Cedar Creek OU1 – Plant 2 Site

Cedarburg, Wisconsin
Ozaukee County

Record of Decision

United States
Environmental Protection Agency

Region 5

March 2008

TABLES

FIGURES

APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or relevant and appropriate requirements
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CFR	Code of Federal Regulations
CIP	Community Involvement Plan
COC	Chemical of concern
COPC	Chemical of potential concern
CSM	Conceptual Site Model
CTE	Central tendency exposure
DCL	Default closure level
DQO	Data quality objectives
DRO	Diesel range organics
ELCR	Excess lifetime cancer risk
EPA	United States Environmental Protection Agency
EPC	Exposure point concentration
ERA	Ecological risk assessment
ES	Enforcement standard
ESD	Explanation of Significant Difference
FFS	Focused Feasibility study
GPS	Global Positioning System
GRO	Gasoline range organics
HHRA	Human health risk assessment
HI	Hazard Index
HQ	Hazard quotient
HRS	Hazard Ranking System
LOQ	Limit of quantitation
MCL	Maximum contaminant levels
mg/kg	Milligrams per kilogram
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable unit
OU1	Operable Unit 1
OU2	Operable Unit 2
PAH	Polynuclear aromatic hydrocarbon
PAL	Preventative Action Level
PCB	Polychlorinated Biphenyl
ppm	Parts per million
PRG	Preliminary remediation goals
PRP	Potentially Responsible Party
RAGS	Risk Assessment Guidance for Superfund
RAO	Remedial action objective

RBSL	Risk based screening level
RCL	Residual Contaminant Level
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RI	Remedial investigation
RI/FS	Remedial investigation/feasibility study
RME	Reasonable maximum exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SF	Slope Factor
SVOC	Semivolatile organic compound
TAL	Target analyte list
TBC	To be considered
TCL	Target compound list
TCLP	Toxicity characteristic leaching procedure
TSCA	Toxic Substances Control Act
UCL	Upper confidence limit
UST	Underground storage tank
VOC	Volatile organic compound
WDNR	Wisconsin Department of Natural Resources

This Record of Decision (ROD) documents the remedy selected for the Cedar Creek OU1 - Plant 2 Site in the City of Cedarburg, Ozaukee County, Wisconsin. The ROD is organized in two sections: Part I contains the *Declaration* for the ROD and Part II contains the *Decision Summary*. The *Responsiveness Summary* is included as Appendix A.

PART I: DECLARATION

This section summarizes the information presented in the ROD and includes the authorizing signature of the United States Environmental Protection Agency (EPA) Region 5 Superfund Division Director.

Site Name and Location

The Cedar Creek Site (CERCLIS # WID988590261) is located in Cedarburg, Ozaukee County Wisconsin. The Site is divided into two operable units. The first operable unit (OU1) is Mercury Marine's Plant 2 located at W66 N598 Madison Avenue in the City of Cedarburg, Wisconsin (See Figure 1-1). The building was approximately 66,000 square feet in size and is addressed in this ROD. The Cedar Creek operable unit (OU2) consists of Cedar Creek, its impoundments, raceways, free flowing reaches and floodplain soils starting after the Ruck Pond dam, then downstream 4.6 miles to its confluence with the Milwaukee River.

Statement of Basis and Purpose.

This decision document presents the selected remedy for the Cedar Creek OU1 - Plant 2 Site. The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Contingency Plan (NCP). Information used to select the remedy is contained in the Administrative Record file for the Site. The Administrative Record file is available for review at the EPA Region 5 Records Center, 77 West Jackson Boulevard, Chicago, Illinois, the Cedarburg City Hall, W63 N645 Washington Avenue and the Cedarburg Public Library, W63 N583 Hanover Avenue, Cedarburg, Wisconsin.

Assessment of the Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from this Site which may present an imminent and substantial endangerment to public health or welfare.

Description of the Selected Remedy

The Cedar Creek Site is being addressed as two operable units under the framework set forth in CERCLA. The selected remedy specified in this ROD will serve as the final action for soil contamination for Operable Unit 1 (OU1) at the Site. The selected remedy specifies response actions through removal of contaminated soil, backfill with clean soil, capping and groundwater monitoring. In addition, the selected remedy would include institutional controls (restrictive covenants) to restrict future site use and prohibit the use of site groundwater for potable purposes. EPA believes the response actions outlined in this ROD, if properly implemented, will protect human health and the environment.

The selected remedy consists of excavating soil material from the Plant 2 property that has concentrations in the soil that exceed the site-specific clean up levels for polychlorinated biphenyls (PCBs). In addition, shallow soils (up to 4 feet in depth) where the highest volatile organic compound (VOC) concentrations were detected will be excavated. This remedy would include removal of affected soils around the perimeter and beneath the existing concrete building slab to prevent potential future exposure or releases. In addition, the remedy would include periodic groundwater monitoring, installation of new groundwater monitoring wells and institutional controls (restrictive covenants) to restrict future site use and prohibit the use of site groundwater for potable purposes. A final remedy for groundwater will be determined at a later date, based on the results of the periodic monitoring. Under this alternative, the following soils would be targeted for removal:

- Surface soils surrounding the concrete slab and up to the fence line to the north and south and up to the sidewalks adjacent to St. John and Madison Avenues to the east and west (respectively) would be excavated to a depth of approximately 2 feet below ground surface (bgs) to address the presence of PCB-affected surface and shallow subsurface soils. Removal would include shallow subsurface soils around the perimeter of the Site with PCB concentrations above 1 ppm.

- Soils beneath the concrete slab, to the extent necessary, to support installation of foundations and/or utilities associated with possible redevelopment of the Site.

- Soils with higher concentrations of PCBs would be removed to prevent potential future exposure or releases. These soils are in targeted areas where former operations evidenced elevated PCB impacts; more specifically, in areas limited to the footprint of some former sumps, pits, and/or trenches, where elevated PCB concentrations (> 50 ppm) were detected in subsurface soils. Excavation has been assumed to bedrock.

- Shallow soils (up to 4 feet in depth) beneath Sumps 3 and 5, as well as at sample location B2 (in the vicinity of a former drainage ditch, Figure 4-2), where the highest VOC concentrations were detected. (Elevated metals concentrations were also detected at location B2.)

There is one viable potentially responsible party (Mercury Marine) for OU1, which will be responsible for implementing the remedy.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to this remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies (or resource recovery) to the maximum extent practicable. This remedy does not satisfy the preference for treatment as a principle element of the remedy for the following reasons: (1) the treatment of contaminated PCB soils in place has not been demonstrated for long term permanence and effectiveness, (2) treatment technologies are less-cost effective than this remedy, (3) the chosen remedy is a permanent remedy that is widely accepted by the community, and (4) source materials consisting of principle threat wastes will be addressed within the scope of this action. Because this remedy will result in hazardous substances, pollutants, or contaminants in groundwater and soil under the concrete slab remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory five-year review will be required for this remedial action.

Data Certification Checklist

The following information is included in the Decision Summary section (Part II) of this ROD. Additional information can be found in the Administrative Record file for this Site.

- Contaminants of concern and their respective concentrations (Section 5);
- Baseline risk represented by the contaminants of concern (Section 7);
- Remedial action objectives established for the site (Section 8);
- Current and reasonably anticipated future land use assumptions used in the baseline risk assessment and ROD (Sections 6 and 7);
- Potential land use that will be available at the Site as a result of the selected remedy (Section 12);
- Estimated total present worth costs and the number of years over which the remedy cost estimates are projected (Sections 9,10 and 12); and
- Key factors that led to selecting the remedy (Sections 10 and 12).

Support Agency Acceptance

The Wisconsin Department of Natural Resources (WDNR) concurs with the selection of Alternative 4 for the Cedar Creek OU1 - Plant 2 Site. The WDNR's concurrence letter is provided in Appendix B.

Authorizing Signature

3/31/08

Richard C. Karl, Director
for Superfund Division
United States Environmental Protection Agency, Region 5

Date

PART II: DECISION SUMMARY

1.0 Site Name, Location, and Brief Description

The Plant 2 Site is located in Cedarburg, Ozaukee County Wisconsin (See Figure 1-1). The Plant 2 Site consists of soils contaminated by PCBs and VOCs. The Cedar Creek site is divided into two operable units. The first operable unit (OU1), the Plant 2 Site, is located at W66 N598 Madison Avenue. The Plant 2 Site was occupied by an approximately 66,000 square foot building between St. John and Madison Avenues, and is shown in Figure 2-1. Demolition of the Plant 2 above-grade building components (roof, ceiling, and wall) was completed in May 2005 under EPA's Toxic Substances Control Act (TSCA) program, and a temporary cover was constructed over the remaining concrete floor slab. The surrounding area consists primarily of residential properties, with several industries located within a 2,000-foot radius of the Site. The Cedar Creek operable unit (OU2) consists of Cedar Creek, its impoundments , raceways, free flowing reaches and floodplain soils starting after the Ruck Pond dam, then downstream 4.6 miles to its confluence with the Milwaukee River. This ROD addresses the remediation of OU1, which will be the first OU addressed at the site. EPA is the lead agency for this site, and the Wisconsin Department of Natural Resources (WDNR) is the support agency. This site is not listed on the National Priorities List (NPL) but is instead being addressed under the Superfund Alternatives Site Program. The EPA CERCLIS Number is WID988590261. Site remediation will be financed by the Potentially Responsible Party (PRP).

2.0 Site History and Enforcement Activities

2.1 Source of Contamination

The original building was approximately 13,000 square feet and was constructed by the Milwaukee Northern Railway Company (Milwaukee Northern) between 1906 and 1907. This structure served as a car barn and rail car repair shop for Milwaukee Northern's interurban transport operations.

In 1928, the train car repair shop housed in the car barn was closed, except for light running repairs. The car barn and property were sold in 1942 to Herbert A. Nieman & Company, who reportedly used the original building as a canning factory.

In 1950, Herbert A. Nieman & Company sold the property to Kiekhaefer Corporation, which, as Cedarburg Manufacturing, started building outboard motors. The Kiekhaefer Corporation was the precursor to the current Mercury Marine of Fond du Lac, Wisconsin, which now is a Division of the Brunswick Corporation. The facility was renamed Kiekhaefer Plant 2 and was converted to an aluminum die casting and machining facility. In 1983, the building was sold to Madison Avenue (a joint venture) and reportedly used as a dry goods warehouse. In September 1993, the building was purchased by Brunswick, Mercury Marine's parent company.

Mercury Marine, which began operations in the 1950s, likely utilized products in their operations that contained PCBs and VOCs. Most recently, the deteriorating condition of the Plant 2 building necessitated that the building be demolished. Since PCBs were detected within the Plant 2 building, EPA requested that Mercury Marine proceed with an above-grade demolition under the EPA TSCA self-implementing rule. Under this rule, the party is allowed to cleanup PCBs at a moderately-sized site where there should be low residual impact from remedial activities. Demolition of the plant and installation of a temporary cover over the Site was completed in May 2005.

2.2 Previous Investigations

Investigation activities were performed between 1987 and 2002 to characterize Plant 2 Site conditions and included collection and laboratory analysis of samples from materials within the plant, as well as soils and groundwater.

2.2.1 Soil

Overall, over 100 soil samples were collected and analyzed from numerous locations at the Plant 2 Site. Soil borings were installed to depths of up to approximately 15 feet bgs. Samples collected from the borings were analyzed for Target Compound List/Target Analyte List (TCL/TAL) parameters, diesel range organics (DRO), and gasoline range organics (GRO). Total PCB concentrations reported for the soil samples ranged from non-detect to 7,854 milligrams per kilogram (mg/kg), with the highest PCB concentrations detected in samples collected up to depths of 11 feet from borings taken from three areas where former die casting operations were conducted in Plant 2. PCBs were detected in surface soils (top 1 foot of soil) surrounding the Plant 2 building, ranging in concentrations from non-detect to 146 mg/kg. The highest surface soil concentration (146 mg/kg) was detected in a soil sample collected from a location near the southeast corner of the plant. PCB concentrations in the remaining samples ranged from non-detect to 27.1 mg/kg. (See Figure 3-10A)

Other constituents were detected in the soil samples collected at the plant, including a few VOCs, semi volatile organic compounds (SVOCs) (primarily polynuclear aromatic hydrocarbons [PAHs]), pesticides (only a couple locations at low levels), and inorganics. A few chlorinated VOCs – primarily tetrachloroethene (PCE) and/or trichloroethene (TCE) – were detected in soil samples collected at the Site (all shallow). PAHs were primarily detected in the soil samples collected from the northern portion of the Plant 2 Site, mostly around the perimeter of the building, and the southeast corner of the Site. A few metals – primarily lead, copper, and arsenic – were detected at elevated concentrations at some locations.

2.2.2 Groundwater

Since 1997, Mercury Marine installed and sampled 18 monitoring wells, including one replacement well installed to replace a damaged well, at 16 locations around the Plant 2 Site. Shallow groundwater flows beneath the property and surrounding areas from the north-northwest to the south-southeast toward Cedar Creek. Analytes included TCL/TAL parameters as well as GRO and DRO.. PCB concentrations ranging from 0.00025 to 0.00090 mg/L were detected in groundwater sampled from two well locations (in the northwest and southeast corners of the Site). PCBs were not detected in groundwater sampled from the other well locations, including the downgradient off-site wells.

One to six VOCs were detected at low concentrations in some of the wells and form a plume migrating offsite to the southeast. 1,1,1-Trichloroethane, 1,1-Dichloroethene, Tetrachloroethene (PCE) and Trichloroethene (TCE) were detected above Maximum Contaminant Levels (MCLs) and/or Wisconsin NR 140 Preventative Action Levels (PAL) (See Figures 3-16 – 3-17).

A number of inorganic constituents were also detected in the groundwater samples at low concentrations. SVOCs, herbicides, GRO, and DRO were not reported above the limit of quantitation (LOQ).

2.2.3 Building Floor Slab

The plant's concrete floor slab was sampled to delineate the extent of PCBs within the facility. PCBs were reported at concentrations ranging from non-detect to 877 mg/kg.

2.3 Previous Response Actions

Mercury Marine performed a number of cleaning and improvement activities, described in more detail below, at the Site since 1994, including cleaning the plant, demolition, and removal of two underground storage tanks (USTs) in 1998 (a third UST, which stored waste oil, was removed from outside the plant in 1987).

2.3.1– Storm Sewer Cleaning, Rerouting/Repairing Roof Leaders, and Sealing

During the summer of 1994, various measures were undertaken at Plant 2 and on the storm sewer system servicing Plant 2. An investigation at the facility was initially undertaken by Mercury Marine. The recommendations that were implemented included:

- Cleaning of the storm sewer located between the Plant 2 Site and the storm sewer outfall discharging to Ruck Pond.
- Sealing of two laterals which connected the storm sewer to the plant.
- Rerouting and repairing internal roof leaders at the plant.
- Repairing and sealing the plant's roof and repairing masonry walls.

2.3.2 – Plant Demolition and Capping

The Plant 2 was demolished to the concrete floor slab in May 2005. A temporary cover consists of the following components (from top to bottom):

- 4 to 6 inch layer of washed stone/gravel ballast
- 12-mil reinforced polyethylene flexible membrane liner
- 12-oz non-woven geotextile cushion layer
- Brick and masonry rubble
- Former building concrete floor slab (average approximately 6 to 8 inches thick)

In areas where the rubble was not placed, the non-woven geotextile cushion layer, the flexible membrane liner, and gravel were placed directly over the top of the floor slab.

2.4 Enforcement Activities

The Site was a State (WDNR) lead for a number of years before EPA became the lead in 2002. Two PRPs were identified by the State. An Administrative Order of Consent (AOC) was signed between EPA and Mercury Marine to conduct a Remedial Investigation/Feasibility Study (RI/FS) for the Cedar Creek Site, which includes Plant 2, in 2002.

3.0 Community Participation

The Proposed Plan for the Cedar Creek OU1 - Plant 2 Site was made available to the public for comment from October 8, to November 9, 2007. Copies of the Proposed Plan and the final RI and FS (as well as other supporting documents) were in the local Information Repository at the Cedarburg Public Library. Documents are also available at the EPA Region 5 Records Center in Chicago, Illinois. Copies of the Proposed Plan were sent to about 300 people on site mailing list. A note and link to the Proposed Plan on the site's web page was emailed to about 80 people.

A public notice announcing the comment period, public meeting and availability of the Proposed Plan was published in the Cedarburg News-Graphic on October 1st. A news release was also sent to Cedarburg and Milwaukee media on October 3, 2007. EPA held a public meeting on October 10th at the Cedarburg City Hall to present the Proposed Plan. About 30 people attended. Representatives from EPA, WDNR and Wisconsin Department of Health and Family Services gave a short presentation, answered questions and accepted comments on the Proposed Plan. Representatives from the City of Cedarburg, Cedarburg Public Library and Congressman Herb Kohl's office were in the audience in addition to a few residents. Responses to comments received during the public comment period (including those submitted at the public meeting) are included in the Responsiveness Summary attached to this ROD. These comments were considered prior to selection of the final cleanup plan for Plant 2.

In addition to the Proposed Plan mailing and public meeting, EPA held a kick off meeting for the RI in 2003 to explain the Cedar Creek site. A public notice was placed in the News-Graphic and a news release was sent to local media about a week prior to the meeting. EPA also spoke with many local residents during the community interviews when the Community Involvement Plan (CIP) was being developed in 2003. The CIP, Proposed Plan, news releases, technical and legal documents have been posted on the Region 5 Web page at http://www.epa.gov/region5/sites/cedarcreek.

4.0 Scope and Role of Response Action and Operable Units

The EPA has organized the Cedar Creek Site into two operable units (OUs).

Operable Unit 1: The first operable unit (OU1) is Mercury Marine's Plant 2 located at W66 N598 Madison Avenue in the City of Cedarburg, Wisconsin. The building was approximately 66,000 square feet in size and is addressed in this ROD. OU1 consists of excavating soil material from the Plant 2 property that has concentrations in the soil that exceed the site-specific clean up levels for polychlorinated biphenyls (PCBs) and volatile organic compounds (VOCs). In addition, OU1 would include groundwater monitoring and institutional controls (restrictive covenants) to restrict future site use and prohibit the use of site groundwater for potable purposes. OU1 will be the first operable unit addressed at the Site, and remediation activities at OU1 will be financed by the PRP.

Operable Unit 2: The second operable unit (OU2) is the creek portion of the Site. OU2 consists of Cedar Creek, its impoundments, raceways, free flowing reaches and floodplain soils starting after the Ruck Pond dam, then downstream 4.6 miles to its confluence with the Milwaukee River (See Figure 1). Remediation of OU2 will begin after a ROD for OU2 is completed, and will be the final response action for the Cedar Creek site. Remediation activities at OU2 will be financed by the PRP.

EPA addressed OU1 in the RI and Focused Feasibility Study (FFS) Report dated October 2007. The site was divided into operable units for two reasons: to address the soils with the highest levels of PCBs and VOCs in a timely manner and to address the need for two separate strategies for the OUs. The different strategies are necessary because of the large difference in sizes of the two operable units, which will affect the logistics, including time and money, of implementing the remedy at each OU. A ROD for OU2 is schedule to be completed in 2009, and will be the final response action for this Site. The implementation of a remedy at OU2 will likely take a considerable amount of time and resources as compared to OU1.

5.0 Site Characteristics

5.1 Conceptual Site Model for Cedar Creek OU1 - Plant 2 Site

The conceptual site model (CSM) provides an understanding of the site based on the sources of contaminants of concern (primarily PCBs), potential transport pathways, and environmental receptors. Based on the nature and extent of contamination and the fate and transport mechanisms described in the RI and FFS reports, the CSM includes the following components:

- Groundwater flows across the Plant 2 Site from the north-northwest toward the south-southeast.

- The highest concentrations of PCBs in soils were found within the footprint of Plant 2 beneath areas of the former die casting operations (within the Former Die Casting Room, Southeast Die Casting Room, and southern portion of the Furnace Area). PCBs in these areas likely were historically transported downward from trenches and/or sumps in the plant's floors, in areas where their integrity was compromised. The highest surface soil concentrations were detected in soil samples collected from a location near the southeast corner of the plant. Surface soil contamination is limited to locations close to the building foundation and has not been found off-site.

- PCBs were detected in groundwater in two areas of the Plant 2 Site. The PCB levels detected were at very low concentrations. PCBs exhibit hydrophobic behavior and the available data indicate that PCBs are likely to remain within close proximity to the property.

- Off-site PCB transport could occur via storm water, but this is unlikely due to the presence of the former building floor slab and temporary cap.

- Other constituents detected at the Plant 2 Site include PAHs, VOCs, and inorganics:
  - PAHs were primarily detected in soil samples collected from the northern portion of the Plant 2 Site and the southeast corner of the Site (Southeast Die Cast Room/Shipping Room area) and are not migrating (not reported above reporting limits in groundwater).
  - Generally, low levels of chlorinated VOCs were detected in the groundwater beneath the eastern portion of the Plant 2 Site, however, 1,1,1-Trichloroethane, 1,1-Dichloroethene, Tetrachloroethene (PCE) and Trichloroethene (TCE) were detected above Maximum Contaminant Levels (MCLs) and/or Wisconsin NR 140 Preventative Action Levels (PAL). There were detections of chlorinated VOCs in site soils. Where chlorinated VOCs were detected in soils, detections were generally limited to the shallower depths.
  - While inorganics/metals are naturally occurring, lead, copper, and arsenic were detected in a limited number of soil samples at higher levels. However, these constituents were not reported above their respective laboratory reporting limits in groundwater. The highest soil lead and copper levels were generally in the southern portion of the Plant 2 Site, with some elevated concentrations also detected in the northern portion of the Plant 2 Site. While the reason for this is unknown, these higher levels may be associated with use of the original plant building as a canning factory, or prior use of the southern portion of the Plant 2 Site for parking/unloading. Elevated arsenic levels do not appear to be related to any portion of the Plant 2 Site.

- No ecological chemicals of concern are associated with the Plant 2 Site.

5.2 Site Overview

The Cedar Creek OU1 - Plant 2 Site is located in Cedarburg, Wisconsin. The Plant 2 Site is roughly bounded by Madison Avenue to the west, St. John Avenue to the east, residential properties to the south and Norstar (industry) located north of the Plant 2 Site. OU1, the area addressed in this ROD, contains elevated levels of PCBs and VOCs in soils found at the Plant 2 Site. Surficial soils contaminated with PCBs present an exposure risk to children and adults within the Plant 2 Site boundary. Sampling found PCB concentrations above cleanup levels at depths of two feet or less. There is one surface water body near the Plant 2 Site, Cedar Creek, which is approximately 1/4 mile from OU1. The Plant 2 Site does not lie within a floodplain. The Plant 2 Site is located in the Wisconsin-Lake Michigan basin. Based on the visual characterization of subsurface soil and bedrock samples collected during the investigations, three primary geologic units have been identified beneath the property, as described below:

- Fill: Man-placed fill materials and various man-made structures, including those related to the former on-site facilities. The fill is composed of a mixture of silt, sand, gravel, and debris (including slag, coal, concrete, bricks, and glass).
- Glacial Deposits: Native unconsolidated sediments consisting of glacial deposits of sand, gravel, silt, and clay. The unconsolidated Quaternary deposits encountered on-site consist of glacially-originated materials derived from end moraines and pitted outwash/ice-contact deposits.
- Bedrock in the vicinity of the Plant 2 Site is described as Cayugan/Niagaran/Alexandrian series dolomite of Silurian Age (Mudrey et al., 1982). Bedrock was encountered during the RI and previous investigations at depths ranging from 1.2 feet (at soil boring PTSBA1 located in the northwestern portion of the site) to 16 feet (at soil boring PTSBG1 located near the central portion of the Site).

The three main water-bearing units in Ozaukee County consist of the unconsolidated sand and gravel aquifer, the Niagara aquifer found in the dolomite bedrock, and the Sandstone aquifer found below the Maquoketa Shale. The sand and gravel aquifer generally is absent in the Cedarburg area, where the thickness of the unconsolidated deposits typically is about 50 feet or less, and the water table is located below the top of the Niagara aquifer. The unconsolidated deposits are reported to have a low to medium permeability and allow precipitation to infiltrate and recharge the Niagara aquifer. The infiltration rate for soils in the Cedarburg area is estimated to be about 0.2 to 0.8 inch per hour. Groundwater movement in the Niagara aquifer under static conditions at the Plant 2 Site is to the southeast, toward Cedar Creek, based on the direction of groundwater flow determined for water table wells installed by the City of Cedarburg. The water supply for the City of Cedarburg is provided by six wells that draw groundwater from both the Niagara and Sandstone aquifers (See Figure 3-8).

Two of the Municipal Wells, Nos. 3 and 5, which are located approximately 1600 feet and 4000 feet, respectively from the Site, have documented detections of trichloroethene (TCE) and 1,2-dichloroethene (1,2-DCE). However, given that the groundwater flow direction for the deep bedrock zone underlying the Plant 2 Site is toward the east-northeast, and not to the south-southeast toward the location of Municipal Wells No. 3 and No. 5, there appears to be no connection between the Plant 2 Site and the municipal wells.

Ozaukee County has a continental climate characterized by a wide range of temperatures between summer and winter, and modified by the effects of Lake Michigan. The Great Lakes significantly influence the local climate. The effects of the lake are most pronounced in the spring and early summer due to the prevailing north-northeasterly wind off the lake.

Temperature extremes are modified by Lake Michigan and, to a lesser extent, the other Great Lakes. Average daily maximum temperatures range from 28.8 degrees Fahrenheit (°F) in January to 81.9°F in July, with average daily minimum temperatures of 11.3 and 58.5°F for the same respective months. Mean annual precipitation for the area is about 31 inches per year, typically with the months of May and June having the highest average monthly precipitation. Yearly average snowfall is about 37 inches, with January having the highest average monthly snowfall.

5.3 Sampling Strategy

Soil sampling has been performed as part of a number of investigations conducted at the Plant 2 Site since 1987. Overall, 180 samples were collected and analyzed from 72 locations. The primary soil sampling programs were undertaken by Mercury Marine and included the 1997 subsurface investigation boring program, surficial soil sampling from 1999 to 2002, the 2003 RI/FS soil sampling, and the 2006 and 2007 supplemental soil sampling. Soil borings were installed to depths of up to approximately 15 feet bgs and sampled to further assess the potential impact to soils from historical operations and potential source areas associated with the Plant 2 Site. Samples collected from the borings have been analyzed for TCL/TAL parameters, DRO, and GRO.

Sampling of monitoring well MW-1, installed at the Plant 2 Site in August 1989 as part of the city-wide study commissioned by the City of Cedarburg, indicated the presence of VOCs and PCBs. Since 1997, Mercury Marine installed and sampled 18 monitoring wells, including one replacement well installed to replace a damaged well, at 16 locations around the Plant 2 Site. Analytes have included TCL/TAL parameters as well as GRO and DRO.

In addition, the plant's concrete floor slab was extensively sampled from 1994 to 2006, to delineate the extent of PCBs within the facility.

These investigation activities were documented in several reports, including the following:

- *Subsurface Investigations Documentation Report* (BBL, 2000) provided a description of the Plant 2 Site's history, existing regional information, and then-available Plant 2 Site soil and groundwater data.
- *Building Investigations Documentation Report* (BBL, 2001), a companion volume to the above report, provided data collected from within the plant itself, a brief description of the analytical results (with a focus on PCBs), and a brief overview of cleaning and improvement activities performed at the plant. This document and the prior one were prepared at the request of the EPA to document data for facilitating discussions regarding potential options for addressing the presence of PCBs at the Plant 2 Site.
- *Cedar Creek Remedial Investigation/Feasibility Study Work Plan* (BBL, 2003) (RI/FS Work Plan) included a review of previous investigative activities and existing data for both Cedar Creek and Plant 2, and outlined planned RI/FS characterization efforts.
- *Cedar Creek Preliminary Site Characterization Summary* (BBL, 2005) documented the investigation activities and analytical results of sampling efforts performed at Plant 2 as part of the Cedar Creek Site RI/FS in accordance with the RI/FS Work Plan (BBL, 2003).

5.4 Source of Contamination

As discussed in Section 2.1 of this ROD, the PCBs and VOCs found at the Cedar Creek OU1 - Plant 2 Site most likely originated from Mercury Marine's plant operations. In 1994, various measures were undertaken to control the source of contamination (PCBs) to Cedar Creek. The storm sewer system that serviced Plant 2 was cleaned and/or sealed. However, the other former property owners also may have contributed to the contamination. In addition, the still operating industry (Norstar) located just north of the Plant 2 site may be contributing to the contamination.

5.5 Types of Contaminants and Affected Media

At the Cedar Creek OU1 - Plant 2 Site, groundwater and soil were analyzed for TCL/TAL parameters, DRO, GRO. The results were evaluated in the Baseline Human Health Risk Assessment (HHRA) to determine the Contaminants of Potential Concern (COPCs), which revealed which of these chemicals and affected media were most important in driving potential risk at the Plant 2 Site. These findings are summarized in Section 7 of this ROD, but extensive evaluation is found in the RI Report. The HHRA was evaluated using the site data, and the main Contaminant of Concern (COC) at the site was determined to be PCBs in soils.

The Plant 2 site is currently a building slab and parking area with little or no unpaved surfaces. It has a liner and is fenced, and located in a residential/commercial/industrial area. The available habitat was not considered suitable for ecological receptors. Therefore, the potential for ecological exposure at the Plant 2 site is unlikely and was not further addressed in the baseline risk assessment.

5.6 Extent of Contamination

5.6.1 Soil

A total of seven borings were installed/sampled in October 2003, as part of the RI to collect subsurface soil samples for analysis from: 1) beneath and adjacent to the locations of former UST-1 and UST-2, as shown on Figure 3-10A; 2) beneath the floor of the Southeast Die Cast Room; and 3) beneath the floor of the Tool Room. Subsurface soil samples were collected and analyzed to generate data to assess the presence of PCBs in the soils in the vicinity of the former USTs and beneath the floor of the building. The data were also collected to assess whether soil below the Tool Room floor may be acting as a source of the VOCs previously detected in groundwater samples from MW-97-5. The boring locations and summarized analytical results are shown on Figure 3-10A.

The two borings installed in each former UST area were advanced in the approximate center of each former tank pit (SB-03-17 and SB-03-19) and at an adjacent location, downgradient of each former tank (SB-03-18 and SB-03-20). The borings in the Southeast Die Cast Room were advanced in the vicinity of former floor trenches (SB-03-22) and/or a sump (SB-03-21) associated with the room. The boring in the Tool Room (SB-03-23) was advanced in the vicinity of the sump associated with the room.

An eighth boring was planned to be installed off site, north of and upgradient of groundwater monitoring well MW-97-5, to assess whether upgradient soil may be acting as a source of the VOCs detected in that well. This boring was to be developed as a monitoring well. However, the current property owner, Norstar, requested and received permission from the EPA to install the boring/well approximately 25 feet north of the Norstar building's south wall, inside the plant, instead of in the area between Plant 2 and the Norstar plant (as specified in the RI/FS Work Plan [BBL, 2003]). The boring/well was installed on January 6, 2004. The boring was reportedly terminated at approximately 6 feet bgs, where bedrock was encountered. According to Norstar, soil samples were not retained for analytical testing and groundwater was not encountered at that depth.

Recovered soil samples were visually characterized with respect to lithology, grain size, moisture content, staining, odors, and other observations. Representative samples from each 2-foot split-spoon were placed in resealable plastic bags for headspace screening with a PID and the remaining portion of the samples placed in jars for potential laboratory analysis. One sample was selected from each boring for laboratory analysis based on observed staining, high PID readings, and/or smell. The other samples were retained for subsequent analysis, if necessary. If there were no indications that constituents were present, then the soil sample collected from immediately below the floor slab was selected. If there were no indications that constituents of interest were present in the borings near the former USTs, the soil sample located immediately below the bottom elevation of the former tank was selected. Samples collected from borings SB-03-17 through SB-03-23 were submitted for PCB and chlorinated VOC analyses. Encore samplers were used for collection of soil samples to be analyzed for VOCs. Results are summarized as follows:

PCBs

- Total PCB concentrations reported for the soil samples ranged from non-detect (SB-03-19) to 5,300 mg/kg, detected in one of the samples collected from beneath the Southeast Die Cast Room at a depth of 8.6 to 10.1 feet bgs (SB-03-22).

VOCs

- The VOCs detected in soil collected at the 8.6- to 10.1-foot depth interval from boring SB-03-22 in the Southeast Die Cast Room were 1,2,4-trichlorobenzene, isopropylbenzene, and m- and p-xylenes with reported concentrations of 0.083, 0.97, and 0.98 mg/kg, respectively.
- SB-03-23 had non-PCB constituents (VOCs) detected at the 0- to 0.7-foot depth interval, where PCE was detected at a concentration of 0.43 mg/kg. VOC concentrations in the other five borings that were installed were non-detect.

Site Perimeter Soil Sampling (2003)

Soil sampling was performed in October 2003 as part of the RI along the western and eastern edges of the property to define the horizontal and vertical extent of constituents of interest. The selection of sample locations and sample-specific analytical parameters was based on the results of soil sampling performed at the Plant 2 Site since 1997. In 2003, a total of 10 locations (SS-13 through SS-22) were sampled in 6-inch increments to depths of up to 1 foot or refusal. Sample locations are shown on Figure 3-10A. Samples were submitted to the analytical laboratory for analysis of PCBs, polynuclear aromatic hydrocarbons (PAHs), lead, and/or chromium, based on prior adjacent sampling results. Samples were analyzed using a phased approach. Surficial soil samples (0- to 6-inch bgs) collected at each location were analyzed. Subsurface soil samples (6- to 12-inch bgs, or to less than 12 inches if refusal was encountered) were then analyzed as appropriate based on the analytical results of the associated surficial samples. PCB concentrations ranged from 0.064 to 13 mg/kg. Several PAH constituents were detected at the five locations sampled at concentrations ranging from 0.00065 mg/kg (estimated) for acenaphthylene to 49 mg/kg for fluoranthene. Total PAH concentrations ranged from 0.31 to 259.7 mg/kg. Lead was detected at the seven locations sampled at concentrations ranging from 7.7 to 49 mg/kg, and chromium was detected in the 0- to 6-inch depth interval at two locations at concentrations of 19 and 20 mg/kg.

Installation/Sampling of Soil Borings (2006)

A total of twenty borings were installed/sampled in October 2006, as a supplement to the previous RI sampling events to collect surface and subsurface soil samples. Those borings were located based upon a detailed review of historical figures and site features. Figures 3-10A through 3-10D shows soil boring locations and summarized analytical results. Results are summarized as follows:

PCBs

- Total PCB concentrations reported for the soil samples ranged from non-detect to 1,800 mg/kg, detected in one of the samples collected from beneath the Southeast Die Cast Room, near Sump 1, at a depth of 8 to 10 feet bgs (PTSBH3).
- The next highest PCB concentrations detected were 860 mg/kg, reported in the sample collected from beneath the Southeast Die Cast Room (PTSBH1), and 780 mg/kg in a sample collected from beneath the Furnace Area (PTSBC3), in an area of former die casting.

VOCs

- Trace VOCs, primarily methyl acetate, were detected in samples collected from 13 of the borings at the Plant 2 Site.
- A few chlorinated VOCs were detected in some of the soil samples. PCE was detected at five locations, while other compounds were only detected at one location each: TCE, 1,1,1-TCA, *cis*- and *trans*-1,2-DCE, and 1,2- and 1,3-dichlorobenzene. PCE was detected at concentrations ranging from 0.042 mg/kg to 0.65. TCE was detected at 0.2 mg/kg and 0.42 mg/kg in samples collected from the 0- to 2-foot and 2- to 4-foot depth intervals, respectively, at location PTSBC2. Chlorinated VOC detections were generally limited to the shallower depths.

PAHs

- Total PAH concentrations ranged from non-detect to 108.1 mg/kg (PTSBH3, 2 to 4 feet).
- The higher concentrations of total PAHs were generally reported for soil samples collected from the northern portion of the Site and the southeast corner of the Site (Southeast Die Cast Room/Shipping Room area).

Inorganics

- A few metals - primarily lead, copper, and arsenic - were detected at elevated concentrations at some locations.
- Lead and copper were detected at elevated levels (up to 5,600 mg/kg, lead, 24,000 mg/kg, copper) in the northern portion of the Site and in the southeast corner of the Site. Arsenic was detected at elevated levels (58 and 59 mg/kg) at two locations in the eastern portion of the Site.

<u>**Installation/Sampling of Soil Borings (2007)**</u>

Three borings were installed on March 8, 2007, to supplement the previous RI sampling. Those borings were located based upon a detailed review of sample results from the 2006 soil sampling. Figures 3-10A through 3-10D shows soil boring locations and summarized analytical results. Results are summarized as follows:

Room C

- Total PCB concentrations reported for boring location PTSBC6 ranged from 0.50 mg/kg (12 to 14 feet bgs) to 680 mg/kg (4 to 6 feet bgs). Total PCB concentrations at boring location PTSBC7 ranged from non-detect to 0.13 mg/kg (4 to 6 feet bgs).

Room H

- Total PCB concentrations reported for boring location PTSBH5 ranged from non-detect to 1.1 mg/kg (2 to 4 feet bgs).
- Total PAH concentrations at boring location PTSBH5 ranged from non-detect to 12.4 mg/kg (2 to 4 feet bgs).
- The four metals analyzed for (arsenic, chromium, copper, and lead) in the samples collected from location PTSBH5 were detected. Arsenic was detected at up to 8.60 mg/kg (4 to 6 feet bgs), chromium up to 19.0 mg/kg (4 to 6 feet bgs), copper up to 58.0 mg/kg (4 to 6 feet bgs), and lead up to 120 mg/kg (4 to 6 feet bgs).

5.6.2 Groundwater

<u>**Installation/Sampling of Monitoring Wells (2003-2004)**</u>

Four additional monitoring wells were installed at the Plant 2 Site during 2003 and 2004 (MW-03-4R, MW-04-1, MW-04-2, and MW-04-3), the locations of which are shown on Figure 3-13A. Monitoring well MW-03-4R was installed in 2003, on the east side of the building, to replace the damaged and abandoned monitoring well MW-97-4. In 2004, double-cased monitoring wells MW-04-1 and MW-04-2 were installed upgradient and downgradient, respectively, of the Site to further assess PCBs in groundwater. Monitoring well MW-04-3 was installed as a double-cased well adjacent to MW-97-3 to investigate the potential for drag-down of PCBs during well installation that may have lead to PCB detection in groundwater previously sampled from MW-97-3. To allow for fluctuation of the water table during wet and dry seasons, 5 feet of well screen was installed in or straddling the bedrock/weathered bedrock.

A boring was to be installed off site, north of and upgradient of groundwater monitoring well MW-97-5 and converted to a monitoring well for collection of groundwater samples. However, as previously noted, the current property owner, Norstar, instead requested and received permission to install the well inside its plant, further upgradient than planned. The well was installed on January 6, 2004. The boring was reportedly terminated at approximately 6 feet bgs, where bedrock was encountered. According to Norstar, groundwater was not encountered at that depth. At the time of well installation, Norstar indicated that it would check the monitoring well installed on its property at an unspecified date sometime in the spring of 2004 to see if groundwater was present for testing. To date, Mercury Marine has not been contacted by Norstar regarding the well. Mercury Marine also has received no notice from Norstar that a new well was installed.

Groundwater-Level Measurement

Prior to sampling groundwater at Plant 2, water-level measurements were taken in the monitoring wells to characterize the direction of groundwater flow at the Plant 2 Site. Based on the groundwater water-level measurements, shallow groundwater flows from the north-northwest to the south-southeast across the Site.

Groundwater Sampling

Groundwater sampling was performed to document the groundwater quality at the Site. Four groundwater sampling events were performed during 2003 and 2004, as follows:

- In October 2003, monitoring wells MW-97-1, MW-97-2, MW-97-3, MW-97-5, MW-99-6, and MW-03-04R were sampled for PCBs and VOCs using low-flow sampling techniques. PCB concentrations ranged from non-detect to 0.00053 mg/L, with PCBs being detected in samples from MW-97-1 and MW-97-3. Select (two to six) VOCs were detected at low concentrations in some wells sampled, including one of the upgradient wells (MW-97-5). VOCs detected included TCE (0.00077 mg/L), PCE (0.110 mg/L), 1,1-dichloroethene (1,1-DCE) (0.012 mg/L), 1,1-DCA (0.0031 mg/L), and 1,1,1-TCA (0.2 mg/L).
- In February 2004, ultra low-flow sampling was performed at MW-97-1 and MW-97-3 to collect and analyze samples for PCBs to assess whether PCBs detected in October 2003 were associated with particulates in the well. PCB concentrations ranged from 0.00025 mg/L at MW-97-1 to 0.00067 mg/L at MW-97-3.
- In April 2004, MW-03-4R and MW-97-5 were sampled for VOCs to evaluate for the presence of these compounds in the groundwater. PCE was detected at 0.015 mg/L (MW-03-04R) and 0.0077 mg/L (MW-97-5). Other compounds,

including 1,1-DCE (0.0043 mg/L), 1,1-DCA (0.0011 mg/L), and 1,1,1-TCA (0.090 mg/L), were detected in the sample collected from MW-03-4R.

- In July 2004, MW-04-1, MW-04-2, and MW-04-3 were sampled for PCBs using ultra low-flow techniques to assess off-site groundwater (MW-04-1 and MW-04-2) and to verify PCB levels detected in groundwater near the southeast corner of the Plant Site (MW-04-3). PCB concentrations were non-detect at MW-04-1 and MW-04-2 and 0.00090 mg/L at MW-04-3.

The results of the groundwater sampling are summarized on Figure 3-13A.

Installation/Sampling of Monitoring Wells (2006)

Eight additional double-cased PVC monitoring wells were installed at the Plant 2 Site during 2006 (MW-06-1, MW-06-2, MW-06-3, MW-06-4, MW-06-5, MW-06-6, MW-06-7, and MW-06-8), the locations of which are shown on Figures 3-13A and 3-13B. Monitoring wells MW-06-2 and MW-06-3 were installed at an upgradient location near the property boundary and at a downgradient location, respectively, along the eastern side of the Site to further assess VOCs in groundwater. Monitoring well MW-06-4 was installed off site across St. John Avenue to assess the extent of VOCs in groundwater. Monitoring wells MW-06-5, MW-06-6, MW-06-7, and MW-06-8 were installed as deep bedrock groundwater monitoring wells in the northwestern, northeastern, southeastern, and southwestern corners of the Site, respectively, to assess the potential migration of constituents to the deep groundwater below the Site. To allow for fluctuation of the water table during wet and dry seasons, 5 feet of well screen was installed in or straddling the water table for the shallow wells.

Groundwater-Level Measurement

Prior to sampling groundwater at Plant 2, water-level measurements were taken in the monitoring wells to characterize the direction of groundwater flow at the Site. Based on the groundwater water-level measurements, shallow groundwater flows from the northwest to the southeast across the Site and that deep (bedrock) groundwater flows from the west-southwest to the east-northeast across the Site.

Groundwater Sampling

One round of groundwater sampling was performed during 2006 to document the groundwater quality at the Site. In October 2006, the 16 existing monitoring wells at the Site were sampled for PCBs and VOCs using ultra low-flow sampling techniques to minimize sample turbidity. Monitoring wells MW-03-4R, MW-04-1, and MW-06-1 were additionally analyzed for PAHs and inorganics. PCB concentrations ranged from non-detect to 0.00069 mg/L, with PCBs being detected in samples from MW-97-3 and MW-04-3. Select (one to six) VOCs were detected at low concentrations in some wells sampled, including both of the wells located upgradient near the property boundary (MW-97-5 and MW-06-2). VOCs detected included TCE (0.00065 mg/L), PCE (0.087 mg/L), 1,1-

dichloroethene (1,1-DCE) (0.0046 mg/L), 1,1-DCA (0.0016 mg/L), 1,1,1-TCA (0.078 mg/L), *cis*-1,2-dichloroethene (*cis*-1,2-DCE) (0.0016 mg/L), and acetone (0.0053 mg/L). Only one PAH (i.e., phenanthrene at 0.000015 mg/kg was detected in one groundwater sample at the Site. All other PAH analyses were reported as non-detect. Select (three to seven) inorganics were detected at low levels in the wells sampled, though neither the Wisconsin Enforcement Standards (ESs) nor Preventive Action Limits (PALs) were exceeded in any of the wells.

The results of the groundwater sampling are summarized on Figures 3-13A and 3-13B.

<u>Sampling of Monitoring Wells (2007)</u>

Two rounds of quarterly groundwater sampling were performed during 2007 – one during March and the second during June, as described below.

Groundwater-Level Measurement

Prior to sampling groundwater at Plant 2, water-level measurements were taken in the monitoring wells to characterize the direction of groundwater flow at the Site. Based on the groundwater water-level measurements, shallow groundwater flows from the northwest to the southeast across the Site and that deep (bedrock) groundwater flows from the west-southwest to the east-northeast across the Site.

Groundwater Sampling

In March and June of 2007, the 16 existing monitoring wells at the Site were sampled for VOCs using low-flow sampling techniques to minimize sample turbidity. Select VOCs were detected at low concentrations in some wells sampled, including both of the wells located near the northern property boundary (MW-97-5 and MW-06-2). VOCs detected included TCE (0.00082 mg/L, J-flagged as estimated), PCE (0.098 mg/L), 1,1-DCE (0.0049 mg/L), 1,1-DCA (0.0013 mg/L), 1,1,1-TCA (0.063 mg/L), *cis*-1,2-DCE (0.0011 mg/L), and acetone (0.0067 mg/L).

The results of the groundwater sampling are summarized on Figures 3-13A and 3-13B.

5.6.3 Building Floor Slab

To better characterize the concrete plant floors at depth, concrete floor samples were collected that consisted of concrete cores from either the interval between 1 cm and the bottom of the concrete pad or the interval between 7.5 cm and the bottom of the concrete pad (depending on prior sampling results). Samples were analyzed for PCBs by Aroclor using EPA Method SW-846 8082.

A total of four 1 cm-to-bottom composite floor samples were taken concurrent with sample locations PTSBA1, PTSBE4, PTSBG2, and PTSBH3. Two 7.5 cm-to-bottom composite floor samples were taken concurrent with PTSBC1 and PTSBD1. Sample locations are shown on Figure 3-15.

Analytical results for the concrete floor samples collected indicate that PCBs were detected in all rooms except the Die Repair Room (Room A). PCB concentrations ranged from 0.042 to 11 mg/kg in the samples collected below 1 cm. For the concrete floor sampling below 7.5 cm, total PCB detections ranged from 0.036 to 13 mg/kg.

6.0 Current and Potential Future Land and Resource Uses

The human health risk assessment (HHRA) for this Plant 2 Site considered exposure scenarios associated with assumed future land uses. Future land use at the Plant 2 Site is assumed to be commercial, but as a conservative approach, residential land use is also evaluated (both scenarios are non-industrial use). The HHRA also considered potential exposure of future workers involved in site construction activities. It is assumed that the future land use at the Plant 2 Site addressed in this ROD will be non-industrial use.

7.0 Summary of Site Risks

Mercury Marine prepared a HHRA for the Cedar Creek OU1 - Plant 2 Site, in order to evaluate potential risks to human health if no action is taken. This process characterizes current and future threats or risks to human health and the environment posed by contaminants at the Plant 2 Site. The risk assessments provide the basis for taking action and identify the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline HHRA. The HHRA determined that the COCs for the Plant 2 Site are PCBs and VOCs in soils and that cleanup to levels within EPA's risk range will be protective of human health and the environment at the Plant 2 Site for current and future use.

In accordance with EPA guidance on preparing RODs, the information presented here focuses on the information that is driving the need for the response action at the Cedar Creek OU1 - Plant 2 Site and does not necessarily summarize the entire HHRA. Further information is contained in the risk assessments within the RI report, included in the Administrative Record for the Plant 2 Site.

7.1 Summary of Human Health Evaluation

The HHRA was prepared in accordance with EPA's Risk Assessment Guidance for Superfund (EPA, 1989; 2002; 2004a). Current plans for this Plant 2 Site are to redevelop the property, and as such future land use is assumed to be commercial. However, because there is currently no deed or other restrictions to preclude residential land use in the future, hypothetical future residential land use is also conservatively evaluated. It should be noted that this HHRA includes both reasonable- and worst-case exposure scenarios that assume either no removal or removal of the entire slab, respectively.

Media of potential concern for Plant 2 are soils and groundwater. Future commercial or residential receptors may be exposed to constituents in surface soil at the Plant 2 Site (i.e., generally a relatively small area of soil around the perimeter of the Plant 2 Site). Should the slab be removed for redevelopment purposes, these receptors may also be exposed to soils immediately beneath the slab. Receptors engaged in intrusive soil activities (e.g., construction workers) may also be exposed to constituents in perimeter surface and subsurface soils, as well as sub-slab soils if the slab is removed. Shallow groundwater at the Plant 2 Site is not used as a source of potable water, and as such, potential exposure to chemical constituents via potable use of groundwater is not quantitatively evaluated in the HHRA. Shallow site groundwater is not used, and is not likely to be used in the future, as a potable source largely because of the low yield of the shallow aquifer (i.e., five of nine site wells purged dry during low-flow sampling events). In addition, municipal drinking water is supplied to the Plant 2 Site and surrounding area by the Cedarburg Light & Water Utility (the Utility), and City Ordinance No. 2005-12 (City of Cedarburg, 2005) requires that all private supply wells be permitted for operation. City Ordinance No. 2005-12 also restricts the drilling of new private supply wells in the City; the Utility will only approve a new private well if the homeowner can justify its need in addition to water provided by the public water system. However, potential exposure via dermal contact with groundwater during intrusive activities is evaluated. While site-related constituents have been detected in the building's concrete floor slab, these constituents would be expected to be relatively immobile because of the nature of the concrete matrix. Thus, the constituents would not be readily available for exposure, and the concrete slab is not considered a medium of potential concern.

Constituents of Potential Concern (COPC) for soil are conservatively selected using WDNR Residual Contaminant Levels (RCLs) as outlined in WDNR Chapter NR 720 and WDNR (2002) Guidance. Groundwater COPCs are selected by comparing data to Enforcement Standards (ES) and Preventative Action Level (PAL) presented in WDNR Chapter NR 140. In instances where RCLs, ESs, or PALs are not available for certain detected constituents in soil or groundwater, alternative screening criteria such as the EPA (2004b) Region 9 Preliminary Remediation Goals (PRGs) for residential soil or drinking water are used to identify COPCs.

The HHRA process consists of the following four steps: 1) data evaluation, to identify site-related constituents of interest; 2) exposure assessment, to determine potential exposure pathways and quantify the magnitude of potential exposure; 3) toxicity assessment, to determine the types of effects associated with exposures; and 4) risk characterization, to quantify cancer risks and non-cancer hazards associated with specific exposures at the Plant 2 Site.

7.2 Identification of Contaminants of Concern

The COPC screening process was used to identify constituents for further evaluation in the HHRA. The process involves comparison of site data to conservative criteria which, if not exceeded, show that risks/hazards are insignificant.

Constituents in soil are compared to screening values derived according to WDNR Chapter NR 720 and WDNR (2002) guidance for developing generic RCLs. These screening values are based on the EPA (1996) soil screening levels (SSLs) for residential exposure but are further adjusted to account for a target cancer risk level of 1×10^{-7} and a hazard quotient of 0.2. These screening values are conservative and are used to satisfy requirements of the WDNR Voluntary

Party Liability Exemption (VPLE) program. When RCLs are not available, EPA (2004b) Region 9 PRGs for residential soil are used. Constituents in soil whose maximum concentrations exceed these screening values are considered COPC and are quantitatively evaluated in the HHRA. RCLs and PRGs are presented in Table 4-3 of Appendix D.

For groundwater, concentrations of chemical constituents are compared to WDNR Chapter NR 140 ES and PALs. ESs are generally the same as federal drinking water standards (i.e., maximum contaminant levels – MCLs), and the PALs are either 10% or 20% of the ES, depending on chemical classification (e.g., carcinogen, mutagen, teratogen). When ESs or PALs are not available, EPA (2004b) Region 9 PRGs for drinking water are used. Constituents in groundwater that exceed these drinking water standards and/or screening criteria are quantitatively evaluated in the HHRA using a construction worker dermal contact exposure scenario. Because site groundwater is not used as a potable water source, use of drinking water-based screening criteria provides a conservative evaluation. ESs, PALs, and PRGs are presented in Table 4-4 of Appendix D.

7.2.1 COPC Screening Results – Soil

Constituents in soil that exceeded the residential soil RCLs or PRGs are shown in Figures 3-10A – 3-10E. A comparison of maximum detected concentrations to residential RCLs and PRGs is shown in Table 4-3 of Appendix D. Several PAHs reported in surface soils around the perimeter of the Plant 2 building slab (benzo(a)anthracene, benzo(b)fluoranthene, benzo(k) fluoranthene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) exceeded their respective residential RCLs. Maximum concentrations of these constituents ranged from 2.8 mg/kg (dibenz(a,h)anthracene) to 21 mg/kg (chrysene) and were reported in sample SS-21 (collected from the 0- to 0.5-foot and 0.5- to 1.0-foot depth intervals near the northwest corner of the building). Total PCB concentrations in most of the perimeter surface soil samples were above the residential RCL of 0.032 mg/kg. The highest total PCB concentration was 146 mg/kg (reported in SS-7, southeast corner of Plant 2, outside and adjacent to the Former Die Cast Room). A few inorganics also exceeded their respective RCLs, including lead and arsenic. The highest concentrations of arsenic and lead in surface soils are reported in sample SB-97-4 (69.1 mg/kg at 0 to 2 feet) and SS-9 (510 mg/kg at 0 to 1 foot), respectively.

TCE was detected in sub-slab soils in 3 of 57 samples (0.077 mg/kg at location SB-97-15 [0 to 2 feet below the slab floor]; 0.2 mg/kg at PTSBC2 [0 to 2 feet below the slab floor]; and 0.42 mg/kg at PTSBC2 [2 to 4 feet below the slab floor]), and was the only VOC detected above its respective residential RCL (of 0.0094 mg/kg). PCB concentrations reported in soils beneath the Plant 2 building slab are also above the residential RCL. Highest concentrations of TCE are reported below the Former Die Casting Room floor. There were also a few subsurface samples collected from the perimeter of the Plant 2 Site (about 3 to 5 feet bgs) that exceeded the residential PCB RCL. However, PCB concentrations reported in these outdoor subsurface samples are less than the concentrations reported in subsurface soils beneath the Plant 2 building slab (e.g., below the Former Die Casting Room floor). A few inorganics (i.e., antimony, arsenic, chromium, copper, lead, and thallium) also exceeded their respective residential RCLs. The highest concentration of arsenic (307 mg/kg) was reported outside of the former building foundation between the former Furnace Area and the sidewalk (SB-97-4 2- to 4-foot sample). The highest concentration of lead (5,600 mg/kg) was reported in sample PTSBB2 (2 to 4 feet) located beneath the floor slab of the Tool Room.

Based on this screening evaluation, TCE, PAHs, PCBs, and a few inorganic constituents (including arsenic and lead) have been identified as soil COPCs for further consideration in the HHRA.

7.2.2 COPC Screening Results – Groundwater

VOCs, pesticides, PCBs, and inorganics have been reported in groundwater associated with the Plant 2 Site; however, a few constituents have been detected above their respective ES, PAL, or PRG. No pesticides were present at concentrations above the ES, PAL, or PRG. Only two VOCs (PCE and 1,1-DCE) and total PCBs were reported at or above both the ES and PAL. Detected total PCB concentrations reported above the ES (0.00003 mg/L) and/or PAL (0.000003 mg/L) ranged from 0.00025 mg/L (MW-97-1) to 0.0009 mg/kg (MW-04-03). The only other monitoring well with detectable PCB concentrations was MW-97-3 (maximum detected concentration of 0.00069 mg/L in 2006). Arsenic was the only inorganic to exceed its respective PAL of 0.001 mg/L, but did not exceed the ES of 0.010 mg/L.

Based on this screening evaluation, a few VOCs, PCBs, and arsenic have been identified as groundwater COPCs for further consideration in the HHRA (Table 4-4).

7.2.3 Exposure Assessment

The exposure assessment identifies potential pathways by which receptors may be exposed to chemical constituents. This process involves consideration of constituent concentrations in site-related media (e.g., soils, groundwater) and potentially exposed receptor populations and their activity patterns.

Plant 2 was demolished to the concrete slab in May 2005. Although most of the data used in this assessment were collected prior to demolition of the building, the data are still considered representative of current conditions as the perimeter soils and subsurface soils beneath the slab were not disturbed. Additional data were collected from below the slab floor in 2006 and 2007 and are also used in the HHRA. The former plant's concrete slab floor is covered with a temporary cover and stone, and the Plant 2 Site is fenced. Residential properties are nearby, and there are also other industries located within a 2,000-foot radius of the Plant 2 Site. Under current conditions, there is little or no potential for exposure to constituents in soils or groundwater. As such, this HHRA considers exposure scenarios associated with assumed future land uses.

Future land use at the Plant 2 Site is assumed to be commercial, but as a conservative approach, residential land use is also evaluated. For purposes of this discussion, the following terms are used: surface soil, defined as the top 1 foot of soil; subsurface soil, defined as soils deeper than 1 foot.

Direct contact with soils (i.e., incidental ingestion and dermal contact) is likely to be the predominant exposure pathway for the Plant 2 Site. Inhalation of soil particulates is also considered as a potential exposure route. As requested by EPA (2007), the vapor intrusion to indoor air pathway is also evaluated due to the presence of VOCs in groundwater. Potential future receptors (commercial or residential) may be exposed to constituents in surface soils during routine activities (e.g., gardening, children playing). Exposure of commercial or residential receptors to subsurface soils is not likely under typical conditions, particularly to the extent that the slab can remain in place with additional development over it. If the slab is removed in the future, future commercial or residential receptors will still probably not be exposed to sub-slab soils as long as the slab is replaced by a new building foundation and/or backfill to bring the area back up to grade, thereby providing a barrier between the current sub-slab constituents and potential receptors. However, as a conservative approach, and consistent with EPA (2006) comments, should the slab be removed, future residential and commercial receptors are assumed to be exposed to sub-slab surface soils (i.e., top 1 foot of soil beneath the slab). There is also the potential for construction workers involved in intrusive activities to be exposed to perimeter surface and subsurface soils in addition to sub-slab soils should the slab be removed.

In summary, each receptor is evaluated using two different data sets; one that assumes that the slab will remain in place and the other that assumes the slab will be removed. For the commercial worker and resident, the first data set considers only surface soil samples collected from the perimeter area outside the slab and the latter data set considers exposure to these perimeter surface soil samples as well as sub-slab surface soils (i.e., soils immediately beneath the slab). Construction workers are also evaluated using two different data sets; one data set considers perimeter surface and subsurface soils, and the other considers all these perimeter soils plus all sub-slab soils.

As previously discussed, shallow groundwater at the Plant 2 Site is not used as a potable source and is not likely to be used as a potable source in the future. Potential exposure associated with dermal contact with groundwater by construction workers is, however, evaluated in this HHRA, because groundwater below the Plant 2 Site is somewhat shallow (approximately 10 feet bgs) and may be encountered during intrusive construction activities.

As previously mentioned, because the Plant 2 Site itself is a building slab and parking area with little or no unpaved surfaces, and because it is located in a residential/commercial/industrial area, available habitat is not considered suitable for ecological receptors. As such, the potential for ecological exposure is unlikely and is not further addressed in this baseline risk assessment.

7.2.4 Toxicity Assessment

The toxicity assessment identifies the potential effects that are generally associated with exposure to a given chemical. To quantify carcinogenic effects, EPA has derived slope factors (SFs) for those chemicals found to cause a dose-related, statistically significant increase in tumor incidence in an exposed population relative to the incidence of tumors observed in unexposed populations. SFs are typically developed based on oral toxicity studies and are reported as risk per unit dose in units of inverse milligrams per kilogram body weight per day [$(mg/kg\text{-}day)^{-1}$]. The SFs are used to quantify the potential risk of cancer associated with a given exposure (EPA, 1989).

To quantify non-carcinogenic hazards, EPA has derived reference doses (RfDs) that represent a threshold of toxicity in units of mg/kg-day. RfDs are intended to represent an exposure that the human population could be exposed to daily for an entire lifetime without appreciable risk of harmful effects (EPA, 1989).

Because most oral SFs and RfDs are based on an administered dose, the toxicity values are sometimes adjusted (expressed as an absorbed dose) when evaluating the dermal exposure scenarios. In accordance with EPA (2004b) Dermal Risk Assessment Guidance, the oral SF is adjusted only when the gastrointestinal absorption of the compound is less than 50%.

DROs and GROs are present in soil at the Plant 2 Site, but risks/hazards are not quantified due to the lack of toxicity data. Toxicity data are also not available for lead. However, potential effects of lead exposure are assessed using EPA-recommended models [Adult Lead Model (ALM) and Integrated Exposure Uptake Biokinetic (IEUBK) Model]. These models are briefly discussed below.

The EPA (2003) ALM is used to assess risks/hazards associated with non-residential adult exposures to lead in soil. It is intended to predict hypothetical blood lead concentrations in fetuses carried by women exposed to lead in soils (EPA, 2003). EPA (2003) guidance established a threshold of concern (fetal blood lead level of 10 ug/dL), and associated cleanup goals which limit the risk of exceeding the blood lead level of concern (10 μg/dL) to 5%.

The IEUBK model (Windows version 1, Build 263) is used to assess risks to hypothetical future child residents. The IEUBK model estimates the distribution of blood lead levels in children exposed to lead-containing media, which in turn is used to estimate the risk that a child will exceed the target level of concern (10 μg/dL). According to the model, the soil concentration that corresponds to the target blood lead level of concern of 10 μg/dL is 340 mg/kg.

7.2.5 Risk Characterization

The Risk Characterization integrates the results of the data evaluation, toxicity assessment, and exposure assessment to evaluate potential risks/hazards. Consistent with EPA guidance, carcinogenic risks and non-carcinogenic hazards are evaluated separately.

Carcinogenic Risk

Carcinogenic risk is expressed as a probability of developing cancer over the course of a lifetime as a result of a given level of exposure. For a given chemical and route of exposure, carcinogenic risk is calculated as follows:

Risk = E x SF

where:

E = Exposure Intake (mg/kg-day)
SF = Slope Factor $(mg/kg\text{-}day)^{-1}$

The equations used to quantify risk for each exposure scenario are presented in Tables 4-5 and 4-6 in Appendix F.

Regulatory agencies have policies and guidelines to determine the significance of these calculated risk levels. EPA uses 1×10^{-6} to 1×10^{-4} as a "target range within which the Agency strives to manage risks as part of a Superfund cleanup" (EPA, 1991).

Soil

Future residents, commercial workers, and construction workers were each evaluated using two different exposure scenarios that assumed: 1) the current slab remains in place, and 2) the current slab is removed prior to redevelopment. Currently, the slab prevents direct contact and inhalation exposures to constituents beneath it. Cancer risk estimates for each receptor group and scenario are presented below.

Future Commercial

The total cancer risk associated with future commercial workers exposed to COPCs in perimeter surface soils (e.g., PAHs, total PCBs, and arsenic) is 8×10^{-5} (Table 4-9). This is based on the assumption that the slab remains in place and prevents exposure to constituents beneath it. COPCs with the highest individual cancer risks are arsenic (3×10^{-5}), followed by total PCBs (2×10^{-5}) and benzo(a)pyrene (2×10^{-5}). These risk levels are within the EPA target risk range of 1×10^{-6} to 1×10^{-4}. It should be noted that the cancer risk level for arsenic is driven by a single isolated elevated arsenic concentration of 69.1 mg/kg in sample SB-97-4, which is located just outside the furnace area. The maximum detected PCB concentration (146 mg/kg) was observed in sample SS-7, which was collected from the area of the Southeast Die Cast Room.

If the slab is removed, future commercial workers may be exposed to COPCs in soils immediately below the slab in addition to COPCs in the perimeter soils. For this commercial worker scenario, the total cancer risk is 1×10^{-4}, with the greatest risks being attributed to total PCBs (1×10^{-4}) (Table 4-10). The maximum detected PCB concentration (7,854 mg/kg) was observed in sample SB-97-7 from beneath the Former Die Casting Room area. Cancer risks attributed to arsenic are 1×10^{-5}, and are again attributed to a single isolated elevated arsenic concentration. The cancer risks for all other carcinogenic COPCs are on the order of 10^{-6} to 10^{-9}.

Future Residential
The total cancer risk associated with potential exposure of future residents (children and adults) to PAHs, total PCBs, and arsenic in perimeter surface soils is 4×10^{-4} (Table 4-11). This cancer risk level assumes that the slab remains in place and exposure occurs to COPCs in perimeter surface soil samples only. The highest individual COPC cancer risk (for combined child and adult) of 2×10^{-4} is attributed to arsenic, followed by benzo(a)pyrene (1×10^{-4}), and total PCBs (9×10^{-5}). The maximum detected arsenic concentration in surface soil (69.1 mg/kg) was observed in sample SB-97-4, which was collected adjacent to the furnace area. The maximum detected benzo(a)pyrene concentration (17 mg/kg) was observed in sample SS-21, which was collected from outside the Die Repair Room area. The cumulative cancer risk of 4×10^{-4} is greater than 1×10^{-4}.

Similar to the commercial worker scenario, if the slab is removed, future residents may also be exposed to soils immediately beneath the slab, in addition to perimeter soils. For this residential scenario, the total cancer risk is 6×10^{-4}, with the greatest risks being attributed to total PCBs (4×10^{-4}), followed by arsenic (7×10^{-5}) and benzo(a)pyrene (3×10^{-5}) (Table 4-12). Once again, the arsenic risk estimate is driven by a single isolated elevated arsenic concentration.

Future Construction Workers
Assuming that the slab remains in place (which prevents exposure to constituents beneath it), the total cancer risk level for construction workers is 1×10^{-6} (Table 4-13). The highest individual COPC cancer risk is associated with arsenic (1×10^{-6}).

The total cancer risk for construction workers using a dataset that includes perimeter soils as well as all soils beneath the current slab (i.e., assumes that the slab has been removed) is 5×10^{-6} (Table 4-14). The highest individual COPC cancer risk of 5×10^{-6} is associated with total PCBs. All other cancer risk levels for individual COPCs (PAHs and arsenic) are on the order of 10^{-8} to 10^{-11}.

Summary of Carcinogenic Risk for Soil
Total cancer risk estimates for the commercial and construction worker exposure scenarios are within the EPA target risk range of 1×10^{-6} to 1×10^{-4}. The total risk estimates for hypothetical future residential receptors of 4×10^{-4} (with slab) and 6×10^{-4} (slab removed) are greater than 1×10^{-4}.

Groundwater

Four VOCs (1,1,1-TCA, 1,1-DCE, TCE, and PCE), total PCBs, and arsenic were detected in groundwater above the Wisconsin ES, PAL groundwater standards, and/or EPA (2004b) Region 9 PRGs for drinking water. Cancer risks associated with construction worker dermal contact exposure to constituents in groundwater are presented in Table 4-15. The cumulative cancer risk is 1×10^{-7} and is less than the EPA target risk range of 1×10^{-6} to 1×10^{-4}. The highest carcinogenic risk is associated with PCE (7×10^{-8}) and total PCBs (4×10^{-8}) (Table 4-15).

In addition, an evaluation of the vapor intrusion to indoor air pathway was conducted for both nearby offsite residences and hypothetical future onsite residences. PCE was the only constituent whose concentrations exceeded the EPA VI screening criteria. Using maximum detected groundwater COPC concentrations from onsite and offsite wells, potential risks were estimated for this pathway using the Johnson-Ettinger (JE) model. Results indicated that onsite risk (8×10^{-5}) and offsite risk (7×10^{-5}) are within the EPA target risk range.

Non-Carcinogenic Health Hazards

The hazard index (HI) approach is used to characterize the overall potential for non-carcinogenic health hazards associated with exposure to multiple chemicals. This approach assumes that subthreshold chronic exposures to multiple chemicals are additive. The hazard index is calculated as follows:

HI = E1/RfD1 + E2/RfD2 + ... + Ei/RfDi

where:

HI = Hazard Index (HI)
E/RfD = Hazard Quotient (HQ)
Ei = exposure intake for the i^{th} chemical (mg/kg-day)
RfDi = RfD for the i^{th} chemical

Equations used to derive non-carcinogenic HQs for each exposure scenario are presented in Table 4-5 (soil) and Table 4-6 (groundwater). A HQ value greater than 1 indicates that a calculated exposure is greater than the RfD for a given constituent, and that there may be some potential for health concerns. Similarly, a HI greater than 1 indicates that overall exposure to all chemicals of interest may present concern for potential human health effects (USEPA, 1989).

Soil

<u>Future Commercial</u>
The non-cancer HI associated with future commercial workers exposed to COPCs in perimeter surface soils is 1 (Table 4-9), which is equal to the EPA target. This is based on the assumption that the slab remains in place and prevents exposure to constituents beneath it. This HI of 1 is attributed to total PCBs (HQ = 1). HQs for other COPCs are less than 0.2.

If the slab is removed, future commercial workers may be exposed to COPCs in soils immediately below the slab in addition to COPCs in the perimeter soils. For this worker scenario, the total non-cancer HI is 7, which exceeds the EPA target of 1 (Table 4-10). Total PCBs contribute most to the HI (HQ = 7). The maximum detected PCB concentration (7,854 mg/kg) was observed in sample SB-97-7 from beneath the Former Die Casting Room area. HQs for other non-carcinogenic COPCs are less than 0.1.

Future Residential

Non-cancer HIs associated with future residential exposure to constituents in surface soil (total PCBs and inorganics) for children and adults are 21 and 2, respectively, with total PCBs contributing HQs of 16 (child) and 2 (adult). For children, arsenic and thallium also contributed to the HI of 21, with HQs of 3 and 2, respectively (Table 4-11). For adults, the HQs for all other COPCs are less than 1. The maximum detected PCB concentration in shallow surface soil (146 mg/kg) was observed in sample SS-7, which was collected near the Southeast Die Cast Room area.

Non-cancer HIs were also derived for future residents assumed to be exposed to both perimeter soils and soils immediately beneath the slab (under the assumption that the slab is removed). For this residential scenario, non-cancer HIs for children and adults are 93 and 11, respectively (Table 4-12). Total PCBs are the main contributor to the HIs, with HQs of 88 and 11 respectively. For children, other COPCs with HQs greater than 1 are arsenic (1) and thallium (3). For adults, the HQs for other COPCs are less than 1.

Future Construction Worker

The non-cancer HIs associated with exposure of construction workers to combined surface and subsurface soils (but exclusive of soil beneath the slab) are less than 1 (0.6). The HQ for total PCBs is 0.4 and 0.1 for arsenic (Table 4-13). However, under the assumption that construction workers are exposed to constituents beneath the slab (assuming slab is removed for redevelopment purposes), the HI is greater than 1 (8) (Table 4-14). This HI is largely attributed to total PCBs (HQ of 8), and is greater that the EPA target of 1.

Summary of Non-Carcinogenic Hazards

The non-cancer HIs associated with exposure to constituents in site soils are less than 1 for future construction workers (assuming the slab remains in place). The non-cancer HI for the future commercial worker exposed to site soils with the slab in-place is equal to 1. For all other scenarios evaluated, the HI is greater than 1 and is generally driven by total PCBs.

Groundwater

For the construction worker dermal contact exposure scenario, the total non-cancer HI is less than 1 (HI of 0.3) (Table 4-15).

Lead

Because there are no standard toxicity values for lead that would allow for a typical risk/hazard calculation, potential risks associated with exposure to lead in soils are evaluated using the EPA (2002b) IEUBK Model and the EPA (2003) ALM.

Hypothetical Future Child Resident

Figure 4-2 shows the relationship between soil lead concentration and P10 statistic (probability of a blood lead level greater than or equal to 10 ug/dL) for child resident populations ages 1-84 months using EPA's IEUBK Model (EPA, 1994; Windows version 1, Build 263) with default input parameters. According to the model, the target risk of P10 equal to 5% is exceeded when the soil lead concentration is greater than 340 mg/kg. Consistent with EPA (2002b) guidance, arithmetic mean soil lead concentrations were used in the IEUBK model. The soil lead concentration for the slab-in-place scenario is 110 mg/kg which yields a P10 of 0%. The soil lead concentration for the slab-removed scenario is 103 mg/kg, which also yields a P10 of 0%. As such, the soil lead concentration, for both the slab-in-place and slab-removed scenarios yields a P10 value less than 5%, which indicates that soil lead levels will not pose a concern for hypothetical future child residents.

Future Construction Worker

Figure 4-3 shows the relationship between soil lead concentration (PbS, mg/kg) and P10 statistic for construction workers using the EPA (2003) ALM Model. The target risk of P10 of 5% is exceeded when the soil lead concentration is greater than 632 mg/kg. Consistent with EPA (2003) guidance, arithmetic mean soil lead concentrations were used in the ALM model. Specifically, the soil lead concentration used for the slab-in-place scenario was 81 mg/kg, and the concentration used for the slab-removed scenario was 173 mg/kg. The soil lead concentrations for the two scenarios are less than 632 mg/kg, and therefore lead levels in soil are below a level of concern for the construction worker.

Vapor Intrusion

An evaluation of the vapor intrusion to indoor air pathway was conducted for the Plant 2 Site. Specifically, the potential for VOCs to affect the indoor air quality of nearby offsite residences and hypothetical future onsite residences was evaluated. This evaluation relies on relevant guidance on vapor intrusion (VI) evaluations, specifically the Wisconsin Department of Health and Family Services (WDHFS) (2003) *Chemical Vapor Intrusion and Residential Indoor Air*, and EPA (2002c) *Draft Guidance for Evaluating Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils*. The Wisconsin guidance generally refers to the EPA (2002c) guidance which consists of the three-tiered approach: tier 1 primary screening to simply determine whether the potential for vapor intrusion exists; tier 2 comparison of observed VOC concentrations (groundwater and/or soil vapor) to generic screening values; and tier 3, a site-specific assessment that may involve modeling or collection of additional data.

Tier 2 Evaluation

Based on VOCs detected onsite and in offsite well MW-06-4, EPA (2007b) determined that the potential for VI into offsite residences and hypothetical onsite residences exists. Consistent with the USEPA (2002c) tier 2 approach, VOC concentrations in onsite wells and offsite well MW-06-4 were compared to generic EPA (2002c) groundwater screening criteria. While EPA (2002c) provides three sets of screening values based on target cancer risk levels of 1 x 10^{-4}, 1 x 10^{-5} and 1 x 10^{-6}, the most conservative values (1 x 10^{-6}) were used consistent with Wisconsin guidance (see Tables below). Results show that all VOC concentrations in offsite well MW-06-4 were less than conservative screening criteria except PCE (100 ug/L in October 2006 and 51 ug/L in March 2007). Likewise, results show that all onsite VOC concentrations were less than screening criteria, except for PCE, which was detected above 5 μg/L in several wells (MW-97-4, MW-97-5, MW-03-4R, MW-06-1, MW-06-2, and MW-06-3). The maximum detected PCE concentration (110 μg/L) was observed in well MW-03-4R in 2003. Consistent with the EPA tier 2 approach, the maximum PCE concentrations were then compared to more site-specific screening criteria calculated using attenuation factors based on actual soil type. As shown in the tables below, the maximum PCE concentration was greater than the highest screening value listed (11 ug/L based on a 1 x 10^{-6} cancer risk level). As such, results of the Tier 2 screening indicate that additional site-specific evaluation is warranted. [Note that other available EPA (2002c) PCE screening criteria based on 1 x 10^{-5} and 1 x 10^{-4} target risk levels are 11 ug/L and 110 ug/L, respectively. The maximum detected PCE concentration in offsite well MW-06-4 (100 ug/L) is less than this latter value, and the maximum detected PCE concentration in onsite wells (110 ug/L) is equal to this value.]

Table 1 - Comparison of Offsite VOC Concentrations in Groundwater to EPA Groundwater Screening Values

Volatile Constituent	Maximum Detected at Concentration at Offsite Well MW-06-4	EPA Generic GW Screening Values – Table 2C)
	(ug/L)	(ug/L)
1,1,1-Trichloroethane	70	3100
1,1-Dichloroethane	1.1	2200
1,1-Dichloroethene	4.6	190
1,2,3-Tricholorobenzene	NA	3400
2-Butanone	ND(5)	440,000
cis-1,2-Dichloroethene	1.3	210
sec-Butylbenzene	NA	250
Tetrachloroethene (PCE)	**100**	5 [5 to 11]
Trichloroethene	0.57 J	5

Notes:

NA = Not analyzed.

ND = Non-detect. Value in parentheses is associated laboratory detection limit.

Values in square brackets present the range of attenuation factor-specific screening values listed in EPA Table 3c.

Table 2 - Comparison of Onsite VOC Concentrations in Groundwater to EPA Groundwater Screening Values

Volatile Constituent	Maximum Detected Onsite Concentration	EPA Generic GW Screening Values – Table 2C)
	(ug/L)	(ug/L)
1,1,1-Trichloroethane	200	3100
1,1-Dichloroethane	3.1	2200
1,1-Dichloroethene	12	190
1,2,3-Tricholorobenzene	4	3400
2-Butanone	1.6	440,000
cis-1,2-Dichloroethene	5.2	210
sec-Butylbenzene	1.55	250
Tetrachloroethene (PCE)	**110**	5 [5 to 11]
Trichloroethene	2	5

Notes:

Values in square brackets present the range of attenuation factor-specific screening values listed in EPA Table 3c.

Tier 3 Evaluation

The Johnson-Ettinger (JE) model (EPA, 2004c) was used to estimate the extent of PCE volatilization from groundwater to indoor air of offsite residences and hypothetical onsite residences. Potential cancer risks associated with exposure to PCE via inhalation of indoor air were also estimated using the JE model. The JE model is intended as a screening tool only and should not be the sole basis for remedial action. For this evaluation, the EPA (2004c) recommended default values for all model input parameters were used except: 1) groundwater temperature, 2) soil type, and 3) groundwater depth. The site-specific information is based on boring logs for offsite well MW-06-4 and onsite well MW-03-4R, and soil survey information for Ozaukee County.

Average Groundwater Temperature

The JE model allows site-specific groundwater temperature inputs to account for reduced volatility under colder temperatures. The groundwater temperature used in the model is 5.5°C, which is estimated based on the EPA (2004d) *User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings* (the model default value is 10°C).

Soil Type

The soil type and the associated water-filled porosity are used to estimate the soil vapor permeability of the soil in contact with the hypothetical basement floor. The boring log for offsite well MW-06-4 identifies a mix of soil types including sand, silt and clay; the top 2 feet is generally sand, followed by clay from about 2.5 to 4 feet, followed by a mix of varying layers of sand, clay and silt to sand/gravel at 6 to 8 feet (which may simply be weathered bedrock encountered just above the water table). The boring log for onsite well MW-03-4R identifies a mix of soil types including sand, gravel, and silt; the top two feet is generally sand, followed by gravel/rock from 2 to 4 feet, followed by sand and silt from 5 to 6 feet and coarse material at deeper depths. Based on the soil types presented in the boring logs, as well as information presented in the USGS soil survey for Ozaukee county, silt loam was chosen as the vadose zone soil type for the JE model. Because coarse grade material (e.g., sand/gravel) is present at deeper depths in wells MW-06-4 and MW-03-4R, sand was conservatively chosen as the soil type immediately above the water table.

Depth to Groundwater

Groundwater depth at MW-06-4 was reported as 8.1 feet in October 2006 and 7.7 in March 2007. To be conservative, the shallower groundwater depth of 7.7 feet was used in the JE model. Groundwater depth at MW-03-4R ranged from 6.6 to 9.7 ft bgs from 2003 to 2007. The average of the 2007 groundwater depths (7.5 feet) was used in the JE model.

Results

Using conservative default assumptions and the site-specific parameters described above, JE model results show an estimated PCE inhalation cancer risk of 7×10^{-5} for potential offsite exposures and 8×10^{-5} for potential onsite exposures, both of which are within the EPA target risk range of 1×10^{-4} to 1×10^{-6}. These risks are based on the modeled indoor air concentration associated with the maximum detected PCE concentrations (100 ug/L for offsite well MW-06-4 and 110 ug/L for onsite well MW-03-4R).

7.3 Risk Assessment Conclusions

Results of the HHRA show that total cancer risks for all soil scenarios are within the EPA target risk range of 1×10^{-6} to 1×10^{-4}, with the exception of the total residential risks of 4×10^{-4} for the slab-in-place scenario and 6×10^{-4} for the slab-removed scenario. The highest carcinogenic risks are associated with total PCBs, arsenic, and benzo(a)pyrene. The non-cancer HIs associated with exposure to constituents in Site soils are less than 1 for future construction workers (assuming the slab remains in place). The HI for the future commercial worker scenario (slab-in-place) is 1. For all other scenarios evaluated, the HI is greater than 1 and is driven by total PCBs.

While non-cancer HIs greater than 1 have been identified for construction workers potentially exposed to constituents beneath the slab (HI = 8), these soils are not likely to pose a risk as long as the slab floor remains in place (non-cancer HIs for intrusive workers exposed only to surface and subsurface soils from around the perimeter of the former plant are less than 1 [HI of 0.6]). In addition, the current slab should limit rainwater infiltration and potential migration of constituents from soil into groundwater.

Potential risks/hazards associated with exposure to lead-containing soils were determined for both the hypothetical future child resident and the future construction worker. Results indicated that soil lead concentrations would not result in blood lead levels greater than the target level of 10 ug/dL for a hypothetical future child resident. Likewise, soil lead levels would not pose a concern to future construction workers. Arithmetic mean soil lead concentrations of 81 mg/kg (slab-in-place) and 173 mg/kg (slab-removed) are less than the model-predicted acceptable target concentration of 632 mg/kg.

PCB concentrations in groundwater are low and near the detection limit. Detected total PCB concentrations reported above the ES (0.00003 mg/L) and/or PAL (0.000003 mg/L) ranged from 0.00025 to 0.0009 mg/L in samples collected from three on-site monitoring wells at two locations. To put these concentrations into perspective, the reported PCB concentrations are less than or near the analytical detection limit of 0.00050 mg/L (detection limit used for previous groundwater data collected for the Site), and the PCB groundwater standards (ES and PAL) are actually less than this PCB detection limit. In addition, PCBs have not been detected in off-site monitoring wells. Arsenic was the only inorganic to exceed its respective PAL of 0.001 mg/L, but did not exceed the ES of 0.010 mg/L.

An evaluation of the vapor intrusion to indoor air pathway was conducted for both nearby offsite residences and hypothetical future onsite residences. PCE was the only constituent whose concentrations exceeded the EPA VI screening criteria. Using maximum detected groundwater COPC concentrations from onsite and offsite wells, potential risks were estimated for this pathway using the JE model. Results indicated that onsite risk (8×10^{-5}) and offsite risk (7×10^{-5}) are within the EPA target risk range.

In summary, certain constituents in Plant 2 Site soils may pose a concern to potential future residents, commercial workers, and/or construction workers. However, it is important to note that these estimates are based on reasonable maximum scenarios that consider: 1) maximum detected COPC concentrations (for some constituents, e.g., arsenic), 2) soil exposure frequencies that do not reflect seasonal factors (e.g., the lack of exposure to soils during the winter months), and 3) the fact that accessible surface soils are currently limited to a relatively small area around the perimeter of the Plant 2 Site.

As previously mentioned, because the Plant 2 Site itself is a building slab and parking area with little or no unpaved surfaces, and because it is located in a residential/commercial/industrial area, available habitat is not considered suitable for ecological receptors. Therefore, an ecological risk assessment was not conducted.

8.0 Remedial Action Objectives and ARARS

8.1 Remedial Action Objectives (RAOs)

RAOs are remedial goals for protecting human health and the environment. These objectives are used in the development of specific alternatives (i.e., alternatives are developed in consideration of site objectives), and later as a criterion in the evaluation of the various alternatives (i.e., evaluation of the extent to which each alternative would achieve the RAOs). The specific RAOs developed for the Plant 2 Site are:

- Protect human health by reducing or eliminating exposure of future site users to soils containing PCBs or other site-related COCs representing an excess cancer risk greater than 10^{-6}, a hazard index (HI) greater than 1, and State of Wisconsin standards per NR 720.

- Protect human health by preventing exposure to site groundwater with COCs in excess of regulatory or risk-based standards.

- Monitor contaminant levels in groundwater in order to assess compliance with Maximum Contaminant Levels (MCLs), State of Wisconsin NR 140 groundwater standards, and the need for further actions.

Thus, the focus of the remedial effort will be to minimize exposure to site soils and groundwater potentially posing a risk to human health and to assess the groundwater for further action.

8.2 Applicable or Relevant and Appropriate Requirements (ARARs)

CERCLA, as amended by SARA, specifies that Superfund Remedial actions must comply with the substantive requirements of federal and state environmental laws. Such requirements may be ARARs. In addition to ARARs, federal and state advisories and guidance documents exist that, although not binding regulations, contain information "to be considered" (TBC). ARARs and TBCs are important in developing remedial objectives that comply with regulatory requirements or guidance (as appropriate). The identification of site-specific ARARs is based on specific constituents at a site, the various response actions proposed, and the general site characteristics. As such, ARARs are classified into three general categories:

Chemical-specific ARARs – specific to the type(s) of constituents, pollutants, or hazardous substances at a site; include state and federal requirements that regulate contaminant levels in various media;

Action-specific ARARs – specific to the cleanup activities being considered; usually technology- or activity-based; regulatory requirements that define acceptable excavation, treatment, and disposal procedures; and

Location-specific ARARs – specific to actions at the geographic location; requirements for contaminant concentrations or remedial activities resulting from a site's physical location (e.g., wetlands or floodplains).

Potentially applicable federal, state and local ARARs and TBCs are summarized in Appendix C.

9.0 Description of Alternatives

Following development of the RAOs, a screening and evaluation of potential remedial alternatives was conducted in accordance with CERCLA and the NCP in the FFS Report.

The technologies were assembled into remedial alternatives that meet RAOs and satisfy ARARs. The specific details of the remedial components discussed for each alternative are intended to serve as representative examples.

A number of potential remedial scenarios were developed to address soil and groundwater at the Site considering available and applicable remedial technologies. The alternatives were developed in cooperation with WDNR. When developing the alternatives, emphasis was placed on reducing the potential for human exposure to site-related constituents. The alternatives were developed considering overall effectiveness, implementability, and relative cost.

9.1 Description of Remedy Components

Each of the alternatives is briefly described below. More detailed information about each of the alternatives can be found in the FFS report, which is included in the Administrative Record for the Site.

Alternative 1 – No Action

Under Alternative 1, no active remediation would occur at the Plant 2 Site. Required under the NCP, this alternative serves as a baseline against which the alternatives with active remedial components are compared. This alternative considers only ongoing natural recovery processes at the Plant 2 Site, and does not incorporate institutional controls or monitoring. The existing fencing and cap would remain at the Plant 2 Site; however, their condition would not be monitored or maintained, potentially allowing for exposure to COCs in Plant 2 Site soils in the future. In addition, no restrictive covenants would be implemented to control future use of the Plant 2 Site.

Alternative 2 – Capping with Groundwater Monitoring

Alternative 2 requires that the site fence, concrete slab, and cap currently covering the Plant 2 Site would continue to be monitored and maintained as a direct contact barrier and to prevent surface water infiltration. Periodic monitoring of site groundwater would be performed to help determine the extent of groundwater contamination at and adjacent to the Plant 2 Site. Additional groundwater monitoring wells would be installed and developed. Institutional controls (restrictive covenants) would be implemented to control groundwater use at the Plant 2 Site. In addition, restrictive covenants would be implemented to control future use of the Plant 2 Site. Municipal drinking water is supplied to the Site and surrounding area by the Cedarburg Light & Water Utility, and City Ordinance No. 2005-12 (City of Cedarburg, 2005) requires all private supply wells be permitted for operation. City Ordinance No. 2005-12 also restricts the drilling of new private supply wells in the City; the Utility will only approve a new private well if the homeowner can justify its need in addition to water provided by the public water system. In addition, use of groundwater at the Plant 2 Site, as well as offsite, would be restricted through continued implementation of this City ordinance.

Alternative 3 – Removal of Surface Soil with Groundwater Monitoring

Alternative 3 assumes the Plant 2 Site will be redeveloped and a majority of the concrete slab will remain in place. In order to ensure continuity and adherence to institutional and engineering controls, deed restrictions, may be appropriate, and would be employed. All surface soils from approximately 0 to 2 feet depth around the perimeter of the existing concrete slab would be removed to reduce risk associated with potential direct contact. Removal would include shallow subsurface soils around the perimeter of the Site with PCB concentrations above 1 ppm. Removal areas would be backfilled with clean soil. Soils would be removed using readily available earthmoving equipment, such as backhoes, and properly disposed at an off-site disposal facility.

To reduce the risk to construction workers and others, the concrete slab would be removed only to the extent needed to accommodate the possible redevelopment of the Plant 2 Site and soils would be excavated only to the depth necessary for construction. Clean soil would be backfilled into the excavation areas to reduce the risk to future construction workers. The rest of the slab would remain across the Plant 2 Site to eliminate direct contact and minimize surface water infiltration, and would be incorporated into the design of any future site structure. Periodic monitoring of site groundwater would be performed to help determine the extent of groundwater contamination at and adjacent to the Plant 2 Site. Additional groundwater monitoring wells would be installed and developed.

In addition, institutional controls (restrictive covenants) would be implemented to control future use of the Plant 2 Site, limiting the use and providing for appropriate cap maintenance. Use of groundwater at the Plant 2 Site, as well as offsite, would also be restricted using restrictive covenants and/or through continued implementation of City Ordinance No. 2005-12.

Alternative 4 - Removal of Surface Soils and Subsurface Soils, with Groundwater Monitoring

Alternative 4 assumes the Plant 2 Site will be redeveloped and removal of the concrete slab will be required in order to excavate higher contaminated areas. All surface soils from approximately 0 to 2 feet around the perimeter of the existing concrete slab would be removed as necessary to reduce risk associated with potential direct contact. Removal would include shallow subsurface soils around the perimeter of the Site with PCB concentrations above 1 ppm. Removal areas would be backfilled with clean soil. Soils would be removed using readily available earthmoving equipment, such as backhoes, and properly disposed at an off-site disposal facility.

Excavation would be conducted (i) where needed to accommodate the possible redevelopment of the Plant 2 Site and (ii) in targeted areas where former operations evidenced elevated constituent impacts. More specifically, the targeted areas were defined based on the detection of elevated PCB (> 50 ppm) or VOC concentrations in soils and the locations of the likely sources within the former building (e.g., sumps, pits, trenches). Additional sampling would be performed in areas slated for removal as a result of PCB detections prior to remediation to further verify the limits of the excavation. A plan would be developed and approved by EPA describing the sampling approach, and would show proposed sample locations. The excavation of subsurface soil with elevated concentrations reduces potential future risk.

The concrete slab would be removed to the extent necessary for targeted excavations or as needed to accommodate the possible redevelopment. Excavations for possible footings would be conducted at such limited locations as necessary across the Plant 2 Site and soils would be excavated to the depth necessary for construction. Clean soil would be backfilled around the concrete footings. In the areas of elevated concentrations, targeted excavations would be conducted. The rest of the slab would remain across the Plant 2 Site to eliminate direct contact and minimize surface water infiltration. Periodic monitoring of site groundwater would be performed to help determine the extent of groundwater contamination at and adjacent to the Plant 2 Site. Additional groundwater monitoring wells would be installed and developed.

In addition, institutional controls (restrictive covenants) would be implemented to control future use of the Site, limiting the use and providing for appropriate cap maintenance. Use of groundwater at the Site, as well as offsite, would also be restricted using restrictive covenants and/or through continued implementation of City Ordinance No. 2005-12.

9.2 Common Elements and Distinguishing Features of Each Alternative

With the exception of Alternative 1 – No Action, each of the remedial alternatives address the primary exposure route of direct contact with affected site media. Alternatives 2 through 4 each meet the RAOs of reducing or eliminating exposure of future site users to soils (RAO No. 1) and groundwater (RAO No. 2). The potential exposure to site soils is generally related to anticipated future use of the Plant 2 Site. Alternative 2 assumes that the Plant 2 Site would not be developed in the future and the existing liner and stone cap would remain and be maintained. Alternatives 3 and 4 assume a future use of the Plant 2 Site (non-industrial) and incorporate additional measures (i.e., soil removal beneath the existing building slab) to reduce potential exposure to affected soil during potential onsite excavation. The alternatives incorporate more aggressive removal of materials relative to the future-use scenario.

Alternatives 2 through 4 each incorporate groundwater monitoring as a means of helping to determine the extent of groundwater contamination at and adjacent to the Plant 2 Site. Alternatives 2 through 4 would include installing new groundwater monitoring wells.

The estimated time for completion of remedial action for Alternatives 3 and 4 is 6 to 9 months. The implementation of Alternative 2 would require 2 to 3 months and Alternative 1 would not require any time. The estimated total costs for Alternative 1 are $0, for Alternative 2 are $370,000, for Alternative 3 are $840,000, and for Alternative 4 are $2.7 million.

9.3 Expected Outcomes of Each Alternative

If Alternative 1 is implemented, the COCs in environmental media at the Plant 2 Site would continue to pose unacceptable risk to adults and children. If Alternatives 2 or 3 are implemented, the risks will be within acceptable levels, however, it will likely be more difficult to redevelop the property. If Alternative 4 is implemented, the risks will be within acceptable risk levels and the reuse of the property will be more feasible.

Groundwater usage, which does not occur in OU1, will not change regardless of the alternative that is implemented.

If Alternative 1 or 2 is implemented, the area in and around OU1 will likely not change from its current condition and will continue to have a negative association of PCB contamination. If Alternative 3 is implemented, there may be a negative association attached to the area because the higher contamination will remain in the subsurface soils. If Alternative 4 is implemented, the contaminated areas in excess of the cleanup levels will be remediated and this may facilitate the area being redeveloped and revitalized. Currently, the City of Cedarburg is interested in neighborhood revitalization, with the remediation of OU1 being a step in that process.

9.4 Preferred Alternative

The preferred alternative described in the Proposed Plan for the Cedar Creek OU1 - Plant 2 Site is Alternative 4. The estimated cost of the preferred alternative is $2.7 million.

10.0 Summary of Comparative Analysis of Alternatives

This section explains the EPA's rationale for selecting the preferred alternative. The EPA has developed nine criteria to evaluate remedial alternatives to ensure that important considerations are factored into remedy selection decisions. These criteria are derived from the statutory requirements of Section 121 of CERCLA, the NCP, as well as other technical and policy considerations that have proven to be important when selecting remedial alternatives. When selecting a remedy for a site, EPA conducts a detailed analysis of the remedial alternatives consisting of an assessment of the individual alternatives against each of the nine evaluation criteria and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

The nine evaluation criteria are described in more detail below.

<u>**Threshold Criteria**</u>
Threshold criteria are standards that all alternatives must meet in order to be selected as a remedy for the site. There is little flexibility in meeting the threshold criteria. If ARARs cannot be met, a waiver may be obtained where one or more site exceptions occur as defined in the NCP.

Overall Protection of Human Health and the Environment. Protectiveness is the main requirement that remedial actions must meet under CERCLA. It is an assessment of whether each alternative achieves and maintains adequate protection of human health and the environment. A remedy is protective if it eliminates, reduces, or controls all current and potential risks posed by the site through each exposure pathway. Adequate engineering controls, land use controls, or some combination of the two can be implemented to control exposure and thereby ensure reliable protection of human health and the environment over time. In addition, implementation of a remedy cannot result in unacceptable short-term risks or cross-media impacts on human health and the environment.

Compliance with ARARs. Compliance with ARARs is a statutory requirement of remedy selection. This criterion is used to determine whether the selected alternative would meet the federal, state, and local ARARs identified in Appendix C. A discussion of the compliance of each alternative with chemical-, location-, and action-specific ARARs is included.

Primary Balancing Criteria

Balancing criteria are used to weigh tradeoffs between alternatives. These represent the standards upon which the detailed evaluation and comparative analysis of alternatives are based. A high rating for one criterion can generally compensate for a low rating on another of the balancing criteria.

Long-Term Reliability and Effectiveness. Long-term reliability and effectiveness reflects CERCLA's emphasis on implementing remedies that will protect human health and the environment in the long term. Under this criterion, results of a remedial alternative are evaluated in terms of the risk remaining at the site after response objectives are met. The primary focus of the evaluation is the extent and effectiveness of the actions or controls that may be required to manage the risk posed by treatment residuals or untreated wastes.

Factors to be considered and addressed are magnitude of residual risk, adequacy of controls, and reliability of controls. Magnitude of residual risk is the assessment of the risk remaining from untreated waste or treatment residuals after remediation. Adequacy and reliability of controls is the evaluation of the controls that can be used to manage treatment residuals or untreated wastes that remain onsite.

Reduction of Toxicity, Mobility, or Volume through Treatment. This criterion addresses the statutory preference for remedies that employ treatment to significantly reduce the toxicity, mobility, or volume of the hazardous substances. That preference is satisfied when treatment is used to reduce the principal threats at a site by destroying toxic chemicals or reducing the total mass or total volume of affected media. This criterion is specific to evaluating only how the treatment reduces toxicity, mobility, and volume. Specifically, the analysis will examine the magnitude, significance and irreversibility of reductions. It does not address containment actions, such as capping.

Short-Term Effectiveness. This criterion examines the short-term impacts associated with implementing the alternative. Implementation may affect workers, the neighboring community, or the surrounding environment. Short-term effectiveness also includes potential threats to human health and environment associated with excavation, treatment and transportation of hazardous substances; potential cross-media impacts of the remedy; and the time required to achieve protection of human health and the environment.

Implementability. Implementability considerations include technical and administrative feasibility of the alternatives, as well as the availability of goods and services (including treatment, storage or disposal capacity) associated with the alternative. Implementability considerations often affect the timing of remedial actions (for example, limitations on the season in which the remedy can be implemented, the number and complexity of material handling steps, and the need to secure technical services). Onsite activities must comply with the substantive parts of applicable permitting regulations.

Cost. The detailed cost analysis of alternatives includes capital and annual O&M costs incurred over a period of 50 years in accordance with EPA guidance *Guide to Developing and Documenting Cost Estimates During the Feasibility Study.* The focus during the detailed analysis is on the net present worth of these costs. Costs are used to select the most cost-effective alternative that will achieve the remedial action objectives.

The cost estimates are prepared to have accuracy in the range of –30 to +50 percent. The exact accuracy of each cost estimate depends upon the assumptions made and the availability of costing information. Present worth will be calculated assuming the current discount rate established by the Office of Management and Budget.

Modifying Criteria

Modifying criteria are evaluated by addressing comments received after the regulatory agencies and the public have reviewed the FFS and Proposed Plan. This evaluation is presented in the Responsiveness Summary, found in Appendix A.

State Acceptance. This criterion evaluates the technical and administrative issues and concerns the state may have regarding the alternatives. This is addressed by receiving comments on the RI/FS Report and the Proposed Plan.

Community Acceptance. This criterion evaluates the issues and concerns the public may have regarding the alternatives. This is addressed by receiving comments documented during the public comment period.

The full text of the detailed analysis of the four remedial alternatives against the nine evaluation criteria (including both the individual analysis and the comparative analysis) is contained in the FFS Report for the Cedar Creek OU1 - Plant 2 Site, which is part of the Administrative Record for the Plant 2 Site. Because the two Modifying Criteria cannot be fully evaluated until the public comment is closed, they were not evaluated in the FFS. The Responsiveness Summary of this ROD contains a more detailed discussion of public comments received.

This section of the ROD presents a comparative analysis of the remedial alternatives presented for the Plant 2 Site. The purpose of the comparative analysis is to identify the relative advantages and/or disadvantages of each remedial action alternative. The NCP is the basis for the detailed comparative analysis.

10.1 Overall Protection of Human Health and the Environment

With the exception of Alternative 1 – No Action, each of the remedial alternatives addresses the primary exposure route of direct contact with affected site media. Alternatives 2 through 4 each meet the RAOs of reducing or eliminating exposure of future site users to soils (RAO No. 1) and groundwater (RAO No. 2). The potential exposure to site soils is generally related to anticipated future use of the Plant 2 Site. Alternative 2 assumes that the Plant 2 Site would not be developed in the future and the existing liner and stone cap would remain and be maintained. Alternatives 3 and 4 assume a future use of the Plant 2 Site (non-industrial) and incorporate additional measures (i.e., soil removal beneath the existing building slab) to reduce potential exposure to affected soil during potential onsite excavation. The alternatives incorporate more aggressive removal of materials relative to the future-use scenario.

Alternatives 2 through 4 each incorporate groundwater monitoring as a means of helping to determine the extent of groundwater contamination surrounding the Plant 2 Site. Alternatives 2 through 4 would include installing new groundwater monitoring wells.

10.2 Compliance with ARARs

Chemical Specific ARARs: The primary chemical-specific ARARs for this OU1 include soil and groundwater quality standards. Alternatives 1 and 2 do not include any soil removal or treatment and do not effectively address the chemical-specific soil ARARs (e.g., PCBs - 50 ppm for TSCA). Alternatives 3 and 4 incorporate soil removal as part of the remedial activities. Alternative 4 incorporates removal of a larger soil volume and will remove soil containing higher PCB concentrations. Alternatives 2 through 4 each incorporate continued groundwater monitoring. Based on current information, Alternatives 2 through 4 have a comparable potential for meeting the chemical-specific groundwater ARARs.

Action-Specific ARARs: Action-specific ARARs that apply to this alternative include remedial activity requirements (e.g., Resource Conservation and Recovery Act [RCRA] and TSCA requirements) and health and safety requirements. Compliance with action-specific ARARs would be accomplished by following an EPA-approved RD/RA Work Plan and a site-specific Health and Safety Plan (HASP). Based on current information, Alternatives 2 through 4 have a comparable potential for meeting the action-specific ARARs.

Location-Specific ARARs: Each alternative possesses equal potential for meeting the location-specific ARARs. Potentially applicable location-specific ARARs include historic preservation-related requirements, although no issues are anticipated with this Site.

All the ARARs are presented in Tables 2-1 and 2-2 in Appendix C.

10.3 Long-Term Effectiveness and Permanence

Long-term effectiveness for Alternative 2 is primarily dependant upon maintaining the integrity of the existing surface cover, institutional controls, and deed restrictions. Alternatives 3 and 4 provide potentially more permanence due to less emphasis on maintenance and an increase in removal of affected media. Alternative 4 involves the most removal, and includes removal of VOC-containing soils. All three of these alternatives would be effective at reducing the primary exposure route of direct contact with affected site media.

10.4 Reduction of Toxicity, Mobility, or Volume through Treatment

None of the alternatives include treatment to reduce toxicity, mobility or volume of the COCs. The treatment of contaminated PCB soils in place has not been demonstrated for long term permanence and effectiveness.

10.5 Short-Term Effectiveness

Alternatives 1 and 2 do not involve any invasive activities to implement the remedies. Therefore there are no short-term impacts. Alternatives 3 and 4 include soil removal which could potentially present a complete exposure pathway between onsite workers or trespassers to affected site media. Alternative 4 includes removal of soils containing higher concentrations of COCs and thus may pose additional risks in the short term. Under both of these alternatives, the potential exposure would be addressed by utilizing engineering controls to reduce the possibility of releases, using appropriate PPE, adhering to a site-specific HASP, and restricting access to the Plant 2 Site via security fencing.

10.6 Implementability

Each of the remedial alternatives is implementable. The remedial technologies are well understood and present no unusual challenges for construction. Although readily implementable, Alternative 4 would be the more difficult to implement of the four alternatives, possibly requiring sheetpiling to prevent slope failure during removal, including the subslab, beneath the Former Die Casting Room. Common to Alternatives 3 and 4 is the need for coordination with the future redevelopment of the property. Alternatives 3 and 4 incorporate removal of subsurface material to facilitate installation of subsurface foundations and utilities associated with potential redevelopment of the property. These potential difficulties for both alternatives could be addressed by prior planning/coordination and frequent communication.

10.7 Cost

There are no costs associated with Alternative 1. Costs increase from lowest to highest from Alternatives 2 through 4 due to effort and volume of material removed (in Alternatives 3 and 4). The table below summarizes the estimated costs associated with each of the remedial alternatives presented above.

Remedial Alternative	Estimated Capital Cost	Estimated Annual O&M Cost	Estimated Total Cost
Alternative 1 – No Action	$0 M	$0 M	$0 M
Alternative 2 – Capping with Groundwater Monitoring	$0.09 M	$0.28 M	$0.37 M
Alternative 3 – Removal of Surface Soils with Groundwater Monitoring	$0.64 M	$0.20 M	$0.84 M
Alternative 4 – Removal of Surface Soils and Subsurface Soils, with Groundwater Monitoring	$2.5 M	$0.20 M	$2.7 M

10.8 State Acceptance

The State Agency, WDNR, has been involved with the Site prior to EPA taking the lead, and has continued to be involved in all steps of the RI/FS for the Plant 2 Site. The WDNR concurs with the selection of Alternative 4. A letter of concurrence from the State can be found in Appendix B.

10.9 Community Acceptance

During the public comment period on the Proposed Plan, the community expressed very few concerns with the proposed remedy for the Cedar Creek OU1 - Plant 2 Site. This ROD includes a responsiveness summary that summarizes the public comments and EPA's response to those comments. The responsiveness summary is included as Appendix A.

11.0 Principal Threat Wastes

The NCP establishes an expectation that EPA will use treatment to address the principal threat posed by a site wherever practicable. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. The PCB contamination found in the soils at the Cedar Creek OU1 - Plant 2 Site is considered to be highly toxic. Therefore, the principal threat waste definition applies to the contamination at this Plant 2 Site.

12.0 Selected Remedy

This section describes the selected remedy and provides EPA's reasoning behind its selection. Alternatives can change or be modified if new information is made available to EPA through further investigation or research. An appropriate range of alternatives was developed, based upon initial screening of technologies, potential for contaminants to impact the environment, and site-specific RAOs and goals.

12.1 Identification of the Selected Remedy and Summary of the Rationale for its Selection

Based on the analysis of the nine criteria as summarized in Section 10 of this ROD, the selected remedy for the Cedar Creek OU1 - Plant 2 Site is Alternative 4. This alternative represents the best balance of overall protectiveness, compliance with ARARs, long-term effectiveness and permanence, cost, and other criteria. It is also the alternative favored by the WDNR and the community.

12.2 Description of the Selected Remedy

Alternative 4 would include removal of affected soils around the perimeter and beneath the existing concrete building slab to prevent potential future exposure or releases. Under this alternative, the following soils would be targeted for removal:

- Surface soils surrounding the concrete slab and up to the fence line to the north and south and up to the sidewalks adjacent to St. John and Madison Avenues to the east and west (respectively) would be excavated to a depth of approximately 2 feet bgs to address the presence of PCB-affected surface and shallow subsurface soils. Removal would include shallow subsurface soils around the perimeter of the Plant 2 Site with concentrations above 1 ppm.

- Soils beneath the concrete slab, to the extent necessary, to support installation of foundations and/or utilities associated with possible redevelopment of the Plant 2 Site.

- Soils with higher concentrations of PCBs would be removed to prevent potential future exposure or releases. These soils are in targeted areas where former operations evidenced elevated PCB impacts; more specifically, in areas limited to the footprint of some former sumps, pits, and/or trenches, where PCB concentrations (> 50 ppm) in excess of TSCA were detected in subsurface soils. Excavation has been assumed to bedrock.

- Shallow soils (up to 4 feet in depth) beneath Sumps 3 and 5, as well as at sample location B2 (in the vicinity of a former drainage ditch, Figure 4-2), where the highest VOC concentrations were detected. (Elevated metals concentrations were also detected at location B2.)

This alternative would also include the removal, management, and disposal of any sections of the concrete building slab necessary to support sub-slab soil removal. The anticipated maximum limits of the soil (and the concrete slab) to be removed under this alternative are shown on Figure 4-2. The areas of removal, or removal zones, were purposely expanded around the sample locations containing elevated PCBs to provide a buffer coincident with and/or beyond the limits of the historic sumps/trenches, which based on the RI sampling results, represent the source of the underlying COCs in the soil. Excavation activities would be conducted using a backhoe, excavator and/or other appropriate earthmoving equipment. Sheetpiling may be necessary to allow for excavation of the higher concentration PCB soils at depth below the building slab.

Additional soil removal beneath the existing concrete building slab is included under this alternative due to the increased potential for intrusive activities (utility installation, general construction, installation of foundation).

Approximately 4,700 CY of soil and concrete would be removed and managed under this alternative to meet the above objectives. The excavated soil would be stockpiled onsite to facilitate characterization of the material prior to transportation and offsite disposal. Soil stabilization/dewatering are not part of this alternative as excavation activities would primarily take place above the water table. Based on results obtained for soil samples collected during the investigation activities conducted at the Plant 2 Site, approximately 3,000 CY of the soil/concrete waste contains PCBs at concentrations greater than 50 ppm. Excavated material containing PCBs at concentrations less than 50 ppm would be transported for off-site disposal at a non-hazardous waste disposal facility. Excavated material containing PCBs at concentrations greater than 50 ppm would be transported for disposal as TSCA-regulated material at a TSCA approved landfill. Following soil removal, the excavation would be backfilled with imported clean fill material.

As part of this alternative, the existing liner and stone layer would be removed from the concrete slab to prepare the Plant 2 Site for possible redevelopment. As part of any future construction at the Plant 2 Site, a vapor barrier and collection system would be installed beneath any building constructed as a precautionary measure against potential volatilization of VOCs.

This alternative also includes institutional controls (restrictive covenants) to restrict future site use and prohibit the use of site groundwater for potable purposes. In addition, use of groundwater at the Plant 2 Site, as well as offsite, would be restricted through continued implementation of City Ordinance No. 2005-12.

Periodic groundwater monitoring would also be conducted to document concentrations of remaining chemical constituents in groundwater. Additional monitoring wells at and adjacent to the Plant 2 Site would be installed and developed. The entire site well network would be sampled for VOC and PCB analysis on a regular basis. A final remedy for groundwater will be determined at a later date, based on the results of the periodic monitoring.

12.3 Summary of the Estimated Remedy Costs and Time Required for Implementation

The estimated cost of the selected remedy for the Cedar Creek OU1 - Plant 2 Site is $2,700,000. The remedial design is expected to take three months to complete, and the remedial action is expected to take at least three months to complete. Appendix E contains the cost breakdown for Alternative 4.

The information in the cost estimate summary table is based on the best available information regarding the scope of the remedy. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedy. Changes may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Difference (ESD), or a ROD amendment. The cost estimate is expected to be within +50 to -30 percent of the actual project cost.

12.4 Expected Outcomes of the Selected Remedy

The selected remedy for the Cedar Creek OU1 - Plant 2 Site, Alternative 4, will achieve the RAOs for the Plant 2 Site. The selected remedy will be protective of human health and the environment and will comply with all ARARs. The following are expected to occur by implementing Alternative 4 for OU1:

- Possible non-industrial reuse at the remediated property.
- Soil at the Plant 2 Site will have PCB and VOC concentrations below the cleanup levels, which will reduce the potential human health risk at OU1 to acceptable levels.
- Groundwater use at the site will not be affected, as there are no private groundwater wells within OU1 and all drinking water in OU1 is provided by the City of Cedarburg.
- There are anticipated beneficial socio-economic and community impacts resulting from the remediation of OU1. The City of Cedarburg is currently interested in revitalization of the area. Any planned projects will not move forward until the Plant 2 area is remediated.

13.0 Statutory Determinations

Under CERCLA Section 121 and the NCP, remedies selected for Superfund Alternative Sites are required to be protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a waiver is justified) and be cost effective. The following sections discuss how the selected remedy for the Cedar Creek OU1 - Plant 2 Site meets these statutory requirements.

13.1 Protection of Human Health and the Environment

The current and potential future risks at the Cedar Creek OU1 – Plant 2 Site are due to the presence of elevated concentrations of PCBs and VOCs in soils. Implementation of the selected remedy will be protective of human health and the environment, as described in the NCP, through the removal of subsurface soils with PCB concentrations above 50 ppm and surface and shallow subsurface soils around the perimeter of the Plant 2 Site with concentrations above 1 ppm. In addition, the shallow soils (up to 4 feet in depth) where the highest VOC concentrations were detected will be removed. The site specific RAOs were developed to protect current and future receptors that are potentially at risk from contaminants at the Plant 2 Site. The selected remedy will meet the RAOs. OU1 will be available for reuse at the completion of the remedial action and institutional controls will be required to ensure that the remedy remains protective.

13.2 Compliance with ARARs

Section 121(d) of CERCLA requires that Superfund remedial actions meet ARARs. Appendix C provides all ARARs identified for this site which will be met under this ROD. In addition to

ARARs, non-enforceable guidelines, criteria, and standards may be useful in designing the selected remedy. As described previously in Section 8.2 of this ROD, these guidelines, criteria, and standards are known as TBCs. The selected remedy will comply with the ARARs for the Plant 2 Site.

13.3 Cost Effectiveness

EPA has determined that the selected remedy for the Cedar Creek OU1 - Plant 2 Site is cost effective and represents value for the money to be spent. A cost effective remedy in the Superfund program is one whose costs are proportional to its overall effectiveness. The overall effectiveness of the potential remedial alternatives for the Plant 2 Site was evaluated in the FFS by considering the following three criteria: long-term effectiveness and permanence, reduction in toxicity, mobility and volume through treatment, and short-term effectiveness. The overall effectiveness was then compared to cost to determine whether an alternative is cost effective. Of the remedial alternatives evaluated for the Plant 2 Site, Alternative 4 provided the highest degree of cost effectiveness.

13.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable (MEP)

The selected remedy represents the maximum extent to which permanent solutions and treatment are practicable at the Plant 2 Site. Although treatment technologies will not be utilized in this remedy, the selected remedy is the only remedy with proven long-term permanence, and is more cost-effective than treatment technologies available. The selected remedy also permanently removes the contamination from the Plant 2 Site, allowing for reuse of the property. The selected remedy is also favored by the state and local community.

13.5 Preference for Treatment as a Principle Element

This remedy does not satisfy the preference for treatment as a principle element of the remedy for the following reasons: (1) the treatment of contaminated PCB soils in place has not been demonstrated for long term permanence and effectiveness, (2) treatment technologies are less-cost effective than this remedy, (3) the chosen remedy is a permanent remedy that is widely accepted by the community, and (4) source materials consisting of principle threat wastes will be addressed within the scope of this action.

13.6 Five-Year Review Requirements

The NCP requires that the remedial action be reviewed no less often than every five years if the remedial action results in hazardous substances, pollutants, or contaminants remaining at the Plant 2 Site above levels that allow for unlimited use and unrestricted exposure. Because this remedy will result in hazardous substances, pollutants, or contaminants in groundwater and soil under the concrete slab remaining on-site above levels that allow for unlimited use and unrestricted exposure, including Wisconsin Preventative Action Limits (PAL), a five-year review will be required for this remedial action.

14.0 Documentation of Significant Changes

The Proposed Plan for Cedar Creek OU1 - Plant 2 Site was released for public comment on October 8, 2007, and the public comment period ran from October 8 through November 9, 2007. The Proposed Plan identified Alternative 4 (Removal of Surface Soils and Subsurface Soils, with Groundwater Monitoring) as the preferred alternative for the Plant 2 Site. EPA reviewed all written and verbal comments submitted during the comment period and determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

APPENDIX A
Responsiveness Summary

RESPONSIVENESS SUMMARY
for the Cedar Creek OU1 - Plant 2 Site

This Responsiveness Summary provides both a summary of the public comments U.S. EPA received regarding the Proposed Plan for the Cedar Creek Plant 2 Site and U.S. EPA's responses to those comments. The Proposed Plan was released to the public in early October 2007, and the public comment period ran from October 8 2007, through November 9, 2007. Wisconsin Department of Natural Resources (WDNR) provided support on the Proposed Plan. U.S. EPA held a public meeting regarding the Proposed Plan on October 10, 2007, at the Cedarburg City Hall in Cedarburg, Wisconsin. WDNR participated in the public meeting, assisted in responding to questions, and provided support at the meeting.

U.S. EPA received written comments (via regular and electronic mail) and verbal comments (at the public meeting) during the public comment period. In total, U.S. EPA received comments from approximately 9 different people. Copies of all the comments received during the public meeting (including the verbal comments reflected in the transcript of the public meeting) are included in the Administrative Record for the Site. U.S. EPA carefully considered all comments prior to selecting the final Site remedy documented in the ROD.

This Responsiveness Summary does not repeat verbatim each individual comment. Rather, the comments are summarized and grouped by the type of issue raised. The comments fell within several different categories: support for the proposed remedy, future use of the Site, concerns during the Site cleanup and requests for a different alternative.

The Responsiveness Summary contains a summary of the comments U.S. EPA received and U.S. EPA's responses to those comments, grouped by category.

I. SUPPORT FOR THE PROPOSED REMEDY

A majority of the comments expressed support of the cleanup of the Cedar Creek Plant 2 Site and indicated that the need for protection to human health and the environment from any contaminants existing on the Site is a high priority.

II. FUTURE USE OF THE SITE

Reuse of the property continues to be part of the City of Cedarburg's plan for the neighborhood. The City is considering the possibility of using the Site for a new library. Most of the comments agreed with the library as a possible development option.

III. CONCERNS DURING SITE CLEANUP

A couple comments expressed concern with leaving portions of the concrete slab as a cap, indicating that we should be sure you clean it up so it can have multiple uses generations into the future. Another comment suggested that we don't want to cover something up that might come back to haunt us down the road. They would like the cleanup done right.

In addition, there was a concern that capping it at the height it is now could cause water runoff onto neighboring properties. They would like to see it brought down to the natural level of the ground.

IV. PREFERENCE FOR DIFFERENT ALTERNATIVE

One comment indicated their preference for removing the entire concrete slab and any contamination under the slab in order to protect future generations. Based upon U.S. EPA's evaluation of all of the cleanup options, Alternative 4 provided the best level of protection to humans and the environment. As the risk assessment and evaluations in this document have shown, there are no additional risks associated with the using the concrete slab as a possible cap. Therefore, a cleanup option that would remove the entire concrete slab was not included as a possible option.

V. COMMENTS

Comment 1

Comment: "The only thing I am concerned about with the options is the reliance upon leaving the portions of the concrete slab as a cap."

Response: Based upon U.S. EPA's evaluation of all of the cleanup options, Alternative 4 provided the best level of protection to humans and the environment. As the risk assessment and evaluations in this document have shown, there are no additional risks associated with the using the concrete slab as a possible cap.

Comment 2

Comment: "I am concerned that we're capping it at the height it is now, so I am worried about runoff. I would like to see something done to bring it down to the natural level of the ground."

Response: Whatever development is completed at the Site, it will have to include certain measures to control runoff during storm events, so that it will not cause flooding problems on nearby properties.

<u>Comment 3</u>

Comment: "Do an adequate job in the cleanup. Let's do things the right way."

Response: U.S. EPA's goal is to make sure we protect people's health by reducing or eliminating exposure to soil with high levels of PCBs, preventing exposure to contaminated groundwater, and ensuring that contamination levels in groundwater are reduced. U.S. EPA believes that Alternative 4 will provide the best level of protection by addressing the highest levels of contamination on the Site. The groundwater will be monitored on a regular basis to make sure that contaminant levels are decreasing or remain stable.

APPENDIX B
Concurrence Letter from WDNR

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

WISCONSIN
DEPT. OF NATURAL RESOURCES

Jim Doyle, Governor
Matthew J. Frank, Secretary

101 S. Webster St.
Box 7921
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Mr Richard C. Karl, Director
Superfund Division
USEPA Region 5
77 West Jackson Blvd.
Mail Code: SR-6J
Chicago, IL 60604-3507

RE: Concurrence with the Record of Decision for Operable Unit 1 (OU1) (Soil Contamination only) of the Cedar Creek Site, Cedarburg, WI

Dear Mr. Karl, Rich

I am sending you this letter to document that the Wisconsin Department of Natural resources has reviewed the Record of Decision for the Cedar Creek Site, Operable Unit 1 (OU1) (aka Mercury Marine Plant 2) for the final action for soil contamination. We have concluded that we can concur with the selected remedy for soil remediation at the site with continued groundwater monitoring for a future final remedy for the groundwater pathway.

The selected remedy consists of excavating soil material from the Plant 2 property that has concentrations in the soil that exceed the site-specific clean up levels for polychlorinated biphenyls (PCBs) and volatile organic compounds (VOCs). This remedy would include removal of affected soils around the perimeter and beneath the existing concrete building slab to prevent potential future exposure or releases. In addition, the remedy would include periodic groundwater monitoring, installation of new groundwater monitoring wells and institutional controls (restrictive covenants) to restrict future site use and prohibit the use of site groundwater for potable purposes. A final remedy for groundwater will be determined at a later date, based on the results of the periodic monitoring. Under this alternative, the following soils would be targeted for removal:

- Surface soils surrounding the concrete slab and up to the fence line to the north and south and sidewalks adjacent to St. John and Madison Avenues to the east and west (respectively) would be excavated to a depth of approximately 2 feet below ground surface (bgs) to address the presence of PCB-affected surface and shallow subsurface soils. Removal would include shallow subsurface soils around the perimeter of the Site with PCB concentrations above 1 ppm

- Soils beneath the concrete slab, to the extent necessary, to support installation of foundations and/or utilities associated with possible redevelopment of the Site

- Soils with higher concentrations of PCBs would be removed to prevent potential future exposure or releases. These soils are in targeted areas where former operations evidenced elevated PCB impacts; more specifically, in areas limited to the footprint of some former sumps, pits, and/or trenches, where elevated PCB concentrations (> 50 ppm) were detected in subsurface soils. Excavation has been assumed to bedrock

- Shallow soils (up to 4 feet in depth) beneath Sumps 3 and 5, as well as at sample location B2 (in the vicinity of a former drainage ditch, Figure 4-2), where the highest VOC concentrations were detected. (Elevated metals concentrations were also detected at location B2.)

We are hopeful that your staff will continue to work in close consultation with our staff during the implementation of the Record of Decision We appreciate your efforts thus far and look forward to working to working with you and your staff until the site is remediated. If you have any questions regarding this letter please contact Jim Schmidt at (414)263-8561.

Sincerely,

Mark F. Giesfeldt

Mark F. Giesfeldt, P.E., Director
Bureau for Remediation and Redevelopment

APPENDIX C
ARARs and TBCs

Table 2-1

Mercury Marine Plant 2
Cedarburg, WI
Focused Feasibility Study

Federal ARARs/TBCs

Regulation	Citation	Description	Applicability/ Appropriateness	Rationale
FEDERAL CHEMICAL-SPECIFIC ARARS				
Clean Water Act [Federal Water Pollution Control Act, as amended]	40 CFR 122, 125, 129, 131; Section 301 303, 306, 307, 401, 404; 33 USC 1251; 33 USC 1314	Provides federal, state and local discharge requirements to control pollutants to navigable waters (also includes NPDES).	ARAR	Establishes relevant and appropriate water quality criteria to protect against adverse effects, if dewatering is necessary.
Safe Drinking Water Act (SDWA)	40 CFR 141	Provides Maximum Contaminant Levels (MCLs) for groundwater pollutants.	ARAR	Establishes relevant and appropriate groundwater quality criteria to protect against adverse effects.
Resource Conservation and Recovery Act (RCRA)	40 CFR 261, 262, 264, 268; 42 U.S.C. 6901 et seq.	Identifies and lists certain materials as hazardous wastes and sets management standards for such wastes.	ARAR	Potentially applicable in consideration of management of materials removed from a site if they contain any listed hazardous waste or exhibit a characteristic of a hazard.
FEDERAL ACTION-SPECIFIC ARARS				
NPDES Program Requirements	40 CFR 122, Subpart B; 40 CFR 125; 40 CFR 301, 303, and 307	NPDES Program Permit Requirements. Establishes permitting requirements for point source discharges; regulates discharge of water into navigable waters including the quantity and quality of discharge.	TBC	These requirements will be considered if dewatering is necessary and treated water is discharged from the site.
	33 USC 1342; 40 CFR 122.26 (c)(1)(ii)(C); 40 CFR 122.44(k); 40 CFR 125.1-.3, .100-.104	Best management practices to control pollutants in stormwater discharges during construction activities. Best Available Technology (BAT) effluent limits for toxic and non-conventional pollutants; Best Conventional Technology (BCT) limits for conventional pollutants; water-quality based effluent limitations. Best management practices to prevent release of toxics to surface water from ancillary areas or spills.	ARAR	Best management practices for erosion and sedimentation control will be adopted to minimize the potential for rainfall or flood-induced migration of soils from disturbed areas.
Federal Criteria, Advisories, and Guidance	American Conference of Governmental Industrial Hygienists (ACGIH)	Threshold Limit Value (TLV). These standards were issued as consensus standards for controlling air quality in workplace environments.	TBC	TLVs could be used for assessing the potential for site inhalation risks during remediation.

Table 2-1

Mercury Marine Plant 2
Cedarburg, WI
Focused Feasibility Study

Federal ARARs/TBCs

Regulation	Citation	Description	Applicability/ Appropriateness	Rationale
FEDERAL ACTION-SPECIFIC ARARS (Cont'd)				
Clean Air Act	40 CFR 52	Air emission rates for chemical constituents. Establishes filing requirements and standards for constituent emission rates in accordance with National Ambient Air Quality Standards (NAAQS).	TBC	To be considered for remedial alternatives that include removal of soil or treatment within the site.
RCRA	40 CFR 260 - 282	Pertains to management of hazardous wastes.	ARAR	The substantive requirements of these regulations may apply to actions within the site.
	40 CFR 264/265, Subpart D	Contingency Plan and emergency procedures. Outlines requirements for contingency plan and emergency procedures.	TBC	May be considered for on-site activities related to development of contingency plans and emergency procedures to be implemented during site work.
	40 CFR 264/265, Subpart I	Use and management of containers. Requires all hazardous waste to be stored and managed in appropriate containers.	TBC	May be considered for on-site activities requiring hazardous waste storage.
	40 CFR 264/265, Subpart N	Landfills. Details the design, operation, monitoring, inspection, recordkeeping, closure, and permit requirements for a RCRA landfill.	TBC	May be considered for on-site consolidation of soil following removal.
	40 CFR 268	Land Disposal Restrictions. Identifies treatment standards and prohibitions of hazardous waste in a land disposal unit.	ARAR	May apply to disposition of removed soil.
	40 CFR 261.24	Identifies concentrations of contamination which, if present, make a waste hazardous due to toxicity. The analytical test set forth in Appendix II of 40 CFR part 261 is referred to as the Toxicity Characteristic Leaching Procedure (TCLP).	ARAR	TCLP will be used to determine whether soils and sediments are characteristic hazardous waste.

Table 2-1

Mercury Marine Plant 2
Cedarburg, WI
Focused Feasibility Study

Federal ARARs/TBCs

Regulation	Citation	Description	Applicability/ Appropriateness	Rationale
FEDERAL ACTION-SPECIFIC ARARS (Cont'd)				
Toxic Substances Control Act (TSCA)	40 CFR 761.50(a)(3)	Prohibits discharge of water containing PCBs to navigable waters unless PCB concentration is less than approximately 3 ppb or in accordance with discharge limits of NPDES permit.	ARAR	Criteria will be considered in establishing discharge criteria for water treatment effluent.
	40 CFR 761.61(c) 40 CFR 761.65	Establishes cleanup options and storage options for PCB remediation waste, including PCB-contaminated soils. Options include risk-based approval by USEPA. Risk-based approval option must demonstrate that cleanup or storage plan will not pose an unreasonable risk of injury to health or the environment.	ARAR	Applicable to remedial actions that involve PCB-contaminated wastes.
	40 CFR 761.79	Establishes decontamination standards and procedures for removing PCBs from non-porous surfaces.	ARAR	Applicable to decontamination of equipment used in excavation and restoration activities.
	40 CFR 761.40	Requirements regarding the marking of PCB containers and PCB storage areas.	ARAR	Applicable to remedial actions that involve PCB-contaminated wastes.
	40 CFR 761, Subpart G	Policy used to determine adequacy of cleanup of spills resulting from the release of materials containing PCBs at concentration of 50 ppm or greater.	TBC	Will be considered in the event of PCB spills occurring during the work.
Hazardous Materials Transportation Act, as amended	49 CFR 107, 171,179	General information, regulations and definitions. Department of Transportation rules for transportation of hazardous materials, including procedures for the packaging, labeling, manifesting, and transporting of hazardous materials.	ARAR	Applicable for material shipment off-site.
USEPA Guidance - Office of Solid Waste and Emergency Response (OSWER)	EPA/540/R-95/052, OSWER Directive No. 9355.7-04, May 1995	*Land Use in the CERCLA Remedy Selection Process* . Presents information for considering land use in making remedy selection decisions at NPL sites.	TBC	Guidance will be considered during evaluation of remedial alternatives.

Table 2-1

Mercury Marine Plant 2
Cedarburg, WI
Focused Feasibility Study

Federal ARARs/TBCs

Regulation	Citation	Description	Applicability/ Appropriateness	Rationale
FEDERAL ACTION-SPECIFIC ARARS (Cont'd)				
Comprehensive Environmental Recovery, Compensation and Liability Act (CERCLA)	42 USC 103 Section 9621(d)(4)(C)	Technical impracticability waiver.	ARAR	Applicable if attainment of cleanup goals cannot be achieved due to technical impracticability from an engineering perspective.
	42 USC 9601 Section 121(e)	Waives the requirement to obtain federal, state, and local permits for on-site CERCLA actions.	ARAR	Applicable to CERCLA actions.
USEPA Guidance - OSWER	OSWER Directive 9200.4-14	*Consistent Implementation of the FY1993 Guidance on Technical Impracticability of Ground-Water Restoration at Superfund Sites*	TBC	Clarifies how to determine when ARAR-based cleanup levels may be waived for reasons of technical impracticability.
	OSWER Directive 9234.2-25, September 1993	*Guidance for Evaluating the Technical Impracticability of Groundwater Restoration*. Establishes USEPA's policy and procedures for demonstrating technical impracticability of groundwater remediation.	TBC	This guidance may be considered for potential actions at the site.
	OSWER Directive 9200.4-17P, 1997	*Use of Monitored Natural Attenuation (MNA) at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*. Provides guidance regarding the use of MNA for the cleanup of soil and groundwater.	TBC	This guidance may be considered for potential actions at the site.
	OSWER 9355.7-03B-P, June 2001	*Comprehensive Five-Year Review Guidance.* Provides guidance on conducting five-year reviews for sites at which hazardous substances, pollutants, or contaminants remain on-site above levels that allow for unrestricted use and unlimited exposure.	TBC	Guidance will be considered during preparation of any post remediation monitoring plans.

Table 2-1

Mercury Marine Plant 2
Cedarburg, WI
Focused Feasibility Study

Federal ARARs/TBCs

Regulation	Citation	Description	Applicability/ Appropriateness	Rationale
FEDERAL ACTION-SPECIFIC ARARS (Cont'd)				
OSHA	29 CFR 1910	General Industry Standards. These regulations specify the 8-hour time-weighted average concentration for exposure of site workers to various organic compounds. Training requirements for workers at hazardous waste operations are specified in 29 CFR 1910.120.	ARAR	Applicable for on-site remedial actions.
	29 CFR 1926	Safety and Health Standards. This regulation specifies the type of safety equipment to be used on-site and procedures to be followed during site remediation.	ARAR	These requirements apply to all site contractors and subcontractors and must be followed during all site work.
	29 CFR 1904	Recordkeeping, Reporting, and Related Regulations. This regulation outlines the recordkeeping and reporting requirements for an employer under OSHA.	ARAR	Applicable for on-site remedial actions performed.
FEDERAL LOCATION-SPECIFIC ARARS				
USEPA Guidance - OSWER	OSWER Directive 9355.7-04, May 1995	*Land Use in CERCLA Remedy Selection Process.* Identifies considerations for incorporating anticipated future land use in the remedy selection process.	TBC	Provides guidance for consideration of future site land use in selection of a site remedy.
National Historic Preservation Act, 16 USC 470 et seq.	36 CFR 800, 36 CFR 65, and 40 CFR 6.301	Proposed remedial actions must take into account effect on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed undertaking.	ARAR	Relevant and appropriate if activities will affect historic properties or landmarks at/near the site.
Historic Sites, Buildings and Antiquities Act, 16 USC 461 et seq.	36 CFR 62.6	National Landmarks. Proposed remedial actions shall consider the existence of national landmarks and avoid undesirable impacts upon such landmarks.	TBC	May be considered if activities will affect historical areas.

Table 2-2

Mercury Marine Plant 2
Cedarburg, WI
Focused Feasibility Study

State ARARs/TBCs

Regulation	Citation	Description	Applicability/ Appropriateness	Rationale
STATE CHEMICAL-SPECIFIC ARARS				
Soil Cleanup Standards	WAC NR 720	Allows for the calculation of site-specific risk- based cleanup standards based on the intended reuse of the property. Generally applied to unsaturated material or soils.	ARAR	Applicable.
Standards for Selecting Remedial Actions	WAC NR 722	Establishes standards for selection of remedial actions. Generally applied to soil cleanup programs.	ARAR	Applicable.
Groundwater Quality Standards	WAC NR 140	Establishes groundwater quality standards and evaluation and response procedures.	ARAR	Applicable.
STATE ACTION-SPECIFIC ARARS				
Management of PCBs and Products Containing PCBs	WAC NR 157	Establishes procedures for the storage, collection, transportation, processing, and final disposal of PCBs and materials containing PCBs at any level. It refers to NR 500 and 600 series.	ARAR	Applicable for removal, transport, and disposal of contaminated soils.
Wisconsin Pollutant Discharge Elimination System	WAC NR 200	Technology-based effluent limits (NR 220–297). Requires compliance with permit limitations for discharge to navigable waters, including water quality effluent limits, water quality standards, national performance standards, and toxic and pretreatment effluent standards.	ARAR	Applicable for remedial alternatives involving discharges.
Water Quality Antidegradation	WAC NR 207	Establishes implementation procedures for the antidegradation policy in s. NR 102.05(1)(a).	ARAR	Applicable to proposed new or increased discharges.
Water Quality Antidegradation: Waste Load Allocated, Water Quality-related Effluent Standards and Limitations	WAC NR 212–220	Establishes permit limitations for effluent discharges.	ARAR	Applicable for remedial alternatives involving effluent discharges.
Wisconsin's General Permit Program for Certain Water Regulatory Permits	WAC NR 322	Establishes minimum design standards and specifications for projects permitted under a general permit.	ARAR	Potentially applicable for implementation of a given remedial alternative.

Table 2-2

Mercury Marine Plant 2
Cedarburg, WI
Focused Feasibility Study

State ARARs/TBCs

Regulation	Citation	Description	Applicability/ Appropriateness	Rationale
STATE ACTION-SPECIFIC ARARS (Cont'd)				
Wisconsin State Air Pollutant Control Regulations	WAC NR 400–499	Establishes concentration levels, by chemical, for new sources. Manages construction and operation permits.	ARAR	Applicable for removal and disposal of soils.
Solid Waste Management	WAC NR 500–520	Provides definitions, submittal requirements, exemptions and other general information relating to solid waste facilities which are subject to regulations under s. 2789.01(35) Stats. Applicable for off-site siting processes. Applicable to new and existing facilities.	ARAR	Applicable for implementation of a given remedial alternative.
Hazardous Waste Management	WAC NR 600–685	Provides definitions, general permit application information, incorporation by reference citations and general information concerning the hazardous waste management program. Establishes procedures for handling, storage, and disposal of hazardous wastes.	ARAR	Applicable for removal, transport, and disposal of contaminated soils. Applicable to treatment units.
Identification and Listing of Hazardous Waste	WAC NR 605	Establishes criteria for identifying the characteristics of hazardous waste to determine if the waste is subject to regulation.	ARAR	Applicable for removal, transport, and disposal of contaminated soils.
Investigation and Remediation of Environmental Contamination	WAC NR 700	Establishes standards and procedures that allow for site-specific flexibility, pertaining to the identification, investigation, and remediation of sites and facilities which are subject to regulation under s. 144.442, 144.76, or 144.77, Stats.	ARAR	Applicable for implementation of a given remedial alternative.
Notification of the Discharge of Hazardous Substances	WAC NR 706	Notification procedures and responsibilities by discharger of hazardous substances including containment, cleanup, disposal, and restoration.	ARAR	Applicable for removal, transport, and disposal of contaminated soils.
Low-hazard Solid Waste Exemption	Wis. Stats. Ch. 289.43	Solid waste law that allows issuance of exemption from siting requirements in NR 500–520. Excavated soils may be considered "exempt" after treatment if "new" product is created.	ARAR	Potentially applicable if ex-situ treatment option is selected.

Table 2-2

Mercury Marine Plant 2
Cedarburg, WI
Focused Feasibility Study

State ARARs/TBCs

Regulation	Citation	Description	Applicability/ Appropriateness	Rationale
STATE ACTION-SPECIFIC ARARS (Cont'd)				
EPA TSCA Coordinated Approval	The State of Wisconsin Approval Process for Dredging of Commercial Ports, WDNR 2004	USEPA Region 5 works with WDNR on review of application to waive disposal requirements in NR 500 landfills and allow disposal of TSCA-level sediments (>50 ppm) in a Wisconsin licensed solid waste landfill.	TBC	Applicable in evaluating disposal options of soils.
STATE LOCATION-SPECIFIC ARARS				
Beneficial Reuse Solid Waste Exemption	WAC NR 500.08	Establishes criteria for possible beneficial use of solid wastes after treatment. Applies for on-site reuse options only.	ARAR	Applicable for disposal of treated soils meeting disposal criteria.
Landfill Siting and Approval Process	Wis. Stats. Ch. 289	State statute for solid waste facilities. Addresses the upland disposal of solid waste. Landfill facilities are prohibited from shoreland and floodplain zone areas except by permits issued from WDNR.	ARAR	Applicable for implementation of any given remedial alternative disposal option.

APPENDIX D
Comparison to Standards (Tables 4-3 – 4-4)

Table 4-3

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Comparison of Maximum Detected Concentrations in Soil to Residential RCLs

Constituents	RCL	Detection Frequency	Detected Maximum Concentration	Maximum Detected Location	COPC
VOLATILE ORGANIC COMPOUNDS (Concentrations in mg/kg)					
1,1,1-Trichloroethane	1.20E+03	2/42	0.041	PTSBC2	No
1,2,4-Trichlorobenzene	1.56E+02	2/50	0.083	SB-03-22	No
(1,2,4 & 1,3,5) Trimethylbenzene	3.30E+01	2/2	0.8	S-4	No
1,2-Dichlorobenzene	6.00E+02	1/42	0.11	PTSBH4	No
1,3-Dichlorobenzene	5.30E+02 (a)	1/42	0.03	PTSBH4	No
Acetone	*1.41E+04*	*4/71*	*0.18*	*SB-97-7,SB-97-14,PTSBB2*	*No*
Bromomethane	2.50E+00	1/68	0.076	SB-97-14	No
Carbon Disulfide	2.30E+02	1/71	0.032	SB-97-6	No
Chloromethane	2.80E-01	4/71	0.095	SB-97-1	No
cis-1,2-Dichloroethene	1 56E+02	1/42	0.54	PTSBH1	No
Ethylbenzene	4 00E+02	1/42	0 079	PTSBH1	No
Isopropyl Benzene (Cumene)	1 58E+03	2/50	0 97	SB-03-22	No
Methyl Acetate	1.56E+04	16/42	40	PTSBC1	No
Methycyclohexane	4.80E+02	2/42	0 044	PTSBC4	No
sec-Butylbenzene	6.26E+02	1/5	0.44	SB-99-6	No
Tetrachloroethene	1.23E+00	10/71	0.84	PTSBBB2	No
Toluene	4.30E+02	14/73	1.4	SB-97-7	No
trans-1,2-Dichloroethene	3.13E+02	1/42	0 14	PTSBH1	No
Trichloroethene	9 40E-03	3/71	0.42	PTSBC2	Yes
Xylene, o	3 13E+04	3/71	0.46	PTSBH1	No
Xylenes, m + p	1.70E+02	3/71	0.98	SB-03-22	No
Xylenes, total	1.90E+02				No
SEMIVOLATILE ORGANIC COMPOUNDS (Concentrations in mg/kg)					No
Acenaphthene	9 39E+02	49/100	6	SS-21	No
Acenaphthylene	NA	44/100	0.73	PTSBC1	No
Anthracene	*4.69E+03*	*52/100*	*8.2*	*SS-21*	*No*
Benzo(a)anthracene	8 70E-02	58/100	20	SS-21	Yes
Benzo(b)fluoranthene	8 70E-02	62/100	16	SS-21	Yes
Benzo(k)fluoranthene	8 75E-01	60/100	15	SS-21	Yes
Benzo(g,h,i)perylene	NA	56/100	8 5	SS-21	No
Benzo(a)pyrene	9 00E-03	58/100	17	SS-21	Yes
Bis(2-ethylhexyl)phthalate	4 56E+00	1/24	0.039	S-1	No
Carbazole	3 19E+00	2/22	0 34	SB-97-4	No
Chrysene	8.75E+00	59/100	21	SS-21	Yes
Dibenz(a,h)anthracene	9.00E-03	50/100	2.8	SS-21	Yes
Dibenzofuran	6 26E+01	1/22	0 284	SB-97-4	No
Di-n-butyl phthalate	1.56E+03	2/24	0.073	S-1	No
2,4-Dimethylphenol	3 13E+02	2/22	2.34	SB-97-11	No
Fluoranthene	6 26E+02	64/100	49	SS-21	No
Fluorene	6 26E+02	2/22	0.326	SB-97-4	No
Indeno(1,2,3-cd)pyrene	8 70E-02	55/100	8.6	SS-21	Yes
2-Methylnaphthalene	6 26E+01	1/22	0 613	SB-97-4	No
2-Methylphenol	7 82E+02	1/22	0.621	SB-97-7	No
4-Methylphenol	7 82E+01	1/22	13 1	SB-97-11	No
Naphthalene	4 60E+01	45/100	3.5	SS-21	No
Phenanthrene	*NA*	*82/100*	*43*	*SS-21*	*No*
Phenol	4 69E+03	1/22	1 94	SB-97-14	No
Pyrene	4 69E+02	63/100	41	SS-21	No
PESTICIDES (Concentrations in mg/kg)					
beta-BHC	3.55E-02	3/24	0 0119	SB-97-13	No
delta-BHC	NA	1/24	0 00084	SB-97-1	No
Heptachlor	1 42E-02	3/24	0 00552	SB-97-13	No
Aldrin	3 76E-03	2/24	0 00193	SB-97-13	No
Heptachlor epoxide	7.02E-03	1/24	0.00228	SB-97-1	No
Endosulfan I	9.39E+01	1/24	0.00106	SB-97-1	No
Dieldrin	3 99E-03	1/24	0.00384	SB-97-5	No
4,4'-DDE	1 88E-01	1/24	0.00707	SB-97-14	No
Endrin	4.69E+00	1/24	0.0027	SB-97-5	No
Endosulfan II	9.39E+01	1/24	0.000654	SB-97-13	No
4,4'-DDD	2 66E-01	3/24	0.00398	SB-97-14	No
Endosulfan sulfate	9 39E+01	1/24	0 00111	SB-97-5	No
4,4'-DDT	1 88E-01	3/24	0.0233	SB-97-14	No
Methoxychlor	7 82E+01	1/24	0 00308	SB-97-5	No
PCB AROCLORS (Concentrations in mg/kg)					
Total PCBs	3 20E-02	123/145	7480	SB-97-11	Yes
INORGANICS (Concentrations in mg/kg)					
Antimony	6.26E+00	5/22	76.7	SB-97-14	Yes
Arsenic	3 90E-02	76/87	307	SB-97-4	Yes
Barium	1 10E+03	60/60	220	PTSBH2	No
Beryllium	3 13E+01	10/22	0 74	SB-97-4	No
Cadmium	8 00E+00	48/60	2 6	SS-4,PTSBB2	No
Chromium	1 40E+01	81/81	210	SB-97-1	Yes
Cobalt	6 21E+01	22/22	11 2	SB-97-4	No
Copper	6 26E+02	79/79	24000	PTSBB2	Yes
Cyanide (total)	3 13E+02	1/22	1.2	SB-97-1	No
Lead	5.00E+01	102/102	5600	PTSBB2	Yes
Mercury	2 70E+00	55/60	0 83	SS-4	No
Nickel	3.13E+02	60/60	26	PTSBE4	No
Selenium	7 82E+01	9/60	59.7	SB-97-4	No
Silver	7.82E+01	13/60	2 6	PTSBB2	No
Thallium	1.25E+00	18/22	14	SS-6	Yes
Vanadium	1 10E+02	22/22	62 2	SB-97-4	No
Zinc	4 69E+03	60/60	2000	PTSBB2	No
GASOLINE RANGE ORGANICS (Volatile Fraction) (mg/kg)					
Gasoline Range Organics	1 00E+02	5/20	320	SB-97-7	Yes
DIESEL RANGE ORGANICS (Semivolatile Fraction) (mg/kg)					No
Diesel Range Organics	1 00E+02	13/22	6300	SB-97-7	Yes

Notes:

mg/kg - milligrams per kilogram or parts per million
RCL - Residual Contaminant Level
RCLs for arsenic, cadmium, chromium and lead are from Table 2 of NR 720
RCLs for all other constituents were derived using WDNR (2002) guidance for deriving UCLs using the USEPA on-line soil screening level calculator RCLs are the lower of
RCLs are based on 1×10^{7} excess cancer risk or a hazard quotient of 0 2
The RCL for GROs and DROs is 100 mg/kg as listed in NR 720 (4)(a)
(a) USEPA Region 9 Preliminary Remediation Goals (PRGs) for residential soil were used when RCLs were not available
Samples with italicized sample IDs are those samples collected from beneath the current slab and are included in the construction worker exposure scenario
Shaded Value - concentration exceeds RCL
NA - Not available

Table 4-4

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Groundwater Data - Comparison to Wisconsin Groundwater Standards

Constituents	Units	ES	PAL	PRG	Detection Frequency	Maximum Detect	Max Detect Location	COPC
VOCs								
1,1,1-Trichloroethane	mg/L	0.200	0.040	--	21/73	0.2	MW-03-4R	Yes
1,1-Dichloroethane	mg/L	0.850	0.085	--	12/73	0.0031	MW-03-4R	No
1,1-Dichloroethene	mg/L	0.007	0.0007	--	17/73	0.012	MW-03-4R	Yes
1,2,3-Tricholorobenzene	mg/L	NA	NA	NA	1/19	0.004	MW-97-3	No
2-Butanone	mg/L	0.460	0.090	--	1/66	0.0016	MW-97-2	No
cis-1,2-Dichloroethene	mg/L	NA	NA	0.061	10/63	0.0052	MW-03-4R	No
sec-Butylbenzene	mg/L	NA	NA	0.24	1/9	0.00155	MW-99-6	No
Tetrachloroethene	mg/L	0.005	0.0005	--	41/73	0.11	MW-03-4R	Yes
Trichloroethene	mg/L	0.005	0.0005	--	14/73	0.002	MW-97-5	Yes
PESTICIDES								
4,4'-DDD	mg/L	NA	NA	0.00028	1/10	0.000033	MW-97-1	No
Endosulfan sulfate	mg/L	NA	NA	0.22	1/10	0.000188	MW-97-4	No
Endrin ketone	mg/L	NA	NA	0.011	1/10	0.000033	MW-97-1	No
Heptachlor	mg/L	0.0004	0.00004	--	1/10	0.000023	MW-97-1	No
PCBs								
Total PCBs	mg/L	0.00003	0.000003	--	7/36	0.0009	MW-04-3	Yes
INORGANICS								
Arsenic	mg/L	0.010	0.001	--	6/13	0.0039	MW-97-3	Yes
Barium	mg/L	2	0.4	--	13/13	0.15	MW-06-1	No
Chromium	mg/L	0.100	0.010	--	5/13	0.0049	MW-97-2	No
Copper	mg/L	1.300	0.130	--	4/13	0.0052	MW-06-1	No
Nickel	mg/L	0.100	0.020	--	5/13	0.0073	MW-97-1	No
Selenium	mg/L	0.050	0.010	--	4/13	0.0035	MW-97-5	No
Silver	mg/L	0.050	0.010	--	6/13	0.0036	MW-97-2	No
Zinc	mg/L	5	2.5	--	3/13	0.0934	MW-97-2	No

Notes:
mg/L - milligrams per liter or parts per million
ES - Wisconsin NR 140 Enforcement Standard
PAL - Wisconsin NR 140 Preventative Action Level
PRG = USEPA Region 9 Preliminary Remediation Goal (PRG) for tap water PRGs were used for comparison only when ESs or PALs were unavailable
-- = PRG was not used for COPC screening for this constituent
Shaded Value - Exceeds PAL
Bolded Value - Exceeds ES
NA = Not available

APPENDIX E
Detailed Cost Analysis of Remedy

Table 4-3

Mercury Marine Plant 2
Cedarburg, WI
Focused Feasibility Study

Remedial Alternative 4 Cost Estimate

Item	Unit Cost	Units	Extended
CAPITAL COSTS			
CONSTRUCTION			
1. Mobilization/demobilization	$64,870 / ls	1	$64,900
2. Oversight	$3,000 / day	100	$300,000
3. Site preparation	$25,000 / ls	1	$25,000
4. Removal of cap materials	$15 / cy	1885	$28,300
5. Concrete slab demolition			
Non-TSCA	$20 /ton	157	$3,100
TSCA	$28 /ton	231	$6,500
6. Sheeting	$50 / sf	7,880	$394,000
7. Excavation	$20 / cy	4,219	$84,400
8. Backfill	$20 / cy	4,219	$84,400
9. Excavation for footings and VOC soil removal			
Excavation	$30 / cy	236	$7,100
Backfill	$20 / cy	236	$4,700
10. Monitoring well installation and pre-remediation confirmatory sampling	$125,000 / ls	1	$125,000
11. Site restoration	$10,000 / ls	1	$10,000
12. Miscellaneous disposal	$10,000 / ls	1	$10,000
13. Offsite transportation			
TSCA	$1,500 /20 ton load	230	$345,000
Non-TSCA	$150 /20 ton load	218	$32,700
14. Offsite disposal			
TSCA	$85 / ton	4,595	$390,596
Non-TSCA	$18 / ton	6,116	$110,100
15. Hydroseeding	$0.10 /sf	12,049	$1,200
Capital Cost Subtotal			$2,026,996
Obtain deed/GIS restriction	$10,000 / ls	1	$10,000
Contingency (25%)			$284,650
Engineering, administration, and management (15%)			$170,790
TOTAL COST			**$2,492,436**
ANNUAL O&M COSTS			
16. Monitoring Well Sampling	$20,000 / event	10	$200,000
17. Annual Site Monitoring and Maintenance	$5,000 / event	30	$150,000
O&M Present Worth (30 years, 5% discount rate)			$203,500
TOTAL COST			**$2,695,936**
			Rounded to $2.7M

Alternative:

- Removal of surface soils and subsurface soils, with groundwater monitoring.

General Assumptions:

- Costs are based on current Site information and project understanding Costs may change following collection of additional data and/or actual project design.
- Costs include materials, equipment, and labor unless otherwise noted.
- Costs assume that construction of a vapor barrier and collection system will be part of future construction plans. As such, costs to construct a vapor barrier and collection system are not included in estimate.
- Costs are based on sampling of entire groundwater well network annually for the first 5 years and then once every 5 years after for a total of 30 years for VOCs and PCBs.
- Unit costs are in 2007 dollars and are estimated using standard estimating guides (e.g., Means Site Work and Landscape Cost Data), vendors, professional judgment, and experience from similar projects
- Construction activities have been assumed to be performed in modified Level D protection.
- ARCADIS BBL prepared these estimates using current and generally accepted engineering cost estimation methods. These estimates are based on assumptions concerning future events and actual costs may be affected by known and unknown risks including, but not limited to, changes in general economic and business conditions, site conditions that were unknown to ARCADIS BBL at the time the estimates were performed, future changes in site conditions, regulatory or enforcement policy changes, and delays in performance. Actual costs may vary from these estimates and such variations may be material. We are not licensed as accountants or securities attorneys and, therefore, make no representations that these costs form an appropriate basis for complying with financial reporting requirements for such costs.

Table 4-3

Mercury Marine Plant 2
Cedarburg, WI
Focused Feasibility Study

Remedial Alternative 4 Cost Estimate

Alternative 4 Assumptions:

1. Assumed to be 10% of construction costs, except oversight, transportation and disposal. The mobilization cost estimate includes mobilization of personnel, equipment, and materials necessary to implement construction. Includes costs for decontamination of equipment.
2. Includes costs and expenses for two field oversight staff through the duration of the project. Assumes a duration of 100 days.
3. Includes costs for miscellaneous clearing and access activities. The staging area cost estimate includes labor, equipment, and materials necessary to construct a soil staging/equipment decon pad for decontamination activities and the processing of generated waste materials, and an access/staging area adjacent to the work site.
4. Cap removal costs are $15 per cy. The cost estimate is based on removing liner materials, gravel cap, and brick/masonry rubble located across the Site property limits and processing debris as necessary for offsite disposal purposes. Removal of the materials will be conducted using standard excavation methods. Gravel cap layer assumed 6 in. thick.
5. Concrete slab demolition costs are $28 and $20 per ton for TSCA and non-TSCA material, respectively. The cost estimate is based on demolishing concrete slabs-on-grade located at the building footprint limits and processing demolition debris as necessary for offsite disposal purposes. The TSCA areas will be demolished in a controlled manner using standard demolition methods with some sawcutting and manual jackhammering, as needed. Demolition of the non-TSCA areas will also be conducted using standard demolition methods however, sawcutting or manual jackhammering of the slabs is not required. Non-TSCA estimates assume no vapor or dust control (other than misting with water, as needed) will be required. Interior concrete pad assumed 8 in. thick.
6. Temporary sheetpile installation/removal costs are based on installing and removing sheeting around the interior removal areas. Sheetpiles are assumed to be supported with bracing.
7. Includes costs to excavate the building perimeter (building footprint to sidewalk/fence line) 2 ft. bgs and PCBs greater than 50ppm at depth, includes a 15% volume increase from sidewall sloughing.
8. Includes costs to procure and place general fill.
9. Includes costs to excavate Sump 3 and Sump 5 to 4 ft., Location B2 in the Tool Repair Room, and fifty-two 5 ft. square future footing grids 4 ft. deep, accounting for 8 in. thick concrete pad and backfilled with general fill
10. Includes costs to install 2 shallow wells nested with 2 deep wells, and to perform pre-remediation confirmatory soil sampling that will include collection of composite samples for PCB analysis.
11. Includes costs to perform grading to achieve pre-construction topographic contours in areas used for access, staging, and decontamination.
12. Includes costs to transport and dispose of miscellaneous site waste including PPE.
13. Transportation costs are $1500 and $150 per 20 ton load for TSCA and non-TSCA material, respectively. Estimates have been rounded up to the nearest whole ton load.
14. Includes costs to dispose of Site cap materials (including additional 10 tons for liner/geotextile/miscellaneous debris), excavated soils and demolished concrete slabs.
15. Assumes that the backfill placed in the excavations will be hydroseeded.

APPENDIX F
Exposure Factors and Risk Characterization Summary
(Tables 4-5 – 4-15)

Table 4-5

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Summary of Exposure Factors - Soil

Exposure Factors	Units	Commercial Indoor Worker	Ref.	Residential Adult	Ref.	Residential Child	Ref.	Construction Worker	Ref.
Cancer Slope Factor (CSFo)	$(mg/kg\text{-}day)^{-1}$	chemical-specific	IRIS	chemical-specific	IRIS	chemical-specific	IRIS	chemical-specific	IRIS
Reference Dose (RfDo)	mg/kg-day	chemical-specific	IRIS	chemical-specific	IRIS	chemical-specific	IRIS	chemical-specific	IRIS
Cancer Slope Factor (CSFd)	$(mg/kg\text{-}day)^{-1}$	chemical-specific	IRIS, (b)	chemical-specific	IRIS, (b)	chemical-specific	IRIS, (b)	chemical-specific	IRIS, (b)
Reference Dose (RfDd)	mg/kg-day	chemical-specific	IRIS, (b)	chemical-specific	IRIS, (b)	chemical-specific	IRIS, (b)	chemical-specific	IRIS, (b)
Cancer Slope Factor (CSFi)	$(mg/kg\text{-}day)^{-1}$	chemical-specific	IRIS	chemical-specific	IRIS	chemical-specific	IRIS	chemical-specific	IRIS
Reference Dose (RfDi)	mg/kg-day	chemical-specific	IRIS	chemical-specific	IRIS	chemical-specific	IRIS	chemical-specific	IRIS
Body Weight (BW)	kg	70	(a)	70	(a)	15	(a)	70	(a)
Ingestion Rate (IR)	mg/day	50	(c)	100	(c)	200	(c)	100	(c, d)
Exposed Surface Area (SA)	cm^2/day	3300	(b, c)	5700	(b, c)	2800	(b, c)	3300	(b, c)
Adherence Factor (AF)	mg/cm^2	0.2	(b, c)	0.07	(b, c)	0.2	(b, c)	0.3	(b, c)
Absorption Fraction (ABS)	percent	chemical-specific	(b)	chemical-specific	(b)	chemical-specific	(b)	chemical-specific	(b)
Inhalation Rate (IRA)	m^3/day	20	(a)	20	(a)	10	(a)	20	(a)
Particulate Emission Factor (PEF)	m^3/kg	1.32E+09	(c)	1.32E+09	(c)	1.32E+09	(c)	1.32E+09	(c)
Volatilization Factor (VF)	m^3/kg	chemical-specific	(c)	chemical-specific	(c)	chemical-specific	(c)	chemical-specific	(c)
Exposure Frequency (EF)	days/year	250	(a, b, c)	350	(a, b, c)	350	(a, b, c)	30	Site-specific
Exposure Duration (ED)	years	25	(a, b, c)	24	(a, b, c)	6	(a, b, c)	1	Site-specific
Averaging Time (Cancer) (ATc)	days	25550	(a)	25550	(a)	25550	(a)	25550	(a)
Averaging Time (Non-Cancer) (ATnc)	days	9125	(a)	8760	(a)	2190	(a)	365	(a)

Equations:

Carcinogens = [((CSFo * EPC * CF* EF * ED * IR)/(ATc * BW)) + ((CSFd * EPC * CF* EF * ED * SA * AF* ABS)/(ATc * BW)) + ((CFSI* EPC * IRA* EF* ED* 1/VFor 1/PEF)/ (Atc * BW))]
Non-carcinogens = [((1/RfDo * EPC * CF * EF * ED* IR *FI)/ (ATnc * BW)) + ((1/RfDd * EPC * CF* EF * ED* SA * AF * ABS)/(Atnc * BW)) + ((1/RfDi * EPC * IRA* EF * ED * 1/VF or 1/PEF)/(ATnc * BW)]

Notes:
Chemical-specific toxicity data are provided in Table 4-7.
VF is used for volatile chemicals. VF for trichloroethene is 3.3E+03 m^3/kg.
Default PEF is used for non-volatiles.

References:

(a) USEPA, 1989. Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A). Interim Final. EPA/540/1-89/002.
(b) USEPA, 2004. Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual. Part E, Supplemental Guidance for Dermal Risk Assessment, Interim. EPA/540/R/99/005.
(c) USEPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.
(d) Calabrese, 2003. Letter from Edward Calabrese Regarding Soil Ingestion Rates. Provided as an attachment to Comments of the General Electric Company on the U.S. Environmental Protection Agency's Human Health Risk Assessment for the Housatonic River Site – Rest of River. Prepared for General Electric by AMEC Earth and Environmental, Inc. and BBL Sciences. July 28, 2003.

IRIS = USEPA's Integrated Risk Information System

Table 4-6

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Summary of Exposure Factors - Groundwater

Exposure Factors	Units	Construction Worker	Ref.
Cancer Slope Factor (CSF)	$(mg/kg\text{-}day)^{-1}$	chemical-specific	IRIS
Reference Dose (RfD)	mg/kg-day	chemical-specific	IRIS
Chemical Concentration in Water (CW)	(mg/cm^3)	chemical-specific	Calculated
Body Weight (BW)	kg	70	(a)
Exposed Surface Area (SA)	cm^2/day	3300	(b, c)
Absorption Fraction (ABS)	percent	chemical-specific	(b)
Permeability Constant (Kp)	cm/hour	chemical-specific	(b)
Fraction Absorbed (FA)	Fraction absorbed	chemical-specific	(b)
Event Duration (t_{event})	hour/event	2	Site-specific
T-event	lag time per event	chemical-specific	(b)
B	ratio of permeability coefficient	chemical-specific	(b)
Event Frequency (EV)	events/day	1	(b)
Exposure Frequency (EF)	days/year	30	Site-specific
Exposure Duration (ED)	years	1	Site-specific
Averaging Time (Cancer) (ATc)	days	25550	(a)
Averaging Time (Non-Cancer) (ATnc	days	365	(a)

Equations:

Construction Worker
Carcinogens = [((DAevent * EV * ED * EF *SA * CSF)/(BW*ATc))]
Non-carcinogens = [((DAevent * EV * ED * EF *SA * 1/RfD)/(BW*ATnc))]

where:
DAevent (for tetrachloroethane and PCBs) = ((2FA * Kp * CW * √6T-event *t-event/π))
DAevent (for 1,1,1-trichloroethene, 1-1-dichloroethene and trichloroethene) = FA * Kp *CW [(tevent/1+*B*) +2Tevent (1 +3*B* + 3B^2)/(1 + *B*)^2)]

Note:
Chemical-specific toxicity data are provided in Table 4-8.

References:

(a) USEPA, 1989. Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A). Interim Final. EPA/540/1-89/002.
(b) USEPA, 2004. Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual. Part E, Supplemental Guidance for Dermal Risk Assessment, Interim. EPA/540/R/99/005.
(c) USEPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

IRIS = USEPA's Integrated Risk Information System

Table 4-7

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Summary of Chemical-Specific Data - Soil COPCs

Soil COPCs	Dermal Absorption Fraction (unitless)	Gastrointestinal Absorption Efficiency	Oral Cancer Slope Factor (mg/kg-day)-1	Oral Reference Dose (mg/kg-day)	Dermal Slope Factor (mg/kg-day)	Dermal Reference Dose (mg/kg-day)	Inhalation Slope Factor (mg/kg-day)-1	Inhalation Reference Dose (mg/kg-day)
Trichloroethene	0.4	No adjustment	4.00E-01	3.00E-04	NA	NA	4.00E-01	1.00E-02
Benzo(a)anthracene	0.13	No adjustment	0.73	NA	0.73	NA	3.08E-01	NA
Benzo(a)pyrene	0.13	No adjustment	7.3	NA	7.3	NA	3.08	NA
Benzo(b)fluoranthene	0.13	No adjustment	0.73	NA	0.73	NA	3.08E-01	NA
Benzo(k)fluoranthene	0.13	No adjustment	0.073	NA	0.073	NA	3.08E-02	NA
Chrysene	0.13	No adjustment	0.0073	NA	0.0073	NA	3.08E-03	NA
Dibenz(a,h)anthracene	0.13	No adjustment	7.3	NA	7.3	NA	3.08	NA
Ideno(1,2,3-cd)pyrene	0.13	No adjustment	0.73	NA	0.73	NA	3.08E-01	NA
Total PCBs	0.14	No adjustment	2	2.00E-05	2	2.00E-05	2.00E+00	2.00E-05
Antimony	NA	Adjust	NA	4.00E-04	NA	NA	NA	NA
Arsenic	0.03	No adjustment	1.5	3.00E-04	1.5	3.00E-04	15	NA
Chromium	NA	Adjust	NA	1.50E+00	NA	NA	42	NA
Copper	NA	NA	NA	4.00E-02	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	No adjustment	NA	6.60E-05	NA	NA	NA	NA

Notes:
Dermal and gastrointestinal absorption values are those presented in USEPA (2004).
Toxicity data are those presented in the USEPA Integrated Risk Assessment System (IRIS).
NA - Not Applicable.

Table 4-8

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Summary of Chemical-Specific Data - Groundwater

Groundwater COPCs	FA (dimensionless)	Kp (cm/hour)	T-Event (hour)	B	Cancer Slope Factor (mg/kg-day)-1	Reference Dose (mg/kg-day)
1,1,1-trichloroethane	1	1.30E-02	0.6	0.1	NA	2.80E-01
1,1-dichloroethene	1	1.20E-02	0.37	0	NA	1.00E-01
Trichloroethene	1	1.20E-02	0.58	0.1	4.00E-01	3.00E-04
Tetrachloroethene	1	3.30E-02	0.91	--	0.54	1.00E-02
Total PCB	0.5	4.30E-01	11.29	--	0.4	2.00E-05

Notes:
Chemical-specific dermal values are those presented in USEPA (2004).
Toxicity data are those presented in the USEPA Integrated Risk Assessment System (IRIS).
NA - Not Applicable.

Table 4-9

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Summary of Cancer Risks and Non-Cancer Hazards Future Commercial Indoor Worker - With Slab

Future Commercial Worker				
Soil COPCs	**Exposure Point Concentrations (mg/kg)**	**Rationale**	**Cancer Risk (Adult)**	**Non-Cancer Hazard (Adult)**
Trichloroethene	NA	NA	NA	NA
Benzo(a)anthracene	7.395	95% KM (Chebyshev) UCL	3.E-06	NA
Benzo(a)pyrene	6.39	95% KM (Chebyshev) UCL	2.E-05	NA
Benzo(b)fluoranthene	6.075	95% KM (Chebyshev) UCL	2.E-06	NA
Benzo(k)fluoranthene	5.633	99% KM (Chebyshev) UCL	2.E-07	NA
Chrysene	7.775	95% KM (Chebyshev) UCL	3.E-08	NA
Dibenz(a,h)anthracene	1.241	95% KM (Chebyshev) UCL	4.E-06	NA
Ideno(1,2,3-cd)pyrene	3.804	95% KM (Chebyshev) UCL	1.E-06	NA
Total PCBs	18.04	95% Adjusted Gamma UCL	2.E-05	1
Antimony	2.4	95% KM (Percentile Bootstrap) UCL	NA	0.003
Arsenic	69.1	Maximum detected concentration [a]	3.E-05	0.2
Chromium	131	95% Chebyshev (Mean, Sd) UCL	3.E-07	0.00004
Copper	94.69	95% Student's-t UCL	NA	0.001
Lead	242	95% Chebyshev (MVUE) UCL	NA	NA
Thallium	9.815	95% Student's-t UCL	NA	0.07
		Total Cancer Risk =	**8.E-05**	
		Total Non-Cancer Hazard =		**1**

Note:
NA - Not Applicable.
[a] Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used as EPC.

Table 4-10

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Summary of Cancer Risks and Non-Cancer Hazards Future Commercial Indoor Worker - Without Slab

Future Commercial Worker				
Soil COPCs	**Exposure Point Concentrations (mg/kg)**	**Rationale**	**Cancer Risk (Adult)**	**Non-Cancer Hazard (Adult)**
Trichloroethene	0.2	95% KM (Percentile Bootstrap) UCL	9.E-08	0.002
Benzo(a)anthracene	2.156	95% KM (BCA) UCL	7.E-07	NA
Benzo(a)pyrene	2.063	95% KM (BCA) UCL	7.E-06	NA
Benzo(b)fluoranthene	1.906	95% KM (BCA) UCL	7.E-07	NA
Benzo(k)fluoranthene	5.501	99% KM (Chebyshev) UCL	2.E-07	NA
Chrysene	2.397	95% KM (BCA) UCL	8.E-09	NA
Dibenz(a,h)anthracene	0.38	95% KM (BCA) UCL	1.E-06	NA
Ideno(1,2,3-cd)pyrene	1.135	95% KM (BCA) UCL	4.E-07	NA
Total PCBs	99.13	97.5% KM (Chebyshev) UCL	1.E-04	7
Antimony	2.4	95% KM (Percentile Bootstrap) UCL	NA	0.003
Arsenic	27.78	97.5% KM (Chebyshev) UCL	1.E-05	0.06
Chromium	62.57	95% Chebyshev (Mean, Sd) UCL	1.E-07	0.00002
Copper	1688	99% Chebyshev (Mean, Sd) UCL	NA	0.02
Lead	227.3	95% Chebyshev (MVUE) UCL	NA	NA
Thallium	14	Maximum detected concentration [a]	NA	0.1
		Total Cancer Risk =	**1.E-04**	
		Total Non-Cancer Hazard =		**7**

Note:
NA - Not Applicable.
[a] Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used as EPC.

Table 4-11

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Summary of Cancer Risks and Non-Cancer Hazards Future Residents - With Slab

Future Resident Child				
Soil COPCs	**Exposure Point Concentrations (mg/kg)**	**Rationale**	**Cancer Risk (Child)**	**Non-Cancer Hazard (Child)**
Trichloroethene	NA	NA	NA	NA
Benzo(a)anthracene	7.395	95% KM (Chebyshev) UCL	8.E-06	NA
Benzo(a)pyrene	6.39	95% KM (Chebyshev) UCL	7.E-05	NA
Benzo(b)fluoranthene	6.075	95% KM (Chebyshev) UCL	7.E-06	NA
Benzo(k)fluoranthene	5.633	99% KM (Chebyshev) UCL	6.E-07	NA
Chrysene	7.775	95% KM (Chebyshev) UCL	8.E-08	NA
Dibenz(a,h)anthracene	1.241	95% KM (Chebyshev) UCL	1.E-05	NA
Ideno(1,2,3-cd)pyrene	3.804	95% KM (Chebyshev) UCL	4.E-06	NA
Total PCBs	18.04	95% Adjusted Gamma UCL	6.E-05	16
Antimony	2.4	95% KM (Percentile Bootstrap) UCL	NA	0.08
Arsenic	69.1	Maximum detected concentration [a]	1.E-04	3
Chromium	131	95% Chebyshev (Mean, Sd) UCL	2.E-07	0.001
Copper	94.69	95% Student's-t UCL	NA	0.03
Lead	242	95% Chebyshev (MVUE) UCL	NA	NA
Thallium	9.815	95% Student's-t UCL	NA	2
		Total Cancer Risk =	**3.E-04**	
		Total Non-Cancer Hazard =		**21**

Future Resident Adult				
Soil COPCs	**Exposure Point Concentrations (mg/kg)**	**Rationale**	**Cancer Risk (Adult)**	**Non-Cancer Hazard (Adult)**
Trichloroethene	NA	NA	NA	NA
Benzo(a)anthracene	7.395	95% KM (Chebyshev) UCL	4.E-06	NA
Benzo(a)pyrene	6.39	95% KM (Chebyshev) UCL	3.E-05	NA
Benzo(b)fluoranthene	6.075	95% KM (Chebyshev) UCL	3.E-06	NA
Benzo(k)fluoranthene	5.633	99% KM (Chebyshev) UCL	3.E-07	NA
Chrysene	7.775	95% KM (Chebyshev) UCL	4.E-08	NA
Dibenz(a,h)anthracene	1.241	95% KM (Chebyshev) UCL	6.E-06	NA
Ideno(1,2,3-cd)pyrene	3.804	95% KM (Chebyshev) UCL	2.E-06	NA
Total PCBs	18.04	95% Adjusted Gamma UCL	3.E-05	2
Antimony	2.4	95% KM (Percentile Bootstrap) UCL	NA	0.008
Arsenic	69.1	Maximum detected concentration [a]	5.E-05	0.4
Chromium	131	95% Chebyshev (Mean, Sd) UCL	4.E-07	0.0001
Copper	94.69	95% Student's-t UCL	NA	0.003
Lead	242	95% Chebyshev (MVUE) UCL	NA	NA
Thallium	9.815	95% Student's-t UCL	NA	0.2
		Total Cancer Risk =	**1.E-04**	
		Total Non-Cancer Hazard =		**2**

Total Residential Cancer Risk (combined child and adult risk)	**4.E-04**

Note:
NA - Not Applicable.
[a] Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used as EPC.

Table 4-12

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Summary of Cancer Risks and Non-Cancer Hazards Future Residents - Without Slab

Future Resident Child

Soil COPCs	Exposure Point Concentrations (mg/kg)	Rationale	Cancer Risk (Child)	Non-Cancer Hazard (Child)
Trichloroethene	0.2	95% KM (Percentile Bootstrap) UCL	2.E-07	0.02
Benzo(a)anthracene	2.156	95% KM (BCA) UCL	2.E-06	NA
Benzo(a)pyrene	2.063	95% KM (BCA) UCL	2.E-05	NA
Benzo(b)fluoranthene	1.906	95% KM (BCA) UCL	2.E-06	NA
Benzo(k)fluoranthene	5.501	99% KM (Chebyshev) UCL	6.E-07	NA
Chrysene	2.397	95% KM (BCA) UCL	3.E-08	NA
Dibenz(a,h)anthracene	0.38	95% KM (BCA) UCL	4.E-06	NA
Ideno(1,2,3-cd)pyrene	1.135	95% KM (BCA) UCL	1.E-06	NA
Total PCBs	99.13	97.5% KM (Chebyshev) UCL	3.E-04	88
Antimony	2.4	95% KM (Percentile Bootstrap) UCL	NA	0.08
Arsenic	27.78	97.5% KM (Chebyshev) UCL	5.E-05	1
Chromium	62.57	95% Chebyshev (Mean, Sd) UCL	1.E-07	0.001
Copper	1688	99% Chebyshev (Mean, Sd) UCL	NA	0.5
Lead	227.3	95% Chebyshev (MVUE) UCL	NA	NA
Thallium	14	Maximum detected concentration [a]	NA	3
		Total Cancer Risk =	**4.E-04**	
		Total Non-Cancer Hazard =		**93**

Future Resident Adult

Soil COPCs	Exposure Point Concentrations (mg/kg)	Rationale	Cancer Risk (Adult)	Non-Cancer Hazard (Adult)
Trichloroethene	0.2	95% KM (Percentile Bootstrap) UCL	1.E-07	0.002
Benzo(a)anthracene	2.156	95% KM (BCA) UCL	1.E-06	NA
Benzo(a)pyrene	2.063	95% KM (BCA) UCL	1.E-05	NA
Benzo(b)fluoranthene	1.906	95% KM (BCA) UCL	1.E-06	NA
Benzo(k)fluoranthene	5.501	99% KM (Chebyshev) UCL	3.E-07	NA
Chrysene	2.397	95% KM (BCA) UCL	1.E-08	NA
Dibenz(a,h)anthracene	0.38	95% KM (BCA) UCL	2.E-06	NA
Ideno(1,2,3-cd)pyrene	1.135	95% KM (BCA) UCL	6.E-07	NA
Total PCBs	99.13	97.5% KM (Chebyshev) UCL	1.E-04	11
Antimony	2.4	95% KM (Percentile Bootstrap) UCL	NA	0.008
Arsenic	27.78	97.5% KM (Chebyshev) UCL	2.E-05	0.1
Chromium	62.57	95% Chebyshev (Mean, Sd) UCL	2.E-07	0.0001
Copper	1688	99% Chebyshev (Mean, Sd) UCL	NA	0.06
Lead	227.3	95% Chebyshev (MVUE) UCL	NA	NA
Thallium	14	Maximum detected concentration [a]	NA	0.3
		Total Cancer Risk =	**2.E-04**	
		Total Non-Cancer Hazard =		**11**

Total Residential Cancer Risk (combined child and adult risk)	**6.E-04**

Note:
NA - Not Applicable.
[a] Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used as EPC.

Table 4-13

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Summary of Cancer Risks and Non-Cancer Hazards
Future Construction Workers - With Slab

Future Construction Workers				
Soil COPCs	**Exposure Point Concentrations (mg/kg)**	**Rationale**	**Cancer Risk**	**Non-Cancer Hazard**
Trichloroethene	NA	NA	NA	NA
Benzo(a)anthracene	3.325	95% KM (BCA) UCL	9.E-09	NA
Benzo(a)pyrene	2.737	95% KM (BCA) UCL	8.E-08	NA
Benzo(b)fluoranthene	2.682	95% KM (BCA) UCL	8.E-09	NA
Benzo(k)fluoranthene	8.053	99% KM (Chebyshev) UCL	2.E-09	NA
Chrysene	3.277	95% KM (BCA) UCL	9.E-11	NA
Dibenz(a,h)anthracene	0.575	95% KM (BCA) UCL	2.E-08	NA
Ideno(1,2,3-cd)pyrene	1.673	95% KM (BCA) UCL	5.E-09	NA
Total PCBs	29.59	97.5% KM (Chebyshev) UCL	2.E-07	0.4
Antimony	2.24	95% KM (Percentile Bootstrap) UCL	NA	0.0007
Arsenic	293	99% KM (Chebyshev) UCL	1.E-06	0.1
Chromium	89.18	95% Chebyshev (Mean, Sd) UCL	9.E-10	0.000007
Copper	73.28	95% Approximate Gamma UCL	NA	0.0002
Lead	298	99% Chebyshev (Mean, Sd) UCL	NA	NA
Thallium	14	Maximum detected concentration [a]	NA	0.02
		Total Cancer Risk =	**1.E-06**	
		Total Non-Cancer Hazard =		**0.6**

Note:
NA - Not Applicable.
[a] Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used as EPC.

Table 4-14

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Summary of Cancer Risks and Non-Cancer Hazards
Future Construction Workers - Without Slab

Future Construction Workers				
Soil COPCs	**Exposure Point Concentrations (mg/kg)**	**Rationale**	**Cancer Risk**	**Non-Cancer Hazard**
Trichloroethene	0.094	95% KM (t) UCL	3.E-10	0.0002
Benzo(a)anthracene	2.08	97.5% KM (Chebyshev) UCL	6.E-09	NA
Benzo(a)pyrene	1.012	95% KM (BCA) UCL	3.E-08	NA
Benzo(b)fluoranthene	1.061	95% KM (BCA) UCL	3.E-09	NA
Benzo(k)fluoranthene	0.925	95% KM (BCA) UCL	3.E-10	NA
Chrysene	2.178	97.5% KM (Chebyshev) UCL	6.E-11	NA
Dibenz(a,h)anthracene	0.283	95% KM (Chebyshev) UCL	8.E-09	NA
Ideno(1,2,3-cd)pyrene	0.965	97.5% KM (Chebyshev) UCL	3.E-09	NA
Total PCBs	569.5	97.5% KM (Chebyshev) UCL	5.E-06	8
Antimony	28.2	97.5% KM (Chebyshev) UCL	NA	0.008
Arsenic	26.08	95% KM (Chebyshev) UCL	9.E-08	0.01
Chromium	17.56	Use 95% H-UCL	2.E-10	0.000001
Copper	2350	97.5% Chebyshev (Mean, Sd) UCL	NA	0.007
Lead	556.8	97.5% Chebyshev (Mean, Sd) UCL	NA	NA
Thallium	9.153	99% KM (Chebyshev) UCL	NA	0.02
		Total Cancer Risk =	**5.E-06**	
		Total Non-Cancer Hazard =		**8**

Notes:
EPC - exposure point concentration
Scenario assumes that the current slab has been removed and intrusive workers are exposed to constituents in surface and subsurface soils (including soils data previously considered sub-slab).
NA - Not Applicable.

Table 4-15

Mercury Marine Plant 2
Cedarburg, WI
Remedial Investigation Report

Summary of Cancer Risks and Non-Cancer Hazards - Groundwater

Future Construction Worker - Dermal Contact				
Groundwater COPCs	**EPC (mg/cm^3)**	**Rationale**	**Cancer Risk**	**Non-Cancer Hazard**
1,1,1-trichloroethane	0.0000192	95% KM (t) UCL	NA	0.00001
1,1-dichloroethene	0.00000191	95% KM (t) UCL	NA	0.000002
Trichloroethene	0.00000075	95% KM (t) UCL	6.E-10	0.0004
Tetrachloroethene	0.0000182	95% KM (BCA) UCL	7.E-08	0.0009
Total PCB	0.00000061	95% KM (Percentile Bootstrap) UCL	4.E-08	0.3
		Total Cancer Risk =	**1.E-07**	
		Total Non-Cancer Hazard =		**0.3**

Notes:

EPC - exposure point concentration.

According to USEPA (2004) RAGS Part E, dermal risks are not quantified for arsenic.

NA - Not Applicable.

APPENDIX G
Administrative Record Index

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
CEDAR CREEK SITE
CEDARBURG, OZAUKEE COUNTY, WISCONSIN

ORIGINAL
NOVEMBER 2, 2005

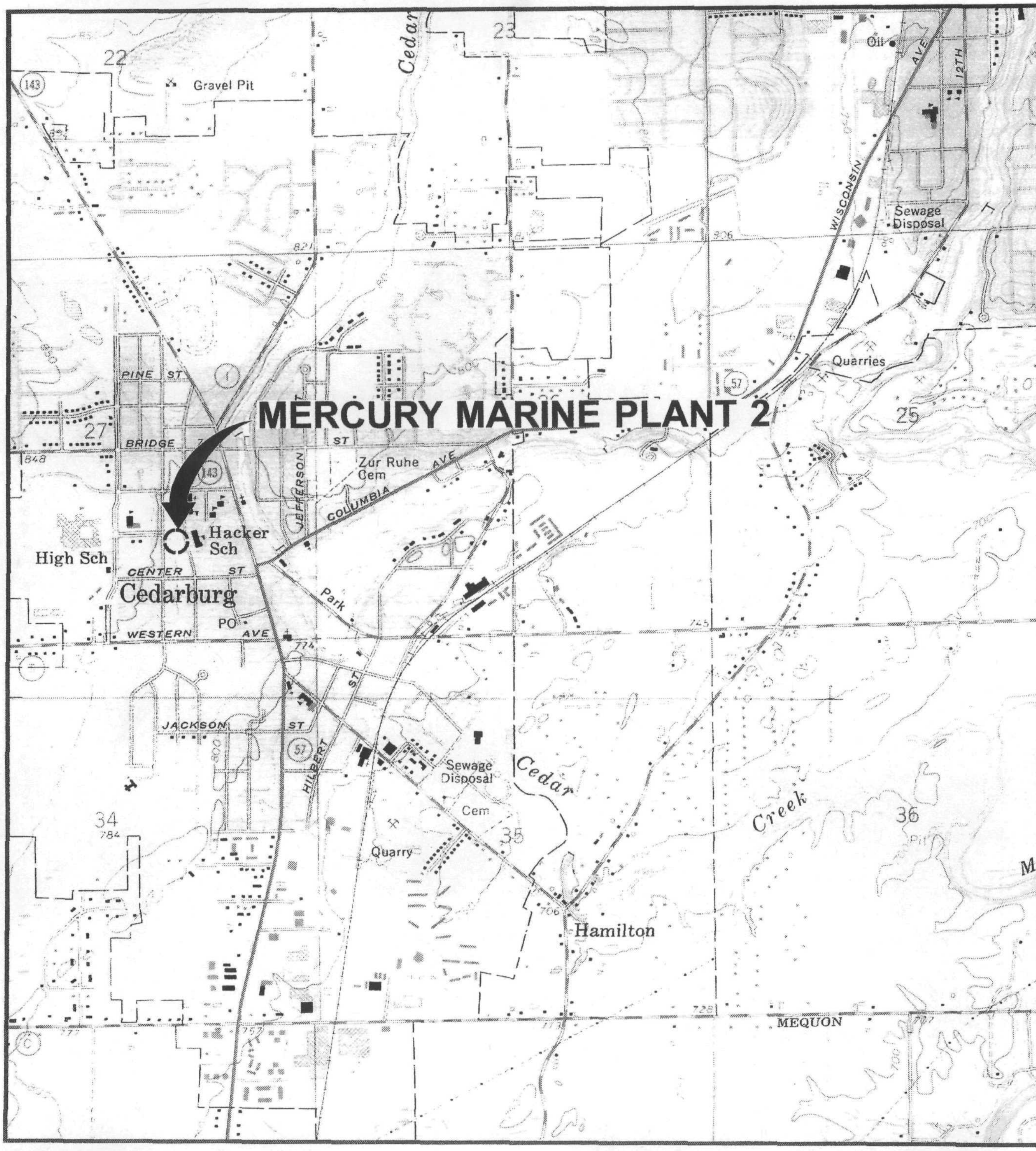
NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	07/00/02	Foth & Van Dyke	U.S. EPA	Health and Safety Plan for the Remedial Investigation for the Amcast Industrial Corporation Site	51
2	06/00/03	Foth & Van Dyke	U.S. EPA	Remedial Investigation Work Plan for the Amcast Industrial Corporation	548
3	09/00/03	Foth & Van Dyke	U.S. EPA	Final Field Sampling Plan for the Amcast Industrial Corporation	96
4	09/00/03	Foth & Van Dyke	U.S. EPA	QAPP for the Remedial Investigation for the Amcast Industrial Corporation	585
5	10/00/03	Foth & Van Dyke	U.S. EPA	Quality Management Plan for the Remedial Investigation for the Amcast Industrial Corporation Site	72

UPDATE #1
MARCH 25, 2008

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	01/29/98	Haase, A., Mercury Marine	Graefe, M., WDNR	Letter re: Status Report of Cleanup Activities at Plant 2	3
2	06/13/00	Baumgartner, T., Mercury Marine	Martig, T., U.S. EPA	Subsurface Investigations Documentation Report for Mercury Marine Plant 2	93
3	09/00/01	Blasland, Bouck & Lee, Inc.	U.S. EPA	Building Investigations Documentation Report for Mercury Marine Plant 2	53
4	09/27/02	U.S. EPA	Respondent	Administrative Order on Consent for Remedial Investigation/Feasibility Study	71
5	12/02/02	Brunette, M., WDNR	Hansen, S., U.S. EPA	Memorandum re: Documents for Administative Record w/ Attachments	82
6	07/00/03	Blasland, Bouck & Lee, Inc.	U.S. EPA	Remedial Investigation/ Feasibility Study Work Plan for the Cedar Creek Site	72

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
7	11/00/03	Blasland, Bouck & Lee, Inc.	U.S. EPA	Remedial Investigation/ Feasibility Study Field Sampling Plan for the Cedar Creek Site (REVISION TO SEPTEMBER 2003 REPORT)	328
8	01/00/05	Blasland, Bouck & Lee, Inc.	U.S. EPA	Preliminary Site Characterization Summary for the Cedar Creek Site (REVISION TO THE DECEMBER 2004 REPORT)	173
9	10/00/07	U.S. EPA	Public	Fact Sheet: EPA Proposes Cleanup Plan for Former Cedar Creek Plant 2 Site	8
10	10/00/07	Arcadis BBL	Mercury Marine	Alternatives Document/ Focused Feasibility Study Study Report for Mercury Marine Plant 2	64
11	10/00/07	Arcadis BBL	U.S. EPA	Remedial Investigation Report for Mercury Marine Plant 2	563
12	10/10/07	Brown & Jones, Reporting, Inc.	U.S. EPA	Transcript: U.S. EPA Public Hearing for the Proposed Cleanup Plan for the Cedar Creek Plant 2 Site	46
13	03/04/08	U.S. EPA	Mercury Marine	Administrative Settlement Agreement and Order on Consent for Remedial Investigations and Feasibility Studies for the Cedar Creek Site	67

FIGURES



REFERENCE: Base Map Source: USGS 7.5 Min. Topo. Quad., Cedarburg, Wis. (1959, Photorevised 1971 and 1976).

2,000' 0 2,000'

APPROX. SCALE 1" = 2,000'

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

SITE LOCATION MAP

ARCADIS BBL
infrastructure, environment, facilities

FIGURE
1-1

02/21/07 SYR-D85-DJH LJP KLS
17628006/17628n01.CDR

NOTES:

1. BASE MAP FROM J.E. ARTHUR AND ASSOCIATES, INC., MAP ENTITLED "PL. 2 MONITORING WELLS AND SOIL BORINGS", SHEET 1, DATED 2/13/97.

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

SURVEY MAP/SITE PLAN

ARCADIS BBL

FIGURE
2-1

SYR-85-GHS KLS LAF LAYER: ON=*, OFF=*REF*
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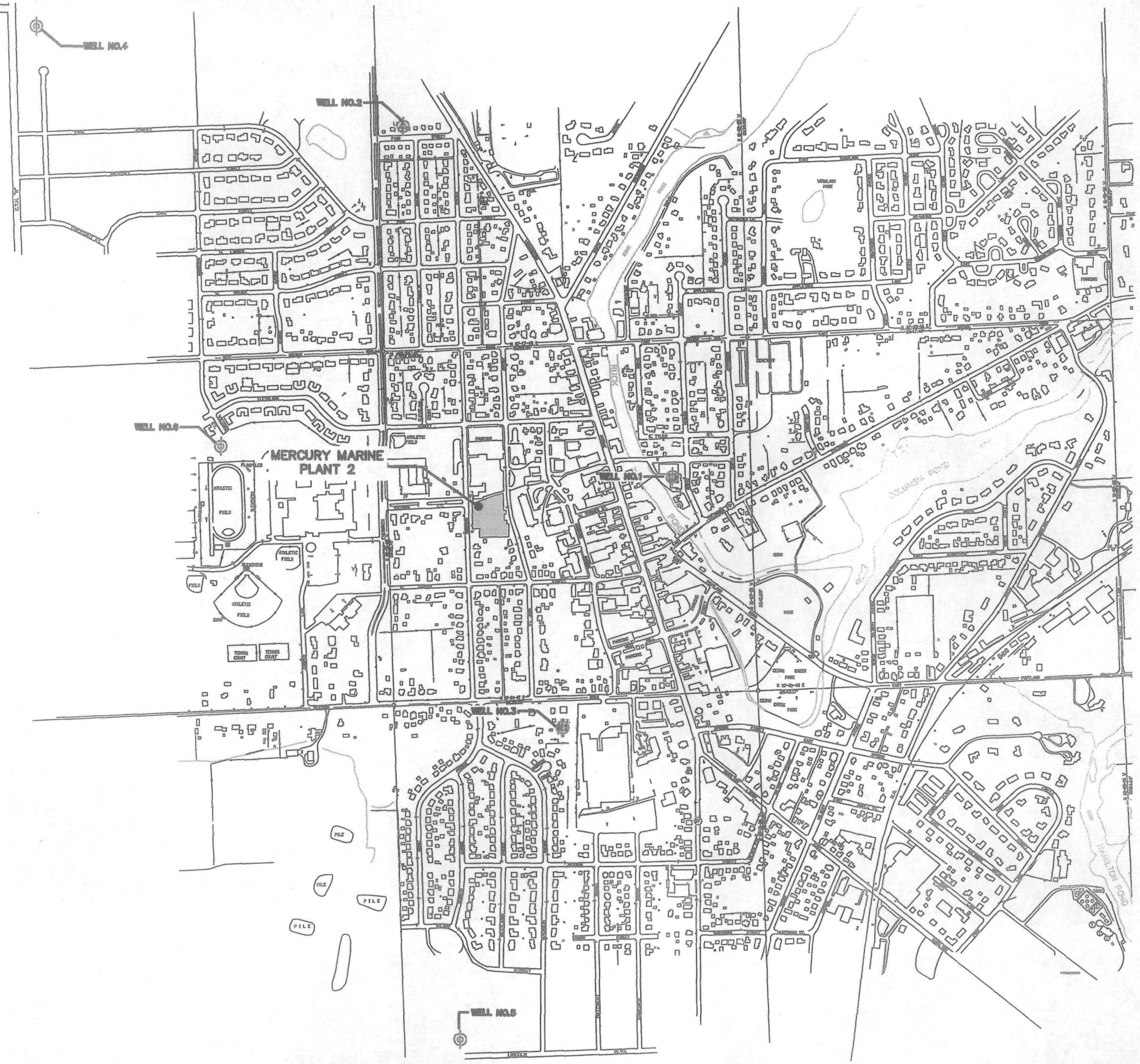
17628X02
17628X00



LEGEND

⊕ APPROXIMATE MUNICIPAL WELL LOCATION

NOTES:

1. BASE MAP–SECTION OF "TOPOGRAPHIC MAP OF SECTION 27, TOWNSHIP 10 NORTH, RANGE 21 EAST, OZAUKEE COUNTY, WISCONSIN," PREPARED BY AERO–METRIC ENGINEERING, INC., REVISED MAPPING MARCH 1987, AT A SCALE OF 1"=200'.
2. MUNICIPAL WELL LOCATIONS FROM STRAND ASSOCIATES, INC., 1990, FIGURE 2.04–2, ENTITLED "CITY WELL LOCATIONS", FOR WISCONSIN DNR, CEDARBURG GROUNDWATER INVESTIGATION.
3. THE LOCATIONS OF ALL FEATURES ARE APPROXIMATE ONLY, AND MAY NOT BE TO SCALE.

APPROXIMATE SCALE

800' 0 800' 1,600'

1"=800'

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

CITY OF CEDARBURG
MUNICIPAL WELL LOCATION MAP

ARCADIS BBL

FIGURE
3-8

9/22/05 SYR-85-RCB GHS JHR LAYER: ON=*, OFF=*REF*
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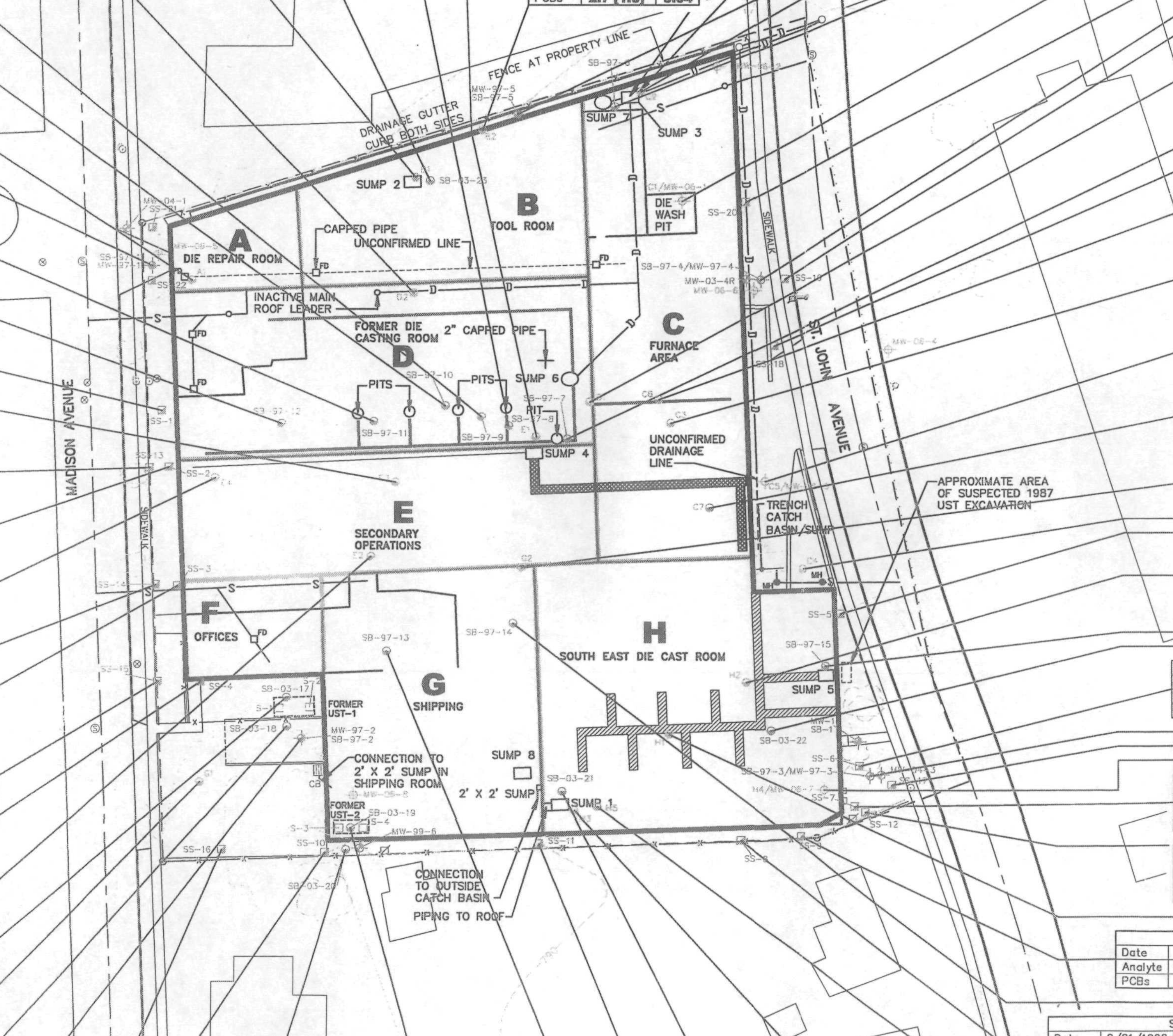


PTSBB1					
Date	10/3/2006				
Analyte	0-2'	2-4'	4-6'	6-8'	8-10'
PCBs	ND(0.065)	0.19	0.63	0.021	ND(0.056)

SB-97-8	
Date	3/26/1997
Analyte	6-8'
PCBs	15.8

SB-97-5	
Date	4/1/1997
Analyte	3-5'
PCBs	ND(0.0584)

PTSBC2		
Date	10/3/2006	
Analyte	4-6'	6-8'
PCBs	ND(0.059)	0.044

SB-97-6	
Date	3/27/1997
Analyte	0-2'
PCBs	4.85

PTSBC1		
Date	10/18/2006	
Analyte	4-6'	6-8'
PCBs	3.4	0.27

SS-20		
Date	10/15/2003	
Analyte	0-0.5'	0.5-1'
PCBs	5[6.1 J]	7

SB-97-9	
Date	3/26/1997
Analyte	9-11'
PCBs	1846.9 J

PTSBD2				
Date	10/9/2006			
Analyte	0.66-2'	4-6'	6-8'	8-8.75'
PCBs	ND(0.058)	4.4	12	2.8

SB-03-23	
Date	10/14/2003
Analyte	0-0.7'
PCBs	3.6 J

PTSBE1				
Date	10/16/2006			
Analyte	6.5-8.5'	8.5-10.5'	10.5-12.5'	12.5-14.5'
PCBs	3.3 [2.1]	0.35	0.026	0.3

SS-19	
Date	10/15/2003
Analyte	0-0.5'
PCBs	0.35

PTSBB2		
Date	10/3/2006	
Analyte	2-4'	6-8'
PCBs	2.7 [1.9]	0.04

SB-97-7		
Date	3/26/1997	
Analyte	0-2'	2-4'
PCBs	623 [406]	1156

SB-97-10		
Date	3/26/1997	
Analyte	2-4'	5-7'
PCBs	5399 J	0.781

PTSBA1	
Date	10/3/2006
Analyte	0-2'
PCBs	0.27

SB-97-1	
Date	3/17/1997
Analyte	0-2'
PCBs	0.857

SB-97-11	
Date	3/26/1997
Analyte	5-7'
PCBs	7854 J

SB-97-12	
Date	3/26/1997
Analyte	2-4'
PCBs	2.65

SS-1	
Date	9/22/1999
Analyte	0-1'
PCBs	0.2

PTSBE3			
Date	10/16/2006		
Analyte	0.66-2'	4-6'	6-6.5'
PCBs	ND (0.064)	ND(0.063)	0.033

SS-13		
Date	10/14/2003	
Analyte	0-0.5'	0.5-0.75'
PCBs	0.89	2

SS-2	
Date	9/21/1999
Analyte	0-1'
PCBs	5.6 D

PTSBE4			
Date	10/9/2006		
Analyte	0.5-2'	2-4'	4-4.75'
PCBs	0.56	8.6	9.3

SS-14		
Date	10/14/2003	
Analyte	0-0.5'	0.5-1'
PCBs	7	2.7

SS-3		
Date	9/21/1999	
Analyte	0-1'	1-2'
PCBs	2.3	2

SS-15		
Date	10/15/2003	
Analyte	0-0.5'	0.5'-0.91'
PCBs	2.7	1.1

SS-4		
Date	9/22/1999	
Analyte	0-1'	1-2'
PCBs	11 D	2.6

PTSBE2		
Date	10/16/2006	
Analyte	0.5-2'	2-2.75'
PCBs	ND (0.063)	0.044

SB-03-17	
Date	10/13/2003
Analyte	9.4-10.2'
PCBs	0.33

PTSBG1			
Date	10/19/2006		
Analyte	0-2'	2-4'	4-5'
PCBs	0.39	0.67	0.2

SB-97-2	
Date	3/18/1997
Analyte	9-11'
PCBs	ND(0.0536)

SB-03-20	
Date	10/13/2003
Analyte	0-1.5'
PCBs	0.78[2.5]

SB-03-19	
Date	10/14/2003
Analyte	13-14.2'
PCBs	ND(0.056)

SB-97-13	
Date	3/24/1997
Analyte	4-6'
PCBs	ND(0.0551)

SB-03-21	
Date	10/14/2003
Analyte	10.3-11.7'
PCBs	0.082

PTSBH5								
Date	3/8/2007							
Analyte	0-2'	2-4'	4-6'	6-8'	8-10'	10-12'	12-14'	14-16'
PCBs	ND(0.053)	1.1	0.062 [0.050 J]	ND(0.055)	ND(0.057)	ND(0.060)	0.017 J	ND(0.056) [ND(0.055)]

SB-03-18	
Date	10/13/2003
Analyte	10-12'
PCBs	0.084 J

SS-16	
Date	10/15/2003
Analyte	0-0.5'
PCBs	0.064

SS-10					
Date	8/3/2000	8/3/2000	8/3/2000	2002	2002
Analyte	0-1'	1-2'	2-3'	3-4'	4-5'
PCBs	3.5 D[5.6]	0.91	0.71	2	0.035

SS-11			
Date	8/3/2000		
Analyte	0-1'	1-2'	2-3'
PCBs	0.26	0.13	0.097

PTSBH3						
Date	10/19/2006					
Analyte	0.5-2'	2-4'	4-6'	6-8'	8-10'	10-10.5'
PCBs	0.35	210	2.8	71	1800	0.09

SS-8			
Date	9/21/1999	9/21/1999	9/20/2001
Analyte	0-1'	1-2'	2-3'
PCBs	17 D	4.3 D	ND(0.12)

SB-97-14	
Date	3/21/1997
Analyte	2-4'
PCBs	0.269 J

PTSBD1					
Date	10/8/2006				
Analyte	2-3'	3.5-6.5'	6.5-8'	8-10'	10-10.5'
PCBs	1.6	14	0.21	0.36	0.18

SB-97-4		
Date	3/19/1997	
Analyte	0-2'	2-4'
PCBs	7.47	0.471

SS-18	
Date	10/15/2003
Analyte	0-0.5'
PCBs	1.2

PTSBC6							
Date	3/8/2007						
Analyte	0-2'	2-4'	4-6'	6-8'	8-10'	10-12'	12-14'
PCBs	1.1	450	680	38	3.1	0.78	0.5

PTSBC3					
Date	10/8/2006				
Analyte	0.75-2.75'	2.75-4.75'	4.75-6.75'	6.75-8.75'	8.75-10.75'
PCBs	0.34	5.9	780	360	0.39

PTSBC5					
Date	10/10/2006				
Analyte	0.66-2'	2-4'	4-6'	6-8'	8-8.25'
PCBs	0.63	0.64	0.10	ND(0.055)	ND(0.056)

PTSBC7						
Date	3/8/2007					
Analyte	0-2'	4-6'	6-8'	8-10'	10-12'	12-12.5'
PCBs	0.087	0.13	ND(0.060)	0.055 J	0.018J	0.036

PTSBG2				
Date	10/16/2006			
Analyte	0.66-2'	2-4'	4-6'	16-18'
PCBs	ND(0.053)	0.056	ND(0.065)	ND(0.055)

PTSBC4				
Date	10/10/2006			
Analyte	0.33-2'	4-6'	6-8'	8-8.5'
PCBs	1.2	1.3	0.074	0.16

SS-5	
Date	9/22/1999
Analyte	0-1'
PCBs	0.089 [0.15]

PTSBH2					
Date	10/11/2006				
Analyte	0.33-2'	2-4'	4-6'	6-8'	8-9'
PCBs	2.3	0.4	1.4	ND(0.060)	ND(0.058)

SB-97-15			
Date	3/27/1997		
Analyte	0-2'	2-4'	6-8'
PCBs	1.42	1.13	1.896

SS-6		
Date	9/22/1999	
Analyte	0-1'	1-2'
PCBs	27.1 DJN	5.7 D

SB-03-22	
Date	10/14/2003
Analyte	8.6-10.1'
PCBs	5300 J

SB-97-3	
Date	3/20/1997
Analyte	6-8'
PCBs	0.2516

SS-17		
Date	10/14/2003	
Analyte	0-0.5'	0.5-1'
PCBs	13 J	2.1 J

SS-7		
Date	9/21/1999	
Analyte	0-1'	1-2'
PCBs	146 DJN	107 D

PTSBH4					
Date	10/10/2006				
Analyte	0.33-2'	2-4'	4-6'	6-8'	8-9'
PCBs	ND(0.052)	0.17	0.069	0.095	ND(0.058)

SS-12	
Date	12/1/2000
Analyte	0-1'
PCBs	ND(0.044)

PTSBH1							
Date	10/19/2006						
Analyte	0.5-2'	2-4'	4-6'	6-8'	8-10'	10-12'	12-14'
PCBs	56	0.075	860	760	560	140	680

SS-9				
Date	9/21/1999	9/21/1999	9/20/2001	9/20/2001
Analyte	0-1'	1-2'	2-3'	3-4'
PCBs	18 D	5.3 D	0.53	0.096

LEGEND:

- A — AREA DESIGNATION
- PARCEL BOUNDARY
- IRON PIPE FOUND
- GAS VALVE
- WATER VALVE
- SANITARY MANHOLE
- STORM MANHOLE
- POWER POLE
- HYDRANT
- CB — CATCH BASIN
- CO — CLEAN OUT
- FD — FLOOR DRAIN
- MH — MANHOLE
- UNCONFIRMED DRAINAGE LINE
- TRENCH FILLED WITH CONCRETE
- TRENCH COVERED WITH METAL SHEETING
- COVERED PIPE
- S — SANITARY SEWER
- D — STORM SEWER
- PRE-2006 SOIL BORING
- PRE-2006 MONITORING WELL
- PRE-2006 SURFACE SOIL SAMPLE
- PRE-2006 UNDERGROUND STORAGE TANK SAMPLE LOCATION
- 2006 SOIL BORING
- 2006 MONITORING WELL
- 2007 SOIL BORING

DATA QUALIFIERS:

- ND(2.1) = ANALYTE NOT DETECTED. VALUE IN PARENTHESES IS DETECTION LIMIT.
- NA = ANALYTE NOT ANALYZED.
- [ ] = DUPLICATE SAMPLE RESULT.
- D = CONCENTRATION IS BASED ON DILUTED SAMPLE ANALYSIS.
- J = THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.
- N = THE ANALYSIS INDICATES THE PRESENCE OF A COMPOUND FOR WHICH THERE IS PRESUMPTIVE EVIDENCE TO MAKE A TENTATIVE IDENTIFICATION.

NOTES:

1. ALL CONCENTRATIONS IN mg/kg.
2. BASE MAP FROM J.E. ARTHUR AND ASSOCIATES, INC., MAP ENTITLED "PL. 2 MONITORING WELLS AND SOIL BORINGS", SHEET 1, DATED 2/13/97.
3. THE LOCATIONS OF FEATURES SUCH AS SUMPS, TRENCHES, DRAINS, AND PIPING ARE APPROXIMATE ONLY. THESE FEATURES ARE NOT TO SCALE.
4. LABORATORY QA/QC INFORMATION REVIEWED BY BLASLAND, BOUCK, & LEE, INC/ARCADIS OF NEW YORK, INC. (EXCEPT FOR SS-8 (2-3'), SS-9 (2-3' AND 3-4'), AND SS-10 THROUGH SS-12).
5. BOLDED VALUES REPRESENT EXCEEDANCES OF THE WISCONSIN NON-INDUSTRIAL RESIDUAL CONTAMINANT LEVELS (RCLs).

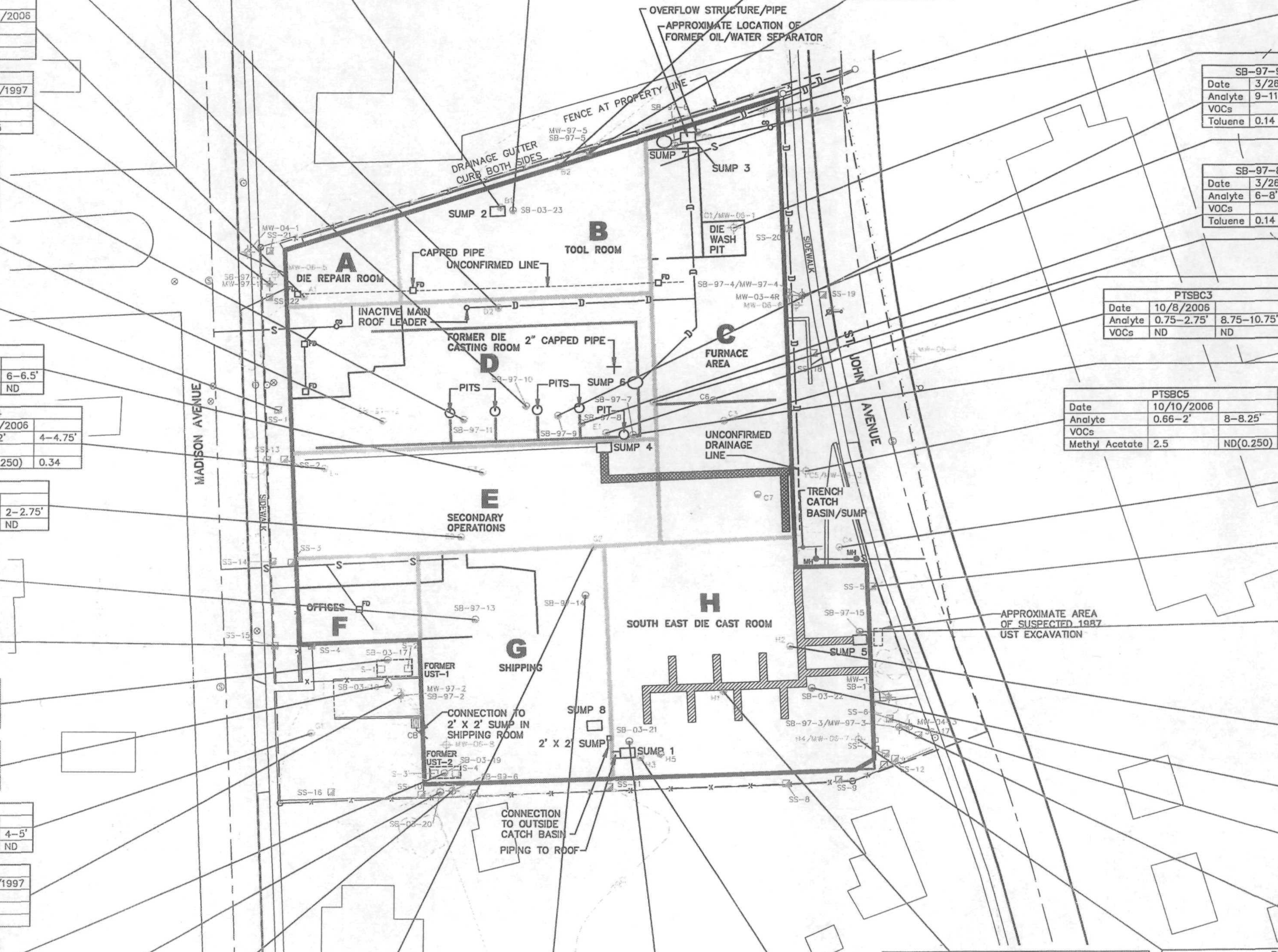
0 30' 60'
GRAPHIC SCALE

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

SOIL SAMPLE LOCATIONS AND SUMMARY OF PCB DETECTIONS

ARCADIS BBL

FIGURE
3-10A



SB-97-10	
Date	3/26/1997
Analyte	5-7'
VOCs	
Toluene	0.17

PTSBD2		
Date	10/9/2006	
Analyte	0.66-2'	8-8.75'
VOCs	ND	ND

PTSBB1		
Date	10/3/2006	
Analyte	2-4'	8-10'
VOCs		
Methyl Acetate	0.98	ND(0.250)
Tetrachloroethene	0.049	ND(0.025)

SB-03-23	
Date	10/14/2003
Analyte	0-0.7'
VOCs	
Tetrachloroethene	0.43 J

PTSBB2		
Date	10/3/2006	
Analyte	2-4'	6-8'
VOCs		
Acetone	0.16 J [ND(0.250)]	0.13 J
Methyl Acetate	1.4 [1.2]	ND(0.250)
Tetrachloroethene	0.65 [0.84]	0.045
Toluene	0.048 [0.059]	ND(0.025)

SB-97-5	
Date	4/1/1997
Analyte	3-5'
VOCs	ND

PTSBC2				
Date	10/3/2006			
Analyte	0-2'	2-4'	4-6'	6-8'
VOCs				
1,1,1-Trichloroethane	0.041 J	0.039	ND(0.025)	ND(0.025)
Methyl Acetate	0.24 J	0.110 J	ND(0.250)	0.67
Tetrachloroethene	0.08 J	0.083	ND(0.025)	ND(0.025)
Trichloroethene	**0.2 J**	**0.42**	ND(0.025)	ND(0.025)

PTSBA1	
Date	10/3/2006
Analyte	0-2'
VOCs	
Methyl Acetate	1

SB-97-1	
Date	3/17/1997
Analyte	0-2'
VOCs	
Chloromethane	0.095

SB-97-11	
Date	3/26/1997
Analyte	5-7'
VOCs	
Toluene	0.098

SB-97-12	
Date	3/26/1997
Analyte	2-4'
VOCs	R

SS-1	
Date	9/22/1999
Analyte	0-1'
VOCs	ND

PTSBE3		
Date	10/16/2006	
Analyte	0.66-2'	6-6.5'
VOCs	ND	ND

PTSBE4		
Date	10/9/2006	
Analyte	0.5-2'	4-4.75'
VOCs		
Methyl Acetate	ND(0.250)	0.34

PTSBE2		
Date	10/16/2006	
Analyte	0.5-2'	2-2.75'
VOCs	ND	ND

SB-97-13	
Date	3/24/1997
Analyte	4-6'
VOCs	
Toluene	0.23

SS-4	
Date	9/22/1999
Analyte	0-1'
VOCs	ND

SB-03-17	
Date	10/13/2003
Analyte	9.4-10.2'
VOCs	ND

SB-03-18	
Date	10/13/2003
Analyte	10-12'
VOCs	ND

PTSBG1		
Date	10/19/2006	
Analyte	0-2'	4-5'
VOCs	ND	ND

SB-97-2	
Date	3/18/1997
Analyte	9-11'
VOCs	
Chloromethane	0.067

SB-03-19	
Date	10/14/2003
Analyte	13-14.2'
VOCs	ND

SB-03-20	
Date	10/13/2003
Analyte	0-1.5'
VOCs	ND[ND]

SB-99-6	
Date	5/20/1999
Analyte	10.0-10.1'
VOCs	
Sec-Butylbenzene	0.44 DM

PTSBG2		
Date	10/16/2006	
Analyte	2-4'	16-18'
VOCs		
Methyl Acetate	0.096 J	ND(0.250)

SB-97-14	
Date	3/21/1997
Analyte	2-4'
VOCs	
Chloromethane	0.049
Bromomethane	0.076
Acetone	0.16 J
Toluene	0.056
p/m-Xylene	0.13
o-Xylene	0.12

SB-03-21	
Date	10/14/2003
Analyte	10.3-11.7'
VOCs	ND

PTSBH3		
Date	10/19/2006	
Analyte	4-6'	10-10.5'
VOCs	ND	ND

PTSBH1		
Date	10/19/2006	
Analyte	4-6'	12-14'
VOCs		
cis-1,2-Dichloroethene	0.54	ND(0.025)
Ethylbenzene	0.079	ND(0.025)
Isopropylbenzene	0.43	ND(0.025)
Methyl Acetate	0.25 J	ND(0.250)
Tetrachloroethene	0.079	ND(0.025)
trans-1,2-Dichloroethene	0.14	ND(0.025)
Xylene, m + p	0.54	ND(0.050)
Xylene, o	0.46	ND(0.025)

PTSBH4		
Date	10/10/2006	
Analyte	2-4'	8-9'
VOCs		
1,2,4-Trimethylbenzene	0.033	ND(0.025)
1,2-Dichlorobenzene	0.11	ND(0.025)
1,3-Dichlorobenzene	0.03	ND(0.025)
Methyl Acetate	0.18 J	ND(0.250)

SB-97-6	
Date	3/27/1997
Analyte	0-2'
VOCs	
Carbon disulfide	0.032 J
Toluene	0.043

PTSBC1		
Date	10/18/2006	
Analyte	4-6'	6-8'
VOCs		
Methyl Acetate	0.6	40

SB-97-9	
Date	3/26/1997
Analyte	9-11'
VOCs	
Toluene	0.14

SB-97-4		
Date	3/19/1997	
Analyte	0-2'	2-4'
VOCs		
Chloromethane	0.048	ND(0.025)
Toluene	0.73	ND(0.025)

SB-97-8	
Date	3/26/1997
Analyte	6-8'
VOCs	
Toluene	0.14

PTSBD1		
Date	10/8/2006	
Analyte	6.5-8'	10-10.5'
VOCs	ND	ND

PTSBE1		
Date	10/16/2006	
Analyte	6.5-8.5'	12.5-14.5'
VOCs		
Methyl Acetate	0.19 J [0.21 J]	ND(0.250)

PTSBC3		
Date	10/8/2006	
Analyte	0.75-2.75'	8.75-10.75'
VOCs	ND	ND

SB-97-7		
Date	3/26/1997	
Analyte	0-2'	2-4'
VOCs		
Acetone	0.16 JN [ND(0.13)]	ND(1.3) J
Toluene	1.4 JN [ND(0.025)]	ND(0.25)

PTSBC5		
Date	10/10/2006	
Analyte	0.66-2'	8-8.25'
VOCs		
Methyl Acetate	2.5	ND(0.250)

PTSBC4		
Date	10/10/2006	
Analyte	4-6'	8-8.5'
VOCs		
Methyl Acetate	0.67	ND(0.250)
Methycyclohexane	0.044	ND(0.025)
Tetrachloroethene	0.042	ND(0.025)

SS-5	
Date	9/22/1999
Analyte	0-1'
VOCs	ND [ND]

SB-97-15		
Date	3/27/1997	
Analyte	0-2'	2-4'
VOCs		
Trichloroethene	**0.077**	ND(0.025)
Tetrachloroethene	0.19	ND(0.025)
Toluene	ND(0.025)	0.051

PTSBH2		
Date	10/11/2006	
Analyte	2-4'	8-9'
VOCs		
Methycyclohexane	0.032	ND(0.025)
Toluene	0.032	ND(0.025)
Xylene, o	0.04	ND(0.025)

SB-03-22	
Date	10/14/2003
Analyte	8.6-10.1'
VOCs	
Isopropylbenzene	0.970
1,2,3-Trichloropropane	0.083
Xylenes, m+p	0.980

SS-6	
Date	9/22/1999
Analyte	0-1'
VOCs	ND

SB-97-3	
Date	3/20/1997
Analyte	6-8'
VOCs	
Toluene	0.87

LEGEND:

- A — AREA DESIGNATION
- PARCEL BOUNDARY
- IRON PIPE FOUND
- GAS VALVE
- WATER VALVE
- SANITARY MANHOLE
- STORM MANHOLE
- POWER POLE
- HYDRANT
- CB — CATCH BASIN
- CO — CLEAN OUT
- FD — FLOOR DRAIN
- MH — MANHOLE
- UNCONFIRMED DRAINAGE LINE
- TRENCH FILLED WITH CONCRETE
- TRENCH COVERED WITH METAL SHEETING
- COVERED PIPE
- S — SANITARY SEWER
- D — STORM SEWER
- PRE-2006 SOIL BORING
- PRE-2006 MONITORING WELL
- PRE-2006 SURFACE SOIL SAMPLE
- PRE-2006 UNDERGROUND STORAGE TANK SAMPLE LOCATION
- 2006 SOIL BORING
- 2006 MONITORING WELL
- 2007 SOIL BORING

DATA QUALIFIERS:

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- [ ] = DUPLICATE SAMPLE RESULT.
- D = CONCENTRATION IS BASED ON DILUTED SAMPLE ANALYSIS.
- J = THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.
- M = MATRIX INTERFERENCE.
- N = THE ANALYSIS INDICATES THE PRESENCE OF A COMPOUND FOR WHICH THERE IS PRESUMPTIVE EVIDENCE TO MAKE A TENTATIVE IDENTIFICATION.
- R = THE SAMPLE RESULTS WERE REJECTED BASED ON QA/QC REVIEW OF DATA.

NOTES:

1. ALL CONCENTRATIONS IN mg/kg.
2. BASE MAP FROM J.E. ARTHUR AND ASSOCIATES, INC., MAP ENTITLED "PL. 2 MONITORING WELLS AND SOIL BORINGS", SHEET 1, DATED 2/13/97.
3. THE LOCATIONS OF FEATURES SUCH AS SUMPS, TRENCHES, DRAINS, AND PIPING ARE APPROXIMATE ONLY. THESE FEATURES ARE NOT TO SCALE.
4. LABORATORY QA/QC INFORMATION REVIEWED BY BLASLAND, BOUCK, & LEE, INC/ARCADIS OF NEW YORK, INC. (EXCEPT FOR MW-99-6).
5. BOLDED VALUES REPRESENT EXCEEDANCES OF THE WISCONSIN NON-INDUSTRIAL RESIDUAL CONTAMINANT LEVELS (RCLs).

0 30' 60'
GRAPHIC SCALE

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

SOIL SAMPLE LOCATIONS AND SUMMARY OF VOC DETECTIONS

ARCADIS BBL

FIGURE
3-10B

LAYER: ON=*, OFF=*REF*, [RDNAME] PAGESETUP: DL2BL-PDF PENTABLE: PLTFULL.CTB PRINTED: 8/13/2007 9:12 AM BY: BPITTSLEY
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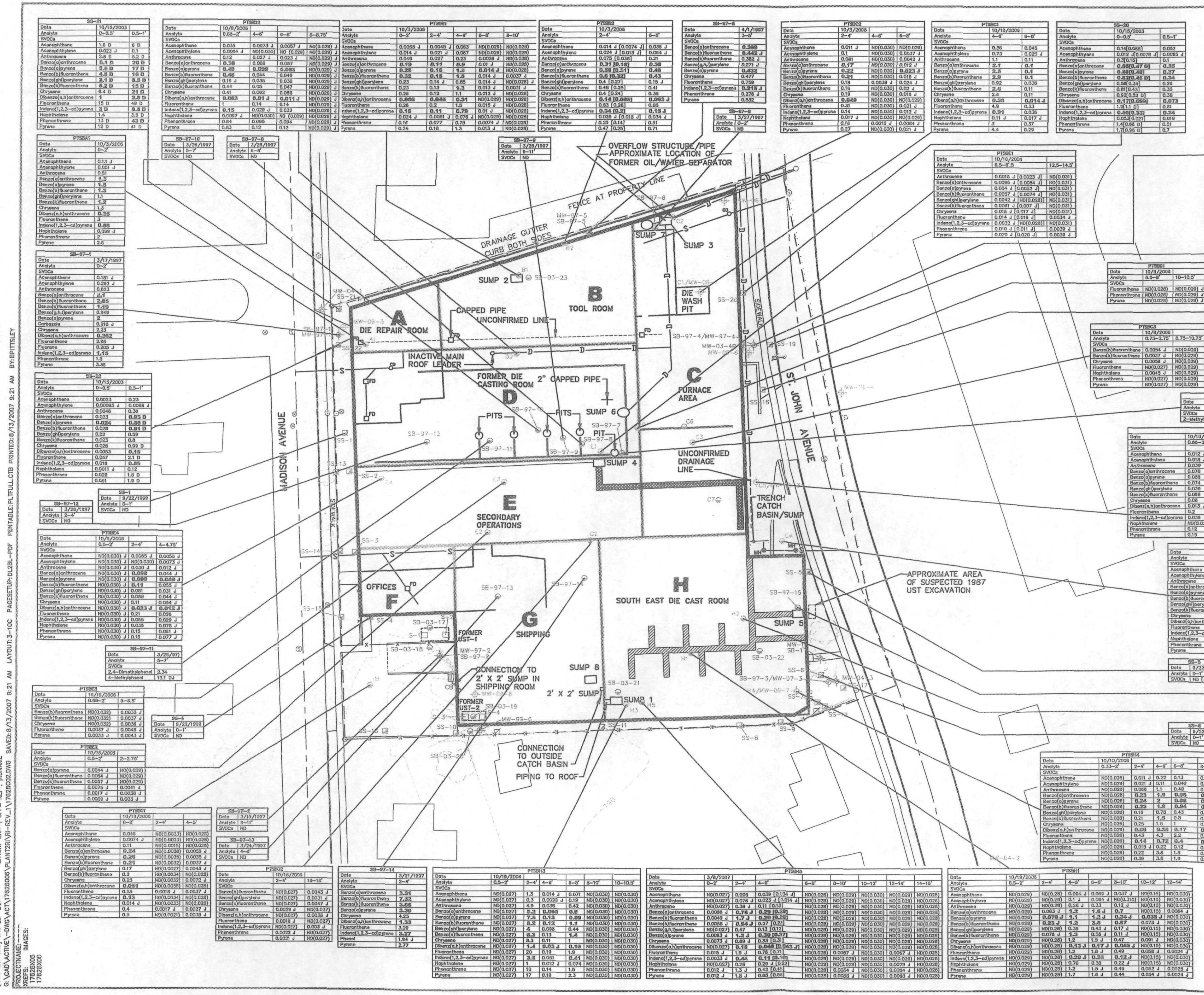

LEGEND:

- A — AREA DESIGNATION
- PARCEL BOUNDARY
- IRON PIPE FOUND
- GAS VALVE
- WATER VALVE
- SANITARY MANHOLE
- STORM MANHOLE
- POWER POLE
- HYDRANT
- CB — CATCH BASIN
- CO — CLEAN OUT
- FD — FLOOR DRAIN
- MH — MANHOLE
- UNCONFIRMED DRAINAGE LINE
- TRENCH FILLED WITH CONCRETE
- TRENCH COVERED WITH METAL SHEETING
- COVERED PIPE
- S — SANITARY SEWER
- D — STORM SEWER
- PRE-2006 SOIL BORING
- PRE-2006 MONITORING WELL
- PRE-2006 SURFACE SOIL SAMPLE
- PRE-2006 UNDERGROUND STORAGE TANK SAMPLE LOCATION
- 2006 SOIL BORING
- 2006 MONITORING WELL
- 2007 SOIL BORING

DATA QUALIFIERS:

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- NA = ANALYTE NOT ANALYZED.
- [ ] = DUPLICATE SAMPLE RESULT.
- D = CONCENTRATION IS BASED ON DILUTED SAMPLE ANALYSIS.
- J = THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

NOTES:

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3. THE LOCATIONS OF FEATURES SUCH AS SUMPS, TRENCHES, DRAINS, AND PIPING ARE APPROXIMATE ONLY. THESE FEATURES ARE NOT TO SCALE.
4. LABORATORY QA/QC INFORMATION REVIEWED BY BLASLAND, BOUCK, & LEE, INC./ARCADIS OF NEW YORK INC.
5. BOLDED VALUES REPRESENT EXCEEDANCES OF THE WISCONSIN NON-INDUSTRIAL RESIDUAL CONTAMINANT LEVELS (RCLS).

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

SOIL SAMPLE LOCATIONS AND SUMMARY OF SVOC DETECTIONS

ARCADIS BBL

FIGURE **3-10C**

[SYR-85-GHS] GHS LJP BGP LAYER: ON=*, OFF=*REF*, |RDNAME
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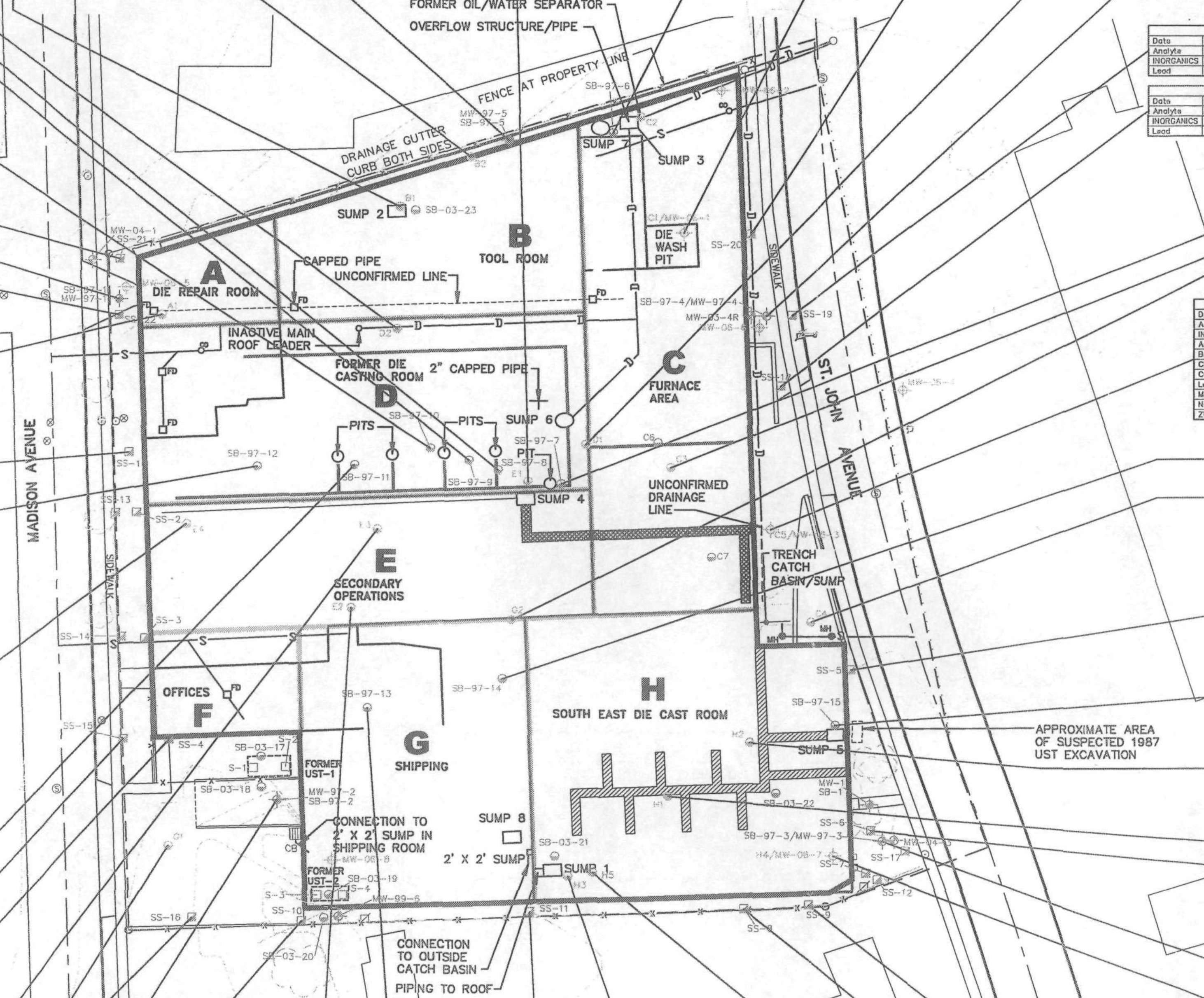


SB-97-8	
Date	3/26/1997
Analyte	6-8'
INORGANICS	
Arsenic	0.88
Barium	13.5
Chromium	6.3
Cobalt	1.1
Copper	7.4
Lead	4.3 J
Mercury	0.01 B
Nickel	4.7
Vanadium	18.5
Zinc	17.4

PTSBB2				
Date	10/3/2006			
Analyte	0.65-2'	4-6'	6-8'	8-8.75'
INORGANICS				
Arsenic	1.5 J	3.1	1.7 B	1.5 J
Barium	45 J	NA	NA	31 J
Cadmium	ND(0.58) J	NA	NA	0.11 J
Chromium	18	20	14	11
Copper	9.9 J	15	12	11 J
Lead	8.8 J	9.4	7.2	6 J
Mercury	0.024	NA	NA	0.033
Nickel	11 J	NA	NA	7.8 J
Zinc	31 J	NA	NA	24 J

PTSBB1	
Date	10/3/2006
Analyte	2-4'
INORGANICS	
Arsenic	4.5 J
Barium	42 J
Cadmium	0.22 J
Chromium	13
Copper	80 J
Lead	36 J
Mercury	0.025
Nickel	13
Zinc	80 J

PTSBD2		
Date	10/3/2006	
Analyte	2-4'	6-8'
INORGANICS		
Arsenic	17 J [22 J]	2.1 J
Barium	180 J [110 J]	30 J
Cadmium	2.8 J [0.73 J]	0.18 J
Chromium	18 [16]	7.9
Copper	24000 J [3200 J]	18 J
Lead	5800 J [3300 J]	12 J
Mercury	0.48 [0.4]	0.02
Nickel	20 J [12 J]	7.9 J
Silver	2.6 [ND(1.2)]	ND(1.1)
Zinc	2000 J [250 J]	29 J

SB-97-5	
Date	4/1/1997
Analyte	3-5'
INORGANICS	
Arsenic	2.68
Barium	65.3
Beryllium	0.40 B
Cadmium	0.33 B
Chromium	15.4
Cobalt	5.49
Copper	49.1
Lead	58.2
Mercury	0.12 B
Nickel	12.1
Silver	0.48
Thallium	0.13 B
Vanadium	26.3
Zinc	88.6

PTSBE1		
Date	10/18/2006	
Analyte	6.5-8.5'	12.5-14.5'
INORGANICS		
Arsenic	1.3 [1.3]	2.9
Barium	12 [13]	29
Cadmium	0.09 B [0.063 B]	0.12 B
Chromium	7.1 J [8.9 J]	5.7 J
Copper	8.4 [7.9]	16
Lead	2.7 [2.4]	3
Mercury	ND(0.011) [ND(0.011)]	0.0048 B
Nickel	4.3 J [4.2 J]	23 J
Zinc	15 J [14 J]	25 J

SB-97-6	
Date	3/27/1997
Analyte	0-2'
INORGANICS	
Arsenic	2.8
Barium	10.1
Cadmium	0.30 B
Chromium	4.7
Cobalt	2.9
Copper	20.3
Lead	8.6
Mercury	0.03 B
Nickel	8.14
Silver	0.65
Thallium	0.2 B
Vanadium	10.4
Zinc	58.2

PTSBC1		
Date	10/18/2006	
Analyte	4-6'	6-8'
INORGANICS		
Arsenic	59	3.1
Barium	150	23
Cadmium	1.1	0.15 B
Chromium	28	11
Copper	130	13
Lead	62	3.6
Mercury	0.42 J	0.024 J
Nickel	19	8.4
Zinc	250	24

SS-20		
Date	10/15/2003	
Analyte	0-0.5'	0.5-1'
INORGANICS		
Lead	20[20]	15

PTSBD1				
Date	10/6/2006			
Analyte	2-3'	3.5-6.5'	6.5-8'	10-10.5'
INORGANICS				
Arsenic	1.5 J	1.9 J	1.1 J	ND(2.3) J
Barium	31 J	38 J	11 J	14 J
Cadmium	0.12 J	0.13 J	0.05 J	ND(0.58) J
Chromium	12	33	6.3	5.7
Copper	28 J	30 J	8 J	7 J
Lead	5.4 J	12 J	1.8 J	2.4 J
Mercury	0.0053 B	0.009 B	0.0023 B	0.007 B
Nickel	11 J	8.6 J	5.5 J	5.7 J
Zinc	30 J	40 J	18 J	20 J

SB-97-4		
Date	3/19/1997	
Analyte	0-2'	2-4'
INORGANICS		
Antimony	2.2 J	1.4 J
Arsenic	69.1	307
Barium	83.9	133
Beryllium	0.27 B	0.74
Cadmium	0.98	0.75
Chromium	9.8	28.8
Cobalt	3.5	11.2
Copper	184	36.5
Lead	295	28
Mercury	0.08 B	0.09 B
Nickel	10.6	19.8
Selenium	59.7	39.4
Silver	1	0.39
Thallium	0.16 B	0.27 B
Vanadium	15.1	62.2
Zinc	211	95.4

SB-97-9	
Date	3/26/1997
Analyte	9-11'
INORGANICS	
Arsenic	0.78
Barium	22.3
Chromium	7.8
Cobalt	1.8
Copper	12.8
Lead	3.1 J
Nickel	8.7
Thallium	0.13 B
Vanadium	19.2
Zinc	29.4

SB-97-10	
Date	3/26/1997
Analyte	5-7'
INORGANICS	
Arsenic	1
Barium	11.3
Chromium	6.4
Cobalt	0.84 B
Copper	6.3
Lead	2.2 J
Mercury	0.02 B
Nickel	4.2
Vanadium	14.8
Zinc	15.5

SB-97-1	
Date	3/17/1997
Analyte	0-2'
INORGANICS	
Arsenic	4
Barium	66.3
Beryllium	0.46 B
Cadmium	0.64
Chromium	210
Cobalt	5.8
Copper	76.1
Lead	64.1
Mercury	0.05 B
Nickel	23.1
Selenium	32.3
Silver	1
Thallium	0.40 B
Vanadium	49.7
Zinc	127
Cyanide	1.2

SS-21		
Date	10/15/2003	
Analyte	0-0.5'	0.5-1'
INORGANICS		
Chromium	19	NA
Lead	20 EJ	NA

SS-22		
Date	10/15/2003	
Analyte	0-0.5'	0.5-1'
INORGANICS		
Chromium	20	NA
Lead	13	NA

PTSBA1	
Date	10/3/2006
Analyte	0-2'
INORGANICS	
Arsenic	1.6 B
Barium	24
Cadmium	0.24 B
Chromium	5.3
Copper	24 J
Lead	66 J
Mercury	0.019
Nickel	3.6
Zinc	28 J

SS-1	
Date	9/22/1999
Analyte	0-1'
INORGANICS	
Barium	31
Chromium	10
Cobalt	3.9
Copper	20
Lead	8.7
Nickel	8.6
Thallium	7.7 JM
Vanadium	15
Zinc	48

SB-97-12	
Date	3/26/1997
Analyte	2-4'
INORGANICS	
Arsenic	3.3
Barium	47.5
Cadmium	0.36 B
Chromium	14.4
Cobalt	2.5
Copper	14.4
Lead	9.3 J
Mercury	0.06 B
Nickel	11.9
Thallium	0.26 B
Vanadium	32.6
Zinc	31.8

PTSBE4			
Date	10/9/2006		
Analyte	0.5-2'	2-4'	4-4.75'
INORGANICS			
Arsenic	6.7 J	8.2	5.5 J
Barium	91 J	NA	74 J
Cadmium	0.11 J	NA	0.11 J
Chromium	28	27 J	28
Copper	23 J	32 J	20 J
Lead	12 J	23 J	23 J
Mercury	0.043	NA	0.044
Nickel	26 J	NA	20 J
Zinc	72 J	NA	62 J

SB-97-11	
Date	3/26/1997
Analyte	5-7'
INORGANICS	
Arsenic	2.9
Barium	10.3
Chromium	4.8
Cobalt	1
Copper	8.5
Lead	1.9 J
Mercury	0.02 B
Nickel	5.1
Thallium	0.12 B
Vanadium	12.2
Zinc	13.8

SS-15		
Date	10/15/2003	
Analyte	0-0.5'	0.5'-0.91'
INORGANICS		
Lead	49	36

SS-4		
Date	9/22/1999	
Analyte	0-1'	1-2'
INORGANICS		
Antimony	2.4 JM	NA
Barium	41	NA
Cadmium	2.6	NA
Chromium	17	NA
Cobalt	3.3	NA
Copper	63	NA
Lead	390	NA
Mercury	0.83 D	NA
Nickel	8.6	NA
Thallium	5.5 JM	NA
Vanadium	12	NA
Zinc	730	NA

PTSBE3				
Date	10/18/2006			
Analyte	0.66-2'	2-4'	4-6'	6-6.5'
INORGANICS				
Arsenic	2.6	4.3 J	2.6 J	1.4
Barium	45	NA	NA	30
Cadmium	0.12 B	NA	NA	0.088 B
Chromium	15 J	23 J	12 J	11 J
Copper	14	20 J	11 J	8
Lead	10	15 J	7.3 J	5.5
Mercury	0.055	NA	NA	0.053
Nickel	10 J	NA	NA	6.7 J
Zinc	38 J	NA	NA	21 J

PTSBG1		
Date	10/19/2006	
Analyte	0-2'	4-5'
INORGANICS		
Arsenic	4.5	1.9 B
Barium	71	23
Cadmium	0.23 B	0.15 B
Chromium	13	7.6
Copper	13	11
Lead	19	5.2
Mercury	0.042 J	0.013 J
Nickel	9.8	9.5
Zinc	47	24

SS-18	
Date	10/15/2003
Analyte	0-0.5'
INORGANICS	
Lead	7.7

SS-10					
Date	8/3/2000	8/3/2000	8/3/2000	2002	2002
Analyte	0-1'	1-2'	2-3'	3-4'	4-5'
INORGANICS					
Lead	57[66]	32	NA	22	4.8

SB-97-2	
Date	3/18/1997
Analyte	9-11'
INORGANICS	
Arsenic	10.3
Barium	11.4
Chromium	3.2
Cobalt	3.2
Copper	9.1
Lead	4.8
Mercury	0.02 B
Nickel	6.6
Selenium	25.5
Silver	0.79
Vanadium	7.7
Zinc	25.8

PTSBE2		
Date	10/16/2006	
Analyte	0.5-2'	2-2.75'
INORGANICS		
Arsenic	3.7	2.5
Barium	63	62
Cadmium	0.089 B	0.068 B
Chromium	19 J	22 J
Copper	14	14
Lead	13	8.3
Mercury	0.038	0.04
Nickel	13 J	13 J
Zinc	43 J	36 J

SB-97-13	
Date	3/24/1997
Analyte	4-6'
INORGANICS	
Arsenic	2.7
Barium	42.1
Cadmium	0.74
Chromium	15
Cobalt	4.6
Copper	80.4
Lead	42.4 J
Nickel	16.1
Selenium	1.3
Thallium	0.17 B
Vanadium	44.7
Zinc	97.7

SS-11			
Date	8/3/2000		
Analyte	0-1'	1-2'	2-3'
INORGANICS			
Lead	170	66	21

PTSBH3					
Date	10/19/2006				
Analyte	0.5-2'	2-4'	4-6'	6-8'	10-10.5'
INORGANICS					
Arsenic	ND(2.2) J	8.9 J	3.5	2.4 J	1.1 B
Barium	NA	NA	80	NA	27
Cadmium	NA	NA	0.27 B	NA	0.13 B
Chromium	5.5 J	16 J	29	9.4 J	8.5
Copper	2.6 J	260 J	13	28 J	11
Lead	1.8 J	140 J	11	32 J	3.8
Mercury	NA	NA	0.042 J	NA	ND(0.012) J
Nickel	NA	NA	17	NA	8.7
Zinc	NA	NA	60	NA	26

PTSBH5													
Date	3/8/2007												
Analyte	0-2'	2-4'	4-6'	6-8'	6-8'	8-10'	8-10'	10-12'	10-12'	12-14'	12-14'	14-16'	14-16'
INORGANICS													
Arsenic	ND(2.10)	1.40 B	8.80 [10.0]	ND(2.20)	ND(2.20)	1.90 B	1.90 B	ND(2.40)	ND(2.40)	1.30 B	1.30 B	1.40 B	1.40 B
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	5.50	5.50	19.0 [19.0]	7.00	7.00	8.20	8.20	5.80	5.80	6.40	6.40	8.90	8.90
Copper	4.50	53.0	58.0 [72.0]	5.80	5.80	13.0	13.0	6.60	6.60	8.70	8.70	18.0	18.0
Lead	2.40	68.0	120 J [160]	2.40	2.40	3.60	3.60	1.70	1.70	2.50	2.50	4.80	4.80
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

SS-9				
Date	9/21/1999	9/21/1999	9/20/2001	9/20/2001
Analyte	0-1'	1-2'	2-3'	3-4'
INORGANICS				
Lead	510 D	220 D	31 D	19 D

SS-8			
Date	9/21/1999	9/21/1999	9/20/2001
Analyte	0-1'	1-2'	2-3'
INORGANICS			
Lead	430 D	83 D	23 D

PTSBH4				
Date	10/16/2006			
Analyte	2-4'	4-6'	6-8'	6-7'
INORGANICS				
Arsenic	4.5	3.4 J	10 J	3.4
Barium	84	NA	NA	47
Cadmium	0.25 B	NA	NA	0.13 B
Chromium	11 J	11 J	15 J	21 J
Copper	43	69 J	8500 J	19
Lead	44 J	49 J	760 J	16 J
Mercury	0.018	NA	NA	0.031
Nickel	12	NA	NA	11
Zinc	48 J	NA	NA	43 J

SS-19		
Date	10/15/2003	
Analyte	0-0.5'	0.5-1'
INORGANICS		
Lead	25	NA

SS-18		
Date	10/15/2003	
Analyte	0-0.5'	0.5-1'
INORGANICS		
Lead	29	NA

SB-97-7		
Date	3/26/1997	
Analyte	0-2'	
INORGANICS		
Arsenic	1.5 [1.8]	0.73
Barium	74.2 [66.2]	17.8
Cadmium	0.59 [0.51]	ND(0.22)
Chromium	18.8 [18.1]	8
Cobalt	2.9 [4.6]	1.4
Copper	24.5 [31.7]	11.3
Lead	11.8 J [14.3 J]	3.4 J
Mercury	0.06 B [0.07 B]	0.02 B
Nickel	10.7 [10.9]	5.6
Selenium	0.53 [ND(0.57)]	ND(0.49)
Thallium	0.13 B [0.22 B]	ND(0.04)
Vanadium	22.7 [24]	19.1
Zinc	65.2 [59.7]	23.2

PTSBC3		
Date	10/6/2006	
Analyte	0.75-2.75'	8.75-10.75'
INORGANICS		
Arsenic	4.4 J	1.2 J
Barium	13 J	19 J
Cadmium	0.27 J	0.12 J
Chromium	6.1	8.8
Copper	15	8.3 J
Lead	25	3.1 J
Mercury	0.014	0.0018 B
Nickel	8.1 J	11 J
Zinc	48 J	23 J

PTSBC2		
Date	10/16/2006	
Analyte	2-4'	16-18'
INORGANICS		
Arsenic	1.5	1.5
Barium	16	20
Cadmium	0.08 B	0.12 B
Chromium	5.6 J	7.3 J
Copper	9.7	11
Lead	3	4
Mercury	0.0026 B	0.0049 B
Nickel	5.6 J	7.1 J
Zinc	19 J	18 J

PTSBC5	
Date	10/10/2006
Analyte	0.66-2'
INORGANICS	
Arsenic	1.5 B
Barium	19
Chromium	4.3 J
Copper	3.6
Lead	6.3 J
Mercury	0.023
Nickel	3.1
Zinc	19 J

SB-97-14	
Date	3/21/1997
Analyte	2-4'
INORGANICS	
Antimony	76.7 J
Arsenic	14
Barium	170
Beryllium	0.42 B
Cadmium	1.6
Chromium	18
Cobalt	5.2
Copper	979
Lead	1630
Mercury	0.13
Nickel	19.3
Selenium	23.5
Silver	1.4
Thallium	0.13 B
Vanadium	16.1
Zinc	307

PTSBC4				
Date	10/10/2006			
Analyte	0.33-2'	4-6'	6-8'	8-8.5'
INORGANICS				
Arsenic	24 J	58	12 J	17
Barium	NA	130	NA	84
Cadmium	NA	1.2	NA	0.62 B
Chromium	63 J	22 J	14 J	21 J
Copper	3200 J	910	66 J	180
Lead	850 J	300 J	63 J	100 J
Mercury	NA	0.27	NA	0.087
Nickel	NA	21	NA	16
Silver	NA	0.33 B	NA	ND(1.2)
Zinc	NA	580 J	NA	180 J

SS-5	
Date	9/22/1999
Analyte	0-1'
INORGANICS	
Antimony	ND(0.9) J [1.1 JM]
Barium	25 [27]
Beryllium	0.21 [0.28]
Cadmium	ND(0.40) [0.35]
Chromium	9.7 [9.3]
Cobalt	3.8 [4.1]
Copper	11 [11]
Lead	11 [11]
Nickel	7.2 [7.2]
Silver	ND(0.51) [0.51]
Thallium	ND(2) [5.8 JM]
Vanadium	17 [14]
Zinc	77 [79]

SB-97-15		
Date	3/27/1997	
Analyte	0-2'	2-4'
INORGANICS		
Arsenic	3.8	6.1
Barium	77.1	50.2
Beryllium	0.6	0.37 B
Cadmium	0.37 B	0.32 B
Chromium	20.9	12.9
Cobalt	6.5	4.5
Copper	60.6	46.7
Lead	36.4	12.4
Mercury	0.07 B	0.05 B
Nickel	15.6	11.4
Silver	0.38	0.67
Thallium	0.21 B	0.18 B
Vanadium	38.5	27.5
Zinc	79.6	47.9

PTSBH2					
Date	10/11/2006				
Analyte	0.33-2'	2-4'	4-6'	6-8'	8-9'
INORGANICS					
Arsenic	6.8 J	31	14 J	1.7 J	2.5
Barium	NA	220	NA	NA	32
Cadmium	NA	1.3	NA	NA	0.14 B
Chromium	16 J	18 J	21 J	21 J	11 J
Copper	100 J	700	240 J	12 J	28
Lead	270 J	1200 J	580 J	8.1 J	41 J
Mercury	NA	0.4	NA	NA	0.0056 B
Nickel	NA	17	NA	NA	8.6
Selenium	NA	2.1 B	NA	NA	ND(2.3)
Zinc	NA	340 J	NA	NA	34 J

SS-6		
Date	9/22/1999	
Analyte	0-1'	1-2'
INORGANICS		
Barium	57	NA
Beryllium	0.72	NA
Chromium	17	NA
Cobalt	8.1	NA
Copper	37	NA
Lead	24	NA
Mercury	0.052	NA
Nickel	14	NA
Thallium	14	NA
Vanadium	20	NA
Zinc	120	NA

SB-97-3	
Date	3/20/1997
Analyte	6-8'
INORGANICS	
Arsenic	1.8
Barium	29.2
Beryllium	0.22 B
Chromium	8.7
Cobalt	7.3
Copper	40.9
Lead	15.8
Mercury	0.01 B
Nickel	18.6
Selenium	47.2
Silver	0.53
Thallium	0.17 B
Vanadium	32.8
Zinc	45.3

LEGEND:

- A — AREA DESIGNATION
- PARCEL BOUNDARY
- IRON PIPE FOUND
- GAS VALVE
- WATER VALVE
- SANITARY MANHOLE
- STORM MANHOLE
- POWER POLE
- HYDRANT
- CB — CATCH BASIN
- CO — CLEAN OUT
- FD — FLOOR DRAIN
- MH — MANHOLE
- UNCONFIRMED DRAINAGE LINE
- TRENCH FILLED WITH CONCRETE
- TRENCH COVERED WITH METAL SHEETING
- COVERED PIPE
- S — SANITARY SEWER
- D — STORM SEWER
- PRE-2006 SOIL BORING
- PRE-2006 MONITORING WELL
- PRE-2006 SURFACE SOIL SAMPLE
- PRE-2006 UNDERGROUND STORAGE TANK SAMPLE LOCATION
- 2006 SOIL BORING
- 2006 MONITORING WELL
- 2007 SOIL BORING

DATA QUALIFIERS:

ND(2.1) = ANALYTE NOT DETECTED. VALUE IN PARENTHESES IS DETECTION LIMIT.

NA = ANALYTE NOT ANALYZED.

[ ] = DUPLICATE SAMPLE RESULT.

B = THE REPORTED VALUE WAS OBTAINED FROM A READING LESS THAN THE CRDL BUT GREATER THAN OR EQUAL TO THE IDL.

D = CONCENTRATION IS BASED ON DILUTED SAMPLE ANALYSIS.

E = ESTIMATED CONCENTRATION DUE TO INTERFERENCE.

J = THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

M = MATRIX INTERFERENCE.

NOTES:

1. ALL CONCENTRATIONS IN MG/KG.
2. BASE MAP FROM J.E. ARTHUR AND ASSOCIATES, INC., MAP ENTITLED "PL. 2 MONITORING WELLS AND SOIL BORINGS", SHEET 1, DATED 2/13/97.
3. THE LOCATIONS OF FEATURES SUCH AS SUMPS, TRENCHES, DRAINS, AND PIPING ARE APPROXIMATE ONLY. THESE FEATURES ARE NOT TO SCALE.
4. LABORATORY QA/QC INFORMATION REVIEWED BY BLASLAND, BOUCK, & LEE, INC/ARCADIS OF NEW YORK, INC. (EXCEPT FOR 11, SS-8 (2-3'), SS-9 (2-3' AND 3-4'), AND SS-10 THROUGH SS-11).
5. BOLDED VALUES REPRESENT EXCEEDANCES OF THE WISCONSIN NON-INDUSTRIAL RESIDUAL CONTAMINANT LEVELS (RCLs).

PTSBH1						
Date	10/19/2006					
Analyte	2-4'	4-6'	6-8'	8-10'	10-12'	12-14'
INORGANICS						
Arsenic	1.8 J	7	9.8 J	2.8 J	ND(2.3) J	ND(2.4)
Barium	NA	89	NA	NA	NA	17
Cadmium	NA	0.78	NA	NA	NA	0.079 B
Chromium	8 J	19	20 J	21 J	5 J	6.4
Copper	19 J	55	240 J	15 J	5 J	8.9
Lead	16 J	180	370 J	19 J	1.9 J	2.7
Mercury	NA	0.05 J	NA	NA	NA	0.014 J
Nickel	NA	14	NA	NA	NA	4.8
Zinc	NA	140	NA	NA	NA	16

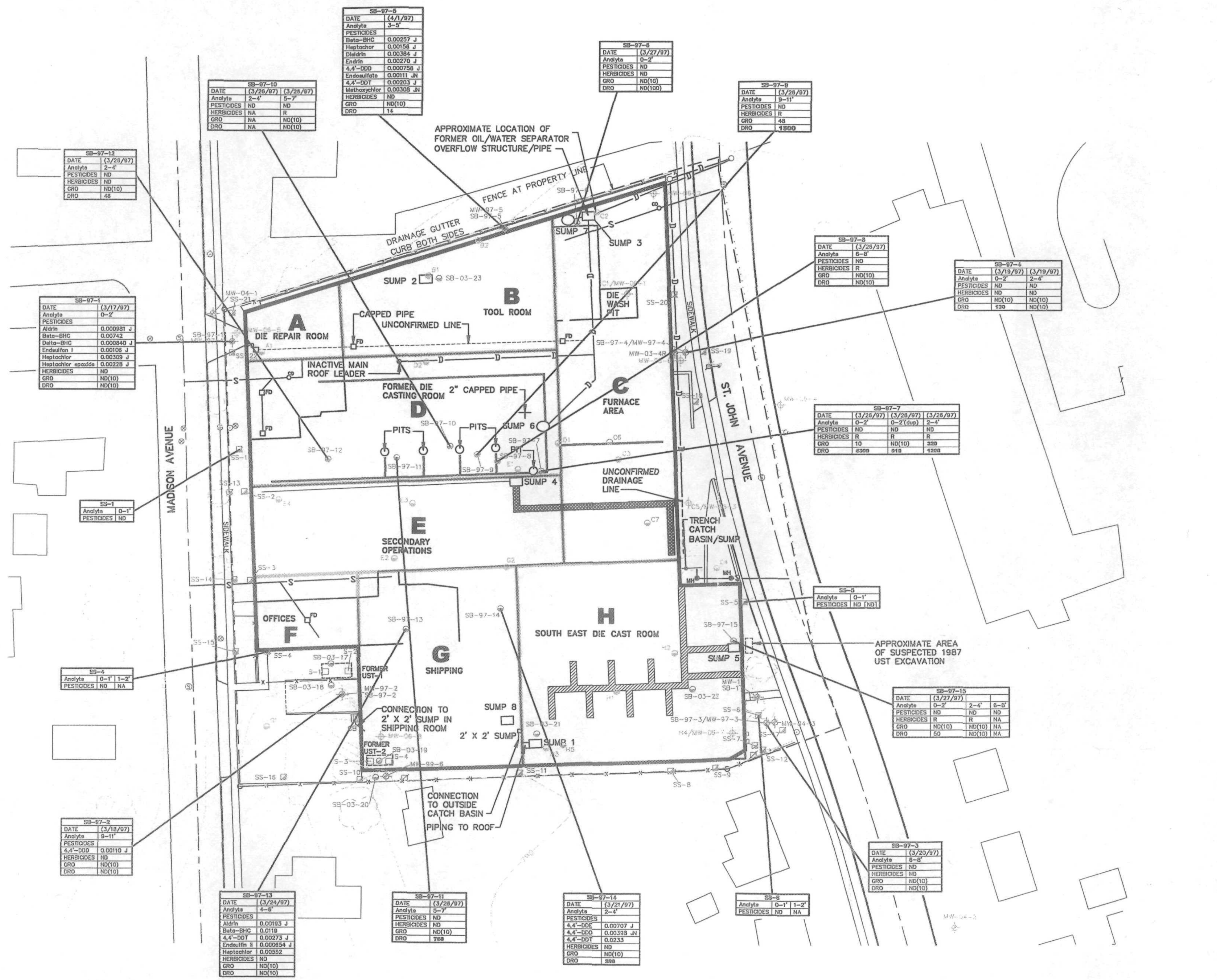
0 30' 60'
GRAPHIC SCALE

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

SOIL SAMPLE LOCATIONS AND SUMMARY OF INORGANIC DETECTIONS

ARCADIS BBL
infrastructure, environment, facilities

FIGURE
3-10D



LEGEND:

A	AREA DESIGNATION
	PARCEL BOUNDARY
	IRON PIPE FOUND
	GAS VALVE
	WATER VALVE
	SANITARY MANHOLE
	STORM MANHOLE
	POWER POLE
	HYDRANT
CB	CATCH BASIN
CO	CLEAN OUT
FD	FLOOR DRAIN
MH	MANHOLE
	UNCONFIRMED DRAINAGE LINE
	TRENCH FILLED WITH CONCRETE
	TRENCH COVERED WITH METAL SHEETING
	COVERED PIPE
S	SANITARY SEWER
D	STORM SEWER
	PRE-2006 SOIL BORING
	PRE-2006 MONITORING WELL
	PRE-2006 SURFACE SOIL SAMPLE
	PRE-2006 UNDERGROUND STORAGE TANK SAMPLE LOCATION
	2006 SOIL BORING
	2006 MONITORING WELL
	2007 SOIL BORING
GRO =	GASOLINE RANGE ORGANICS
DRO =	DIESEL RANGE ORGANICS
ND =	NOT DETECTED
ND(10) =	NOT DETECTED AT GIVEN CONCENTRATION
NA =	NOT ANALYZED

DATA QUALIFIERS:

J = THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

N = THE ANALYSIS INDICATES THE PRESENCE OF A COMPOUND FOR WHICH THERE IS PRESUMPTIVE EVIDENCE TO MAKE A TENTATIVE IDENTIFICATION.

R = THE SAMPLE RESULTS WERE REJECTED BASED ON QA/QC REVIEW OF DATA.

[2.5] = VALUES IN BRACKETS INDICATE DUPLICATE SAMPLE RESULTS.

NOTES:

1. ALL CONCENTRATIONS IN MG/KG.
2. BASE MAP FROM J.E. ARTHUR AND ASSOCIATES, INC., MAP ENTITLED "PL. 2 MONITORING WELLS AND SOIL BORINGS", SHEET 1, DATED 2/13/97.
3. THE LOCATIONS OF FEATURES SUCH AS SUMPS, TRENCHES, DRAINS, AND PIPING ARE APPROXIMATE ONLY. THESE FEATURES ARE NOT TO SCALE.
4. LABORATORY QA/QC INFORMATION REVIEWED BY BLASLAND, BOUCK, & LEE, INC.
5. BOLDED VALUES REPRESENT EXCEEDANCES OF THE WISCONSIN NON-INDUSTRIAL RESIDUAL CONTAMINANT LEVELS (RCLs).

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

SOIL SAMPLE LOCATIONS AND SUMMARY OF OTHER DETECTIONS

ARCADIS BBL

FIGURE
3-10E

MW-97-5								
Analyte	4/17 & 24/97	7/31 & 8/13/97	9/22/1999	10/18/2003	4/9/2004	11/1/2006	3/22/2007	6/28/2007
VOCs								
Tetrachloroethene	25	14	18	12	7.7	15	1.9	13
Trichloroethene	2	1	1.8	ND(1)	ND (0.48)	ND(1.0)	ND(1.0)	0.65 J
SVOCs	ND	ND	NA	NA	NA	NA	NA	NA
PCBs	ND	ND	NA	ND(0.21)	NA	ND	NA	NA
PESTICIDES	ND	ND	NA	NA	NA	NA	NA	NA
HERBICIDES	ND	ND	NA	NA	NA	NA	NA	NA
Inorganics								
Barium	88.2	97.2	NA	NA	NA	NA	NA	NA
Chromium	2.5	ND(2.0)	NA	NA	NA	NA	NA	NA
Nickel	4.4 B	ND(3.0)	NA	NA	NA	NA	NA	NA
Selenium	3.5 B	ND(3.0) J	NA	NA	NA	NA	NA	NA
Silver	2.1 B	ND(2.0)	NA	NA	NA	NA	NA	NA
GRO	ND(100)	ND(100)	NA	NA	NA	NA	NA	NA
DRO	ND(100)	ND(100)	NA	NA	NA	NA	NA	NA

MW-06-1			
Analyte	11/1/2006	3/22/2007	6/27/2007
VOCs			
1,1,1-Trichloroethane	12	11	12
1,1-Dichloroethane	1	0.90 J	0.88 J
Tetrachloroethene	10	6.0	7.1
SVOCs	ND	NA	NA
PCBs	ND	NA	NA
Inorganics			
Arsenic	0.32 B	NA	NA
Barium	150	NA	NA
Cadmium	0.27 B	NA	NA
Chromium	ND	NA	NA
Copper	5.2 B	NA	NA
Lead	0.46 B	NA	NA
Nickel	3.1 B	NA	NA
Selenium	2	NA	NA

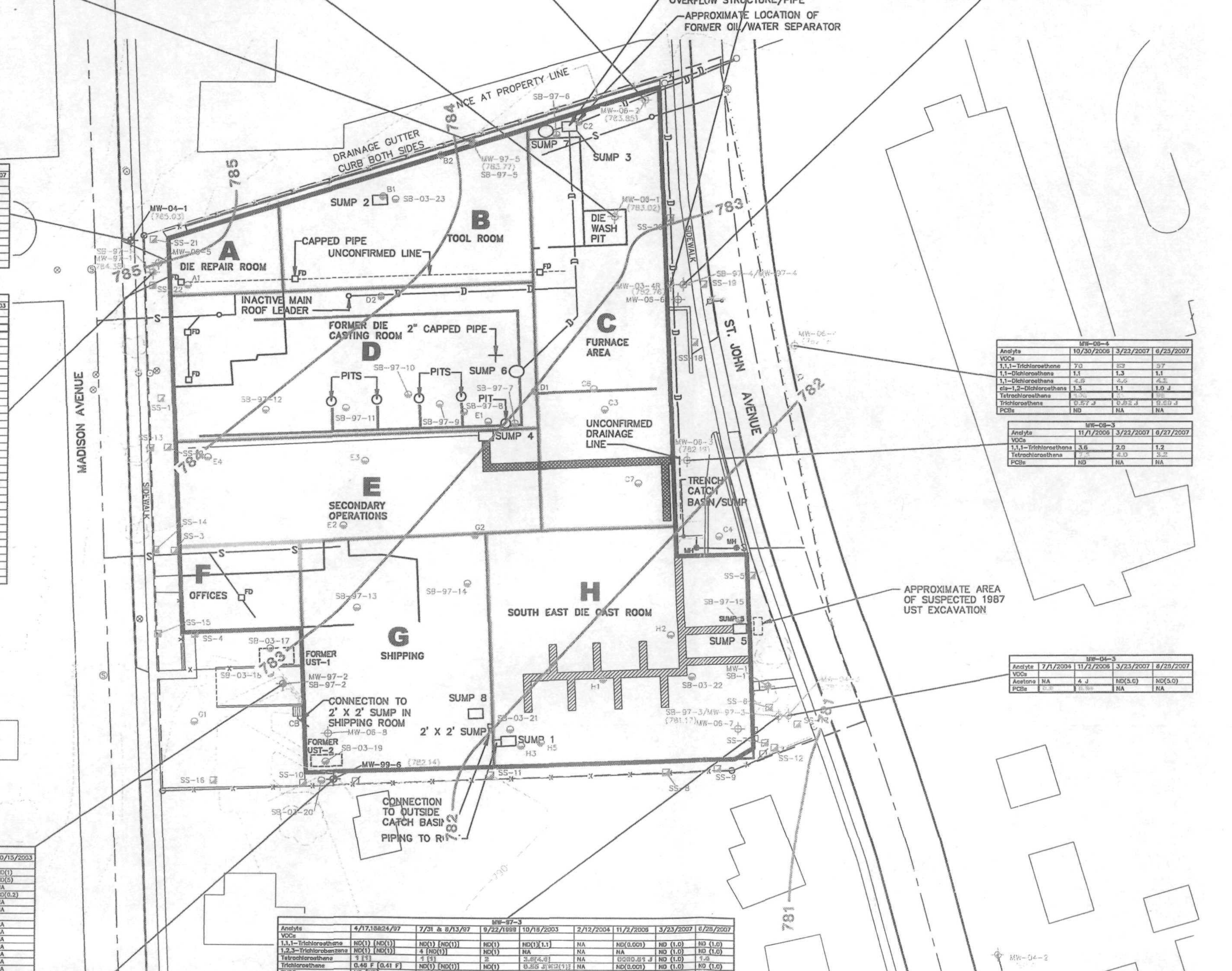
MW-06-2			
Analyte	10/31/2006	3/22/2007	6/26/2007
VOCs			
1,1,1-Trichloroethane	78	2.9	85
1,1-Dichloroethane	1.6	ND(1.0)	1.2
1,1-Dichloroethene	7	ND(1.0)	4.9
cis-1,2-Dichloroethene	1.6	ND(1.0)	0.94 J
Tetrachloroethene	11	0.89 J	20
PCBs	ND	NA	NA

MW-03-4R					
Analyte	10/17/2003	4/9/2004	10/31/2006	3/23/2007	6/26/2007
VOCs					
1,1,1-Trichloroethane	200 D	90	65 [60]	40 [46]	46 [48]
1,1-Dichloroethane	3.1	1.1 Q	0.99 J [0.96 J]	ND(1.0) [ND(1.0)]	0.97 J [1.0]
1,1-Dichloroethene	12	4.3	4.2 [3.8]	3.0 [3.1]	3.6 [3.5]
cis-1,2-Dichloroethene	5.2	2.0 Q	1.3 [1.4]	ND(1.0) [ND(1.0)]	ND(1.0) [0.97 J]
Tetrachloroethene	110	13	37 [32]	24 [30]	60 [50]
Trichloroethene	0.77 J	0.94 Q	0.82 J [0.83 J]	ND(1.0) [ND(1.0)]	ND(1.0) [ND(1.0)]
SVOCs	NA	NA	ND	NA	NA
PCBs	ND(0.2)	NA	ND [ND]	NA	NA
Inorganics					
Arsenic	NA	NA	0.4 B	NA	NA
Barium	NA	NA	75	NA	NA
Chromium	NA	NA	1.5 A	NA	NA
Selenium	NA	NA	2.1	NA	NA

MW-97-4			
Analyte	4/18 & 24/97	7/31 & 8/13/97	9/22/1999
VOCs			
1,1-Dichloroethene	1	2	1.3
1,1-Dichloroethane	0.88 F	3	ND(1)
1,1,1-Trichloroethane	19	31	35
Trichloroethene	0.74 F	ND(1)	ND(1)
Tetrachloroethene	34	30	[illegible]
SVOCs	ND	ND	NA
PCBs	ND	ND	NA
PESTICIDES			
Endosulfan sulfate	0.188 JN	ND(0.100)	NA
HERBICIDES	ND	ND	NA
INORGANICS (filt.)			
Barium	53.3	63.8	NA
Chromium	1.5	ND(2.0)	NA
GRO	ND(100)	ND(100)	NA
DRO	ND(100)	ND(100)	NA

MW-04-1				
Analyte	7/1/2004	10/31/2006	3/22/2007	6/25/2007
VOCs	NA	ND	ND	ND
SVOCs				
Phenanthrene	NA	0.015 J	NA	NA
PCBs	ND	ND	NA	NA
Inorganics				
Arsenic	NA	0.53 B	NA	NA
Barium	NA	66	NA	NA
Chromium	NA	ND	NA	NA
Copper	NA	1.8 B	NA	NA
Lead	NA	0.07 B	NA	NA
Selenium	NA	1.1	NA	NA
Silver	NA	0.04 BJ	NA	NA

MW-97-1				
Analyte	4/17 & 24/97	7/30 & 8/12/97	9/22/1999	10/16 & 17/03
VOCs				ND
SVOCs	ND	ND	NA [NA]	NA
PCBs	ND	ND	NA [NA]	0.48
PESTICIDES				
Heptachlor	0.023 J	ND(0.0500)	NA [NA]	NA
4-4'-DDD	0.033 J	ND(0.100)	NA [NA]	NA
Endrin Ketone	0.033 J	ND(0.100)	NA [NA]	NA
HERBICIDES	ND	ND	NA [NA]	NA
Inorganics				
Barium	142	69.1	NA [NA]	NA
Chromium	2.6	ND(2.0)	NA [NA]	NA
Copper	ND(10.0)	4.2 B	NA [NA]	NA
Nickel	7.3	ND(3.0)	NA [NA]	NA
Silver	2.3 B	ND(2.0)	NA [NA]	NA
Zinc	36.7 J	ND(19.0)	NA [NA]	NA
GRO	ND(100)	ND(100)	NA [NA]	NA
DRO	ND(100)	ND(100)	NA [NA]	NA
MW-97-1				
Analyte	2/11/2004	10/31/2006	3/22/2007	6/25/2007
VOCs				
Acetone	NA	ND(5.0)	ND(5.0)	2.4 J
SVOCs	NA	NA	NA	NA
PCBs	[illegible]	ND	NA	NA
PESTICIDES				
Heptachlor	NA	NA	NA	NA
4-4'-DDD	NA	NA	NA	NA
Endrin Ketone	NA	NA	NA	NA
HERBICIDES	NA	NA	NA	NA
Inorganics				
Barium	NA	NA	NA	NA
Chromium	NA	NA	NA	NA
Copper	NA	NA	NA	NA
Nickel	NA	NA	NA	NA
Silver	NA	NA	NA	NA
Zinc	NA	NA	NA	NA
GRO	NA	NA	NA	NA
DRO	NA	NA	NA	NA



MW-06-4			
Analyte	10/30/2006	3/22/2007	6/25/2007
VOCs			
1,1,1-Trichloroethane	70	83	57
1,1-Dichloroethane	1.1	1.3	1.1
1,1-Dichloroethene	4.8	4.6	4.2
cis-1,2-Dichloroethene	1.3	1.1	1.0 J
Tetrachloroethene	[illegible]	[illegible]	[illegible]
Trichloroethene	0.57 J	0.82 J	0.60 J
PCBs	ND	NA	NA

MW-06-3			
Analyte	11/1/2006	3/22/2007	6/27/2007
VOCs			
1,1,1-Trichloroethane	3.6	2.0	1.2
Tetrachloroethene	7.3	4.0	3.2
PCBs	ND	NA	NA

MW-04-3				
Analyte	7/1/2004	11/2/2006	3/23/2007	6/28/2007
VOCs				
Acetone	NA	4 J	ND(5.0)	ND(5.0)
PCBs	[illegible]	[illegible]	NA	NA

MW-97-2					
Analyte	4/17 & 24/97	7/30 & 8/12/97	8/31/1999	9/22/1999	10/15/2003
VOCs					
Trichloroethene	0.29 F	ND(1)	NA	ND(1)	ND(1)
2-Butanone	1.6 FJ	ND(5)	NA	ND(5)	ND(5)
SVOCs	ND	ND	ND	NA	NA
PCBs	ND	ND	NA	NA	ND(0.2)
PESTICIDES	ND	ND	NA	NA	NA
HERBICIDES	ND	ND	NA	NA	NA
INORGANICS (filt.)					
Arsenic	ND(2.0)	2.9 B	NA	NA	NA
Barium	85.8	65	NA	NA	NA
Chromium	4.9	ND(2.0)	NA	NA	NA
Copper	ND(10)	4.2 B	NA	NA	NA
Silver	3.6 B	2.6 B	NA	NA	NA
Zinc	93.4 J	ND(19.0)	NA	NA	NA
GRO	ND(100)	ND(100)	NA	NA	NA
DRO	ND(100)	ND(100)	NA	NA	NA

MW-99-6						
Analyte	5/28/1999	9/22/1999	10/17/2003	11/2/2006	3/23/2007	6/28/2007
VOCs						
Acetone	ND(25) [ND(25)]	ND(250)	ND(5)	5.3	ND(5.0)	ND(5.0)
Sec-Butylbenzene	1.53 [1.55]	ND(10)	NA	NA	NA	NA
PCBs	NA [NA]	NA	NA	ND	NA	NA

MW-97-3								
Analyte	4/17,18&24/97	7/31 & 8/13/97	9/22/1999	10/16/2003	2/12/2004	11/2/2006	3/23/2007	6/28/2007
VOCs								
1,1,1-Trichloroethane	ND(1) [ND(1)]	ND(1) [ND(1)]	ND(1)	ND(1)[1.1]	NA	ND(0.001)	ND (1.0)	ND (1.0)
1,2,3-Trichlorobenzene	ND(1) [ND(1)]	4 [ND(1)]	ND(1)	NA	NA	NA	ND (1.0)	ND (1.0)
Tetrachloroethene	1 [1]	1 [1]	2	3.8[4.8]	NA	0.81 J	ND (1.0)	1.8
Trichloroethene	0.46 F [0.41 F]	ND(1) [ND(1)]	ND(1)	0.55 J[ND(1)]	NA	ND(0.001)	ND (1.0)	ND (1.0)
SVOCs	ND [ND]	ND [ND]	NA	NA	NA	NA	NA	NA
PCBs	ND [ND]	ND [ND]	NA	0.52[0.53]	0.47	0.69	NA	NA
PESTICIDES	ND [ND]	ND [ND]	NA	NA	NA	NA	NA	NA
HERBICIDES	ND [ND]	ND [ND]	NA	NA	NA	NA	NA	NA
Inorganics								
Arsenic	2.9 B [3.4 B]	3.9 B [3.7 B]	NA	NA	NA	NA	NA	NA
Barium	112 [114]	103 [104]	NA	NA	NA	NA	NA	NA
Chromium	1.2 [1.6]	ND(2.0) [ND(2.0)]	NA	NA	NA	NA	NA	NA
Nickel	3.9 B [4.0 B]	5.8 [3.6 B]	NA	NA	NA	NA	NA	NA
Silver	ND(2.0) [2.4 B]	ND(2.0) [ND(2.0)]	NA	NA	NA	NA	NA	NA
Zinc	ND(19.0) J [41.9 J]	ND(19.0) [ND(19.0)]	NA	NA	NA	NA	NA	NA
GRO	ND(100) [ND(100)]	ND(100) [ND(100)]	NA	NA	NA	NA	NA	NA
DRO	ND(100) [ND(100)]	ND(100) [ND(100)]	NA	NA	NA	NA	NA	NA

MW-04-2				
Analyte	7/1/2004	10/30/2006	3/22/2007	6/25/2007
VOCs				
Acetone	NA	3.9 J	ND(5.0)	ND(5.0)
Tetrachloroethene	NA	1.5	1.0	1.4
PCBs	ND	ND	NA	NA

LEGEND:

- A — AREA DESIGNATION
- PARCEL BOUNDARY
- IRON PIPE FOUND
- GAS VALVE
- WATER VALVE
- SANITARY MANHOLE
- STORM MANHOLE
- POWER POLE
- HYDRANT
- CB — CATCH BASIN
- CO — CLEAN OUT
- FD — FLOOR DRAIN
- MH — MANHOLE
- UNCONFIRMED DRAINAGE LINE
- TRENCH FILLED WITH CONCRETE
- TRENCH COVERED WITH METAL SHEETING
- COVERED PIPE
- S — SANITARY SEWER
- D — STORM SEWER
- SOIL BORING LOCATION
- MONITORING WELL WITH NO EXCEEDANCES
- MONITORING WELL WITH PAL EXCEEDANCE(S)
- MONITORING WELL WITH ES EXCEEDANCE(S)
- SURFACE SOIL SAMPLE LOCATION
- GROUNDWATER ELEVATION (FT AMSL)
- 781 — GROUNDWATER ELEVATION CONTOUR

DATA QUALIFIERS:

ND = ANALYTE NOT DETECTED.

ND(2.1) = ANALYTE NOT DETECTED. VALUE IN PARENTHESES IS DETECTION LIMIT.

NA = ANALYTE NOT ANALYZED.

[ ] = DUPLICATE SAMPLE RESULT.

B = THE REPORTED VALUE WAS OBTAINED FROM A READING LESS THAN THE CRDL BUT GREATER THAN OR EQUAL TO THE IDL.

F = INDICATES THAT THE ANALYTE WAS DETECTED BUT THE RESULT WAS BETWEEN THE NORMAL REPORTING LEVEL AND THE MDL. THE RESULTS SHOULD BE COSIDERED ESTIMATED.

J = THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

N = THE ANALYSIS INDICATES THE PRESENCE OF A COMPOUND FOR WHICH THERE IS PRESUMPTIVE EVIDENCE TO MAKE A TENTATIVE IDENTIFICATION.

Q = THE ANALYTE WAS DETECTED BETWEEN THE LIMIT OF DETECTION AND LIMIT OF QUANTITATION.

NOTES:

1. ALL CONCENTRATIONS IN ug/L.
2. BASE MAP FROM J.E. ARTHUR AND ASSOCIATES, INC., MAP ENTITLED "PL 2 MONITORING WELLS AND SOIL BORINGS", SHEET 1, DATED 2/13/97.
3. THE LOCATIONS OF FEATURES SUCH AS SUMPS, TRENCHES, DRAINS, AND PIPING ARE APPROXIMATE ONLY. THESE FEATURES ARE NOT TO SCALE.
4. LABORATORY QA/QC INFORMATION REVIEWED BY BLASLAND, BOUCK, & LEE, INC/ARCADIS OF NEW YORK, INC. (EXCLUDING INFORMATION FOR MW-97-2 AND MW-99-6, SAMPLES COLLECTED IN MAY AND AUGUST 1999).
5. RESULTS FOR ANALYTES THAT ARE SHOWN IN BLUE, BOLDED TEXT REPRESENT EXCEEDANCES OF THE GROUNDWATER PREVENTIVE ACTION LIMITS (PALs). RESULTS FOR ANALYTES THAT ARE SHOWN IN RED, BOLDED, AND BOXED TEXT REPRESENT EXCEEDANCES OF THE GROUNDWATER PALs AND ENFORCEMENT STANDARDS (ESs).

0 30' 60'
GRAPHIC SCALE

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

GROUNDWATER ELEVATION CONTOUR MAP - JUNE 22, 2007 AND SUMMARY OF GROUNDWATER DETECTIONS

ARCADIS BBL

FIGURE
3-13A

[SYR-85-GHS] GHS KLS BGP LAYER: ON=*, OFF=*REF*, |RDNAME
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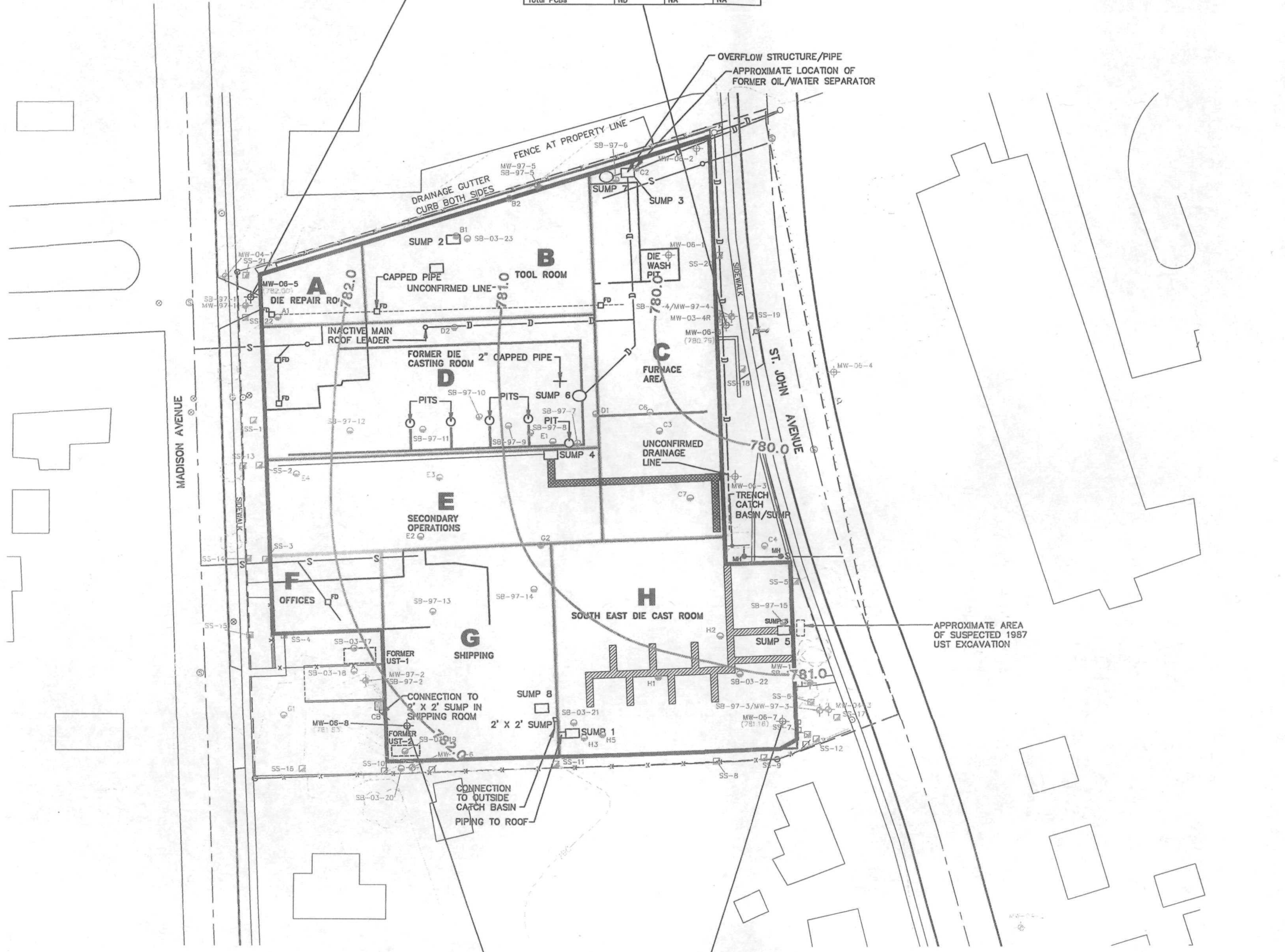
17628X00
17628X04
17628X05

MW-06-5			
Analyte	10/31/2006	3/22/2007	6/26/2007
VOCs			
Acetone	ND(5.0)	ND(5.0)	3.3 J
Total PCBs	ND	NA	NA

MW-06-6			
Analyte	10/31/2006	3/22/2007	6/27/2007
VOCs			
1,1-Dichloroethane	ND(1.0)	ND(1.0)	1.0
1,1-Dichloroethene	ND(1.0)	ND(1.0)	**1.1**
cis-1,2-Dichloroethene	ND(1.0)	ND(1.0)	1.0
Tetrachloroethene	**0.79 J**	ND(1.0)	ND(1.0)
Total PCBs	ND	NA	NA



MW-06-8			
Analyte	11/1/2006	3/23/2007	6/27/2007
VOCs	ND	ND	ND
Total PCBs	ND	NA	NA

MW-06-7			
Analyte	11/2/2006	3/23/2007	6/28/2007
VOCs			
Acetone	ND(5.0)	ND(5.0)	6.7
Tetrachloroethene	**3.3**	**2.9**	**3.6**
Total PCBs	ND	NA	NA

LEGEND:

- A — AREA DESIGNATION
- PARCEL BOUNDARY
- IRON PIPE FOUND
- GAS VALVE
- WATER VALVE
- SANITARY MANHOLE
- STORM MANHOLE
- POWER POLE
- HYDRANT
- CB — CATCH BASIN
- CO — CLEAN OUT
- FD — FLOOR DRAIN
- MH — MANHOLE
- UNCONFIRMED DRAINAGE LINE
- TRENCH FILLED WITH CONCRETE
- TRENCH COVERED WITH METAL SHEETING
- COVERED PIPE
- —S— SANITARY SEWER
- —D— STORM SEWER
- SOIL BORING LOCATION
- MONITORING WELL WITH NO EXCEEDANCES
- MONITORING WELL WITH PAL EXCEEDANCE(S)
- SURFACE SOIL SAMPLE LOCATION
- GROUNDWATER ELEVATION (FT AMSL)
- 781.0 GROUNDWATER ELEVATION CONTOUR

DATA QUALIFIERS:

ND = ANALYTE NOT DETECTED.

J = THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

NOTES:

1. ALL CONCENTRATIONS IN ug/L.
2. BASE MAP FROM J.E. ARTHUR AND ASSOCIATES, INC., MAP ENTITLED "PL. 2 MONITORING WELLS AND SOIL BORINGS", SHEET 1, DATED 2/13/97.
3. THE LOCATIONS OF FEATURES SUCH AS SUMPS, TRENCHES, DRAINS, AND PIPING ARE APPROXIMATE ONLY. THESE FEATURES ARE NOT TO SCALE.
4. LABORATORY QA/QC INFORMATION REVIEWED BY ARCADIS OF NEW YORK, INC.
5. RESULTS FOR ANALYTES THAT ARE SHOWN IN BLUE, BOLDED TEXT REPRESENT EXCEEDANCES OF THE GROUNDWATER PREVENTIVE ACTION LIMITS (PALs).

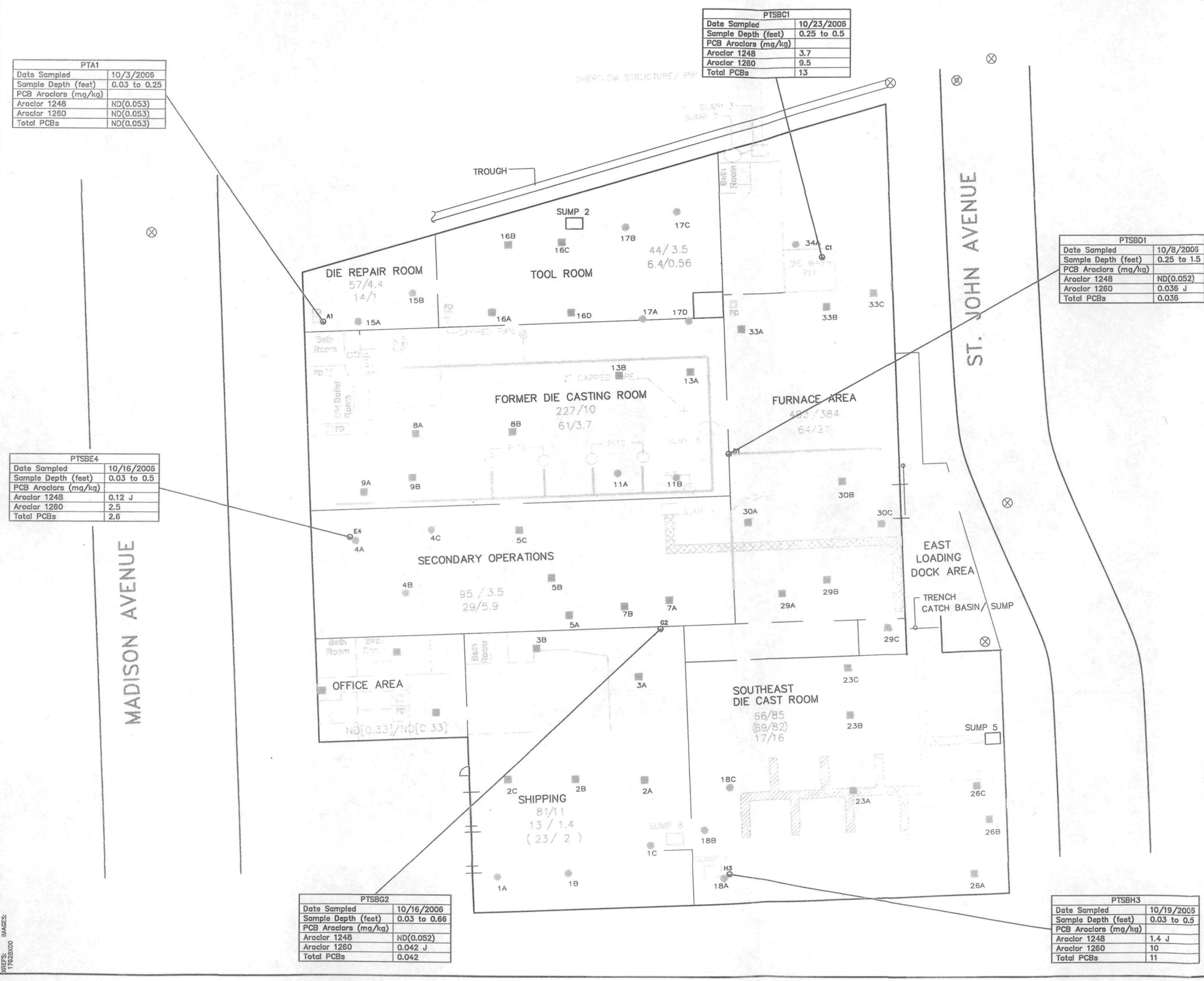
0 30' 60'
GRAPHIC SCALE

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

BEDROCK GROUNDWATER POTENTIOMETRIC CONTOUR MAP - JUNE 22, 2007 AND SUMMARY OF GROUNDWATER DETECTIONS

ARCADIS BBL

FIGURE
3-13B



PTA1	
Date Sampled	10/3/2006
Sample Depth (feet)	0.03 to 0.25
PCB Aroclors (mg/kg)	
Aroclor 1248	ND(0.053)
Aroclor 1260	ND(0.053)
Total PCBs	ND(0.053)

PTSBC1	
Date Sampled	10/23/2006
Sample Depth (feet)	0.25 to 0.5
PCB Aroclors (mg/kg)	
Aroclor 1248	3.7
Aroclor 1260	9.5
Total PCBs	13

PTSBD1	
Date Sampled	10/8/2006
Sample Depth (feet)	0.25 to 1.5
PCB Aroclors (mg/kg)	
Aroclor 1248	ND(0.052)
Aroclor 1260	0.036 J
Total PCBs	0.036

PTSBE4	
Date Sampled	10/16/2006
Sample Depth (feet)	0.03 to 0.5
PCB Aroclors (mg/kg)	
Aroclor 1248	0.12 J
Aroclor 1260	2.5
Total PCBs	2.6

PTSBG2	
Date Sampled	10/16/2006
Sample Depth (feet)	0.03 to 0.66
PCB Aroclors (mg/kg)	
Aroclor 1248	ND(0.052)
Aroclor 1260	0.042 J
Total PCBs	0.042

PTSBH3	
Date Sampled	10/19/2006
Sample Depth (feet)	0.03 to 0.5
PCB Aroclors (mg/kg)	
Aroclor 1248	1.4 J
Aroclor 1260	10
Total PCBs	11

LEGEND:

- CLEAN OUT
- FLOOR DRAIN
- MANHOLE
- TRENCH FILLED WITH CONCRETE
- TRENCH COVERED WITH METAL SHEETING
- COVERED PIPE
- 11A CONCRETE COMPOSITE 1 CM AND 7.5 CM FLOOR SUB-SAMPLE LOCATION (1999)
- 29C CONCRETE COMPOSITE 7.5 CM FLOOR SUB-SAMPLE LOCATION (1999)
- PCB AROCLOR 1260/1248 IN mg/kg (1 CM FLOOR CORE)
- PCB AROCLOR 1260/1248 IN mg/kg (7.5 CM FLOOR CORE)
- DUPLICATE CONCENTRATION IN mg/kg
- NOT DETECTED AT GIVEN DETECTION LIMIT
- C1 2006 CONCRETE FLOOR SAMPLE LOCATION

NOTES:

1. BASE MAP MODIFIED FROM PLANT 2 (DIE CAST) MERCURY MARINE DRAWING (BY S. KUNTZ).
2. THE LOCATIONS OF SAMPLE POINTS ARE APPROXIMATE ONLY.
3. LABORATORY QA/QC INFORMATION FOR 2006 SAMPLES REVIEWED BY ARCADIS BBL.

DATA QUALIFIERS:

ND(0.053) = ANALYTE NOT DETECTED. VALUE IN PARENTHESES IS DETECTION LIMIT.

J = THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

0 20' 40'
GRAPHIC SCALE

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

CONCRETE FLOOR CORE SAMPLE LOCATIONS/ RESULTS (1999,2006)

ARCADIS BBL

FIGURE
3-15

[SYR-85-GHS] RCB GMS JHR LAYER: ON=*, OFF=*REF
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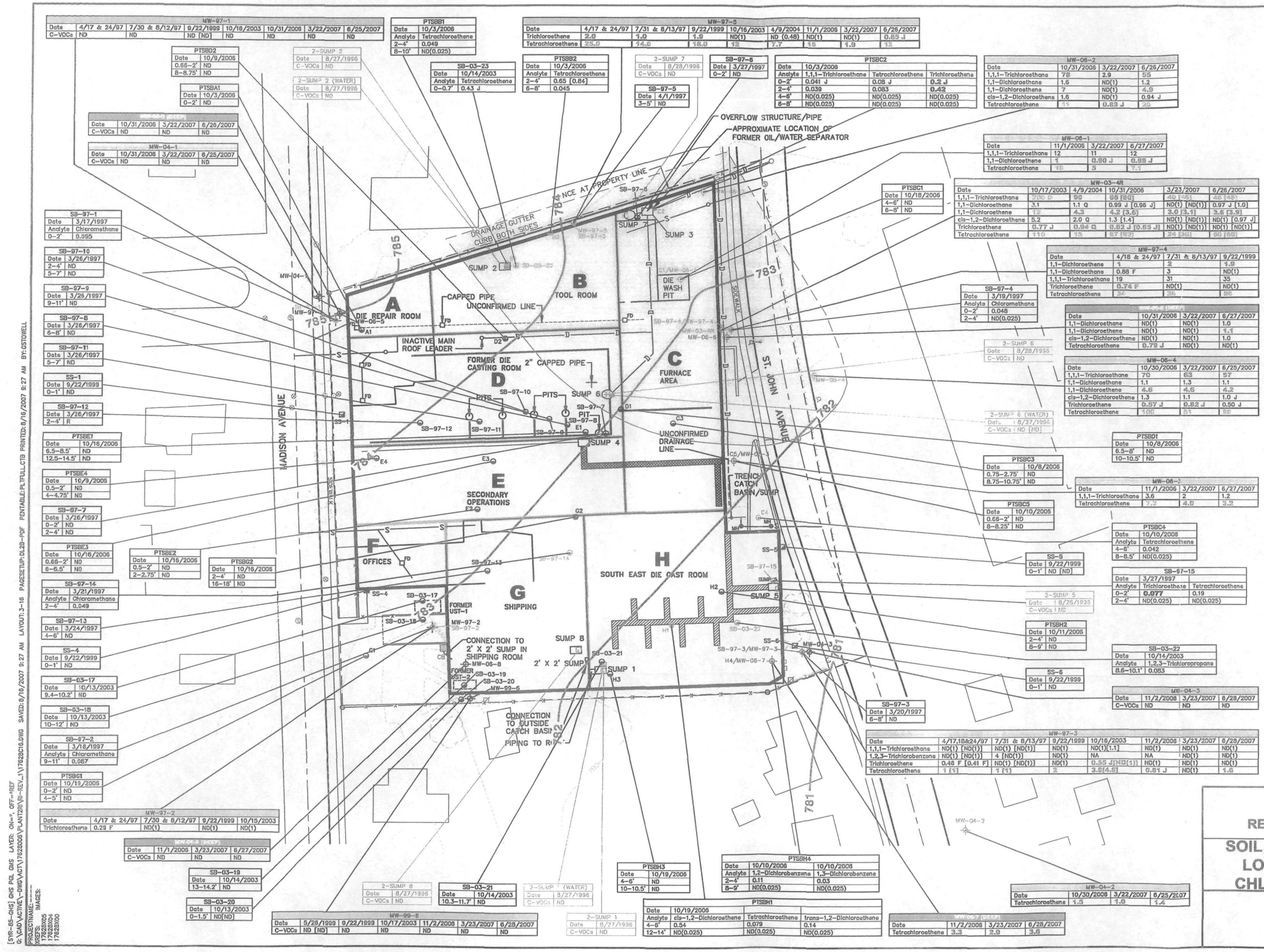


LEGEND:

- A — AREA DESIGNATION
- PARCEL BOUNDARY
- IRON PIPE FOUND
- GAS VALVE
- WATER VALVE
- SANITARY MANHOLE
- STORM MANHOLE
- POWER POLE
- HYDRANT
- CB — CATCH BASIN
- CO — CLEAN OUT
- FD — FLOOR DRAIN
- MH — MANHOLE
- UNCONFIRMED DRAINAGE LINE
- TRENCH FILLED WITH CONCRETE
- TRENCH COVERED WITH METAL SHEETING
- COVERED PIPE
- S — SANITARY SEWER
- D — STORM SEWER
- SOIL BORING WITH CHLORINATED VOC ND
- SOIL BORING WITH CHLORINATED VOC < NON-INDUSTRIAL RCL
- SOIL BORING WITH CHLORINATED VOC > NON-INDUSTRIAL RCL
- MONITORING WELL WITH NO GROUNDWATER EXCEEDANCES (2007)
- MONITORING WELL WITH GROUNDWATER PAL EXCEEDANCE(S) (2007)
- MONITORING WELL WITH GROUNDWATER ES EXCEEDANCE(S) (2007)
- SURFACE SOIL BORING WITH CHLORINATED VOC ND
- SUMP/TRENCH SOLIDS SAMPLE
- SUMP/TRENCH WATER SAMPLE
- APPROXIMATE AREA WHERE GROUNDWATER ES EXCEEDANCE(S) NOTED
- 781 — GROUNDWATER ELEVATION CONTOUR (JUNE 22, 2007)

DATA QUALIFIERS:

- ND(2.1) = ANALYTE NOT DETECTED. VALUE IN PARENTHESES IS DETECTION LIMIT.
- NA = ANALYTE NOT ANALYZED.
- [ ] = DUPLICATE SAMPLE RESULT.
- D = CONCENTRATION IS BASED ON A DILUTED SAMPLE ANALYSIS.
- F = INDICATES THAT THE ANALYTE WAS DETERMINED BUT THE RESULT WAS BETWEEN THE NORMAL REPORTING LEVEL AND THE MDL. THE RESULT SHOULD BE CONSIDERED ESTIMATED.
- J = THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.
- Q = THE ANALYTE HAS BEEN DETECTED BETWEEN THE LIMIT OF DETECTION (LOD) AND LIMIT OF QUANTIFICATION (LOQ). THE RESULTS ARE QUALIFIED DUE TO THE UNCERTAINTY OF ANALYTE CONCENTRATIONS WITHIN THIS RANGE.
- R = THE SAMPLE RESULTS ARE REJECTED

NOTES:

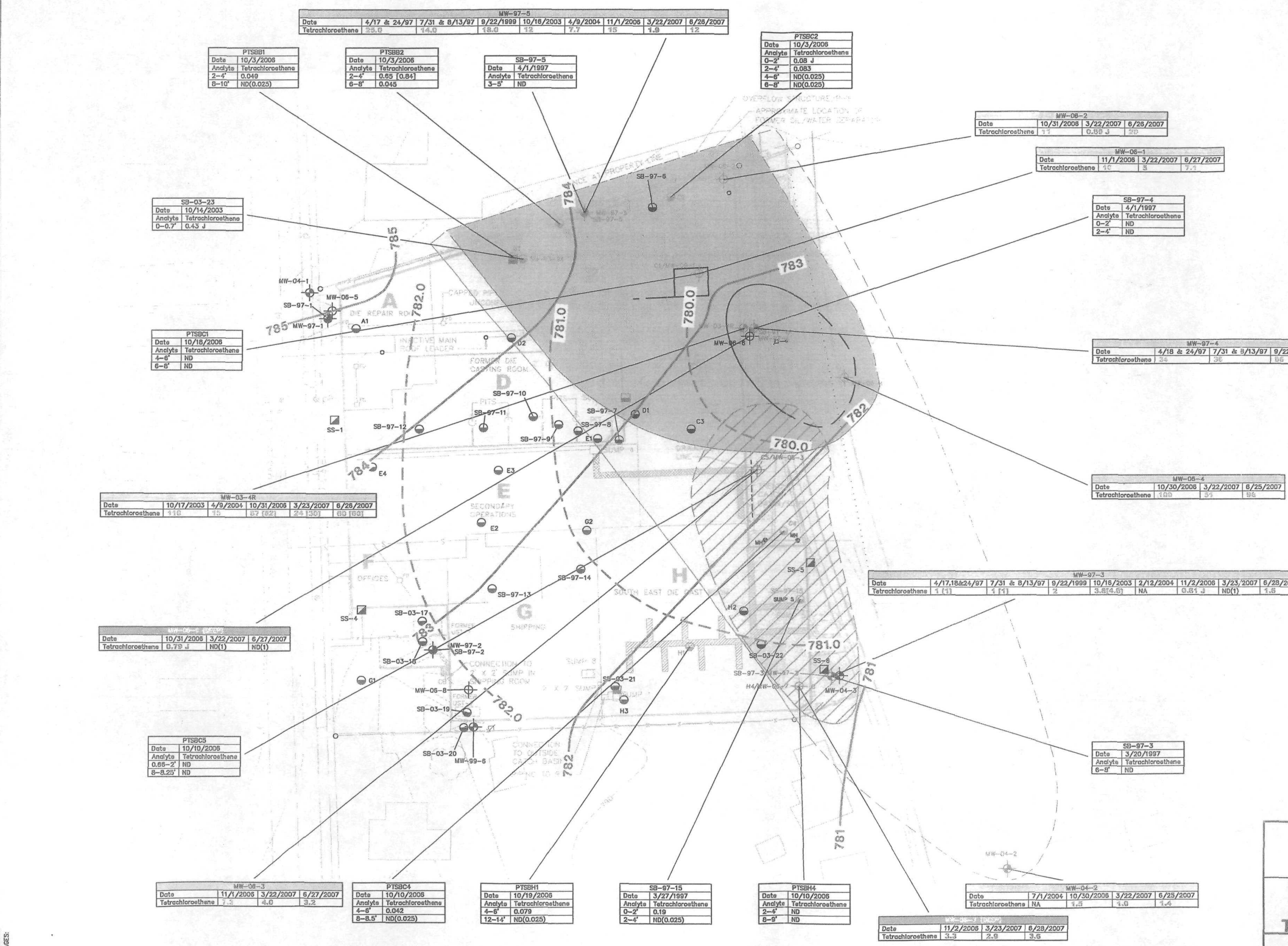
1. ALL CONCENTRATIONS IN mg/kg (SOIL AND SOLIDS) OR ug/L (GROUNDWATER, DESIGNATED AS "MW-", AND SUMP WATER SAMPLES)
2. BASE MAP FROM J.E. ARTHUR AND ASSOCIATES, INC., MAP ENTITLED "PL. 2 MONITORING WELLS AND SOIL BORINGS", SHEET 1, DATED 2/13/97.
3. THE LOCATIONS OF FEATURES SUCH AS SUMPS, TRENCHES, DRAINS, AND PIPING ARE APPROXIMATE ONLY. THESE FEATURES ARE NOT TO SCALE.
4. LABORATORY QA/QC INFORMATION REVIEWED BY BLASLAND, BOUCK, & LEE, INC/ARCADIS OF NEW YORK, INC (EXCLUDING INFORMATION FOR MW-97-2 AND MW-99-6 GROUNDWATER SAMPLES COLLECTED IN MAY AND AUGUST 1999).
5. BOLDED VALUES REPRESENT EXCEEDANCES OF THE WISCONSIN NON-INDUSTRIAL SOIL RESIDUAL CONTAMINANT LEVELS (RCLs).
6. RESULTS FOR ANALYTES THAT ARE SHOWN IN BLUE, BOLDED TEXT REPRESENT EXCEEDANCES OF THE GROUNDWATER PREVENTIVE ACTION LIMITS (PALs). RESULTS FOR ANALYTES THAT ARE SHOWN IN RED, BOLDED TEXT REPRESENT EXCEEDANCES OF THE GROUNDWATER PALs AND ENFORCEMENT STANDARDS (ESs).
7. GROUNDWATER DATA BOXES COLORED BLUE (DARK BLUE FOR DEEP GROUNDWATER WELLS).

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

SOIL AND GROUNDWATER SAMPLE LOCATIONS AND SUMMARY OF CHLORINATED VOC DETECTIONS

ARCADIS BBL

FIGURE **3-16**



LEGEND:

AREA DESIGNATION
PARCEL BOUNDARY
IRON PIPE FOUND
GAS VALVE
WATER VALVE
SANITARY MANHOLE
STORM MANHOLE
POWER POLE
HYDRANT
CATCH BASIN
CLEAN OUT
FLOOR DRAIN
MANHOLE
UNCONFIRMED DRAINAGE LINE
TRENCH FILLED WITH CONCRETE
TRENCH COVERED WITH METAL SHEETING
COVERED PIPE
SANITARY SEWER
STORM SEWER
SOIL BORING WITH PCE ND
SOIL BORING WITH PCE < NON-INDUSTRIAL RCL
SOIL BORING WITH PCE > NON-INDUSTRIAL RCL
MONITORING WELL WITH NO GROUNDWATER EXCEEDANCES (2007)
MONITORING WELL WITH GROUNDWATER PAL EXCEEDANCE(S) (2007)
MONITORING WELL WITH GROUNDWATER ES EXCEEDANCE(S) (2007)
SURFACE SOIL WITH PCE ND
SURFACE SOIL WITH PCE < NON-INDUSTRIAL RCL
SURFACE SOIL WITH PCE > NON-INDUSTRIAL RCL
SUMP/TRENCH SOLIDS SAMPLE
SUMP/TRENCH WATER SAMPLE
SUMP/TRENCH OIL SAMPLE
APPROXIMATE AREA WHERE GROUNDWATER PCE ≥50 ug/L (2007)
APPROXIMATE AREA WHERE GROUNDWATER ES EXCEEDANCE(S) NOTED (2007)
APPROXIMATE AREA WHERE GROUNDWATER PAL EXCEEDANCE(S) NOTED (2007)
APPROXIMATE AREA WHERE DEEP GROUNDWATER PAL EXCEEDANCE(S) NOTED (2007)
784.0 GROUNDWATER ELEVATION CONTOUR (JUNE 22, 2007)
781.0 DEEP GROUNDWATER ELEVATION CONTOUR (JUNE 22, 2007)

DATA QUALIFIERS:

ND(2.1) = ANALYTE NOT DETECTED. VALUE IN PARENTHESES IS DETECTION LIMIT.
NA = ANALYTE NOT ANALYZED.
[ ] = DUPLICATE SAMPLE RESULT.
J = THE COMPOUND WAS POSITIVELY IDENTIFIED; HOWEVER, THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED CONCENTRATION ONLY.

NOTES:

1. ALL CONCENTRATIONS IN mg/kg (SOILS AND SOLIDS) OR ug/L (GROUNDWATER, DESIGNATED AS "MW-", AND SUMP WATER SAMPLES).
2. BASE MAP FROM J.E. ARTHUR AND ASSOCIATES, INC., MAP ENTITLED "PL. 2 MONITORING WELLS AND SOIL BORINGS", SHEET 1, DATED 2/13/97.
3. THE LOCATIONS OF FEATURES SUCH AS SUMPS, TRENCHES, DRAINS, AND PIPING ARE APPROXIMATE ONLY. THESE FEATURES ARE NOT TO SCALE.
4. LABORATORY QA/QC INFORMATION REVIEWED BY BLASLAND, BOUCK, & LEE, INC/ARCADIS OF NEW YORK, INC (EXCLUDING INFORMATION FOR MW-97-2 AND MW-99-8 GROUNDWATER SAMPLES COLLECTED IN MAY AND AUGUST 1999).
5. BOLDED VALUES REPRESENT EXCEEDANCES OF THE WISCONSIN NON-INDUSTRIAL SOIL RESIDUAL CONTAMINANT LEVELS (RCLs).
6. RESULTS FOR ANALYTES THAT ARE SHOWN IN BLUE, BOLDED TEXT REPRESENT EXCEEDANCES OF THE GROUNDWATER PREVENTIVE ACTION LIMITS (PALs). RESULTS FOR ANALYTES THAT ARE SHOWN IN RED, BOLDED TEXT REPRESENT EXCEEDANCES OF THE GROUNDWATER PALs AND ENFORCEMENT STANDARDS (ESs).
7. GROUNDWATER DATA BOXES COLORED BLUE (DARK BLUE FOR DEEP GROUNDWATER WELLS).

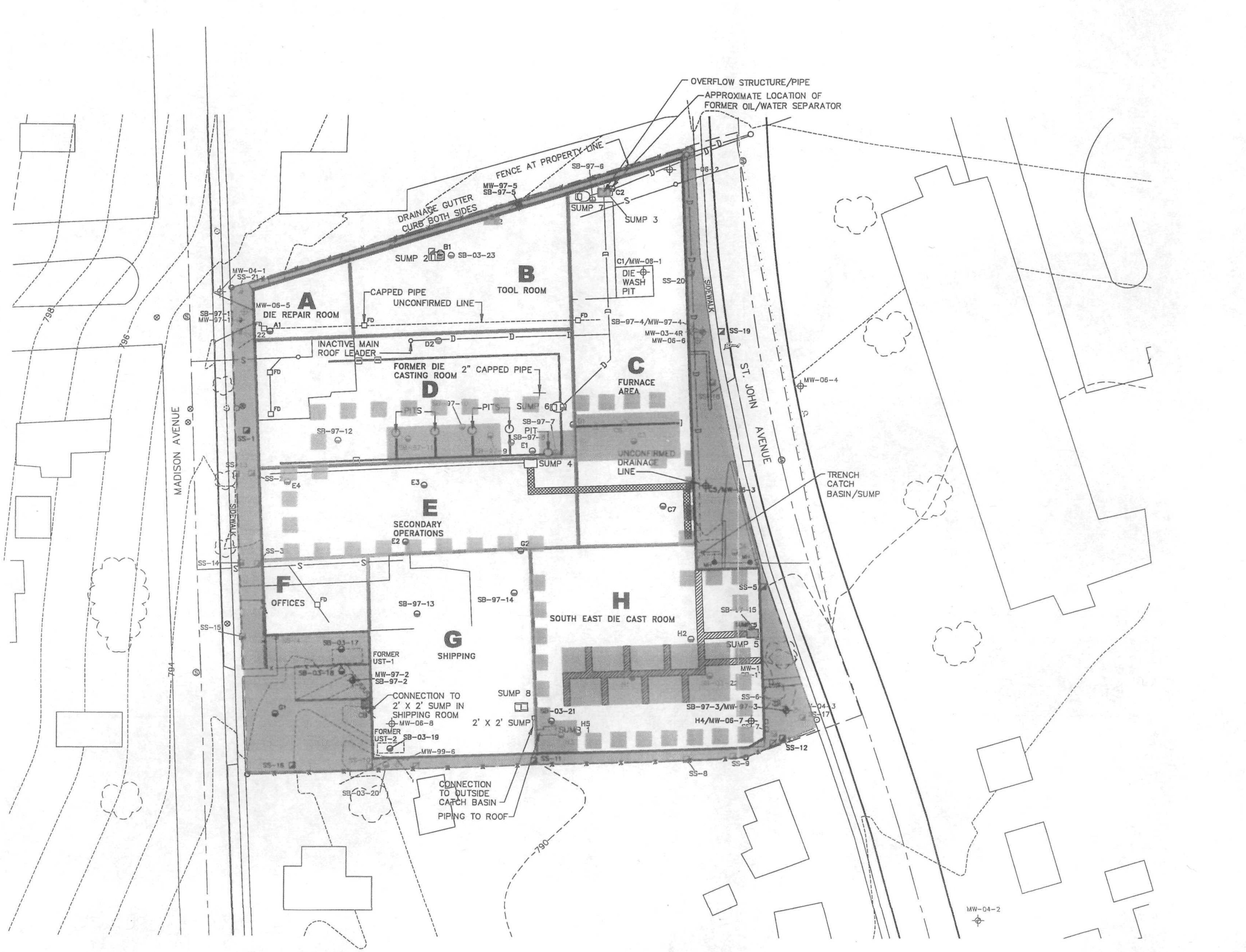
0 30' 60'
GRAPHIC SCALE

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
REMEDIAL INVESTIGATION REPORT

SOIL AND GROUNDWATER SAMPLE LOCATIONS AND SUMMARY OF TETRACHLOROETHENE DETECTIONS

ARCADIS BBL
infrastructure, environment, facilities

FIGURE
3-17



LEGEND:

- AREA DESIGNATION
- PARCEL BOUNDARY
- IRON PIPE FOUND
- GAS VALVE
- WATER VALVE
- SANITARY MANHOLE
- STORM MANHOLE
- POWER POLE
- HYDRANT
- CB CATCH BASIN
- CO CLEAN OUT
- FD FLOOR DRAIN
- MH MANHOLE
- UNCONFIRMED DRAINAGE LINE
- TRENCH FILLED WITH CONCRETE
- TRENCH COVERED WITH METAL SHEETING
- COVERED PIPE
- SANITARY SEWER
- STORM SEWER
- SOIL BORING WITH PCBs < 1 mg/kg
- SOIL BORING WITH 1 mg/kg ≤ PCBs ≤ 50 mg/kg
- SOIL BORING WITH PCBs > 50 mg/kg
- MONITORING WELL BORING WITH PCBs < 1 mg/kg
- MONITORING WELL BORING WITH 1 mg/kg ≤ PCBs ≤ 50 mg/kg
- MONITORING WELL BORING WITH PCBs > 50 mg/kg
- SURFACE SOIL WITH PCBs < 1 mg/kg
- SURFACE SOIL WITH 1 mg/kg ≤ PCBs ≤ 50 mg/kg
- SURFACE SOIL WITH PCBs > 50 mg/kg
- SUMP/TRENCH SOLIDS SAMPLE
- SUMP/TRENCH WATER SAMPLE
- SUMP/TRENCH OIL SAMPLE
- ANTICIPATED EXTENT OF PROPOSED REMOVAL. FOR AREAS UNDER THE FORMER BUILDING SLAB SLATED FOR REMOVAL AS A RESULT OF PCB DETECTIONS, ADDITIONAL SAMPLING WOULD BE PERFORMED PRIOR TO REMEDIATION TO VERIFY AND POSSIBLY REDUCE OR EXPAND THE EXCAVATION LIMITS.

NOTES:

1. BASE MAP FROM J.E. ARTHUR AND ASSOCIATES, INC., MAP ENTITLED "PL. 2 MONITORING WELLS AND SOIL BORINGS", SHEET 1, DATED 2/13/97.
2. THE LOCATIONS OF FEATURES SUCH AS SUMPS, TRENCHES, DRAINS, AND PIPING ARE APPROXIMATE ONLY. THESE FEATURES ARE NOT TO SCALE.

0 30' 60'
GRAPHIC SCALE

MERCURY MARINE PLANT 2
CEDARBURG, WISCONSIN
FOCUSED FEASIBILITY STUDY

REMEDIAL ALTERNATIVE 4

ARCADIS BBL
Infrastructure, environment, facilities

FIGURE
4-2

[SYR-85-GHS] JHR BGP LJP LAYER: ON=*, OFF=*REF
G:\CAD\ACTIVE\-DWG\ACT\17628009\SSDATA\17628C20.DWG SAVED:10/4/2007 3:48 PM LAYOUT:4-2 PAGESETUP:---- PENTABLE:PLTFULL.CTB PRINTED:10/5/2007 9:44 AM BY:LPOSENAUER
PROJECTNAME:----
XREFS: IMAGES:
17628X01
17628X00
17628X02