibenzo(a,h)anthracene | 258 | 315 | 82% | 7.2 | J | 490 | | 131.4 |
| Dibenzofuran | 16 | 315 | 5% | 11 | J | 68 | J | 20.69 |
| Diethyl phthalate | 1 | 315 | 0.3% | 43 | J | 43 | J | 43 |
| Dimethyl phthalate | 5 | 315 | 2% | 13 | J | 18 | J | 15.8 |
| Di-n-butyl phthalate | 94 | 315 | 30% | 27 | J | 970 | J | 141.5 |
| Di-n-octyl phthalate | 2 | 315 | 1% | 220 | | 900 | | 124.2 |
| Fluoranthene | 301 | 315 | 96% | 11 | J | 3600 | J | 1012 |
| Fluorene | 193 | 315 | 61% | 11 | J | 170 | | 46.75 |
| Hexachlorobenzene | 0 | 315 | 0% | -- | | -- | | -- |
| Hexachlorobutadiene | 0 | 315 | 0% | -- | | -- | | -- |
| Hexachlorocyclopentadiene | 0 | 313 | 0% | -- | | -- | | -- |
| Hexachloroethane | 0 | 332 | 0% | -- | | -- | | -- |
| Indeno(1,2,3-cd)pyrene | 288 | 315 | 91% | 11 | J | 1600 | | 406.9 |
| Isophorone | 0 | 315 | 0% | -- | | -- | | -- |
| Isopropylbenzene | 0 | 251 | 0% | -- | | -- | | -- |
| Naphthalene | 141 | 583 | 24% | 8.6 | J | 110 | | 16.42 |
| Nitrobenzene | 0 | 315 | 0% | -- | | -- | | -- |
| N-Nitrosodi-n-propylamine | 0 | 268 | 0% | -- | | -- | | -- |
| N-Nitrosodiphenylamine | 0 | 315 | 0% | -- | | -- | | -- |
| Pentachlorophenol | 1 | 315 | 0.3% | 300 | J | 300 | J | 300 |
| Phenanthrene | 284 | 315 | 90% | 14 | J | 1300 | | 311.6 |
| Phenol | 2 | 315 | 1% | 10 | J | 73 | J | 41.5 |
| Pyrene | 293 | 315 | 93% | 15 | J | 4000 | | 896.8 |
| TPH (DRO) | 234 | 251 | 93% | 1700 | J | 540000 | J | 153715 |
| TPH (GRO) | 2 | 251 | 1% | 12000 | | 14000 | J | 1653 |
| TPH (ORO) | 251 | 251 | 100% | 8900 | | 5000000 | J | 1072031 |
| **Volatile Organic Compounds (VOCs) (ug/kg)** | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 0 | 318 | 0% | -- | | -- | | -- |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 0 | 22 | 0% | -- | | -- | | -- |
| 1,1,2-Trichloroethane | 0 | 318 | 0% | -- | | -- | | -- |
| 1,1,2-Trichlorotrifluoroethane | 0 | 229 | 0% | -- | | -- | | -- |
| 1,1-Dichloroethane | 0 | 318 | 0% | -- | | -- | | -- |

**TABLE B-2a**
**Summary Statistics for Morrow Lake Reference Sediment Samples**

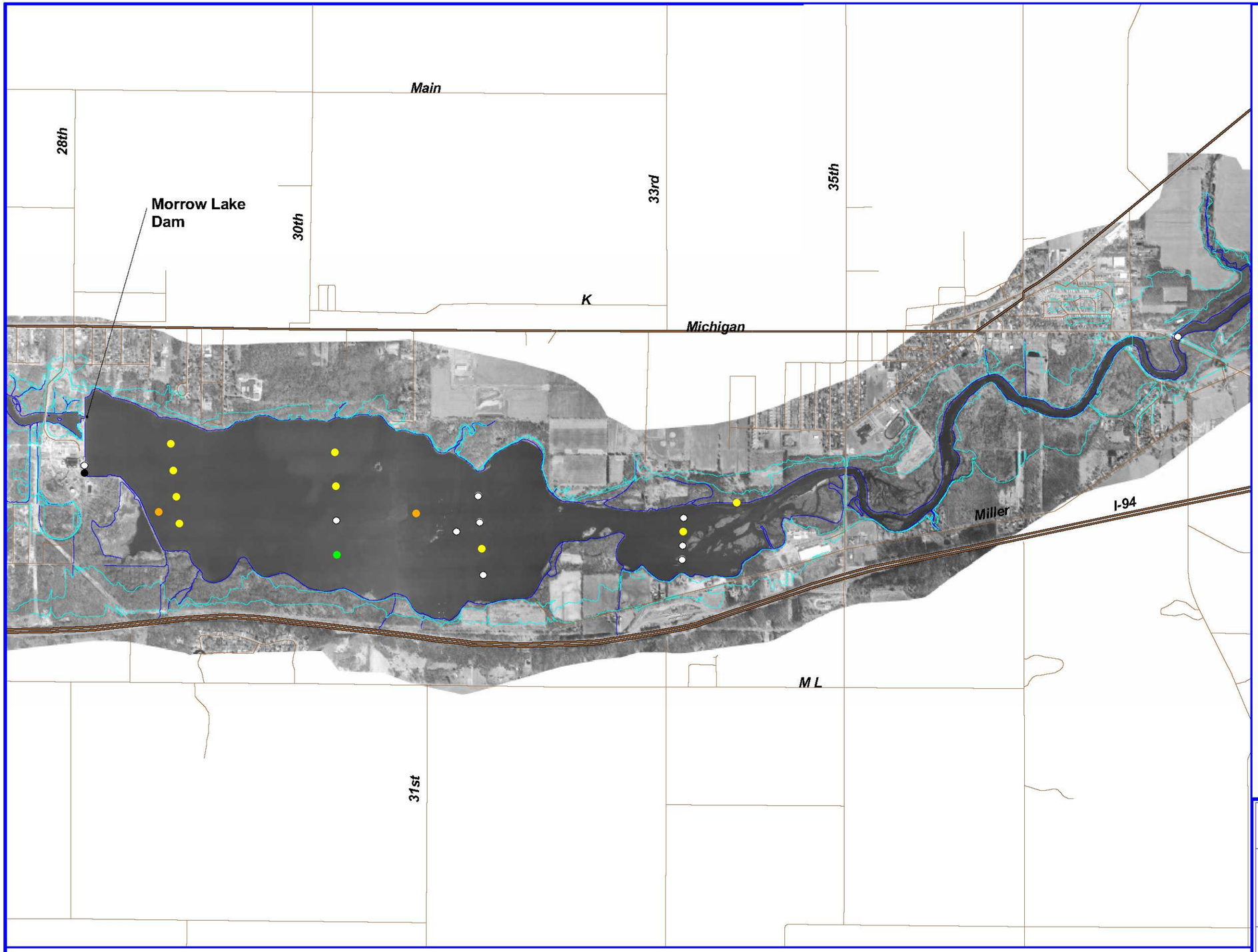
| Analyte | Number of Detects | Number of Samples | Frequency of Detects | Minimum Detected Concentration | | Maximum Detected Concentration | | KM Mean |
|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethene | 0 | 318 | 0% | -- | | -- | | -- |
| 1,2,3-Trichloropropane | 1 | 268 | 0.4% | 1.9 | J | 1.9 | J | 1.9 |
| 1,2,4-Trimethylbenzene | 1 | 268 | 0.4% | 2.9 | J | 2.9 | J | 2.85 |
| 1,2-Dibromo-3-Chloropropane | 0 | 318 | 0% | -- | | -- | | -- |
| 1,2-Dibromoethane | 0 | 318 | 0% | -- | | -- | | -- |
| 1,2-Dichloroethane | 1 | 318 | 0% | 1.6 | J | 1.6 | J | 1.6 |
| 1,2-Dichloropropane | 0 | 318 | 0% | -- | | -- | | -- |
| 1,3,5-Trimethylbenzene | 1 | 268 | 0.4% | 0.88 | J | 0.88 | J | 0.88 |
| 2-Butanone | 86 | 255 | 34% | 2.4 | J | 220 | | 21.03 |
| 2-Hexanone | 0 | 301 | 0% | -- | | -- | | -- |
| 4-Methyl-2-pentanone | 0 | 318 | 0% | -- | | -- | | -- |
| Acetone | 173 | 373 | 46% | 3.2 | J | 9700 | J | 216.5 |
| Benzene | 0 | 318 | 0% | -- | | -- | | -- |
| Bromochloromethane | 0 | 318 | 0% | -- | | -- | | -- |
| Bromodichloromethane | 0 | 318 | 0% | -- | | -- | | -- |
| Bromoform | 0 | 318 | 0% | -- | | -- | | -- |
| Bromomethane | 0 | 318 | 0% | -- | | -- | | -- |
| Chloroethane | 0 | 318 | 0% | -- | | -- | | -- |
| Chloroform | 4 | 318 | 1% | 96 | J | 180 | J | 4.902 |
| Chloromethane | 1 | 318 | 0.3% | 300 | J | 300 | J | 3.926 |
| cis-1,2-Dichloroethene | 0 | 318 | 0% | -- | | -- | | -- |
| cis-1,3-Dichloropropene | 0 | 318 | 0% | -- | | -- | | -- |
| Dibromochloromethane | 0 | 318 | 0% | -- | | -- | | -- |
| Dibromomethane | 0 | 268 | 0% | -- | | -- | | -- |
| Dichlorodifluoromethane | 0 | 251 | 0% | -- | | -- | | -- |
| Diethyl ether | 0 | 246 | 0% | -- | | -- | | -- |
| Ethyl ether | 0 | 22 | 0% | -- | | -- | | -- |
| Ethylbenzene | 1 | 318 | 0.3% | 0.91 | J | 0.91 | J | 0.91 |
| m,p-Xylene | 1 | 251 | 0.4% | 3.7 | J | 3.7 | J | 3.7 |
| Methyl iodide | 0 | 268 | 0% | -- | | -- | | -- |
| Methyl tert-butyl ether | 0 | 318 | 0% | -- | | -- | | -- |
| Methylene Chloride | 64 | 373 | 17% | 10 | WJ | 420 | J | 17.59 |
| N-Propylbenzene | 0 | 268 | 0% | -- | | -- | | -- |
| o-Xylene | 1 | 318 | 0.3% | 1.5 | J | 1.5 | J | 1.5 |
| Styrene | 1 | 318 | 0.3% | 0.8 | J | 0.8 | J | 0.8 |

**TABLE B-2a**
**Summary Statistics for Morrow Lake Reference Sediment Samples**

| Analyte | Number of Detects | Number of Samples | Frequency of Detects | Minimum Detected Concentration | | Maximum Detected Concentration | | KM Mean |
|---|---|---|---|---|---|---|---|---|
| Tetrachloroethene | 0 | 318 | 0% | -- | | -- | | -- |
| Toluene | 84 | 393 | 21% | 0.41 | J | 15000 | | 420.9 |
| trans-1,2-Dichloroethene | 0 | 318 | 0% | -- | | -- | | -- |
| trans-1,3-Dichloropropene | 0 | 318 | 0% | -- | | -- | | -- |
| trans-1,4-Dichloro-2-butene | 0 | 268 | 0% | -- | | -- | | -- |
| Trichloroethene | 0 | 318 | 0% | -- | | -- | | -- |
| Trichlorofluoromethane | 0 | 251 | 0% | -- | | -- | | -- |
| Vinyl acetate | 0 | 268 | 0% | -- | | -- | | -- |
| Vinyl chloride | 0 | 318 | 0% | -- | | -- | | -- |
| Xylenes (total) | 4 | 268 | 1% | 5.2 | J | 220 | J | 7.082 |

**Notes:**
mg/kg = milligrams per kilogram
ug/kg = microgram per kilogram
J = Value is estimated
W = Post-digestion spike for furnace analysis is out of control limits, while sample absorbance is <50% of spike absorbance.
-- = Cannot calculate for zero detects
KM = Kaplan Meier

PREPARED BY/DATE: LSV 05/07/14
CHECKED BY/DATE: NSR 05/14/14





## LEGEND

Total PCB (mg/kg)

- > 50 ppm
- 10 - 50 ppm
- 5 - 10 ppm
- 1 - 5 ppm
- 0.33 - 1 ppm
- Non-Detect - 0.33 ppm
- Non-Detect
- Highways
- Local Roads
- INTERMEDIATE_CONTOUR
- STREAM_LIMIT
- County Line
- City Line

1000 0 1000 2000 3000 Feet

Notes:
(1) Aerial photographs taken by Air Land Surveys, Inc. on 4/24/00.
(2) Coordinates are in State Plane Michigan South NAD 1983.
(3) Data obtained from: BBL database "Kzoo082202-A2000.mdb" dated 8/22/02;
CDM/MDEQ database "Kzoomaster.mdb";
Weston/EPA data from Plainwell and Otsego City Removal Assessments.
(4) Boring/data points may overlap and may not depict all samples.
(5) QA/QC samples (ie duplicates) are not shown within this dataset.

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# DRAFT VERSION
# Maximum Total PCBs
# Sediment and Soils

CDM

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Prepared By:
A. Santini
Date:
2/24/04

**Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site**

**Maximum Total PCBs Morrow Lake**

**Figure No. 1**