

# Memo

TO: Ben Hughes – City Manager  
FROM: Bryan Babcock, PE – Director of Public Works  
DATE: January 24, 2012  
SUBJECT: Ten Mile Drain – 2011 Source Area Investigation, Data Summary Report  
CC:

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The attached is a copy of the Ten Mile Drain – 2011 Source Area Investigation, Data Summary Report received by the City on January 19, 2012.

The attached 23 pages is the report summary. The remaining 378 pages of the report include tables, figures and appendices. The complete document is available in my office as well as the Library for viewing. In addition I also have an electronic copy of the report.

Please let me know if there is anything else you should need and I would be happy to distribute. Thank you.

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# REGION 5 RAC2

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## REMEDIAL ACTION CONTRACT FOR

Remedial, Enforcement Oversight, and  
Non-Time Critical Removal Activities at Sites of Release  
or Threatened Release of Hazardous Substances in Region 5

### 2011 SOURCE AREA INVESTIGATION

Ten-Mile Drain Site  
Data Summary Report  
St. Clair Shores, Michigan

WA No. 107-RICO-B5BP/Contract No. EP-S5-06-01

January 2012

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PREPARED FOR

U.S. Environmental Protection Agency



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PREPARED BY

**CH2M HILL**

FOR OFFICIAL USE ONLY

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**FINAL  
2011 SOURCE AREA INVESTIGATION  
DATA SUMMARY REPORT**

**TEN-MILE DRAIN SITE**

**St. Clair Shores, Michigan**

**WA No. 107-RICO-B5BP / Contract No. EP-S5-06-01**

**January 2012**

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# Acronyms and Abbreviations

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bgs	below ground surface
CIPP	cured-in-place pipe
ECT	Environmental Consulting & Technology
MCPWO	Macomb County Public Works Office
MDEQ	Michigan Department of Environmental Quality
NPL	National Priorities List
NRCS	Natural Resources Conservation Service
ppb	parts per billion
ppm	parts per million
PCB	Polychlorinated Biphenyl
SAI	Source Area Investigation
SAP	Sampling Action Plan
TMD	Ten-Mile Drain
TSCA	Toxic Substance Control Act
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

## SECTION 1

# Introduction

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This Data Evaluation Summary Report presents the findings of the Source Area Investigation (SAI) conducted in April and May 2011 at the Ten-Mile Drain (TMD) Site in St. Clair Shores, Michigan. This Data Evaluation Summary Report is being submitted pursuant to the statement of work received on July 27, 2010. The work is being conducted in accordance with Work Assignment No. 107-RICO-B5BP under Contract No. EP-S5-06-01. (CH2M HILL, 2010)

## 1.1 Objective

The overall objective of the SAI was to investigate the source of polychlorinated biphenyls (PCBs) that continue to recontaminate the TMD and the Lange and Revere Street Canals in order to support the selection of a remedy that can be implemented by the U.S. Environmental Protection Agency (USEPA) to mitigate future PCB impact to the TMD system. In order to meet this objective, CH2M HILL reviewed historical documentation (including aerial photographs and Sanborn fire insurance maps), previous investigation reports, public utility maps, public tips or leads on dumping, and known data gaps from previous investigations to identify potential sampling locations (CH2M HILL, March 2011). Previous investigations assessed properties and areas of concern located adjacent to the TMD system. Therefore, the SAI was focused within utility corridors (sanitary sewer, 12-inch and 24-inch water mains) that crossed the TMD utility corridor which potentially provide preferential pathways for PCB contamination to migrate into the TMD. If contamination was present within utility corridors crossing the TMD system, the contamination could be traced back to the potential source area. The SAI also included additional investigation along the TMD utility corridor.

## 1.2 Site Background

The site is located in a mixed commercial/residential area in St. Clair Shores, Macomb County, Michigan. The majority of the TMD study area encompasses a several-block area bounded by Bon Brae Street on the north, Harper Avenue on the west, Ten Mile Road on the south, and Jefferson Avenue on the east, along with the TMD outfall and the Lange and Revere Street Canals. The SAI expanded the investigation, based on the review of previous investigations and known data gaps, north along Harper Avenue to Frazho Street and west of Harper Avenue on Bon Brae Street several blocks. The TMD system and SAI area are depicted on Figure 1.

### History of Removal Activities and Investigations (2001-2006)

In July 2001, sediment samples were collected by the Macomb County Public Works Office (MCPWO) as part of a permit application process for a proposed dredging project in the Lange and Revere Street Canals. The analytical results were submitted to the U.S. Army Corps of Engineers (USACE) and based on the elevated levels of PCBs in the sediment, the USACE notified the Michigan Department of Environmental Quality (MDEQ). In December

2001, the MDEQ conducted an investigation of the TMD system and confirmed there was an upstream source of PCB contamination in the drain. As a result of MDEQ's investigation, the MCPWO sampled and confirmed the presence of PCBs in both the Lange and Revere Street Canals and TMD system.

The USEPA removal program initiated a time-critical removal action in August 2002 and completed work at the site on July 16, 2004. During this time frame, high concentrations of PCB-contaminated sediments were removed from the TMD system and the Lange and Revere Street Canals. All waste was transported for disposal at approved offsite facilities. The USEPA completed the following activities as part of the time-critical removal action:

- Developed and implemented a site-specific Health and Safety Plan and an Air Monitoring Plan.
- Developed and implemented a Site Security Plan which included guard services, installation of signs on gates and temporary fencing.
- Dewatered the TMD System and removed all sediments via confined space entry and high-pressure Jet-vacuum truck.
- Constructed an onsite water treatment system and treated approximately 2.5 million gallons of contaminated water. Water treatment operation included the dewatering of the Wahby Park Pond, located approximately 200 feet south of the Revere Street Canal, and sampling of the sediments.
- Installed sheet piling to create excavation cells and replaced any sections of sea walls that failed after dewatering due to removal activities.
- Excavated all known areas with sediments initially identified with PCBs at levels exceeding 10 milligrams per kilogram, parts per million (ppm), from the Revere and Lange Street Canals. The performance standard goal for this removal action was to remove sediments in each area to below 1 ppm.
- Developed and implemented a confirmation sampling plan during the excavation phase of the project. In the event that the confirmatory sampling demonstrated that the performance standard goal of 1 ppm was not met, additional excavation and confirmatory sampling was required.
- Disposed offsite all PCB-contaminated sediments and any other hazardous substances or pollutants or contaminants at a USEPA-approved disposal facility in accordance with the USEPA Off-Site Rule (40 CFR § 300.440).
- Restored any areas damaged due to USEPA's actions.

In total, USEPA disposed of approximately 5,900 tons of Toxic Substance Control Act (TSCA) regulated materials (containing greater than 50 ppm PCBs) and 18,000 tons of non-TSCA regulated materials (containing less than 50 ppm PCBs). In April 2004, MCPWO completed the re-cleaning of the drain and the outfall area where the TMD discharges into the Lange and Revere Street Canals.

In June 2004, MCPWO initiated quarterly PCB sampling inside TMD. PCBs were present at levels as high as 1.3 milligrams per liter (ppm) in water samples collected from inside TMD and at the time were believed to be residual contamination. In July 2004, MCPWO initiated

a Phase I-type assessment of the Harper Avenue and Bon Brae Street area. In September 2004, MCPWO completed the second round of quarterly PCB sampling and detected PCBs in sediment at the outfall of TMD at 770 ppm. In December 2004, MCPWO conducted the third round of PCB sampling and detected PCBs at levels as high as 17,000 ppm inside TMD. MCPWO then initiated sampling of the backfill soils surrounding TMD to assess if a source of PCBs in the backfill material was re-contaminating the drain. Results indicated that PCBs were present in backfill surrounding the TMD at levels as high as 41,000 ppm. In January 2005, MCPWO collected sediment samples from inside TMD near the intersection of Harper Avenue and Bon Brae Street and detected PCBs at levels as high as 200,000 ppm.

In May 2005, USEPA and MDEQ installed 64 additional soil borings in the TMD study area to better define the extent of PCB contamination. PCBs were detected in the sand and gravel backfill surrounding the TMD and appeared centered in the area near the intersection of Harper Avenue and Bon Brae Street. The May 2005 investigation also identified one surface soil area contaminated with PCBs at approximately 800 ppm. In the spring and summer of 2006, USEPA conducted another removal action to address the near surface soil contamination. The following activities were completed during the 2006 removal action:

- Removal and restoration of shallow surface soils containing low-level PCB concentrations.
- Repair of sea walls.
- Removal of sediment from a portion of the sewer system.
- Installation of monitoring wells and a large trap to collect contaminated sediment at the TMD outfall.
- A portion of the sewers along Bon Brae Street and Harper Avenue were lined with cured-in-place pipe (CIPP) to attempt to impede PCB infiltration into TMD.

#### **City of St. Clair Shores and USEPA Removal Activities (2007-2011)**

In the fall of 2007, MDEQ provided a \$500,000 grant to the City of St. Clair Shores for further investigation and cleanup efforts. The City of St. Clair Shores hired Environmental Consulting & Technology (ECT) as its contractor. Four primary tasks were performed under this grant: environmental sampling to monitor the conditions in and around TMD; installation and maintenance of monitoring wells along TMD; cleaning contaminated sediment from portions of TMD; and installation of two weirs within TMD to slow the migration of PCBs to Lake St. Clair. The weirs are half-circle metal structures approximately two feet high that act like small dams to collect PCB oil and contaminated sediment before the contaminants migrate into the Lange and Revere Street Canals.

In late 2009, inside the CIPP-lined portion of the sewer located at the Bon Brae Street and Harper Avenue intersection, ECT discovered oil that contained more than 80 percent PCBs (more than 800,000 ppm). The City of St. Clair Shores and ECT asked for assistance from the USEPA in addressing the oil in the drain. The USEPA and the City of St. Clair Shores identified immediate time-critical concerns to mitigate the PCB oil migration down TMD into the Lange and Revere Street Canals. On March 8, 2010, the USEPA mobilized its Superfund Technical Assessment and Response Team and Emergency Response and

Removal Services contractors to the site to initiate removal action activities, which included the following:

- Dewatering and high-pressure jet-vacuuming of the sewer along Bon Brae Street, Harper Avenue and Jefferson Avenue to remove PCB oil and sediment.
- Stabilization, transportation, and disposal of the PCB-contaminated materials.
- Installation of temporary weir structures in 15 manhole locations to allow sediment collection points in addition to the two weirs previously installed in the TMD by the City of St. Clair Shores.
- A geophysical survey of the area near TMD where contamination was present, and installation of soil borings and collection of soil samples from suspected source areas.

USEPA proposed the site for the National Priorities List (NPL) in March 2010 and finalized the site on the NPL in September 2010.

After the aforementioned removal activities, the City of St. Clair Shores continued to conduct environmental sampling to monitor conditions behind the 17 weirs in the TMD. Sampling results indicated that high levels of PCB contamination continued to infiltrate into the drain and accumulate behind the weirs from an unknown source.

Based on the sampling results, the USEPA conducted another removal action at the site on February 26, 2011 to remove PCB oil from the drain. Absorbent snares were used to swipe and adsorb the oil that had collected behind the weirs. Six of the 17 weir locations required cleanout. In April 2011, the City of St. Clair Shores, as a part of their environmental monitoring activities, inspected and removed stained snares and placed clean snares behind the weirs where needed. MDEQ's grant to fund the City of St. Clair Shores' investigations and cleanup efforts at the TMD Site expired in September 2011.

### **1.3 Contaminants of Concern**

PCBs are the contaminants of concern in soil, sediment, and water in the TMD study area. Since 2001, PCBs have been known to contaminate the TMD system, the soils and water immediately surrounding the TMD in the utility corridor, and the sediments in the Lang and Revere Street Canals at the outfall of TMD. (USEPA, 2009).

## SECTION 2

# Physical Setting

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This section summarizes the physical setting in the TMD study area based on data collected during the SAI and previous investigations.

## 2.1 Topography

The TMD study area is relatively flat with little topographic relief. Based upon field global positioning system measurements, the average surface elevation of the TMD study area is approximately 583 feet above mean sea level. The TMD study area slopes to the east-southeast at approximately 5 feet per mile, and does not contain any notable topographical relief features.

## 2.2 Geology and Soils

The TMD study area is located in an area classified as containing approximately 80 percent (by area) Lenawee Clay, 10 percent Toledo silty clay loam, and 10 percent Del Ray loam soils (Natural Resources Conservation Service [NRCS], 2011). These soils are typical of clayey glaciolacustrine deposits that formed on flats of till-floored lake planes (NRCS, 2011). The majority of soil borings installed during the SAI were installed within the backfill of utility corridors which included: sanitary sewer, 12-inch and 24-inch water mains, and the TMD. The soils observed in the utility corridor borings were either disturbed native soils or imported backfill materials until the native soils beneath the utility corridors were encountered. Soil types encountered in borings installed outside and beneath the utility corridors were consistent with clays and silts identified by the NRCS. The majority of the TMD utility corridor appears to have been backfilled with washed sand and pea gravel (rounded to sub-rounded gravels 3/16 to 3/8 inch in diameter) to depths of 12 to 18 feet below ground surface (bgs). With the exception of the local 12-inch-diameter water main, the other intersecting or adjacent utilities corridors (24-inch water main and sanitary sewer), have been backfilled with bricks, cement, and native materials. The 12-inch-diameter water main was backfilled with imported sandy material.

## 2.3 Hydrogeology

There is no groundwater aquifer present within 20 feet of ground surface in the TMD study area based on borings installed in native soils located outside the TMD and other utility corridors during the SAI and previous investigations.

## 2.4 Storm Drain Hydraulics

There is low topographic relief in the vicinity of the TMD study area, and water is continually present within the TMD system. The TMD outfall is 8 feet in diameter and is located in the Lange Street Canal and is always partially submerged in the canal. Wind direction causes water level fluctuations (seiches) along the shoreline of Lake St. Clair. The changes in water levels

directly affect the water levels within the TMD. Under normal conditions, water within the TMD system flows from inland areas to the east out into the Lange and Revere Street Canals. However, on-shore winds cause the water levels to increase in the canals causing water flow in the TMD system to reverse, and water to flow from the canals backward up the TMD system.

TMD is constructed with jointed reinforced concrete pipe, 4 to 6 feet in diameter, located between 6 and 12 feet bgs in the TMD study area. The jointed concrete construction appears to allow water to pass through the joints of the drain causing both infiltration and exfiltration of water in the TMD backfill material to flow into and out of the TMD. Water levels in the transmissive sand and gravel backfill equalize with the water levels inside the drain. Water within the TMD backfill material averaged between 5 and 8 feet bgs. Water levels in each boring are depicted on the cross sections in Appendix A and boring logs in Appendix C.

## Field Methods

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The Sampling and Analysis Plan (SAP; CH2M HILL, 2011) outlines the full scope of the SAI. The field methods and sampling approaches described in detail in the SAP are summarized in the following subsections. Deviations from the SAP included collecting water and sediment from inside of TMD and the sanitary sewer utility corridors. Additional water samples were also collected from borings installed in the backfill of the utility corridors. The deviations are discussed in the following subsections. All samples were analyzed by the USEPA mobile laboratory which was located onsite during the SAI. The USEPA mobile lab allowed for a faster turnaround on sample analyses and helped facilitate decisions on the placement of subsequent borings during the SAI.

### 3.1 Utility Corridor Investigation

The primary focus of the SAI was the utility corridors transecting the TMD utility corridor (sanitary sewer, 12-inch and 24-inch water mains) and the TMD utility corridor itself. The utility corridor investigation was conducted to assess whether utility corridors intersecting the TMD utility corridor were conduits for the migration of PCBs into the TMD utility corridor, or if historical releases into the TMD have resulted in secondary source areas of PCBs within the TMD system. A total of 90 borings were installed during the SAI.

#### 3.1.1 Utility Locating

Native soils within the investigation area are dense semi-impermeable clay to silty clay that does not readily transmit water or other liquids. Therefore, the most likely migration pathway(s) for the PCB contamination found within the TMD is the more transmissive disturbed or fill materials in the backfilled utility corridors. In order to meet the objective of the SAI, borings were installed within the backfill of the sanitary sewer, TMD, and water main utility corridors. Michigan's MISS DIG utility locate service was contacted and all known utilities were marked by the MISS DIG contractors at each boring location. A private utility locator conducted ground penetrating radar surveys at the original 50 proposed boring locations to confirm the MISS DIG locates, identify unmarked or unknown lines, and if possible, identify potential anomalies requiring additional investigation. Prior to installing direct-push borings, the utilities were also located by installing borings by hand (hand augering) to provide another level of security for the workers drilling adjacent to active utility lines, to ensure placement of the borings within the utility corridors, and to pre-screen the materials within the utility corridors for visual evidence of contamination.

#### 3.1.2 Soil Sample Collection

Soil sampling within the utility corridors was performed using a hydraulic direct-push technology drilling rig to collect undisturbed soil cores. The SAP had identified 50 potential boring locations and indicated more boring locations may be added based upon results obtained from the initial boring locations. A total of 90 soil borings were installed during the SAI.

Continuous soil cores were collected from each boring. The sampling frequency for each soil core was every other 1-foot interval starting with the 0- to 1-foot bgs interval. Each sample was analyzed for PCBs. Soil borings were advanced into native materials underlying the utility corridors, and samples were collected above and below the native soil interface to assess the extent that native soils have been impacted beneath the utility corridors. Soil descriptions from each boring and the depth that water was encountered were recorded on individual boring logs. The boring Logs are included in Appendix C. Soil boring and water sample locations are shown on Figures 2 through 5.

If a sample from a predetermined interval could not be collected due to minimal recovery from that interval or lack of sufficient sample material due to the presence of debris, concrete, or gravel, etc., an adjoining interval, containing sufficient sample material, was collected as an alternative. Additional intervals were collected from locations outside of the predetermined frequency when field staff observed intervals of potentially contaminated soil, based on visual observations (staining or sheen).

### **3.1.3 Utility Corridor Water Sample Collection**

Water samples were collected from within the backfill of the utility corridors in 32 soil borings using a temporary stainless steel well screen and low-flow sampling methods outlined in the SAP. The SAP indicated that 20 water samples would be collected during the investigation. Due to the installation of 40 additional borings, 12 additional water samples were collected.

A total of 24 water samples were collected from the TMD, five samples from the 12-inch water main and three samples from the 24-inch water main utility corridors. The sanitary sewer lines are backfilled with clay and did not yield enough water to collect samples for PCB analysis. All water samples were analyzed for PCBs. Water sample locations are shown on Figure 6, and PCB analytical results are summarized in Table 2.

### **3.1.4 Sanitary Sewer and TMD Lines Water Sample Collection**

Collecting water samples inside the sanitary sewer and TMD lines was outside of the scope of work outlined in the SAP. During investigation activities, crews working for the City of St. Clair Shores were cleaning out the sanitary sewer lines within the TMD study area. A black-stained, solidified piece of material, roughly 12 inches in diameter, was found by CH2M HILL personnel in the green space along the roadway on Bon Brae Street west of Harper Avenue. The material was subsequently sampled by CH2M HILL and contained PCBs at a concentration of 190 ppm. An additional sediment and water sample were collected from inside the sanitary sewer manhole at the Bon Brae Street and Harper Avenue intersection. A water sample was also collected from inside the sanitary sewer manhole at the intersection of Frazho Street and the alley west of Harper Avenue, and a water sample was collected from inside TMD at the manhole near the intersection of Bon Brae Street and Bon Brae Court.

## SECTION 4

# Findings

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A total of 416 soil samples and 32 water samples were collected from 90 borings installed in the TMD, sanitary sewer, and water utility corridors during the SAI. Two water samples and one sediment sample were collected from inside the sanitary sewer, and one water sample was collected from within a catch basin that leads to TMD. Four soil samples were collected from two borings installed on Sunnydale Street east of Harper Avenue.

Soil samples within the 0 to 3, 3 to 10, and 10 to 20 feet bgs intervals are discussed in the following subsections. Figures 7-10 depict PCB concentrations by depth interval. Figures 11-13 depict the highest PCB concentration for each boring separated by utility corridor.

All soil/sediment and water samples were analyzed for PCBs. Analytical data is summarized in Table 1 (soil/sediment) and Table 2 (water). Conceptual subsurface cross-sections are included in Appendix A. The laboratory analytical data sheets are included in Appendix B.

## 4.1 Ten-Mile Drain Corridor

A total of 267 soil samples and 25 water samples were collected from 57 borings installed in the TMD utility corridor. Figure 11 depicts the highest PCB concentration from each boring installed in the TMD utility corridor.

### 4.1.1 Soil Samples, 0 to 3 feet bgs

A total of 134 samples were collected from 0 to 3 feet bgs in the TMD utility corridor. A total of 119 samples did not exceed 1 ppm PCBs. Thirteen samples contained between 1 and 10 ppm PCBs and two samples contained between 10 and 1,000 ppm PCBs. The highest concentration of PCBs in the samples collected from 0 to 3 feet bgs was in boring TMD-070 (450 ppm) located near the intersection of Bon Brae Street and Harper Avenue near manhole vault J01. Soil concentrations in the 0 to 3 feet bgs samples are depicted on Figure 7.

### 4.1.2 Soil Samples, 3 to 10 feet bgs

A total of 58 soil samples were collected from 3 to 10 feet bgs in the TMD utility corridor. Forty-seven samples did not exceed 1 ppm PCBs. Seven samples contained between 1 and 10 ppm PCBs and four samples contained between 10 and 1,000 ppm PCBs. The highest concentration of PCBs in the samples collected from 3 to 10 feet bgs was in boring TMD-055 (170 ppm) located near the intersection of Bon Brae Street and Harper Avenue near manhole vault M7179. Soil concentrations in the 3 to 10 feet bgs samples are depicted on Figure 8.

### 4.1.3 Soil Samples 10 to 20 feet bgs

A total of 75 soil samples were collected from 10 to 20 feet bgs in the TMD utility corridor. Fifty samples did not exceed 1 ppm PCBs. Ten soil samples contained between 1 and 10 ppm, and 21 samples contained greater than 10 ppm PCBs. The highest concentrations of PCBs in the samples collected from 10 to 20 feet bgs were in borings TMD-53 (66,000 ppm) and TMD-68 (39,000 ppm) located near the intersection of Bon Brae Street and Harper

Avenue near manhole vaults M7179 and J01, respectively. Soil concentrations in the 10 to 20 feet bgs samples are depicted on Figures 9 and 10.

#### **4.1.4 TMD Utility Corridor Water Samples**

A total of 25 water samples were collected from within the TMD utility corridor. Ten samples were below 5 micrograms per liter, parts per billion (ppb) PCBs, five samples contained PCB concentrations between 5 and 10 ppb, eight samples contained concentrations between 10 and 1,000 ppb, and three samples contained concentrations exceeding 1,000 ppb. The highest concentrations of PCBs in water collected from the TMD utility corridor were from borings TMD-078 (17,000 ppb) located near manhole vault 7183 and TMD-029 (2,300 ppb) located approximately 100 feet east of manhole vault J01. Water sample concentrations are depicted on Figure 6; PCB analytical results are summarized in Table 2.

## **4.2 Adjoining/Intersecting Water Main and Sanitary Sewer Utility Corridors**

A total of 149 soil samples and seven water samples were collected from 36 borings installed in water main and sanitary sewer utility corridors. Five of the borings (085 to 089) were installed near the sanitary sewer on the north side of Bon Brae Street at the approximate location that the former Martin Drain crossed Bon Brae Street to assess if the former Martin Drain had been backfilled with sand or other permeable backfill material. The location where Martin Drain historically crossed Bon Brae Street could not be verified as there was no sand or other distinguishable backfill material identified in borings 085 to 089. The highest PCB concentrations from borings installed in the water main and sanitary sewer utility corridors are depicted on Figures 12 and 13, respectively.

### **4.2.1 Soil Samples, 0-3 feet bgs**

A total of 61 samples were collected from 0 to 3 feet bgs in the water main and sanitary sewer utility corridors. Forty-eight samples did not exceed 1 ppm PCBs. Nine samples contained between 1 and 10 ppm PCBs, four samples contained between 10 and 1,000 ppm PCBs. The highest concentrations of PCBs in the samples collected from 0 to 3 feet bgs in the adjoining/intersecting utility corridors was in boring TMD-025 (300 ppm) located near the intersection of Bon Brae Street and Harper Avenue. Soil concentrations in the 0 to 3 feet bgs samples are depicted on Figure 7.

### **4.2.2 Soil Samples, 3 to 10 feet bgs**

A total of 72 soil samples were collected from 3 to 10 feet bgs in the water main and sanitary sewer utility corridors. Seventy samples did not exceed 1 ppm PCBs. One sample contained between 1 and 10 ppm PCBs; 1 sample contained greater than 10 ppm PCBs. The highest concentrations of PCBs in the samples collected from 3 to 10 feet bgs in the adjoining/intersecting utility corridors were in borings TMD-025 (56 ppm) and TMD-049 (2.1 ppm) located near the intersection of Bon Brae Street and Harper Avenue. Soil concentrations in the 3 to 10 feet bgs samples are depicted on Figure 8.

### **4.2.3 Soil Samples, 10 to 20 feet bgs**

A total of 16 soil samples were collected from 10 to 20 feet bgs in the water main and sanitary sewer utility corridors. None of the 16 samples exceeded 1 ppm. Soil concentrations in the 10 to 20 feet bgs samples are depicted on Figures 9 and 10.

### **4.2.4 Water Main and Sanitary Utility Corridors Water Samples**

A total of seven water samples were collected from within the water and sanitary line utility corridors. There were no detections of PCBs in water sampled from within these corridors. Water sample concentrations are depicted on Figure 6; PCB analytical results are summarized in Table 2.

## **4.3 Utility Samples**

Two sediment and three water samples were collected from inside water, sewer, and/or the TMD utility lines during the SAI.

Sample TMD-048/MH was collected from a solid piece of black-stained material located at the surface near a sanitary sewer manhole during sanitary sewer cleaning activities. The sanitary sewer manhole is located near TMD manhole M7178. The sample contained a PCB concentration of 190 ppm. Sediment and water were collected at TMD-063, a sanitary sewer manhole, located near TMD manhole M7178. The sediment sample contained 39 ppm PCBs, and the water sample did not contain detectable concentrations of PCBs. Additional water samples were collected from locations TMD-077 (sanitary sewer) located at the intersection of Frahzo Street and the alley west of Harper Avenue and TMD-091 (storm sewer lead to TMD) located on Bon Brae Court. Neither sample had detectable concentrations of PCBs.

## **4.4 Additional Sample Locations**

Four soil samples were collected from two borings installed on Sunnydale Street east of Harper Avenue. The samples were collected to assess whether PCBs were present on adjacent side streets. No PCBs were detected in the two samples collected on Sunnydale Street.

## SECTION 5

# Conclusions

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The primary focus of the SAI was the utility corridors transecting the TMD utility corridor (sanitary sewer, 12-inch and 24-inch water mains) and the TMD utility corridor itself. The utility corridor investigation was conducted to assess whether utility corridors intersecting the TMD utility corridor were conduits for the migration of PCBs into the TMD utility corridor, or if historical releases into the TMD have resulted in secondary source areas of PCBs within the TMD system.

Based on the low PCB concentrations in samples collected from the water main and sanitary sewer utility lines intersecting the TMD utility corridor during the SAI, the water main and sanitary sewer corridors are not conduits for the migration of PCBs or the cause for the recontamination of the TMD system. The highest concentrations of PCBs in the water and sanitary sewer utility corridors are located at borings TMD-025 (300 ppm) and TMD-028 (10 ppm) near the intersection of Bon Brae Street and Harper Avenue (Figure 7). These levels are low compared to 180,000 and 240,000 ppm, the highest concentration of PCBs collected by the City of St. Clair Shores from inside the TMD system.

Historical release(s) into the TMD system likely have resulted in secondary source areas of PCBs within the utility corridor backfill material around the TMD. SAI results indicate that the high PCB concentrations in samples collected from the backfill of the TMD utility corridor are capable of re-impacting the sediment and water inside the TMD. The highest concentrations (greater than 1,000 ppm PCBs) depicted on Figure 9 and Figure 10 are located adjacent to four manhole vaults. In addition, an oily sheen was observed on samples collected adjacent to the four manhole vaults. Two of the vaults are located near the intersection of Bon Brae Street and Harper Avenue (M7179 and J01), and two of the vaults are located east of Harper Avenue on Bon Brae Street at the intersection of Bon Brae Street and E Street (M4335) and between E Street and B Street (M7183). The manhole vaults where greater than 1,000 ppm PCB concentrations were detected and the oily sheen was observed are depicted on Figure 14. The bottoms of the manhole vault structures are lower in elevation than the concrete pipe portions of the TMD system. PCBs, which are denser than water, appear to have accumulated around the bottom of the four vaults. The secondary source areas at the manhole vaults in the TMD utility corridor are conceptually depicted on Figures 15 and 16. The movement of water in and out of the TMD utility corridor through the joints in the piping along Bon Brae Street and Harper Avenue appear to be causing the PCB oil that has accumulated at the bottom of the vaults to continue to re-enter the drain. Figures 15 and 16 depict the potential movement of PCBs from the vault areas in and out of the TMD system.

Potential source areas other than the impacted fill around the TMD vaults were not identified during the SAI. Based on the widespread levels of PCBs in all depth intervals along Bon Brae Street and Harper Avenue, between Bon Brae and Lakeland Streets, it appears that a surficial spill or fill materials contaminated with PCB concentrations capable

of contaminating the TMD backfill in the vicinity of Bon Brae Street and Harper Avenue may have been the original source of the PCB contamination.

SECTION 6

## References

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