FIELD SAMPLING PLAN
FOR
MIDLAND/SAGINAW/BAY CITY WATER SUPPLY SAMPLING
ARENAC, MIDLAND, SAGINAW, AND BAY COUNTIES, MICHIGAN

Prepared for
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region V

Prepared by
WESTON SOLUTIONS, INC.
Region V Superfund Technical Assessment and Response Team

July 22, 2009

Approved by: Mary P. Log Date: 7/22/09
U.S. EPA Region V
Remedial Project Manager

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ACRONYM LIST

COC	Chain of Custody
DO	Dissolved Oxygen
FSP	Field sampling plan
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MCLs	Maximum Contaminant Levels
PCB	Polychlorinated Biphenyl
PPE	Personal Protective Equipment
±	Plus or Minus
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RPM	Remedial Project Manager
SMMWSC	Saginaw-Midland Municipal Water Supply Corporation
SVOC	Semi-volatile Organic Compound
SOP	Standard Operating Procedure
START	Superfund Technical Assessment and Response Team
TAL	Target Analyte List
TCL	Target Compound List
TSS	Total Suspended Solids
USACE	United States Army Corp of Engineers
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WESTON	Weston Solutions, Inc.

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ATTACHMENT

Attachment A List of Chemicals to be Analyzed

1.0 Introduction

This Field Sampling Plan (FSP) identifies the data collection activities and associated quality assurance/quality control (QA/QC) measures specific to the Midland/Saginaw/Bay City water supply sampling task. All data will be generated in accordance with the quality requirements described in the *Superfund Technical Assessment and Response Team (START) III Generic Quality Assurance Project Plan (QAPP)*, dated June 2006. The purpose of this FSP is to describe site-specific tasks that will be performed in support of the stated objectives. The FSP will reference the QAPP for generic tasks common to all data collection activities including routine procedures for sampling and analysis, sample documentation, equipment decontamination, sample handling, data management, assessment, and data review. Additional site-specific procedures and/or modifications to procedures described in the *START III Generic QAPP* are described in the following FSP elements.

This FSP is prepared, reviewed, and approved in accordance with the procedures detailed in the *START III Generic QAPP*. Any deviations or modifications to the approved FSP will be documented using **Table 1: FSP Revision Form**.

2.0 Project Management and FSP Distribution and Project Team Member List

Management of this task will be as documented in the *START III Generic QAPP*. Refer to the *START III Generic QAPP* for an organizational chart, communication pathways, personnel responsibilities and qualifications, and special personnel training requirements.

The following personnel will be involved in planning and/or technical activities performed for this data collection activity. Each will receive a copy of the approved FSP. A copy of the FSP will also be retained in the site file.

Personnel	Title	Organization	Phone Number	Email
Mary Logan	RPM	U.S. EPA	312-886-4699	logan.mary@epa.gov
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NOTES:
RPM – Remedial Project Manager
QA – Quality Assurance
START – Superfund Technical Assessment and Response Team
U.S. EPA – United States Environmental Protection Agency

3.0 Planning and Problem Definition

3.1 Problem Definition

The water supply facilities (the Facilities) are located in Midland, Saginaw and Bay City, Michigan and provide drinking water to the Midland, Saginaw, and Bay City regions. Water is obtained from intakes within Saginaw Bay which is then transported to the Facilities for treatment before being distributed to the public. In recent years, removal activities have been conducted upstream from Saginaw Bay in the Tittabawassee and Saginaw Rivers under U.S. EPA's Superfund Authority to address historical dioxin/furan contamination originating from the Dow Chemical Corporation in Midland, Michigan (Dow Plant). Environmental investigations have revealed that dioxin/furan contaminated sediments have migrated off-site and that contaminated river sediments extend over 50 miles downstream of the Dow Plant through the Tittabawassee and Saginaw Rivers and into Saginaw Bay. In May 2009, the United States Army Corps of Engineers (USACE) commenced navigational dredging in the Saginaw River that has the potential to re-suspend contaminated sediments and enable contaminant migration downstream into Saginaw Bay, potentially impacting the municipal water supply intakes. U.S. EPA has tasked Weston Solutions, Inc. (WESTON®) START to perform sampling at the Facilities for the purpose of verifying contaminated sediments are not entering drinking water supplies during dredging activities.

3.2 Site History and Background

The Midland Facility is located at 2607 Bay City Road in Midland, Michigan (Figure 2) in a mixed commercial and residential area (45 degrees [°]; 36 minutes ['']; 20.60 seconds ["] North and 84°11'43.30" West). The Midland Facility lies within approximately 48.37 acres with a waste water treatment facility to the west and a park to the east. To the south are residential parcels and to the north is Highway M-20. The Midland Facility is owned and operated by the City of Midland and source water is supplied through the Saginaw-Midland Municipal Water Supply Corporation (SMMWSC) intake. SMMWSC was organized in 1946, is jointly owned and operated by the cities of Midland and Saginaw, and has supplied potable water from Lake Huron since 1948. Water is drawn into the system through two intake structures located at the SMMWSC Whitestone Point Facility at 720 North Huron Road in Au Gres, Michigan (44°06'19.75" North and 83°34'05.85" West). A 72 inch diameter intake is located one mile offshore and a second 66 inch diameter intake (primary) is located two miles offshore, approximately 53 feet beneath the surface of the water (Figure 3). The two intakes transport water though 65 miles of pipeline to the Midland and Saginaw facilities to provide 230 million gallons per day of available capacity to the Midland and Saginaw Facilities. The Midland Facility provides 48 million gallons of treated water per day to Midland area customers. There is also a 110 million gallon source water reservoir located to the north of the Midland Facility that is used for flow equalization and emergency supply.

The Saginaw Facility is located at 522 Ezra Rust Drive in Saginaw, Michigan (Figure 4) in a mixed commercial residential area (43°24'43.43" North and 83°57'20.10" West). The Saginaw Facility lies within approximately 54 acres with the Saginaw River to the west and residential

and city properties to the south and east. Ojibway Island and Linton Lake are north of the facility. The Saginaw Facility is owned and operated by the City of Saginaw and also obtains source water from SMMWSC through the Whitestone Point, Michigan intakes as previously described. The Saginaw Facility provides 21.5 million gallons of treated water per day to Saginaw Valley customers.

The Bay City Facility is located at 2691 North Euclid Road in Bay City, Michigan (Figure 5) in a rural residential area (43°39'41.50" North and 83°54'35.40" West). The Bay City Facility lies within approximately 22.86 acres with residential properties to the west and south and a state park to the northeast. The Bay City Facility was built in 1979 and is owned and operated by the City of Bay City. Water is supplied to the facility through two 48 inch diameter intakes within Saginaw Bay. The primary intake, installed in 1954, is approximately 4 miles offshore and the secondary intake, installed in 1922, is approximately ¾ mile offshore (Figure 6). The Bay City Facility provides 40 million gallons of treated water per day to Bay County customers.

The Dow Plant is located approximately 50 miles upstream from Saginaw Bay in Midland, Michigan on the Tittabawassee River. The Dow Plant has operated since 1897 and has produced more than 1,000 inorganic and organic chemicals. Since 1930, the plant manufactured 24 chlorophenolic compounds. Early in the plant's history, wastes were discharged directly to the Tittabawassee River. Subsequent historical waste management practices at the plant include waste storage and treatment in ponds, disposal on land, and incineration. Recent changes in waste management practices at the Dow Plant include the installation of a modern wastewater treatment plant and incinerators. Historic flooding on the plant property resulted in discharges of stored brines and process wastewaters to the Tittabawassee River. Off-site migration of contaminated sediment has subsequently occurred through the Tittabawassee and Saginaw Rivers and into Saginaw Bay. Dioxins and furans are the principal contaminants of interest in the river system, but other contaminants are of concern. Contaminant concentrations are generally lower in the Saginaw River and Saginaw Bay than in the Tittabawassee River. Additionally, other facilities operate along the Saginaw River that have, or may have contributed to the overall contaminant concentrations in the river system.

On May 11, 2009, USACE began navigational dredging activities in the Saginaw River. Some stakeholders are concerned that the dredging has the potential to re-suspend contaminated sediments. The channel extends from 14 miles out in Saginaw Bay at the north end through the mouth of Saginaw River and 22 miles upstream to the City of Saginaw (February 2003, USACE). Dredge spoils are pumped to a dredge material disposal facility located on at the boundary of Frankenlust Township in Bay County and Zilwaulkee Township in Saginaw County. The project is anticipated to conclude fall 2009 or fall 2010.

3.3 Contaminants of Concern/Target Analytes

Analytes and/or classes of compounds that will be analyzed include:

1. Tetra through Octa-Chlorinated Dioxins and Furans using U.S. EPA Method 1613B.
2. Target Compound List (TCL) Volatile Organic Compounds (VOC) using U.S. EPA Method 8260B (non-filtered samples only).

3. TCL Semi-Volatile Organic Compounds (SVOC) using U.S. EPA Method 8270C.
4. TCL Polychlorinated Biphenyls (PCB) using U.S. EPA Method 8082.
5. TCL Pesticides using U.S. EPA Method 8081A.
6. Target Analyte List (TAL) Metals using U.S. EPA Methods 6010B/7470A/6020A/9010/9012.
7. Total Suspended Solids (TSS) using U.S. EPA Method 160.2 (non-filtered intake samples only).

A complete list of the chemicals analyzed using the aforementioned methods is provided in Attachment A.

4.0 Project Description and Schedule

START will conduct at least two rounds of water supply sampling: one round will be conducted during a period of no dredging activity; and one round will be conducted while dredging is occurring. In order to insure maximum impact of dredging activities around municipal water intake location, START will conduct the "dredging-in-progress" samples after a minimum of five days of active dredging. This is based on the detention time through the treatment system for the Saginaw Facility operating at the lowest flow rate (approximately 100 hours).

START will collect a total of seven water samples plus one duplicate from the following locations:

Intakes:

- Whitestone Point Facility (Intake for Saginaw and Midland Facilities)
  - 1 filtered pre-treatment sample
  - 1 non-filtered pre-treatment sample

- Bay City Facility
  - 1 filtered pre-treatment sample
  - 1 non-filtered pre-treatment sample

Treatment Facilities:

- Midland Facility
  - 1 non-filtered post-treatment water sample

- Saginaw Facility
  - 1 non-filtered post-treatment water sample

- Bay City Facility
  - 1 non-filtered post-treatment water sample

START anticipates collecting all water samples from the designated compliance sampling ports

located in the laboratories at each Facility.

All samples will be analyzed for the parameters described in Subsection 3.3. In addition, START will measure pH, conductance, temperature, and turbidity prior to sample collection. Two commercial laboratories will provide analytical services for the water supply sampling task. The laboratory names, addresses, telephone numbers, and fax numbers are as follows:

TriMatrix (performing all analyses except dioxin/furan)
5560 Corporate Exchange
Grand Rapids, MI
616-846-9528
616-846-9541 (fax)

SGS North America, Inc. (performing dioxin/furan analyses)
5500 Business Drive
Wilmington, NC
910-350-1903
910-350-1557 (fax)

START will provide sample coordination including laboratory procurement and sample shipment. Sample labels and chain-of-custody (COC) paperwork will be generated by START. Samples will be packaged properly by START and shipped to the laboratory. The turn-around time for sample results will be approximately two weeks with Level IV data packages to be provided by the laboratories within three weeks. The sampling data will be reviewed and validated by a START chemist within one week of data receipt from the laboratory. A draft summary report of the sampling results will be submitted to U.S. EPA within one week of receipt of the validated data.

U.S. EPA and START will begin sampling activities in July 2009. Sampling activities are expected to require one to two days for each of the two events.

5.0 Project Quality Objectives

5.1 Project Objectives

The objective of water supply sampling task will be to assess the impact, if any, as a result of the USACE dredging activities on drinking water supplies due to the potential mobilization of contaminated sediment. More information about the sampling and monitoring procedures to support this is provided in Section 6.

5.2 Measurement and Performance Criteria

Generic measurement and performance criteria described in the *START III Generic QAPP* will be used. These criteria will ensure that data are sufficiently sensitive, precise, accurate, and representative to support site decisions.

5.3 Data Quality Objectives

Data quality objectives address requirements that include when, where, and how to collect samples; the number of samples; and the limits on tolerable error rates. These steps should periodically be revisited as new information about a problem is learned.

Water samples will be collected from the Facilities at pre- and post- treatment points along with filtered and unfiltered samples collected at the intake locations for the Facilities. Samples will be analyzed for the parameters described in Subsection 3.3 and detailed in Attachment A. All sample results will be compared to Federal Drinking Water Standards and any more stringent State of Michigan Drinking Water Standards; taking into account chemicals that are a result of the treatment/disinfectant process.

Refer to *START III Generic QAPP*, Figure 13 for more information about the data quality objectives.

6.0 Sampling Design

Seven water samples (total) will be collected from the intake locations and Facilities to be analyzed for the parameters described in Subsection 3.3 and detailed in Attachment A. Final Level IV data packages will be received within three weeks of submitting the samples to the respective laboratories. Requirements for the sample container, volume, preservation, and QC samples are presented in **Table 2: Sampling and Analysis Summary**.

6.1 Sample Location

Based on discussions with the Facilities, representative raw (untreated) and treated water can be obtained from the sampling ports available at each Facilities' laboratory. Section 4.0 lists the seven locations to be sampled per sampling event. The sampling ports are designed to provide representative samples for compliance reporting. Therefore, START will collect samples from the respective Facility compliance sampling ports.

6.2 Sample Collection Procedures

6.2.1 Sample Purging

Purging is the process of removing stagnant water immediately prior to sampling. For potable water supply sampling it is recommended to purge the system for at least 15 minutes during which time START will record three sets of water quality parameter using a water quality meter: pH, conductivity, temperature, dissolved oxygen (DO) and turbidity. An adequate purge is achieved when three consecutive readings have been collected that are within plus or minus (±) 0.1 units for pH, ±3 percent for conductivity, ±0.1 ^{o}C for temperature; ±0.1 mg/l for DO; and ±10 percent for turbidity. Continued measurement of these parameters may occur if further assessment is needed to verify stabilization. All measurements will be recorded in the dedicated logbook.

6.2.2 Sample Collection

After adequate purging and parameter data collection, water samples will be collected. Samples will be collected in the following manner:

1. Purge water from the sample location as described in Subsection 6.2.1.
2. Don fresh sampling gloves prior to commencing sampling at each sampling location.
3. Use a smooth water stream with a very low flow-rate (less than 0.5 liters per minute if possible) for sampling.
4. Place sample into appropriate, labeled container with all samples being preserved as necessary (see Table 2).
5. Record all information in the site logbook. Data recorded will include all purge data, meter readings, sampling location, sampling date, and sampling times.

6.2.2.1 Sample Filtering

Sample filtering will be conducted for one of the two samples collected at each water intake location. Filtration will occur for all sample aliquots of the filtered sample with the exception of the TCL VOC fraction as sample integrity may be compromised for this analysis due to filtration. The following techniques will be adhered to in addition to the using techniques described in Subsection 6.2.2:

1. Use disposable, high capacity in-line filters (barrel-type). A 0.1 micron pore-size filter will be used to remove most non-dissolved particles.
2. Attach disposable Teflon tubing to end of sampling port.
3. Open sampling port and rinse the cartridge or barrel-type filter with 500 milliliters of the water to be sampled prior to collection of sample.
4. After rinsing the filter, fill the appropriate sample containers directly with water from the filter (see Table 2 for container and preservation requirements).

One equipment blank will be collected during each sampling event. The equipment blank will be collected by running de-ionized water through unused Teflon tubing and filter media into the appropriate sample containers.

6.3 Sample Numbering System

All samples for analysis, including QC samples, will be given a unique sample number. The sample numbers will be recorded in the field logbook and on the COC paperwork.

WESTON START will assign each sample its unique number. The sample number highlights the suspected contaminated area and location, and will be used for documentation purposes in field logbooks, as well as for presentation of the analytical data in memoranda and reports.

The project samples collected from the Facilities will be identified using the following format:

MSB-XXX-YYY-ZZZ-mmddyy

MSB Indicates that the sample is for the Midland/Saginaw/Bay City water supply sampling task.

XXX Indicates which facility the sample is collected; in this case **MID** will be used for Midland; **SAG** will be used for Saginaw; **BAY** will be used for Bay City; and WSP will be used for Whitestone Point (Midland/Saginaw intake).

YYY Indicates if sample is pre- or post- treatment; in this case **PRE** will be used for pre-treatment; and **POS** will be used for post-treatment.

ZZZ Indicates whether the sample is filtered or unfiltered; in this case **FIL** will be used for filtered samples; and **UNF** will be used for unfiltered samples.

mmddyy Indicates the sampling date.

Duplicate samples will include the full sample identifier followed by a "D".

Examples of the sample identifications for the Site are as follows:

- MBS-SAG-POS-UNF-072809: Midland/Saginaw/Bay City water supply sampling task; Saginaw Treatment Facility; Post-Treatment; Unfiltered; and collected on July 28, 2009.

- MBS-WSP-PRE-FIL-072809: Midland/Saginaw/Bay City water supply sampling task; Whitestone Point Intake Facility; Pre-Treatment; Filtered; and collected on July 28, 2009.

6.4 Management of Investigation-Derived Wastes

For purposes of this FSP, investigation-derived wastes are defined as any byproduct of the field activities that is suspected or known to be contaminated with hazardous substances. The performance of field activities will produce waste products, such as spent sampling supplies (*e.g.*, tubing, filters, etc.), and expendable Personal Protective Equipment (PPE). Disposable equipment will be used for most sampling and, therefore, no decontamination water will be generated with the use of disposable equipment. Water quality probes will be rinsed with an alconox and water mixture followed by a clean water rinse. With the approval of each Facility, purge and decontamination water will be returned to the respective treatment facility's pre-treatment water.

All other waste generated during the site assessment will be placed in trash bags and disposed of as general refuse with U.S. EPA approval.

7.0 Sampling Procedures

7.1 Sampling Standard Operating Procedures

The following Standard Operating Procedures (SOPs) will be utilized for guidance with specific methodology specified in Section 6.0:

- SOP 202, Residential Well Sampling

For the operation of the water quality meter, START will utilize the manufacturer's instruction manual.

7.2 Decontamination Procedures

General decontamination procedures are described in Section B.2 of the *START III Generic QAPP*. All disposable sampling supplies and PPE will be bagged and disposed of as general refuse with U.S. EPA approval.

8.0 Sample Handling, Tracking, and Custody Procedures

All samples will be identified, handled, shipped, tracked, and maintained under COC, in accordance with the *START III Generic QAPP*.

9.0 Field Analytical Methods and Procedures

9.1 Field Analytical Methods and Standard Operating Procedures

START will use a water quality meter to determine pH, temperature, conductivity, and DO of the samples collected. A turbidity meter will be used to determine turbidity of the samples collected. Both the water quality meter and turbidity meter will be calibrated and used per the manufacturer's instructions. All calibration information will be recorded in the field logbook.

9.2 Field Testing Laboratory

A field testing laboratory will not be used during the sampling events.

9.3 Screening/Confirmatory Analyses

Screening/Confirmatory Analyses will not be used during the sampling event.

10.0 Fixed Laboratory Analytical Methods and Procedures

Two commercial laboratories will be subcontracted through START as described in Section 4. The laboratory analytical methods and procedures are detailed in Table 2 of this FSP. A

complete list of chemicals to be analyzed is provided in Attachment A.

11.0 Quality Control Activities

11.1 Field Quality Control

The number of QC samples collected for each analytical parameter and concentration level are listed in **Table 2: Sampling and Analysis Summary**. The QC sample determination and frequency is in accordance with the *START III Generic QAPP*, Table 4.

11.2 Analytical Quality Control

QC for analytical procedures will be performed at the frequency described in the *START III Generic QAPP*, Tables 5 and 6. In addition, method-specific QC requirements will be used to ensure data quality.

11.3 Performance Evaluation Samples

Performance evaluation samples will not be submitted during this sampling event.

12.0 Documentation, Records, and Data Management

Documentation, record keeping, and data management activities will be conducted in accordance with the *START III Generic QAPP*, Section B.10.

13.0 Quality Assurance Assessment and Corrective Actions

Field audits are not planned for this project.

14.0 Reports to Management

Reports to management will be written and distributed in accordance with the *START III Generic QAPP*, Section C.

15.0 Steps 1, 2 and 3: Data Review Requirements and Procedures

Step 1: Data collection activities, including sample collection and data generation, will be verified in accordance with the *START III Generic QAPP*, Section D.

Step 2: Data will be validated by WESTON START.

Step 3: Data will be reviewed for usability in accordance with the *START III Generic QAPP*, Section D.

TABLES

Table 1
FSP Revision Form

Site: Midland/Saginaw/Bay City Water Supply Sampling, Midland, Saginaw, Bay City, Michigan
RPM: Mary Logan
TDD: S05-0008-0906-034

Date	Revision Number	Proposed Change to FSP/QAPP	Reason for Change of Scope/Procedures	FSP Section Superseded	Requested By	Approved By

Table 2
Sampling and Analysis Summary

Site: Midland/Saginaw/Bay City Water Supply Sampling, Midland, Saginaw, Bay City, Michigan
RPM: Mary Logan
TDD: S05-0008-0906-034

Matrix	Analytical Parameter	Analytical Method	Containers (Numbers, Size, and Type)	Preservation Requirements	Number of Sampling Locations	Number of Field Duplicates	Number of MS/ MSDs[2]	Number of Blanks (Trip, Field, Equip. Rinsate)[1]	Total Number of Samples to Lab[3]	Holding Time
Water	Dioxin/Furan	1613B	Two 1-liter amber bottles	cool to 4°C	7	1	0	1	9	7 days to extraction (Clean Water Act/Safe Drinking Water Act)
Water	TCL VOC	8260B	Three 40-ml vials	HCl to pH less than 2; cool to 4°C	7	1	1	1	10	14 days
Water	TCL SVOC	8270C	Two 1-liter amber bottle	cool to 4°C	7	1	1	1	10	7 days to extraction; 40 days to analysis from extraction
Water	TCL PCBs	8082	Two 1-liter amber bottle	cool to 4°C	7	1	1	1	10	7 days to extraction; 40 days to analysis from extraction
Water	TCL Pesticides	8081A	Two 1-liter amber bottle	cool to 4°C	7	1	1	1	10	7 days to extraction; 40 days to analysis from extraction
Water	TAL Metals	6010B/7470	One 500-milliliter plastic bottle	HNO3 to pH less than 2; cool to 4°C	7	1	1	1	10	180 days; 28 days for mercury

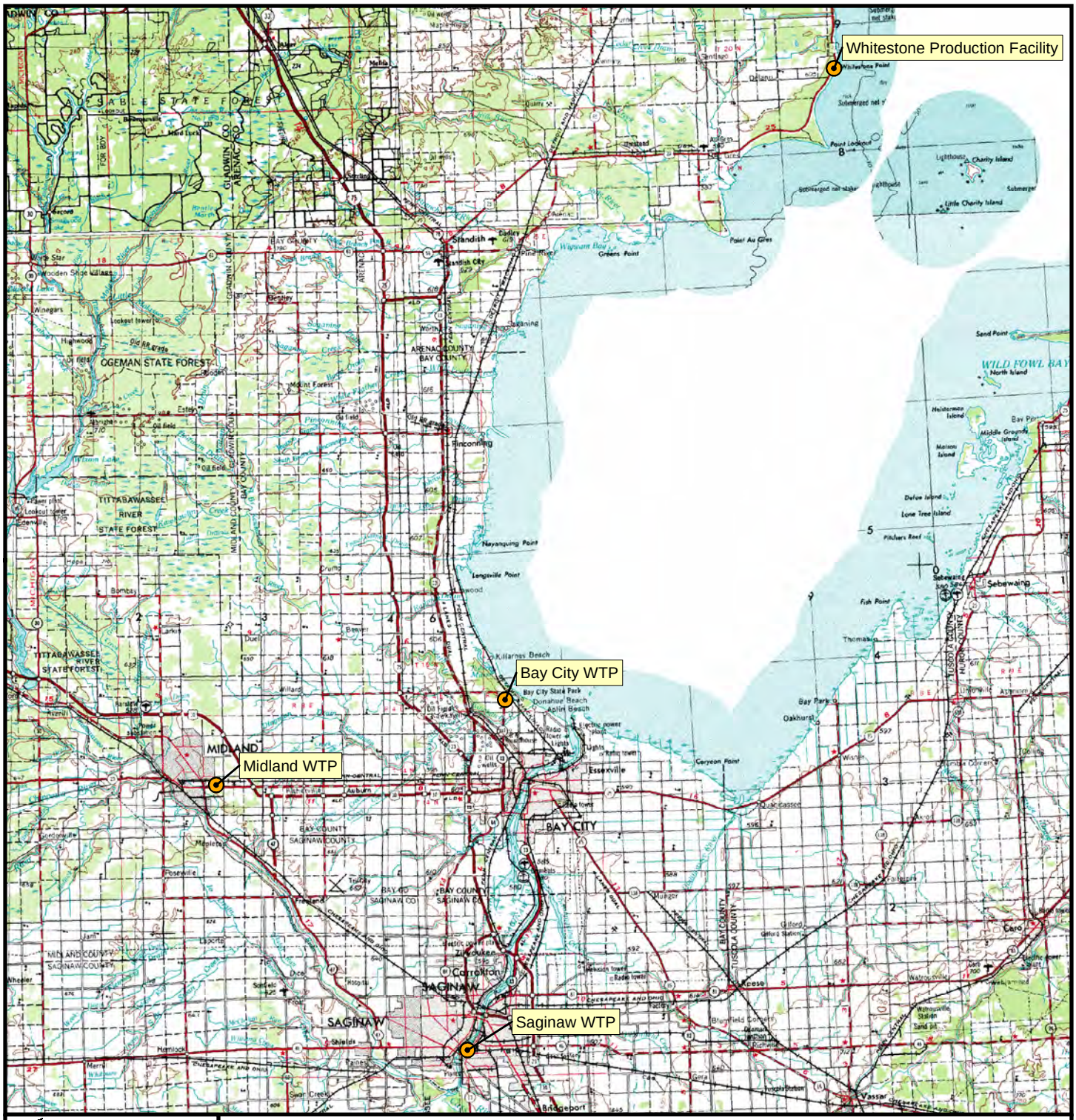
Table 2 (Continued)
Sampling and Analysis Summary

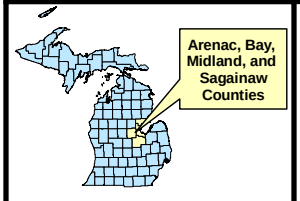
Matrix	Analytical Parameter	Analytical Method	Containers (Numbers, Size, and Type)	Preservation Requirements	Number of Sampling Locations	Number of Field Duplicates	Number of MS/ MSDs[2]	Number of Blanks (Trip, Field, Equip. Rinsate)[1]	Total Number of Samples to Lab[3]	Holding Time
Water	Cyanide	9010/9012	One 500- milliliter plastic bottle	NaOH to pH greater than 12; cool to 4°C	7	1	1	1	10	14 days
Water	TSS	160.2	One 250-milliliter plastic bottle	Cool to 4°C	2	1	1	0	4	7 days

Notes:
[1] Trip blanks are only required for VOCs in water samples. One equipment blank will be collected through unused Teflon tubing and filter media to be analyzed for all fractions except VOCs (the VOC fraction will not be collected for the filtered samples).
[2] For the samples designated for MS/MSDs, double volume is required except for TAL Metals and Cyanide.
[3] Total number of samples to the laboratory includes MS/MSD samples.

°C – Degrees Celsius
Equip. – Equipment
HCL - Hydrochloric Acid
HNO3 – Nitric Acid
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NaOH – Sodium Hydroxide
PCB – Polychlorinated Biphenyl
SVOC – Semi-volatile Organic Compound
TAL – Target Analyte List
TCL – Target Compound List
TSS – Total Suspended Solids
VOC – Volatile Organic Compound

FIGURES





Base Map Source: The Michigan Geographic Data Library
WTP = Water Treatment Facility

0 3.5 7
Miles

Figure 1

Prepared for:
U.S. EPA REGION V
Contract No: EP-S5-06-04

TDD No.: S05-0008-0906-034
DCN: 689-2A-AEHY

Prepared by:
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Detroit, MI 48235

FACILITIES LOCATION MAP
ARENAC, BAY, MIDLAND, AND SAGINAW COUNTIES, MICHIGAN

JULY 2009

File: D:\GIS_Projects\START\Midland_Saginaw_Dioxin\mxds\workplan\Fig 1 Facilities Location Map.mxd, 21-Jul-09 10:40, brownk

Aerial Image Source: ESRI ArcGIS Online Map Service

Figure 2

Prepared for:
U.S. EPA REGION V
Contract No: EP-S5-06-04

TDD No.: S05-0008-0906-034
DCN: 689-2A-AEHY

Prepared by:
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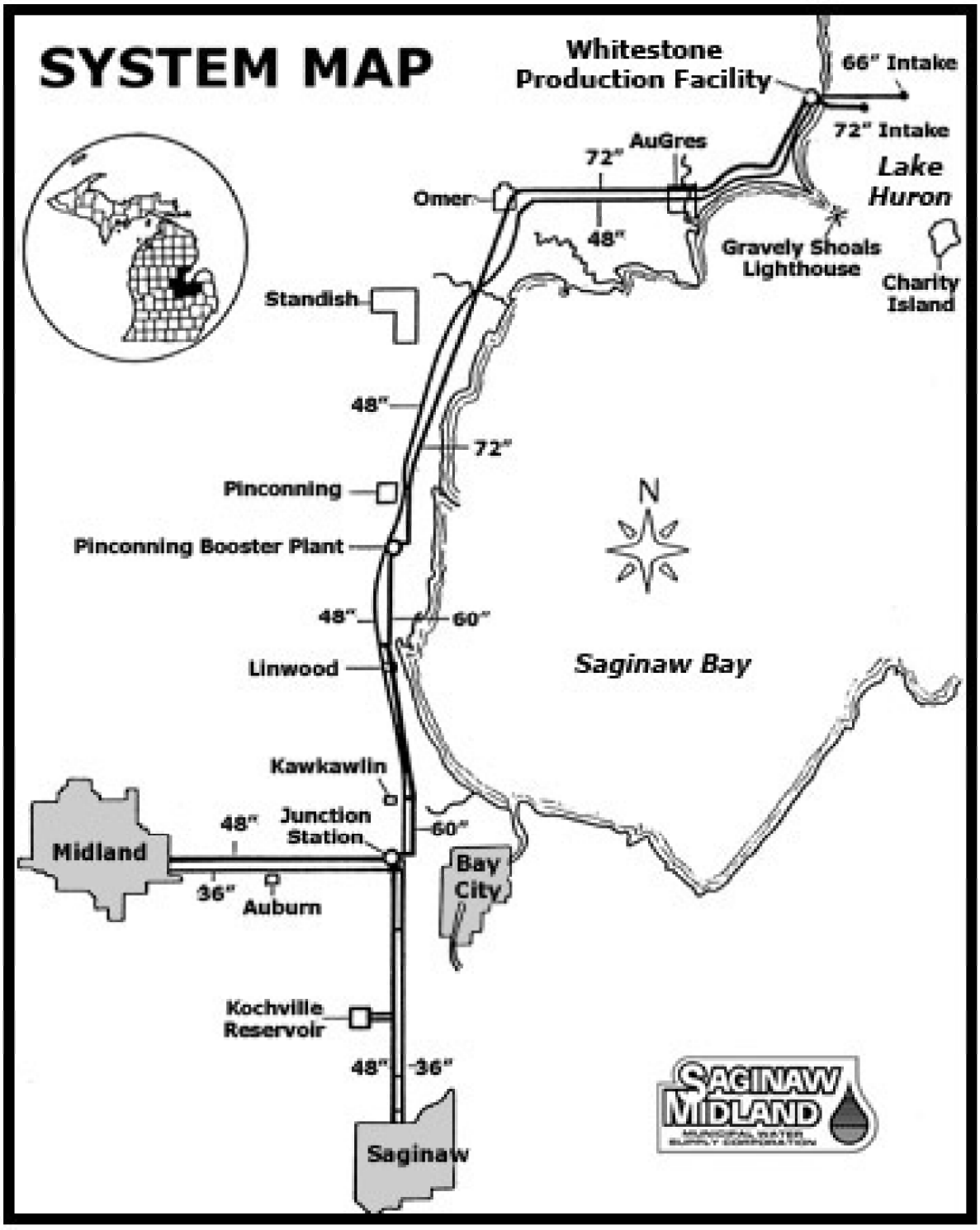
MIDLAND FACILITY
LOCATION MAP
2607 BAY CITY ROAD
MIDLAND
MIDLAND COUNTY, MICHIGAN
JULY 2009

File: D:\GIS_Projects\START\Midland_Saginaw_Dioxin\mxds\workplan\Fig 2 Midland WTP.mxd, 21-Jul-09 10:54, brownk



Map Source: City of Midland,
Utilities - Water Department website

Figure 3

Prepared for:
U.S. EPA REGION V
Contract No: EP-S5-06-04

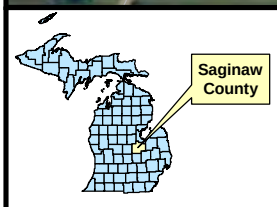
TDD No.: S05-0008-0906-034
DCN: 689-2A-AEHY

Prepared by:
WESTON SOLUTIONS, INC.
7800 W. Outer Drive, Suite 200
Detroit, MI 48235

MIDLAND/SAGINAW FACILITY
INTAKE LOCATION MAP
720 NORTH HURON ROAD
AU GRES
ARENAC COUNTY, MICHIGAN
JULY 2009

File: D:\GIS_Projects\START\Midland_Saginaw_Dioxin\mxds\workplan\Fig 3 System Map.mxd, 21-Jul-09 10:56, brownk

Aerial Image Source: ESRI ArcGIS Online Map Service



0 250 500 Feet

Figure 4

Prepared for:
U.S. EPA REGION V
Contract No: EP-S5-06-04

TDD No.: S05-0008-0906-034
DCN: 689-2A-AEHY

Prepared by:
WESTON SOLUTIONS, INC.
7800 W. Outer Drive, Suite 200
Detroit, MI 48235

SAGINAW FACILITY LOCATION MAP
522 EZRA RUST DRIVE
SAGINAW
SAGINAW COUNTY, MICHIGAN
JULY 2009

File: D:\GIS_Projects\START\Midland_Saginaw_Dioxin\mxds\workplan\Fig 4 Saginaw WTP.mxd, 21-Jul-09 10:51, brownk

Aerial Image Source: ESRI ArcGIS Online Map Service

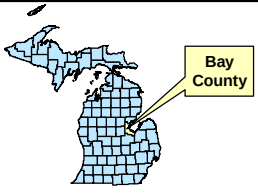


Figure 5

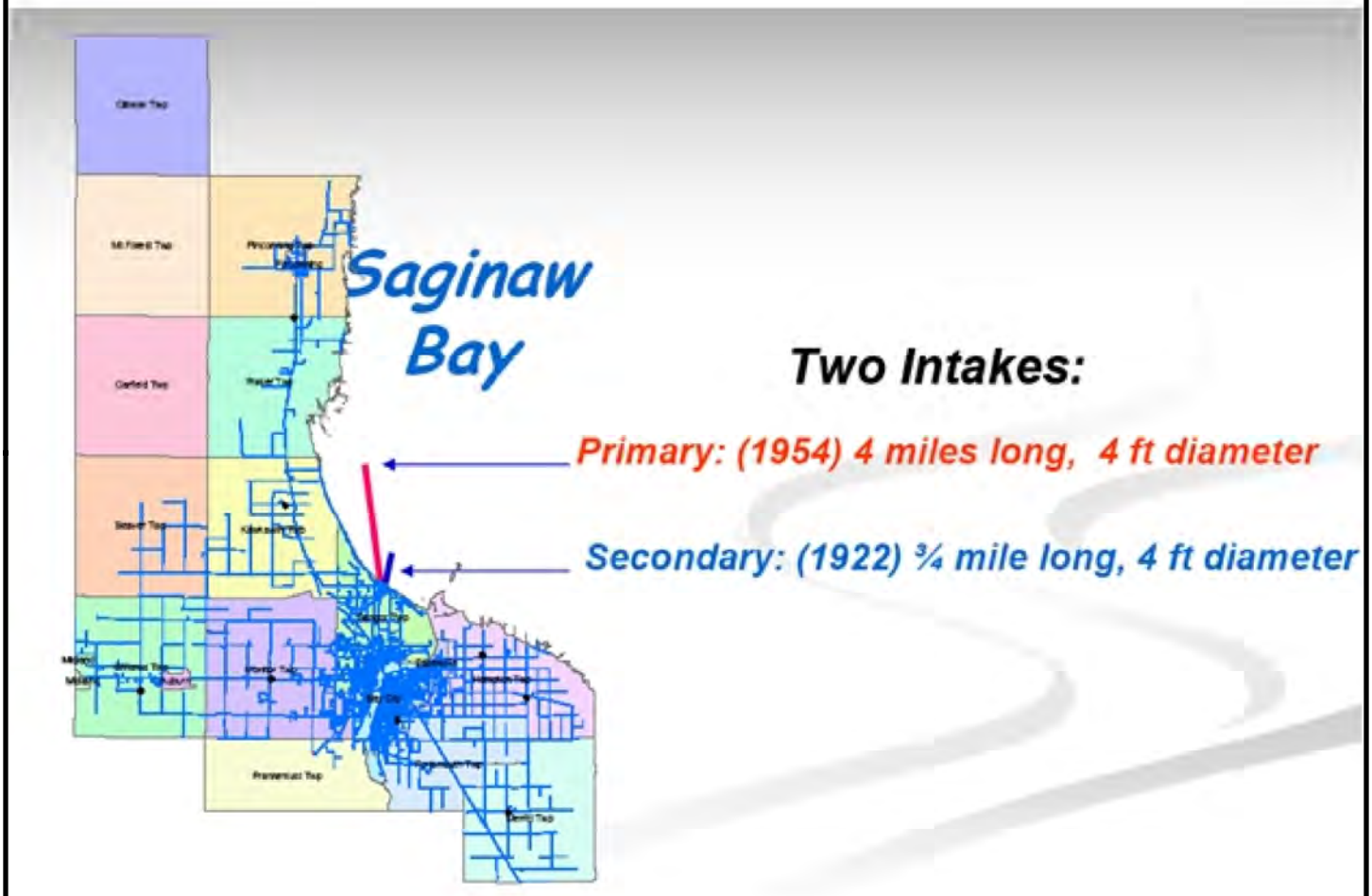
Prepared for:
U.S. EPA REGION V
Contract No: EP-S5-06-04

TDD No.: S05-0008-0906-034
DCN: 689-2A-AEHY

Prepared by:
WESTON SOLUTIONS, INC.
7800 W. Outer Drive, Suite 200
Detroit, MI 48235

BAY CITY FACILITY LOCATION MAP
2691 NORTH EUCLID RD
BAY CITY,
MIDLAND COUNTY, MICHIGAN
JULY 2009

File: D:\GIS_Projects\START\Midland_Saginaw_Dioxin\mxds\workplan\Fig 5 Bay City WTP.mxd, 21-Jul-09 10:53, brownk



Map Source: City of Bay City
Town Hall Meeting Presentation
Water Division, March 19, 2009

Figure 6

Prepared for:
U.S. EPA REGION V
Contract No: EP-S5-06-04

TDD No.: S05-0008-0906-034
DCN: 689-2A-AEHY

Prepared by:
WESTON SOLUTIONS, INC.
7800 W. Outer Drive, Suite 200
Detroit, MI 48235

BAY CITY FACILITY
INTAKE LOCATION MAP
SAGINAW BAY
BAY COUNTY, MICHIGAN

JULY 2009

File: D:\GIS_Projects\START\Midland_Saginaw_Dioxin\mxds\workplan\Fig 6 Bay City Intake Map.mxd, 21-Jul-09 10:47, brownk

ATTACHMENT A

Attachment A
Summary of Contaminants to be Analyzed
Midland/Saginaw/Bay City Drinking Water Supply Sampling

Target Compound List Volatile Organic Compounds
1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethylene
1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Dichloropropane
1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,4-Dioxane
2-Hexanone
4-Methyl-2-pentanone
Acetone
Benzene
Bromochloromethane
Bromodichloromethane
Bromoform
Bromomethane
Carbon Disulfide
Carbon Tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
cis-1,2-Dichloroethene
cis-1,3-Dichloropropene
Cyclohexane
Dibromochloromethane
Dichlorofluoromethane
Ethylbenzene
Isopopylbenzene
m,p-Xylene
Mehtyl tert-butyl ether
Methyl acetate
Methyl ethyl ketone (2-butanone)
Methylcyclohexane
Methylene chloride
o-Xylene
Styrene
Tetrachloroethylene
Toluene
trans-1,2-Dichloroethene
trans-1,3-Dichloropropene
Trichloroethylene
Trichlrofluoromethane
Vinyl Chloride

Target Compound List Polychlorinated Biphenyls
Aroclor-1016
Aroclor-1221
Aroclor-1232
Aroclor-1242
Aroclor-1248
Aroclor-1254
Aroclor-1260
Aroclor-1262
Aroclor-1268

Target Compound List Pesticides
4,4'-DDD
4,4'-DDE
4,4'-DDT
Aldrin
alpha-BHC
alpha-Chlordane
beta-BHC
delta-BHC
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
Endrin Ketone
gamma-BHC (Lindane)
gamma-Chlordane
Heptachlor
Heptachlor epoxide
Methoxychlor
Toxaphene

Target Compound List Semi-Volatile Organic Compounds
1,1'-Biphenyl
1,2,4,5-Tetrachlorobenzene
2,2'-oxybis(1-chloropropane) [bis-chloroisopropyl ether]
2,3,4,6-Tetrachlorophenol
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,4-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
2-Chloronaphthalene
2-Chlorophenol
2-Methylnaphthalene
2-Nitroanaline
2-Nitrophenol
3,3'-Dichlorobenzidine
3-Nitroanaline
4,6-Dinitro-2-methylphenol
4-Bromophenyl phenyl ether
4-Chloro-3-methylphenol
4-Chloroaniline
4-Chlorophenyl phenyl ether
4-Nitroaniline
4-Nitrophenol
Acenaphthalene
Acenaphthene
Acetophenone
Anthracene
Atrazine
Benzaldehyde
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoroanthene
Benzo(g,h,i)perylene
Benzo(k)fluoroanthene
Bis-(2-chloroethoxy) methane
bis-(2-chloroethyl)ether
Bis(2-ethylhexyl)phthalate
Butylbenzylphthalate
Caprolactam
Carbazole
Chrysene
Dibenzo(a,h)anthracene
Dibenzofuran
Diethylphthalate
Dimethylphthalate
Di-n-butylphthalate
Di-n-octylphthalate
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Indeno(1,2,3-cd)pyrene
Isophorone
Naphthalene
Nitrobenzene
N-Nitroso-di-n-propylamine
N-Nitrosodiphenylamine
o-Cresol (2-methylphenol)
p-Cresol (4-methylphenol)
Pentachlorophenol
Phenanthrene
Phenol
Pyrene

Tetra-Octa Chlorinated Dioxins and Furans
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)
2,3,7,8-Tetrachlorodibenzofuran (TCDF)
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)

Target Analyte List Metals
Arsenic
Barium
Cadmium
Chromium
Lead
Mercury
Selenium
Silver
Aluminum
Antimony
Beryllium
Calcium
Cobalt
Copper
Iron
Magnesium
Manganese
Nickel
Potassium
Sodium
Thallium
Vanadium
Zinc
Cyanide