SITE-SPECIFIC SAMPLING AND ANALYSIS PLAN

Phase II Environmental Site Assessment -
Characterization and Assessment of Polychlorinated Biphenyl Impacts to Soil and Groundwater Beneath the Loading Dock and Area 8

1512 Washington Street
Manitowoc, Wisconsin

U.S. EPA Brownfield Cooperative Agreement No.: BF-00E01529-0

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June 2017
Project Number 193703931

Stantec

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GENERAL INFORMATION

FACILITY:	1512 Washington Street Manitowoc, Wisconsin
PARCEL ID:	052.000.246.000.00
SIZE:	3.72 Acres
USEPA ACRES ID:	169132
WDNR BRRTS NO.:	02-36-545108 (Open)
SITE LOCATION:	SW1/4 of the NE 1/4 of Section 30, Township 19 North, Range 24 East, Manitowoc County, Wisconsin
RESPONSIBLE PARTY:	Community Development Authority of the City of Manitowoc City of Manitowoc 900 Quay Street Manitowoc, WI 54220-4543
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1.0 INTRODUCTION

1.1 General

This Site-Specific Sampling and Analysis Plan (SAP) has been prepared on behalf of the City of Manitowoc (hereinafter referred to as the "City") by Stantec Consulting Services Inc. (Stantec) for field sampling and associated laboratory analyses to be performed as part of a focused Phase II Environmental Site Assessment (ESA) conducted at the property located at 1512 Washington Street in the City of Manitowoc, Wisconsin (herein referred to as the Site or Property). The location of the Site is illustrated on Figures 1a and 1b. The objective of this Phase II ESA is to determine the magnitude and delineate the horizontal and vertical extents of residual impacts to soil and groundwater related to release(s) of oil from two former polychlorinated biphenyl (PCB) electrical transformers in the "Loading Dock" and "Area 8" (Figure 2). This assessment work will be conducted following building demolition and prior to removal of impacted concrete flooring with PCB concentrations greater than 50 milligrams per kilogram. Proposed soil borings are illustrated on Figure 3 and 4.

The project is being performed using funds from an assessment grant for hazardous substances and petroleum brownfields awarded to the City by the United States Environmental Protection Agency (USEPA) in 2015. The Wisconsin Department of Natural Resources (WDNR) approved the petroleum brownfield eligibility determination request for the property on October 18, 2016.

1.2 Site Description/Background

Industrial Development and Operation. As described in the Stantec (2016b) Phase I ESA, the property appears undeveloped in 1835. By 1878, the property was platted as 18 contiguous parcels within lot 246; however, development had not yet occurred. A plat map published in 1878 indicates Sherman Creek bisected the far northwestern portion of the property and the creek flowed north to the Manitowoc River. Initial development of the property appears to have occurred between 1878 and 1893, at which time, the property was occupied by a tannery and 6 apparent residential structures. By 1906, the property consisted of 13 individual residential dwellings and associated automobile garages, a tannery, and a small aluminum manufacturing plant. By 1921, Sherman Creek had been contained within a culvert, residential structures removed, and most of the property occupied by a large industrial facility utilized for the manufacturing of aluminum goods. Significant development of the property for industrial use as a multi-story aluminum goods manufacturing facility occurred between 1906 and 1912 and again between 1912 and 1927. The final multi-story building was constructed at the property adjacent to Washington Street by 1929. Industrial operations ceased at the Site in 1986; however, the Mirro Aluminum Company corporate and engineering offices remained on the 6th and 7th floors of the building until 2001.

Property Ownership. The property was purchased from Newell Holdings Delaware, Inc. by Union Street Partners, LLC on March 26, 2004 who sold the property to Kenneth J. Lemberger, Sr. on November 18, 2005. The property was transferred to Mirro Building, LLC on March 23, 2006, and EJ Spirtas Manitowoc, LLC purchased the property from Mirro Building, LLC on June 2, 2006. EJ Spirtas Manitowoc, LLC razed the 3-story building previously located on the northeast corner of the property and several smaller buildings in March 2014. The Community Development Authority of the City of Manitowoc involuntarily took ownership of the Property on June 29, 2016 for the purpose of blight elimination.

1.3 Environmental Concerns

Stantec (2016b) Phase I ESA. Multiple phases of due diligence have occurred at the Site. A Phase I ESA was completed on behalf of the current owner (the Community Development Authority of the City of Manitowoc) on June 28, 2016 by Stantec utilizing USEPA Brownfield Assessment grant funding

provided to the City of Manitowoc. The Stantec (2016b) Phase I ESA reviewed previous investigations completed at the Site by others between 2003 and 2015 and identified the following Recognized Environmental Condition (REC) specifically related to releases of PCBs:

REC 2: **Documented Residual PCB impacts to Soil, and/or Building Materials.** Documented residual impacts to soil, and/or building materials from PCBs [some concentrations greater than Toxic Substance Control Act (TSCA) threshold of 50 milligrams per kilogram] associated with Site development and/or prior Site operations represents a REC reflective of ongoing evaluation of known release areas. Of particular concern are the multiple release areas inside the buildings. Further investigation to delineate the vertical and horizontal extents of impacts in known release areas is warranted.

REC 5: **Potential Petroleum and Hazardous Substance Releases to Building Materials.** Stains observed within the buildings by others suggest industrial operations may have resulted in releases of petroleum and hazardous substances to building materials. Potential impacts to the buildings represent an additional REC relative to the existing structures. Characterization of building materials for disposal/handling purposes is warranted and a materials management plan developed prior to building demolition.

The Stantec (2016) Phase I ESA reviewed AECOM (2009), AES (2011), and Symbiont (2016) as described further below. Previous boring locations illustrated on figures provided in the reports were georeferenced by Stantec and are illustrated on Figure 3 and Figure 4 of this SAP. Further, select pages (figures, tables, and boring logs) from these reports are provided in Appendix A for reference:

AECOM (2009): Figure 3 from AES (2011) suggests soil boring GP-8 completed by AECOM (2009) is located directly beneath the PCB-transformer currently located in Area 14. The concentration of Aroclor 1260 in near-surface fill at GP-8 described as "brown fine to medium sandy silt" was 210 milligrams per kilogram. No other constituents were measured in soil by AECOM (2009) beneath the Loading Dock; however, the boring log suggests the presence of "cinders" in soil indicative of anthropogenic fill extending to four feet below ground surface.

AES (2011): AES (2011) completed soil borings SB-9, SB-11, SB-11, and SB-13 in/near the Loading Dock and describes the lithology below the concrete floor as coarse fill underlain by fine grain yellowish brown sandy silty, which is similar to observations by AECOM (2009). As noted on Tables 4a and 4b provided in Appendix A, although detected, heavy metals and volatile organic compounds (VOCs) do not appear to be constituents of major concern in soil beneath the Loading Dock. The PCB data summarized Table 4d in AES (2011) is incorrect based on laboratory reports provided in the report; the results should have been reported as:

Aroclor	SB-9 (5.5-8)	SB-10 (3-4)	SB-10 (5.5-7)	SB-11 (3-4)	SB-11 (6.5-8)	SB-13 (1.5-2)
1016	< 0.027	< 0.027	< 0.027	**0.67**	< 0.029	< 0.028
1221	< 0.027	< 0.027	< 0.027	< 0.053	< 0.029	< 0.028
1232	< 0.027	< 0.027	< 0.027	< 0.053	< 0.029	< 0.028
1242	< 0.027	< 0.027	< 0.027	< 0.053	< 0.029	< 0.028
1248	< 0.027	< 0.027	< 0.027	< 0.053	< 0.029	< 0.028
1254	< 0.027	< 0.027	< 0.027	< 0.053	< 0.029	< 0.028
1260	< 0.027	**0.027**	< 0.027	< 0.053	< 0.029	< 0.028

Note: concentrations reported in milligrams per kilogram

Symbiont (2016): Figure 5 (provided in Appendix A) from Symbiont (2016) suggests soil borings SB-101 and SB-106 were completed in/near the Loading Dock. However, we are not confident the locations of these borings are correct in the figure prepared by Symbiont (2016) due to inconsistencies between their figure and AES (2011). Although the precise locations of the borings remain unknown, boring logs indicate the concrete floor is underlain by sand (extending from 0.5 to 7 feet below ground surface) grading to silty sand from 7 feet to the end of the boring. Groundwater was identified at the sand/silty sand interface. Heavy metal

concentrations in soil summarized on Table 1 of Symbiont (2016) are similar to AECOM (2009) and are indicative of background conditions. Further, VOC concentrations in soil summarized on Table 1 of Symbiont (2016) are similar to AES (2011) and suggest VOCs are not constituents of major concern in soil beneath the Loading Dock. The concentrations of select polycyclic aromatic hydrocarbons (PAHs) in soil exceeded non-industrial RCLs. Aroclor 1260 was barely detected (0.012 milligrams per kilogram) in soil from 1-2 feet below ground surface in "sand" at SB-106. Aroclor 1260 is the PCB mixture identified in soil at GP-8 by AECOM (2009) and the mixture associated with residual PCB impacts to porous building materials in the Loading Dock (Stantec, 2017). Aroclor 1016 was detected in soil from SB-101; however the concentrations were minor (less than 0.05 milligrams per kilogram). PCBs were not detected in groundwater at SB-101/TW-101 nor at SB-106/TW-106. Residual groundwater impacts from VOCs and Resource Conservation and Recovery Act metals beneath the Loading Dock will be evaluated in the future during the site-wide ch. NR 716 Site Investigation to be completed following building demolition.

Stantec (2017) Identification and Delineation of TSCA-Level PCB Impacts to Porous Building Materials. Building on previous investigations, Stantec (2017) delineated the horizontal extents of residual PCB impacts to porous building materials in the Loading Dock and Area 8 as illustrated on Figure 3 and Figure 4 of this SAP (as dashed red lines) and summarized on the table below:

Area	PCBs > 50 mg/kg (square feet)	Concrete Thickness (inches)
Area 8	500	8
Loading Dock	3,500	12-15

mg/kg – milligrams per kilogram

The City has procured the services of a demolition contractor to abate/remove the PCB-impacted building materials remaining at the Site as described in Brandenburg (2017).

2.0 DATA QUALITY OBJECTIVES

2.1 Problem Statement

Various environmental concerns associated with the Property have been identified, but not yet fully investigated or assessed. Specifically, records indicate release(s) and subsequent previous cleaning activities associated with two former PCB-electrical transformers have occurred in the Loading Dock and Area 8. Although previous work completed by AECOM (2009) documented significant PCB impacts to soil beneath the Loading Dock, the extent has not yet been defined; further, the potential for residual impacts to soil beneath Area 8 has not been evaluated. Residual impacts to groundwater in the Loading Dock and Area 8 also have not been fully evaluated.

Stantec (2017) has identified and delineated the horizontal extent of residual PCB impacts to porous building materials in the Loading Dock and Area 8 and the City (on behalf of the owner) has retained the services of a demolition contractor to remove the impacted material as described in Brandenburg (2017). However, removal of the impacted concrete flooring by Brandenburg in the Loading Dock and Area 8 is considered premature until residual soil and groundwater impacts in the two target areas are defined/delineated.

The objective of this Phase II ESA is to determine the magnitude and delineate the horizontal and vertical extents of residual impacts to soil and groundwater beneath the Loading Dock and Area 8 to plan for required removal of impacted subsurface media during removal of the PCB-impacted porous building materials as described by Brandenburg (2017).

2.2 Conceptual Site Model

The "Triad approach" for characterization and remediation of contaminated sites was developed by USEPA and others with a goal of increasing confidence that project decisions about contaminant presence or absence, location, fate, exposure and risk reduction choices, are made correctly and cost effectively. The foundation for site-related decisions that are both correct and optimized (from a cost-benefit standpoint) is the "Conceptual Site Model" (CSM) (Crumbling, 2004). CSM uses all available historical and current information to estimate:

- where contamination is (or might be) located,
- how much is (or might be) there,
- how variable concentrations may be and how much spatial patterning may be present,
- what is happening to contaminants as far as fate and migration,
- who might be exposed to contaminants or harmful degradation products, and
- what might be done to manage risk by mitigating exposure.

The current CSM builds on the environmental concerns outlined in Section 1.3 and acknowledges the following attributes of the Site that are relevant to defining the nature and extent of impacts:

1. A PCB transformer was previously located in Area 8. The transformer room has been demolished; though oil residue remains on the transformer pad. Although the transformer was drained and removed from the pad, transformer components with PCB residues remain near Area 8. The floor in Area 8 consists of wood flooring underlain by an 8" thick concrete slab on grade. A large quantity of wood flooring was removed from Area 8, presumably during previous PCB cleanup activities. Residual PCB impacts to the remaining wood/concrete flooring greater than 50 milligrams per kilogram are targeted for removal. The concrete floor appears mostly competent and likely served as a significant engineered barrier in preventing the release of transformer oil to the subsurface. However, the building walls located adjacent to the transformer pad appear to be foundation walls and could have served as a conduit for migration of transformer oil to the subsurface, while also serving as subsurface structural

impediments to the migration of possible subsurface impacts. The structural I-beam adjacent to the transformer pad could also be a conduit for migration of transformer oil to the subsurface.

2. A PCB transformer was previously located in Area 14, which is located on the second floor, directly above the Loading Dock. The transformer has been disassembled, though PCB-impacted components remain. Records suggest the transformer was drained, which resulted in a significant release of transformer oil to porous building materials in Area 14 and the Loading Dock. A large quantity of wood flooring was previously removed from the Loading Dock and the area reportedly cleaned; though PCB impacts to porous building materials remain and a large quantity of remaining flooring is targeted for removal. Further, previous work has identified significant PCB impacts to soil beneath the Loading Dock. The concrete floor in the Loading Dock is approximately 12-inches thick, appears mostly competent, and likely served as a significant engineered barrier in preventing the release of transformer oil to the subsurface. However, the building walls located north and east of the greatest residual PCB impacts appear to be foundation walls and could have served as a conduit for migration of transformer oil to the subsurface, while also serving as subsurface structural impediments to the migration of possible subsurface impacts. Likewise, the walls surrounding the loading dock ramps and the driving pad could also have served as conduits for migration to the subsurface. Structural concrete columns in the Loading Dock also be a conduit for migration of transformer oil to the subsurface.
3. Aroclor 1260 is the primary PCB mixture associated with onsite transformer oils and is the mixture detected in porous building materials in the Loading Dock and Area 8. Aroclor 1260 is considered especially hydrophobic, recalcitrant, and unlikely to be mobilized by water or transported significant distances in dissolved phase groundwater or pore water by advection and dispersion. However, mobilization/migration of PCB impacts to the subsurface may have been exacerbated by the use of petroleum solvents during previous concrete cleaning activities.
4. Soil lithology across the Site, and in the Loading Dock in particular, consists of near-surface coarse fill underlain by sand and/or silty sand. The porosity of vadose soils is considered relatively large and unlikely to have restricted horizontal or vertical migration of transformer oil, if a release to the subsurface has occurred.
5. Prior work indicates heavy metals and VOCs in soil are not broad constituents of major concern in soil beneath the Loading Dock. However, the concentration of select carcinogenic PAHs in soil below the Loading Dock exceeded non-industrial RCLs. Prior cleaning of transformer oil from the Loading Dock floor with petroleum solvents could have resulted in a release not yet identified.
6. Subsurface soil and/or groundwater data has not been collected beneath Area 8. Prior cleaning of transformer oil from the floor in Area 8 with petroleum solvents could have resulted in a release not yet identified. Nearby samples suggest the potential for PAHs and/or VOCs to be present in the subsurface in Area 8.

The locations of proposed soil borings are illustrated on Figures 3 and 4. Potential constituents of concern include those associated with the transformer oil (primary PCB mixture Aroclor 1260) and petroleum solvents (VOCs and PAHs) presumably used to clean the two target areas by a prior owner. If fill is present beneath the building, additional constituents of concern include heavy metals.

3.0 SOIL ASSESSMENT

3.1 General

Proposed soil sampling locations and analyses are based on the environmental concerns and CSM detailed in Sections 1.3 and 2.2, respectively. Utilities have been disconnected pursuant to the upcoming building demolition and are not a concern for this Phase II ESA. A site-specific Health and Safety Plan to be utilized by Stantec personnel during the assessment activities, is presented in Appendix B.

As noted in multiple previous reports, Aroclor 1260 is the primary Aroclor mixture associated with the drained transformer oils, known soil impacts, and residual PCB impacts to transformer components. Therefore, we propose limiting the laboratory PCB analysis of soil to the 7 Aroclor mixtures.

3.2 Objectives

Stantec will conduct soil sampling activities to characterize the magnitude and extent of residual impacts to soil beneath two PCB release areas.

The primary objective of this investigation is to determine the volume of soil warranting excavation concurrent with removal of the PCB-impacted flooring in the Loading Dock and Area 8. Standard Operating Procedures (SOPs) for tasks associated with this work plan are presented in the Quality Assurance Project plan (QAPP; Stantec, 2015) and associated addenda/updates (Stantec, 2016a and 2016c). Reuse of the Loading Dock and Area 8 remains unknown, but the Site is likely to be redeveloped as mixed-use multi-family residential/commercial with surface parking and/or green space. PCB cleanup objectives in soil are based on occupancy ("high occupancy" vs. "low occupancy"). For comparison purposes, in addition to comparing to ch. NR 720 Wisconsin Administrative Code (WAC) soil residual concentration levels (RCLs) for the direct contact pathway at industrial properties and to soil standards for the soil to groundwater exposure pathway, pursuant to the One Cleanup Program Memorandum of Agreement (WDNR PUB RR-786), PCB data will be compared to the following cleanup action levels per 40 CFR 761.61(a)(4)(i)(A) and 40 CFR 761.61(a)(4)(i)(B):

Occupancy Level	Total PCB Cleanup Action Level Threshold
High	A: < 1 PPM
	B: > 1 PPM to < 10 PPM
Low	C: < 25 PPM
	D: 25 PPM to < 50 PPM
	E: 25 PPM to < 100 PPM
	F: > 100 PPM

PPM = milligrams per kilogram, total PCBs

As the occupancy level and proposed reuse of portions of the Site impacted with PCBs remain unknown, the interim remedial objective for soil will be 100 ppm total PCBs (the total of 7 Aroclor mixtures). Therefore, this work will primarily focus on delineation of residual soil impacts up to 100 PPM total PCBs. If practical, we will attempt to delineate soil impacts down to 50 PPM as a secondary objective. Future redevelopment may require additional delineation based on proposed reuse.

The secondary objective is to evaluate soil beneath the Loading Dock and Area 8 for a broader range of constituents (VOCs and PAHs) generally associated with petroleum solvents potentially used in previous transformer oil cleanup activities. PAH and VOC data will be compared to ch. NR 720 WAC soil RCLs for the direct contact pathway at industrial properties and to soil standards for the soil to groundwater exposure pathway.

3.3 Soil Boring and Subsurface Assessment

As illustrated on Figures 3 and 4, soil assessment in the Loading Dock and Area 8, respectively, will include advancing up to 67 soil borings up to 15 feet below ground surface using dual-tube direct-push drilling methods. The density of sampling is designed to meet USEPA sample requirements for PCB's and to tightly define the volume of soil impacted with PCBs in order to accurately assess remedial costs. Actual locations may be adjusted based on accessibility and the location of underground anomalies, such as the tunnel network. The elevation of the ground surface at each soil boring will be surveyed relative to a static site datum using a laser level per SOP No. 15 (Stantec, 2015).

Soil sampling and field classification will be conducted according to SOP No. 02 (Stantec, 2015). Sample collection and laboratory analytical methods for soil samples, as well as the rational for selecting sample locations and criteria to be used for selection of specific depth intervals for analysis, are presented in Table 1 (Loading Dock) and Table 2 (Area 8).

Soil samples will be collected continuously with four to five foot samplers. Soil samples will be visually and physically examined by Stantec field geologists, and observations made of the general soil type (percentages of gravel, sand, silt, and clay), any visible layering, evidence of non-native fill materials (with estimated percentages of these materials contained in the soil matrix), indications of chemical or other staining, odors, and any other distinctive features as described in SOP No. 02 (Stantec, 2015). In addition, pertinent observations noted during installation of the soil borings will be documented on the soil boring logs.

Soil samples will be field screened for the presence of VOCs using a photoionization detector (PID) as described in SOP No. 01 (Stantec, 2015). The PID will be calibrated daily in the field in accordance with the manufacturer's specifications per SOP No. 09. If significant staining is apparent, samples will be further screened using a low-voltage ultraviolet light as described in SOP No. 16 (Stantec, 2015).

As summarized on Table 1 and Table 2, a minimum of one soil sample will be collected from directly below the concrete floor and analyzed for PCBs. Soil samples will then be collected on half-foot intervals, placed in appropriate sample containers, and submitted to the laboratory for extraction. If the concentration of total PCBs in the soil sample from directly below the concrete floor is greater than 25 milligrams per kilogram, the laboratory will analyze deeper samples in a phased manner to provide for vertical delineation of residual soil impacts in each soil boring. As noted on Table 1 and Table 2, select soil samples may also be analyzed for VOCs and PAHs based on indications of impact (i.e. PID screening results, visual or olfactory observations, or fluorescence with ultraviolet light) and/or from directly above the water table.

All soil samples will be collected and preserved in accordance with SOP No. 02 and Table 3 of the QAPP (Stantec, 2015). All samples will be placed in laboratory-supplied containers (per SOP No. 02), preserved as appropriate, stored on ice, and submitted under chain-of-custody procedures to TestAmerica Laboratories (Chicago, Illinois), a State of Wisconsin-certified laboratory for analysis as described in the QAPP using protocols outlined in SOP No. 07. Samples will be submitted to the laboratory as soon as possible after collection (i.e. daily).

Each soil sample will be assigned a sample identification number (SIN) based on the following format:

Sample Type	Label for Type of Sample	Location Number	Sample Interval (feet bgs)	Sample Round	Sample Identification No. (SIN)	Location ID
Soil boring	SB	1	(0-2)	---	SB1(0-2)	SB1
Field Duplicate	FD	---	---	Number	FD1	---
Trip blank	TB	---	---	Number	TB1	---

bgs = below ground surface

Soil sampling equipment such as drilling tools will be decontaminated prior to arrival on-site and between each sampling location (SOP No. 08). Investigative wastes generated during the Soil Boring and Subsurface Investigation will be managed per SOP No. 10. In general, waste soil cuttings will be collected in Department of Transportation (DOT)-approved 55 gallon drums or other appropriate containers, sealed, labeled, and stored on site pending the completion of laboratory analysis and determination of disposal restrictions, if any. As appropriate, waste soil cuttings will be handled, transported, and disposed of by a licensed waste hauler per federal and state requirements. The generator of the waste will be the property owner at the time of the investigation.

3.3.1 Special Handling Considerations and QA/QC Samples

Collection and preservation of soil samples for VOC analysis will be performed in accordance with SOP No. 02 (Stantec, 2015). As summarized on Table 1 and Table 2, quality assurance/quality control (QA/QC) samples to be collected and analyzed will include a trip blank and field duplicate sample. Trip blanks prepared by the analytical laboratory will accompany the sample bottles from the time of shipment from the laboratory through the time the samples are returned for analysis. Trip blanks will be used to document any contamination detected in samples that may be attributable to shipping and field handling procedures, or contaminated sample containers. Trip blanks will be provided by the laboratory and will be subject to the same handling and transportation procedures as the investigative samples.

De-identified field duplicate samples will be collected and analyzed to evaluate sample variability and overall data precision. Duplicate samples will be collected from soil borings and depth intervals representing the range of site conditions. Duplicate samples will be collected and analyzed for constituents at a rate of one sample for every 20 or fewer investigative samples.

3.3.2 Chain-Of-Custody

Chain-of-custody procedures will be utilized to track possession and handling of individual samples from the time of collection in the field through the time of delivery to the analytical laboratory. The chain-of-custody program will include use of sample labels, custody seals, field logbooks, chain-of-custody forms and laboratory logbooks. All chain-of-custody procedures will be performed in accordance with SOP No. 07 (Stantec, 2015).

3.3.3 Field Log Book

An up-to-date field log book will be maintained by each sampling team to document daily activities (if more than one group of individuals is sampling). The log book will include a general list of tasks performed, additional data, or observations not listed on field data sheets and document communications with on-site personnel or visitors as these apply to the project.

4.0 GROUNDWATER ASSESSMENT

4.1 General

Proposed temporary groundwater monitoring well sampling locations and analyses are based on the environmental concerns and CSM detailed in Sections 1.3 and 2.2, respectively. A site-specific HASP, to be utilized by Stantec personnel during the assessment activities, is presented in Appendix B.

As noted in multiple previous reports, Aroclor 1260 is the primary Aroclor mixture associated with the drained transformer oils, known soil impacts, and residual PCB impacts to transformer components. Therefore, we propose limiting the laboratory PCB analysis of groundwater to the 7 Aroclor mixtures.

4.2 Objectives

Although PCBs are considered hydrophobic, the use of petroleum solvents during apparent previous cleaning activities could have mobilized PCBs and transported residual impacts to groundwater. The primary objective is to confirm PCB impacts to groundwater do not exist beneath the Loading Dock and Area 8. Secondarily, this evaluation will be used to focus the Site Investigation warranted at the Site under the ch. NR 700 WAC rule series. SOPs for tasks associated with this work plan are presented in the QAPP (Stantec, 2015) and associated addenda/updates (Stantec, 2016a and 2016c).

Groundwater quality data will be compared to ch. NR 140 WAC groundwater standards. VOCs detected in groundwater will be used to provide screening of the vapor intrusion pathway per WDNR Pub-RR800. If constituents exceed ch. NR 140 WAC Preventive Action Limits, permanent ch. NR 141 WAC groundwater monitoring wells will be installed during the ch. NR 716 Site Investigation for confirmation/delineation purposes.

4.3 Groundwater Assessment

As illustrated on Figures 3 and 4, the groundwater assessment will include the completion of 12 soil borings described in Section 3 as one-inch diameter temporary groundwater monitoring wells. The depth for the new wells will depend on the actual depth at which groundwater is encountered beneath the Site. The wells will be constructed in general conformance with ch. NR 141 WAC using 1-inch diameter poly-vinyl chloride casing with 10-foot long 0.010-inch slotted-screens placed to intersect the water table surface. It is anticipated that well depths will be approximately 15 feet below ground surface. The wells may be protected with a flush mounted steel protective cover.

The elevation of the top of each well casing will be surveyed relative to a static site datum using a laser level per SOP No. 15 (Stantec, 2015).

Following installation and recovery, and prior to purging and collection of groundwater samples, the elevation of the groundwater table will be measured and the volume of water present within each well will be calculated using the procedures set forth in SOP No. 04 (Stantec, 2015). Groundwater elevation data will also be used to document the gradient in potentiometric surface.

The depth and thickness of floating (light) and/or sinking (dense) non-aqueous phase liquids, if present, will be measured using an interface probe. SOP No. 04 details the procedures that will be used to detect immiscible layers. The interface probe will be decontaminated in accordance with SOP No. 08 (Stantec, 2015).

Each temporary well will be purged prior to sampling in accordance with SOP No. 04 (Stantec, 2013). If the geologic materials surrounding the well are low yielding, then the wells will be completely evacuated, and groundwater samples collected after the water level recovers sufficiently to provide the volume of water needed to fill sample containers for the desired analyses. Temperature, pH, dissolved oxygen and specific conductance will be measured on the evacuated purge water (SOP No. 04). The well may be purged using any of the following methods: a peristaltic pump, a low-flow Micro-Purge Sampling System (or equivalent), a Voss disposable polyethylene bailer (or equivalent),

or a Waterra hand pump (or equivalent) or similar equipment. Non-disposable purging equipment will be decontaminated in accordance with SOP No. 08 (Stantec, 2015).

After purging, groundwater samples will be collected from all temporary groundwater monitoring wells, and analyzed for PCBs, VOCs, and PAHs per SOP No. 04 (Stantec, 2015). All samples will be placed in laboratory-supplied containers (per SOP No. 04), preserved as appropriate, stored on ice, and submitted under chain-of-custody procedures to TestAmerica Laboratories (Chicago, Illinois), a State of Wisconsin-certified laboratory for analysis as described in the QAPP using protocols outlined in SOP No. 07. Anticipated sample collection and laboratory analytical methods for groundwater samples are summarized on Table 3 and Table 4.

Each groundwater sample will be assigned a SIN based on the following format:

Sample Type	Label for Type of Sample	Location Number	Sample Round	Sample Identification No. (SIN)	Location ID
Temporary well	TW	1	01	TW1(01)	TW1
Field Duplicate	FD	---	---	FD1	---

Decontamination procedures for any non-dedicated or non-disposable equipment used for collection of groundwater samples will also be performed using the procedures set forth in SOP No. 08 (Stantec, 2015).

All purge water will be collected in DOT-approved 55 gallon drums or other appropriate containers, sealed, labeled, and stored on site pending the completion of laboratory analysis and determination of disposal restrictions, if any per SOP No. 10 (Stantec, 2015). As appropriate, purge water will be handled, transported, and disposed of by a licensed waste hauler per federal and state requirements. The generator of the waste will be the property owner at the time of the investigation.

The groundwater monitoring wells will be decommissioned in accordance with SOP No. 04 (Stantec, 2015) and sealed in accordance with ch. NR 141.25 WAC prior to concrete removal in the two areas.

4.3.1 Special Handling Considerations and QA/QC Samples

Collection and preservation of groundwater samples for VOC analysis will be performed in accordance with SOP No. 04 (Stantec, 2015). Headspace should not be present in the sample container, thus minimizing the volatilization of organics from the sample. The laboratory will supply the pre-preserved 40-ml glass vials with Teflon™-lined lids.

As summarized on Table 3 and Table 4, QA/QC samples to be collected and analyzed will include a trip blank and a field duplicate sample.

Trip blanks prepared by the analytical laboratory will accompany the sample bottles from the time of shipment from the laboratory through the time the samples are returned for analysis. Trip blanks will be used to document any contamination detected in samples that may be attributable to shipping and field handling procedures, or contaminated sample containers. Trip blanks will be provided by the laboratory and will be subject to the same handling and transportation procedures as the investigative samples. At least one trip blank sample will accompany each shipping container that contains samples for VOC analysis.

De-identified field duplicate samples will be collected and analyzed to evaluate sample variability and overall data precision. For groundwater samples, the duplicate samples will be “field replicate samples” collected at the same time from the same well. To the extent practicable, multiple bottles associated with a set of duplicate samples will be filled in two or three stages such that each bottle receives a portion of the water from each section of the bailer, or each interval of sample pump operation. In recognition that data for duplicate samples are most meaningful when there are detectable concentrations present of constituents of concern, if there are existing groundwater data, or other data by which to anticipate wells with greater levels of contamination, duplicate samples will be preferentially collected from wells where detectable concentrations of constituents of

concern are most likely to be present. Otherwise, duplicate samples will be collected from a randomly selected well or wells. Duplicate samples will be collected and analyzed for constituents at a rate of one sample for every 20 or fewer investigative samples.

4.3.2 Chain-Of-Custody

Chain-of-custody procedures will be utilized to track possession and handling of individual samples from the time of collection in the field through the time of delivery to the analytical laboratory. The chain-of-custody program will include use of sample labels, custody seals, field logbooks, chain-of-custody forms and laboratory logbooks. All chain-of-custody procedures will be performed in accordance with SOP No. 07 (Stantec, 2015).

4.3.3 Field Log Book

An up-to-date field log book will be maintained by each sampling team to document daily activities (if more than one group of individuals is sampling). The log book will include a general list of tasks performed, additional data or observations not listed on field data sheets, and document communications with on-site personnel or visitors as these apply to the project.

5.0 REPORT

The Phase II ESA will enable refinement of the conceptual model of the physical subsurface conditions and contaminant sources at the Site. The Phase II ESA report will include:

- Laboratory Analytical Reports
- Soil boring logs
- Monitoring Well Construction Forms
- Field PID data
- Groundwater Elevation Data
- Tables Summarizing Analytical Results for Soil and Groundwater Samples
- Potentiometric Surface Map of Shallow Groundwater

If warranted, modifications to the Brandenburg (2017) *Self-Implementing Cleanup and Disposal Plan for Polychlorinated Biphenyls* to facilitate removal of residual PCB impacts to the subsurface concurrently with removal of PCB-impacted porous building materials will be included in the Phase II ESA. Further, recommendations for future actions to further investigate and/or address residual subsurface impacts will also be provided in the Phase II ESA Report.

6.0 REFERENCES

AECOM, 2009, Phase II Subsurface Assessment, Former Mirro Plant No. 9, 1512 Washington Street, Manitowoc, Wisconsin, May 2009.

AES, 2011, Targeted Brownfields Assessment, Former Mirro Plant No. 9, 1512 Washington Street, Manitowoc, Wisconsin, March 2009.

Brandenburg, 2017, Work Execution Plan; Self-Implementing Cleanup and Disposal Plan for Polychlorinated Biphenyls, Mirro Building, 1512 Washington Street; Manitowoc, Wisconsin, April 22, 2017.

Crumbling, D. 2004, Summary of the Triad Approach, White Paper, U.S. EPA, Office of Superfund Remediation and Technology Innovation, March 25, 2004.

Symbiont, 2016, Site Investigation Results and Summary of Previous Site Assessment, Former Mirro Plant 9 1512 Washington Street, Manitowoc, Wisconsin, August 1, 2016.

Stantec, 2015, Quality Assurance Project Plan (Revision 0), Implementation of U.S. EPA Assessment Grants for Petroleum and Hazardous Substance Brownfields, City of Manitowoc, WI, U.S. EPA Cooperative Agreement Nos. BF- BF-00E01529-0, August 19, 2015.

Stantec, 2016a, Quality Assurance Project Plan Addendum 1, June 3, 2016.

Stantec, 2016b, 1512 Washington Street Manitowoc, Wisconsin, Phase I Environmental Site Assessment, June 28, 2016.

Stantec, 2016c, Quality Assurance Project Plan Update and Addendum 2, August 15, 2016.

Stantec, 2017, Identification and Delineation of TSCA-Level PCB Impacts to Porous Building Materials, 1512 Washington Street, Manitowoc, Wisconsin, February 22, 2017.

TABLES

Table 1
Proposed Laboratory Analysis for Soil in the Loading Dock
1512 Washington Street
Manitowoc, Wisconsin

Soil Boring ID	Estimated Soil Boring Depth (ft)	Rationale	PCBs (8082)	VOCs (8260)	PAHs (8270)
SB-1	8 Feet	SB-1 will evaluate soil quality beneath the loading dock adjacent to and below the catch basin, near flooring sample B21.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-2	8 Feet	SB-2 will evaluate soil quality beneath the loading dock, north of flooring sample B37.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-3	8 Feet	SB-3 will evaluate soil quality beneath the loading dock adjacent to the northern loading ramp, near flooring sample B18.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-4	8 Feet	SB-4 will evaluate soil quality below the loading dock adjacent to the concrete column, near flooring sample B36	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-5	8 Feet	SB-5 will evaluate soil quality beneath the loading dock between the concrete column and concrete footing.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-6	8 Feet	SB-6 will evaluate soil quality beneath the loading dock adjacent to the concrete footing.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-7	8 Feet	SB-7 will evaluate soil quality beneath the loading dock.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-8	8 Feet	SB-8 will evaluate soil quality beneath the loading dock south of the concrete footing.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-9	8 Feet	SB-9 will evaluate soil quality beneath the loading dock, adjacent to the southern loading ramp.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-10	8 Feet	SB-10 will evaluate soil quality beneath the northern loading ramp, near flooring sample B5	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-11	8 Feet	SB-11 will evaluate soil quality beneath the southern loading ramp.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-12	8 Feet	SB-12 will evaluate soil quality beneath the former factory floor along the north foundation wall of the building.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-13	8 Feet	SB-13 will evaluate soil quality beneath the former factory floor along the north foundation wall of the building.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-14	8 Feet	SB-14 will evaluate soil quality below the concrete floor adjacent to the concrete footing.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-15	8 Feet	SB-15 will evaluate soil quality below the area of previous concrete removal along the south foundation wall.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-16	8 Feet	SB-16 will evaluate soil quality beneath the concrete floor adjacent to flooring sample B3.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-17	8 Feet	SB-17 will evaluate soil quality below the area of previous concrete removal.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-18	8 Feet	SB-18 will evaluate soil quality east of the foundation wall and beneath the concrete floor in the adjacent room.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-19	8 Feet	SB-19 will evaluate soil quality beneath the concrete floor west of the prior concrete removal area.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-20	8 Feet	SB-20 will evaluate soil quality below the area of previous concrete removal.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-21	8 Feet	SB-21 will evaluate soil quality beneath the concrete floor west of the prior concrete removal area.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-22	8 Feet	SB-20 will evaluate soil quality below the area of previous concrete removal, near flooring sample B1.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-23	8 Feet	SB-23 will evaluate soil quality east of the foundation wall and beneath the concrete floor in the adjacent room.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-24	8 Feet	SB-24 will evaluate soil quality beneath the concrete floor west of the prior concrete removal area.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-25	8 Feet	SB-25 will evaluate soil quality beneath the concrete floor adjacent to the concrete column.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-26	8 Feet	SB-26 will evaluate soil quality beneath the concrete floor near the adjacent room, north of flooring sample B12.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts

Table 1
Proposed Laboratory Analysis for Soil in the Loading Dock
1512 Washington Street
Manitowoc, Wisconsin

SB-27	8 Feet	SB-27 will evaluate soil quality beneath the concrete floor near previous soil boring SB-13.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-28	8 Feet	SB-28 will evaluate soil quality beneath the concrete floor northeast of flooring sample B39 and west of proposed soil boring SB-29.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-29	8 Feet	SB-29 will evaluate soil quality beneath the concrete floor west of proposed soil boring SB-16.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-30	8 Feet	SB-30 will evaluate soil quality beneath the concrete floor at previous building sample B40.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-31	8 Feet	SB-31 will evaluate soil quality beneath the concrete floor at previous building sample B42.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-32	8 Feet	SB-32 will evaluate soil quality beneath the concrete floor north of previous soil boring SB-9.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-33	8 Feet	SB-33 will evaluate soil quality beneath the concrete floor northeast of SB-9.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-34	8 Feet	SB-34 will evaluate soil quality northeast of proposed soil boring SB-13.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-35	8 Feet	SB-35 will evaluate soil quality beneath the concrete floor at previous building sample B4.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-36	8 Feet	SB-36 will evaluate soil quality beneath the concrete floor at previous building sample B7.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-37	8 Feet	SB-37 will evaluate soil quality beneath the concrete floor at previous building sample B15.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-38	8 Feet	SB-38 will evaluate soil quality beneath the concrete floor at previous building sample B29.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-39	8 Feet	SB-39 will evaluate soil quality beneath the concrete floor at previous building sample B27.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-40	8 Feet	SB-40 will evaluate soil quality beneath the concrete floor east of previous building sample B13.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-41	8 Feet	SB-41 will evaluate soil quality beneath the concrete floor outside of the PCB removal area at previous building sample B30.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-42	8 Feet	SB-42 will evaluate soil quality beneath the concrete floor outside of the PCB removal area at previous building sample B30.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-43	8 Feet	SB-43 will evaluate soil quality beneath the concrete floor outside of the PCB removal area east of proposed soil boring SB-18.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-44	8 Feet	SB-44 will evaluate soil quality beneath the concrete floor outside of the PCB removal area east of proposed soil boring SB-43.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
Estimated number of investigative samples to be analyzed			88	10	10
Trip Blank		Field and Laboratory QAQC Sample	0	1	0
Field Duplicate		Assess the quality of the data and collection techniques.	4	1	1
Estimated number of QAQC samples to be analyzed			4	2	1
Estimated number of samples to be analyzed			92	12	11

Notes:
FD = Field Duplicate
QAQC = Quality Assurance Quality Control
PCB = Polychlorinated Biphenyl (7 Aroclor Mixtures)
VOC = Volatile Organic Compounds
PAH = Polycyclic Aromatic Hydrocarbons
(6010) = Laboratory analytical method (SW-846)

Table 2
Proposed Laboratory Analysis for Soil in Area 8
1512 Washington Street
Manitowoc, Wisconsin

Soil Boring ID	Estimated Soil Boring Depth (ft)	Rationale	PCBs (8082)	VOCs (8260)	PAHs (8270)
SB-1	8 Feet	SB-1 will evaluate soil quality west of the foundation wall.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-2	8 Feet	SB-2 will evaluate soil quality beneath the concrete floor outside of the PCB removal area, near previous flooring sample B20.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-3	8 Feet	SB-3 will evaluate soil quality beneath the concrete floor, near previous flooring sample B19.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-4	8 Feet	SB-4 will evaluate soil quality below the concrete floor near the edge of the PCB removal area.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-5	8 Feet	SB-5 will evaluate soil quality beneath the concrete floor outside of the PCB removal area.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-6	8 Feet	SB-6 will evaluate soil quality beneath the concrete floor, near flooring sample B9.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-7	8 Feet	SB-7 will evaluate soil quality below the concrete floor near the edge of the PCB removal area.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-8	8 Feet	SB-8 will evaluate soil quality below the concrete floor, adjacent to the former transformer pad.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-9	8 Feet	SB-9 will evaluate soil quality adjacent to the former transformer pad and I-column, adjacent to previous flooring sample "Column-2".	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-10	8 Feet	SB-10 will evaluate soil quality beneath the concrete floor outside of the PCB removal area.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-11	8 Feet	SB-11 will evaluate soil quality west of the foundation wall, north of previous floor sample B3.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-12	8 Feet	SB-12 will evaluate soil quality beneath the western edge of the transformer pad.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-13	8 Feet	SB-13 will evaluate soil quality beneath the transformer pad, near previous flooring sample B6.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-14	8 Feet	SB-14 will evaluate soil quality below the concrete floor, near previous flooring sample B5.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-15	8 Feet	SB-15 will evaluate soil quality beneath the concrete floor near previous flooring sample B14.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
SB-16	8 Feet	SB-16 will evaluate soil quality west of the foundation wall, south of previous floor sample B3.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-17	8 Feet	SB-17 will evaluate soil quality beneath the transformer pad, near the south and west walls.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-18	8 Feet	SB-18 will evaluate soil quality beneath the transformer pad, near the south wall.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-19	8 Feet	SB-19 will evaluate soil quality beneath the concrete, adjacent to the transformer pad.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-20	8 Feet	SB-20 will evaluate soil quality beneath the concrete floor, east of proposed SB-19.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-21	8 Feet	SB-21 will evaluate soil quality beneath the concrete floor west of the proposed PCB removal area.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-22	8 Feet	SB-22 will evaluate soil quality below the concrete floor south of the foundation wall, near previous flooring sample B8.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	*None, unless PID suggests a release*	(1) Visual or Olfactory Indications of Impacts
SB-23	8 Feet	SB-23 will evaluate soil quality below the concrete floor south of the foundation wall, near previous flooring sample B7.	*(1) Directly below concrete floor and (2)Half-Foot Intervals*	(1) Highest PID	(1) Visual or Olfactory Indications of Impacts
Estimated number of investigative samples to be analyzed			46	5	10
Trip Blank		Field and Laboratory QAQC Sample	0	1	0
Field Duplicate		Assess the quality of the data and collection techniques.	3	1	1
Estimated number of QAQC samples to be analyzed			3	2	1
Estimated number of samples to be analyzed			49	7	11

Notes:
FD = Field Duplicate
QAQC = Quality Assurance Quality Control
PCB = Polychlorinated Biphenyl (7 Aroclor Mixtures)
VOC = Volatile Organic Compounds
sVOC = Semi-Volatile Organic Compounds
PAH = Polycyclic Aromatic Hydrocarbons
* Samples collected for sVOC will not be additionally analyzed for PAHs.
(6010) = Laboratory analytical method (SW-846)

Table 3
Proposed Laboratory Analysis for Groundwater in Area 8
1512 Washington Street
Manitowoc, Wisconsin

Well ID	Estimated Well Depth (ft)	Rationale	PCBs (8082)	VOCs (8260)	PAHs (8270)
SB-1/TW-1	15 Feet	TW-1 will evaluate groundwater quality adjacent to the catch basin in the Loading Dock	1	1	1
SB-5/TW-2	15 Feet	TW-2 will evaluate groundwater beneath the Loading Dock apron.	1	1	1
SB-7/TW-3	15 Feet	TW-3 will evaluate groundwater beneath the Loading Dock apron.	1	1	1
SB-13/TW-4	15 Feet	TW-4 will evaluate groundwater quality north of the PCB release area, beyond the foundation wall.	1	1	1
SB-15/TW-5	15 Feet	TW-5 will evaluate groundwater quality inside the greatest PCB impacted area.	1	1	1
SB-19/TW-6	15 Feet	TW-6 will evaluate groundwater quality west of the PCB release area.	1	1	1
SB-20/TW-7	15 Feet	TW-7 will evaluate groundwater quality inside the greatest PCB impacted area, near GP-8.	1	1	1
SB-27/TW-8	15 Feet	TW-8 will evaluate groundwater quality south of the PCB release area, near MB-SB-13.	1	1	1
Estimated number of investigative samples to be analyzed			8	8	8
Field Duplicate (FD)		Assess the quality of the data and collection techniques.	1	1	1
Trip Blank (TB)		Field and Laboratory QAQC Sample		1	
Estimated number of QAQC samples to be analyzed			1	2	1
Estimated number of samples to be analyzed			9	10	9

Notes:
FD = Field Duplicate
QAQC = Quality Assurance Quality Control
PCB = Polychlorinated Biphenyl (7 Aroclor Mixtures)
VOC = Volatile Organic Compounds
PAH = Polycyclic Aromatic Hydrocarbons
(6010) = Laboratory analytical method (SW-846)

Table 4
Proposed Laboratory Analysis for Groundwater in Area 8
1512 Washington Street
Manitowoc, Wisconsin

Well ID	Estimated Well Depth (ft)	Rationale	PCBs (8082)	VOCs (8260)	PAHs (8270)
SB-5/TW-1	15 Feet	TW-1 will evaluate groundwater quality beneath "Building I", outside of the TSCA-PCB impacted flooring area.	1	1	1
SB-11/TW-2	15 Feet	TW-2 will evaluate quality benath "Building J" outside of the TSCA-PCB impacted flooring area.	1	1	1
SB-22/TW-3	15 Feet	TW-3 will evaluate quality benath "Building O" outside of the TSCA-PCB impacted flooring area.	1	1	1
SB-13/TW-4	15 Feet	TW-4 will evaluate groundwater quality beneath the former transformer slab.	1	1	1
Estimated number of investigative samples to be analyzed			4	4	4
Field Duplicate (FD)		Assess the quality of the data and collection techniques.	1	1	1
Trip Blank (TB)		Field and Laboratory QAQC Sample		1	
Estimated number of QAQC samples to be analyzed			1	2	1
Estimated number of samples to be analyzed			5	6	5

Notes:
FD = Field Duplicate
QAQC = Quality Assurance Quality Control
PCB = Polychlorinated Biphenyl (7 Aroclor Mixtures)
VOC = Volatile Organic Compounds
PAH = Polycyclic Aromatic Hydrocarbons
(6010) = Laboratory analytical method (SW-846)

FIGURES

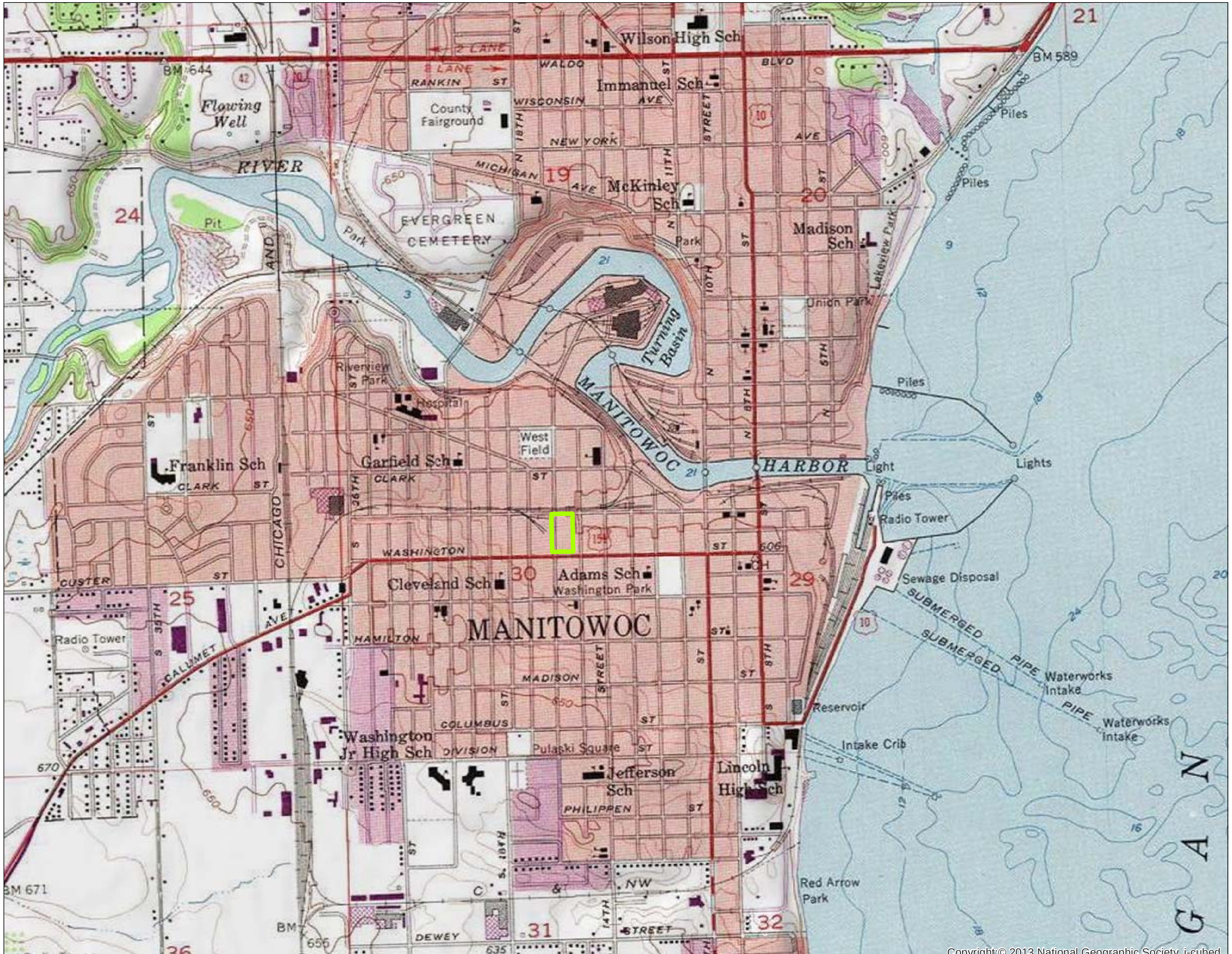


Figure No.
1A

Title
Figure 1A
Site Location and Local Topography

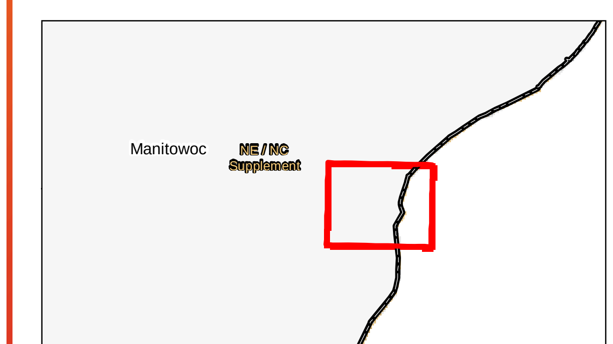
Client/Project
City of Manitowoc
USEPA Brownfield Assessment Grant
Hazardous Substances

0 1,050 2,100 Feet

193703931
Prepared by HLB on 5-24-16

N

Legend
Target Site



Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include:
   Topo Map: USGS/National Geographic Society

Stantec

Figure No.
1B

Title
Figure 1B
Site Location and 2014 Ortho

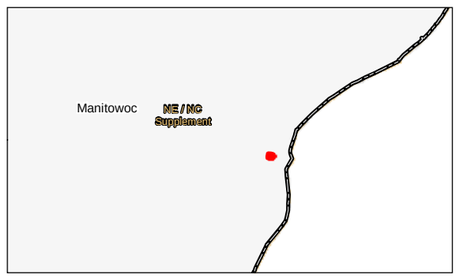
Client/Project
City of Manitowoc
USEPA Brownfield Assessment Grant
Hazardous Substances

0 65 130 Feet

193703931
Prepared by HLB on 5-24-16

Legend
- Target Site
- Parcels

N



Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803
2. Feet
3. Data Sources Include:
   Orthophotography: 2015 City of Mantiowoc

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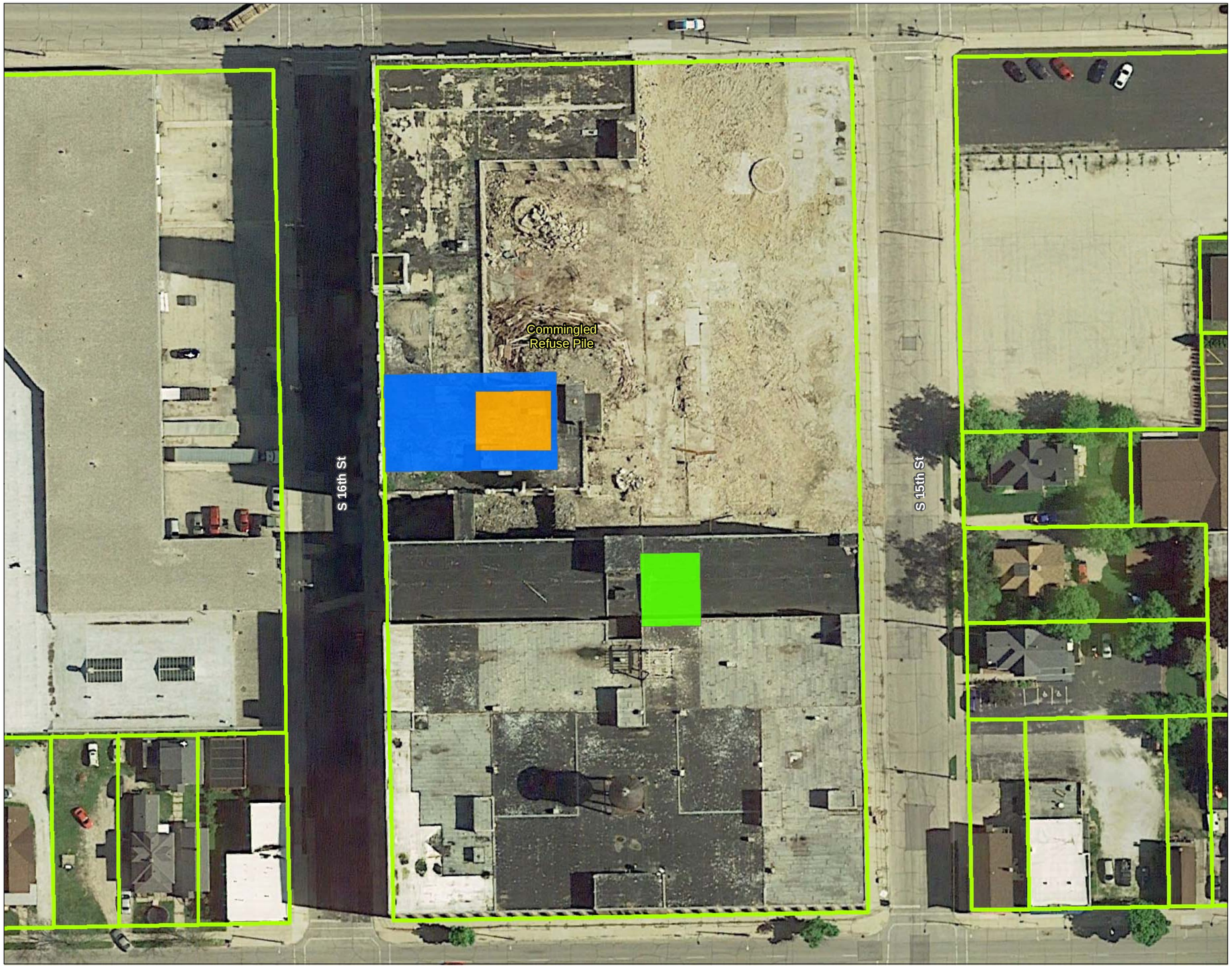


Figure No.
2

Title
FIgure 2. PCB Focus Areas

Client/Project
City of Manitowoc
USEPA Brownfield Assessment Grant
Hazardous Substances

Project Location
T19N, R24E, S30
C. of Manitowoc,
Manitowoc Co., WI

193703931
Prepared by HLB on 2016-12-20

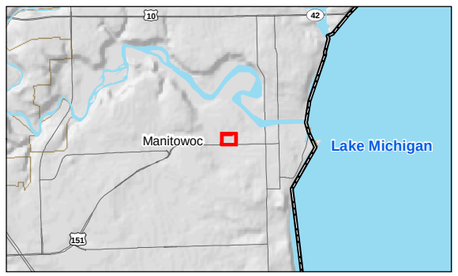
Legend

PCB Areas

- Area 14 (2nd Floor)
- Area 8 (Ground Floor)
- Loading Dock (Ground Floor)

N

0 75 150
Feet



Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include: Stantec, NADS

Stantec

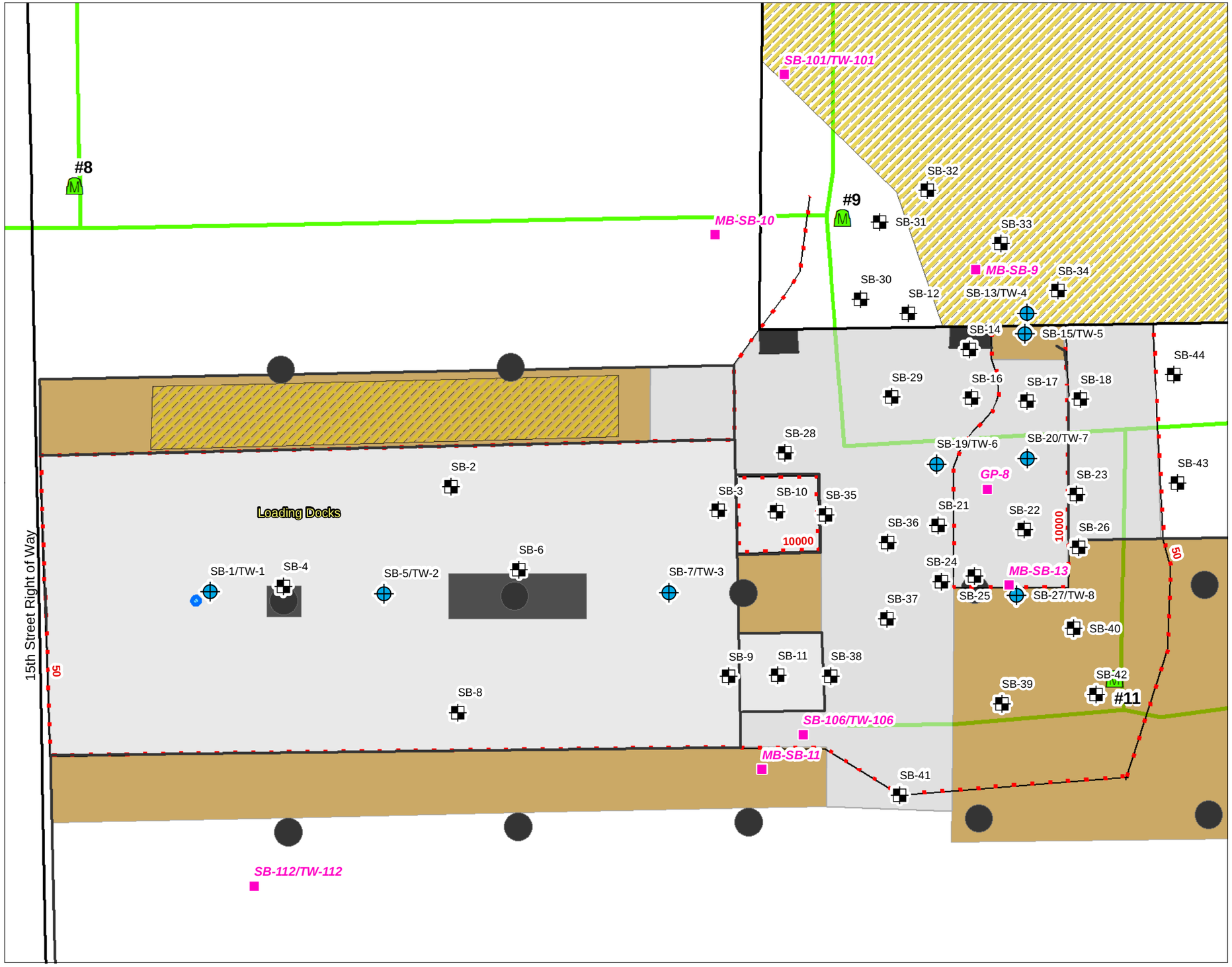
Figure No.
3

Title
Figure 3. Proposed Soil Borings in the Loading Dock Area

Client/Project
City of Manitowoc
USEPA Brownfield Assessment Grant
Petroleum Substances

Project Location
T19N, R24E, S30
C. of Manitowoc,
Manitowoc Co., WI

193703931
Prepared by HLB on 2016-12-20



Legend

Proposed Soil Borings

- Soil Boring (36)
- Soil Boring / Temp Well (8)
- Interior Building Walls
- Exterior Building Wall
- PCB Concentrations in Flooring
- Previous Soil Borings
- Tunnel Entrance
- Tunnel
- Catch Basin
- Concrete Column
- Concrete Footing

Area Features

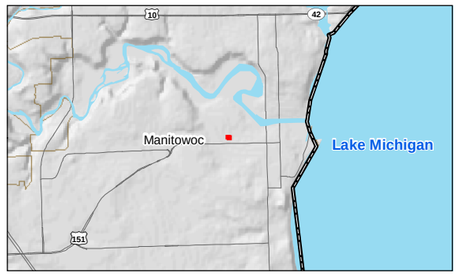
- Debris Pile
- Loading Dock

Flooring Type

- Wood Flooring
- Concrete

N

0 10 20 Feet



Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include: Stantec, NADS
3. Previous Soil Borings digitized from drawings provided in
4. Symbiont (2016); AES (2011); and AECOM (2009)

Stantec

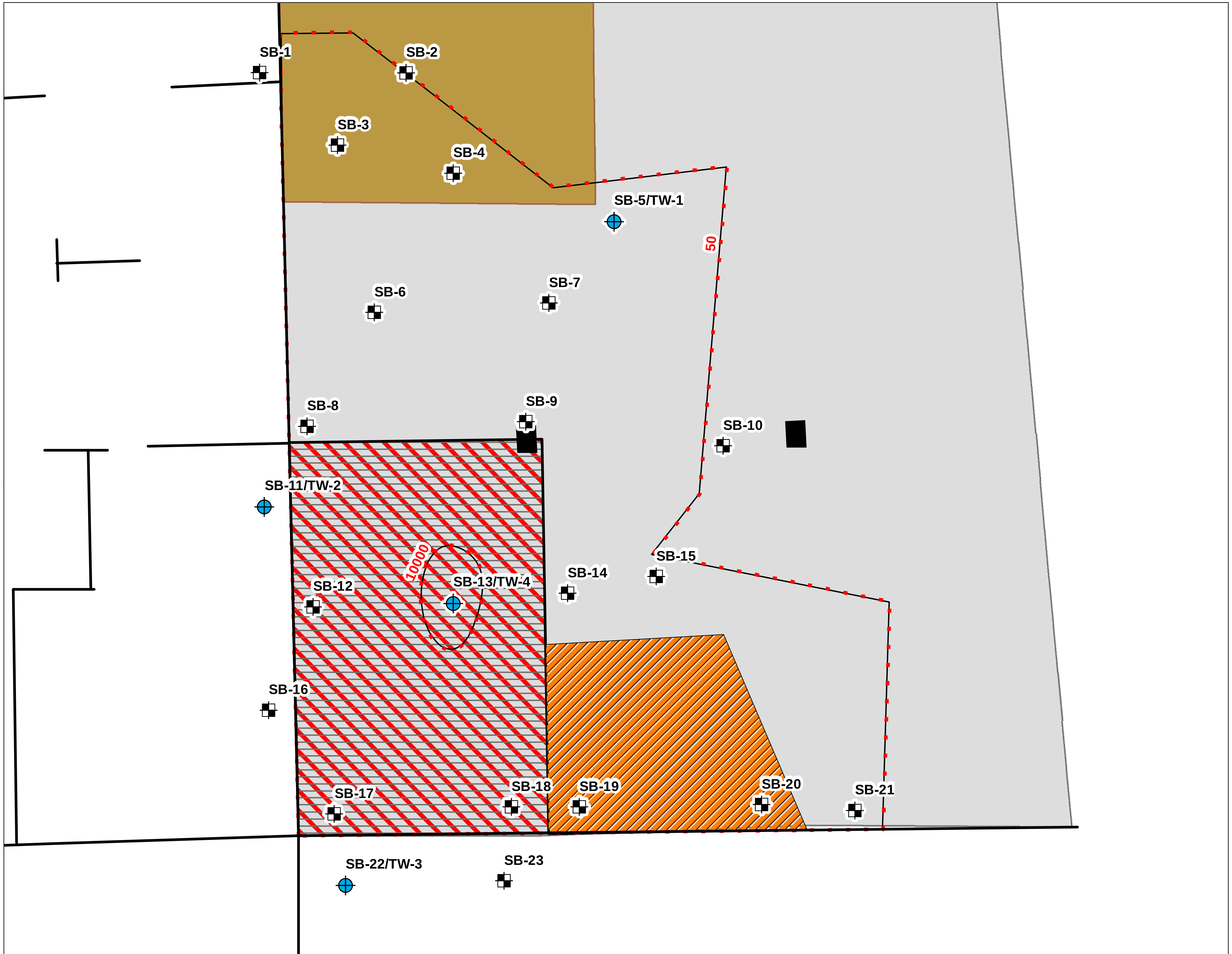


Figure No.
4

Title

Figure 4. Proposed Soil Boring Locations in Area 8

Client/Project

City of Manitowoc
USEPA Brownfield Assessment Grant
Hazardous Substances

Project Location
T19N, R24E, S30
C. of Manitowoc,
Manitowoc Co., WI

193703931
Prepared by HLB on 2016-12-20

N

Legend

- Soil Boring
- Soil Boring/Temp Well
- Interior Walls
- PCB Concentrations in Flooring

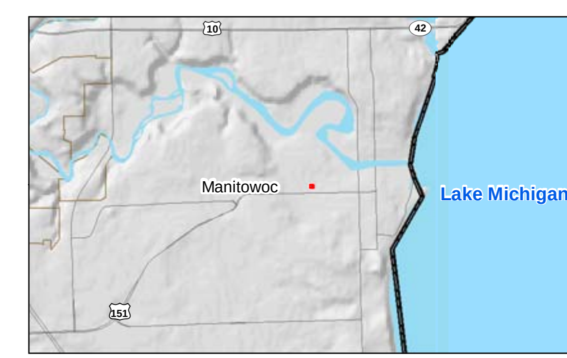
Area Features

- Debris Pile
- I-Column
- Transformer Slab

Flooring Type

- Concrete
- Wood

0 5 10
Feet



Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803 Feet
2. Data Sources Include: Stantec, NADS
3. Orthophotography: 2015 NAIP

Stantec

APPENDIX A – SELECT PAGES FROM PRIOR SITE INVESTIGATIONS

AECOM, 2009:

- TABLE 2
- SOIL BORING LOG FOR GP-8

AES, 2011:

- FIGURE 3
- TABLE 4A
- TABLE 4B
- TABLE 4D
- SOIL BORING LOGS FOR SB-9 THROUGH SB-11

SYMBIONT, 2016:

- TABLE 1
- TABLE 2
- TABLE 4
- FIGURE 5
- SOIL BORING LOGS FOR SB-101 AND SB-106

TABLE 2
SOIL ANALYTICAL RESULTS
MIRRO PLANT
OSHKOSH, WISCONSIN
PROJECT NO. 200803466

Parameters	Generic RCLs: Direct Contact Pathway Non-Industrial	Generic RCLs: Direct Contact Pathway Industrial	Generic RCLs: Groundwater Pathway	NR 746 Soil Screening Levels	GP-1 S02 2/16/09	GP-2 S03 2/16/09	GP-3 S03 2/16/09	GP-4 S05 2/16/09	GP-5 S02 2/17/09	GP-6 S03 2/17/09	GP-8 S02 2/17/09	GP-9 S01 2/16/09	GP-10 S01 2/16/09	GP-11 S01 2/16/09	GP-12 S02 2/17/09
Metals (mg/kg)															
Aluminum	--	--	--	--	NA	NA	NA	NA	16,000	8,000	NA	NA	NA	NA	NA
Arsenic	0.039 [E]	1.6 [E]	0.58	--	NA	<0.27	NA	<1.4	0.40 "J"	<1.4	NA	NA	NA	NA	NA
Barium	3,130	2.4×10^5 [E]	3,300	--	NA	NA	NA	8.1	230	32	NA	NA	NA	NA	NA
Cadmium	8.0 [E]	510 [E]	1.5	--	NA	NA	NA	0.054 "J"	0.8	0.096 "J"	NA	NA	NA	NA	NA
Chromium	16,000 [E]	1.53×10^6 [E]	--	--	NA	6.0	NA	5.6	6.7	14	NA	NA	NA	NA	NA
Lead	50 [E]	500 [E]	--	--	NA	3.5	NA	2.1	10	4.4	NA	NA	NA	NA	NA
Selenium	78.2	5,110	1.0	--	NA	NA	NA	**1.2** [C]	**8.4** [C]	0.76	NA	NA	NA	NA	NA
Silver	78.2	5,110	1.67	--	NA	NA	NA	<0.16	<0.16	<0.16	NA	NA	NA	NA	NA
Mercury	--	--	0.42	--	NA	NA	NA	0.011 "J"	0.015 "J"	0.028	NA	NA	NA	NA	NA
VOCs (µg/kg)															
Benzene	1,100 [E]	52,000	5.5 [E]	8,500	<20	**51 "J"** [C]	<20	<200	<20	<20	NA	<20	<20	**27.3 "J"** [C]	<20
Bromobenzene	--	--	--	--	<34	<34	<34	<340	<34	<34	NA	<34	<34	<34	<34
Bromochloromethane	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	1,030	46,200	0.24	--	<16	<16	<16	<160	<16	<16	NA	<16	<16	<16	<16
Bromoform	8,090	362,000	2.0	--	<23	<23	<23	<230	<23	<23	NA	<23	<23	<23	<23
Bromomethane	21,900	1,430,000	4.0	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	--	--	--	--	<25	<25	<25	410 "J"	<25	<25	NA	<25	<25	46 "J"	<25
tert-Butylbenzene	--	--	--	--	<23	<23	<23	<230	<23	<23	NA	<23	<23	<23	<23
n-Butylbenzene	--	--	--	--	<35	<35	<35	1,910	<35	<35	NA	<35	86 "J"	264	<35
Carbon tetrachloride	491	22,000	5.0	--	<21	<21	<21	<210	<21	<21	NA	<21	<21	<21	<21
Chloroform	10,500	469,000	2.0	--	<50	<50	<50	<500	<50	<50	NA	<50	<50	<50	<50
Chlorobenzene	313,000	20,400,000	150	--	<16	<16	<16	<160	<16	<16	NA	<16	<16	<16	<16
Chlorodibromomethane	760	34,100	24	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	--	--	--	--	<23	<23	<23	<230	<23	<23	NA	<23	<23	<23	<23
Chloromethane	4,910	220,000	1.0	--	**43 "J"** [C]	<43	<43	**480 "J"** [C]	<43	<43	NA	**57 "J"** [C]	**53 "J"** [C]	**72 "J"** [C]	<43
2-Chlorotoluene	313,000	20,400,000	--	--	<31	<31	<31	<310	<31	<31	NA	<31	<31	<31	<31
4-Chlorotoluene	--	--	--	--	<24	<24	<24	<240	<24	<24	NA	<24	<24	<24	<24
1,2-Dibromo-3-chloropropane	46	2,040	0.1	--	<37	<37	<37	<370	<37	<37	NA	<37	<37	<37	<37
1,2-Dibromoethane	31.9	1,430	0.033	--	<21	<21	<21	<210	<21	<21	NA	<21	<21	<21	<21
Dibromomethane	156,000	10,200,000	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	--	--	--	--	<41	<41	<41	<410	<41	<41	NA	<41	<41	<41	<41
1,4-Dichlorobenzene	2,660	119,000	110	--	<42	<42	<42	<420	<42	<42	NA	<42	<42	<42	<42
1,2-Dichloroethane	702 [E]	31,400	4.9 [E]	600	<24	<24	<24	<240	<24	<24	NA	<24	<24	<24	<24
1,2-Dichlorobenzene	1,410,000	92,000,000	1,800	--	<32	<32	<32	<320	<32	<32	NA	<32	<32	<32	<32
1,1-Dichloroethene	782,000	51,100,000	10	--	<27	<27	<27	<270	<27	<27	NA	<27	<27	<27	<27
cis-1,2-Dichloroethene	156,000	10,200,000	55	--	<24	<24	<24	<240	<24	<24	NA	<24	<24	<24	<24
Dichlorodifluoromethane	3,130,000	204,000,000	21,918	--	<33	<33	<33	<330	<33	<33	NA	<33	<33	<33	<33
trans-1,2-Dichloroethene	313,000	20,400,000	98	--	<29	<29	<29	<290	<29	<29	NA	<29	<29	<29	<29
1,2-Dichloropropane	939	42,100	1.9	--	<19	<19	<19	<190	<19	<19	NA	<19	<19	<19	<19
1,1-Dichloroethane	3,130,000	204,000,000	349	--	<22	<22	<22	<220	<22	<22	NA	<22	<22	<22	<22
1,3-Dichloropropane	313,000	20,400,000	--	--	<21	<21	<21	<210	<21	<21	NA	<21	<21	<21	<21
2,2-Dichloropropane	--	--	--	--	<115	<115	<115	<1,150	<115	<115	NA	<115	<115	<115	<115
1,1-Dichloropropene	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diisopropyl ether	6,260,000	409,000,000	--	--	<15	<15	<15	<150	<15	<15	NA	<15	<15	<15	<15
Ethylbenzene	1,560,000	102,000,000	2,900 [E]	4,600	<16	37 "J"	<16	1,050	<16	<16	NA	<16	23.2 "J"	100	<16
Trichlorofluoromethane	4,690,000	307,000,000	9,264	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	819	36,700	--	--	<50	<50	<50	<500	<50	<50	NA	<50	<50	<50	<50
Isopropylbenzene	--	--	--	--	<30	<30	<30	<300	<30	<30	NA	<30	<30	40 "J"	<30
p-Isopropyltoluene	--	--	--	--	<30	<30	<30	<300	<30	<30	NA	<30	241	41 "J"	<30
Methylene chloride	8,520	382,000	1.6	--	<44	<44	<44	<440	<44	<44	NA	<44	<44	<44	<44
Methyl-tert-butyl-ether	--	--	--	--	<23	<23	<23	<230	<23	<23	NA	<23	<23	<23	<23
Naphthalene	60,000 [E]	4,000,000 [E]	400 [E]	2,700	<117	<117	<117	**14,200** [D]	<117	<117	NA	<117	252 "J"	**640** [C]	<117
n-Propylbenzene	--	--	--	--	<29	<29	<29	810 "J"	<29	<29	NA	<29	39 "J"	206	<29
Styrene	3,130,000	204,000,000	370	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	319	14,300	0.09	--	<25	<25	<25	<2,500	<25	<25	NA	<25	<25	<25	<25
1,1,1,2-Tetrachloroethane	2,460	110,000	157	--	<27	<27	<27	<2,700	<27	<27	NA	<27	<27	<27	<27
Tetrachloroethene	1,230	55,000	4.1	--	<18	<18	<18	<180	<18	<18	NA	<18	**27.8 "J"** [C]	**340** [C]	<18
Toluene	1,250,000	81,800,000	1,500 [E]	38,000	<23	131	<23	<230	37 "J"	<23	NA	28.8 "J"	290	152	<23
1,2,3-Trichlorobenzene	--	--	--	--	<87	<87	<87	<870	<87	<87	NA	<87	<87	<87	<87
1,2,4-Trichlorobenzene	156,000	10,200,000	540	--	<53	<53	<53	<530	<53	<53	NA	<53	<53	<53	<53
1,1,1-Trichloroethane	3,130,000	204,000,000	280	--	<27	<27	<27	<270	121	<27	NA	<27	<27	30.1 "J"	<27
1,1,2-Trichloroethane	1,120	50,200	1.9	--	<30	<30	<30	<300	<30	<30	NA	<30	<30	<30	<30
1,2,4-Trimethylbenzene [1]	782,000	51,100,000	7573	--	<53	41 "J"	<20	6,500	22.3 "J"	<20	NA	28.8 "J"	150	740	<53
Trichloroethene	160	7,150	3.7	--	<20	<20	<20	<200	**5,100** [A]	**40 "J"** [C]	NA	<20	**20.4 "J"** [C]	**1,260** [A]	<20
1,2,3-Trichloropropane	9.12	409	0.0076	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene [1]	782,000	51,100,000	3520	--	<24	<24	<24	1,810	26.8 "J"	<24	NA	<24	153	154	<24
Vinyl chloride	42.6	1,910	0.13	--	<17	<17	<17	<170	<17	<17	NA	<17	<17	<17	<17
Xylenes, total	3,130,000	204,000,000	4,100 [E]	42,000	<48	153 "J"	<48	3,490	44 "J"	<48	NA	<48	162 "J"	578	<48
PAHs (µg/kg) [F]															
Acenaphthene	900,000	60,000,000	38,000	--	<19	<19	<19	<19	<19	<19	NA	<19	<19	<19	<19
Acenaphthylene	18,000	360,000	700	--	<11	<11	<11	124	<11	26.6 "J"	NA	<11	<11	67	<11
Anthracene	5,000,000	300,000,000	3,000,000	--	<19	<19	<19	137	<19	21.3 "J"	NA	<19	39 "J"	140	<19
Benzo(a)anthracene	88	3,900	17,000	--	<16	<16	<16	46 "J"	19.9 "J"	20 "J"	NA	<16	**230** [A]	**312** [A]	<16
Benzo(a)pyrene	8.8	390	48,000	--	<25	<25	<25	<25	<25	<25	NA	<25	**390** [B]	**315** [A]	<25
Benzo(b)fluoranthene	88	3,900	360,000	--	<18	<18	<18	**95** [A]	34 "J"	32 "J"	NA	<18	**650** [A]	**320** [A]	<18
Benzo(ghi)perylene	1,800	39,000	6,800,000	--	<19	<19	<19	<19	19.6 "J"	42 "J"	NA	<19	201	51 "J"	<19
Benzo(k)fluoranthene	880	39,000	870,000	--	<16	<16	<16	<16	<16	<16	NA	<16	211	141	<16
Chrysene	8,800	390,000	37,000	--	<18	<18	<18	530	51 "J"	22.4 "J"	NA	<18	460	730	<18
Dibenzo(a,h)anthracene	8.8	390	38,000	--	<22	<22	<22	<22	<22	<22	NA	<22	**68 "J"** [A]	**77** [A]	<22
Fluroanthene	600,000	40,000,000	500,000	--	16.9 "J"	16.9 "J"	21.1 "J"	460	40 "J"	45	NA	<13	370	297	<13
Fluorene	600,000	40,000,000	100,000	--	<8.3	<8.3	<8.3	155	<8.3	<8.3	NA	<8.3	14.6 "J"	<8.3	<8.3
Indeno(1,2,3-cd)pyrene	88	3,900	680,000	--	<12	<12	<12	<12	<12	28.9 "J"	NA	<12	**175** [A]	61	<12
1-Methylnaphthalene	1,100,000	70,000,000	23,000	--	<15	<15	<15	121	70	<15	NA	<15	20.8 "J"	48 "J"	<15
2-Methylnaphthalene	600,000	40,000,000	20,000	--	<17	<17	<17	63	79	<17	NA	<17	22.2 "J"	53 "J"	<17
Naphthalene	20,000	110,000	400	--	<13	<13	<13	21 "J"	54	<13	NA	<13	33 "J"	40 "J"	<13
Phenanthrene	18,000	390,000	1,800	--	<14	<14	18.4 "J"	1620	131	41 "J"	NA	<14	203	284	<14
Pyrene	500,000	30,000,000	8,700,000	--	<15	<15	<15	113	38 "J"	38 "J"	NA	<15	330	1,250	<15
PCBs (mg/kg)				EPA Regulatory Limit											
Aroclor 1016	--	--	--	50	NA	NA	<0.002	<0.002	NA	<0.002	<2.0	<0.002	NA	NA	NA
Aroclor 1221	--	--	--	50	NA	NA	<0.0049	<0.0049	NA	<0.0049	<4.9	<0.0049	NA	NA	NA
Aroclor 1232	--	--	--	50	NA	NA	<0.0072	<0.0072	NA	<0.0072	<7.2	<0.0072	NA	NA	NA
Aroclor 1242	--	--	--	50	NA	NA	<0.0049	<0.0049	NA	<0.0049	<4.9	<0.0049	NA	NA	NA
Aroclor 1248	--	--	--	50	NA	NA	<0.0027	<0.0027	NA	<0.0027	<2.7	<0.0027	NA	NA	NA
Aroclor 1254	--	--	--	50	NA	NA	<0.005	<0.005	NA	<0.005	<5.0	<0.005	NA	NA	NA
Aroclor 1260	--	--	--	50	NA	NA	<0.0028	<0.0028	NA	<0.0028	**210**	0.017 "J"	NA	NA	NA

Notes:

VOCs = Volatile Organic Compounds
PAHs = Polynuclear Aromatic Hydrocarbons
PCBs = PolyChlorinated Biphenyls

[1] Standards are for 1,2,4- and 1,3,5-Trimethylbenzene combined.
[A] Parameter exceeds NR 720 Generic RCL for Non-Industrial Direct Contact.
[B] Parameter exceeds NR 720 Generic RCL for Industrial Direct Contact.
[C] Parameter exceeds NR 720 Generic RCL for Groundwater Pathway.
[D] Parameter exceeds NR 746 Table 1 Soil Screening Levels
[E] Generic RCL is established under NR 720 or NR 746
[F] Generic RCLs provided in *Soil Cleanup Levels for PAHs Interim Guidance* , WDNR RR-5 1997
-- No Generic RCL established.
Generic RCLs not included in Wisconsin Administrative Code or Guidance are calculated from the US EPA Soil Screening Level Web Page and the default values contained in *Determining Residual Contaminant Levels using the EPA Soil Screening Level Web Site* WDNR PUB-RR-682 on May 12, 2006
NA = Not analyzed

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Former Mirro Plant No. 9		GP-8

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
On-Site Environmental - Tony - AECOM Project No. 13085001	2/17/2009	2/17/2009	geoprobe

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		GP-8	Feet MSL	Feet MSL	2.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
SW 1/4 of NE 1/4 of Section 30, T 19 N, R 23 E
Lat ° ' "
Long ° ' "
Local Grid Location ☐ N Feet ☐ S ☐ E Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Manitowoc	36	Manitowoc

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 GP	36 24		1	Wood Concrete Fill: Dark brown fine to medium sand with gravel and cinders				12.5						
			2	Fill: Brown fine to medium sandy silt with gravel and cinders - odor										
			3					12.5						
			4	End of Boring. Boring advanced from 0.0 feet to 4.0 feet with geoprobe.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature

Firm AECOM
558 North Main Street Oshkosh, WI 54902
Tel: 920-235-0270
Fax:

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

LEGEND

EXCEEDANCE	SCRIPT
CONCENTRATIONS EXCEED THE GROUNDWATER PATHWAY STANDARDS.	a
CONCENTRATIONS EXCEED THE WDNR NON-INDUSTRIAL VOLITILE INHALATION STANDARD.	b
CONCENTRATIONS EXCEED THE WDNR NON-INDUSTRIAL DIRECT CONTACT PATHWAY STANDARD.	c
CONCENTRATIONS EXCEED THE WDNR NON-INDUSTRIAL DIRECT CONTACT PATHWAY STANDARD.	d
CONCENTRATIONS EXCEED THE WDNR INDUSTRIAL DIRECT CONTACT PATHWAY STANDARD.	e

PARAMETERS	
ARSENIC	As
PHENANTHRENE	Phen
INDENO(1,2,3-cd)PYRENE	I(1,2,3-cd)P
DIBENZO(a)ANTHRACENE	D(a,h)A
BENZO(a)ANTHRACENE	B(a)A
BENZO(a)PYRENE	B(b)P
BENZO(b)FLUORANTHENE	B(b)F
BENZO(ghi)PERYLENE	B(g,h,i)P
BENZO(k)FLOURANTHENE	B(k)F
METHYLENE CHLORIDE	MeCL
NAPHTHALENE	Naph
TETRACHLOROETHENE	PCE
TRICHLORORTHENE	TCE

APPROXIMATE LOCATION OF UTILITY TUNNEL

MW-10A

MW-17

16TH STREET

FORMER LOCATION OF MINERAL SPIRITS USTS (CLOSED LUST SITE) #02-36-216394, MW13, TWO TANKS SVE W 1991-1996

MW-13A

RW-2A

MW-12A

APPROXIMATE LOCATION OF SHERMAN CREEK TUNNEL

LOCATION OF DIESEL USTS EXCAVATION EXCAVATION #2 TWO TANKS NO

FRANKLIN STREET

PATTERN SHOP

COAL BOILER ROOM

PCB TRANSFORMER OIL DRUM AREA

MB-SB-8
6.5-8'
VOCs TCE=47a,b
PAHs B(a)A=160b
B(a)P=140b
D(a,h)A=58b
I(1,2,3,-cd)P=95b

MB-SB-11
3-4'
VOCs TCE=47a,b
6.5-8'
VOCs TCE=30a,b

MB-SB-TW-5
2-4'
METALS As=5.5a,e

MB-SB-4
3.5-4'
VOCs TCE=750a,b,d
PAHs B(a)A=1500b
B(a)P=940b,e
B(b)F=550b
B(k)F=900b
D(a,h)A=540b,e
Phen=2600a
I(1,2,3,-cd)P=990b

MB-SB-13
2-4'
METALS As=7.7a,e
VOCs TCE=47a,b

MB-SB-12
2.5-4'
METALS As=8.1a,e

MB-SB-MW-19
2-4'
METALS As=7.2a,e
VOCs TCE=120a,b
5.5-8'
METALS As=3a,e

MB-SB-MW-20
2-4'
VOCs TCE=270a,b,d
PCE=110a

MB-SB-3
2-4'
VOCs TCE=380a,b,d

MB-SB-2
2-3.5'
METALS As=6.1a,e

MB-SB-MW-15
2-4'
METALS As=5a,e
PAHs B(a)A=2900b
B(a)P=2000b,e
B(b)F=1000b
B(g,h,i)P=1900b
B(k)F=1100b
D(a,h)A=990b,e
Phen=8800a
I(1,2,3,-cd)P=1000b

MB-SB-14
2-4'
METALS As=5.8a,e
VOCs TCE=200a,b,d
PCE=90a

MB-SB-1
2-4'
METALS As=6a,e

MW-16A
2-4'
PAHs B(a)A=1300b
B(a)P=1200b,e
B(b)F=380b
D(a,h)A=570b,e
PCE=2200a
I(1,2,3,-cd)P=750b

MACHINE SHOP

MAIN ENTRANCE

FORMER ETHYLENE GLYCOL HEATING COIL SYSTEM

AUTOMATIC ANODIZING ROOM

FORMER STEAM OUTLET

ALUMINUM ETCHING ROOM

PAVED DRAINAGE CHANNELS AREA

HEAVY PRESS ROOM

HEAVY PRESS PIT AREA

STAINED FLOORING AREA

TW-3 NOT COMPLETED DUE TO BASEMENT

FORMER TANNERY LOCATION

BOILER ROOM

4 ABANDONED IN-PLACE FUEL OIL TANKS & PIPE LINE (CLOSED LUST SITE) #03-36-274209 DRO (GIS REGISTERY)

HEAT TREAT ROOM (OIL AND WATER QUENCH)

WASHINGTON STREET

ALLEY

BASEMENT AREA SUMP LOCATION

AIR COMPRESSOR PITS

MEDIUM PRESS ROOM

15TH STREET

FORMER LOCATION OF MINERAL SPIRITS USTS (CLOSED LUST SITE) #02-36-000085 (EAST) EXCAVATION #3 THREE TANKS SVE 1991-1996

MAP SOURCE:

BASEMAP DERIVED FROM FACILITY DRAWING PROVIDED BY MIRRO CORPORATION

30 0 30 60
1" = 30'

LEGEND

- GP-1 — APPROXIMATE AECOM SOIL BORING LOCATION
- GP-12 — APPROXIMATE AECOM PHASE II ESA TEMPORARY WELL LOCATION
- MW-1A — APPROXIMATE CLOSED LUST SITE MONITORING WELL LOCATION(ABANDONED)
- RW-1A — APPROXIMATE CLOSED LUST SITE RECOVERY WELL LOCATION(ABANDONED)
- MW-1 — APPROXIMATE MONITORING WELL LOCATION
- MW-16A — APPROXIMATE PIEZOMETER WELL LOCATION
- SB-1 — APPROXIMATE SOIL BORING LOCATION
- TW-1 — APPROXIMATE 1" TEMPORARY MONITORING WELL LOCATION
- 1ST FLOOR TRANSFORMER DRUM 1
- 2ND FLOOR TRANSFORMER DRUM 1
- DOORS #6 & #7 STORM DRAIN WIPE SAMPLE
- ASSESSMENT BOUNDARY
- RIGHT OF WAY
- BUILDING OUTLINE
- UNDERGROUND TUNNEL

AECOM
558 North Main Street
Oshkosh, WI 54901
920.235.0270
www.aecom.com

SAMPLING LOCATIONS
PHASE II ESA
MIRRO PLANT 9 (1512 WASHINGTON STREET)
MANITOWOC, WISCONSIN

Issued

Rev	Date	Description

Designed:	AGM	9/13/2010
Drawn:	REG	9/13/2010
Checked:	AGM	9/13/2010
Approved:		

PROJECT NUMBER
200803466

SHEET REFERENCE NUMBER
FIGURE 3

L:\work\Projects\60163491\000_CAD\001_Drawings\Sheets\Figure 3_Sample Locations.dwg, 3/24/2011 4:38:23 PM, BREUNIG, ADAM, STS.stb

Table 4A
TAL Metals Soil Analytical Data
Former Mirro Plant No. 9 Property
Manitowoc, Wisconsin

	WDNR Generic RCLs-Data Quality Objectives (ug/kg)					Results (ug/kg)										
	Direct Contact Pathway		Volatile Inhalation		Groundwater	MB-SB-TW-5	MB-SB-2	MB-SB-1	MB-SB-12	MB-SB-12	MB-SB-MW-19	MB-SB-MW-19 (DUP)	MB-SB-MW-1	MB-SB-13	MB-SB-14	MB-SB-15
Parameters	Non-Industrial	Industrial	Non-Industrial	Industrial	Pathway	2-4'	2-3.5	2-4'	2.5-4'	5-7'	2-4'	2-4'	5.5-8'	1.5-2'	2.5-4'	2-4'
Sample Date						10/29/2010	10/29/2010	10/29/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010
Aluminum	--	--	--	--	--	3500	3900	3100	4500	4700	3800	3500	3900	4700	5600	4000
Antimony	--	--	--	--	--	3.4	3	2.6	1.3	ND	0.8	2.1	1.3	0.33	2.3	1.6
Arsenic	0.039	1.6	--	--	0.58	*5.5*	*6.1*	*6*	*8.1*	ND	*7.2*	*4.5*	*3*	*7.7*	*5.8*	*5*
Barium	3,130	2.4×10^5	--	--	3,300	14	45	8.6	16	29	29	21	11	22	31	14
Beryllium	--	--	--	--	--	0.15	0.26	0.13	0.18	0.23	0.26	0.22	0.18	0.2	0.25	0.15
Cadmium	8	510	--	--	1.5	ND	0.14	ND	ND	0.35	0.32	0.14	0.17	0.11	0.37	0.17
Calcium	--	--	--	--	--	84000	80000	87000	47000	47000	52000	51000	71000	72000	60000	77000
Chromium	16,000	1.53×10^6	--	--	360	9.2	9.5	9	9.3	9	7.2	7.2	8.5	9	11	9.3
Cobalt	--	--	--	--	--	2.5	3.4	2.8	3.8	3.7	3.5	3.4	3.9	3.3	3.4	3.8
Copper	--	--	--	--	2200	9.3	12	8.9	30	33	190	28	11	69	21	9.8
Iron	--	--	--	--	--	6100	7100	5000	9900	9500	8400	7400	8100	8100	9000	7500
Lead	50	500	--	--	--	3.7	6.6	6	11	20	28	18	4.2	12	32	6.5
Magnesium	--	--	--	--		52000	46000	53000	29000	23000	29000	29000	45000	38000	34000	48000
Manganese	--	--	--	--		180	200	130	240	340	200	210	240	230	190	210
Mercury	--	--	2.9	2.9	0.42	ND	ND	ND	0.015	0.022	ND	ND	0.012	ND	0.043	0.017
Nickel	--	--	--	--	--	5.9	7	5.6	9	8.1	27	9.2	7.8	7.7	8.2	6.9
Potassium	--	--	--	--	--	590	670	530	640	780	590	560	580	720	620	710
Selenium	78.2	5,110	--	--	1	ND	ND	ND	*5.8*	ND	*4.7*	ND	ND	ND	*6*	ND
Silver	78.2	5,110	--	--	1.67	0.16	ND	0.17	0.17	ND	0.29	0.15	0.15	0.53	0.16	0.13
Sodium	--	--	--	--	--	310	310	300	280	290	430	370	350	260	290	300
Thallium	--	--	--	--	--	nd	6.6	ND	nd	4.7	ND	4.4	ND	8	4	6.8
Zinc	--	--	--	--	--	14	20	13	23	27	27	22	14	32	49	14

Notes:
WDNR = Wisconsin Department of Natural Resources
Concentrations noted in *italics* exceed the Groundwater Pathway standards.
Concentrations in grey cells exceed WDNR Direct Contact Pathway
TAL Metals = Target Analyte List
All units in ug/kg
-- = no standard
Direct Contact Pathway and Volatile Inhalation Pathway from WAC 720 Soil Cleanup Standards

TABLE 4B
VOCS Soil Analytical Data
Former Mirro Plant No. 9 Property
Manitowoc, Wisconsin

	WDNR Generic RCLs-Data Quality Objectives (ug/kg)																						
	Direct Contact Pathway		Volatile Inhalation		Groundwater	MB-SB-MW-14	MB-SB-MW-15	MB-SB-MW-17	MB-SB-MW-16A	MB-SB-MW-16A	MB-SB-TW-5	MB-SB-2	MB-SB-1	MB-SB-12DUP	MB-SB-12	MB-SB-12	MB-SB-MW-19	MB-SB-MW-19	MW-SB-MW-19 (DUP)	MB-SB-13	MB-SB-14	MB-SB-14	MB-SB-15	MB-SB-15
Parameters	Non-Industrial	Industrial	Non-Industrial	Industrial	Pathway	6-8'	5.5-6.5'	5-7'	6-8'	29-30'	2-4'	2-3.5'	2-4'	2.5-4'	5-7'	2.5-4'	2-4'	5.5-8	5-5.8	1.5-2	2.5-4'	6-7.5'	2-4'	5.6-6
SAMPLE DATE						10/18/2010	10/18/2010	10/18/2010	10/18/2010	10/18/2010	10/29/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010	10/28/2010
Benzene	1,100	52,000	160	2,600	5.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	1,030	46,200	32000000[F]	32000000[F]	0.24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	8,090	362,000	10,000	170,000	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	21,900	1,430,000	3,800	27,000	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	491	22,000	62	1,000	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	313,000	20,400,000	49,000	340,000	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorodibromomethane	760	34,100	--	--	24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	10,500	469,000	54	910	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	4,910	220,000	410	6,900	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	313,000	20,400,000	--	--	2700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	46	2,040	8,200	57,000	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	31.9	1,430	0.019	0.33	0.033	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	156,000	10,200,000	2,000,000[F]	2,000,000[F]	210	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	1,410,000	92,000,000	600,000[F]	600,000[F]	1,800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	57	ND	ND	ND	ND
1,3-Dichlorobenzene	--	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2,660	119,000	4,000,000	28,000,000	110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	3,130,000	204,000,000	89,000	620,000	21,918	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	3,130,000	204,000,000	490,000	1,800,000[F]	349	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	702	31,400	73	1,200	4.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	782,000	51,100,000	110,000	780,000	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	156,000	10,200,000	1,300,000[F]	1,300,000[F]	55	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	313,000	20,400,000	3,200,000[F]	3,200,000[F]	98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	939	42,100	5,800	40,000	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	313,000	20,400,000	1,700,000[F]	1,700,000[F]	640	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	1,560,000	102,000,000	400,000[F]	400,000[F]	2,900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	819	36,700	1,500	24,000	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene (cumene)	1,560,000	102,000,000	--	860,000[F]	37,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	8,520	382,000	2,600	43,000	1.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	*70*	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-tert-butyl-ether	--	--	--	10,000,000[F]	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	60,000	4,000,000	65,000	440,000	400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	120	ND	ND	ND	380	ND	ND	ND
n-Propylbenzene	--	--	--	460,000	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	3,130,000	204,000,000	1,500,000	1,500,000	370	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	319	14,300	110	1,900	0.09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	1,230	55,000	2,000	34,000	4.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	***90***	ND	ND	ND
Toluene	1,250,000	81,800,000	670,000[F]	670,000[F]	1,500	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	61	ND	ND	ND	160	ND	ND	ND
1,2,3-Trichlorobenzene	--	--	67,000	470,000	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	156,000	10,200,000	--	--	540	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	120	ND	ND	ND	ND
1,1,1-Trichloroethane						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	1,120	50,200	190	3,200	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	160	7,150	14	230	3.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	***120***	ND	ND	***47***	***200***	ND	ND	ND
Trichlorofluoromethane	4,690,000	307,000,000	--	1,600,000[F]	29,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	9.12	409	--	570,000[F]	76	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene[1]	782,000	51,100,000	47,000	330,000	7573	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	51	ND	ND	ND	210	ND	ND	ND
1,3,5-Trimethylbenzene[1]	782,000	51,100,000	27,000	190,000	3520	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	70	ND	ND	ND
Vinyl chloride	42.6	1,910	53	890	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes, total	3,130,000	204,000,000	270,000	1,900,000	4,100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	150	ND	ND	ND	530	ND	ND	ND

Notes:
MW-SB-TW-2* : Asterisk denotes samples were analysed one day beyond holding time, see Data Validation section for discussion.
WDNR = Wisconsin Department of Natural Resources
All units in ug/kg
Concentrations noted in *italics* exceed the Groundwater Pathway standards.
Concentrations noted in **bold** exceed the WDNR non-industrial volatile inhalation standard.
Concentrations in grey cells exceed the WDNR non-industrial direct contact pathway standard.
Direct Contact Pathway and Volatile Inhalation Pathway from WAC 720 Soil Cleanup Standards

TABLE 4B
VOCS Soil Analytical Data
Former Mirro Plant No. 9 Property
Manitowoc, Wisconsin

	WDNR Generic RCLs-Data Quality Objectives (ug/kg)					Results (ug/kg)																	
	Direct Contact Pathway		Volatile Inhalation		Groundwater	MB-SB-8	MB-SB-8	MB-SB-3	MB-SB-3	MB-SB-4	MB-SB-4	MB-SB-4	MB-SB-5	MB-SB-5	MB-SB-5 (DUP)	MB-SB-5	MB-SB-7	MB-SB-7	MB-SB-9	MB-SB-10	MB-SB-10	MB-SB-11	MB-SB-11	MB-SB-TW-4*
Parameters	Non-Industrial	Industrial	Non-Industrial	Industrial	Pathway	6.5-8'	9.5-12'	2-4'	9-10'	3.5-4'	6.5-8'	11.5-12'	2-4'	9.5-12'	9.5-12'	14-15'	2-4'	5.5-8'	5.5-8'	3-4'	5.5-7.5'	3-4'	6.5-8'	3-4'
SAMPLE DATE						10/28/2010	10/28/2010	10/26/2010	10/26/2010	10/26/2010	10/26/2010	10/26/2010	10/27/2010	10/27/2010	10/27/2010	10/27/2010	10/27/2010	10/27/2010	10/27/2010	10/27/2010	10/27/2010	10/28/2010	10/28/2010	10/26/2010
Benzene	1,100	52,000	160	2,600	5.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	1,030	46,200	32000000[F]	32000000[F]	0.24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	8,090	362,000	10,000	170,000	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	21,900	1,430,000	3,800	27,000	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	491	22,000	62	1,000	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	313,000	20,400,000	49,000	340,000	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorodibromomethane	760	34,100	--	--	24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	10,500	469,000	54	910	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	4,910	220,000	410	6,900	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	313,000	20,400,000	--	--	2700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	46	2,040	8,200	57,000	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	31.9	1,430	0.019	0.33	0.033	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	156,000	10,200,000	2,000,000[F]	2,000,000[F]	210	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	1,410,000	92,000,000	600,000[F]	600,000[F]	1,800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	64	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	--	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2,660	119,000	4,000,000	28,000,000	110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	3,130,000	204,000,000	89,000	620,000	21,918	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	3,130,000	204,000,000	490,000	1,800,000[F]	349	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	702	31,400	73	1,200	4.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	782,000	51,100,000	110,000	780,000	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	156,000	10,200,000	1,300,000[F]	1,300,000[F]	55	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	313,000	20,400,000	3,200,000[F]	3,200,000[F]	98	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	939	42,100	5,800	40,000	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	313,000	20,400,000	1,700,000[F]	1,700,000[F]	640	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	1,560,000	102,000,000	400,000[F]	400,000[F]	2,900	ND	ND	ND	ND	73	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	819	36,700	1,500	24,000	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene (cumene)	1,560,000	102,000,000	--	860,000[F]	37,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	8,520	382,000	2,600	43,000	1.6	ND	ND	120	ND	ND	ND	ND	ND	ND	ND	ND	*120*	*160*	*270*	*190*	ND	89	ND	ND
Methyl-tert-butyl-ether	--	--	--	10,000,000[F]	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	60,000	4,000,000	65,000	440,000	400	ND	ND	110	ND	*540*	ND	120	150	ND	ND	ND	ND	ND	ND	ND	ND	62	ND	76
n-Propylbenzene	--	--	--	460,000	--	ND	ND	ND	ND	34	ND	58	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	3,130,000	204,000,000	1,500,000	1,500,000	370	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	319	14,300	110	1,900	0.09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	1,230	55,000	2,000	34,000	4.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1,250,000	81,800,000	670,000[F]	670,000[F]	1,500	ND	ND	ND	ND	400	ND	52	45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	--	--	67,000	470,000	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	180	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	156,000	10,200,000	--	--	540	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	*970*	ND	ND	ND	ND	ND
1,1,1-Trichloroethane						ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	1,120	50,200	190	3,200	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	160	7,150	14	230	3.7	***47***	ND	***380***	ND	***170***	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	***47***	***30***	ND
Trichlorofluoromethane	4,690,000	307,000,000	--	1,600,000[F]	29,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	9.12	409	--	570,000[F]	76	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene[1]	782,000	51,100,000	47,000	330,000	7573	ND	ND	38	ND	210	ND	260	110	120	80	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene[1]	782,000	51,100,000	27,000	190,000	3520	ND	ND	ND	ND	53	ND	47	40	98	62	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	42.6	1,910	53	890	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes, total	3,130,000	204,000,000	270,000	1,900,000	4,100	ND	ND	ND	ND	860	ND	ND	180	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
MW-SB-TW-2* : Asterisk denotes samples were analysed one day beyond holding time, see Data Validation sect
WDNR = Wisconsin Department of Natural Resources
All units in ug/kg
Concentrations noted in *italics* exceed the Groundwater Pathway standards.
Concentrations noted in **bold** exceed the WDNR non-industrial volatile inhalation standard.
Concentrations in grey cells exceed the WDNR non-industrial direct contact pathway standard.
Direct Contact Pathway and Volatile Inhalation Pathway from WAC 720 Soil Cleanup Standards

Table 4D
PCBs Soil Analytical Data
Former Mirro Plant No. 9 Property
Manitowoc, Wisconsin

Parameters	WDNR Generic RCLs-Data Quality Objectives: Direct Contact Pathway Non-Industrial	Direct Contact Pathway Industrial	Groundwater Pathway	MB-SB-TW-5 2-4'	MB-SB-2 2-3.5'	MB-SB-1 2-4'	MB-SB-1 DUP) 2-4'	MB-SB-9 5.5-8'	MB-SB-10 3-4'	MB-SB-10 5.5-7'	MB-SB-11 3-4'	MB-SB-11 6.5-8'	MB-SB-13 1.5-2'	MB-SB-MW-18 3-4'	MB-SB-MW-18 6.5-8'	1st Floor Transformer Drum 1 Oil - mg/kg	2nd Floor Transformer Drum 1 Oil - mg/kg	Doors #6 & #7 Storm Drain Wipe -total ug
							10/29/2010	10/27/2010	10/27/2010	10/27/2010	10/28/2010	10/28/2010	10/28/2010	10/26/2010	10/26/2010	10/29/2010	10/29/2010	10/29/2010
Aroclor 1016	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<50000	<50000	<250
Aroclor 1221	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<50000	<50000	<250
Aroclor 1232	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<50000	<50000	<250
Aroclor 1242	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<50000	<50000	<250
Aroclor 1248	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<50000	<50000	<250
Aroclor 1254	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<50000	<50000	<250
Aroclor 1260	NS	NS	NS	ND	ND	ND	ND	ND	0.27	ND	ND	ND	ND	ND	ND	**460,000**	**500,000**	**7,600**

Notes:
WDNR = Wisconsin Department of Natural Resources
All Units mg/kg, except Wipe Sample (Doors 6 7 &, which is in total micrograms.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Former Mirro Plant #9		SB-9

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Tony On-Site Environmental	10/27/2010	10/27/2010	Hydraulic Push Probe

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		SB-9	Feet MSL	Feet MSL	2.00 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
SW 1/4 of NE 1/4 of Section 30, T 19 N, R 23 E
Lat ___ ° ___ ' ___ "
Long ___ ° ___ ' ___ "
Local Grid Location ☐ N Feet ☐ S ☐ E Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Manitowoc	36	Manitowoc

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 GP	48 / 6		1–4	Concrete Fill: Silty gravel	Concrete Fill			0.5						
2 GP	48 / 30		4–8	Fine grain silty sand, yellowish brown, moist	SM			1.1						
3 GP	48 / 48		8–12					0.6						
			12	End of boring at 12.0' Backfilled with bentonite.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	Tel: / Fax:
	AECOM	

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Former Mirro Plant #9		SB-10

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Tony On-Site Environmental	10/27/2010	10/27/2010	Hydraulic Push Probe

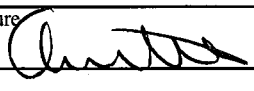
WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		SB-10	Feet MSL	Feet MSL	2.00 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
SW 1/4 of NE 1/4 of Section 30, T 19 N, R 23 E
Lat ____ ° ____ ' ____ "
Long ____ ° ____ ' ____ "
Local Grid Location ☐ N Feet ☐ S ☐ E Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Manitowoc	36	Manitowoc

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 GP	48 / 12		1	Concrete	Concrete									
			2	Fill: Silt with some fine gravel, moist, brown, gray, dark brown										
			3											
2 GP	48 / 30		4		Fill			1.3						
			5											
			6											
			7					0.5						
3 GP	48 / 30		8	Fill: Gravel 1/2" - 1/4" silty white/gray per Driller - 4" concrete	Fill			0.6						
				Fine grain silty sand, brown, moist	SP			0.5						
			9	Fine grain sandy silt, brown, wet										
			10		SM									
			11											
			12	Silt, moist, light brown/gray	ML									
				End of boring at 12.0' Backfilled with bentonite. Refusal on 1st attempt. Offset and advanced boring.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	Tel:
	AECOM	Fax:

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Former Mirro Plant #9		SB-11

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Tony On-Site Environmental	10/28/2010	10/28/2010	Hydraulic Push Probe

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		SB-11	Feet MSL	Feet MSL	2.00 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
SW 1/4 of NE 1/4 of Section 30, T 19 N, R 23 E
Lat ___ ° ___ ' ___ "
Long ___ ° ___ ' ___ "
Local Grid Location ☐ N Feet ☐ S ☐ E Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Manitowoc	36	Manitowoc

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 GP	48 12		1	Concrete	Concrete									
			2	Fill: Sandy silt with some fine gravel, yellowish brown, moist to dry	Fill									
			3											
2 GP	48 18		4	Sandy silt, yellowish brown, moist, wet at 8.0'	SM			0.2						
			5											
			6											
			7					0.5						
			8											
3 GP	48 12		9											
			10											
			11											
			12	End of boring at 12.0' Backfilled boring with bentonite.				0.5						

I hereby certify that the information on this form is true and correct to the best of my knowledge.

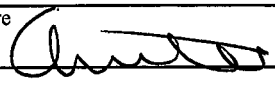
Signature  Firm AECOM Tel: Fax:

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TABLE 1
DETECTED CONSTITUENTS IN SOIL
FORMER MIRRO #9 PLANT
1512 WASHINGTON STREET
MANITOWOC, WISCONSIN

CONSTITUENT	Industrial Direct Contact RCL	Soil to Groundwater Pathway RCL	SB-101		SB-103		SB-104		SB-105		SB-106		SB-107		SB-108		SB-109		SB-110		SB-111		SB-112	
			(1-2)	(4-6)	(4-6)	(10-12)	(1-2)	(5-7)	(1-2)	(5-7)	(1-2)	(5-7)	(1-3)	(5-7)	(1-2)	(11-12)	(1-3)	(5-7)	(5-7)	(10-11)	(5-7)	(10-11)	(0-1)	(4-6)
Volatile Organic Compounds (ug/kg)																								
1,2,4-Trimethylbenzene	219000	1382	< 15	< 31	< 15	**97000**	**410**	< 14	< 18	< 15	< 12	< 15	< 16	< 16	< 13	**190**	< 15	< 16	< 15	< 15	< 16	< 14	< 13	**94**
1,3,5-Trimethylbenzene	182000	1382	< 15	< 30	< 15	**32000**	**66**	< 13	< 17	< 15	< 12	< 15	< 16	< 16	< 13	**94**	< 14	< 15	< 14	< 15	< 16	< 14	< 13	**39 J**
Ethylbenzene	37000	1570	< 8.9	< 18	< 9.2	**240**	**170**	< 8.1	< 11	< 9.0	< 7.1	< 9.0	< 9.8	< 9.5	< 7.7	**27**	< 8.8	< 9.4	< 8.8	< 8.9	< 9.8	< 8.6	< 7.6	< 9.2
Isopropylbenzene	268000	NE	< 18	< 36	< 18	**6400**	**83**	< 16	< 21	< 18	< 14	< 18	< 20	< 19	< 15	< 18	< 17	< 19	< 18	< 18	< 20	< 17	< 15	< 18
Naphthalene	26000	658.2	< 35	< 72	< 36	< 380	**880**	< 32	< 41	< 35	< 28	< 35	< 39	< 37	< 30	< 35	< 34	< 37	< 35	< 35	< 39	< 34	< 30	< 36
N-Propylbenzene	264000	NE	< 12	< 25	< 13	**15000**	**95**	< 11	< 15	< 13	< 9.9	< 13	< 14	< 13	< 11	< 12	< 12	< 13	< 12	< 12	< 14	< 12	< 11	**47 J**
p-Isopropyltoluene	162000	NE	< 13	< 27	< 13	**790**	< 11	< 12	< 16	< 13	< 10	< 13	< 14	< 14	< 11	< 13	< 13	< 14	< 13	< 13	< 14	< 13	< 11	< 13
sec-Butylbenzene	145000	NE	< 11	< 22	< 11	**7200**	< 9.4	< 9.9	< 13	< 11	< 8.7	< 11	< 12	< 12	< 9.4	< 11	< 11	< 12	< 11	< 11	< 12	< 10	< 9.3	< 11
tert-Butylbenzene	183000	NE	< 9.6	< 20	< 9.9	**2800**	< 8.3	< 8.7	< 11	< 9.8	< 7.7	< 9.7	< 11	< 10	< 8.3	< 9.6	< 9.5	< 10	< 9.5	< 9.6	< 11	< 9.2	< 8.3	< 9.9
Toluene	818000	1107	< 8.2	< 17	< 8.4	< 88	**480**	< 7.4	< 9.7	< 8.2	**31**	< 8.2	< 9.0	< 8.7	< 7.0	< 8.1	< 8.0	< 8.6	< 8.1	< 8.1	< 9.0	< 7.8	< 7.0	**20**
Trichloroethene	8810	3.6	< 13	< 27	< 14	< 140	**130**	**25 J**	< 16	< 13	**480**	**450**	< 15	< 14	< 11	**330**	< 13	< 14	< 13	< 13	< 15	**43**	**61**	**26 J**
Xylenes, Total	258000	3940	< 4.9	< 9.9	< 5.0	**480**	**1500**	< 4.4	< 5.7	< 4.9	**67**	< 4.9	< 5.3	< 5.2	< 4.2	**160**	< 4.8	< 5.1	< 4.8	< 4.8	< 5.3	< 4.6	< 4.2	**50**
Polycyclic Aromatic Hydrocarbons (ug/kg)																								
1-Methylnaphthalene	53100	NE	**190 J**	< 86	< 9.8	**1200**	**150**	< 9.3	< 9.3	< 9.8	**37**	< 9.8	< 100	< 9.8	< 89	**430**	< 9.8	< 10	**290**	< 9.4	< 92	**510**	**51**	< 9.6
2-Methylnaphthalene	2200000	NE	**170 J**	< 65	< 7.4	**1200**	**160**	< 7.0	< 7.0	< 7.4	**39**	< 7.4	< 77	< 7.4	< 67	**320 J**	< 7.4	< 7.5	**300**	< 7.1	< 70	**300 J**	**58**	< 7.3
Acenaphthene	33000000	NE	< 69	< 63	< 7.2	< 7.3	**18 J**	< 6.9	< 6.9	< 7.2	< 6.2	< 7.2	< 75	< 7.2	< 66	< 69	< 7.2	< 7.4	**160 J**	< 6.9	< 68	< 70	< 6.7	< 7.1
Acenaphthylene	NE	NE	**390**	< 46	**11 J**	< 5.3	**20 J**	< 5.0	< 5.0	< 5.3	< 4.5	< 5.3	< 55	< 5.3	< 48	< 50	< 5.3	< 5.4	**120 J**	< 5.1	< 50	< 51	**13 J**	< 5.2
Anthracene	100000000	197727	**3100**	< 59	**10 J**	< 6.8	**78**	**13 J**	< 6.4	< 6.7	**8.0 J**	< 6.7	< 70	< 6.7	< 61	< 64	< 6.7	< 6.8	**520**	< 6.4	< 63	< 65	**8.1 J**	< 6.6
Benzo[a]anthracene	2100	NE	**1300**	< 47	**55**	< 5.4	**1700**	**22 J**	< 5.1	< 5.4	**21 J**	**15 J**	< 56	< 5.4	< 49	< 51	< 5.4	< 5.5	**740**	**12 J**	< 51	< 52	**70**	**12 J**
Benzo[a]pyrene	211	470	**1200**	< 68	**62**	**100**	**1900**	**16 J**	< 7.4	< 7.8	**24 J**	**17 J**	< 81	< 7.8	< 71	< 74	< 7.7	< 7.9	**590**	**9.4 J**	< 73	< 76	**86**	**13 J**
Benzo[b]fluoranthene	2110	479	**2300**	< 76	**93**	< 8.7	**6300**	**99**	< 8.2	< 8.7	**39**	**23 J**	< 90	< 8.7	< 79	< 83	< 8.6	< 8.8	**930**	**15 J**	< 82	< 84	**120**	**18 J**
Benzo[g,h,i]perylene	NE	NE	< 120	< 110	**34 J**	< 13	**850**	**25 J**	< 12	< 13	**18 J**	< 13	< 130	< 13	< 120	< 120	< 13	< 13	**140 J**	< 12	< 120	< 130	**40**	< 13
Benzo[k]fluoranthene	21100	NE	**720**	< 100	**39 J**	< 12	**1700**	**33 J**	< 11	< 12	**17 J**	**14 J**	< 120	< 12	< 110	< 110	< 12	< 12	**350**	< 11	< 110	< 110	**51**	< 12
Chrysene	211000	144	**1900**	< 96	**73**	< 11	**3900**	**66**	< 10	< 11	**25 J**	**22 J**	< 110	< 11	< 100	< 100	< 11	< 11	**710**	**14 J**	< 100	< 110	**76**	**13 J**
Dibenz(a,h)anthracene	211	NE	< 74	< 68	< 7.8	< 7.8	**340**	< 7.4	< 7.4	< 7.7	< 6.7	< 7.7	< 80	< 7.8	< 71	< 74	< 7.7	< 7.9	< 36	< 7.5	< 73	< 75	**9.7 J**	< 7.6
Fluoranthene	22000000	88877	**1900**	< 65	**150**	**31 J**	**1500**	**38**	< 7.1	< 7.4	**38**	**37 J**	< 77	< 7.5	< 68	< 71	< 7.4	< 7.6	**1500**	**26 J**	< 70	< 72	**120**	**23 J**
Fluorene	22000000	14802	< 54	< 49	< 5.6	**5.7 J**	**19 J**	< 5.4	< 5.4	< 5.6	< 4.9	< 5.6	< 59	< 5.7	< 52	< 54	< 5.6	< 5.7	**520**	< 5.4	< 53	< 55	< 5.3	< 5.5
Indeno[1,2,3-cd]pyrene	2110	NE	< 99	< 91	**34 J**	< 10	**950**	**30 J**	< 9.9	< 10	**14 J**	**11 J**	< 110	< 10	< 95	< 99	< 10	< 11	**190**	< 10	< 98	< 100	**41**	< 10
Naphthalene	26000	658.2	**260 J**	< 54	**6.8 J**	**5900**	**120**	< 5.9	< 5.9	< 6.2	**31 J**	< 6.2	< 64	< 6.2	< 56	< 59	< 6.2	< 6.3	**650**	**8.3 J**	< 58	**74 J**	**41**	< 6.1
Phenanthrene	NE	NE	**890**	< 49	**67**	**26 J**	**510**	**41**	< 5.3	< 5.6	**40**	**13 J**	< 58	< 5.6	< 51	< 53	< 5.6	< 5.7	**2600**	**25 J**	< 53	< 54	**59**	**11 J**
Pyrene	16500000	54132	**3300**	< 70	**120**	**16 J**	**2000**	**57**	< 7.6	< 8.0	**42**	**35 J**	< 83	< 8.0	< 73	< 76	< 7.9	< 8.1	**2600**	**26 J**	< 75	< 78	**110**	**19 J**
Polychlorinated Biphenyls (ug/kg)																								
PCB-1016	20500	9.4	**48**	**25**	< 6.9	< 7.4	< 6.6	< 6.7	< 6.9	< 7.1	< 6.4	< 7.1	< 360	< 7.4	< 6.3	< 7.1	< 7.1	< 7.3	< 6.8	< 7.1	< 6.9	< 6.7	< 6.5	< 6.9
PCB-1248	713	9.4	< 7.7	< 7.3	< 7.7	< 8.2	< 7.4	< 7.5	< 7.7	< 7.9	< 7.1	< 7.9	**5600**	< 8.2	< 7.1	< 7.9	< 7.9	< 8.2	< 7.6	< 7.9	< 7.7	< 7.4	< 7.2	< 7.7
PCB-1254	724	9.4	< 4.2	< 4.0	< 4.2	< 4.5	< 4.0	< 4.1	< 4.2	< 4.3	< 3.9	< 4.3	< 220	< 4.5	< 3.9	< 4.3	< 4.3	< 4.5	**14 J**	< 4.3	< 4.2	< 4.1	< 4.0	< 4.2
PCB-1260	731	9.4	< 9.6	< 9.0	< 9.6	< 10	< 9.2	< 9.3	< 9.6	< 9.8	**12 J**	< 9.8	< 500	< 10	< 8.8	< 9.8	< 9.8	< 10	< 9.4	< 9.9	< 9.6	< 9.2	< 9.0	< 9.6
Polychlorinated biphenyls, Total	723	9.4	**48**	**25**	< 3.8	< 4.0	< 3.6	< 3.6	< 3.8	< 3.8	**12 J**	< 3.8	**5600**	< 4.0	< 3.4	< 3.8	< 3.8	< 4.0	**14 J**	< 3.9	< 3.8	< 3.6	< 3.5	< 3.7
Metals (mg/kg)																								
Arsenic	2.39	0.584	**1.5**	< 0.49	**1.2**	**1.7**	**3.5**	**57** [1]	**0.87 J**	**0.94 J**	**1.3**	< 0.52	**0.74 J**	**0.89 J**	< 0.50	< 0.54	**1.9**	**0.73 J**	< 0.51	**0.82 J**	**0.63 J**	< 0.52	**1.9**	< 0.55
Barium	100000	164.8	**54**	**8.3**	**41**	**48**	**38**	**24**	**20**	**14**	**24**	**12**	**12**	**12**	**11**	**9.5**	**27**	**13**	**20**	**16**	**9.5**	**8.6**	**41**	**11**
Cadmium	798	0.752	**0.34 B**	**0.25 B**	**0.31 B**	**0.28 B**	**0.33 B**	**1.6 B**	**0.31 B**	**0.29 B**	**0.39 B**	**0.31 B**	**0.30 B**	**0.26 B**	**0.25 B**	**0.29 B**	**0.25 B**	**0.22 B**	**0.33 B**	**0.30 B**	**0.27 B**	**0.27 B**	**0.48 B**	**0.31 B**
Chromium	NE	360,000	**6.3 B**	**5.1 B**	**14 B**	**17 F1 B V**	**5.8 B**	**12 B**	**9.6 B**	**8.0 B**	**82 B**	**29 B**	**7.2 B**	**9.9 B**	**5.8 B**	**5.3 B**	**13 B**	**7.1 B**	**6.9 B**	**5.7 B**	**6.0 B**	**5.3 B**	**12 B**	**13 B**
Lead	800	27	**43**	**2.1**	**40**	**6.2**	**73** [2]	**110** [2]	**3.2**	**2.7**	**13**	**3.7**	**2.7**	**3.1**	**5.5**	**2.2**	**4.6**	**2.6**	**4.2**	**2.4**	**2.7**	**2.2**	**16**	**6.7**
Mercury	3.13	0.208	**0.018**	< 0.0057	**0.029**	**0.021**	**0.092**	**0.039**	**0.024**	**0.0066 J**	**0.041**	**0.012 J**	**0.010 J**	**0.011 J**	**0.016 J**	< 0.0068	**0.022 F1**	< 0.0067	**0.023**	**0.0083 J**	< 0.0067	< 0.0064	**0.017 J**	< 0.0067
Selenium	5110	0.52	**1.5**	< 0.52	< 0.61	< 0.57	**1.1**	**8.7**	< 0.57	**0.58 J**	**1.2**	< 0.56	< 0.62	< 0.58	< 0.54	**0.78 J**	< 0.57	< 0.54	< 0.55	**0.74 J**	< 0.60	< 0.56	< 0.52	< 0.59
Silver	5110	0.85	< 0.13	< 0.12	< 0.14	< 0.13	< 0.13	**0.12 J**	< 0.13	< 0.13	< 0.13	< 0.13	< 0.15	< 0.14	< 0.13	< 0.14	< 0.13	< 0.13	< 0.13	< 0.13	< 0.14	< 0.13	< 0.12	< 0.14

NOTES:
NE = Not Established
< = Less than. The reported value is the analytical methods limit of detection for the constituent.
ug/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
Bold = Indicates detected concentration
Yellow shading indicates NR 720 Wisconsin Admistrative Code, Industrial Not-to-Exceed Direct Contact Residual Contaminant Level exceeded.
Blue shading indicates NR 720 Wisconsin Admistrative Code, Soil to Groundwater Pathway Residual Contaminant Level exceeded.
[1] Arsenic concentration exceeds Wisonsin Background Threshold Value of 8 mg/kg.
[2] Lead concentration exceeds Wisconsin Background Threshold Value of 52 mg/kg

SB-101 = Soil boring identifier.
(1-2) = Sol sample collection depth, feet below ground surface.
All soil samples collected 10/5/15.

LABORATORY DATA QUALIFIERS:
J = Result value is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
B = Compound was found in the method blank.
F1 = Matrix spike and/or matrix spike duplicate is outside acceptable criteria.
V = Serial dilution exceeds control limits.

TABLE 2
DETECTED CONSTITUENTS IN GROUNDWATER
FORMER MIRRO #9 PLANT
1512 WASHINGTON STREET
MANITOWOC, WISCONSIN

Constituent	Enforcement Standard	Preventive Action Limit	MONITORING WELL																		
			MW-14	MW-15	MW-15D	MW-16	MW-16A	TW-101	TW-103		TW-104	TW-105	TW-106		TW-107	TW-108		TW-109	TW-110		TW-111	TW-112
			SAMPLE DATE																			
			10/06/15	10/06/15	10/06/15	10/06/15	10/06/15	10/06/15	10/06/15	12/07/15	10/06/15	10/06/15	10/06/15	12/07/15	10/06/15	10/06/15	12/07/15	10/06/15	10/06/15	12/07/15	10/06/15	10/06/15
Volatile Organic Compounds (ug/l)																						
1,2,4-Trimethylbenzene	30	6	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.70	**1800**	**970**	**1.4**	< 0.14	< 0.14	<0.36	< 0.14	**1.1**	**4.0**	< 0.14	< 0.14	NS	< 0.14	< 0.14
1,3,5-Trimethylbenzene	30	6	< 0.18	< 0.18	< 0.18	< 0.18	< 0.18	< 0.90	**480**	**280**	< 0.18	< 0.18	< 0.18	<0.25	< 0.18	**0.78 J**	**5.0**	< 0.18	< 0.18	NS	< 0.18	< 0.18
Benzene	5	0.5	< 0.074	< 0.074	< 0.074	< 0.074	< 0.074	< 0.37	**1.7 J**	<0.73	< 0.074	< 0.074	**0.26 J**	<0.15	< 0.074	**0.31 J**	<0.15	< 0.074	< 0.074	NS	< 0.074	< 0.074
cis-1,2-Dichloroethene	70	7	< 0.12	< 0.12	< 0.12	< 0.12	**3.3**	< 0.60	< 0.60	<2.0	< 0.12	< 0.12	< 0.12	<0.41	< 0.12	< 0.12	<0.41	< 0.12	< 0.12	NS	< 0.12	< 0.12
Ethylbenzene	700	140	< 0.13	< 0.13	< 0.13	< 0.13	< 0.13	< 0.65	**13**	**7.4**	< 0.13	< 0.13	< 0.13	<0.18	< 0.13	< 0.13	**0.56**	< 0.13	< 0.13	NS	< 0.13	**0.78**
Isopropylbenzene	NE	NE	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.70	**120**	**73**	< 0.14	< 0.14	< 0.14	<0.39	< 0.14	< 0.14	<0.39	< 0.14	< 0.14	NS	< 0.14	< 0.14
Naphthalene	100	10	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.80	**300**	**120**	< 0.16	< 0.16	< 0.16	<0.34	< 0.16	< 0.16	<0.34	< 0.16	**1.3**	NS	< 0.16	< 0.16
n-Butylbenzene	NE	NE	< 0.13	< 0.13	< 0.13	< 0.13	< 0.13	< 0.65	**76**	**30**	< 0.13	< 0.13	< 0.13	<0.39	< 0.13	< 0.13	<0.39	< 0.13	< 0.13	NS	< 0.13	< 0.13
N-Propylbenzene	NE	NE	< 0.13	< 0.13	< 0.13	< 0.13	< 0.13	< 0.65	**220**	**120**	< 0.13	< 0.13	< 0.13	<0.41	< 0.13	< 0.13	**1.2**	< 0.13	< 0.13	NS	< 0.13	< 0.13
p-Isopropyltoluene	NE	NE	< 0.17	< 0.17	< 0.17	< 0.17	< 0.17	< 0.85	**65**	<1.8	< 0.17	< 0.17	< 0.17	<0.36	< 0.17	< 0.17	<0.36	< 0.17	< 0.17	NS	< 0.17	< 0.17
sec-Butylbenzene	NE	NE	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.75	**43**	**23**	< 0.15	< 0.15	< 0.15	<0.40	< 0.15	< 0.15	**1.1**	< 0.15	< 0.15	NS	< 0.15	< 0.15
tert-Butylbenzene	NE	NE	< 0.14	< 0.14	< 0.14	< 0.14	< 0.14	< 0.70	**7.1**	**29**	< 0.14	< 0.14	< 0.14	<0.40	< 0.14	< 0.14	<0.40	< 0.14	< 0.14	NS	< 0.14	< 0.14
Toluene	800	160	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.55	< 0.55	<0.76	**0.26 J**	< 0.11	< 0.11	0.15	**0.95**	**0.62**	**1.3**	< 0.11	**1.9**	NS	**0.30 J**	**14**
Trichloroethene	5	0.5	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.95	< 0.95	<0.82	< 0.19	< 0.19	**28**	**27**	**0.29 J**	**15**	**21**	< 0.19	< 0.19	NS	**0.84**	**3.0**
Xylenes, Total	2000	400	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.34	**150**	**100**	< 0.068	< 0.068	< 0.068	<0.22	< 0.068	**1.9**	**5.7**	< 0.068	< 0.068	NS	< 0.068	**2.8**
Polycyclic Aromatic Hydrocarbons (ug/l)																						
1-Methylnaphthalene	NE	NE	< 0.25	< 0.23	< 0.22	< 0.23	< 0.25	< 33	**32**	**22**	< 2.8	< 0.31	< 0.25	NS	< 0.40	< 25	NS	< 0.27	< 0.35	<0.25	< 2.6	< 0.26
2-Methylnaphthalene	NE	NE	< 0.054	< 0.049	< 0.049	< 0.050	< 0.054	< 7.2	**25**	**12**	< 0.60	< 0.067	< 0.054	NS	< 0.087	< 5.5	NS	< 0.058	**0.10 J**	<0.054	< 0.55	< 0.055
Anthracene	3000	600	< 0.28	< 0.25	< 0.25	< 0.26	< 0.28	< 37	< 0.27	<0.26	< 3.1	< 0.34	< 0.28	NS	**1.4**	< 28	NS	< 0.30	< 0.38	**0.56 J**	< 2.8	< 0.28
Benzo[a]anthracene	NE	NE	< 0.047	< 0.043	< 0.042	< 0.044	< 0.047	< 6.2	< 0.046	**0.17**	< 0.52	< 0.058	< 0.047	NS	< 0.076	< 4.8	NS	< 0.050	**0.35**	**0.32**	< 0.48	< 0.048
Benzo[a]pyrene	0.2	0.02	< 0.081	< 0.075	< 0.074	< 0.076	< 0.083	< 11	< 0.081	**0.17**	< 0.92	< 0.10	< 0.082	NS	< 0.13	< 8.3	NS	< 0.088	**0.37**	**0.26**	< 0.84	< 0.084
Benzo[b]fluoranthene	0.2	0.02	< 0.066	< 0.061	< 0.060	< 0.062	< 0.067	< 8.9	< 0.066	**0.26**	< 0.75	< 0.082	< 0.067	NS	< 0.11	< 6.8	NS	< 0.072	**0.45**	**0.39**	< 0.69	< 0.069
Benzo[k]fluoranthene	NE	NE	< 0.053	< 0.048	< 0.048	< 0.049	< 0.054	< 7.0	< 0.052	**0.11 J**	< 0.59	< 0.065	< 0.053	NS	< 0.086	< 5.4	NS	< 0.057	**0.21 J**	**0.14 J**	< 0.54	< 0.054
Chrysene	0.2	0.02	< 0.056	< 0.051	< 0.051	< 0.053	< 0.057	< 7.5	< 0.056	**0.19 J**	< 0.63	< 0.070	< 0.056	NS	< 0.092	< 5.7	NS	< 0.061	**0.49 J**	**0.33 J**	< 0.58	< 0.058
Fluoranthene	400	80	< 0.37	< 0.34	< 0.34	< 0.35	< 0.38	< 50	< 0.37	**0.51 J**	< 4.2	< 0.46	< 0.38	NS	**0.80 J**	< 38	NS	< 0.40	**0.84 J**	**0.54 J**	< 3.9	< 0.39
Naphthalene	100	10	< 0.25	< 0.23	< 0.23	< 0.24	< 0.26	< 34	**230**	**120**	< 2.9	< 0.32	< 0.26	NS	< 0.41	< 26	NS	< 0.28	< 0.36	<0.25	< 2.6	< 0.26
Phenanthrene	NE	NE	< 0.25	< 0.23	< 0.22	< 0.23	< 0.25	< 33	**0.44 J**	<0.23	< 2.8	< 0.31	< 0.25	NS	**0.98 J**	< 25	NS	< 0.27	**0.76 J**	**0.42 J**	< 2.6	< 0.26
Pyrene	250	50	< 0.35	< 0.32	< 0.32	< 0.33	< 0.36	< 47	< 0.35	**0.39 J**	< 3.9	< 0.44	< 0.35	NS	< 0.57	< 36	NS	< 0.38	**0.70 J**	**0.48 J**	< 3.6	< 0.36
Resource Conservation and Recovery Act Metals (dissolved) (ug/l)																						
Arsenic	10	1	**1.0**	**0.85 J**	**0.67 J**	**0.44 J**	**0.92 J**	**1.5**	**7.0**	NS	**0.97 J**	**1.8**	**1.1**	NS	**0.71 J**	**2.4**	NS	**6.0**	**0.52 J**	NS	**1.3**	**6.2**
Barium	2000	400	**140**	**120**	**120**	**130**	**12**	**87**	**60**	NS	**66**	**16**	**36**	NS	**40**	**73**	NS	**12**	**34**	NS	**89**	**23**
Cadmium	5	0.5	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	< 0.19	NS	< 0.19	< 0.19	< 0.19	NS	< 0.19	< 0.19	NS	< 0.19	< 0.19	NS	**0.20 J**	< 0.19
Chromium	100	10	< 0.61	< 0.61	< 0.61	< 0.61	< 0.61	**5.7**	**0.70 J**	NS	**1.1 J**	< 0.61	**460**	**260**	< 0.61	**1.8 J**	NS	< 0.61	< 0.61	NS	< 0.61	**60**
Lead	15	1.5	< 0.14	< 0.14	**0.23 J**	< 0.14	< 0.14	**0.20 J**	**0.19 J**	NS	**0.16 J**	< 0.14	< 0.14	NS	< 0.14	**0.27 J**	NS	**0.14 J**	< 0.14	NS	**0.19 J**	**0.24 J**
Selenium	50	10	< 0.83	< 0.83	< 0.83	< 0.83	< 0.83	**3.5**	< 0.83	NS	**1.3 J**	**13**	**1.3 J**	NS	< 0.83	**1.3 J**	NS	**1.1 J**	< 0.83	NS	< 0.83	**3.6**

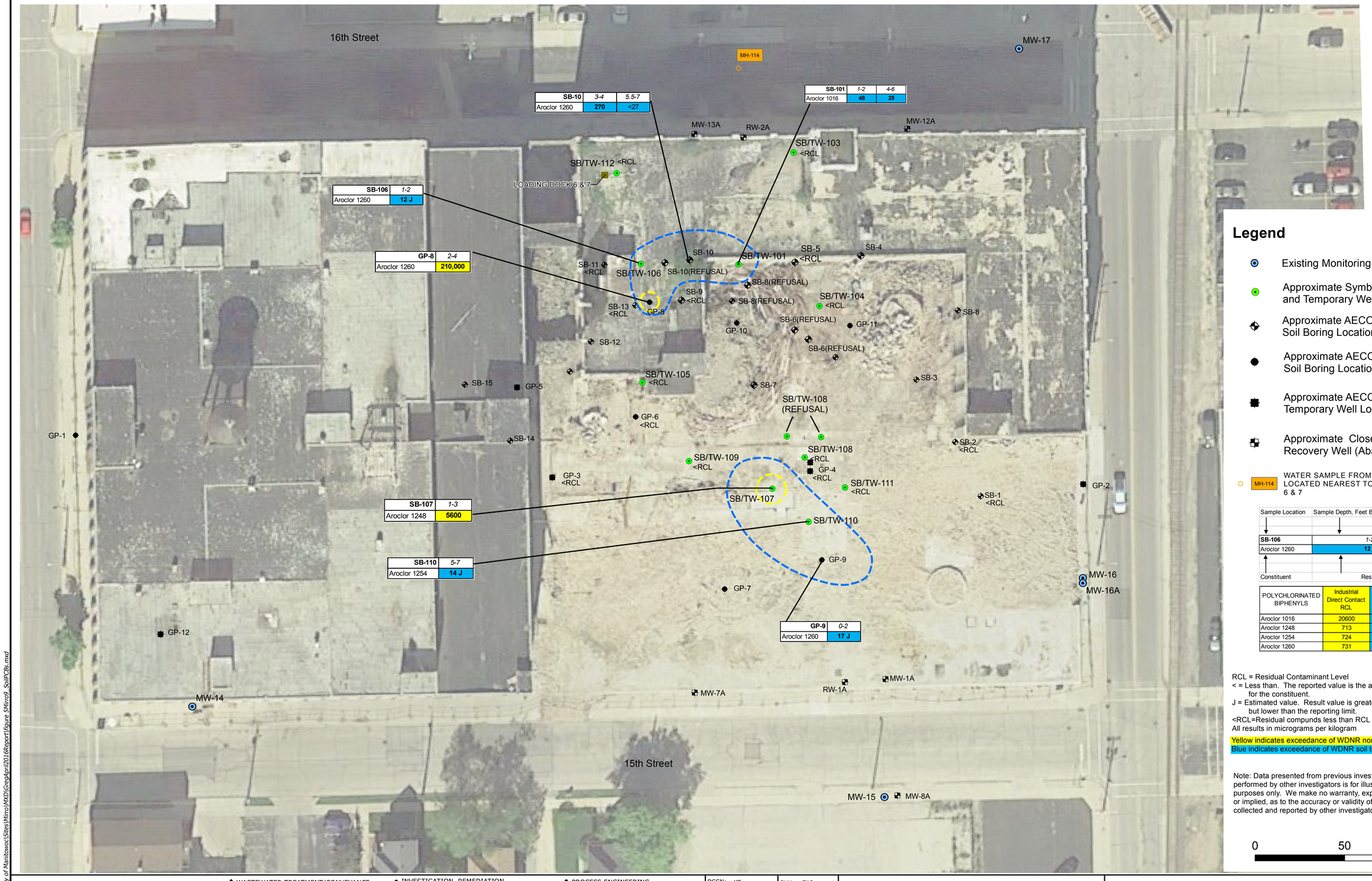
NOTES:
NE = Not Established
< = Less than. The reported value is the analytical methods limit of detection for the constituent.
ug/l = Micrograms per liter
Bold = Indicates detected concentration
Yellow shading indicates NR 140.10 Wisconsin Admistrative Code, Enforement Standard exceeded.
Blue shading indicates NR 140.10 Wisconsin Admistrative Code, preventative action limit exceeded.

LABORATORY DATA QUALIFIERS:
J = Result value is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.

TABLE 4
POLYCHLORINATED BIPHENYLS IN GROUNDWATER
FORMER MIRRO PLANT #9
1512 WASHINGTON STREET, MANITOWOC, WISCONSIN

Constituent	Enforcement Standard	Preventive Action Limit	*MONITORING WELL*						*SEWER STORM DRAIN*
			TW-101	TW-103	TW-106	TW-107	TW-108	TW-110	MH-114
			SAMPLE DATE						
			10/06/15	12/07/15	10/06/15	10/06/15	12/07/15	10/06/15	12/07/15
Polychlorinated Biphenyls (ug/l)									
PCB-1016	0.03	0.003	< 0.087	< 0.077	< 0.074	< 0.070	< 1.3	< 0.077	< 0.083
PCB-1221	0.03	0.003	< 0.26	< 0.23	< 0.22	< 0.21	< 3.8	< 0.23	< 0.25
PCB-1232	0.03	0.003	< 0.26	< 0.23	< 0.22	< 0.21	< 3.8	< 0.23	< 0.25
PCB-1242	0.03	0.003	< 0.26	< 0.23	< 0.22	< 0.21	< 3.8	< 0.23	< 0.25
PCB-1248	0.03	0.003	< 0.26	< 0.23	< 0.22	< 0.21	< 3.8	< 0.23	< 0.25
PCB-1254	0.03	0.003	< 0.26	< 0.23	< 0.22	< 0.21	< 3.8	< 0.23	< 0.25
PCB-1260	0.03	0.003	< 0.091	**0.55**	< 0.078	< 0.073	< 1.3	< 0.081	< 0.086

NOTES:
NE = Not Established
< = Less than. The reported value is the analytical methods limit of detection for the constituent.
ug/l = Micrograms per liter
Bold = Indicates detected concentration
Yellow shading indicates NR 140.10 Wisconsin Admistrative Code, Enforement Standard exceeded.
Blue shading indicates NR 140.10 Wisconsin Admistrative Code, preventative action limit exceeded.



Legend

- Existing Monitoring Well (AECOM/AES 2010)
- Approximate Symbiont Soil Boring and Temporary Well Location (2015)
- Approximate AECOM/AES Soil Boring Location (2010)
- Approximate AECOM Soil Boring Location (2009)
- Approximate AECOM Temporary Well Location (2009)
- Approximate Closed LUST Site Recovery Well (Abandoned)
- MH-114 — WATER SAMPLE FROM MANHOLE LOCATED NEAREST TO LOADING DOCK 6 & 7

Sample Location	Sample Depth, Feet Below Land Surface
SB-106	1-2
Aroclor 1260	12 J
Constituent	Result

POLYCHLORINATED BIPHENYLS	Industrial Direct Contact RCL	Soil to Groundwater Pathway RCL
Aroclor 1016	20600	9.4
Aroclor 1248	713	9.4
Aroclor 1254	724	9.4
Aroclor 1260	731	9.4

RCL = Residual Contaminant Level
< = Less than. The reported value is the analytical methods limit of detection for the constituent.
J = Estimated value. Result value is greater than the method detection limit, but lower than the reporting limit.
<RCL=Residual compunds less than RCL
All results in micrograms per kilogram

Yellow indicates exceedance of WDNR non-industrial direct contact RCL
Blue indicates exceedance of WDNR soil to groundwater pathway RCL

Note: Data presented from previous investigations performed by other investigators is for illustrative purposes only. We make no warranty, expressed or implied, as to the accuracy or validity of data collected and reported by other investigators.

0 50 100 Feet

Path: G:\Projects\City of Manitowoc\Sites\Mirro\MXD\Gregdpril2016Report\figure 5\Mirro9_SoilPCBs.mxd

SYMBIONT
6737 West Washington Street
Suite 3440
West Allis, Wisconsin 53214
414.291.8840
FAX 414.291.8841

- WASTEWATER TREATMENT/CONVEYANCE
- FACILITIES ENGINEERING
- ENVIRONMENTAL MANAGEMENT
- AIR QUALITY
- DESIGN/BUILD CONSTRUCTION MANAGEMENT
- INVESTIGATION, REMEDIATION, AND SITE CLOSURE
- HEALTH CARE FACILITIES DESIGN
- WATER SUPPLY AND DISTRIBUTION
- SOLID AND HAZARDOUS WASTE MANAGEMENT
- PROCESS ENGINEERING
- WATER RESOURCES PLANNING/DESIGN
- STORM WATER MANAGEMENT
- GIS SERVICES
- BROWNFIELDS

DSGN: KE | CHK: TAR
DR: KE | APVD: TAR

MIRRO PLANT #9
1512 WASHINGTON STREET
MANITOWOC, WI

FIGURE 5
POLYCHLORINATED BIPHENYLS
IN SOIL

SCALE 1 in = 25 ft
DWG 5
DATE APRIL 2016
PROJ NO. W140408

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-97

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Mirro 9		SB-101

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Horizon Construction and Exploration	10/5/2015	10/5/2015	Geoprobe - Direct Push

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		SB-101	Feet MSL	Feet MSL	1.00 Inches

Boring Location or Local Grid Origin (Check if estimated: ☐)
State Plane S / C / N
SW 1/4 of NE 1/4 of Section 30, T 19 N, R 23
Lat. 44° 5' 24.0"
Long. 87° 40' 6.0"
Local Grid Location (If applicable)
Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Manitowoc	36	Manitowoc

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1	48 24		1 2 3	**0.0 - 4.0 FEET** FILL: Mix of brown silt, clay, and fine sand No recovery from 2 - 4 ft				145		m				
2	48 36		4 5 6 7	**4.0 - 15.0 FEET** VERY FINE SAND: Loose, poorly graded, moist No recovery from 7 - 8 ft				257 195		m m				
3	48 42		8 9 10 11 12	Changes to wet, increasing wettness with depth Black staining and chemical odor	SP			140.6		w w				

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature [signature] Firm Symbiont
6737 W. Washington St., Suite 3440, West Allis, WI
Tel: 414-291-8840
Fax: 414-291-8841

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A Rev. 5-97

Boring Number
SB-101

Use only as an attachment to Form 4400-122.

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
4	36 36		13 14 15	**E.O.B. 15.0 FEET** A 1-inch diameter PVC temporary monitoring well was completed at 15 ft bgs and screened from 5 to 15 ft bgs.						m				

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 5-97

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Mirro 9		SB-103

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Horizon Construction and Exploration	10/5/2015	10/5/2015	Geoprobe - Direct Push

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		SB-103	Feet MSL	Feet MSL	1.00 Inches

Boring Location or Local Grid Origin (Check if estimated: ☐)
State Plane S / C / N
SW 1/4 of NE 1/4 of Section 30, T 19 N, R 23
Lat. 44° 5' 24.0"
Long. 87° 40' 7.0"
Local Grid Location (If applicable)
Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Manitowoc	36	Manitowoc

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	60 24		1	**0.0 - 1.0 FEET** FILL: Mix of brown silt, clay, and fine sand										
CS			2	**1.0 - 15.0 FEET** SILTY SAND: Fine grained, poorly graded, loose				0.0		m				
			3	No recovery from 2 - 5 ft										
			4											
			5											
CS	60 48		6					0.0						
			7	Changes to wet						w				
			8		SP									
CS			9					1085		w				
			10	No recovery from 9 - 10 ft										
	60 60		11											
CS			12					1123		w				

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	Tel: 414-291-8840
	Symbiont 6737 W. Washington St., Suite 3440, West Allis, WI	Fax: 414-291-8841

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A Rev. 5-97

Boring Number
SB-103

Use only as an attachment to Form 4400-122.

Sample										Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			13					575						
CS			14					3.7		w				
			15	**E.O.B. 15.0 FEET** A 1-inch diameter PVC temporary monitoring well was completed at 15 ft bgs and screened from 5 to 15 ft bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 5-97

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Mirro 9		SB-104

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Horizon Construction and Exploration	10/5/2015	10/5/2015	Geoprobe - Direct Push

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		SB-104	Feet MSL	Feet MSL	1.00 Inches

Boring Location or Local Grid Origin (Check if estimated: ☐)
State Plane S / C / N
SW 1/4 of NE 1/4 of Section 30, T 19 N, R 23
Lat. 44° 5' 24.0"
Long. 87° 40' 6.0"
Local Grid Location (If applicable)
Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Manitowoc	36	Manitowoc

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	60 30		1	**0.0 - 0.5 FEET** CONCRETE										
			1	**0.5 - 7.5 FEET** FILL: Gravely, dark in color, alternating pieces of brick at depth				0.0		m				
			2											
			3					0.0		m				
			4											
2 CS	60 42		5					0.0		m				
			6											
			7					0.0		m				
			8	**7.5 - 15.0 FEET** SILTY SAND: Fine grained, poorly graded, brown, 10 YR 4/6 Wet at 8 feet						w				
			9					0.0						
3 CS	60 60		10											
			11		SM-ML			0.0						
			12											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	Tel:
	Symbiont 6737 W. Washington St., Suite 3440, West Allis, WI	414-291-8840 Fax: 414-291-8841

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A Rev. 5-97

Boring Number
SB-104

Use only as an attachment to Form 4400-122.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			13					0.0						
			14											
			15	**E.O.B. 15.0 FEET** A 1-inch diameter PVC temporary monitoring well was completed at 15 ft bgs and screened from 5 to 15 ft bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 5-97

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Mirro 9		SB-105

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Horizon Construction and Exploration	10/5/2015	10/5/2015	Geoprobe - Direct Push

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		SB-105	Feet MSL	Feet MSL	1.00 Inches

Boring Location or Local Grid Origin (Check if estimated: ☐)
State Plane S / C / N
SW 1/4 of NE 1/4 of Section 30, T 19 N, R 23
Lat. 44° 5' 23.0"
Long. 87° 40' 6.0"
Local Grid Location (If applicable) ☐ N Feet ☐ S ☐ E Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Manitowoc	36	Manitowoc

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	60 / 24		1	**0.0 - 0.5 FEET** CONCRETE										
				0.5 - 1.5 FEET FILL: Mix of brown silt, clay, and fine sand				0.0		m				
			2	**1.5 - 15 FEET** SILTY SAND: Fine grained, loose, poorly graded										
			3	No recovery from 2 - 5 ft.										
			4											
2 CS	60 / 48		5					0.0		m				
			6	Changes to wet at 6 ft, becomes more saturdated with depth						w				
			7					0.0		w				
			8		SM									
			9	No recovery from 9 - 10 ft										
3 CS	60 / 60		10											
			11					0.0		w				
			12											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	Tel / Fax
	Symbiont 6737 W. Washington St., Suite 3440, West Allis, WI	Tel: 414-291-8840 Fax: 414-291-8841

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A Rev. 5-97

Boring Number
SB-105

Use only as an attachment to Form 4400-122.

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			13					0.0		w				
			14											
			15	**E.O.B. 15 FEET**										
				A 1-inch diameter PVC temporary monitoring well was completed at 15 ft bgs and screened from 5 to 15 ft bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 5-97

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☒ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Mirro 9		SB-106

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Horizon Construction and Exploration	10/5/2015	10/5/2015	Geoprobe - Direct Push

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		SB-106	Feet MSL	Feet MSL	1.00 Inches

Boring Location or Local Grid Origin (Check if estimated: ☐)
State Plane S / C / N
SW 1/4 of NE 1/4 of Section 30, T 19 N, R 23
Lat. 44° 5' 23.0"
Long. 87° 40' 6.0"
Local Grid Location (If applicable)
☐ N Feet ☐ S ☐ E Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Manitowoc	36	Manitowoc

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 CS	60 / 24		1	**0.0 - 0.5 FEET** CONCRETE										
			1	**0.5 - 7.0 FEET** SAND: Fine grained, loose, poorly graded, moist										
			2					0.0		m				
			3	No recovery from 2 - 5 ft										
			4		SM									
2 CS	60 / 36		5					0.0		m				
			6											
			7	**7.0 - 15.0 FEET** SILTY SAND: Fine grained, loose, trace gravel throughout, changes to wet				0.0		w				
			8											
			9	No recovery from 8 - 10 ft				0.0		w				
3 CS	60 / 48		10											
			11		SM			0.0		w				
			12											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	Tel: 414-291-8840
	Symbiont 6737 W. Washington St., Suite 3440, West Allis, WI	Fax: 414-291-8841

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SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A Rev. 5-97

Boring Number
SB-106

Use only as an attachment to Form 4400-122.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			13					0.0		w				
			14	No recovery from 14 - 15 ft										
			15	**E.O.B. 15 FEET** A 1-inch diameter PVC temporary monitoring well was completed at 15 ft bgs and screened from 5 to 15 ft bgs.										

APPENDIX B – SITE-SPECIFIC HEALTH AND SAFETY PLAN

Site-Specific Health and Safety Plan

City of Manitowoc, Wisconsin

1512 WEST WASHINGTON STREET
MANITOWOC, WISCONSIN

U.S. EPA Brownfield Cooperative Agreement No.: BF-00E01529-0

June 21, 2017
Project Number 193703931

Stantec

Stantec

SITE- SPECIFIC HEALTH AND SAFETY PLAN
1512 West Washington Street
Manitowoc, Wisconsin

June 21, 2017

Prepared For:
Nicolas Sparacio, AICP
Community Development Director
City of Manitowoc
900 Quay Street
Manitowoc, WI 54220-4543

Prepared By:
Stantec Consulting Services Inc.
12075 Corporate Parkway Suite 200
Mequon WI 53092-2649

The information presented in this Site-Specific Health and Safety Plan is intended solely to denote the health and safety measures/guidelines applicable to Stantec personnel engaged in field activities at the above-referenced site. Stantec makes no warranties regarding the accuracy of the Site-Specific Health and Safety Plan, and nothing contained herein shall be construed as providing recommendations or direction, either expressed or implied, regarding health and safety measures to be taken by anyone other than Stantec personnel. Non-Stantec personnel shall be responsible for complying with site safety plans and local, state, and/or federal regulations applicable to non-Stantec personnel.

Stantec Project Number: 193703931

Harris L. Byers
Brownfields Project Manager

Table of Contents

1.0 Introduction

The purpose of this Site-Specific Health and Safety Plan (SHSP) is to identify, evaluate and control the safety and health hazards associated with the planned tasks to complete a Phase II ESA at 1512 Washington Street in Manitowoc, Wisconsin and ensure the health and safety of all Stantec employees involved. The planned tasks are outlined in the Site-Specific Sampling and Analysis Plan (SSSAP).

All field activities must be conducted in compliance with this SHSP. Personnel covered by this SHSP who cannot or will not comply with the SHSP will be excluded from on-site activities. Anyone who will be on site will be required to sign the SHSP review found in this SHSP.

Contractors and sub-contractors will be given a copy of this SHSP and will sign the review acknowledging that they have read and understood this SHSP. Their signature indicates that Stantec has informed them of the site emergency response procedures and any potential fire, explosion, health, safety or other hazards of the hazardous waste operation that have been identified. However, Stantec does not assume responsibility for the actions of the contractors or sub-contractor. Contractors will be required to develop and follow their own SHSP related to specific on-site activities.

This SHSP was prepared from the best available information concerning site conditions at the time of development. The health and safety specifications in this SHSP are based on reasonably available sampling information and reports. The project manager or site safety officer have the authority to amend any part of this program at any time due to changes to site conditions that may affect the health and safety of on-site personnel.

2.0 Background Information

1. Site Name: 1512 West Washington Street, Manitowoc, Wisconsin
2. Site Location: 1512 West Washington Street, Manitowoc, Wisconsin
3. Client Name: City of Manitowoc
4. Client Contact: Nicolas Sparacio Phone: (920) 686-6931
5. Stantec Project Manager: Harris Byers Phone: (414) 581-6476
6. Anticipated On-Site Personnel:

NAME	AFFILIATION	FUNCTION
Nick Heim	Geologist	Site-Safety Officer

7. Plan Prepared by: Harris Byers Date: 6/21/2017
8. Plan Reviewed by: Richard J. Binder, P.G. Date: 6/21/2017

The Project Manager and Site-Safety Officer (SSO) or an alternate designee will be responsible for the implementation of this SHSP. Provided below are the key titles and associated responsibilities for personnel that are involved in the site activities.

PROJECT MANAGER

The Stantec Project Manager provides overall direction for the implementation of field activities in accordance with this SHSP. The Project Manager will also serve as the program liaison to federal, state, and local authorities. Specific program questions will be directed to this individual.

SITE-SAFETY OFFICER

The SSO will be the Stantec field supervisor. She/he will direct the implementation and field evaluation of the SHSP. The SSO will be in charge during any emergency until she/he is relieved by Fire or other senior Emergency Responders. The SSO will be responsible for:

- Conduct health and safety briefings for Stantec employees based upon potential hazards specific to the designated work tasks scheduled
- Modify SHSP as required to address specific situations
- Investigate and report on-site accidents/incidents

3.0 Site Information

1. Purpose of Investigation/Field Work: This work is being performed as part of a Phase II Environmental Site Assessment (ESA) of the property located at 1512 Washington Street in the City of Manitowoc, Wisconsin (herein referred to as the Site or Property). The location of the Site is illustrated on Figure 1.

2a.	Potential Hazard to Personnel	2b.	Protective Equipment Required
	Fire/explosive condition	x	First aid kit
X	Worker exposure/injury	x	Eye wash
	Confined spaces		Ladder
	Steep/uneven terrain	x	Fire Extinguisher
X	Chemical/contaminant exposure	x	Safety Glasses
X	Traffic/heavy machinery	x	Communication
X	Noise exposure	x	Hard Hat
	Thermal exposure	x	Hearing Protection
X*	Respirator/SCBA	X**	Tyvex™ Suit**
		x	Latex Gloves
		X	Steel Toe Boots
		X**	Boot Covers**

Estimated days on site: three days

* If particulates/dust is visible in the air, a half-faced respirator may be worn for comfort.

** If significant dust is present, a Tyvek suit and boot covers may be worn as an additional level of protection

4.0 Contaminant/Chemical Hazard Assessment

1. The purpose of this work is to conduct a Phase II ESA to determine current Site conditions. The following assessment is related to on-site substances which may potentially be encountered. The following assessment is related to on-site substances which may potentially be encountered.

SUBSTANCE	MAXIMUM CONCENTRATION (UNITS)	MEDIUM[1,2]	PEL/TLV (mg/m³)[3]	CANCER STATUS[4]	ROUTE[5]
PCBs	6.4% (see Stantec, 2017)	CONCRETE	0.5/0.5	B2	I, IN
	240 MG/KG (see AECOM, 2009)	S	0.5/0.5	B2	I, IN
VOCs/PAHs	(see Symbiont, 2016)	S, GW	varies	varies	I, A, C

[1]Environmental Medium: Building material (BM), soil (S), and groundwater (GW) as identified in:

AECOM, 2009, Phase II Subsurface Assessment, Former Mirro Plant No. 9, 1512 Washington Street, Manitowoc, Wisconsin, May 2009.

Stantec, 2017, Identification and Delineation of TSCA-Level PCB Impacts to Porous Building Materials, 1512 Washington Street, Manitowoc, Wisconsin, February 22, 2017.

Symbiont, 2016, Site Investigation Results and Summary of Previous Site Assessment, Former Mirro Plant 9 1512 Washington Street, Manitowoc, Wisconsin, August 1, 2016.

[2]List the maximum concentration for each medium separately

[3]Use the lower of the two exposure limits (PEL/TLV); concentrations (milligrams per cubic meter) obtained on May 9, 2017 from *https://www.osha.gov/dsg/annotated-pels/tablez-1.html*

[4]Cancer status; EPA Classification

Group A: Human carcinogen – Sufficient evidence to support a casual association between exposure and cancer.

Group B1: Probable Human Carcinogen – Limited evidence of carcinogenicity in humans

Group B2: Probable Human Carcinogen – Sufficient evidence of carcinogenicity in animals, inadequate evidence of carcinogenicity in humans.

Group C: Possible Human Carcinogen – Limited evidence of carcinogenicity in animals.

Group D: Not Classified – Inadequate evidence of carcinogenicity in animals.

Group E: No Evidence of Carcinogenicity in Humans – No evidence for carcinogenic in at least two adequate animal tests or in both epidemiologist and animal studies.

[5]Route: (I) – Inhalation, (A) – Skin absorption, (IN) – Ingestion, (C) – Eye/skin contact.

2. The following chemical(s) may be/could be brought to the work site:
None Expected

5.0 Physical Hazard Assessment

FLAMMABILITY/EXPLOSIVE

It is unlikely that explosive atmospheres will be encountered while performing tasks. However, it is possible that unknown chemicals may be encountered. Therefore, the following standard safety procedures will be implemented.

- All field vehicles and heavy equipment will be equipped with a type-ABC fire extinguisher. Fire extinguishers will be mounted on the vehicles where field personnel can easily access them. A fire extinguisher check, including inspection of gauges, hoses, and tanks, will be conducted before use of the field vehicle to ensure proper operation of the equipment.
- When necessary other appropriate firefighting equipment will be made available.
- Open fires and burning are prohibited. Smoking will be prohibited in all areas where flammable, combustible, or oxidizing materials are stored or are in use and any area containing unknown contaminants.

HEAVY EQUIPMENT

The hazards associated with the operation of heavy equipment can be effectively managed through adequate training and constant awareness. Any subcontractor equipment operators must have had the required training and must demonstrate the necessary skills for the piece of equipment they are operating. Constant visual and verbal contact should be maintained with the operator to facilitate awareness. Equipment will not obstruct roadways, walkways, electrical lines, etc. Proper distance from power lines should be observed. The operator and field personnel should be aware of loose soil or uneven terrain that cannot be driven over or parked on for sake of a roll-over hazard. All personnel working around heavy equipment will wear hard hats and safety-toed boots (at a minimum). Personnel should avoid turning their back to operating machinery.

EXCAVATIONS

Under no circumstances should an employee enter an un-shored excavation greater than 4 feet in depth. Shored excavations may also be considered confined spaces. A soil sample from excavations should be obtained from the backhoe bucket or other means if at all possible. Before entering an excavation the situations should be discussed with the project manager to assess confined space requirements (See Section 8).

SLIPS, TRIPS, AND FALLS

Although it can be difficult to prevent slips, trips, and fall hazards, these hazards can be minimized through good housekeeping, proper site-control measures, and keeping the work area free of obstructions. In the event that only one Stantec field person is on site, that person will inform the on-site subcontractors of where he/she will be working and ask them to accompany him/her for the work. Since it is virtually impossible to eliminate all slip, trip, and fall hazards in the Assessment Area, personnel should always be aware of the terrain they are walking across and have sure footing, taking very deliberate steps and the easiest path of travel. Cones and or caution tape will be used to mark identifiable hazards.

LIFTING

Field operations often require that physical labor tasks be performed. All employees should employ proper lifting procedures. Additionally, employees should not attempt to lift bulky or heavy objects (greater than 40 pounds) without assistance.

TOOLS AND EQUIPMENT

Hazards present during the use of tools and equipment are generally associated with improper tool handling and inadequate maintenance. Management of these hazards requires a rigorous maintenance of tools and equipment and effective training of employees in the proper use of these tools. Electrical cords must have unbroken insulation and should not be exposed to water or other liquids. A ground fault circuit interrupter outlet or cord must be used in any area where water may be present.

6.0 Personal Protective Equipment

However, if site conditions change (e.g., unknown contaminants encountered, employee complaints, etc.) and a higher degree of protection is required, the SSO will consult the Project Manager and the required changes in personal protective equipment (PPE) will be made. A change in the level of PPE will result in this SHSP being amended and reviewed by the Project Manager.

PROJECT TASK	**LEVEL OF PROTECTION HAZ. WASTE & NON-HAZ. SITE (A, B, C, D, [OTHER SPECIFY BELOW])[1]**
Soil Sampling	Modified Level D*
Groundwater Sampling	Modified Level D*

[1] See Attachment C for PPE description by level

* If particulates/dust is visible in the air, a half-faced respirator may be worn for comfort. If significant dust is present, a Tyvek suit and boot covers may be worn as an additional level of protection.

7.0 Medical Requirements

Stantec personnel, whose presence may be required on a site where exposure to toxic and/or hazardous substances exists, shall be required to participate in any medical monitoring as deemed necessary by Stantec. All medical examinations performed for Stantec personnel shall be conducted in accordance with the requirements of 29 CFR 1910.120, 29 CFR 1910.134. In addition, it may be necessary to require specific clinical tests for certain sites. Any site-specific testing shall be identified below.

SITE-SPECIFIC CLINICAL TESTS

PARAMETER	REQUIRED TESTING	ACTION LEVEL
N/A	N/A	N/A

All Stantec employees will be medically qualified and fit tested for respiratory protection as appropriate.

MEDICAL DATA SUMMARY

Medical examinations are not warranted for the proposed scope of work. Should Site conditions warrant revision, this form shall be completed by Stantec personnel prior to commencement of activities at the site. This form shall be kept at the project site for the duration of applicable project activities. This form must be delivered to the attending physician when medical assistance is required.

Medical Data Summary Forms are provided in Attachment A

8.0 Training Requirements

All Stantec personnel participating in site investigations where exposure to toxic and/or hazardous substances is possible must complete at least 40 hours of health and safety training required by 29 CFR 1910.120. The dates of certification are documented in the following Stantec office:

Stantec
12075 Corporate Parkway Suite 200
Mequon WI 53092-2649
Contact: Mr. Jon Currie

CONFINED SPACE ENTRY

As a general rule, Stantec employees who are engaged in activities at sites covered by 29 CFR 1910.120 are prohibited from entering confined spaces. However, if it becomes absolutely necessary to enter a confined space to accomplish a required task, specific procedures will be established by the Stantec project manager and safety personnel on a task-by-task basis.

9.0 Environmental Monitoring

Service, maintenance, and calibration of monitoring equipment shall be performed in accordance with manufacturers' recommendations.

MONITORING EQUIPMENT CHECKLIST

TYPE OF EQUIPMENT	SERIAL NO.	WRITTEN SOP AVAILABLE	DATE CALIBRATED
PID	To Be Determined	Yes	Daily
4-Gas Meter	To Be Determined	Yes	Daily

SURVEILLANCE METHODS

The monitoring methods to be used at the project site are described below:

The breathing zone and work area will be periodically screened for volatile organic compounds (VOCs) using the PID and four-gas meter. If elevated VOCs are detected in the breathing zone or four-gas meter indicates a risk exists, Stantec staff will remove their persons from the work site, notify the project manager and evaluate appropriate actions (e.g. upgrade to Level C, etc.).

10.0 Site Safety Procedures

A site-specific/pre-entry meeting will be held before the start of any site activities in the Assessment Area. Additional meetings will be held as necessary. The purpose of these safety meetings is to:

- Describe the assigned tasks and their potential hazards.
- Coordinate activities.
- Identify methods and precautions to prevent injuries.
- Plan for emergencies.
- Describe any changes in the Site Safety Plan.
- Solicit worker feedback on conditions affecting safety and health.
- Solicit worker feedback on how well the Site Safety Plan is working.

Safety meetings will also be held at all other times necessary to ensure that all field personnel and visitors are aware of the health and safety hazards at the site. All field personnel and visitors will be required to attend these meetings. The on-site SSO or alternate designee will conduct the meetings.

The SSO will also conduct frequent inspections of site conditions, equipment, and activities to determine whether the SHSP is adequate and being followed. In order to make safety inspections effective, the following guidelines should be observed:

- Review the results of these inspections with supervisors and workers.
- Re-inspect any identified problems to ensure that they have been corrected.
- Document all inspections and subsequent follow-up actions in field notebook kept for this project. Retain these records until site activities are completed and at least 5 years after project has been completed.

The frequency of inspections shall be both at the beginning and the end of each work shift or when site conditions change due to factors such as weather, tasks are performed or new hazards being introduced on-site or discovered during site activities.

PERIMETER ESTABLISHMENT

The property lines will be used as the perimeter.

SITE ENTRY PROCEDURES

Before entering the site all personnel shall don the required personal protective equipment (PPE) and follow the decontamination procedures when exiting site.

SITE CONTROL AND DESIGNATION OF WORK ZONES

The following procedures shall be observed to minimize the potential for contaminant transfer, personnel exposure to hazardous materials, and work place injury.

EXCLUSION ZONE

We do not plan to formally delineate the exclusion zone because of numerous and small work locations involved across the site over a relatively short period of time, and the limited likelihood

of exposure to personnel other than those doing the actual work. The exclusion zone will be determined at each work location.

CONTAMINATION REDUCTION ZONE

We do not plan to formally delineate the contamination reduction zone because of numerous and small work locations involved across the site over a relatively short period of time, and the limited likelihood of exposure to personnel other than those doing the actual work. The contamination reduction zone will be determined at each work location.

SUPPORT ZONE

The support zone will consist of an area outside of the exclusion and contamination reduction zone where field vehicles and equipment will be staged. Eating, drinking, and smoking will only be allowed in this area.

11.0 Decontamination

All non-disposable field equipment will be decontaminated before each use and between samples to avoid cross-contamination between samples and to ensure the health and safety of the field crews. Field personnel must follow the procedures outlined below whenever leaving the exclusion areas. All decontamination procedures will be performed in accordance with the field standard operating procedure for *Equipment Decontamination* and *Management of Investigative Wastes Procedures* included in the Stantec (2015) *Quality Assurance Project Plan.*

PERSONNEL DECONTAMINATION PROCEDURES

Gloves will be placed in a plastic bag and disposed of properly. Re-usable PPE will be decontaminated with an appropriate detergent wash and rinsed with water. Decontamination water will be containerized and disposed of properly.

SAMPLING/MONITORING EQUIPMENT DECONTAMINATION PROCEDURES

Disposable equipment will be placed in a garbage bag and disposed of properly. Re-usable equipment will be washed and scrubbed with an appropriate detergent wash and rinsed with water. Equipment will be decontaminated after each sampling event to prevent cross contamination. Decontamination water will be containerized and disposed of properly.

12.0 Emergency Plan

This emergency action plan can be fully or partially activated depending on the extent of the encountered incident. The plan will be activated whenever an emergency is discovered. Where possible, the emergency will be brought under control by the on-site personnel. The on-site SSO has full responsibility in the event of an emergency and will be required to determine if outside response needs to be contacted.

The personnel who have responsibilities in the event of an emergency are listed below with their area(s) of responsibility. In addition, procedures to be followed in the event of a site evacuation are also outlined.

EMERGENCY PERSONNEL RESPONSIBILITIES

NAME	RESPONSIBILITY
Nic Heim	Site-Safety Officer
Harris Byers	Supervisor

The SSO is the on-site emergency coordinator who has the responsibility for controlling emergency response operations at the site. In the event of an emergency, the SSO must identify, as best as possible, all hazardous substances or conditions present. She/he must implement appropriate emergency operations in accordance with this plan. In addition, she/he must limit the number of personnel exposed to the emergency, by communicating with all personnel on-site and assuring they get to a safe area.

COMMUNICATION

Before starting field activities, the appropriate representatives of the City of Manitowoc will be notified of the planned activities. Stantec will review the SHSP and Emergency Plan with the City of Manitowoc representatives to inform them of potential emergencies related to the field activities at the site.

If an emergency occurs, fast and effective communication is essential. Without proper communication, the ability to initiate and carry out an appropriate response could be severely hindered. There are three important elements to effective communications. First, the appropriate message to be communicated must be determined. Second, the message then must be transmitted correctly. Finally, the person receiving the message must understand the message onsite. Communication will be accomplished through direct-voice contact, two-way radio dispatch, and cell phones. The SSO will have a cell phone either on person or in the field vehicle at all times while performing tasks at the Site.

In the event of an emergency, the SSO will contact off-site first responders or transport the victim to the hospital following the evacuation/hospital route found in this SHSP. If victim is in distress, 911 can be called immediately by the individual who discovers the emergency. Outside medical assistance should be requested if any of the following conditions occur.

- Cardiac Arrest
- Chest Pain

- Breathing Difficulty
- Burns (2nd or 3rd degree over 10 percent of the body or about the face or neck)
- Diabetic Emergency
- Drug Overdose
- Hypertension
- Multiple Trauma
- Seizure
- Smoke, Heat or Toxic Gas Inhalation
- Uncontrollable Bleeding

Emergency eye wash bottles will be kept in field vehicles in case of any eye emergencies requiring immediate flushing of the eyes to prevent permanent damage to the person's sight. If outside assistance is required, immediately dial 911. Call from a safe area. The following information should be given.

- Inform the dispatcher of the emergency
- Identify yourself
- Indicate if someone is injured
- Describe how to get to the area of emergency

After making the call, evacuate victims to safe area if they can be moved and wait to meet the responders.

EMERGENCY PROCEDURES

INJURY

- All site personnel shall assemble at the decontamination line.
- The SSO shall evaluate the nature of injury and contact outside emergency services if needed.
- Move victim to Contamination Reduction Zone if can be moved.
- Perform emergency decontamination procedures (section below) on victim.
- Transport victim to hospital if needed or inform outside emergency personnel of situation and designated medical facility.
- No persons shall re-enter the Exclusion Zone until the cause of the injury (or symptoms) is determined.
- Perform an accident investigation using Attachment B (Incident Report Sheet).

DECONTAMINATION DURING MEDICAL EMERGENCIES

If emergency life-saving first aid and/or medical treatment are required, decontamination procedures may be limited or omitted. If the contamination does not present a hazard to the rescue personnel, life-saving care may be instituted immediately. If contamination will present a risk to rescue personnel, minimal decontamination should be performed to allow initiation of aid.

If contamination presents a significant risk to rescue personnel, then decontamination will need to be performed until the contamination is no longer a risk.

Medical assistance personnel will be notified before transporting the victim if the victim may be contaminated. Assurance must be made that the medical personnel at the receiving area are able and willing to handle a victim who is contaminated. Site personnel will accompany contaminated victim to the medical facility to advice on matters involving decontamination. A copy of this SHSP, including materials safety data sheets (MSDS) (if known), will be brought along with the victim.

Heat-related illnesses range from heat fatigue to heat stroke. Heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing must be promptly removed. Less serious forms of heat stress also require prompt attention. Unless the victim is obviously contaminated, decontamination may be omitted or minimized and treatment should begin immediately.

FIRE/EXPLOSION

If fire or explosions occur in the Assessment Area, the following actions will be performed.

- Any personnel who discover a fire should immediately notify 911 to request assistance.
- On-site personnel, under the direction of the SSO, will attempt to control or extinguish fire with fire extinguisher, if possible.
- A 10-second air horn blast shall be sounded.
- All site personnel not involved with fighting the fire shall assemble at the decontamination line.
- Evacuation of the affected area may be necessary in case of major fire or explosion. All personnel will be familiar with excavation procedures and means of exit from their work areas.
- Emergency Response officials will determine the appropriate actions for off-site response actions.

UNKNOWN INTACT DRUMS

It is not anticipated that unknown intact drums will be encountered during the assessment activities, however, if encountered, the following steps will be performed.

- The drum will first be inspected from the surface by the SSO. The SSO will be looking for the following items:
  - Symbols, words or other marks on the drum indicating that its contents are hazardous (e.g., radioactive, explosive, corrosive, toxic or flammable)
  - Symbols, words or other marks on the drum indicating that it contains discarded laboratory chemicals, reagents, or potentially dangerous materials in small volume individual containers
  - Evidence of deterioration such as corrosion, rust, and leaks
  - Evidence that the drum is under pressure such as swelling and bulging
  - Drum type and drum lid
- After surface inspection of the drum, investigative activities will cease, and the drum will remain intact.

SPILL/RELEASE

If a spill or release occurs, the following steps will be performed.

- Report it immediately to the SSO.
- All personnel shall then re-locate upwind and upgradient of the spill to a safe distance (e.g., 1000 feet).
- SSO will assess the spill and inform the drilling contractor to put absorbent material down to try to contain the spill if possible.
- If spill or release cannot be contained and/or cannot be safely characterized, a 10-second blast shall be sounded and all personnel shall be evacuated immediately to the decontamination line.
- Then a safe distance away, upwind and upgradient of spill.
- SSO will contact the site hazardous material spill response contractor and inform them about the spill/release and to coordinate spill cleanup.
- The SSO will contact the Manitowoc County emergency response personnel, and the Wisconsin Department of Natural Resources.

The SSO will coordinate with the spill release contractor and determine through the SSO's/spill contractor's professional opinion if there is a threat to the neighboring community. Should the neighboring community require evacuation, the SSO will contact the local authorities, inform them of the situation, and ask that they contact the affected receptors.

ADVERSE WEATHER CONDITIONS

If the SSO is notified of adverse weather conditions, the following steps shall be performed.

- The SSO will determine if work can continue without endangering the health and safety of the field workers. The SSO will monitor the weather during the a.m. and p.m. hours and will document it in the field logbook. Some of the items to be considered before determining the continuance of work are:
  - Potential for heat stress and heat related injuries
  - Potential for cold stress and frostbite related injuries
  - Dangerous weather related working conditions (high winds)
  - Limited Visibility
  - Potential for electrical storms/lightning. No activities will be permitted during electrical storms
  - Tornado watches and warnings. No activities will be permitted during a tornado warning
  - Winter weather watches and warnings. No activities will be permitted during a snow storm.

In the event of a weather emergency:

- Take appropriate cover in either nearby buildings or vehicles depending on the emergency.
- Work will cease until the conditions clear up and all watches/warnings are lifted.

GENERAL SITE EVACUATION PROCEDURES

Exit exclusion zone, contaminant reduction zone, and support zone. Contact emergency services (911) if necessary.

First Aid procedures for a variety of situations are included in Attachment D.

13.0 Emergency References

EMERGENCY RESOURCES

* Ambulance	**911**
* Hospital Emergency Center	**(920) 433-0111**
* Hospital Life Line	NA
* Hospital Poison Center	NA
* Local Police	**(920) 448-3200 or 911**
***County Sheriff	**(920) 448-4200**
* State Police	**(920) 448-4200**
* Fire Department	**(920) 448-3280 or 911**
* Explosives Disposal Unit	NA
* Radio Channel	NA

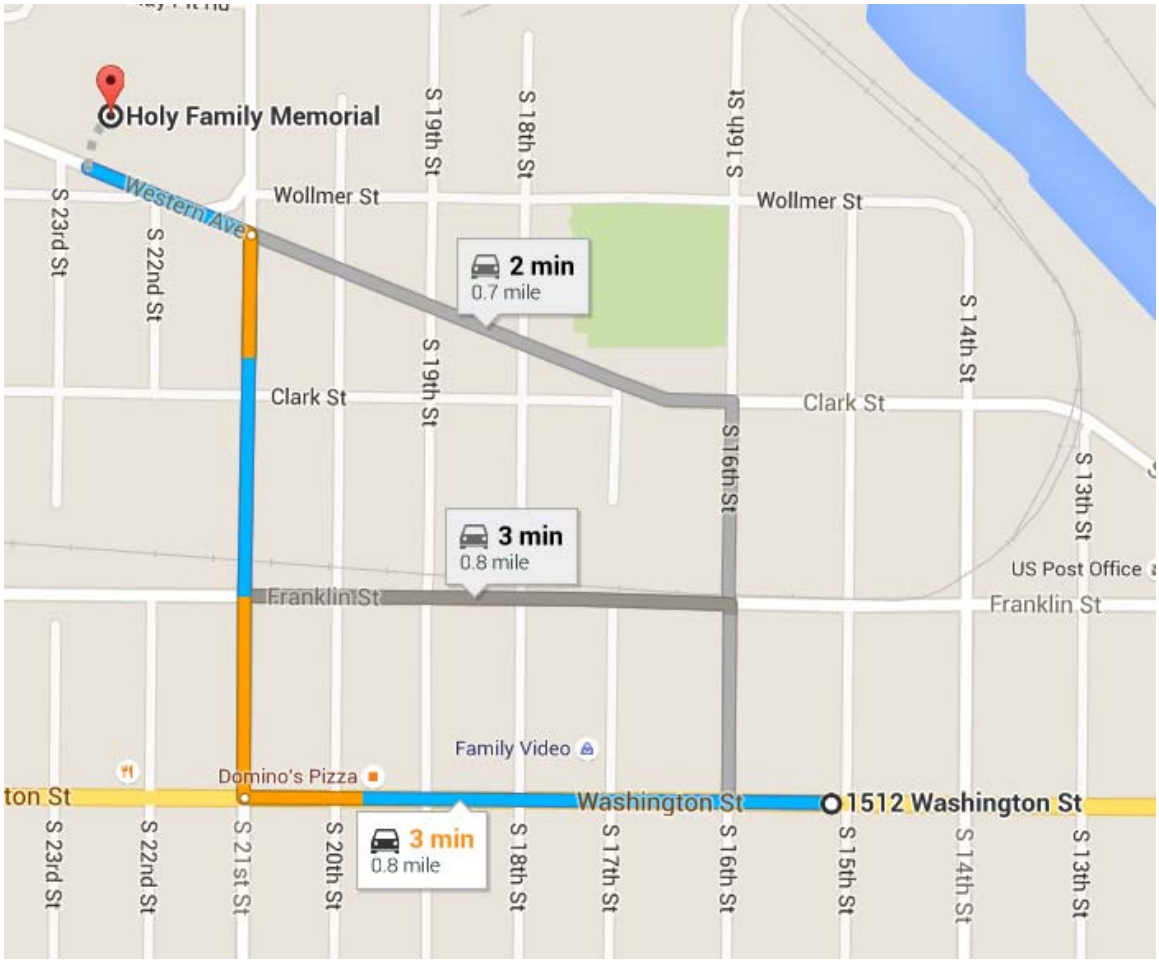
OTHER EMERGENCY CONTACTS

* Stantec Office	(800) 880-4700
* Client/Owner	(920) 448-3086
* National Response Center	(800) 424-8802
* WI Emergency Government	(800) 943-0003

Note: Incident reports are provided in Attachment B.

14.0 Evacuation/Hospital Routes

From 1512 West Washington Street to Holy Family Memorial Hospital



Driving directions from:
1512 Washington Street to

Holy Family Memorial Hospital
2300 Western Avenue
Manitowoc, Wisconsin 54221

1512 Washington St
Manitowoc, WI 54220

Head west on Washington St toward S 16th St
0.3 mi

Turn right onto S 21st St
0.3 mi

Turn left at the 3rd cross street onto Western Ave
Destination will be on the right
0.1 mi

15.0 Site-Specific Health and Safety Plan Review

This document shall be signed by site personnel prior to their first site visit.

"I have read and understand the contents of this Site Safety Plan and will comply with its provisions, requirements, and restrictions."

NAME (PRINT)	SIGNATURE	DATE

16.0 Site-Specific Health and Safety Plan Follow-Up Report

Project Site: _____

1. Was the Site Health and Safety Plan followed?

   _____ Yes _____ No

2. If no, explain all changes to the Site Health and Safety Plan:

3. Reason for changes:

4. Report prepared by: _____ Date: _____

5. Report reviewed by: _____ Date: _____

17.0 Addendum to Site-Specific Health and Safety Plan

Use this page to add additional site data or describe any special circumstances that have become apparent after the original preparation of this Site Health and Safety Plan. Include any changes in site conditions, PPE and monitoring modifications and other items as appropriate.

FIGURES

Figure No.
1

Title
Figure 1
Site Location and 2014 Ortho

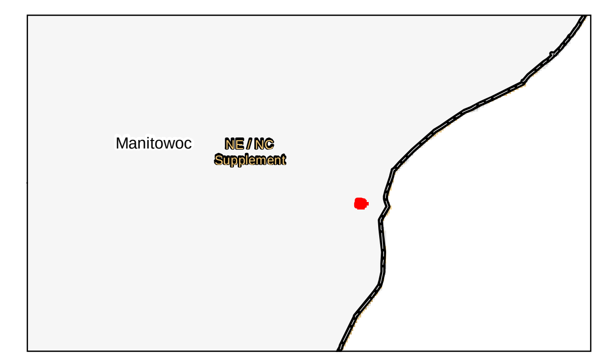
Client/Project
City of Manitowoc
USEPA Brownfield Assessment Grant
Hazardous Substances

0 65 130 Feet

193703931
Prepared by HLB on 5-24-16

Legend
Target Site
Parcels

N



Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin South FIPS 4803
2. Feet
3. Data Sources Include:
Orthophotography: 2015 City of Mantiowoc

Stantec

Attachment A – Medical Data Summary Forms

MEDICAL DATA SUMMARY FORM:

This form shall be completed by Stantec personnel prior to commencement of activities of the site. This form shall be kept at the project site for the duration of project activities. This form must be delivered to the attending physician when medical assistance is required.

Site: _____

Location: _____

Name: _____

Address: _____

Home Phone: _____

Height: _____ Weight: _____ Age: _____ Sex: ___

In case of emergency contact: _____

Address: _____

_____

Phone (_____)_____

Allergies: _____

_____

Recent Illnesses: _____

_____

Previous exposure to hazardous substances?

_____ Yes _____ No

Current medication: _____

Medical restrictions: _____

_____

Name of personal physician: _____

Address: _____

_____

Phone: (_____)_____

Date Completed**:** _____

Attachment B – Incident Report Sheets

INCIDENT REPORT

Project #:_____

Site: _____

Location: _____

Name of Affected Individual: _____

Address: _____

Age: _____ Sex: _____

Description of Incident: _____

Date of Incident: _____ Time of Incident: _____

Was Medical Care Required? ☐ YES ☐ NO

Immediate Family Notified ☐ YES ☐ NO

If Yes, Describe Care Received (attach medical record): _____

Date Care Received: _____ Location: _____

Future Preventative Measures/Corrective Action Taken: _____

_____

_____

_____

Report Prepared By: _____ Date: _____

Report Reviewed By: _____ Date: _____

Attachment C – Personal Protective Equipment

PERSONAL PROTECTIVE EQUIPMENT (PPE)

1. Level A protection should be selected when the highest level of respiratory, skin, eye, and mucous membrane protection is needed.
   - Positive-pressure, self-contained, breathing apparatus (MSHA/NIOSH approved) **(REQUIRED)**
   - Fully encapsulated, chemical resistant suit **(REQUIRED)**
   - Chemical-resistant inner and outer gloves **(REQUIRED)**
   - Chemical-resistant boots with steel toe and shank **(REQUIRED)**
   - Chemical-resistant coveralls
   - Two-way radio communication **(REQUIRED)**
2. Level B protection should be selected when the highest level of respiratory protection is needed, but with a lesser degree of skin and eye protection.
   - Positive-pressure, self-contained, breathing apparatus (MSHA/NIOSH approved) **(REQUIRED)**
   - Chemical-resistant clothing (coveralls, hooded two-piece, chemical resistant splash suit, or disposable chemical-resistant coveralls) **(REQUIRED)**
   - Coveralls (under splash suit)
   - Chemical-resistant inner and outer gloves **(REQUIRED)**
   - Chemical-resistant boots with steel toe and shank **(REQUIRED)**
   - Two-way radio communication
   - Hard hat (REQUIRED)
3. Level C protection should be selected when the type and concentration of hazardous airborne substance is known, the criteria for using air-purifying respirators is met, and skin and eye exposure is unlikely. Monitoring of the air must be performed to comply with OSHA regulations and to ensure respirator effectiveness.
   - Full face, air purifying respirator (MSHA/NIOSH approved) with appropriate cartridges **(REQUIRED)**
   - Chemical-resistant clothing (coveralls, hooded two-piece, chemical resistant splash suit, or disposable chemical-resistant coveralls) **(REQUIRED)**
   - Chemical-resistant inner and outer gloves **(REQUIRED)**
   - Chemical-resistant boots with steel toe and shank **(REQUIRED)**
   - Two-way radio communication
   - Hard hat **(REQUIRED)**
   - Escape respirator
4. Level D is primarily a work uniform. It shall not be worn on-site where respiratory or skin hazards exist.
   - Protective coveralls and protective gloves **(REQUIRED)**
   - Boots with steel toe and shank **(REQUIRED)**
   - Hard hat **(REQUIRED)**
   - Safety glasses **(REQUIRED)**
   - Safety vest **(REQUIRED)**

Attachment D – First Aid

FIRST AID

BITES

ANIMAL BITES

Thoroughly wash the wound with soap and water, flush the area with running water, and apply a sterile dressing. Immobilize affected part until the victim has been attended by a physician. See that the animal is kept alive and in quarantine. Obtain the name and address of the owner of the animal.

INSECT BITES:

Remove "stinger" without squeezing if present; keep affected part below the level of the heart; and apply ice bag. For minor bites and stings, apply soothing lotions such as calamine.

BURNS AND SCALDS

MINOR BURNS:

DO NOT APPLY VASELINE OR GREASE OF ANY KIND. If there are no areas of open skin, apply cold water until pain subsides; cover with a dry, sterile dressing. Do not break blisters or remove tissue. Seek medical attention.

SEVERE BURNS:

Do not remove adhered particles of clothing. Do not apply ice or immerse in water. Do not apply any ointments or grease. Cover burns with thick, sterile dressings. Keep burned feet or legs elevated if possible. May need to treat for shock.

CHEMICAL BURNS:

Wash away the chemical soaked clothing with large amounts of water. Remove victim's chemical-soaked clothing. If dry lime, brush away before flushing. Apply sterile dressing and seek medical attention.

CRAMPS

SYMPTOMS:

Muscle cramps in abdomen and extremities. Heat exhaustion may also be present.

TREATMENT:

Same as for heat exhaustion.

CUTS

Apply pressure with sterile gauze dressing and elevate the area until bleeding stops. Apply bandage and seek medical attention.

EYES

FOREIGN OBJECTS:

Keep the victim from rubbing eyes and flush the eye with water. If flushing fails to remove the object, apply a dry protective dressing to both eyes and seek medical attention.

CHEMICALS:

Flood the eye thoroughly with water for 15 minutes. Cover the eye with a dry sterile pad and seek medical attention.

FAINTING

Keep the victim lying down. Loosen tight clothing. If victim vomits, roll person onto side or turn head to the side. Maintain an open airway. Bathe the person's face gently with cool water. Unless recovery is prompt, seek medical attention.

FRACTURES

Deformity of an injured part usually means a fracture. If a fracture is suspected, splint the part. DO NOT ATTEMPT TO MOVE THE VICTIM. Seek medical attention immediately.

FROSTBITE

SYMPTOMS:

Just before frostbite occurs, skin may be flushed then changes to white or grayish-yellow. Pain may be felt early; then may subside. Blisters may appear; affected part feels very cold and/or may be numb.

TREATMENT:

Bring victim indoors, cover the frozen area; provide extra clothing and blankets. Re-warm frozen area quickly by immersion in warm water—NOT HOT WATER. DO NOT RUB THE PART. Seek medical attention.

HEAT EXHAUSTION

Caused by exposure to heat, either sun or indoor.

SYMPTOMS:

Near-normal body temperature; pale and clammy skin; profuse sweating, tiredness, weakness, headache, perhaps cramps, nausea, dizziness, and possible fainting.

TREATMENT:

Keep victim in lying position and raise feet. Loosen clothing, apply cool wet cloths. If conscious, give sips of water. Seek medical attention immediately.

SUNSTROKE

SYMPTOMS:

High body temperature; hot, red, and dry skin; rapid pulse. Victim may be unconscious.

TREATMENT:

Keep victim in lying position with head elevated. Remove clothing and repeatedly sponge the bare skin with cool water. Seek medical attention immediately.

POISONING

Call the Poison Control Center for instruction on immediate care. If victim becomes unconscious, keep the airway open. If breathing stops, begin rescue breathing. Call Emergency Medical Services (EMS) immediately.

POISON IVY

Remove contaminated clothing. Wash all exposed areas thoroughly with soap and water. If rash is mild, apply calamine lotion or other soothing skin lotion. If a severe reaction occurs, seek medical attention.

PUNCTURE WOUNDS

If puncture wounds is deeper than skin surface, seek medical attention. Serious infection can occur unless proper treatment is received.

SPRAINS

Elevate injured part and apply ice bag or cold packs. Do not soak in hot water. Immobilize affected part and seek medical attention.

UNCONSCIOUSNESS

Never attempt to give anything by mouth. Keep victim lying flat, maintain open airway. If victim is not breathing, perform rescuer breathing and call EMS immediately.

Attachment E – MSDS Sheets

Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Revision Date 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **Benzo[a]pyrene, 98%**

Cat No. : **AC105600010; AC105601000**

Synonyms Benzo[def]chrysene.; 3,4-Benzopyrene; 3,4-Benzpyrene

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Sensitization	Category 1
Germ Cell Mutagenicity	Category 1A
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 1A

Label Elements

Signal Word
Danger

Hazard Statements
May cause an allergic skin reaction
May cause genetic defects
May cause cancer
May damage fertility or the unborn child

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Avoid breathing dust/fume/gas/mist/vapors/spray
Contaminated work clothing should not be allowed out of the workplace
Wear protective gloves
Response
IF exposed or concerned: Get medical attention/advice
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation or rash occurs: Get medical advice/attention
Wash contaminated clothing before reuse
Storage
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Benzo[a]pyrene	50-32-8	> 96

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes.

Inhalation Move to fresh air.

Ingestion Do not induce vomiting.

Most important symptoms/effects May cause allergic skin reaction. Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point
Method - No information available

Autoignition Temperature No information available
Explosion Limits

Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
None known
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions	See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up No information available.

7. Handling and storage

Handling Ensure adequate ventilation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Benzo[a]pyrene		TWA: 0.2 mg/m^3	

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Benzo[a]pyrene	TWA: 0.005 mg/m^3		TWA:

Legend

OSHA - Occupational Safety and Health Administration

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Dark yellow
Odor	aromatic
Odor Threshold	No information available
pH	
Melting Point/Range	175 179 °C
Boiling Point/Range	°C @ 760 mmHg
Flash Point	
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	No information available
Relative Density	No information available
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C20H12
Molecular Weight	252.31

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Benzo[a]pyrene	50-32-8	Group 1	Reasonably Anticipated	A2	X	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing
Endocrine Disruptor Information No information available

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Benzo[a]pyrene	Group III Chemical	Not applicable	Not applicable

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity
Do not empty into drains.

Persistence and Degradability No information available
Bioaccumulation/ Accumulation No information available.

Mobility No information available.

Component	log Pow
Benzo[a]pyrene	6.06

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Benzo[a]pyrene - 50-32-8	U022	-

14. Transport information

DOT
UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE,SOLID, N.O.S.
Hazard Class 9
Packing Group III

TDG
UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE,SOLID, N.O.S.
Hazard Class 9
Packing Group III

IATA
UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE,SOLID, N.O.S.
Hazard Class 9
Packing Group III

IMDG/IMO
UN-No UN3077

Proper Shipping Name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE,SOLID, N.O.S.
Hazard Class	9
Packing Group	III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Benzo[a]pyrene	X	X	-	200-028-5	-		X	-	-	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Benzo[a]pyrene	50-32-8	> 96	0.1

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Benzo[a]pyrene	-	-	X	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Benzo[a]pyrene	1 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Benzo[a]pyrene	50-32-8	Carcinogen	0.06 µg/day	Carcinogen

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Benzo[a]pyrene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D2A Very toxic materials

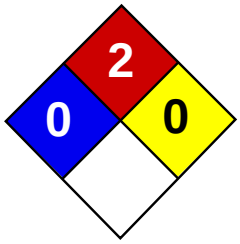
16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 10-Feb-2015
Print Date 10-Feb-2015
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS



Health	2
Fire	2
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Kerosene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Kerosene

Catalog Codes: SLK1048

CAS#: 8008-20-6 or 64742-81-0

RTECS: OA5500000

TSCA: TSCA 8(b) inventory: Kerosene

CI#: Not available.

Synonym: Astral Oil; Coal Oil, Fuel Oil No. 5, Deobase, Astral Oil, Jet A Fuel; Jet Fuel JP-1; JP-5 Navy Fuel; Kerosine, petroleum; Range Oil; K1 Kerosene; Kerosene, hydrodesulfurized; Kerosine

Chemical Name: Kerosene

Chemical Formula: Not available.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Kerosene	8008-20-6 or	100
	64742-81-0	

Toxicological Data on Ingredients: Kerosene: ORAL (LD50): Acute: 15000 mg/kg [Rat]. 20000 mg/kg [Guinea pig]. 2835 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to the nervous system. The substance may be toxic to blood, kidneys, liver, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
If swallowed, do NOT induce vomiting. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 210°C (410°F)

Flash Points: CLOSED CUP: 38°C (100.4°F). (Tagliabue.)

Flammable Limits: LOWER: 0.7% UPPER: 5% - 7%

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Toxic flammable liquid, insoluble or very slightly soluble in water. Poisonous liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Oily liquid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: Not available.

Color: Yellow. Clear (Light.)

pH (1% soln/water): Not applicable.

Boiling Point: 149°C (300.2°F) - 325 C

Melting Point: Not available.

Critical Temperature: Not available.

Specific Gravity: 0.775 - .840(Water = 1)

Vapor Pressure: 0.1 kPa (@ 20°C)

Vapor Density: 4.5 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water. Miscible with other petroleum solvents

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (sparks, flames), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact.

Toxicity to Animals: Acute oral toxicity (LD50): 2835 mg/kg [Rabbit].

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. Causes damage to the following organs: the nervous system. May cause damage to the following organs: blood, kidneys, liver, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation (lung irritant). Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes moderate to severe skin irritation. It can cause defatting dermatitis. Eyes: May cause eye irritation. Inhalation: May cause respiratory tract and mucous membrane irritation and a burning sensation in the chest. Because of its relatively low volatility, overexposure by inhalation is uncommon, but it can occur in poorly ventilated areas or by inhalation of mists or aerosols. Symptoms of inhalation overexposure include central nevous system (CNS) depression (transient euphora, headache, irritability, excitement, ringing in the ears, weakness, incoordination, confusion, disorientation, drowsiness, tremor, somnolence, hallucinations, seizures, coma, death). May affect the heart (cardiac arrythmias), liver, kidneys, and respiration(asphyxia, apnea, acute pulmonary edema, dyspnea, fibrosis, or cyanosis) Ingestion: Causes gastrointestinal tract irritation with burning sensation in mouth, esophagus, and stomach, a b d o m i n a l p a i n , n a u s e a , v o m i t i n g , h y p e r m o t i l i t y , d i a r r h e a , h e a d a c h e , m a l a i s e . M a y a f f e c t respiration/ trachea/bronchi through accidental pulmonary aspiration which can cause hypoxia, chemical pneumonitis, and noncardiogenic pulmonary edema, pulmonary hemmorrhage, coughing, breathing difficulty, acute or chronic pulmonary edema, emphysema, respiratory stimulation. It may also affect the heart (dysrrhythmias, myocardial depression, tachycardia), liver, endocrine system (pancreas - hypoglycemia), behavior/central nervous system (symptoms similar to that of inhalation). Chronic Potential Health Effects: Inhalation: Repeated or prolonged inhalation may cause respiratory tract irritation and affect behavior/central nervous system with symptoms similar to that of acute inhalation. It may also affect the blood (changes in white blood cell count, changes in serum compositon, pigmented or nucleated red blood cells, leukopenia, normocytic anemia) , cardiovascular

system, respiratory system (trachea, bronchi), and may cause kidney damage. Ingestion: Repeated or prolonged ingestion may affect the liver, endocrine system (adrenal gland, pancreas, spleen), and metabolism (weight loss), and blood. Skin: Repeated or prolonged skin contact may cause defatting dermatitis, erythema, and eczema-like skin lesions, drying and cracking of the skin, and possible burns.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: Not available.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Kerosene UNNA: 1223 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Kerosene Rhode Island RTK hazardous substances: Kerosene Pennsylvania RTK: Kerosene Massachusetts RTK: Kerosene Massachusetts spill list: Kerosene New Jersey: Kerosene TSCA 8(b) inventory: Kerosene

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R10- Flammable. R65- Harmful: may cause lung damage if swallowed. S23- Do not breathe gas/fumes/vapour/spray S24- Avoid contact with skin. S62- If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 05:54 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Monsanto
Material Safety Data

POLYCHLORINATED BIPHENYLS (PCBs)

Emergency Phone No.
(Call Collect)
314-694-1000

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: POLYCHLORINATED BIPHENYLS (PCBs)
Aroclor® Series 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, 1268
Therminol® FR Series

MSDS Number: M00018515 Date: 12/95

Chemical Family:	Chlorinated Hydrocarbons
Chemical Name:	Polychlorinated biphenyls
Synonyms:	PCBs, Chlorodiphenyls, Chlorinated biphenyls

Trade Names/Common Names:

PYRANOL® and INERTEEN® are trade names for commonly used dielectric fluids that may have contained varying amounts of PCBs as well as other components including chlorinated benzenes.

ASKAREL is the generic name for a broad class of fire resistant synthetic chlorinated hydrocarbons and mixtures used as dielectric fluids that commonly contained about 30 - 70% PCBs. Some ASKAREL fluids contained 99% or greater PCBs and some contained no PCBs.

PYDRAUL® is the trade name for hydraulic fluids that, prior to 1972, may have contained varying amounts of PCBs and other components including phosphate esters.

The product names/trade names are representative of several commonly used Monsanto products (or products formulated with Monsanto products). Other trademarked PCB products were marketed by Monsanto and other manufacturers. PCBs were also manufactured and sold by several European and Japanese companies. Contact the manufacturer of the trademarked product, if not in this listing, to determine if the formulation contained PCBs.

In 1972, Monsanto restricted sales of PCBs to applications involving only closed electrical systems, (transformers and capacitors). In 1977, all manufacturing and sales were voluntarily terminated. In 1979, EPA restricted the manufacture, processing, use, and distribution of PCBs to specifically exempted and authorized activities.

MONSANTO COMPANY, 800 N. LINDBERGH BLVD., ST. LOUIS, MO 63167

FOR CHEMICAL EMERGENCY, SPILL, LEAK, FIRE, EXPOSURE, OR ACCIDENT
Call CHEMTREC - Day or Night - 1-800-424-9300 Toll free in the continental U.S., Hawaii, Puerto Rico, Canada, Alaska, or Virgin Islands. For calls originating elsewhere: 202-483-7616 (collect calls accepted)

For additional nonemergency information, call: 314-694-3344.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemically, commercial PCBs are defined as a series of technical mixtures, consisting of many isomers and compounds that vary from mobile, oily liquids to white crystalline solids and hard noncrystalline resins. Technical products vary in composition, in the degree of chlorination, and possibly according to batch.

The mixtures generally used contain an average of 3 atoms of chlorine per molecule (42% chlorine) to 5 atoms of chlorine per module (54% chlorine). They were used as components of dielectric fluids in transformers and capacitors. Prior to 1972, PCB applications included heat transfer media, hydraulic, and other industrial fluids, plasticizers, carbonless copy paper, paints, inks, and adhesives.

Component	CAS No.
chlorinated biphenyl	1336-36-3
Aroclor 1016	12674-11-2
Aroclor 1221	11104-28-2
Aroclor 1232	11141-16-5
Aroclor 1242	53469-21-9
Aroclor 1248	12672-29-6
Aroclor 1254	11097-69-1
Aroclor 1260	11096-82-5
Aroclor 1262	37324-23-5
Aroclor 1268	11100-14-4

There are also CAS Numbers for individual PCB congeners and for mixtures of Aroclor® products.

PCBs are identified as hazardous chemicals under criteria of the OSHA Hazard Communication Standard (29 CFR Part 1910.1200). PCBs have been listed in the International Agency for Research on Cancer (IARC) Monographs (1987)-Group 2A and in the National Toxicology Program (NTP) Annual Report on Carcinogens (Seventh).

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance and Odor: PCB mixtures range in form and color from clear to amber liquids to white crystalline solids. They have a mild, distinctive odor and are not volatile at room temperature. Refer to Section 9 for details.

WARNING!
CAUSES EYE IRRITATION
MAY CAUSE SKIN IRRITATION

PROCESSING AT ELEVATED TEMPERATURES MAY RELEASE VAPORS OR FUMES WHICH MAY CAUSE RESPIRATORY TRACT IRRITATION

POTENTIAL HEALTH EFFECTS

Likely Routes of Exposure: Skin contact and inhalation of heated vapors

Eye Contact: Causes moderate irritation based on worker experience.

Skin Contact: Prolonged or repeated contact may result in redness, dry skin and defatting based on human experience. A potential exists for developing chloracne. PCBs can be absorbed through intact skin.

Inhalation: Due to the low volatility of PCBs, exposure to this material in ambient conditions is not expected to produce adverse health effects. However, at elevated processing temperatures, PCBs may produce a vapor that may cause respiratory tract irritation if inhaled based on human experience.

Ingestion: No more than slightly toxic based on acute animal toxicity studies. Coughing, choking and shortness of breath may occur if liquid material is accidentally drawn into the lungs during swallowing or vomiting.

Other: Numerous epidemiological studies of humans, both occupationally exposed and nonworker environmentally exposed populations, have not demonstrated any causal relationship between PCB exposure and chronic human illnesses such as cancer or neurological or cardiovascular effects. PCBs at high dosage can cause skin symptoms; however, these subside upon removal of the exposure source.

Refer to Section 11 for toxicological information.

4. FIRST AID MEASURES

IF IN EYES, immediately flush with plenty of water for at least 15 minutes. If easy to do, remove any contact lenses. Get medical attention. Remove material from skin and clothing.

IF ON SKIN, immediately flush the area with plenty of water. Wash skin gently with soap as soon as it is available. Get medical attention if irritation persists.

IF INHALED, remove person to fresh air. If breathing is difficult, get medical attention.

IF SWALLOWED, do NOT induce vomiting. Rinse mouth with water. Get medical attention. Contact a Poison Control Center. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

NOTE TO PHYSICIANS: Hot PCBs may cause thermal burn. If electrical equipment arcs between conductors, PCBs or other chlorinated hydrocarbon dielectric fluids may decompose to produce hydrochloric acid (HCl), a respiratory irritant. If large amounts are swallowed, gastric lavage may be considered.

5. FIRE FIGHTING MEASURES

Flash Point: 284 degrees F (140 degrees C) or higher depending on the chlorination level of the Aroclor product

Fire Point: 349 degrees F (176 degrees C) or higher depending on the chlorination level of the Aroclor product

NOTE: Refer to Section 9 for individual flash points and fire points.

Extinguishing Media: Extinguish fire using agent suitable for surrounding fire. Use dry chemical, foam, carbon dioxide or water spray. Water may be ineffective. Use water spray to keep fire-exposed containers or transformer cool.

PCBs are fire-resistant compounds. They may decompose to form CO, CO2, HCl, phenolics, aldehydes, and other toxic combustion products under severe conditions such as exposure to flame or hot surfaces.

Dielectric fluids having PCBs and chlorinated benzenes as components have been reported to produce polychlorinated dibenzo-p-dioxins (PCDDs) and furans (PCDFs) during fire situations involving electrical equipment. At temperatures in the range of 600-650 degrees C in the presence of excess oxygen, PCBs may form polychlorinated dibenzofurans (PCDFs). Laboratory studies under similar conditions have demonstrated that PCBs do not produce polychlorinated dibenzo-p-dioxins (PCDDs).

Federal regulations require all PCB transformers to be registered with fire response personnel.

If a PCB transformer is involved in a fire-related incident, the owner of the transformer may be required to report the incident. Consult and follow appropriate federal, state and local regulations.

Fire Fighting Equipment: Fire fighters and others exposed to products of combustion should wear self-contained breathing apparatus. Equipment should be thoroughly decontaminated after use.

6. ACCIDENTAL RELEASE MEASURES

Cleanup and disposal of liquid PCBs and other PCB items are strictly regulated by the federal government. The regulations are found at 40 CFR Part 761. Consult these regulations as well as applicable state and local regulations prior to any cleanup or disposal of PCBs, PCB items, or PCB contaminated items.

If PCBs leak or are spilled, the following steps should be taken immediately:

All nonessential personnel should leave the leak or spill area.

The area should be adequately ventilated to prevent the accumulation of vapors.

The spill/leak should be contained. Loss to sewer systems, navigable waterways, and streams should be prevented. Spills/leaks should be removed promptly by means of absorptive material, such as sawdust, vermiculite, dry sand, clay, dirt or other similar materials, or trapped and removed by pumping or other suitable means (traps, drip-pans, trays, etc.).

Personnel entering the spill or leak area should be furnished with appropriate personal protective equipment and clothing as needed. Refer to Section 8 for personal protection equipment and clothing.

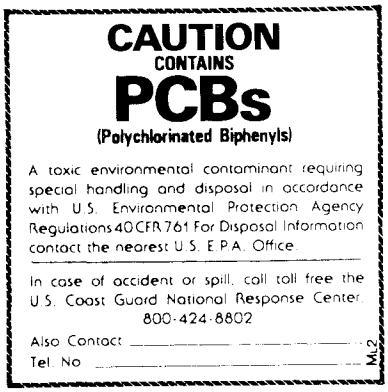
Personnel trained in emergency procedures and protected against attendant hazards should shut off sources of PCBs, clean up spills, control and repair leaks, and fight fires in PCB areas.

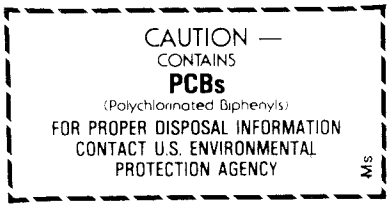
Refer to Section 13 for disposal information and Sections 14 and 15 for information regarding reportable quantity, and Section 7 for marking information.

7. HANDLING AND STORAGE

Care should be taken to prevent entry into the environment through spills, leakage, use vaporization, or disposal of liquid or containers. Avoid prolonged breathing of vapors or mists. Avoid contact with eyes or prolonged contact with skin. If skin contact occurs, remove by washing with soap and water. Following eye contact, flush with water. In case of spillage onto clothing, the clothing should be removed as soon as practical, skin washed, and clothing laundered. Comply with all federal, state, and local regulations.

Federal regulations under the Toxic Substances Control Act require PCBs, PCB items, storage areas, transformer vaults, and transport vehicles to be marked (check regulations, 40 CFR 761, for details).





Storage: The storage of PCB items or equipment (those containing 50 ppm or greater PCBs) and PCB waste is strictly regulated by 40 CFR Part 761. The storage time is limited, the storage area must meet physical requirements, and the area must be labeled.

Avoid contact with eyes.
Wash thoroughly after handling.
Avoid breathing processing fumes or vapors.
Process using adequate ventilation.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye Protection: Wear chemical splash goggles and have eye baths available where there is significant potential for eye contact.

Skin Protection: Wear appropriate protective clothing and chemical resistant gloves to prevent skin contact. Consult glove manufacturer to determine the appropriate type glove for a given application. Wear chemical goggles, face shield, and chemical resistant clothing such as a rubber apron when splashing is likely. Wash immediately if skin is contacted. Remove contaminated clothing promptly and launder before reuse. Clean protective equipment before reuse. Provide a safety shower at any location where skin contact can occur. Wash thoroughly after handling.

ATTENTION! Repeated or prolonged skin contact may cause chloracne in some people.

Respiratory Protection: Avoid breathing vapor, mist, or dust. Use NIOSH/MSHA approved equipment when airborne exposure limits are exceeded. Full facepiece equipment is recommended when airborne exposure limits are exceeded and, if used, replaces the need for face shield and/or chemical splash goggles. Consult respirator manufacturer to determine the type of equipment for a given application. The respirator use limitations specified by NIOSH/MSHA or the manufacturer must be observed. High airborne concentrations may require use of self-contained breathing apparatus or supplied air respirator. Respiratory protection programs must be in compliance with 29 CFR Part 1910.134.

ATTENTION! Repeated or prolonged inhalation may cause chloracne in some people.

Ventilation: Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits (see below). If practical, use local mechanical exhaust ventilation at sources of vapor or mist, such as open process equipment.

Airborne Exposure Limits:

Product: Chlorodiphenyl (42% chlorine)

OSHA PEL: 1 mg/m^3 8-hour time-weighted average - Skin*
ACGIH TLV: 1 mg/m^3 8-hour time-weighted average - Skin*

Product: Chlorodiphenyl (54% chlorine)

OSHA PEL: 0.5 mg/m^3 8-hour time-weighted average - Skin*
ACGIH TLV: 0.5 mg/m^3 8-hour time-weighted average - Skin*

*For Skin notation see Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Government Industrial Hygienists, 1995-1996.

9. PHYSICAL AND CHEMICAL PROPERTIES

PROPERTIES OF SELECTED AROCLORS®							
PROPERTY	**1016**	**1221**	**1232**	**1242**	**1248**	**1254**	**1260**
Color (APHA)	40	100	100	100	100	100	150
Physical state	mobile oil	mobile oil	mobile oil	mobile oil	mobile oil	viscous liquid	sticky resin
Stability	inert	inert	inert	inert	inert	inert	inert
Density (lb/gal 25°C)	11.40	9.85	10.55	11.50	12.04	12.82	13.50
Specific gravity x/15.5°C	1.36-1.37 x-25°	1.18-1.19 x-25°	1.27-1.28 x-25°	1.30-1.39 x-25°	1.40-1.41 x-65°	1.49-1.50 x-65°	1.55-1.56 x-90°
Distillation range (°C)	323-356	275-320	290-325	325-366	340-375	365-390	385-420
Acidity mg KOH/g, maximum	.010	.014	.014	.015	.010	.010	.014
Fire point (°C)	none to boiling point	176	238	none to boiling point	none to boiling point	none to boiling point	none to boiling point
Flash point (°C)	170	141-150	152-154	176-180	193-196	none	none
Vapor pressure (mm Hg @ 100°F)	NA	NA	0.005	0.001	0.00037	0.00006	NA
Viscosity (Saybolt Univ. Sec. @ 100°F) (centistokes)	71-81 13-16	38-41 3.6-4.6	44-51 5.5-7.7	82-92 16-19	185-240 42-52	1800-2500 390-540	— —

NA—*Not Available*

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

Stability: PCBs are very stable, fire-resistant compounds.
Materials to Avoid: None
Hazardous Decomposition
Products: PCBs may decompose to form CO, CO_2, HCl, phenolics, aldehydes, and other toxic combustion products under severe conditions such as exposure to flame or hot surface.
Hazardous Polymerization: Does not occur.

11. TOXICOLOGICAL INFORMATION

Data from laboratory studies conducted by Monsanto and from the available scientific literature are summarized below.
Single exposure (acute) studies indicate:
Oral - Slightly Toxic (Rat LD50 - 8.65 g/kg for 42% chlorinated; 11.9 g/kg for 54% chlorinated)

The liquid products and their vapors are moderately irritating to eye tissues. Animal experiments of varying duration and at different air concentrations show that for similar exposure conditions, the 54% chlorinated material produces more liver injury than the 42% chlorinated material.

There are literature reports that PCBs can impair reproductive functions in monkeys. The National Cancer Institute (NCI) performed a study in 1977 using Aroclor 1254 with both sexes of rats. NCI stated that the PCB, Aroclor 1254, was not carcinogenic under the conditions of their bioassay. There is sufficient evidence in the scientific literature to conclude that Aroclor 1260 can cause liver cancer when fed to rodents at high doses. Similar experiments with less chlorinated PCB products have produced negative or equivocal results.

The consistent finding in animal studies is that PCBs produce liver injury following prolonged and repeated exposure by any route, if the exposure is of sufficient degree and duration. Liver injury is produced first, and by exposures that are less than those reported to cause cancer in rodents. Therefore, exposure by all routes should be kept sufficiently low to prevent liver injury.

Numerous epidemiological studies of humans, both occupationally exposed and nonworker environmentally exposed population, have not demonstrated any causal relationship between PCB exposure and chronic human illnesses such as cancer or neurological or cardiovascular effects. PCBs at high dosage can cause skin symptoms; however, these subside upon removal of the exposure source.

PCBs have been listed in the International Agency for Research on Cancer (IARC) Monographs (1987)-Group 2A and in the National Toxicology Program (NTP) Seventh Annual Report on Carcinogens.

12. ECOLOGICAL INFORMATION

Care should be taken to prevent entry of PCBs into the environment through spills, leakage, use, vaporization or disposal of liquid or solids. PCBs can accumulate in the environment and can adversely affect some animals and aquatic life. In general, PCBs have low solubility in water, are strongly bound to soils and sediments, and are slowly degraded by natural processes in the environment.

13. DISPOSAL CONSIDERATIONS

The disposal of PCB items or equipment (those containing 50 ppm or greater PCBs) and PCB wastes is strictly regulated by 40 CFR Part 761. For example, all wastes and residues containing PCBs (wiping cloths, absorbent material, used disposable protective gloves and clothing, etc.) should be collected, placed in proper containers, marked and disposed of in the manner prescribed by EPA regulations (40 CFR Part 761) and applicable state and local regulations.

14. TRANSPORT INFORMATION

The data provided in this section are for information only. Please apply the appropriate regulations to properly classify a shipment for transportation.

DOT Classification:	IF WEIGHT OF PCBs TO BE SHIPPED IS OVER ONE POUND, THE FOLLOWING CLASSIFICATION AND LABEL APPLY.
DOT Label:	LIQUID: Environmentally Hazardous Substance, liquid, n.o.s. (Contains PCB), 9, UN 3082, III
	SOLID: Environmentally Hazardous Substance, solid, n.o.s. (Contains PCB), 9, UN 3077, III
DOT Label:	Class: 9
DOT Reportable Quantity:	One Pound
IMO Classification:	Polychlorinated Biphenyls, IMO Class 9, UN 2315, II IMO Page 9034, EMS 6.1-02
IATA/ICAO Classification:	Polychlorinated Biphenyls, 9, UN2315, II

15. REGULATORY INFORMATION

For regulatory purposes, under the Toxic Substances Control Act, the term "PCBs" refers to a chemical substance limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain such a substance (40 CFR Part 761).

TSCA Inventory: not listed.

Hazard Categories Under Criteria of SARA Title III Rules (40 CFR Part 370): Immediate, Delayed.
SARA Section 313 Toxic Chemical(s): Listed-1993 (De Minimis concentration 0.1%.)

Reportable Quantity (RQ) under DOT (49 CFR) and CERCLA Regulations: 1 lb. (polychlorinated biphenyls) PCBs.

Release of more than 1 (one) pound of PCBs to the environment requires notification to the National Response Center (800-424-8802 or 202-426-2675).

Various state and local regulations may require immediate reporting of PCB spills and may also define spill cleanup levels. Consult your attorney or appropriate regulatory officials for information relating to spill reporting and spill cleanup.

16. OTHER INFORMATION

Reason for revision: Conversion to the 16 section format. Supersedes MSDS dated 10/88.

FOR ADDITIONAL NONEMERGENCY INFORMATION, CONTACT:

Gary W. Mappes
Manager, Product & Environmental Safety

Robert G. Kaley, II
Director, Environmental Affairs

Monsanto Company
800 North Lindbergh Boulevard
St. Louis, MO 63167
(314) 694-3344

Stantec

RECEIVED

JUL 12 2017

WI DNR - GREEN BAY

Transmittal

Entity Name
Office Address

To:	Tauren Beggs	From:	Harris Byers
Company:	Wisconsin Department of Natural Resources Remediation and Redevelopment Program	☐ ☐ ☑ ☐	For Your Information For Your Approval For Your Review As Requested
Address:	2984 Shawano Ave		
Phone:	Green Bay, WI 54313		
Date:	June 21, 2017	Confirmation of receipt: _____	
File:	1512 Washington; Manitowoc		(signature)
Delivery:	Courier		

Reference: 1512 Washington; Manitowoc, Wisconsin

Attachment:

Copies	Doc Date	Pages	Description
1	6/21/17	113	SSAP for Phase II ESA - Characterization and Assessment of Polychlorinated Biphenyl Impacts to Soil and Groundwater Beneath the Loading Dock and Area 8
1	6/21/17		Form 4400-237 and Check for Review Fee

Enclosed is a hard copy of the SSAP for a Phase II ESA focused on the characterization and assessment of Polychlorinated Biphenyl impacts to soil and groundwater beneath the loading dock and Area 8 at the former Mirro property located at 1512 Washington Street in Manitowoc. Also enclosed is form 4400-237 and a check for the review fee.

Sincerely,

Stantec

Harris Byers

Harris Byers
Brownfields Project Manager
Phone: (262) 643-9174
Fax: (262) 241-4901
Harris.Byers@stantec.com

RECEIVED
JUL 12 2017
WI DNR - GREEN BAY

Technical Assistance, Environmental Liability Clarification or Post-Closure Modification Request

Section 1. Contact and Recipient Information

Requester Information

This is the person requesting technical assistance or a post-closure modification review, that his or her liability be clarified or a specialized agreement and is identified as the requester in Section 7. DNR will address its response letter to this person.

Last Name	First	MI	Organization/ Business Name
Sparacio	Nicolas		CDA of the City of Manitowoc

Mailing Address	City	State	ZIP Code
900 Quay Street	Manitowoc	WI	54220-4543

Phone # (include area code)	Fax # (include area code)	Email
(920) 686-6931		nsparacio@manitowoc.org

The requester listed above: (select all that apply)

- ☒ Is currently the owner
- ☐ Is considering selling the Property
- ☐ Is renting or leasing the Property
- ☐ Is considering acquiring the Property
- ☐ Is a lender with a mortgagee interest in the Property
- ☐ Other. Explain the status of the Property with respect to the applicant:

Contact Information (to be contacted with questions about this request) ☒ Select if same as requester

Contact Last Name	First	MI	Organization/ Business Name
Sparacio	Nicolas		CDA of the City of Manitowoc

Mailing Address	City	State	ZIP Code
900 Quay Street	Manitowoc	WI	54220-4543

Phone # (include area code)	Fax # (include area code)	Email
(920) 686-6931		nsparacio@manitowoc.org

Environmental Consultant (if applicable)

Contact Last Name	First	MI	Organization/ Business Name
Byers	Harris	L	Stantec

Mailing Address	City	State	ZIP Code
12075 Corporate Parkway Suite 200	Mequon	WI	53092-2649

Phone # (include area code)	Fax # (include area code)	Email
(414) 581-6476		harris.byers@stantec.com

Section 2. Property Information

Property Name	FID No. (if known)
MIRRO-SPIRTAS - LGU	

BRRTS No. (if known)	Parcel Identification Number
02-36-545108	052.000.246.000.00

Street Address	City	State	ZIP Code
1512 Washington Street	Manitowoc	WI	54220-4543

County	Municipality where the Property is located	Property is composed of:	Property Size Acres
Manitowoc	◉ City ○ Town ○ Village of Manitowoc	◉ Single tax parcel ○ Multiple tax parcels	5

1. Is a response needed by a specific date? (e.g., Property closing date) Note: Most requests are completed within 60 days. Please plan accordingly.

◉ No ○ Yes

Date requested by: _____

Reason:

_____

2. Is the "Requester" enrolled as a Voluntary Party in the Voluntary Party Liability Exemption (VPLE) program?

◉ No. **Include the fee that is required for your request in Section 3, 4 or 5.**

○ Yes. **Do not include a separate fee.** This request will be billed separately through the VPLE Program.

Fill out the information in Section 3, 4 or 5 which corresponds with the type of request:
Section 3. Technical Assistance or Post-Closure Modifications;
Section 4. Liability Clarification; or Section 5. Specialized Agreement.

Section 3. Request for Technical Assistance or Post-Closure Modification

Select the type of technical assistance requested: [**Numbers in brackets are for WI DNR Use**]

☐ No Further Action Letter (NFA) (Immediate Actions) - NR 708.09, [183] - **Include a fee of $350.** Use for a written response to an immediate action after a discharge of a hazardous substance occurs. Generally, these are for a one-time spill event.

☒ Review of Site Investigation Work Plan - NR 716.09, [135] - **Include a fee of $700.**

☐ Review of Site Investigation Report - NR 716.15, [137] - **Include a fee of $1050.**

☐ Approval of a Site-Specific Soil Cleanup Standard - NR 720.10 or 12, [67] - **Include a fee of $1050.**

☐ Review of a Remedial Action Options Report - NR 722.13, [143] - **Include a fee of $1050.**

☐ Review of a Remedial Action Design Report - NR 724.09, [148] - **Include a fee of $1050.**

☐ Review of a Remedial Action Documentation Report - NR 724.15, [152] - **Include a fee of $350**

☐ Review of a Long-term Monitoring Plan - NR 724.17, [25] - **Include a fee of $425.**

☐ Review of an Operation and Maintenance Plan - NR 724.13, [192] - **Include a fee of $425.**

Other Technical Assistance - s. 292.55, Wis. Stats. [97] (For request to build on an abandoned landfill use Form 4400-226)

☐ Schedule a Technical Assistance Meeting - **Include a fee of $700.**

☐ Hazardous Waste Determination - **Include a fee of $700.**

☐ Other Technical Assistance - **Include a fee of $700.** Explain your request in an attachment.

Post-Closure Modifications - NR 727, [181]

☐ Post-Closure Modifications: Modification to Property boundaries and/or continuing obligations of a closed site or Property; sites may be on the GIS Registry. This also includes removal of a site or Property from the GIS Registry. **Include a fee of $1050, and:**

☐ Include a fee of $300 for sites with residual soil contamination; and

☐ Include a fee of $350 for sites with residual groundwater contamination, monitoring wells or for vapor intrusion continuing obligations.

Attach a description of the changes you are proposing, and documentation as to why the changes are needed (if the change to a Property, site or continuing obligation will result in revised maps, maintenance plans or photographs, those documents may be submitted later in the approval process, on a case-by-case basis).

Skip Sections 4 and 5 if the technical assistance you are requesting is listed above and complete Sections 6 and 7 of this form.

Section 4. Request for Liability Clarification

Select the type of liability clarification requested. Use the available space given or attach information, explanations, or specific questions that you need answered in DNR's reply. Complete Sections 6 and 7 of this form. **[Numbers in brackets are for DNR Use]**

☐ "Lender" liability exemption clarification - s. 292.21, Wis. Stats. [686]

v **Include a fee of $700.**

Provide the following documentation:

(1) ownership status of the real Property, and/or the personal Property and fixtures;

(2) an environmental assessment, in accordance with s. 292.21, Wis. Stats.;

(3) the date the environmental assessment was conducted by the lender;

(4) the date of the Property acquisition; for foreclosure actions, include a copy of the signed and dated court order confirming the sheriff's sale.

(5) documentation showing how the Property was acquired and the steps followed under the appropriate state statutes.

(6) a copy of the Property deed with the correct legal description; and,

(7) the Lender Liability Exemption Environmental Assessment Tracking Form (Form 4400-196).

(8) If no sampling was done, please provide reasoning as to why it was **not** conducted. Include this either in the accompanying environmental assessment or as an attachment to this form, and cite language in s. 292. 21(1)(c)2.,h.-i., Wis. Stats.:

h. The collection and analysis of representative samples of soil or other materials in the ground that are suspected of being contaminated based on observations made during a visual inspection of the real Property or based on aerial photographs, or other information available to the lender, including stained or discolored soil or other materials in the ground and including soil or materials in the ground in areas with dead or distressed vegetation. The collection and analysis shall identify contaminants in the soil or other materials in the ground and shall quantify concentrations.

i. The collection and analysis of representative samples of unknown wastes or potentially hazardous substances found on the real Property and the determination of concentrations of hazardous waste and hazardous substances found in tanks, drums or other containers or in piles or lagoons on the real Property.

☐ "Representative" liability exemption clarification (e.g. trustees, receivers, etc.) - s. 292.21, Wis. Stats. [686]

v **Include a fee of $700.**

Provide the following documentation:

(1) ownership status of the Property;

(2) the date of Property acquisition by the representative;

(3) the means by which the Property was acquired;

(4) documentation that the representative has no beneficial interest in any entity that owns, possesses, or controls the Property;

(5) documentation that the representative has not caused any discharge of a hazardous substance on the Property; and

(6) a copy of the Property deed with the correct legal description.

☐ Clarification of local governmental unit (LGU) liability exemption at sites with: (select all that apply)

- ☐ hazardous substances spills - s. 292.11(9)(e), Wis. Stats. [649];
- ☐ Perceived environmental contamination - [649];
- ☐ hazardous waste - s. 292.24 (2), Wis. Stats. [649]; and/or
- ☐ solid waste - s. 292.23 (2), Wis. Stats. [649].

v **Include a fee of $700, a summary of the environmental liability clarification being requested, and the following:**

(1) clear supporting documentation showing the acquisition method used, and the steps followed under the appropriate state statute(s).

(2) current and proposed ownership status of the Property;

(3) date and means by which the Property was acquired by the LGU, where applicable;

(4) a map and the ¼, ¼ section location of the Property;

(5) summary of current uses of the Property;

(6) intended or potential use(s) of the Property;

(7) descriptions of other investigations that have taken place on the Property; and

(8) (for solid waste clarifications) a summary of the license history of the facility.

Section 4. Request for Liability Clarification (cont.)

☐ Lease liability clarification - s. 292.55, Wis. Stats. [646]

v **Include a fee of $700 for a single Property, or $1400 for multiple Properties and the information listed below:**

(1) a copy of the proposed lease;

(2) the name of the current owner of the Property and the person who will lease the Property;

(3) a description of the lease holder's association with any persons who have possession, control, or caused a discharge of a hazardous substance on the Property;

(4) map(s) showing the Property location and any suspected or known sources of contamination detected on the Property;

(5) a description of the intended use of the Property by the lease holder, with reference to the maps to indicate which areas will be used. Explain how the use will not interfere with any future investigation or cleanup at the Property; and

(6) all reports or investigations (e.g. Phase I and Phase II Environmental Assessments and/or Site Investigation Reports conducted under s. NR 716, Wis. Adm. Code) that identify areas of the Property where a discharge has occurred.

General or other environmental liability clarification - s. 292.55, Wis. Stats. [682] - Explain your request below.

v **Include a fee of $700 and an adequate summary of relevant environmental work to date.**

☐ No Action Required (NAR) - NR 716.05, [682]

v **Include a fee of $700.**

Use where an environmental discharge has or has not occurred, and applicant wants a DNR determination that no further assessment or clean-up work is required. Usually this is requested after a Phase I and Phase II environmental assessment has been conducted; the assessment reports should be submitted with this form. This is not a closure letter.

☐ Clarify the liability associated with a "closed" Property - s. 292.55, Wis. Stats. [682]

v **Include a fee of $700.**

- Include a copy of any closure documents if a state agency other than DNR approved the closure.

Use this space or attach additional sheets to provide necessary information, explanations or specific questions to be answered by the DNR.

Section 5. Request for a Specialized Agreement

Select the type of agreement needed. Include the appropriate draft agreements and supporting materials. Complete Sections 6 and 7 of this form. More information and model draft agreements are available at: dnr.wi.gov/topic/Brownfields/lgu.html#tabx4.

☐ Tax cancellation agreement - s. 75.105(2)(d), Wis. Stats. [654]

v **Include a fee of $700, and the information listed below:**

(1) Phase I and II Environmental Site Assessment Reports,
(2) a copy of the Property deed with the correct legal description; and,
(3) a draft 75.105 agreement based on the DNR's model (dnr.wi.gov/topic/brownfields/documents/mod75-105agrmt.pdf).

☐ Agreement for assignment of tax foreclosure judgement - s.75.106, Wis. Stats. [666]

v **Include a fee of $700, and the information listed below:**

(1) Phase I and II Environmental Site Assessment Reports,
(2) a copy of the Property deed with the correct legal description; and,
(3) a draft 75.105 agreement based on the DNR's model (dnr.wi.gov/topic/brownfields/documents/mod75-106agrmt.pdf).

☐ Negotiated agreement - Enforceable contract for non-emergency remediation - s. 292.11(7)(d) and (e), Wis. Stats. [630]

v **Include a fee of $1400, and the information listed below:**

(1) a draft schedule for remediation; and,
(2) the name, mailing address, phone and email for each party to the agreement.

Section 6. Other Information Submitted

Identify all materials that are included with this request.

Include one copy of any document from any state agency files that you want the Department to review as part of this request. The person submitting this request is responsible for contacting other state agencies to obtain appropriate reports or information.

☐ Phase I Environmental Site Assessment Report - Date: _____

☐ Phase II Environmental Site Assessment Report - Date: _____

☐ Legal Description of Property (required for all liability requests and specialized agreements)

☒ Map of the Property (required for all liability requests and specialized agreements)

Analytical results of the following sampled media: Select all that apply and include date of collection.

☐ Groundwater ☐ Soil ☐ Sediment ☐ Other medium - Describe: _____

Date of Collection: _____

☐ A copy of the closure letter and submittal materials

☐ Draft tax cancellation agreement

☐ Draft agreement for assignment of tax foreclosure judgment

☒ Other report(s) or information - Describe: Site-Specific Sampling and Analysis Plan

For Property with newly identified discharges of hazardous substances only: Has a notification of a discharge of a hazardous substance been sent to the DNR as required by s. NR 706.05(1)(b), Wis. Adm. Code?

○ Yes - Date (if known): _____
○ No

Note: The Notification for Hazardous Substance Discharge (non-emergency) form is available at: dnr.wi.gov/files/PDF/forms/4400/4400-225.pdf.

Section 7. Certification by the Person who completed this form

☐ I am the person submitting this request (requester)

☒ I prepared this request for: N. Sparacio; CDA of City Manitowoc

Requester Name

I certify that I am familiar with the information submitted on this request, and that the information on and included with this request is true, accurate and complete to the best of my knowledge. I also certify I have the legal authority and the applicant's permission to make this request.

Hann Byers — Signature

6/21/17 — Date Signed

Brownfields Project Manager — Title

414-581-6476 — Telephone Number (include area code)

Section 8. DNR Contacts and Addresses for Request Submittals

Send or deliver one paper copy and one electronic copy on a compact disk of the completed request, supporting materials, and fee to the region where the property is located to the address below. Contact a DNR regional brownfields specialist with any questions about this form or a specific situation involving a contaminated property. For electronic document submittal requirements see: http://dnr.wi.gov/files/PDF/pubs/rr/RR690.pdf.

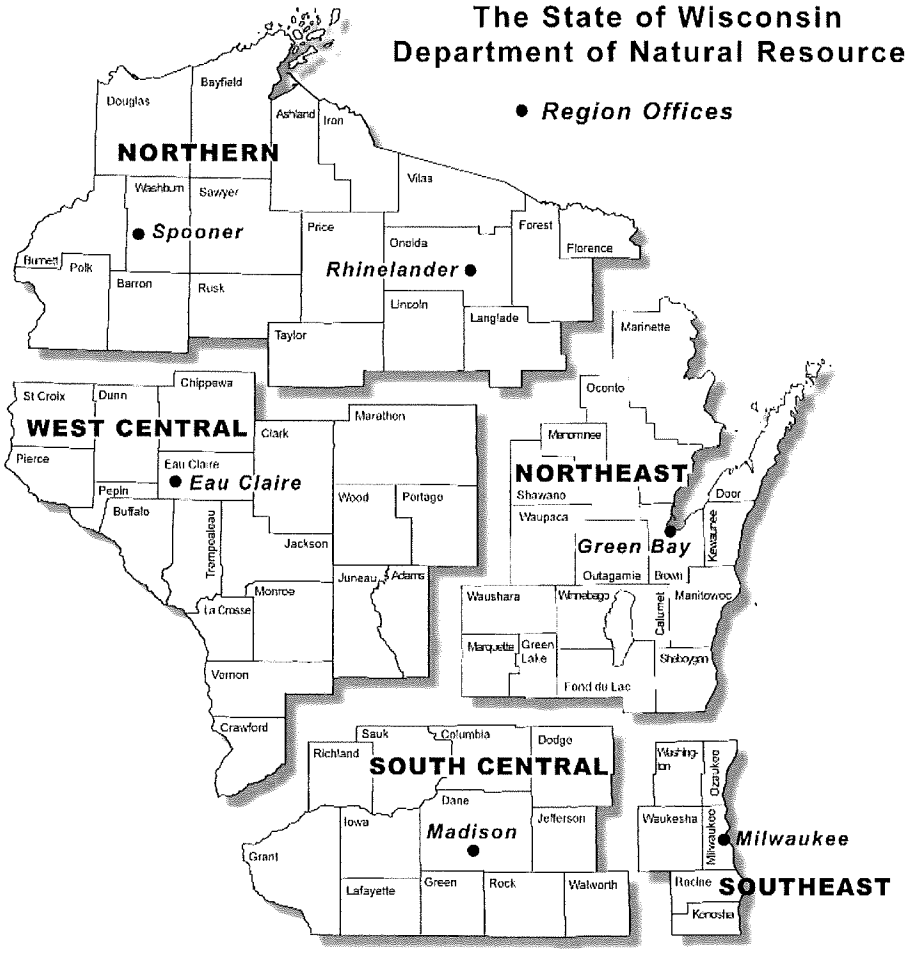
DNR NORTHERN REGION
Attn: RR Program Assistant
Department of Natural Resources
223 E Steinfest Rd Antigo, WI 54409

DNR NORTHEAST REGION
Attn: RR Program Assistant
Department of Natural Resources
2984 Shawano Avenue
Green Bay WI 54313

DNR SOUTH CENTRAL REGION
Attn: RR Program Assistant
Department of Natural Resources
3911 Fish Hatchery Road
Fitchburg WI 53711

DNR SOUTHEAST REGION
Attn: RR Program Assistant
Department of Natural Resources
2300 North Martin Luther King Drive
Milwaukee WI 53212

DNR WEST CENTRAL REGION
Attn: RR Program Assistant
Department of Natural Resources
1300 Clairemont Ave.
Eau Claire WI 54702



Note: These are the Remediation and Redevelopment Program's designated regions. Other DNR program regional boundaries may be different.

DNR Use Only			
Date Received	Date Assigned	BRRTS Activity Code	BRRTS No. (if used)
DNR Reviewer	Comments		
Fee Enclosed? ◯ Yes ◯ No	Fee Amount $	Date Additional Information Requested	Date Requested for DNR Response Letter
Date Approved	Final Determination		