Removal Recommendation
Restrictions on Dredging Activities Beneficial Use Impairment
Manistique River Area of Concern

Issue

The Michigan Department of Environment, Great Lakes, and Energy (EGLE), Water Resources Division, Areas of Concern (AOC) program recommends removal of the Restrictions on Dredging Activities Beneficial Use Impairment (BUI) from the Manistique River AOC. This recommendation is being made with the support of EGLE technical staff, U.S. Army Corps of Engineers (USACE) technical staff, U.S. Environmental Protection Agency (U.S. EPA) Great Lakes National Program Office staff, and community stakeholders, in accordance with the process and criteria set forth in the *Guidance for Delisting Michigan's Great Lakes Areas of Concern* (Michigan Department of Natural Resources [MDNR], 2018). Based on the most recent analyses, Manistique River sediments in the federal navigation channel can be generally characterized as consisting largely of clean sand.

Background

The Manistique River flows toward the southwest through Schoolcraft County in Michigan's central Upper Peninsula, emptying into Lake Michigan at the city of Manistique. The AOC boundary includes the last 1.7 miles of the river, from the dam in Manistique to the mouth of the harbor at Lake Michigan (MDNR, 1987). See Figure 1. The AOC currently has two BUIs remaining as determined under the Great Lakes Water Quality Agreement, including Restrictions on Fish and Wildlife Consumption and Restrictions on Dredging Activities. The Degradation of Benthos, Loss of Fish and Wildlife Habitat and Beach Closings BUIs were removed in 2006, 2008, and 2009, respectively. This document only addresses the Restrictions on Dredging Activities BUI.

As more fully described below in the Restoration Criteria section, the Restrictions on Dredging Activities BUI applies only to the federally maintained navigation channel within the AOC, which extends from the harbor entrance at the breakwalls on Lake Michigan, upstream to a line approximately from the public boat launch on the west side of the river to the entrance at the municipal marina on the east side, Figure 1.

There have been restrictions on the placement of sediment dredged from the federal navigation channel due to elevated concentrations of contaminants, including polychlorinated biphenyls (PCBs) for many years. According to the most recent USACE Sediment Evaluation report (USACE, 2020), approximately 89,000 yd^3 of material may be dredged from the navigation channel in 2021. Since the 1960s, the Manistique River navigation channel has been dredged numerous times, as follows (USACE, 2018):

Year	Cubic Yards of Material Removed
2016	20,700
2010	104,327
1967	10,955
1965	21,755
1964	8,050
1963	12,000

According to the U.S. EPA Superfund program information available through the Interstate Technology and Regulatory Council (ITRC), historical uses of Manistique River waters in the AOC included receiving wastes from sawmills, a paper mill, small industries, and the municipal wastewater treatment plant, plus navigation for shipping, ferrying, recreational boating, and commercial fishing. Large quantities of un-decomposed sawdust were found in harbor and river sediments from the lumbering era, as well as relatively sterile sandy sediment that eroded from riverbanks as a result of log drives on the river (ITRC, 2014).

The original Remedial Action Plan (RAP) for the Manistique River Area of Concern, completed in 1987, cites PCBs and heavy metal contamination as the primary issue impacting designated uses, biota, sediment quality, and water quality of the Manistique River. For example, the document states, “The problems within the Area of Concern as identified in the 1985 Report on Great Lakes Water Quality are sediments contaminated with polychlorinated biphenyls (PCBs) and heavy metals, a fish consumption advisory, and impacted biota.” In the section titled, Sediment Contamination, the document restates, “Sediments in the AOC are contaminated with PCBs and heavy metals.” These claims were supported with analytical sampling results and first-hand knowledge of industrial and municipal wastewater sources from the era (MDNR, 1987).

The primary sources of contamination in the Manistique Harbor included PCBs, beginning in the late 1950s, from point sources (discharges/releases from the former paper mill and lumber mill operations, and other area industrial facilities) and nonpoint sources (runoff from area industrial operations, combined sewer overflows, and discharges from the wastewater treatment plant) (ITRC, 2014).

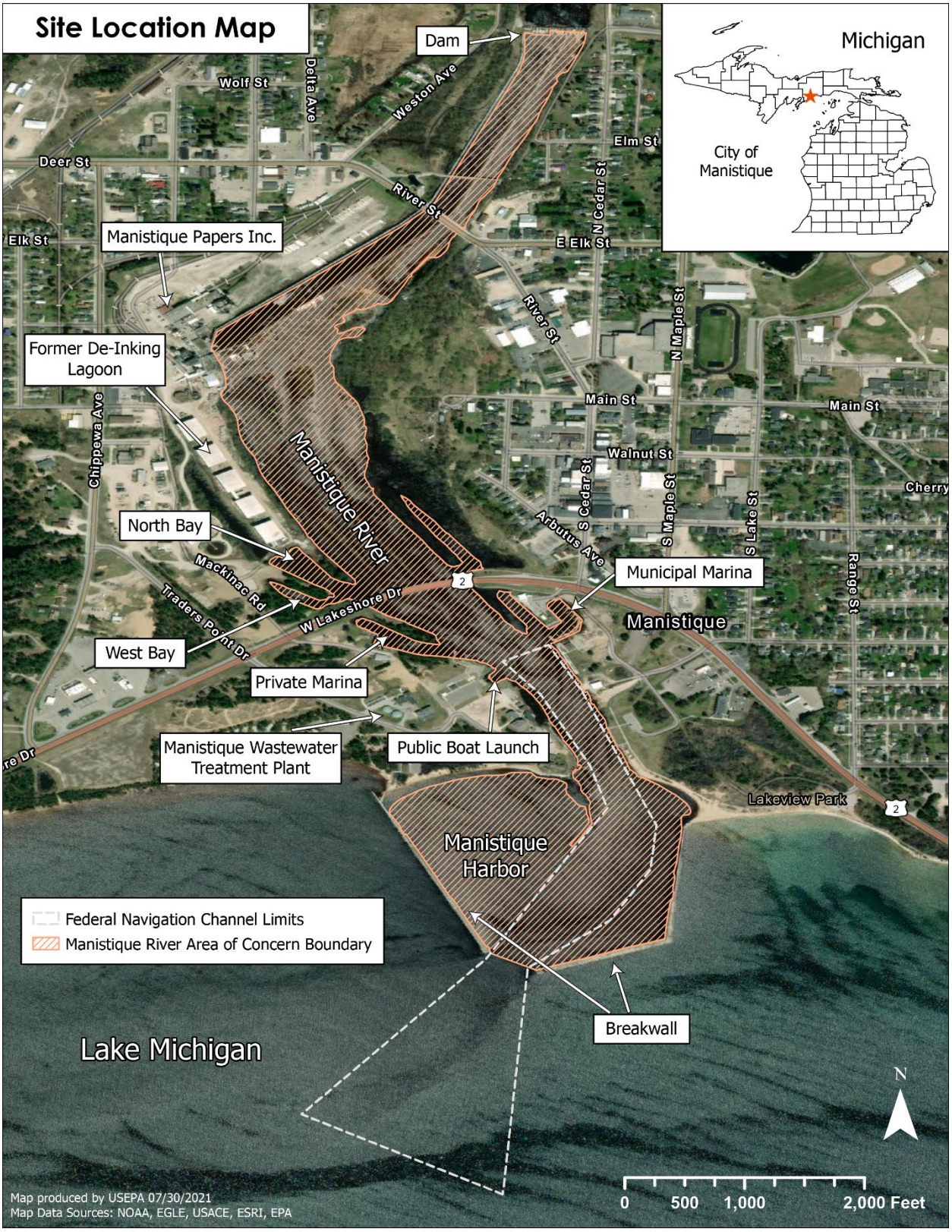

Figure 1. Manistique River Area of Concern boundary, federal navigation channel and sites of interest.

Restoration Criteria

Michigan's 2018 statewide restoration criteria for the Restrictions on Dredging Activities BUI reads in part as follows (see Appendix A for the criteria in its entirety):

"This BUI will be considered restored when:

- During the most recent routine dredging in the U.S. Army Corps of Engineers designated navigational channel, use of a confined disposal facility or TSCA-level landfill for dredge spoils was not required due to chemical contamination." (MDNR, 2018)

Michigan's restoration criteria only apply to the federally maintained commercial navigation channel. The channel does not include marinas, boat slips, public access areas, or shoreline areas. Some of those areas may continue to require restrictions on placement of dredged materials due to chemical contamination. However, there are no known ongoing point sources of chemical contaminants into the Manistique River AOC, notwithstanding National Pollutant Discharge Elimination System regulated facilities, such as the municipal wastewater treatment plant.

Proposed dredge projects are evaluated under federal and state authorities. Any special circumstances, including contamination, are addressed in the permitting process that regulates pre-dredge analyses and disposal of dredge spoils. These programs apply throughout Michigan waters, not just in AOCs. Only sediments located within the federally-maintained navigation channel in the Manistique River were considered in the evaluation of this BUI.

Open water disposal of contaminated dredge spoils in the Great Lakes or connecting waterways is not permitted in Michigan. As a result, use of disposal options other than open water is not automatically a restriction on dredging. Any actual restrictions are determined by analytical results to characterize contaminant concentrations in dredge spoils.

Summary of Remedial Actions

The list of remedial activities in the Manistique River AOC goes back almost 30 years. Over that period, several projects have removed significant volumes of contaminated sediments from the lower river and harbor. The following is a summary of some of the more significant milestones. Today, there are no known sources of PCB contamination remaining.

1977

The Manistique Wastewater Treatment Plant (WWTP) was upgraded to secondary (biological) treatment. Manistique Papers, Inc. upgraded its wastewater treatment facilities to provide secondary treatment of process wastewater from its paper making

operations. Manistique Papers, Inc. also dredged and filled the de-inking wastewater settling lagoon (MDNR, 1987).

1986
Manistique Papers, Inc. placed an erosion barrier along the west bank of the main river channel upstream from the U.S. 2 highway to control erosion of PCB impacted soils from the former de-inking lagoon (MDNR, 1987).

1996
Washed gravel was placed in the North Bay area (located on the west side of the river upstream and adjacent to the U.S. 2 highway bridge) to improve the river bottom as habitat for fish as well as to contain contaminated residuals (Triad Engineering Inc. and Terrafirma Environmental, Inc., 2002).

1999
The Manistique WWTP biological control process was updated from rotating biological contactors to activated sludge, significantly increasing the hydraulic capacity of the plant (C. Barr, personal communication, May 24, 2006).

1993-2000
The 2002 RAP Update estimated that 141,000 cubic yards of PCBs and heavy metal-impacted sediments were successfully removed from the harbor and river system between 1993 and 2000 through U.S. EPA Superfund cleanup activities, including over 10,000 pounds of PCBs (MDEQ, 2002; U.S. EPA AOC website). In addition, approximately 31,100 cubic yards of wood chips, sawdust, and other solid materials were removed as a part of those dredging activities (Triad Engineering Inc. and Terrafirma Environmental, Inc., 2002).

2000-2001
Dredging of impacted sediments was completed, and confirmation sediment sampling for PCBs was conducted to ensure that the U.S. EPA Superfund goal of 10 parts per million (ppm) average PCB concentration for the harbor and river was met (Weston Solutions, Inc., 2005). Superfund personnel collected a comprehensive round of sediment samples at 400 locations on a random grid spacing. The sampling data had an average PCB concentration of 7.7 ppm in the surficial, top six inches of sediment (Weston Solutions, Inc., 2005).

2001-2010
Four separate sediment investigations were conducted in the AOC in 2001, 2004, 2008, and 2010 to identify and characterize remaining areas with elevated PCB sediment concentrations, following the completed dredging projects. These efforts included collection of both surficial and samples at depth throughout the River and Harbor, both upstream and downstream of U.S. 2. In all, over 1200 samples were collected, indicating a wide range of PCB concentrations throughout the AOC during this decade, from non-detect to greater than 100 ppm (GLAES, 2012). The results of these

investigations were instrumental in the development of designs for the remedial dredge projects to come.

2016-2019
Two final sediment remediation projects were implemented to address the remaining PCB contamination in the AOC in 2016 and 2019, at a total cost of approximately $15.7 million, supported by the federal Great Lakes Restoration Initiative with a cooperative agreement between the National Oceanic and Atmospheric Administration and EGLE (S. Noffke, personal communication, March 24, 2021).

Between August and December 2016, about 9,400 cubic yards of contaminated sediment and woody debris were removed from the upper river area, focusing primarily on the North Bay, the West Bay, and the private marina on the west side just downstream of U.S. 2. PCBs were remediated in these areas down to concentrations no greater than 1 ppm. The dredged areas were then covered with six inches to a foot of clean sand, which is approximately equivalent to 1,900 cubic yards of material. As an additional protective measure, in November 2019, approximately 4,000 cubic yards of granular activated carbon and sand mixture was placed over the upper remediation area (Arcadis, 2018).

Between June and November 2019, about 42,500 cubic yards of contaminated sediment and sawdust were removed from the lower river and harbor, closer to Lake Michigan. The remedial targets for these areas were 0.5 ppm for surficial sediments and 0.3 ppm at depth, any minor exceedances of which were covered with amended sand material. Approximately 7,700 cubic yards of granular activated carbon and sand mixture was placed over the cleanup footprint in the lower river area as an additional protective measure (Arcadis, 2020). Any locations that did not receive cover placement were either composed of hard substrate (little to no sediment) or were confirmed to have surficial sediment concentrations below the appropriate remedial action target. As a result of this work, the navigation channel is not expected to be re-contaminated by residuals in the future.

The carbon/sand cover applied to these areas serves two basic functions. One is to provide a physical barrier that may prevent the possible resuspension and exposure of any low-level residual PCBs to aquatic biota. Second, the activated carbon chemically attracts and binds PCB residuals to further prevent biological uptake. All remedial actions identified for the Manistique River AOC were completed in November 2019.

2020
In June of 2020, a contractor for the USACE collected sediment samples in the federal navigation channel in the Manistique River to assess contaminant levels and determine available sediment disposal options for upcoming navigation channel maintenance dredging.

Sampling Results

Michigan's Sediment Testing for Dredging Projects policy (WRD-048; DEQ, 2018) requires sample sediment cores to be collected to the full project depth from six discrete locations representing the first 10,000 cubic yards of material, plus at least one sample for each 10,000 cubic yards of additional material proposed for dredging. Based on recent soundings, the USACE estimated approximately 89,000 cubic yards of material to be dredged from the Manistique River federal navigation channel (USACE, 2020). Accordingly, 15 sediment samples were collected.

Sediments in the federal navigation channel were sampled on June 17 and 18, 2020, by contractors working for the USACE. The sampling method included the collection of one composite sample from cores at each of 15 sample locations, as indicated in Figure 2. Cores were collected at depth ranges including 0 to 5, 2 to 7, 3 to 8, and 5 to 10 feet. The sediment samples were analyzed by Trace Analytical Laboratories, Inc., of Muskegon, Michigan and those results were assessed by qualified USACE Detroit District staff, as well as qualified EGLE staff in the Materials Management and Water Resources Divisions. See Appendix B for analytical results.

Collectively, the sediment samples were determined to consist of about 94% sand with overall average percent fines of 3.6%, according to the USACE Sediment Evaluation report, June 2020. For regulatory purposes, and for determining dredged material placement options, any sediment consisting of over 90% sand is generally considered to be clean and additional chemical analyses are normally not required. However, considering the Manistique River's designation as an AOC and the desire to evaluate the effectiveness of the most recent dredging operations, the samples were chemically analyzed for metals, polycyclic aromatic hydrocarbons (PAHs), chlorinated pesticides, oil and grease, nutrients, and PCBs.

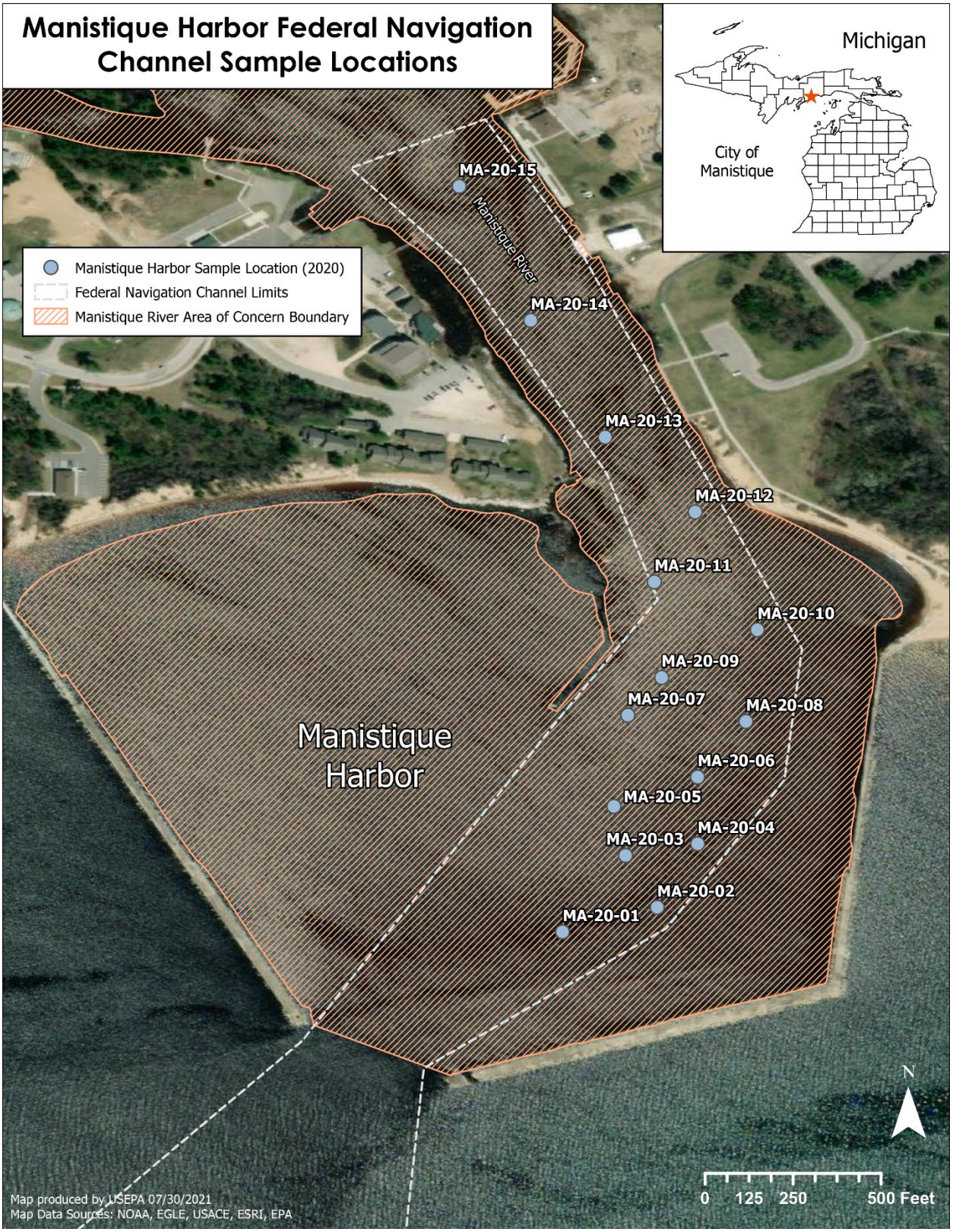

Figure 2. Manistique Harbor Federal Navigation Channel sample locations.

Out of 15 composited sediment samples, none were found to contain total PCB concentrations above the Threshold Effect Concentration (TEC) of 60 micrograms per kilogram (µg/kg). TEC is the concentration below which adverse effects are not expected to occur to benthic communities (MacDonald, 2002; Wisconsin Department of Natural Resources, 2003). Just three of the samples were found to contain detectable levels of PCBs. The concentrations of those samples were: 20, 27, and 44 µg/kg (µg/kg is equivalent to parts per billion, or ppb). No PCBs were detected in the remaining 12 samples.

The 15 sediment samples were also analyzed for a suite of over 20 chlorinated pesticides. One sample included a detectable amount of one of those constituents (alpha-BHC), and the estimated concentration was below the TEC. Several PAHs were found at very low concentrations, none of which exceeded their respective TEC. With regard to 13 different metals analyzed in each sediment sample, none were found to exceed their respective TEC. Oil and grease were non-detectable in all 15 samples.

Analysis

To emphasize the scale of the PCB concentrations that were found (20, 27, and 44 µg/kg), recall that the TEC, the concentration below which adverse effects are not expected to occur to benthic communities, is 60 µg/kg. This means not only were very few locations found to have any detectable levels of PCBs, but in the locations where PCBs were detected, the concentrations were so low as not to be of concern for causing adverse impacts to the organisms that live in those sediments.

Dredged sediments with a PCB concentration of 50 ppm (equivalent to 50,000 µg/kg) or greater must be transported to a Toxic Substances Control Act (TSCA) permitted chemical waste disposal facility or a hazardous waste disposal facility permitted by the U.S. EPA under section 3004 of the Resource Conservation and Recovery Act (RCRA), or by a State authorized under section 3006 of RCRA (40 CFR 761.61). Dredged sediments with a PCB concentration of less than 50 ppm may be disposed of in a standard municipal solid waste landfill, whose permit allows it to accept PCBs, based on the in-situ PCB concentration. But again, only three of the 15 sediment samples were found to contain quantifiable PCBs, all of which were orders of magnitude under the 50 ppm TSCA disposal threshold. With regard to PCBs, the sediment is considered to be non-hazardous waste, making it eligible for disposal in a municipal solid waste landfill.

In Michigan, the specific concentrations below which contaminants are considered non-hazardous and eligible for municipal landfill disposal are listed in the Part 201 Residential Direct Contact Generic Cleanup Criteria and Screening Levels (see Appendix C), with the exception of PCBs, which are regulated under TSCA. Part 201 refers to the Environmental Remediation section of Michigan's Natural Resources and Environmental Protection Act (NREPA, Act 451 of 1994, as amended). The TSCA residential cleanup criterion for total PCBs is 1 ppm and Michigan's Part 201 soil direct

contact cleanup criterion is 4 ppm (as provided in footnote T to the Part 201 standards), both significantly higher than even the highest levels detected in navigation channel sediments.

Even the highest Manistique River sediment sample results for metals, chlorinated pesticides, PAHs and oil and grease were found to be safely below the Part 201 thresholds, meaning the Manistique River sediments that were sampled in the navigation channel are considered to be non-hazardous waste and are therefore acceptable for disposal in a municipal landfill. At more than 94% sand, operators of municipal landfills can potentially use the Manistique Harbor dredge spoils to provide a very economical material for use to meet their daily cover requirements.

In addition, all analytes were found to be at or below their respective TECs, which is a set of measures that are even more restrictive than the state's landfill standards. Collectively, these data tell us that not only are the sediments considered clean for purposes of landfill disposal, but that the benthic organisms living in the sediment of the navigation channel are unlikely to be adversely affected by the minute concentrations of contaminants that are present.

In summary, the use of a confined disposal facility or TSCA-level landfill is not required for the disposal of Manistique Harbor dredge spoils due to chemical contamination, meeting the restoration criteria listed in the *Guidance for Delisting Michigan's Great Lakes Areas of Concern* for the Restrictions on Dredging Activities BUI.

Conclusion

Sediment chemistry analyses were completed by Trace Analytical Laboratories, Inc. and evaluated by qualified USACE and EGLE staff. The resulting determination is detailed above and finds that the Manistique River navigation channel sediments do not require use of a confined disposal facility or TSCA-level landfill. Therefore, the State's restoration criteria for the Restrictions on Dredging Activities BUI are met.

Recommendation

The proposed BUI removal is being public noticed via posting on the Mich-RAP and Enviro-Mich listservs, a local press release, and listing in the EGLE Calendar for 30 days. This document is posted on EGLE's AOC program web page for public review and comment.

The recommendation to remove the Restrictions on Dredging BUI from the AOC was discussed with city stakeholders and support was expressed for removal of the BUI. The city submitted a formal letter of support for removal of the BUI, dated June 9, 2021 (Attachment D).

Based on review of existing data, technical input from the EGLE Materials Management and Water Resources Divisions, U.S. EPA's Great Lakes National Program Office, the U.S. Army Corps of Engineers, and local Manistique River stakeholders, EGLE recommends removal of the Restrictions on Dredging Activities BUI from the Manistique River AOC.

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References

Advanced Matrix-AEM Group JV, LLC, 2020. FY 20 Manistique Harbor Sediment Sampling and Analysis Manistique, Michigan Final Report.

Arcadis of Michigan, LLC, 2018. OU1 Construction Completion Report, Manistique River AOC.

Arcadis of Michigan, LLC, 2020. OU2 Construction Completion Report, Manistique River AOC.

Great Lakes Architect Engineer Services, 2012. Historic Document Review and Information Summary Report, Manistique River Area of Concern.

Governments of Canada and the United States, 2012. Great Lakes Water Quality Agreement. https://binational.net/wp-content/uploads/2014/05/1094_Canada-USA-GLWQA-_e.pdf

Interstate Technology and Regulatory Council (ITRC) website, 2014. Contaminated Sediments Remediation, Manistique River, MI. https://www.itrcweb.org/contseds_remedy-selection/Content/Appendix%20A/A%2040Case%20Study%20Manistique.htm

MacDonald, D.D., G.G. Ingersoll, and T.A. Berger, 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Archives of Environmental Contamination and Toxicology, volume 39, 20-31.

Michigan Department of Environmental Quality, 1996. Manistique River Area of Concern Remedial Action Plan Update.

Michigan Department of Environmental Quality, 2018. Part 201 Generic Cleanup Criteria and Screening Levels/Part 213 Risk-Based Screening Levels. http://www.michigan.gov/documents/deq/deq-rrd-Rules-Table2SoilResidential_447072_7.pdf

Michigan Department of Environmental Quality, 2018. Water Resources Division Policy and Procedure: Sediment Testing for Dredging Projects. https://www.michigan.gov/documents/deq/wrd-policy-048-sediment-testing_620980_7.pdf

Michigan Department of Natural Resources, 1987. Remedial Action Plan for the Manistique River Area of Concern. https://www.epa.gov/sites/production/files/2015-08/documents/1987_manistique_rap.pdf

Michigan Department of Natural Resources, 2018. Guidance for Delisting Michigan's Great Lakes Areas of Concern. https://www.michigan.gov/documents/egle/wrd-aoc-delisting-guidance_665180_7.pdf

Triad Engineering Inc. and Terrafirma Environmental, Inc., 2002. Remedial Action Plan Update Manistique River and Harbor Area of Concern.

United States Army Corps of Engineers, 2020. Sediment Evaluation Manistique Harbor June 2020 Sediment Sampling and Analysis.

United States Army Corps of Engineers, 2018. Contract dredging Report, Detroit District, Operations office: http://lre-ops.usace.army.mil/OandM/dredgingfiles/manisq.pdf

United States Army Corps of Engineers Manistique Harbor web site, accessed July 21, 2021: https://www.lre.usace.army.mil/Missions/Operations/Manistique-Harbor-MI/

United States Environmental Protection Agency Manistique River AOC website accessed March 4, 2021. https://www.epa.gov/great-lakes-aocs/manistique-river-aoc

Weston Solutions, Inc., 2005. Data Evaluation Report. Revision 1. 19 May 2005, U.S. EPA Contract No. 68-W700026, Work Assignment No. 236-TATA-05FV, Document Control No. RFW236-2A-ASJY.

Wisconsin Department of Natural Resources, 2003. Consensus-Based Sediment Quality Guidelines; Recommendations for Use & Application. https://www.dnr.wi.gov/files/PDF/pubs/rr/RR088.pdf

Appendix A

Restrictions on Dredging Activities Restoration Criteria

From the Guidance for Delisting Michigan's Great Lakes Areas of Concern

Restrictions on Dredging Activities

Significance in Michigan's Areas of Concern

Originally, twelve AOCs in Michigan identified restrictions on dredging as impaired or potentially impaired (all except Deer Lake and Torch Lake). This BUI addresses the requirement for special handling or disposal of commercial or recreational navigation channel dredge spoils due to chemical contamination of sediments. This BUI was originally identified for some AOCs based on the existence of contaminated sediments, not on whether there were actual restrictions on dredging in the AOC.

Michigan Restoration Criteria and Assessment

This BUI will be considered restored when:

- During the most recent routine dredging in the U.S. Army Corps of Engineers (COE) designated navigational channel, use of a confined disposal facility or TSCA-level landfill for dredge spoils was not required due to chemical contamination.

Rationale

Practical Application in Michigan

Dredging sediments in the Great Lakes and connected waterways requires state and federal approvals that regulate the extent of dredging, disposal of dredge spoils, and pre-dredge studies. Restrictions on dredging is defined as special handling for dredge spoils requiring use of a confined disposal facility or Toxic Substances Control Act level landfill due to chemical contamination. Open water disposal of any clean or contaminated dredge spoils in the Great Lakes or connected waterways is not routinely permitted in Michigan. As a result, use of disposal options (e.g., confined disposal facility) other than open water is not automatically a restriction on dredging. This restoration criterion applies only to the commercial and recreational navigational channels in the Great Lakes and connected waterways that are maintained by the COE.

1991 IJC General Delisting Guideline

When contaminants in sediments do not exceed standards, criteria, or guidelines such that there are restrictions on dredging or disposal activities.

The IJC general delisting guideline for the BUI is presented here for reference. The Practical Application in Michigan subsection above describes application of specific criteria for restoration based on existing Michigan programs and authorities.

State of Michigan Programs/Authorities

As part of existing planning and regulatory requirements, the MDEQ and the COE evaluate the environmental impacts associated with any proposed navigational dredging and disposal projects.

In assessing restoration of this BUI, the State, in consultation with the COE and the PAC, will conduct an evaluation of the most recent navigational dredging projects in an AOC to determine whether there have been restrictions on the dredging requiring confined disposal due to sediment contamination.

Some local AOC communities also have programs for monitoring water quality and related parameters which may be applicable to this BUI. If an AOC chooses to use local monitoring data for the assessment of BUI restoration, the data can be submitted to the OGL for review. If the OGL determines that the data appropriately address the restoration criteria and meet quality assurance and control requirements, they may be used to demonstrate restoration success.

All non-navigational channel dredging is evaluated under federal and state authorities and any special circumstances are addressed in the permit process, including contamination. These programs apply across the state, not just in AOCs, and as such are not included in the BUI.

Appendix B
Sediment Analytical Results
(Excerpted as Appendix E from FY 20 Manistique Harbor Sediment Sampling and Analysis Final Report)

PARAMETER	SAMPLE ID		MA-20-01	MA-20-DUP2 (1)	MA-20-02	MA-20-03	MA-20-04	MA-20-05	MA-20-06	MA-20-07	MA-20-08	MA-20-09
	LAB ID		20F0631-06	20F0631-17	20F0631-07	20F0631-08	20F0631-09	20F0631-10	20F0631-11	20F0631-12	20F0631-13	20F0631-14
	SAMPLE DATE		6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20
Physical Kit	**Method**	**Units**										
% Solids	ASTM D2974-07a	% by Wt.	**78**	**80**	**76**	**77**	**76**	**75**	**79**	**81**	**81**	**82**
Specific Gravity	ASTM D854-91	mg/kg dry	**2.7**	NA	**2.7**	**2.6**	**2.7**	**2.6**	**2.7**	**2.7**	**2.7**	**2.6**
In-Place Density	USACE, In-Place Density	g/mL	**2.1**	NA	**2.0**	**1.9**	**1.9**	**1.9**	**2.1**	**2.0**	**2.0**	**2.1**
Biochemical Oxygen Demand 5-day	SM 5210B-11 + HACH 10360	mg/L	40 U	38 U	39 U	39 U	39 U	**36**	39 U	39 U	40 U	40 U
Organic Kit	**Method**	**Units**										
Chemical Oxygen Demand	PLUMB	mg/kg dry	**2,200**	**16,000**	**9,900**	**5,500**	**3,900**	**18,000**	**2,500**	**2,500**	**3,800**	**9,500**
Cyanide (total)	EPA 9012B	mg/kg dry	0.17 U	0.19 U	0.19 U	0.19 U	0.19 U	0.20 U	0.20 U	0.19 U	0.19 U	0.20 U
Oil & Grease (HEM)	EPA 9071B	mg/kg dry	540 U	530 U	560 U	550 U	550 U	560 U	530 U	520 U	520 U	510 U
Total Organic Carbon	WALKLEY BLACK	mg/kg dry	**2,700**	**3,000**	**6,600**	**9,500**	**4,100**	**11,000**	**1,300**	**2,000**	**2,100**	**2,300**
Volatile Solids	PLUMB	% by Wt.	**0.67**	**0.90**	**2.5**	**1.2**	**0.63**	**1.8**	**0.41**	**0.75**	**0.39**	**0.42**
Nutrient Kit	**Method**	**Units**										
Ammonia as N	EPA 350.1 Rev. 2.0	mg/kg dry	**3.0** 241	**2.7**	**6.3** 240	**4.9**	**4.2**	**5.0**	**3.6**	**1.5**	**4.1**	**2.4**
Phosphorus	EPA 6010D	mg/kg dry	**87**	**72**	**76**	**69**	**68**	**90**	**57**	**48**	**53**	**61**
Total Kjeldahl Nitrogen	EPA 351.2 Rev. 2.0	mg/kg dry	**130**	**130**	**240**	**130**	**160**	**330**	66 U	**190**	67 U	87 U
Metals Kit	**Method**	**Units**										
Arsenic	EPA 6020B	ug/kg dry	**320 J**	**330 J**	**560 J**	**260 J**	**280 J**	**410 J**	680 U	**200 J**	670 U	**270 J**
Barium	EPA 6010D	ug/kg dry	**7,100**	**5,200**	**7,000**	**4,600**	**5,200**	**7,000**	**3,600**	**4,100**	**3,700**	**4,400**
Cadmium	EPA 6020B	ug/kg dry	190 U	190 U	200 U	190 U	200 U	200 U	190 U	190 U	190 U	180 U
Chromium	EPA 6020B	ug/kg dry	**2,200**	**1,800 J**	**1,800 J**	**1,800 J**	**1,800 J**	**2,500 J**	**1,500 J**	**1,500 J**	**1,300 J**	**1,800**
Copper	EPA 6020B	ug/kg dry	**820**	**540**	**940**	**580**	**540**	**880**	**360 J**	**480**	**390 J**	**600**
Iron	EPA 6010D	ug/kg dry	**3,400,000**	**2,400,000**	**2,900,000**	**2,300,000**	**2,500,000**	**3,200,000**	**1,700,000**	**2,000,000**	**1,700,000**	**1,700,000**
Lead	EPA 6020B	ug/kg dry	**1,100**	**780 J**	**1,300**	**800 J**	**790 J**	**1,000**	**580 J**	**650 J**	**770 J**	**760 J**
Manganese	EPA 6010D	ug/kg dry	**41,000**	**28,000**	**38,000**	**25,000**	**33,000**	**43,000**	**20,000**	**25,000**	**20,000**	**27,000**
Mercury	EPA 7471B	ug/kg dry	48 U	46 U	32 U	34 U	27 U	31 U	32 U	30 U	27 U	33 U
Nickel	EPA 6020B	ug/kg dry	**990**	**850 J**	**870 J**	**810 J**	**780 J**	**1,000**	**650 J**	**710 J**	**610 J**	**760 J**
Selenium	EPA 6020B	ug/kg dry	**730**	600 U	**730**	**580**	**530 J**	**700**	580 U	**560 J**	**490 J**	**590**
Silver	EPA 6020B	ug/kg dry	480 U	470 U	490 U	480 U	490 U	500 U	490 U	480 U	480 U	440 U
Zinc	EPA 6020B	ug/kg dry	**5,700**	**4,800 J**	**5,700**	**4,300 J**	**4,500 J**	**5,700**	**3,700 J**	**4,600 J**	**3,700 J**	**4,500**
PCBs	**Method**	**Units**										
Aroclor-1016	EPA 8082A	ug/kg dry	12 U	11 U	12 U	12 U	12 U	12 U	11 U	11 U	11 U	11 U
Aroclor-1221	EPA 8082A	ug/kg dry	31 U	31 U	32 U	32 U	32 U	32 U	31 U	30 U	30 U	30 U
Aroclor-1232	EPA 8082A	ug/kg dry	8.6 U	8.4 U	8.8 U	8.7 U	8.8 U	8.9 U	8.4 U	8.3 U	8.2 U	8.2 U
Aroclor-1242	EPA 8082A	ug/kg dry	8.6 U	8.4 U	8.8 U	8.7 U	8.8 U	8.9 U	8.4 U	8.3 U	8.2 U	**20**
Aroclor-1248	EPA 8082A	ug/kg dry	8.6 U	8.4 U	8.8 U	8.7 U	8.8 U	8.9 U	8.4 U	8.3 U	8.2 U	8.2 U
Aroclor-1254	EPA 8082A	ug/kg dry	8.6 U	8.4 U	8.8 U	8.7 U	8.8 U	8.9 U	8.4 U	8.3 U	8.2 U	8.2 U
Aroclor-1260	EPA 8082A	ug/kg dry	16 U	15 U	16 U	16 U	16 U	16 U	15 U	15 U	15 U	15 U
Aroclor-1262	EPA 8082A	ug/kg dry	8.6 U	8.4 U	8.8 U	8.7 U	8.8 U	8.9 U	8.4 U	8.3 U	8.2 U	8.2 U
Aroclor-1268	EPA 8082A	ug/kg dry	8.6 U	8.4 U	8.8 U	8.7 U	8.8 U	8.9 U	8.4 U	8.3 U	8.2 U	8.2 U

Bold - Detected analyte

U - Analyte not detected

J - Estimated value

Note 240 : The MS recovery was out of control high. The result for this analyte, in the non-spiked version of the sample, must be considered estimated.

Note 241 : The MS recovery was out of control low. The result for this analyte, in thenon-spiked version of the sample, must be considered estimated.

PARAMETER	SAMPLE ID		MA-20-10	MA-20-11	MA-20-12	MA-20-13	MA-20-14	MA-20-DUP (14)	MA-20-15
	LAB ID		20F0631-15	20F0631-01	20F0631-02	20F0631-16	20F0631-03	20F0631-05	20F0631-04
	SAMPLE DATE		6/18/20	6/17/20	6/17/20	6/18/20	6/17/20	6/17/20	6/17/20
Physical Kit	**Method**	**Units**							
% Solids	ASTM D2974-07a	% by Wt.	**81**	**83**	**80**	**79**	**82**	**82**	**82**
Specific Gravity	ASTM D854-91	mg/kg dry	**2.7**	**2.7**	**2.7**	**2.7**	**2.6**	NA	**2.7**
In-Place Density	USACE, In-Place Density	g/mL	**2.1**	**2.2**	**1.7**	**2.0**	**2.0**	NA	**2.1**
Biochemical Oxygen Demand 5-day	SM 5210B-11 + HACH 10360	mg/L	40 U	40 U	40 U	**22**	40 U	40 U	40 U
Organic Kit	**Method**	**Units**							
Chemical Oxygen Demand	PLUMB	mg/kg dry	**7,300**	**3,100**	**3,600**	**14,000**	**2,100**	**5,000**	**2,600**
Cyanide (total)	EPA 9012B	mg/kg dry	0.19 U	0.20 U	0.18 U	0.19 U	0.20 U	0.20 U	0.20 U
Oil & Grease (HEM)	EPA 9071B	mg/kg dry	520 U	510 U	520 U	530 U	510 U	510 U	510 U
Total Organic Carbon	WALKLEY BLACK	mg/kg dry	**6,300**	**1,200**	**3,700**	**9,400**	**1,700**	**1,600**	**4,300**
Volatile Solids	PLUMB	% by Wt.	**1.1**	**0.32**	**2.0**	**0.91**	**0.52**	**0.38**	**0.55**
Nutrient Kit	**Method**	**Units**							
Ammonia as N	EPA 350.1 Rev. 2.0	mg/kg dry	**2.8**	**2.2**	**1.6** 241	**8.3**	**0.85**	**0.80**	**1.5**
Phosphorus	EPA 6010D	mg/kg dry	**49**	**52**	**43**	**66**	**41**	**49**	**46**
Total Kjeldahl Nitrogen	EPA 351.2 Rev. 2.0	mg/kg dry	**96**	67 U	**110**	**77**	72 U	**96**	69 U
Metals Kit	**Method**	**Units**							
Arsenic	EPA 6020B	ug/kg dry	**280 J**	**200 J**	**220 J**	**280 J**	**300 J**	**230 J**	**280 J**
Barium	EPA 6010D	ug/kg dry	**3,900**	**3,200**	**3,300**	**4,500**	**3,600**	**3,200**	**3,800**
Cadmium	EPA 6020B	ug/kg dry	200 U	190 U	200 U	190 U	190 U	200 U	200 U
Chromium	EPA 6020B	ug/kg dry	**1,400 J**	**1,200 J**	**1,300 J**	**1,500 J**	**1,200 J**	**1,500 J**	**1,500 J**
Copper	EPA 6020B	ug/kg dry	**430 J**	**450 J**	**360 J**	**790**	**380 J**	**410 J**	**450 J**
Iron	EPA 6010D	ug/kg dry	**1,900,000**	**1,700,000**	**1,800,000**	**2,300,000**	**1,900,000**	**1,800,000**	**1,900,000**
Lead	EPA 6020B	ug/kg dry	**740 J**	**570 J**	**680 J**	**1,100**	**500 J**	**530 J**	**650 J**
Manganese	EPA 6010D	ug/kg dry	**27,000**	**22,000**	**23,000**	**34,000**	**30,000**	**25,000**	**30,000**
Mercury	EPA 7471B	ug/kg dry	33 U	**100**	**180**	37 U	40 U	40 U	40 U
Nickel	EPA 6020B	ug/kg dry	**640 J**	**590 J**	**530 J**	**750 J**	**550 J**	**670 J**	**550** J
Selenium	EPA 6020B	ug/kg dry	590 U	**530 J**	**640**	**570**	560 U	590 U	600 U
Silver	EPA 6020B	ug/kg dry	490 U	470 U	500 U	470 U	460 U	490 U	500 U
Zinc	EPA 6020B	ug/kg dry	**4,400 J**	**4,100 J**	**4,300 J**	**4,600 J**	**3,800 J**	**3,900 J**	**4,100 J**
PCBs	**Method**	**Units**							
Aroclor-1016	EPA 8082A	ug/kg dry	11 U	11 U	11 U	11 U	11 U	11 U	11 U
Aroclor-1221	EPA 8082A	ug/kg dry	30 U	29 U	30 U	31 U	30 U	30 U	30 U
Aroclor-1232	EPA 8082A	ug/kg dry	8.3 U	8.1 U	8.3 U	8.5 U	8.1 U	8.1 U	8.1 U
Aroclor-1242	EPA 8082A	ug/kg dry	**27**	8.1 U	8.3 U	**44**	8.1 U	8.1 U	8.1 U
Aroclor-1248	EPA 8082A	ug/kg dry	8.3 U	8.1 U	8.3 U	8.5 U	8.1 U	8.1 U	8.1 U
Aroclor-1254	EPA 8082A	ug/kg dry	8.3 U	8.1 U	8.3 U	8.5 U	8.1 U	8.1 U	8.1 U
Aroclor-1260	EPA 8082A	ug/kg dry	15 U	15 U	15 U	15 U	15 U	15 U	15 U
Aroclor-1262	EPA 8082A	ug/kg dry	8.3 U	8.1 U	8.3 U	8.5 U	8.1 U	8.1 U	8.1 U
Aroclor-1268	EPA 8082A	ug/kg dry	8.3 U	8.1 U	8.3 U	8.5 U	8.1 U	8.1 U	8.1 U

Bold - Detected analyte

U - Analyte not detected

J - Estimated value

Note 241 : The MS recovery was out of control low. The result for this analyte, in thenon-spiked version of the sample, must be considered estimated.

PARAMETER	SAMPLE ID		MA-20-01	MA-20-DUP2 (1)	MA-20-02	MA-20-03	MA-20-04	MA-20-05	MA-20-06	MA-20-07	MA-20-08	MA-20-09
	LAB ID		20F0631-06	20F0631-17	20F0631-07	20F0631-08	20F0631-09	20F0631-10	20F0631-11	20F0631-12	20F0631-13	20F0631-14
	SAMPLE DATE		6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20
PAHs	**Method**	**Units**										
2-Methylnaphthalene	EPA 8270C SIM	ug/kg dry	1.7 U	1.6 U	1.7 U	1.7 U	1.7 U	1.7 U	1.6 U	1.6 U	**3.0**	1.6 U
Acenaphthene	EPA 8270C SIM	ug/kg dry	1.7 U	1.6 U	1.7 U	1.7 U	1.7 U	1.7 U	1.6 U	1.6 U	1.6 U	1.6 U
Acenaphthylene	EPA 8270C SIM	ug/kg dry	1.7 U	1.6 U	1.7 U	1.7 U	1.7 U	1.7 U	1.6 U	1.6 U	1.6 U	1.6 U
Anthracene	EPA 8270C SIM	ug/kg dry	1.7 U	1.6 U	1.7 U	1.7 U	**0.58 J**	1.7 U	1.6 U	1.6 U	1.6 U	1.6 U
Benzo (a) anthracene	EPA 8270C SIM	ug/kg dry	1.7 U	**0.99 J**	1.7 U	1.7 U	**3.0**	1.7 U	**1.4**	1.6 U	1.6 U	**1.9**
Benzo (a) pyrene	EPA 8270C SIM	ug/kg dry	1.7 U	**1.0 J,** 808	1.7 U	1.7 U	**2.2** 808	1.7 U	**1.4** 808	1.6 U	1.6 U	**2.1** 808
Benzo (b) fluoranthene	EPA 8270C SIM	ug/kg dry	1.7 U	**1.7**	**0.55 J**	1.7 U	**3.3**	1.7 U	**2.0**	1.6 U	1.6 U	**2.8**
Benzo (g,h,i) perylene	EPA 8270C SIM	ug/kg dry	1.7 U	1.6 U	1.7 U	1.7 U	**1.3 J**	1.7 U	**0.80 J**	1.6 U	1.6 U	**1.0 J**
Benzo (k) fluoranthene	EPA 8270C SIM	ug/kg dry	1.7 U	1.6 U	1.7 U	1.7 U	**1.4 J**	1.7 U	1.6 U	1.6 U	1.6 U	**1.0 J**
Chrysene	EPA 8270C SIM	ug/kg dry	1.7 U	**1.1 J**	1.7 U	1.7 U	**2.9**	1.7 U	**1.4**	1.6 U	1.6 U	**2.3**
Dibenz (a,h) anthracene	EPA 8270C SIM	ug/kg dry	1.7 U	1.6 U	1.7 U	1.7 U	1.7 U	1.7 U	1.6 U	1.6 U	1.6 U	1.6 U
Fluoranthene	EPA 8270C SIM	ug/kg dry	1.7 U	**2.9**	**1.1 J**	1.7 U	**7.0**	1.7 U	**3.1**	1.6 U	1.6 U	**5.4**
Fluorene	EPA 8270C SIM	ug/kg dry	1.7 U	1.6 U	1.7 U	1.7 U	1.7 U	1.7 U	1.6 U	1.6 U	**0.73 J**	1.6 U
Indeno (1,2,3-cd) pyrene	EPA 8270C SIM	ug/kg dry	1.7 U	**0.73** J	1.7 U	1.7 U	**1.3 J**	1.7 U	**1.0 J**	1.6 U	1.6 U	**1.3 J**
Naphthalene	EPA 8270C SIM	ug/kg dry	1.7 U	1.6 U	1.7 U	1.7 U	1.7 U	1.7 U	1.6 U	1.6 U	**1.5 J**	1.6 U
Phenanthrene	EPA 8270C SIM	mg/kg dry	1.7 U	**1.3 J**	**0.62 J**	1.7 U	**2.8**	1.7 U	**1.0 J**	1.6 U	**0.51 J**	**2.9**
Pyrene	EPA 8270C SIM	ug/kg dry	1.7 U	**2.3**	**0.94 J**	1.7 U	**7.0**	**0.78 J**	**2.6**	1.6 U	1.6 U	**4.1**
Chlorinated Pesticides	**Method**	**Units**										
4,4'-DDD	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
4,4'-DDE	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
4,4'-DDT	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Aldrin	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
alpha-BHC	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
alpha-Chlordane	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
beta-BHC	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Chlordane	EPA 8081B	ug/kg dry	32 U	31 U	33 U	33 U	33 U	33 U	32 U	31 U	31 U	31 U
delta-BHC	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Dieldrin	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Endosulfan I	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Endosulfan II	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Endosulfan sulfate	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Endrin	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Endrin aldehyde	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Endrin ketone	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
gamma-BHC (Lindane)	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
gamma-Chlordane	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Heptachlor	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Heptachlor epoxide	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Methoxychlor	EPA 8081B	ug/kg dry	13 U	13 U	13 U	13 U	13 U	13 U	13 U	12 U	12 U	12 U
Toxaphene	EPA 8081B	ug/kg dry	210 U	210 U	220 U	220 U	220 U	220 U	210 U	210 U	200 U	200 U

Bold - Detected analyte

U - Analyte not detected

J - Estimated value

Note 808 : The continuing calibration failed high for this compound. The result is considered bias high.

PARAMETER	SAMPLE ID		MA-20-10	MA-20-11	MA-20-12	MA-20-13	MA-20-14	MA-20-DUP (14)	MA-20-15
	LAB ID		20F0631-15	20F0631-01	20F0631-02	20F0631-16	20F0631-03	20F0631-05	20F0631-04
	SAMPLE DATE		6/18/20	6/17/20	6/17/20	6/18/20	6/17/20	6/17/20	6/17/20
PAHs	**Method**	**Units**							
2-Methylnaphthalene	EPA 8270C SIM	ug/kg dry	16 U	1.6 U	1.6 U	1.6 U	**1.0 J**	**1.7**	1.6 U
Acenaphthene	EPA 8270C SIM	ug/kg dry	16 U	1.6 U	**0.96 J**	1.6 U	1.6 U	1.6 U	1.6 U
Acenaphthylene	EPA 8270C SIM	ug/kg dry	16 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
Anthracene	EPA 8270C SIM	ug/kg dry	16 U	1.6 U	**1.8** 808	1.6 U	1.6 U	1.6 U	**0.67 J,** 808
Benzo (a) anthracene	EPA 8270C SIM	ug/kg dry	**12** J	1.6 U	**7.0** 808	**1.0 J**	**0.52 J,** 808	**1.5 J,** 808	**2.2** 808
Benzo (a) pyrene	EPA 8270C SIM	ug/kg dry	**11 J,** 808	1.6 U	**6.1** 808	**0.77 J,** 808	1.6 U	**0.8 J,** 808	**2.0** 808
Benzo (b) fluoranthene	EPA 8270C SIM	ug/kg dry	**19**	**1.3 J**	**7.1 J**	**1.2 J**	**0.96 J**	**1.6**	**3.2**
Benzo (g,h,i) perylene	EPA 8270C SIM	ug/kg dry	**7.1 J**	1.6 U	**3.5**	1.6 U	1.6 U	1.6 U	**1.3 J**
Benzo (k) fluoranthene	EPA 8270C SIM	ug/kg dry	16 U	**0.84 J**	**3.7**	1.6 U	1.6 U	1.6 U	**1.0 J**
Chrysene	EPA 8270C SIM	ug/kg dry	**13 J**	1.6 U	**7.4**	**0.95 J**	**0.66 J**	**1.5 J**	**2.3**
Dibenz (a,h) anthracene	EPA 8270C SIM	ug/kg dry	16 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
Fluoranthene	EPA 8270C SIM	ug/kg dry	**40**	1.6 U	**18**	**2.8**	**1.0 J**	**2.6**	**6.2**
Fluorene	EPA 8270C SIM	ug/kg dry	16 U	1.6 U	**1.1 J**	1.6 U	1.6 U	1.6 U	**0.72 J**
Indeno (1,2,3-cd) pyrene	EPA 8270C SIM	ug/kg dry	**8.7 J**	1.6 U	**4.5**	1.6 U	1.6 U	**0.62 J**	**1.6**
Naphthalene	EPA 8270C SIM	ug/kg dry	16 U	1.6 U	1.6 U	1.6 U	**0.99 J**	**1.7**	1.6 U
Phenanthrene	EPA 8270C SIM	mg/kg dry	**20**	1.6 U	**11**	**1.3 J**	**0.83 J**	**1.2 J**	**3.7**
Pyrene	EPA 8270C SIM	ug/kg dry	**31**	**0.75 J**	**13**	**2.4**	**1.2 J**	**3.0**	**4.8**
Chlorinated Pesticides	**Method**	**Units**							
4,4'-DDD	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
4,4'-DDE	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
4,4'-DDT	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Aldrin	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
alpha-BHC	EPA 8081B	ug/kg dry	12 U	**2.1 J**	12 U	13 U	12 U	12 U	12 U
alpha-Chlordane	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
beta-BHC	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Chlordane	EPA 8081B	ug/kg dry	31 U	30 U	31 U	32 U	30 U	30 U	30 U
delta-BHC	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Dieldrin	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Endosulfan I	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Endosulfan II	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Endosulfan sulfate	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Endrin	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Endrin aldehyde	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Endrin ketone	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
gamma-BHC (Lindane)	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
gamma-Chlordane	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Heptachlor	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Heptachlor epoxide	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Methoxychlor	EPA 8081B	ug/kg dry	12 U	12 U	12 U	13 U	12 U	12 U	12 U
Toxaphene	EPA 8081B	ug/kg dry	210 U	200 U	210 U	210 U	200 U	200 U	200 U

Bold - Detected analyte

U - Analyte not detected

J - Estimated value

Note 808 : The continuing calibration failed high for this compound. The result is considered bias high.

PARAMETER	SAMPLE ID		MA-20-01	MA-20-DUP2 (1)	MA-20-02	MA-20-03	MA-20-04	MA-20-05	MA-20-06	MA-20-07	MA-20-08	MA-20-09
	LAB ID		20F0631-06	20F0631-17	20F0631-07	20F0631-08	20F0631-09	20F0631-10	20F0631-11	20F0631-12	20F0631-13	20F0631-14
	SAMPLE DATE		6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20	6/18/20
Grain Size			**SP**		**SP**	**SP**	**SP**	**SP**	**SP**	**SP**	**SP**	**SP**
Coarse Gravel	ASTM D422	%	0.0 U	NA	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U
Fine Gravel	ASTM D422	%	0.0 U	NA	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U
Coarse Sand	ASTM D422	%	0.0 U	NA	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U
Medium Sand	ASTM D422	%	**0.2**	NA	**0.4**	**0.2**	**0.3**	**0.8**	**0.1**	**0.4**	**0.2**	**0.7**
Fine Sand	ASTM D422	%	**94.7**	NA	**95.1**	**95.6**	**94.5**	**92.9**	**97.9**	**97.3**	**97.7**	**96.2**
Silt	ASTM D422	%	**4.4**	NA	**2.9**	**3.1**	**5.1**	**5.1**	**1.2**	**1.4**	**1.0**	**3.1**
Clay	ASTM D422	%	**0.7**	NA	**1.6**	**1.1**	**0.1**	**1.2**	**0.8**	**0.9**	**1.1**	0.0 U
Sieve Test												
9.50 mm	ASTM D422	% Finer	100.0	NA	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
4.75 mm	ASTM D422	% Finer	100.0	NA	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2.00 mm	ASTM D422	% Finer	100.0	NA	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
0.85 mm	ASTM D422	% Finer	99.9	NA	99.9	100.0	99.9	99.6	100.0	99.9	100.0	99.9
0.425 mm	ASTM D422	% Finer	99.8	NA	99.6	99.8	99.7	99.2	99.9	99.6	99.8	99.3
0.18 mm	ASTM D422	% Finer	68.5	NA	60.3	59.4	56.4	64.6	45.9	33.0	47.9	36.3
0.15 mm	ASTM D422	% Finer	42.1	NA	40.3	32.8	36.0	40.9	20.1	19.3	20.8	22.8
0.075 mm	ASTM D422	% Finer	5.1	NA	4.5	4.2	5.2	6.3	2.0	2.3	2.1	3.1
0.053 mm	ASTM D422	% Finer	3.4	NA	3.1	2.9	4.0	4.3	1.4	1.9	1.6	2.4
Hydrometer Results												
2.00 min	ASTM D422	% Finer	2.2	NA	2.9	2.2	1.9	2.4	1.0	2.0	1.2	1.0
5.00 min	ASTM D422	% Finer	1.1	NA	3.0	2.3	1.9	2.4	1.0	1.0	1.2	0.0
15.00 min	ASTM D422	% Finer	1.1	NA	1.5	2.3	1.0	2.5	1.1	1.0	1.2	0.1
30.00 min	ASTM D422	% Finer	1.1	NA	1.7	1.9	1.0	1.9	1.1	1.0	1.2	0.1
60.00 min	ASTM D422	% Finer	1.2	NA	1.7	1.4	0.5	1.3	1.0	0.9	1.1	0.0
250.00 mm	ASTM D422	% Finer	0.0	NA	1.4	1.1	0.0	1.1	0.5	1.0	1.0	0.0
1440.00 min	ASTM D422	% Finer	-0.1	NA	1.3	1.0	-0.1	0.5	-0.1	0.4	1.0	-0.6

Bold - Detected analyte

U - Grain Size not detected

SP - poorly graded sands with < 12% Fines - uniform particle size

* Could not differenate between silts and clays

NA - duplicate sample not analyzed

PARAMETER	SAMPLE ID		MA-20-10	MA-20-11	MA-20-12	MA-20-13	MA-20-14	MA-20-DUP (14)	MA-20-15
	LAB ID		20F0631-15	20F0631-01	20F0631-02	20F0631-16	20F0631-03	20F0631-05	20F0631-04
	SAMPLE DATE		6/18/20	6/17/20	6/17/20	6/18/20	6/17/20	6/17/20	6/17/20
Grain Size			**SP**	**SP**	**SP**	**SP**	**SP**		**SP**
Coarse Gravel	ASTM D422	%	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	NA	0.0 U
Fine Gravel	ASTM D422	%	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	NA	**1.3**
Coarse Sand	ASTM D422	%	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	NA	0.0 U
Medium Sand	ASTM D422	%	**1.4**	**1.0**	**2.0**	**2.8**	**4.3**	NA	**0.7**
Fine Sand	ASTM D422	%	**95.8**	**97.8**	**93.2**	**94.6**	**90.5**	NA	**95.7**
Silt	ASTM D422	%	**1.7**	**1.2 ***	**3.2**	**1.7**	**4.5**	NA	**2.3 ***
Clay	ASTM D422	%	**1.1**		**1.6**	**0.9**	**0.7**	NA	
Sieve Test									
9.50 mm	ASTM D422	% Finer	100.0	100.0	100.0	100.0	100.0	NA	100.0
4.75 mm	ASTM D422	% Finer	100.0	100.0	100.0	100.0	100.0	NA	98.7
2.00 mm	ASTM D422	% Finer	100.0	100.0	100.0	100.0	100.0	NA	98.7
0.85 mm	ASTM D422	% Finer	99.7	99.9	100.0	99.8	100.0	NA	98.6
0.425 mm	ASTM D422	% Finer	98.6	99.0	98.0	97.2	95.7	NA	98.0
0.18 mm	ASTM D422	% Finer	25.7	29.0	20.1	40.9	18.1	NA	27.9
0.15 mm	ASTM D422	% Finer	11.3	14.4	8.8	27.1	9.7	NA	12.3
0.075 mm	ASTM D422	% Finer	2.8	1.2	4.8	2.6	5.2	NA	2.3
0.053 mm	ASTM D422	% Finer	2.3	1.0	4.7	1.7	5.1	NA	1.5
Hydrometer Results									
2.00 min	ASTM D422	% Finer	2.1	1.8	2.3	0.9	1.1	NA	-0.1
5.00 min	ASTM D422	% Finer	2.1	1.9	2.4	0.9	1.1	NA	-0.1
15.00 min	ASTM D422	% Finer	2.1	1.9	2.4	0.9	1.2	NA	-0.1
30.00 min	ASTM D422	% Finer	2.1	1.9	1.7	0.9	1.2	NA	0.0
60.00 min	ASTM D422	% Finer	1.5	0.3	1.6	0.9	1.2	NA	0.0
250.00 mm	ASTM D422	% Finer	1.0	-0.3	1.4	0.9	0.0	NA	-0.1
1440.00 min	ASTM D422	% Finer	0.9	-0.2	-0.2	0.9	-0.1	NA	-0.1

Bold - Detected analyte

U - Grain Size not detected

SP - poorly graded sands with < 12% Fines - uniform particle size

* Could not differenate between silts and clays

NA - duplicate sample not analyzed

Appendix C
Part 201 Residential Direct Contact Screening Criteria

TABLE 2. SOIL: RESIDENTIAL

PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS/PART 213 RISK-BASED SCREENING LEVELS

All criteria, unless otherwise noted, are expressed in units of parts per billion (ppb). One ppb is equivalent to 1 microgram per kilogram (ug/kg). Criteria with 6 or more digits are expressed in scientific notation. For example, 200,000 is presented as 2.0E+5. A footnote is designated by a letter in parentheses and is explained in the footnote pages that follow the criteria tables. When the risk-based criterion is less than the target detection limit (TDL), the TDL is listed as the criterion (§324.20120a(10)). In these cases, 2 numbers are present in the cell. The first number is the criterion (i.e., TDL), and the second number is the risk-based value.

			Groundwater Protection		Indoor Air	Ambient Air (Y) (C)				Contact	Csat
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Level	Residential Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria	Infinite Source Volatile Soil Inhalation Criteria (VSIC)	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria	Direct Contact Criteria	Soil Saturation Concentration Screening Levels
Acenaphthene	83329	NA	3.00E+05	8,700	1.90E+08	8.10E+07	8.10E+07	8.10E+07	1.40E+10	4.10E+07	NA
Acenaphthylene	208968	NA	5,900	ID	1.60E+06	2.20E+06	2.20E+06	2.20E+06	2.30E+09	1.60E+06	NA
Acetaldehyde (I)	75070	NA	19,000	2,600	2.20E+05	1.70E+05	1.70E+05	2.80E+05	6.00E+08	2.90E+07	1.10E+08
Acetate	71501	NA	ID	(G)	ID	ID	ID	ID	ID	ID	ID
Acetic acid	64197	NA	84,000	(G)	NLV	NLV	NLV	NLV	1.70E+10	1.30E+08	6.50E+08
Acetone (I)	67641	NA	15,000	34,000	2.9E+8 (C)	1.30E+08	1.30E+08	1.90E+08	3.90E+11	2.30E+07	1.10E+08
Acetonitrile	75058	NA	2,800	2.60E+05	4.80E+06	1.60E+06	1.60E+06	2.10E+06	4.00E+09	4.30E+06	2.20E+07
Acetophenone	98862	NA	30,000	ID	1.2E+8 (C)	4.40E+07	4.40E+07	4.40E+07	3.30E+10	4.7E+7 (C)	1.10E+06
Acrolein (I)	107028	NA	2,400	NA	410	310	310	610	1.30E+06	3.60E+06	2.30E+07
Acrylamide	79061	NA	10	200 (X)	NLV	NLV	NLV	NLV	2.40E+06	1,900	NA
Acrylic acid	79107	NA	78,000	NA	2.40E+06	1.90E+05	2.30E+05	2.30E+05	6.70E+07	3.5E+7 (DD)	1.10E+08
Acrylonitrile (I)	107131	NA	100 (M); 52	100 (M); 40	6,600	5,000	5,100	10,000	4.60E+07	16,000	8.30E+06
Alachlor	15972608	NA	52	290 (X)	NLV	NLV	NLV	NLV	ID	93,000	NA
Aldicarb	116063	NA	60	NA	NLV	NLV	NLV	NLV	ID	2.30E+05	NA
Aldicarb sulfone	1646884	NA	200 (M); 40	NA	NLV	NLV	NLV	NLV	ID	2.50E+05	NA
Aldicarb sulfoxide	1646873	NA	200(M); 80	NA	NLV	NLV	NLV	NLV	ID	2.90E+05	NA
Aldrin	309002	NA	NLL	NLL	1.30E+06	58,000	58,000	58,000	6.40E+05	1,000	NA
Aluminum (B)	7429905	6.90E+06	1,000	NA	NLV	NLV	NLV	NLV	ID	5.0E+7 (DD)	NA
Ammonia	7664417	NA	ID	(CC)	ID	ID	ID	ID	6.70E+09	ID	1.00E+07
t-Amyl methyl ether (TAME)	994058	NA	3,900	NA	58,000	3.40E+05	7.60E+05	1.80E+06	4.10E+09	2.9E+7 (C)	4.40E+05
Aniline	62533	NA	1,100	330 (M); 80	NLV	NLV	NLV	NLV	6.70E+07	3.30E+05	4.50E+06
Anthracene	120127	NA	41,000	ID	1.0E+9 (D)	1.40E+09	1.40E+09	1.40E+09	6.70E+10	2.30E+08	NA
Antimony	7440360	NA	4,300	94,000 (X)	NLV	NLV	NLV	NLV	1.30E+07	1.80E+05	NA
Arsenic	7440382	5,800	4,600	4,600	NLV	NLV	NLV	NLV	7.20E+05	7,600	NA
Asbestos (BB)	1332214	NA	NLL	NLL	NLV	NLV	NLV	NLV	1.0E+7 (M); 68,000	ID	NA
Atrazine	1912249	NA	60	150	NLV	NLV	NLV	NLV	ID	71,000 (DD)	NA
Azobenzene	103333	NA	4,200	ID	6.10E+06	6.30E+05	6.30E+05	6.30E+05	1.00E+08	1.40E+05	NA

TABLE 2. SOIL: RESIDENTIAL

PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS/PART 213 RISK-BASED SCREENING LEVELS

All criteria, unless otherwise noted, are expressed in units of parts per billion (ppb). One ppb is equivalent to 1 microgram per kilogram (ug/kg). Criteria with 6 or more digits are expressed in scientific notation. For example, 200,000 is presented as 2.0E+5. A footnote is designated by a letter in parentheses and is explained in the footnote pages that follow the criteria tables. When the risk-based criterion is less than the target detection limit (TDL), the TDL is listed as the criterion (§324.20120a(10)). In these cases, 2 numbers are present in the cell. The first number is the criterion (i.e., TDL), and the second number is the risk-based value.

			Groundwater Protection		Indoor Air	Ambient Air (Y) (C)				Contact	Csat
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Level	Residential Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria	Infinite Source Volatile Soil Inhalation Criteria (VSIC)	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria	Direct Contact Criteria	Soil Saturation Concentration Screening Levels
Barium (B)	7440393	75,000	1.30E+06	(G)	NLV	NLV	NLV	NLV	3.30E+08	3.70E+07	NA
Benzene (I)	71432	NA	100	4,000 (X)	1,600	13,000	34,000	79,000	3.80E+08	1.80E+05	4.00E+05
Benzidine	92875	NA	1,000 (M); 6.0	1,000 (M); 6.0	NLV	NLV	NLV	NLV	46,000	1,000 (M); 23	NA
Benzo(a)anthracene (Q)	56553	NA	NLL	NLL	NLV	NLV	NLV	NLV	ID	20,000	NA
Benzo(b)fluoranthene (Q)	205992	NA	NLL	NLL	ID	ID	ID	ID	ID	20,000	NA
Benzo(k)fluoranthene (Q)	207089	NA	NLL	NLL	NLV	NLV	NLV	NLV	ID	2.00E+05	NA
Benzo(g,h,i)perylene	191242	NA	NLL	NLL	NLV	NLV	NLV	NLV	8.00E+08	2.50E+06	NA
Benzo(a)pyrene (Q)	50328	NA	NLL	NLL	NLV	NLV	NLV	NLV	1.50E+06	2,000	NA
Benzoic acid	65850	NA	6.40E+05	NA	NLV	NLV	NLV	NLV	ID	9.90E+08	NA
Benzyl alcohol	100516	NA	2.00E+05	NA	NLV	NLV	NLV	NLV	3.30E+11	3.2E+8 (C)	5.80E+06
Benzyl chloride	100447	NA	150	NA	6,300	14,000	14,000	17,000	6.20E+07	48,000	2.30E+05
Beryllium	7440417	NA	51,000	(G)	NLV	NLV	NLV	NLV	1.30E+06	4.10E+05	NA
bis(2-Chloroethoxy)ethane	112265	NA	ID	ID	NLV	NLV	NLV	NLV	ID	ID	2.70E+06
bis(2-Chloroethyl)ether (I)	111444	NA	100	100 (M); 20	8,300	3,800	3,800	3,800	9.40E+06	13,000	2.20E+06
bis(2-Ethylhexyl)phthalate	117817	NA	NLL	NLL	NLV	NLV	NLV	NLV	7.00E+08	2.80E+06	1.00E+07
Boron (B)	7440428	NA	10,000	1.4E+5 (X)	NLV	NLV	NLV	NLV	ID	4.8E+7 (DD)	NA
Bromate	15541454	NA	200	800 (X)	NLV	NLV	NLV	NLV	ID	17,000	NA
Bromobenzene (I)	108861	NA	550	NA	3.10E+05	4.50E+05	4.50E+05	4.50E+05	5.30E+08	5.40E+05	7.60E+05
Bromodichloromethane	75274	NA	1,600 (W)	ID	1,200	9,100	9,700	19,000	8.40E+07	1.10E+05	1.50E+06
Bromoform	75252	NA	1,600 (W)	ID	1.50E+05	9.00E+05	9.00E+05	9.00E+05	2.80E+09	8.20E+05	8.70E+05
Bromomethane	74839	NA	200	100	860	11,000	57,000	1.40E+05	3.30E+08	3.20E+05	2.20E+06
n-Butanol (I)	71363	NA	19,000	2.00E+05	NLV	NLV	NLV	NLV	2.30E+10	2.9E+7 (C)	8.70E+06
2-Butanone (MEK) (I)	78933	NA	2.60E+05	44,000	5.4E+7 (C)	2.90E+07	2.90E+07	3.50E+07	6.70E+10	1.2E+8 (C, DD)	2.70E+07
n-Butyl acetate	123864	NA	11,000	NA	5.6E+7 (C)	1.10E+08	2.60E+08	3.20E+08	4.70E+11	1.7E+7 (C)	1.10E+06
t-Butyl alcohol	75650	NA	78,000	NA	3.1E+8 (C)	9.70E+07	2.00E+08	2.00E+08	1.30E+11	1.2E+8 (C)	1.10E+08
Butyl benzyl phthalate	85687	NA	2.2E+6 (C)	1.2E+5 (X)	NLV	NLV	NLV	NLV	4.70E+10	3.6E+7 (C)	3.10E+05
n-Butylbenzene	104518	NA	1,600	ID	ID	ID	ID	ID	2.00E+09	2.50E+06	1.00E+07

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PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS/PART 213 RISK-BASED SCREENING LEVELS

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Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Level	Residential Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria	Infinite Source Volatile Soil Inhalation Criteria (VSIC)	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria	Direct Contact Criteria	Soil Saturation Concentration Screening Levels
sec-Butylbenzene	135988	NA	1,600	ID	ID	ID	ID	ID	4.00E+08	2.50E+06	1.00E+07
t-Butylbenzene (I)	98066	NA	1,600	ID	ID	ID	ID	ID	6.70E+08	2.50E+06	1.00E+07
Cadmium (B)	7440439	1,200	6,000	(G,X)	NLV	NLV	NLV	NLV	1.70E+06	5.50E+05	NA
Camphene (I)	79925	NA	ID	NA	3,700	1.50E+05	9.10E+05	2.20E+06	5.30E+09	ID	NA
Caprolactam	105602	NA	1.20E+05	NA	NLV	NLV	NLV	NLV	6.70E+08	5.3E+7 (DD)	NA
Carbaryl	63252	NA	14,000	ID	ID	ID	ID	ID	ID	2.20E+07	NA
Carbazole	86748	NA	9,400	1,100	NLV	NLV	NLV	NLV	6.20E+07	5.30E+05	NA
Carbofuran	1563662	NA	800	NA	NLV	NLV	NLV	NLV	ID	1.10E+06	NA
Carbon disulfide (I,R)	75150	NA	16,000	ID	76,000	1.30E+06	7.90E+06	1.90E+07	4.70E+10	7.2E+6 (C, DD)	2.80E+05
Carbon tetrachloride	56235	NA	100	760 (X)	190	3,500	12,000	28,000	1.30E+08	96,000	3.90E+05
Chlordane (J)	57749	NA	NLL	NLL	1.10E+07	1.20E+06	1.20E+06	1.20E+06	3.10E+07	31,000	NA
Chloride	16887006	NA	5.00E+06	(X)	NLV	NLV	NLV	NLV	ID	5.0E+5 (F)	NA
Chlorobenzene (I)	108907	NA	2,000	500	1.20E+05	7.70E+05	9.90E+05	2.10E+06	4.70E+09	4.3E+6 (C)	2.60E+05
p-Chlorobenzene sulfonic acid	98668	NA	1.50E+05	ID	ID	ID	ID	ID	ID	2.30E+08	ID
1-Chloro-1,1-difluoroethane	75683	NA	3.00E+05	NA	2.9E+6 (C)	7.90E+07	5.60E+08	1.40E+09	3.30E+12	4.7E+8 (C)	9.60E+05
Chloroethane	75003	NA	8,600	22,000 (X)	2.9E+6 (C)	3.00E+07	1.20E+08	2.80E+08	6.70E+11	2.6E+6 (C)	9.50E+05
2-Chloroethyl vinyl ether	110758	NA	ID	NA	ID	ID	ID	ID	ID	ID	1.90E+06
Chloroform	67663	NA	1,600 (W)	7,000	7,200	45,000	1.20E+05	2.70E+05	1.30E+09	1.20E+06	1.50E+06
Chloromethane (I)	74873	NA	5,200	ID	2,300	40,000	4.10E+05	1.00E+06	4.90E+09	1.6E+6 (C)	1.10E+06
4-Chloro-3-methylphenol	59507	NA	5,800	280	NLV	NLV	NLV	NLV	ID	4.50E+06	NA
beta-Chloronaphthalene	91587	NA	6.20E+05	NA	ID	ID	ID	ID	ID	5.60E+07	NA
2-Chlorophenol	95578	NA	900	360	4.30E+05	9.60E+05	9.60E+05	9.60E+05	1.20E+09	1.40E+06	1.90E+07
o-Chlorotoluene (I)	95498	NA	3,300	ID	2.70E+05	1.20E+06	2.90E+06	6.30E+06	4.70E+09	4.5E+6 (C)	5.00E+05
Chlorpyrifos	2921882	NA	17,000	1,500	130	4,600	23,000	55,000	1.30E+08	1.10E+07	NA
Chromium (III) (B,H)	16065831	18,000 (total)	1.0E+9 (D)	(G,X)	NLV	NLV	NLV	NLV	3.30E+08	7.90E+08	NA
Chromium (VI)	18540299	NA	30,000	3,300	NLV	NLV	NLV	NLV	2.60E+05	2.50E+06	NA
Chrysene (Q)	218019	NA	NLL	NLL	ID	ID	ID	ID	ID	2.00E+06	NA

TABLE 2. SOIL: RESIDENTIAL
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS/PART 213 RISK-BASED SCREENING LEVELS

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			Groundwater Protection		Indoor Air	Ambient Air (Y) (C)				Contact	Csat
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Cobalt	7440484	6,800	800	2,000	NLV	NLV	NLV	NLV	1.30E+07	2.60E+06	NA
Copper (B)	7440508	32,000	5.80E+06	(G)	NLV	NLV	NLV	NLV	1.30E+08	2.00E+07	NA
Cyanazine	21725462	NA	200	1,100 (X)	NLV	NLV	NLV	NLV	ID	14,000	NA
Cyanide (P,R)	57125	390 (total)	4,000	100	NLV	NLV	NLV	NLV	2.50E+05	12,000	NA
Cyclohexanone	108941	NA	5.20E+06	NA	17,000	1.00E+06	1.10E+07	2.70E+07	6.70E+10	1.0E+9 (C,D)	2.20E+08
Dacthal	1861321	NA	50,000	NA	NLV	NLV	NLV	NLV	ID	2.30E+06	NA
Dalapon	75990	NA	4,000	NA	NLV	NLV	NLV	NLV	ID	1.90E+07	5.90E+07
4-4'-DDD	72548	NA	NLL	NLL	NLV	NLV	NLV	NLV	4.40E+07	95,000	NA
4-4'-DDE	72559	NA	NLL	NLL	NLV	NLV	NLV	NLV	3.20E+07	45,000	NA
4-4'-DDT	50293	NA	NLL	NLL	NLV	NLV	NLV	NLV	3.20E+07	57,000	NA
Decabromodiphenyl ether	1163195	NA	1.40E+05	NA	1.0E+9 (D)	8.60E+07	8.60E+07	8.60E+07	2.30E+09	3.80E+06	NA
Di-n-butyl phthalate	84742	NA	9.6E+5 (C)	11,000	NLV	NLV	NLV	NLV	3.30E+09	2.7E+7 (C)	7.60E+05
Di(2-ethylhexyl) adipate	103231	NA	1.3E+7 (C)	ID	NLV	NLV	NLV	NLV	9.20E+09	1.5E+7 (C, DD)	9.60E+05
Di-n-octyl phthalate	117840	NA	1.00E+08	ID	NLV	NLV	NLV	NLV	3.10E+10	6.90E+06	1.40E+08
Diacetone alcohol (I)	123422	NA	ID	NA	NLV	NLV	NLV	NLV	1.60E+11	ID	1.10E+08
Diazinon	333415	NA	95	72	NLV	NLV	NLV	NLV	ID	12,000 (DD)	3.10E+05
Dibenzo(a,h)anthracene (Q)	53703	NA	NLL	NLL	NLV	NLV	NLV	NLV	ID	2,000	NA
Dibenzofuran	132649	NA	ID	1,700	2.00E+06	1.30E+05	1.30E+05	1.30E+05	6.70E+06	ID	NA
Dibromochloromethane	124481	NA	1,600 (W)	ID	3,900	24,000	24,000	33,000	1.30E+08	1.10E+05	6.10E+05
Dibromochloropropane	96128	NA	10 (M); 4.0	ID	220	260	260	260	5.60E+05	4,400 (C)	1,200
Dibromomethane	74953	NA	1,600	NA	ID	ID	ID	ID	ID	2.5E+6 (C)	2.00E+06
Dicamba	1918009	NA	4,400	NA	NA	NLV	NLV	NLV	ID	3.40E+06	NA
1,2-Dichlorobenzene	95501	NA	14,000	280	1.1E+7 (C)	3.90E+07	3.90E+07	5.20E+07	1.00E+11	1.9E+7 (C)	2.10E+05
1,3-Dichlorobenzene	541731	NA	170	680	26,000	79,000	79,000	1.10E+05	2.00E+08	2.0E+5 (C)	1.70E+05
1,4-Dichlorobenzene	106467	NA	1,700	360	19,000	77,000	77,000	1.10E+05	4.50E+08	4.00E+05	NA
3,3'-Dichlorobenzidine	91941	NA	2,000 (M); 28	2,000 (M); 7.4	NLV	NLV	NLV	NLV	6.50E+06	6,600	NA
Dichlorodifluoromethane	75718	NA	95,000	ID	9.00E+05	5.30E+07	5.50E+08	1.40E+09	3.30E+12	5.2E+7 (C)	1.00E+06

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1,1-Dichloroethane	75343	NA	18,000	15,000	2.30E+05	2.10E+06	5.90E+06	1.40E+07	3.30E+10	2.7E+7 (C)	8.90E+05
1,2-Dichloroethane (I)	107062	NA	100	7,200 (X)	2,100	6,200	11,000	26,000	1.20E+08	91,000	1.20E+06
1,1-Dichloroethylene (I)	75354	NA	140	2,600	62	1,100	5,300	13,000	6.20E+07	2.00E+05	5.70E+05
cis-1,2-Dichloroethylene	156592	NA	1,400	12,000	22,000	1.80E+05	4.20E+05	9.90E+05	2.30E+09	2.5E+6 (C)	6.40E+05
trans-1,2-Dichloroethylene	156605	NA	2,000	30,000 (X)	23,000	2.80E+05	8.30E+05	2.00E+06	4.70E+09	3.8E+6 (C)	1.40E+06
2,6-Dichloro-4-nitroaniline	99309	NA	44,000	NA	NLV	NLV	NLV	NLV	ID	6.80E+07	NA
2,4-Dichlorophenol	120832	NA	1,500	330 (M); 220	NLV	NLV	NLV	NLV	5.10E+09	6.6E+5 (DD)	1.80E+06
2,4-Dichlorophenoxy acetic acid	94757	NA	1,400	4,400	NLV	NLV	NLV	NLV	6.70E+09	2.50E+06	NA
1,2-Dichloropropane (I)	78875	NA	100	4,600 (X)	4,000	25,000	50,000	1.10E+05	2.70E+08	1.40E+05	5.50E+05
1,3-Dichloropropene	542756	NA	170	180 (X)	1,000	18,000	68,000	1.60E+05	7.80E+08	10,000	6.20E+05
Dichlorovos	62737	NA	50 (M); 32	ID	NLV	NLV	NLV	NLV	3.30E+07	10,000	2.20E+06
Dicyclohexyl phthalate	84617	NA	ID	NA	ID	ID	ID	ID	ID	ID	NA
Dieldrin	60571	NA	NLL	NLL	1.40E+05	19,000	19,000	19,000	6.80E+05	1,100	NA
Diethyl ether	60297	NA	200	ID	2.8E+7 (C)	8.50E+07	1.50E+08	3.40E+08	8.00E+11	1.1E+8 (C)	7.40E+06
Diethyl phthalate	84662	NA	1.10E+05	2,200	NLV	NLV	NLV	NLV	3.30E+09	1.7E+8 (C)	7.40E+05
Diethylene glycol monobutyl ether	112345	NA	1,800	NA	NLV	NLV	NLV	NLV	1.30E+09	2.70E+06	1.10E+08
Diisopropyl ether	108203	NA	600	ID	6.7E+5 (C)	3.40E+05	7.60E+05	1.80E+06	4.10E+09	9.2E+5 (C)	1,300
Diisopropylamine (I)	108189	NA	110	NA	5.50E+06	6.20E+06	6.20E+06	7.30E+06	1.30E+10	1.70E+05	6.70E+06
Dimethyl phthalate	131113	NA	1.5E+6 (C)	NA	NLV	NLV	NLV	NLV	3.30E+09	1.0E+9 (C,D)	7.90E+05
N,N-Dimethylacetamide	127195	NA	3,600	82,000 (X)	NLV	NLV	NLV	NLV	ID	5.60E+06	1.10E+08
N,N-Dimethylaniline	121697	NA	320	NA	1.70E+05	1.50E+05	1.50E+05	1.50E+05	2.60E+08	5.00E+05	8.00E+05
Dimethylformamide (I)	68122	NA	14,000	NA	NLV	NLV	NLV	NLV	2.00E+09	2.20E+07	1.10E+08
2,4-Dimethylphenol	105679	NA	7,400	7,600	NLV	NLV	NLV	NLV	4.70E+09	1.10E+07	NA
2,6-Dimethylphenol	576261	NA	330 (M); 88	NA	NLV	NLV	NLV	NLV	1.30E+08	1.40E+05	NA
3,4-Dimethylphenol	95658	NA	330 (M); 200	500	NLV	NLV	NLV	NLV	2.30E+08	3.20E+05	NA
Dimethylsulfoxide	67685	NA	4.40E+06	3.80E+06	NLV	NLV	NLV	NLV	1.30E+09	1.0E+9 (C,D)	1.80E+07
2,4-Dinitrotoluene	121142	NA	430	NA	NLV	NLV	NLV	NLV	1.60E+07	48,000	NA

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Dinoseb	88857	NA	300	200 (M); 43	NLV	NLV	NLV	NLV	2.70E+08	66,000 (DD)	1.40E+05
1,4-Dioxane (I)	123911	NA	1,700	5,600 (X)	NLV	NLV	NLV	NLV	5.70E+08	5.30E+05	9.70E+07
Diquat	85007	NA	400	400	NLV	NLV	NLV	NLV	ID	5.00E+05	NA
Diuron	330541	NA	620	NA	NLV	NLV	NLV	NLV	4.70E+08	9.70E+05	NA
Endosulfan (J)	115297	NA	NLL	NLL	ID	ID	ID	ID	ID	1.40E+06	NA
Endothall	145733	NA	NLL	NLL	NLV	NLV	NLV	NLV	2.30E+09	3.80E+06	NA
Endrin	72208	NA	NLL	NLL	NLV	NLV	NLV	NLV	ID	65,000	NA
Epichlorohydrin (I)	106898	NA	100	NA	64,000	31,000	31,000	35,000	6.70E+07	8,900	7.30E+06
Ethanol (I)	64175	NA	3.80E+07	ID	NLV	NLV	NLV	NLV	1.30E+12	1.0E+9 (C,D,DD)	1.10E+08
Ethyl acetate (I)	141786	NA	1.30E+05	NA	3.8E+7 (C)	4.90E+07	4.90E+07	9.80E+07	2.10E+11	2.0E+8 (C)	7.50E+06
Ethyl-tert-butyl ether (ETBE)	637923	NA	980	ID	5.40E+05	1.90E+06	4.50E+06	1.10E+07	2.50E+10	ID	6.50E+05
Ethylbenzene (I)	100414	NA	1,500	360	87,000	7.20E+05	1.00E+06	2.20E+06	1.00E+10	2.2E+7 (C)	1.40E+05
Ethylene dibromide	106934	NA	20 (M); 1.0	110 (X)	670	1,700	1,700	3,300	1.40E+07	92	8.90E+05
Ethylene glycol	107211	NA	3.00E+05	3.8E+6 (X)	NLV	NLV	NLV	NLV	6.70E+10	4.5E+8 (C)	1.10E+08
Ethylene glycol monobutyl ether	111762	NA	74,000	NA	7.40E+05	1.80E+07	1.50E+08	3.60E+08	8.70E+11	1.1E+8 (C)	4.10E+07
Fluoranthene	206440	NA	7.30E+05	5,500	1.0E+9 (D)	7.40E+08	7.40E+08	7.40E+08	9.30E+09	4.60E+07	NA
Fluorene	86737	NA	3.90E+05	5,300	5.80E+08	1.30E+08	1.30E+08	1.30E+08	9.30E+09	2.70E+07	NA
Fluorine (soluble fluoride) (B)	7782414	NA	40,000	ID	NLV	NLV	NLV	NLV	ID	9.0E+6 (DD)	NA
Formaldehyde	50000	NA	26,000	3,600	12,000	13,000	23,000	52,000	2.40E+08	4.10E+07	6.00E+07
Formic acid (I,U)	64186	NA	2.00E+05	ID	1.50E+06	2.10E+05	1.40E+05	1.40E+05	1.30E+08	3.2E+8 (C)	1.10E+08
1-Formylpiperidine	2591868	NA	1,600	NA	ID	ID	ID	ID	ID	2.50E+06	1.00E+07
Gentian violet	548629	NA	300	NA	NLV	NLV	NLV	NLV	ID	96,000	NA
Glyphosate	1071836	NA	NLL	NLL	NLV	NLV	NLV	NLV	ID	1.1E+7 (DD)	NA
Heptachlor	76448	NA	NLL	NLL	3.50E+05	62,000	62,000	62,000	2.40E+06	5,600	NA
Heptachlor epoxide	1024573	NA	NLL	NLL	NLV	NLV	NLV	NLV	1.20E+06	3,100	NA
n-Heptane	142825	NA	4.6E+7 (C)	NA	1.5E+6 (C)	2.10E+07	4.40E+07	1.00E+08	2.30E+11	9.9E+8 (C)	2.40E+05
Hexabromobenzene	87821	NA	5,400	ID	ID	ID	ID	ID	ID	1.10E+06	NA

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Hexachlorobenzene (C-66)	118741	NA	1,800	350	41,000	17,000	17,000	17,000	6.80E+06	8,900	NA
Hexachlorobutadiene (C-46)	87683	NA	26,000	91	1.30E+05	1.30E+05	1.30E+05	1.30E+05	1.40E+08	1.00E+05	3.50E+05
alpha-Hexachlorocyclohexane	319846	NA	18	ID	30,000	12,000	22,000	25,000	1.70E+06	2,600	NA
beta-Hexachlorocyclohexane	319857	NA	37	ID	NLV	NLV	NLV	NLV	5.90E+06	5,400	NA
Hexachlorocyclopentadiene (C-56)	77474	NA	3.20E+05	ID	30,000	50,000	50,000	50,000	1.30E+07	2.3E+6 (C)	7.20E+05
Hexachloroethane	67721	NA	430	1,800 (X)	40,000	5.50E+05	9.30E+05	9.30E+05	2.30E+08	2.30E+05	NA
n-Hexane	110543	NA	1.8E+5 (C)	NA	5.1E+5 (C)	3.00E+06	3.20E+06	6.20E+06	1.30E+10	9.2E+7 (C)	44,000
2-Hexanone	591786	NA	20,000	ID	9.90E+05	1.10E+06	1.10E+06	1.40E+06	2.70E+09	3.2E+7 (C)	2.50E+06
Indeno(1,2,3-cd) pyrene (Q)	193395	NA	NLL	NLL	NLV	NLV	NLV	NLV	ID	20,000	NA
Iron (B)	7439896	1.20E+07	6,000	NA	NLV	NLV	NLV	NLV	ID	1.60E+08	NA
Isobutyl alcohol (I)	78831	NA	46,000	NA	2.3E+8 (C)	7.90E+07	7.90E+07	7.90E+07	1.00E+11	7.2E+7 (C)	8.90E+06
Isophorone	78591	NA	15,000	26,000 (X)	NLV	NLV	NLV	NLV	1.20E+10	4.8E+6 (C)	2.40E+06
Isopropyl alcohol (I)	67630	NA	9,400	1.1E+6 (X)	NLV	NLV	NLV	NLV	1.50E+10	1.40E+07	1.10E+08
Isopropyl benzene	98828	NA	91,000	3,200	4.0E+5 (C)	1.70E+06	1.70E+06	2.80E+06	5.80E+09	2.5E+7 (C)	3.90E+05
Lead (B)	7439921	21,000	7.00E+05	(G,X)	NLV	NLV	NLV	NLV	1.00E+08	4.00E+05	NA
Lindane	58899	NA	20 (M); 7.0	20 (M); 1.1	ID	ID	ID	ID	ID	8,300	NA
Lithium (B)	7439932	9,800	3,400	8,800	NLV	NLV	NLV	NLV	2.30E+09	4.2E+6 (DD)	NA
Magnesium (B)	7439954	NA	8.00E+06	NA	NLV	NLV	NLV	NLV	6.70E+09	1.0E+9 (D)	NA
Manganese (B)	7439965	4.40E+05	1,000	(G,X)	NLV	NLV	NLV	NLV	3.30E+06	2.50E+07	NA
Mercury (Total) (B,Z)	Varies	130	1,700	50 (M); 1.2	48,000	52,000	52,000	52,000	2.00E+07	1.60E+05	NA
Methane	74828	NA	ID	NA	8.4E+6 ug/m3 (GG)	ID	ID	ID	ID	ID	ID
Methanol	67561	NA	74,000	1.2E+7 (C)	3.7E+7 (C)	3.10E+07	4.40E+07	9.60E+07	2.20E+11	1.1E+8 (C)	3.10E+06
Methoxychlor	72435	NA	16,000	NA	ID	ID	ID	ID	ID	1.90E+06	NA
2-Methoxyethanol (I)	109864	NA	150	NA	NLV	NLV	NLV	NLV	1.30E+09	2.30E+05	1.10E+08
2-Methyl-4-chlorophenoxyacetic acid	94746	NA	390	NA	NLV	NLV	NLV	NLV	ID	2.30E+05	NA
2-Methyl-4,6-dinitrophenol	534521	NA	830 (M); 400	NA	NLV	NLV	NLV	NLV	1.30E+08	79,000	NA
N-Methyl-morpholine (I)	109024	NA	400	NA	NLV	NLV	NLV	NLV	ID	6.10E+05	1.10E+08

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Methyl parathion	298000	NA	46	NA	NLV	NLV	NLV	NLV	ID	56,000	NA
4-Methyl-2-pentanone (MIBK) (I)	108101	NA	36,000	ID	3.7E+7 (C)	4.50E+07	4.50E+07	6.70E+07	1.40E+11	5.6E+7 (C)	2.70E+06
Methyl-tert-butyl ether (MTBE)	1634044	NA	800	1.4E+5 (X)	9.9E+6 (C)	2.50E+07	3.90E+07	8.70E+07	2.00E+11	1.50E+06	5.90E+06
Methylcyclopentane (I)	96377	NA	ID	NA	92,000	2.30E+06	8.20E+06	2.00E+07	4.70E+10	ID	3.50E+05
4,4'-Methylene-bis-2- chloroaniline (MBOCA)	101144	NA	NLL	NLL	NLV	NLV	NLV	NLV	8.40E+07	6,800	NA
Methylene chloride	75092	NA	100	30,000 (X)	45,000	2.10E+05	5.90E+05	1.40E+06	6.60E+09	1.30E+06	2.30E+06
2-Methylnaphthalene	91576	NA	57,000	4,200	2.70E+06	1.50E+06	1.50E+06	1.50E+06	6.70E+08	8.10E+06	NA
Methylphenols (J)	1319773	NA	7,400	1,000 (M); 600	NLV	NLV	NLV	NLV	6.70E+09	1.10E+07	NA
Metolachlor	51218452	NA	4,800	300	NLV	NLV	NLV	NLV	ID	1.5E+6 (C, DD)	4.40E+05
Metribuzin	21087649	NA	3,600	NA	ID	ID	ID	ID	ID	9.60E+06	NA
Mirex	2385855	NA	NLL	NLL	ID	ID	ID	ID	ID	9,600	NA
Molybdenum (B)	7439987	NA	1,500	64,000 (X)	NLV	NLV	NLV	NLV	ID	2.60E+06	NA
Naphthalene	91203	NA	35,000	730	2.50E+05	3.00E+05	3.00E+05	3.00E+05	2.00E+08	1.60E+07	NA
Nickel (B)	7440020	20,000	1.00E+05	(G)	NLV	NLV	NLV	NLV	1.30E+07	4.00E+07	NA
Nitrate (B,N)	14797558	NA	2.0E+5 (N)	ID	NLV	NLV	NLV	NLV	ID	ID	NA
Nitrite (B,N)	14797650	NA	20,000 (N)	NA	NLV	NLV	NLV	NLV	ID	ID	NA
Nitrobenzene (I)	98953	NA	330 (M); 68	3,600 (X)	91,000	54,000	54,000	54,000	4.70E+07	1.00E+05	4.90E+05
2-Nitrophenol	88755	NA	400	ID	NLV	NLV	NLV	NLV	ID	6.30E+05	NA
n-Nitroso-di-n-propylamine	621647	NA	330 (M); 100	NA	NLV	NLV	NLV	NLV	1.60E+06	1,200	1.50E+06
N-Nitrosodiphenylamine	86306	NA	5,400	NA	NLV	NLV	NLV	NLV	2.20E+09	1.70E+06	NA
Oxamyl	23135220	NA	4,000	NA	NLV	NLV	NLV	NLV	ID	8.60E+06	NA
Oxo-hexyl acetate	88230357	NA	1,500	NA	ID	ID	ID	ID	5.40E+09	2.30E+06	1.00E+07
Pendimethalin	40487421	NA	1.10E+06	NA	NLV	NLV	NLV	NLV	ID	4.60E+07	NA
Pentachlorobenzene	608935	NA	29,000	9,500	ID	ID	ID	ID	ID	3.2E+5 (C)	1.90E+05
Pentachloronitrobenzene	82688	NA	37,000	NA	1.20E+05	2.30E+05	2.30E+05	2.30E+05	3.30E+08	1.70E+06	NA
Pentachlorophenol	87865	NA	22	(G,X)	NLV	NLV	NLV	NLV	1.00E+08	90,000	NA

TABLE 2. SOIL: RESIDENTIAL

PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS/PART 213 RISK-BASED SCREENING LEVELS

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			Groundwater Protection		Indoor Air	Ambient Air (Y) (C)				Contact	Csat
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Level	Residential Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria	Infinite Source Volatile Soil Inhalation Criteria (VSIC)	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria	Direct Contact Criteria	Soil Saturation Concentration Screening Levels
Pentane	109660	NA	ID	NA	9.7E+5 (C)	3.70E+07	3.10E+08	5.80E+08	1.20E+12	ID	2.40E+05
2-Pentene (I)	109682	NA	ID	NA	ID	ID	ID	ID	ID	ID	2.20E+05
Perfluorooctanoic acid (DD)	335671	NA	NA	10,000 (X)	NA	NA	NA	NA	NA	NA	NA
Perfluorooctane sulfonic acid (DD)	1763231	NA	NA	0.24 (X)	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	85018	NA	56,000	2,100	2.80E+06	1.60E+05	1.60E+05	1.60E+05	6.70E+06	1.60E+06	NA
Phenol	108952	NA	88,000	9,000	NLV	NLV	NLV	NLV	4.00E+10	4.0E+7 (C, DD)	1.20E+07
Phenytoin	57410	NA	830	4300 (X)	NLV	NLV	NLV	NLV	2.20E+08	1.00E+05	NA
Phosphorus (Total)	7723140	NA	1.30E+06	(EE)	NLV	NLV	NLV	NLV	6.70E+07	1.0E+9 (D)	NA
Phthalic acid	88993	NA	2.80E+05	NA	NLV	NLV	NLV	NLV	ID	4.3E+8 (C)	1.70E+06
Phthalic anhydride	85449	NA	3.00E+05	NA	NLV	NLV	NLV	NLV	ID	4.7E+8 (C)	1.10E+06
Picloram	1918021	NA	10,000	920	NLV	NLV	NLV	NLV	ID	1.60E+07	NA
Piperidine	110894	NA	64	NA	NLV	NLV	NLV	NLV	9.30E+09	99,000	1.20E+08
Polybrominated biphenyls (J)	67774327	NA	NLL	NLL	NLV	NLV	NLV	NLV	ID	1,200	NA
Polychlorinated biphenyls (PCBs) (J,T)	1336363	NA	NLL	NLL	3.00E+06	2.40E+05	7.90E+06	7.90E+06	5.20E+06	(T)	NA
Prometon	1610180	NA	4,900	NA	NLV	NLV	NLV	NLV	ID	5.00E+06	NA
Propachlor	1918167	NA	1,900	NA	NLV	NLV	NLV	NLV	ID	2.90E+06	NA
Propazine	139402	NA	4,000	NA	NLV	NLV	NLV	NLV	ID	6.10E+06	NA
Propionic acid	79094	NA	2.40E+05	ID	NLV	NLV	NLV	NLV	2.00E+10	3.8E+8 (C)	1.10E+08
Propyl alcohol (I)	71238	NA	28,000	NA	NLV	NLV	NLV	NLV	4.90E+10	1.3E+7 (DD)	1.10E+08
n-Propylbenzene (I)	103651	NA	1,600	ID	ID	ID	ID	ID	1.30E+09	2.50E+06	1.00E+07
Propylene glycol	57556	NA	3.00E+06	5.80E+06	NLV	NLV	NLV	NLV	4.00E+11	1.0E+9 (C,D)	1.10E+08
Pyrene	129000	NA	4.80E+05	ID	1.0E+9 (D)	6.50E+08	6.50E+08	6.50E+08	6.70E+09	2.90E+07	NA
Pyridine (I)	110861	NA	400	NA	1,100	8,200	40,000	97,000	2.30E+08	2.3E+5 (C)	37,000
Selenium (B)	7782492	410	4,000	400	NLV	NLV	NLV	NLV	1.30E+08	2.60E+06	NA
Silver (B)	7440224	1,000	4,500	100 (M); 27	NLV	NLV	NLV	NLV	6.70E+06	2.50E+06	NA
Silvex (2,4,5-TP)	93721	NA	3,600	2,200	NLV	NLV	NLV	NLV	ID	1.70E+06	NA
Simazine	122349	NA	80	340	NLV	NLV	NLV	NLV	ID	1.20E+06	NA

TABLE 2. SOIL: RESIDENTIAL

PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS/PART 213 RISK-BASED SCREENING LEVELS

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Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Level	Residential Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria	Infinite Source Volatile Soil Inhalation Criteria (VSIC)	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria	Direct Contact Criteria	Soil Saturation Concentration Screening Levels
Sodium	17341252	NA	4.60E+06	NA	NLV	NLV	NLV	NLV	ID	1.0E+9 (D)	NA
Sodium azide	26628228	NA	1,800	1,000	ID	ID	ID	ID	ID	2.70E+06	NA
Strontium (B)	7440246	NA	92,000	4.20E+05	NLV	NLV	NLV	NLV	ID	3.30E+08	NA
Styrene	100425	NA	2,700	2,100 (X)	2.50E+05	9.70E+05	9.70E+05	1.40E+06	5.50E+09	4.00E+05	5.20E+05
Sulfate	14808798	NA	5.00E+06	NA	NLV	NLV	NLV	NLV	ID	ID	NA
Tebuthiuron	34014181	NA	10,000	NA	NLV	NLV	NLV	NLV	ID	4.6E+6 (DD)	NA
2,3,7,8-Tetrabromodibenzo-p-dioxin (O)	50585416	NA	NLL	NLL	NLV	NLV	NLV	NLV	(O)	(O)	NA
1,2,4,5-Tetrachlorobenzene	95943	NA	1.50E+06	3,400 (X)	5.80E+05	2.30E+05	2.30E+05	2.30E+05	6.70E+07	7.70E+07	NA
2,3,7,8-Tetrachlorodibenzo-p-dioxin (O)	1746016	NA	NLL	NLL	NLV	NLV	NLV	NLV	71 (O)	0.09 (O)	NA
1,1,1,2-Tetrachloroethane	630206	NA	1,500	ID	6,200	36,000	54,000	1.00E+05	4.20E+08	4.8E+5 (C)	4.40E+05
1,1,2,2-Tetrachloroethane	79345	NA	170	1,600 (X)	4,300	10,000	10,000	14,000	5.40E+07	53,000	8.70E+05
Tetrachloroethylene	127184	NA	100	1,200 (X)	11,000	1.70E+05	4.80E+05	1.10E+06	2.70E+09	2.0E+5 (C)	88,000
Tetrahydrofuran	109999	NA	1,900	2.2E+5 (X)	1.30E+06	1.30E+07	6.70E+07	1.60E+08	3.90E+11	2.90E+06	1.20E+08
Tetranitromethane	509148	NA	ID	NA	500(M); 110	500 (M); 51	ID	ID	2.10E+05	ID	ID
Thallium (B)	7440280	NA	2,300	4,200 (X)	NLV	NLV	NLV	NLV	1.30E+07	35,000	NA
Toluene (I)	108883	NA	16,000	5,400	3.3E+5 (C)	2.80E+06	5.10E+06	1.20E+07	2.70E+10	5.0E+7 (C)	2.50E+05
p-Toluidine	106490	NA	660 (M); 300	NA	NLV	NLV	NLV	NLV	1.00E+08	94,000	1.20E+06
Toxaphene	8001352	NA	24,000	8,200	NLV	NLV	NLV	NLV	9.70E+06	20,000	NA
Triallate	2303175	NA	95,000	NA	ID	ID	ID	ID	ID	2.9E+6 (C)	2.50E+05
Tributylamine	102829	NA	7,800	ID	5.80E+05	6.00E+05	6.00E+05	6.00E+05	4.70E+08	7.90E+05	3.70E+06
1,2,4-Trichlorobenzene	120821	NA	4,200	5,900 (X)	9.6E+6 (C)	2.80E+07	2.80E+07	2.80E+07	2.50E+10	9.9E+5 (DD)	1.10E+06
1,1,1-Trichloroethane	71556	NA	4,000	1,800	2.50E+05	3.80E+06	1.20E+07	2.80E+07	6.70E+10	5.0E+8 (C)	4.60E+05
1,1,2-Trichloroethane	79005	NA	100	6,600 (X)	4,600	17,000	21,000	44,000	1.90E+08	1.80E+05	9.20E+05
Trichloroethylene	79016	NA	100	4,000 (X)	1,000	11,000	25,000	57,000	1.30E+08	1.1E+5 (DD)	5.00E+05
Trichlorofluoromethane	75694	NA	52,000	NA	2.8E+6 (C)	9.20E+07	6.30E+08	1.50E+09	3.80E+12	7.9E+7 (C)	5.60E+05
2,4,5-Trichlorophenol	95954	NA	39,000	NA	NLV	NLV	NLV	NLV	2.30E+10	2.30E+07	NA
2,4,6-Trichlorophenol	88062	NA	2,400	330 (M); 100	NLV	NLV	NLV	NLV	1.00E+09	7.10E+05	NA

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1,2,3-Trichloropropane	96184	NA	840	NA	4,000	9,200	9,200	11,000	2.00E+07	1.3E+6 (C)	8.30E+05
1,1,2-Trichloro-1,2,2-trifluoroethane	76131	NA	9.0E+6 (C)	1,700	5.1E+6 (C)	1.80E+08	8.80E+08	2.10E+09	5.10E+12	1.0E+9 (C,D)	5.50E+05
Triethanolamine	102716	NA	74,000	NA	NLV	NLV	NLV	NLV	3.30E+09	1.10E+08	1.10E+08
Triethylene glycol	112276	NA	86,000	NA	NLV	NLV	NLV	NLV	ID	3.9E+7 (C,DD)	1.10E+05
3-Trifluoromethyl-4-nitrophenol	88302	NA	1.10E+05	NA	NLV	NLV	NLV	NLV	ID	4.1E+7 (DD)	NA
Trifluralin	1582098	NA	1.90E+05	NA	ID	ID	ID	ID	ID	2.00E+06	NA
2,2,4-Trimethyl pentane	540841	NA	ID	NA	1.1E+5 (C)	5.20E+06	3.90E+07	9.60E+07	2.30E+11	ID	19,000
2,4,4-Trimethyl-2-pentene (I)	107404	NA	ID	NA	ID	ID	ID	ID	ID	ID	56,000
1,2,4-Trimethylbenzene (I)	95636	NA	2,100	570	4.3E+6 (C)	2.10E+07	5.00E+08	5.00E+08	8.20E+10	3.2E+7 (C)	1.10E+05
1,3,5-Trimethylbenzene (I)	108678	NA	1,800	1,100	2.6E+6 (C)	1.60E+07	3.80E+08	3.80E+08	8.20E+10	3.2E+7 (C)	94,000
Triphenyl phosphate	115866	NA	1.5E+6 (C)	NA	NLV	NLV	NLV	NLV	ID	3.6E+7 (C)	1.10E+05
tris(2,3-Dibromopropyl)phosphate	126727	NA	930	ID	82,000 (C)	18,000	18,000	18,000	5.90E+06	4,400	27,000
Urea	57136	NA	ID	NA	NLV	NLV	NLV	NLV	ID	ID	NA
Vanadium	7440622	NA	72,000	4.30E+05	NLV	NLV	NLV	NLV	ID	7.5E+5 (DD)	NA
Vinyl acetate (I)	108054	NA	13,000	NA	7.90E+05	1.70E+06	2.60E+06	5.80E+06	1.30E+10	5.8E+6 (C,DD)	2.40E+06
Vinyl chloride	75014	NA	40	260 (X)	270	4,200	30,000	73,000	3.50E+08	3,800	4.90E+05
White phosphorus (R)	12185103	NA	2.2	NA	NLV	NLV	NLV	NLV	ID	2,300 (DD)	NA
Xylenes (I)	1330207	NA	5,600	980	6.3E+6 (C)	4.60E+07	6.10E+07	1.30E+08	2.90E+11	4.1E+8 (C)	1.50E+05
Zinc (B)	7440666	47,000	2.40E+06	(G)	NLV	NLV	NLV	NLV	ID	1.70E+08	NA

Appendix D
Local Letter of Support

June 9, 2021

Mr. John Riley
Area of Concern Coordinator
Water Resources Division
Michigan Department of Environment, Great Lakes & Energy
Lansing, Michigan 48909

Dear Mr. Riley,

The Public Advisory Council (PAC) Active Members for the Manistique River Area of Concern and the City of Manistique concurs with the recommendation to remove Dredging Restriction Beneficial Use Impairment (BUI). On February 15, 2006, the PAC Council accepted the Michigan Department of Environmental, Great Lake & Energy (EGLE) criteria for assessing and removing the impairments in the Area of Concern when each is restored.

Members of the PAC have reviewed the criteria and concur that they have been met. Mr. John Riley EGLE's Water Resource Division, has presented supporting information on the removal recommendation. The PAC and the City of Manistique supports EGLE's recommendations and supports moving forward with the removal of the Dredging Restrictions BUI in the Manistique River Area of Concern.

It is encouraging to the PAC and local units of government to continue to see positive action being taken on removal of restored use impairments in the Area of Concern. The PAC strongly encourages the agencies to continue with assessment of the remaining impairment in the Area of Concern, with a goal of delisting the site as soon as feasibly possible.

Thank you for your time on this issue that is so important to the citizens of Manistique. If you have any questions, please feel free to contact me.

Respectfully,

Corey Barr, Chair
Manistique Public Advisory Council &

City of Manistique
Water & Wastewater Superintendent

Cc: Sheila Aldrich, Manistique PAC/AOC Member and City of Manistique – City Manager