Remedial Action Options Report

N.W. Mauthe Superfund Site
Appleton, Wisconsin

September 21, 2020
Terracon Project No. 58117057
WDNR BRRTS #02-45-000127

Prepared for:
Wisconsin Department of Natural Resources
Oshkosh, Wisconsin

Prepared by:
Terracon Consultants, Inc.
Franklin, Wisconsin

September 21, 2020

Wisconsin Department of Natural Resources
Remediation and Redevelopment Program
625 East County Road Y, Suite 700
Oshkosh, Wisconsin 54901-9731

Attention: Ms. Jennifer Borski

Re: Remedial Action Options Report
N.W. Mauthe Superfund Site
725 South Outagamie Street
Appleton, Wisconsin
WDNR BRRTS #02-45-000127
Terracon Project No. 58117057

Dear Ms. Borski:

Terracon Consultants, Inc. (Terracon) has prepared this Remedial Action Options Report (RAOR) to identify and evaluate options for treating effluent from the currently operating groundwater collection and treatment system to remove per- and polyfluoroalkyl substances (PFAS). The RAOR was completed in general accordance with Terracon's July 16, 2020, proposal. Terracon has prepared this RAOR to document the evaluation and provide recommendations. The evaluation was completed in general accordance with Chapter NR 722, Wisconsin Administrative Code (WAC).

Sincerely,
Terracon Consultants, Inc.

Edmund A. Buc, P.E., CHMM
Senior Project Engineer

Scott A. Hodgson, P.G.
Senior Project Manager

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N.W. MAUTHE SUPERFUND SITE
725 SOUTH OUTAGAMIE STREET
APPLETON, WISCONSIN

September 21, 2020
Terracon Project No. 58117057

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) was retained by the Wisconsin Department of Natural Resources (WDNR) to identify and evaluate options for treating effluent from the currently operating groundwater collection and treatment system at the above-referenced site to remove per- and polyfluoroalkyl substances (PFAS). The WDNR project contact is Ms. Jennifer Borski, Oshkosh Service Center.

2.0 BACKGROUND

2.1 Site Location

The N.W. Mauthe (Mauthe) property is located at 725 South Outagamie Street, Appleton, Wisconsin 54914-5072. The project is located in the NE¼ of the NW¼ of Section 34, T21N, R17E, Outagamie County (Figure 1 – Site Location Map, Appendix A).

2.2 Site History

The Mauthe site is a former electroplating facility. The facility consisted of a zinc building and a chromium building. Zinc, cadmium, copper, and possibly silver were electroplated in the zinc building from 1978 to 1987. Hard chromium plating was conducted in the chromium building from 1960 to 1976. In 1982, the WDNR received a report that yellowish-green water was observed south of the chromium building. Apparently, for several years plating solutions and waste solvents had leaked from holding vats and tanks, and sump pumps allegedly discharged plating tank solutions onto the ground outside the facility.

The WDNR began an investigation of the site in April 1982. A shallow groundwater collection system was installed parallel to the railroad tracks in May 1982, where groundwater and surface water were collected for two years. The Mauthe site was added to the National Priorities List in 1989.

From November 1991 to May 1992, CH2M HILL performed a Remedial Investigation (RI) for the WDNR. The RI showed the greatest concentrations of soil and groundwater contamination in the area around the zinc and chromium buildings. The chemicals most often detected above background levels or state standards included total chromium, hexavalent chromium, zinc, cadmium, cyanide, trichloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene, and toluene. Subsurface soil contamination was detected up to 25 feet deep near the former buildings. Groundwater contamination extended over most of the block bordered by Melvin, Outagamie, and Second Streets.

CH2M HILL conducted a feasibility study for the WDNR. A Record of Decision (ROD) was signed in March 1994. Remedial design/remedial action activities took place at the Mauthe site in a phased approach. Phase I, which took place in 1995, included the following.

- Demolition and removal of the buildings on the Mauthe property
- Excavation and off-site treatment of soils with a total chromium concentration of greater than 500 milligrams per kilogram (mg/kg)
- Backfilling of the excavation with clean soils, capping the site with 2 feet of clay and topsoil, and the establishment of vegetative cover
- Installation of groundwater collection trenches and construction and operation of a groundwater treatment facility to contain and/or control groundwater contamination with ultimate compliance with groundwater Applicable or Relevant and Appropriate Requirements (ARARs)
- Improvement or installation of foundation drain systems and cleaning, painting or sealing of basement walls and floors, as needed, for homes or businesses in the area of the site, to prevent seepage of contaminated water into the buildings

Phase II, which took place in 1996, involved the construction of a groundwater treatment system, which began operation in February 1997.

Midwest Contract Operations, Inc. (MCO) began operating the groundwater treatment system in February 1997. CH2M HILL, the site engineer and project manager for the United States Environmental Protection Agency (EPA), retained responsibility for the overall site operations and the groundwater monitoring wells associated with the treatment system.

In October 1998, after the first year of operation and maintenance of the remediation system, the WDNR assumed the responsibility from the EPA for all operation and maintenance at the site. MCO was retained by the WDNR for the operation and maintenance of the groundwater treatment system, including the groundwater monitoring wells.

In January 2005, the WDNR requested OMNNI Associates, Inc. (OMNNI) provide an evaluation of the groundwater collection and treatment system at the Mauthe site. The construction of four piezometers (PZ-5, PZ-6, PZ-7, and PZ-8) was part of the evaluation to understand the extent of contaminants in the soil and groundwater. OMNNI installed five additional observation wells (MW-

109 through MW-113) on May 24, 2006, to further understand the extent of contaminants in the soil and groundwater in the former source area.

The results of the additional investigation showed contamination remained in the soil above ch. NR 720 Wisconsin Administrative Code (WAC) levels, in the groundwater above ch. NR 140 WAC enforcement standards, and in the groundwater above the ARARs established for the Mauthe site. Groundwater did not appear to be impacted at depth based on the piezometer groundwater analysis.

Active treatment of collected groundwater ended on April 18, 2006, with approval for direct discharge by the City of Appleton. Collected groundwater is now discharged directly to the sanitary sewer system for treatment at the City of Appleton wastewater treatment facility.

On October 13, 2007, MCO discontinued operational responsibilities of the system. OMNNI began operational responsibilities on October 14, 2007, and maintained responsibility through September 30, 2011. Terracon assumed system operation responsibilities on October 1, 2011.

2.3 Site Description

The site is located within the City of Appleton limits in an area of mixed commercial, light industrial, and residential properties. The property is approximately one acre in size and triangular in shape (Figure 2 – Site Detail Map, Appendix A). Melvin Street borders the site to the north, a parking lot owned by Miller Electric and Manufacturing Company is on the west, and railroad tracks are on the southeast. Private residences are located north of Melvin Street and south of the railroad tracks. The former zinc building was located on the northeast portion of the property. The former chromium building was located on the southwest portion of the property. The current building onsite houses the treatment facility. Approximately half of the land immediately surrounding the site contains impervious structures or paved roads and parking areas.

3.0 PFAS ASSESSMENT

As noted in the WDNR's guidance document "Site Investigation Scoping: Identifying Contaminants of Concern" (RR-101), PFAS are a class of emerging contaminants used in a variety of industrial activities and consumer products. The Interstate Technology Regulatory Council (ITRC) fact sheet "History and Use of Per- and Polyfluoroalkyl Substances (PFAS)" indicates that metal plating and etching operations may be a potential source of PFAS.

The monitoring well network at the site is comprised of 20 monitoring points. A Scope of Work (SOW) to sample groundwater at the site for PFAS was sent to Terracon by the WDNR in a March 6, 2020, electronic mail. Terracon provided a proposal for PFAS groundwater sampling dated March 13, 2020, which was approved by the WDNR. The monitoring points will be sampled for PFAS analysis in fall 2020, following EPA approval of the Quality Assurance Project Plan (QAPP) amendment for the PFAS groundwater sampling. The QAPP amendment was submitted to the WDNR and EPA for review on August 4, 2020. The results of the sampling event will be used to evaluate whether PFAS are present at the site.

The WDNR is seeking to have a plan in place for addressing PFAS in groundwater, if detected, prior to collecting samples from the monitoring points. The WDNR requested in a July 10, 2020, electronic mail a cost estimate for completing the following tasks:

- "Performance of a remedial action options evaluation specific for PFAS in groundwater in compliance with Wis. Admin. Code ch. NR 722", and
- "Submittal of a detailed remedial actions options report (RAOR)".

This report presents an overview of the current groundwater collection and treatment system. The operational parameters of the groundwater collection and treatment system were used to identify and evaluate options for treating PFAS, if present, in the effluent.

4.0 CURRENT GROUNDWATER COLLECTION AND TREATMENT SYSTEM

The following section presents descriptions of the currently configured groundwater collection and treatment system, including concentrations of constituents in the influent and effluent. Operational parameters such as discharge volume are also presented.

4.1 Groundwater Collection System

The groundwater collection system consists of three trenches. The west trench crosses the Miller Electric property to the west of the site and is approximately 200 feet long. The central trench runs south of the site parallel to the railroad and is approximately 280 feet long. The southeast trench runs along Second and Outagamie streets and is approximately 600 feet long (Figure 2 – Site Detail Map, Appendix A).

The groundwater treatment system was designed to capture groundwater containing contaminants at concentrations greater than 1992 Chapter NR 140, WAC, preventive action limits (PALs) as approved in the ROD. The west trench and southeast trench were located outside the estimated extent of the groundwater contamination and are designed to limit further migration of groundwater contamination. The central trench was designed to collect contaminated groundwater and limit further migration of the groundwater contamination off-site.

Groundwater enters the trenches based on the head differential between the local water table and the level maintained in the trench. The trenches are backfilled with coarse sand. A 6-inch diameter perforated high-density polyethylene collection pipe in the bottom of the trench drains water from the trench to manholes where the water is collected and pumped to the groundwater treatment facility.

Under normal operation, water levels are maintained at or near the bottom of the trenches. The trenches can provide storage and continue to act as a hydraulic barrier until the water in the trenches rises to the level of the water table. This storage capacity allows the hydraulic barrier to continue even when the collection and treatment system needs to be shut down for repair or maintenance for a short period of time.

Three properties south and southeast of the facility have foundation drain systems that are connected to the groundwater collection system via gravity piping (801 S. Outagamie Street, 1410 W. Second Street, and 1414 W. Second Street). Additionally, the sump pump discharge at 1428 W. Second Street is connected to the collection system.

Groundwater collected in the west trench flows by gravity to Manhole 1 where the maximum depth of the manhole/trench extends approximately 32 feet below ground surface (bgs). Groundwater in the central and southeast trenches flows by gravity to Manhole 2, where the maximum depth of the manhole extends approximately 31 feet bgs. The southeast trench collection piping enters Manhole 2 at a depth of approximately 17 feet bgs, and the central trench collection piping enters Manhole 2 at a depth of approximately 28 feet bgs. Groundwater from the manholes is piped to the treatment facility (Figure 2 – Site Detail Map, Appendix A).

4.2 Groundwater Treatment System

From February 1997 through April 18, 2006, the treatment system operated in a manual batch system mode. The groundwater treatment system was designed to be a fully automated batch treatment process designed for control of total chromium. Each batch operation was capable of treating 2,700 gallons of influent groundwater and took approximately 6 hours to complete a cycle (i.e., from the start of filling the reaction tank to finishing the discharge to the City of Appleton sanitary system). The system was capable of treating 10,800 gallons in a 24-hour period.

Pumps located in the two manholes convey groundwater from the collection trenches into the storage tank. Float switches control water levels in the manholes. The pumps have a pumping capacity of approximately 43 gallons per minute (gpm) each.

An aboveground tank stores water from the collection system to provide equalization of the influent to be treated. The equalization tank has a 9,000-gallon capacity. A top-mounted, turbine type, constant speed mixer, for mixing the tank contents and keeping solids in suspension, is located on the tank. An ultrasonic level indicator monitors the water level in the tank. The water level of the equalization tank is monitored by a programmable logic controller (PLC).

Prior to the start of direct discharge on April 18, 2006, the reaction tank feed pump transferred groundwater from the equalization tank to the reaction tank. The reaction tank feed pump was an air-operated, double-diaphragm pump with an 86 gpm capacity. The reaction tank feed pump was sized to fill the reaction tank working volume (2,700 gallons) in approximately 30 minutes.

The reaction tank has a capacity of 6,100 gallons. The conical bottom of the tank allowed for the collection and transfer of sludge. The volume of water treated during a batch process was approximately 2,700 gallons. Chemical and physical processes for the groundwater treatment occurred in the reaction tank. The water was treated by batch process in the reaction tank as follows: decant, fill, ferrous sulfate addition, caustic addition, aeration, flocculation, settling, and sludge withdrawal.

The above systems were the primary parts in the treatment process. However, there were several other components necessary for the successful treatment of contaminated groundwater. They included a reaction tank mixer, reaction tank level detector, reaction tank air diffuser, reaction tank pH monitor, air compressor, ferrous sulfate feed system, caustic feed system, sludge transfer pump, sludge tank, and tanker truck feed pump. These components were monitored and/or controlled by the PLC in the master control panel. Only the tanker transfer pump and the air compressor were locally controlled. The system was designed to provide continuous batch process treatment, if required.

The master control panel includes failure annunciators, pH strip chart recorder, data access module, auto dialer, PLC system, and uninterruptible power supply. The master control panel also sounds an audible alarm if an upset in the process or a failure is detected.

Although the system was designed to be a fully automated batch treatment process, the City of Appleton industrial user permit required treated groundwater to be tested for hexavalent chromium using a Hach hexavalent chromium test kit before discharge to the sanitary sewer system. The treatment system (batch treatment and manual discharge) met discharge permit conditions, but was labor intensive.

Groundwater brought into the treatment facility currently has contaminant concentrations below City of Appleton industrial user permit discharge limits. The WDNR received approval from the City of Appleton to perform direct discharge of untreated, collected groundwater beginning April 18, 2006, when influent concentrations meet discharge limits listed in the Appleton Industrial User (Wastewater Discharge) Permit No. 06-21. Since April 18, 2006, collected groundwater has been directly discharged without treatment to the City of Appleton sanitary sewer system.

The current Appleton Industrial User (Wastewater Discharge) permit was reissued on May 31, 2018 (Permit No. 18-21). The permit allows the continuation of direct discharge to the sanitary sewer as long as contaminant concentrations remain below discharge limits. Permit No. 18-21 expires at midnight, May 31, 2021.

The components of the treatment system are still present, but are not utilized. The treatment system was reconfigured to allow direct discharge to the City of Appleton sanitary sewer system, via Outfall 001. Water enters the equalization tank and flows from the tank under gravity to Outfall 001 from a discharge pipe located approximately 3.5 feet from the base of the tank. The components of the currently configured groundwater collection and treatment system are depicted on Figure 3 – Process Flow Diagram.

4.3 Influent and Effluent Quality

Terracon collects effluent samples from the sampling port on the equalization tank Outfall 001 discharge pipe. Samples are typically collected the first Thursday of the month. Unfiltered samples are collected and analyzed for hexavalent chromium and total dissolved chromium. A pH value from the Outfall 001 sample is also determined on the samples collected by using an Oakton pHTestr. A summary of the laboratory analysis can be found in Table 1 – Influent and Effluent Summary, Appendix B, which was included in the most recent operation and maintenance report, *Operation and Maintenance Report No. 59*, dated November 12, 2019. In addition, compliance sampling of the groundwater effluent is conducted twice per year by the City of Appleton and once per year by Terracon. The sample is collected at the sampling port for Outfall 001 at the equalization tank. The effluent is analyzed for the parameters listed in Table 2 – City of Appleton Compliance Limits, Outfall 001, Appendix B, which was included in *Operation and Maintenance Report No. 59*.

During the monthly monitoring events, unfiltered samples are collected from the Manhole 1 influent sampling port and from the Manhole 2 influent sampling port. The presence of hexavalent chromium is measured in the Manhole 1 and 2 influent samples using a Hach test kit, model Pocket Colorimeter II, and pH values are determined using an Oakton pHTestrs. A summary of the testing results and the estimated pounds of total chromium removed by the system each month is shown in Table 1.

Total flows from Outfall 001, from Manhole 1, and from Manhole 2 are recorded on an Operator Log Sheet during the monthly sample collection. Total flows from Outfall 001, from Manhole 1, and from Manhole 2 are also recorded periodically throughout the month (Table 1 – Influent and Effluent Summary, Appendix B).

While more recent system data has been reported on a monthly basis throughout 2020, this evaluation uses data reported through October 2019 as this is the most recent data presented as part of an annual evaluation of the groundwater collection and treatment system's operation and maintenance activities. Terracon utilized the operational data presented in Tables 1 and 2 to evaluate influent and effluent characteristics since the start of direct discharge to the City of Appleton sanitary sewer system in April 2006, and for the last 12-month period presented in *Operation and Maintenance Report No. 59* (November 2018 to October 2019). The range of contaminant concentrations and flow rates, with average, minimum, and maximum values, are summarized in Table 3 – Groundwater Collection and Treatment System Operational Parameters, Appendix B. Based on the data collected between November 2018 and October 2019, the average discharge rate is approximately 3,000 gallons per day (gpd), with approximately 68 percent of the flow coming from Manhole 2. These flow rates are consistent with the long-term operational averages of the system. The average pH and hexavalent chromium concentration measured in the influent from Manhole 1 have been slightly higher than the influent from Manhole 2.

5.0 REMEDIAL ACTION OPTIONS EVALUATION

Based on discussions with the WDNR, Terracon understands the purpose of the remedial action options evaluation is to identify and evaluate options for treating the groundwater collection system influent if it is found to contain PFAS, and not to provide *in situ* treatment of groundwater prior to collection by the existing groundwater collection system.

Terracon identified likely remedial action options in accordance with NR 722.07(2) by consulting with its National PFAS Practice Resource Group, contacting qualified treatment technology vendors, and reviewing the ITRC guidance document "Per- and Polyalkyl Substances" (ITRC PFAS-1, April 2020). The EPA Drinking Water Treatability Database (TDB) was also reviewed, as the TDB focuses of the treatment of water as a media. Because PFAS is an emerging contaminant, several technologies are being evaluated by researchers and the regulated community, but relatively few are considered established technologies for this class of contaminants. As noted by the ITRC guidance document, "Treatment technologies for PFAS in environmental media are still evolving and it is prudent to use caution in implementing long-term remedies". Terracon identified the following remedial action options for treating the groundwater collection system influent:

- No Action;
- Influent treatment with granular activated carbon;
- Influent treatment with ion exchange resin; and
- Influent treatment by reverse osmosis.

Each of the identified remedial action options were evaluated in accordance with NR 722.07(4), WAC. PFAS data is not yet available for the groundwater or groundwater collection and treatment system influent. This evaluation assumed that PFAS influent concentrations will be within a range that is treatable by the listed options. Implementation of a remedial action option may be influenced by the PFAS sampling program. For example, it may be found that the influent from one manhole contains PFAS at concentrations above their laboratory limits of detection, but the influent from the other manhole does not. Such results would affect the configuration of the selected option and sizing of equipment, which would in turn affect costs.

5.1 No Action

This option would consist of continuing to operate the existing groundwater collection and treatment system, without implementing modifications to the system.

Technical Feasibility (NR 722.07(4)(a)): This remedial action option would not remove PFAS from the groundwater collection and treatment system influent. The long-term effectiveness of this remedial action option would be based on whether discharge of PFAS to the City of Appleton sewer system would protect public health, safety, and welfare, and the environment over time. Based on discussions with the City of Appleton, discharge limits have not been established for PFAS, and there are no plans to adopt discharge limits in the near term. The WDNR has not yet adopted discharge limits for publicly owned treatment works (POTWs). The absence of discharge limits suggests that a ‘no action’ remedial action option may be feasible in the short term. However, the WDNR has initiated rulemaking to establish discharge limitations for PFAS and develop surface water quality criteria under NR 105, WAC, which may affect the long-term effectiveness of this options.

A ‘no action’ remedial action option would be easily implemented, as modifications to the groundwater collection and treatment system would not be needed. Because the WDNR is proceeding with rulemaking to develop discharge limitations for PFAS, it would be useful to collect effluent quality data for PFAS over time, to evaluate the short- and long-term effectiveness of this remedial action option as trends in PFAS concentrations could be evaluated. Discharge monitoring is already being conducted for the groundwater collection and treatment system, so addition of PFAS as an analytical parameter could be easily implemented. Inclusion of PFAS in the discharge monitoring program would also identify an increase in PFAS concentrations in the effluent and indicate that ‘no action’ may no longer be feasible and indicate another remedial action option should be implemented.

Because a ‘no action’ remedial action option would be similar to the current operation of the groundwater collection and treatment system, changes to the Cooperative Agreement between the City of Appleton and the WDNR should not be needed.

Operation of the groundwater collection and treatment system is considered a long-term remedy at the site. Consequently, the ‘restoration time frame’ criteria (NR 722.07(4)(a)(4)) was not considered in this evaluation.

Economic Feasibility (NR 722.07(4)(b)): This remedial action option would not require capital or initial costs. It is likely that this remedial action option would require implementation of a modified discharge monitoring program to evaluate its continued feasibility. The cost for the modified monitoring program would be considered part of this option's annual operation and maintenance costs.

For the evaluation of economic feasibility, it was assumed that the monthly discharge monitoring program would be modified to include the collection of samples from the influent from Manholes 1 and 2 and the effluent for laboratory analysis of PFAS. The WDNR has not yet issued certifications to laboratories for PFAS analysis, although several laboratories have applied for certification and have been audited by the WDNR. The WDNR has adopted USEPA Method 537.1 for drinking water samples. For aqueous and solid matrices, the WDNR is directing laboratories to follow their method standard operating procedure (SOP) for liquid chromatography/mass spectroscopy (LC/MS) and the WDNR document "Wisconsin PFAS Aqueous (Non-Potable Water) and Non-Aqueous Matrices Method Expectations", dated December 16, 2019. The samples would be analyzed for the WDNR's list of 36 PFAS.

A cost estimate for this remedial action option, including total present worth costs (as state environmental monies are being expended) is included in Table 4 – Cost Estimate, Remedial Action Options. The cost estimate assumes 5 years of annual operation, maintenance, and monitoring for this and the other remedial action options to provide a uniform basis of comparison.

5.2 Granular Activated Carbon

Granular activated carbon (GAC)-based treatment technologies rely on sorption to remove contaminants from a media, usually air or water. In this application, a pair of canisters containing GAC would be rented from a vendor and installed near the equalization tank. A transfer pump would be connected to the equalization tank and plumbed to a bag filter to remove particulates from the influent before entering the GAC system. Water would be pumped through the GAC, which would remove contaminants via sorption, and the treated effluent discharged to Outfall 001. The use of two canisters is a common application; the first (lead) canister provides initial removal of contaminants, while the second (lag) canister acts as a polishing step to further reduce contaminants prior to discharge and mitigate the potential for breakthrough and exceedance of a discharge limit if one canister is used. As the system operates and sorption sites within the GAC become filled, the lead canister is removed from service, and the lag canister becomes the lead canister. A new canister is installed as the lag canister. A monitoring program would be implemented to measure concentrations in the influent and effluent, and in water leaving the lead canister, to determine when canisters should be changed.

Spent canisters would be returned to the vendor under a service contract. GAC is commonly subjected to a regeneration process for most common canisters and returned to service. The

IRTC guidance document states "Spent GAC that contains PFAS can be thermally reactivated and reused, which may result in a lower cost media replacement option versus new GAC. However, some regulatory agencies may not allow the use of reactivated GAC for drinking water systems.". Because the groundwater collection and treatment system is not used for drinking water, it is assumed that the WDNR would allow the spent GAC to be regenerated.

Based on the average discharge rate of approximately 3,000 gpd and discussions with a remediation system vendor, it is assumed that two 500-pound canisters would be used. Information describing the bag filter unit and GAC canisters is included in Appendix C. It is further assumed that the design discharge concentration would be equivalent to the 20 parts per trillion (ppt) groundwater enforcement standard (ES) recommended by the Wisconsin Department of Health (WDH) in June 2019 for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), individually and combined. Final selection of the canister size would be based on the concentration of PFAS in the influent. As previously noted, influent PFAS concentrations are not yet known. For cost estimating purposes, this evaluation assumes that one canister would be changed every 6 months. The proposed canisters are rated for a maximum flow rate of 10 gallons per minute (gpm). The average and maximum pumping rates from the groundwater collection and treatment system observed over the past 12 months are within the design capacity of the proposed canisters. Short-term flow rates from the manholes can approach 40 gpm after major precipitation events. The trenches likely have enough storage capacity to allow the system to manage short-term increases and flow, which would be further evaluated during the design process.

Technical Feasibility (NR 722.07(4)(a)): This remedial action option would remove PFAS from the groundwater collection and treatment system influent. The use of GAC treatment would be effective in the long term by reducing the volume of PFAS-contaminated media by concentrating the PFAS into the GAC, and would be protective of public health, safety, and welfare, and the environment over time by decreasing the concentration of PFAS in the groundwater collection and treatment system effluent. This remedial action option would be effective in the short term, as this option could be quickly implemented. The EPA's TDB states that GAC treatment has been shown to remove greater than 99 percent of many PFAS; however, this remedial action option is more effective in removing longer-chain PFAS, and more effective at removing perfluorinated sulfonates than perfluoroalkyl acids. The results from the PFAS groundwater monitoring program will need to be reviewed to further evaluate this remedial action option. GAC generally sorbs contaminants in a non-preferential manner. The presence of other contaminants, particularly "organic matter", may shorten the operating life of the GAC canisters. Available data suggests the influent contains relatively low concentrations of organics. The presence of chromium in the influent was discussed with a remediation vendor, who indicated the chromium should not interfere with GAC performance. A treatability sample would be collected for analysis of organic and inorganic constituents.

GAC treatment could be easily implemented, as it is a common and proven technology. The ITRC guidance document states “GAC is an established water treatment technology proven to effectively treat long-chain PFAS (such as PFOS, PFOA, and PFNA). The application of GAC as a treatment technology for PFAS removal has been practiced for over 15 years at more than 45 military installations, as well as several industrial sites and publicly owned treatment works… involving private and municipal drinking water supplies”. As noted earlier, influent, effluent, and system water samples would need to be collected to confirm treatment effectiveness and determine when the lead and lag canisters should be changed. Discharge monitoring is already being conducted for the groundwater collection and treatment system, so addition of PFAS as an analytical parameter could be easily implemented, by installing sample ports during installation of the treatment system. The monitoring and maintenance program would also be modified to record system data such as pressure and flow, and to conduct routine maintenance such as bag filter changeouts.

If GAC treatment was installed, the modified groundwater collection and treatment system would operate in a manner similar to its current configuration. Changes to the Cooperative Agreement between the City of Appleton and the WDNR should not be needed. The City of Appleton should be informed of the system modifications. The daily inspection checklist used by City of Appleton staff should be reviewed and, if necessary, modified.

Operation of the groundwater collection and treatment system is considered a long-term remedy at the site. Consequently, the ‘restoration time frame’ criteria (NR 722.07(4)(a)(4)) was not considered in this evaluation.

<u>Economic Feasibility (NR 722.07(4)(b))</u>: This remedial action option requires capital costs for installation of the GAC canisters and a new transfer pump (if the existing pump from the previous system cannot be reused), and updating the PLC to control the pump and improve overall system operation. The WDNR has discussed upgrading the PLC with a local electrical contractor, and it assumed that such an upgrade would be completed in conjunction with implementing this remedial action option. This remedial action option would require initial costs for design, and implementation of a modified discharge monitoring program to evaluate performance and assist with operational decisions. Periodic changeout and regeneration of the GAC canisters would also be required. Changeout frequency would be dependent on the concentration of contaminants in the influent, the discharge limit, and field-observed breakthrough time. As noted above, because the influent PFAS concentration has not yet been determined, this evaluation assumes that changeout would occur every 6 months (twice per year). The cost for the modified monitoring program and canister changeout would be considered part of this option’s annual operation and maintenance costs.

For this evaluation of economic feasibility, it is assumed that the monthly discharge monitoring program would be modified to include the collection of a sample from the influent, effluent, and from between the lead and lag GAC canisters for laboratory analysis of PFAS. The samples would be analyzed for the WDNR's list of 36 PFAS as described for the other remedial action options.

A cost estimate for this remedial action option, including total present worth costs is included in Table 4 – Cost Estimate, Remedial Action Options. The cost estimate assumes 5 years of annual operation, maintenance, and monitoring for this remedial action option.

5.3 Ion Exchange

Ion exchange treatment technologies, like GAC, rely on sorption to remove contaminants from a media. In this application, a pair of canisters containing ion exchange resin would be rented from a vendor and installed near the equalization tank. A transfer pump would be connected to the equalization tank and plumbed to a bag filter to remove particulates from the influent before entering the ion exchange system. Water would be pumped through the ion exchange resin, which would remove contaminants via sorption, and be discharged to Outfall 001. As with GAC, the use of a lead and lag canister is a common application. Unlike GAC, two options are available for management of the ion exchange resin. A monitoring program would be implemented to measure concentrations in the influent and effluent, and in water leaving the lead canister, to determine when canisters should be changed. Spent canisters would be returned to the vendor for proper disposal under a service contract.

Based on the average discharge rate of approximately 3,000 gpd and discussions with a remediation vendor, it is assumed that two 1.2-cubic-foot canisters would be used. Information describing the bag filter unit, ion exchange canisters, and a typical resin for PFAS removal is included in Appendix C. It is further assumed that the design discharge concentration would be equivalent to the 20 ppt groundwater ES recommended by the WDH for PFOA and PFOS, individually and combined. As previously noted, influent PFAS concentrations are not yet known. For cost estimating purposes, this evaluation assumes that one canister would be changed every 6 months. The average and maximum pumping rates from the groundwater collection and treatment system observed over the past 12 months are within the design capacity of the proposed canisters. Short-term flow rates from the manholes can approach 40 gpm after major precipitation events. The trenches likely have enough storage capacity to allow the system to manage short-term increases and flow, which would be further evaluated during the design process.

<u>Technical Feasibility (NR 722.07(4)(a))</u>: This remedial action option would remove PFAS from the groundwater collection and treatment system influent. The use of ion exchange treatment would be effective in the long term by reducing the volume of PFAS-contaminated media by concentrating the PFAS into the resin, and would be protective of public health, safety, and welfare, and the environment over time by decreasing the concentration of PFAS in the groundwater collection and treatment system effluent. This remedial action option would be

effective in the short term, as this option could be quickly implemented. The EPA's TDB indicates that ion exchange treatment exhibits greater variability (zero to greater than 99 percent in full-scale application) in removal efficiency, and that resin selection is based on the individual PFAS in the influent. Resins can be selected to remove short-chain PFAS more effectively than GAC, but analytical data is needed for resin selection. The results from the PFAS groundwater monitoring program will need to be reviewed to further evaluate this remedial action option. The ITRC guidance document states that "Co-contaminants (including organic and inorganic compounds) may significantly reduce the removal capacity of (ion exchange) for PFAS, although this depends on the selectivity of the (ion exchange) resin. Because of the variability in resin behavior, as well as groundwater chemistry, influent characterization is needed to assess potential pretreatment options to remove co-contaminants." Because the influent is not currently pre-treated to remove hexavalent chromium, restarting the chromium treatment process could add significant additional operating costs if a resin cannot be found that is unaffected by hexavalent chromium at the concentrations present in the influent. Based on preliminary discussions with a remediation vendor, the chromium concentrations present in the influent should not impede the performance of ion exchange. Terracon has used ion exchange to treat water at other chromium sites in Wisconsin. If necessary, an additional ion exchange canister could be used to provide pre-treatment for chromium. A treatability sample would be collected for analysis of organic and inorganic constituents.

Ion exchange treatment could be easily implemented, as it is a common and proven technology. The ITRC guidance document states "The development and use of selective resins for PFAS removal is relatively new but already well established". As noted earlier, influent, effluent, and system water samples would need to be collected to confirm treatment effectiveness and determine when the lead and lag canisters should be changed. Discharge monitoring is already being conducted for the groundwater collection and treatment system, so addition of PFAS as an analytical parameter could be easily implemented, by installing sample ports during installation of the treatment system. The monitoring and maintenance program would also be modified to record system data such as pressure and flow, and to conduct routine maintenance such as bag filter changeouts.

If ion exchange treatment was installed, the modified groundwater collection and treatment system would operate in a manner similar to its current configuration. Changes to the Cooperative Agreement between the City of Appleton and the WDNR should not be needed. The City of Appleton should be informed of the system modifications. The daily inspection checklist used by City of Appleton staff should be reviewed and, if necessary, modified.

Operation of the groundwater collection and treatment system is considered a long-term remedy at the site. Consequently, the 'restoration time frame' criteria (NR 722.07(4)(a)(4)) was not considered in this evaluation.

Economic Feasibility (NR 722.07(4)(b)): This remedial action option requires capital costs for installation of the ion exchange canisters and new transfer pump (assuming the existing pump from the previous system cannot be reused), and updating the PLC to control the pump and improve overall system operation. As noted earlier, the WDNR is evaluating upgrading the PLC, and it assumed that such an upgrade would be completed in conjunction with implementing this remedial action option. This remedial action option would require initial costs for design, and implementation of a modified discharge monitoring program to evaluate performance and assist with operational decisions. Periodic changeout and disposal of the ion exchange canisters would also be required. Changeout frequency would be dependent on the concentration of contaminants in the influent, the discharge limit, and field-observed breakthrough time. Because the influent PFAS concentration has not yet been determined, this evaluation assumes that changeout would occur every 6 months (twice per year). The cost for the modified monitoring program and canister changeout would be considered part of this option's annual operation and maintenance costs.

For this evaluation of economic feasibility, it is assumed that the monthly discharge monitoring program would be modified to include the collection of a sample from the influent, effluent, and from between the lead and lag canisters for laboratory analysis of PFAS. The samples would be analyzed for the WDNR's list of 36 PFAS as described for the other remedial action options.

A cost estimate for this remedial action option, including total present worth costs is included in Table 4 – Cost Estimate, Remedial Action Options. The cost estimate assumes 5 years of annual operation, maintenance, and monitoring for this remedial action option.

5.4 Reverse Osmosis

Reverse osmosis (RO) technologies remove contaminants by passing pressurized water across a semipermeable membrane, separating the influent into a treated water (permeate) and rejected water (concentrate). In this application, the influent is pumped into a vessel containing the membrane using a dedicated high-pressure pump. The permeate would be discharged to Outfall 001, and the concentrate would be transferred to a storage tank for offsite disposal. A monitoring program would be implemented to measure concentrations in the influent and effluent. Periodic coordination for disposal of the concentrate would also be required.

The EPA's TDB indicates that RO technology has been found to be effective, achieving PFAS removal of greater than 99 percent. As previously noted, the EPA TDB focuses on technology usage for drinking water. The ITRC guidance document states that "Membranes are highly susceptible to fouling (loss of production capacity) because some accumulated material cannot be removed from the membrane surface. Therefore, effective pretreatment to remove suspended solids is a necessity for any RO system. Pretreatment technologies would be specific to the RO feedwater quality." RO is often employed with ultrafiltration as a pretreatment strategy. The ITRC guidance document also indicates that RO has been used in bench-scale and pilot plants, but there is no reference to full-scale applications in non-drinking water applications. Lastly, the need for a high-pressure pump and the generation of a concentrate that requires subsequent disposal are also listed by ITRC as limitations. Based on these factors, RO was not retained for further evaluation as a remedial action option.

6.0 INTERIM ACTION OPTIONS EVALUATION

The results of the PFAS sampling event may require treatment of the effluent before a remedial action option is approved by WDNR. In addition, although the City of Appleton has not developed discharge limits for PFAS, discharge of groundwater from the groundwater collection system to the sanitary sewer system may be suspended by the City of Appleton as a precautionary measure. At WDNR's request, this remedial action options evaluation also included the identification and evaluation of interim action options to allow the continued collection of groundwater by the existing system while the selected PFAS remedial action option is implemented. This evaluation assumes that an interim action option would be implemented for a 6-month period.

Terracon identified likely interim action options in accordance with NR 708.11, WAC, by consulting with its National PFAS Practice Resource Group, contacting qualified treatment technology vendors, and reviewing the ITRC guidance document and EPA TDB. As noted in the earlier discussion regarding the identification of remedial action options, PFAS is an emerging contaminant, with few established treatment technologies. Terracon identified the following interim action options:

- No Action;
- Transport of effluent to an offsite facility for treatment and disposal; and
- Installation of a temporary treatment system.

The interim action options were evaluated in accordance with NR 708.11, WAC, and the economic feasibility criteria established in NR 722.07(4)(b), WAC.

6.1 No Action

This interim action option would consist of continuing to operate the existing groundwater collection and treatment system without PFAS treatment. This interim action could be implemented to provide additional PFAS monitoring data to determine whether a remedial action option other than 'no action' is needed. The City of Appleton or WDNR has not yet established discharge limits for PFAS, but one or both stakeholders may determine that it would be beneficial in the long term to reduce the concentration of PFAS being discharged. In the absence of a discharge limit, this option could be used while the design, funding, and implementation of a remedial action option other than 'no action' is completed.

Interim Action Selection Criteria (NR 708.11, WAC): This remedial action option would not remove PFAS from the groundwater collection and treatment system influent. The feasibility of this interim action option would be based on whether discharge of PFAS to the City of Appleton sewer system would protect public health, safety, and welfare, and the environment over time. Based on discussions with the City of Appleton, discharge limits have not been established for PFAS, and there are no plans to adopt discharge limits in the near term. The WDNR has not yet adopted discharge limits for POTWs. The absence of discharge limits suggests that a 'no action' remedial action option may be feasible in the short term, while additional PFAS effluent concentration data is collected.

Since discharge limits have not been established, this option could be considered in compliance with state and federal public health standards. Because a 'no action' remedial action option would be similar to the current operation of the groundwater collection and treatment system, changes to the Cooperative Agreement between the City of Appleton and the WDNR should not be needed.

This interim action option would not employ recycling or treatment; however, the use of a 'no action' option would meet the intent of this criteria in reducing waste generation.

A 'no action' interim action would be consistent with any of the proposed remedial action options, if the groundwater collection and treatment system discharge monitoring program was modified to include PFAS as an analytical parameter. This modification would provide data to evaluate design of the selected remedial action option, or future selection of a remedial action option if the discharge monitoring program identified an increase in PFAS concentrations in the effluent and indicate that 'no action' may no longer be feasible.

Economic Feasibility (NR 722.07(4)(b)): This interim action option would not require capital or initial costs. It is likely that this remedial action option would require implementation of a modified discharge monitoring program to evaluate its continued feasibility. For this evaluation of economic feasibility, it is assumed that the monthly discharge monitoring program would be modified to include the collection of a sample from the influent from Manholes 1 and 2 and the effluent for laboratory analysis of PFAS for a 6-month period. The samples would be analyzed for the WDNR's list of 36 PFAS as described for the remedial action options

A cost estimate for this interim action option, is included in Table 5 – Cost Estimate, Interim Action Options. Because the duration of this interim action option is assumed to be 6 months, costs are considered total present worth costs.

6.2 Offsite Treatment

This interim action option would consist of ceasing the discharge of water from the groundwater collection and treatment system. Water would be allowed to accumulate in the equalization tank, and when a sufficient volume is accumulated, a contracted waste disposal vendor would be contacted to pump the tank contents into a tanker truck for transport to a licensed disposal facility. Observations of the groundwater collection and treatment system indicate that some days may generate an insufficient volume of water for disposal, while other days may require multiple tanker trucks. Based on an average pumping rate of 3,000 gallons per day, it is assumed that an average daily disposal of one tanker truck of water would be required.

Selection of a disposal facility would be dependent on the concentration of PFAS in the accumulated water. As with many aspects of PFAS, disposal practices are evolving. EPA has not yet promulgated regulations regarding the management of waste containing PFAS. The WDNR's PFAS Technical Advisory Group has reviewed disposal options through its Waste Management Subgroup. Based on the most recent information from this subgroup, found in a November 7, 2019, presentation, research into best management practices for PFAS-containing waste is ongoing. For the purpose of this proposal, Terracon contacted Clean Harbors for disposal options and pricing. This evaluation assumes the water would be transported to the Clean Harbors facility in Sarnia, Ontario, for disposal via incineration.

Interim Action Selection Criteria (NR 708.11, WAC): This remedial action option would remove PFAS from the groundwater collection and treatment system influent. The feasibility of this interim action option would be based on whether a suitable disposal facility could be identified. Because PFAS-containing effluent would not be discharged to the City of Appleton sewer system, this interim action option would protect public health, safety, and welfare, and the environment onsite. However, the distance and frequency of hauling the water to an offsite disposal facility carries potential risk.

The disposal facility would be selected by completing a waste stream profile and (if needed) laboratory analysis to characterize the waste stream for offsite disposal. Analytical testing, waste characterization, transportation and disposal would be completed in compliance with state and federal public health standards. Logistics associated with the transfer of water from the equalization tank to tanker trucks would need to be evaluated and established to limit interference with the City of Appleton's use of the building under the Cooperative Agreement between the City of Appleton and the WDNR. The City of Appleton should be informed of the system modifications. The daily inspection checklist used by City of Appleton staff should be modified to include inspection of the temporary treatment system and associated transfer lines.

This interim action option would employ recycling or treatment, reducing the concentration of PFAS in the water. However, this interim action option would require daily hauling of water to the disposal facility, resulting in a larger carbon footprint than onsite options.

This interim action would be consistent with any of the proposed remedial action options, as it would eliminate the discharge of PFAS-contaminated effluent to the City of Appleton sewer system. This option assumes that additional water sampling would not be needed after completion of the initial waste profile testing.

Economic Feasibility (NR 722.07(4)(b)): This interim action option would not require capital costs. Initial costs would include waste profile sampling and analysis and disposal facility profile fees. This interim action options assumes that 3,000 gallons of accumulated water would be hauled to the disposal facility on a daily basis for 6 months.

A cost estimate for this interim action option, is included in Table 5 – Cost Estimate, Interim Action Options. Because the duration of this interim action option is assumed to be 6 months, costs are considered total present worth costs.

6.3 Temporary Treatment System

This interim action option would consist of installing a temporary water treatment system. The temporary water treatment system would be rented from a qualified vendor and installed at the site. Based on the remedial action options evaluation and an initial review of the available influent data with a remediation vendor, the temporary water treatment system would utilize GAC, with all of the necessary pumps, valves, and controls as a self-contained 'skid-mounted' unit. Water would be pumped from the equalization tank to the temporary water treatment system, treated, and discharged to Outfall 001. The groundwater collection and treatment system monitoring would be modified to include collection of samples from the temporary water treatment system to evaluate treatment efficiency, compliance with stakeholder-established discharge limits, and guide system maintenance decisions. Information describing a typical system is included in Appendix C. The dimensions of the proposed temporary treatment system trailer are approximately 16 feet long by 8 feet wide. There is insufficient room inside the building for the trailer. The trailer would likely need to be located along the east side of the building, inside the fence. Winterization of the system and conveyance hoses would be necessary if the system operated during the winter months.

Interim Action Selection Criteria (NR 708.11, WAC): This remedial action option would remove PFAS from the groundwater collection and treatment system influent. The feasibility of this interim action option would be based on whether a suitable location for the system that is acceptable to the City of Appleton can be found. Because the influent would be treated to remove PFAS, this interim action option would protect public health, safety, and welfare, and the environment.

Operation of a temporary water treatment system would be consistent with the current discharge approval from the City of Appleton. Contaminated media from the temporary water treatment system would be completed in compliance with state and federal public health standards. The temporary treatment system could likely be placed in an area of the site that would limit interference with the City of Appleton's use of the building under the Cooperative Agreement between the City of Appleton and the WDNR.

This interim action option would employ recycling or treatment, reducing the concentration of PFAS in the water.

This interim action would be consistent with any of the proposed remedial action options, as it would eliminate the discharge of PFAS-contaminated effluent to the City of Appleton sewer system. Because the groundwater collection and treatment system monitoring would be modified to include collection of samples from the temporary water treatment system for PFAS analysis, this interim action option would produce additional data to further evaluate the remedial action options. In addition, performance of the temporary groundwater treatment system could be used to evaluate whether GAC would be effective as a remedial action option.

Economic Feasibility (NR 722.07(4)(b)): This interim action option would not require capital costs, as the entire temporary water treatment system would be rented, and returned to the vendor at the end of the interim action. Initial costs may include supplemental sampling and analysis of the influent to assist the vendor in configuring the system. Because the temporary water treatment system would be parked outdoors, additional costs for winterization would be incurred if this option was implemented during winter months. This interim action options assumes that the temporary groundwater treatment system and associated monitoring program would operate for 6 months.

A cost estimate for this interim action option, is included in Table 5 – Cost Estimate, Interim Action Options. Because the duration of this interim action option is assumed to be 6 months, costs are considered total present worth costs.

7.0 CONCLUSIONS AND RECOMMENDATIONS

In accordance with the WDNR's request, Terracon identified and evaluated remedial action options and interim action options for managing effluent from the existing groundwater collection and treatment system. The intent of this evaluation was to identify a suitable remedial action option to address PFAS in the effluent, if detected during the upcoming PFAS groundwater monitoring program. The evaluation also considered interim action options that could be utilized if effluent treatment is needed while the selected remedial action option is implemented.

7.1 Remedial Action Options

Terracon identified the following remedial action options for treating the groundwater collection system influent:

- No Action;
- Influent treatment with granular activated carbon;
- Influent treatment with ion exchange resin; and
- Influent treatment by reverse osmosis

Each of the identified remedial action options were evaluated in accordance with NR 722.07(4), WAC. PFAS data is not yet available for the groundwater or groundwater collection and treatment system influent. This evaluation assumed that PFAS influent concentrations will be within a range that is treatable by the listed options.

Based on the remedial action evaluation, RO was eliminated from further consideration. In the absence of PFAS discharge limits from the City of Appleton or the WDNR, the 'no action' remedial action option is considered feasible based on technical and economic criteria. However, PFAS is considered to be an emerging contaminant by the WDNR and the EPA, and discharge to the City of Appleton sewer system may not be an attractive option for the project stakeholders. Of the remaining remedial action options, GAC treatment is considered to be the most feasible based on technical and economic criteria.

7.2 Interim Action Options

Terracon identified the following interim action options:

- No Action;
- Transport of effluent to an offsite facility for treatment and disposal; and
- Installation of a temporary treatment system.

The interim action options were evaluated in accordance with NR 708.11, WAC, and the economic feasibility criteria established in NR 722.07(4)(b), WAC

As with the remedial action evaluation, the 'no action' remedial action option was considered feasible based on technical and economic criteria. While this option may not be attractive to project stakeholders in the long term, it offers short-term advantages. The costs associated with implementing an interim action or remedial action other than 'no action' are high. The need to park a temporary water treatment system outdoors would increase costs in the winter and may lead to operational issues. Consequently, implementing 'no action' as an interim action with modification to the groundwater collection and treatment system monitoring program would allow confirmation of the PFAS groundwater monitoring program results prior to proceeding with the expense of designing and implementing more aggressive actions. If this option is not considered attractive by the project stakeholders, use of a temporary treatment system is considered to be the most feasible based on interim action and economic criteria. This interim action would provide additional PFAS data for the groundwater collection and treatment system effluent, and would serve as a field test of influent treatment. Offsite treatment of PFAS-contaminated water from the groundwater collection and treatment system is not likely economically feasible based on current disposal technologies.

7.3 Recommendations

Terracon recommends ‘no action’ as an interim action with modification to the groundwater collection and treatment system monitoring program. If this is not acceptable to the project stakeholders, use of a temporary treatment system is recommended as an alternative, which would require preparation of a Scope of Work to solicit specific costs, based on the PFAS data.

If the PFAS groundwater monitoring program results and the results of the interim action monitoring program indicate that PFAS treatment of the effluent is warranted, Terracon recommends the use of GAC treatment as a remedial action option. Terracon recommends the preparation of a remedial design report in accordance with NR 724, WAC. Initiation of the design process should not begin until receipt of the PFAS groundwater sampling program results, as implementation and design will be influence by the PFAS sampling results.

8.0 GENERAL COMMENTS

The analysis and opinions expressed in this report are based upon data obtained from the system operation and maintenance activities and laboratory chemical analyses at the indicated locations or from other information discussed in this report. This report does not reflect variations in subsurface stratigraphy, hydrogeology, and contaminant distribution that may occur across the site. Actual subsurface conditions may vary and may not become evident without further assessment.

This report was prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted environmental engineering practices. No warranties, express or implied are intended or made. In the event any changes in the nature or location of suspected sources of contamination as outlined in this report are observed, the conclusions and recommendations contained in this report shall not be valid unless these changes are reviewed and the opinions of this report are modified or verified in writing by Terracon.

9.0 CERTIFICATIONS

I, Edmund A. Buc, P.E., hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

E-32096
Signature and P.E. number

Project Engineer
Title

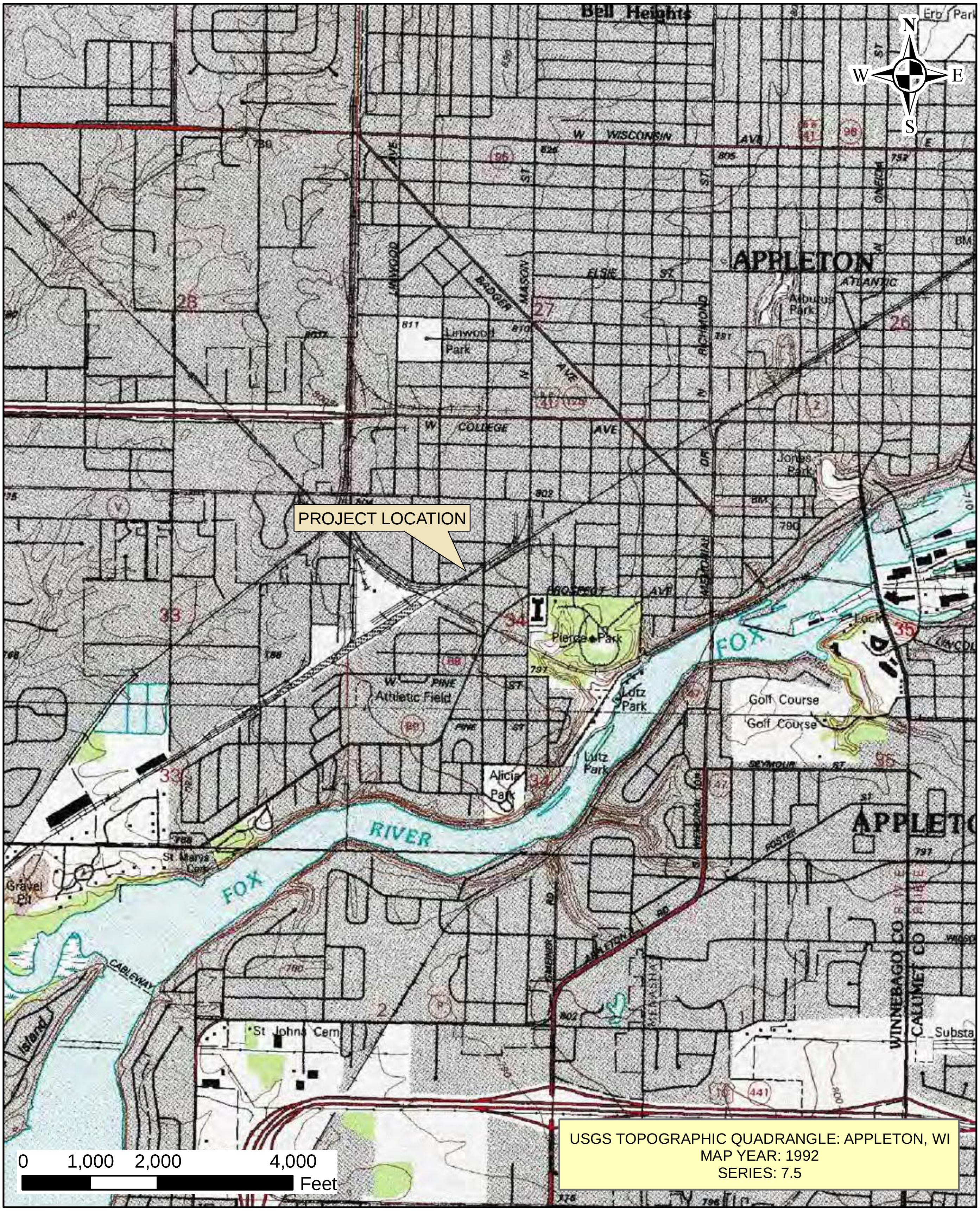
I, Scott A. Hodgson, P.G., hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03 (1), Wis. Adm. Code, am registered in accordance with the requirements of ch. GHSS 2, Wis. Adm. Code, or licensed in accordance with the requirements of ch. GHSS 3, Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

PG-1229 Date 9/21/2020
Signature and P.G. number

Project Geologist
Title

APPENDIX A

FIGURES 1 to 3



Project Mngr:	PAL
Drawn By:	LES
Checked By:	PAL
Project No:	58117057
Date:	03/21/2012

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(414) 423 0255 (414) 423 0566

SITE LOCATION MAP

N.W. MAUTHE SITE
725 SOUTH OUTAGAMIE STREET

APPLETON WISCONSIN

FIGURE
1

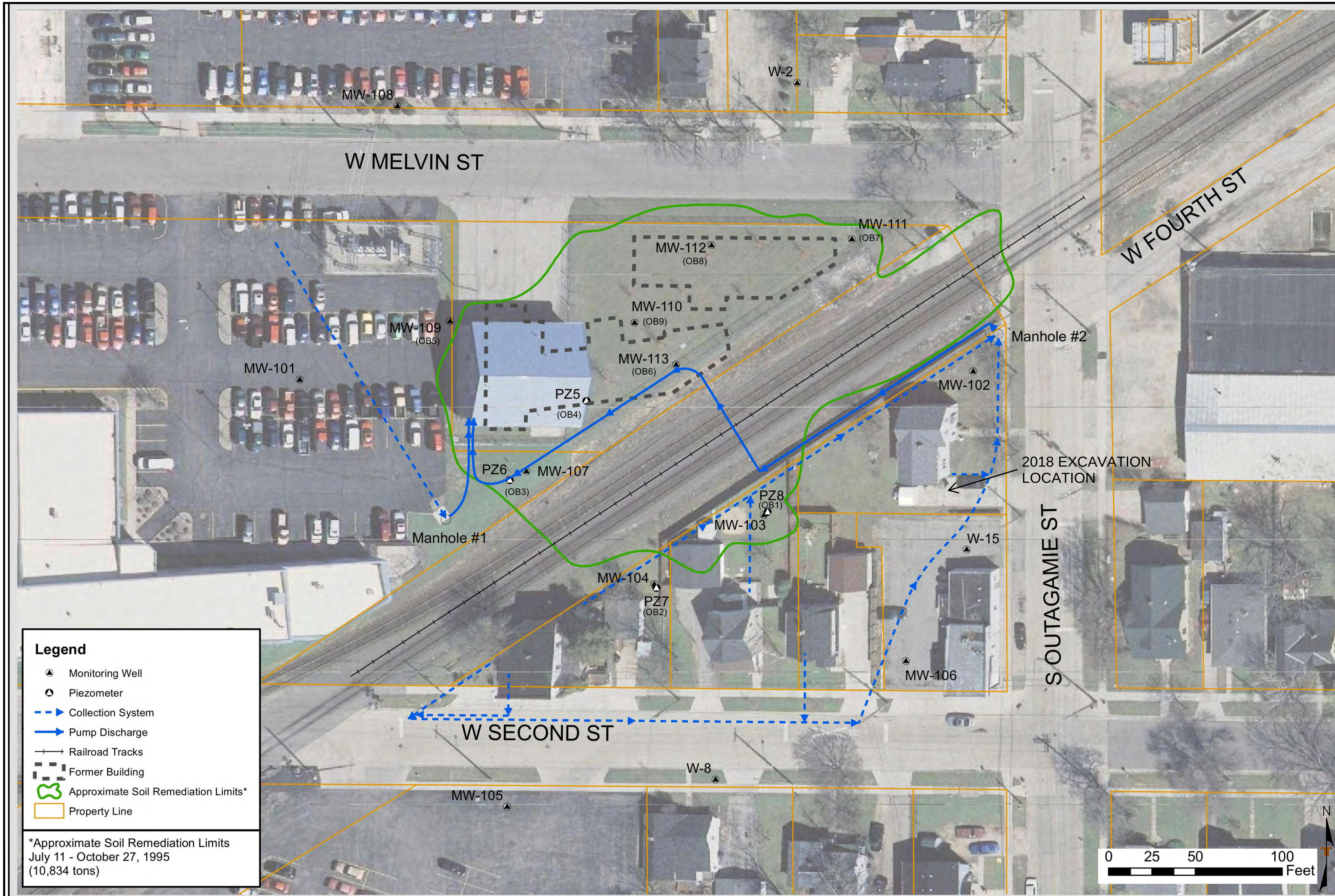

FIGURE 2

SITE DETAIL MAP

N.W. MAUTHE SITE
725 SOUTH OUTAGAMIE STREET
APPLETON WISCONSIN

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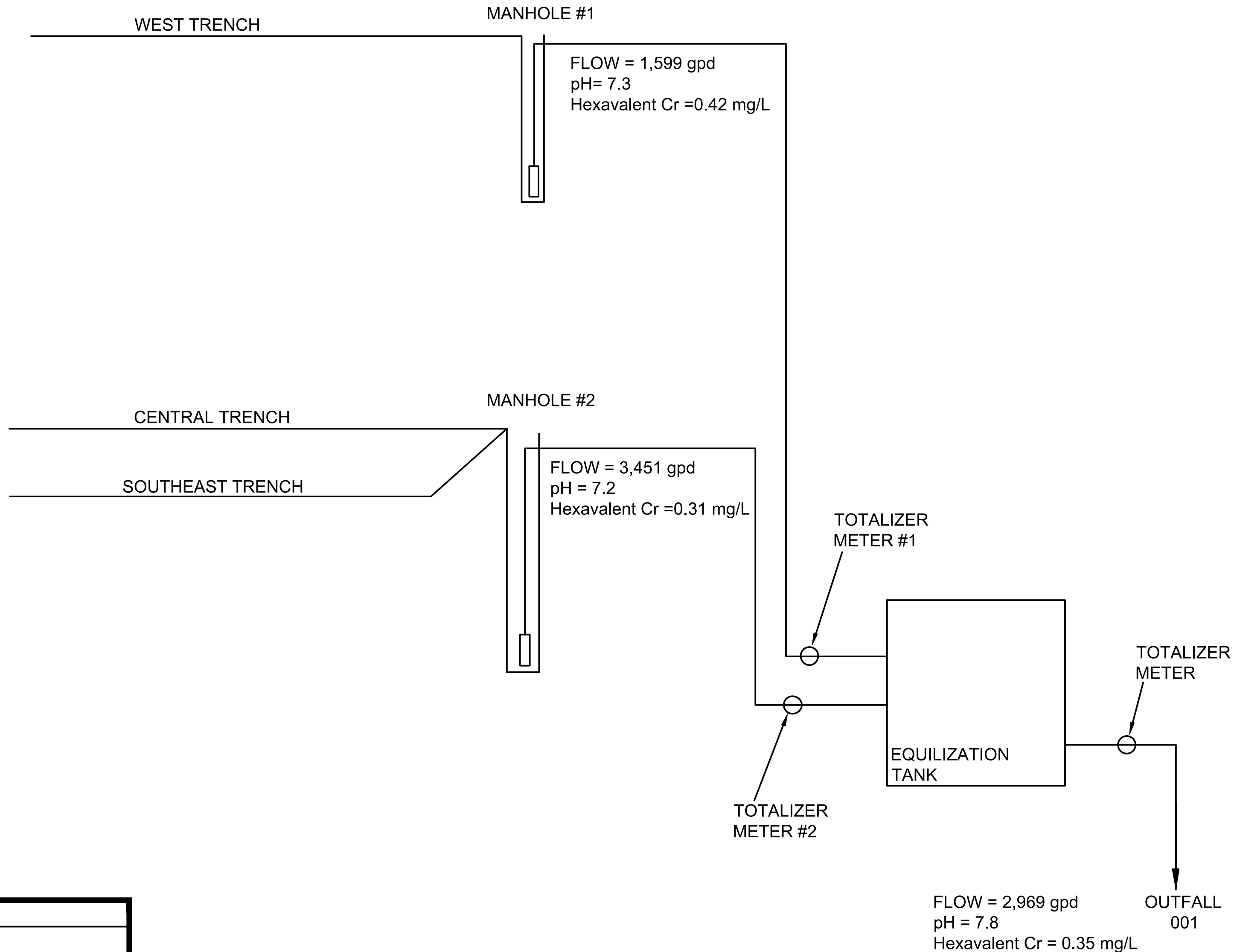
Project Mngr:	PAL	Project No.	58117057
Drawn By:	LES	Scale:	As Shown
Checked By:	PAL	File No.	58117057 MW Location Map.dwg
Approved By:	PAL	Date:	03/20/2012

Note: Figure taken from Omni Site Detail Map, January 2011



LEGEND

gpd = GALLONS PER DAY
mg/L = MILLIGRAMS PER LITER
Cr = CHROMIUM

VALUES ARE AVERAGES BASED ON SYSTEM DATA COLLECTED BETWEEN NOVEMBER 2018 AND OCTOBER 2019

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr:	SAH	Project No.	58117057
Drawn By:	JLM (41)	Scale:	NOT TO SCALE
Checked By:	EAB	File No.	58117057C1
Approved By:	BRS	Date:	9/2020

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PROCESS FLOW DIAGRAM

N.W. MAUTHE SITE
725 SOUTH OUTAGAMIE STREET
APPLETON, WISCONSIN

FIGURE 3

APPENDIX B

TABLES 1 to 5

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
09/25/07		8,290,363											
	10/01/07	*8,300,685*											
10/01/07		8,301,251	10,888										
10/02/07		8,301,251	0		7.7								
10/15/07		8,324,675	23,424										
10/16/07		8,324,675	0		7.4	1.700			6.93	3.9		7.30	0.60
10/22/07		8,355,957	31,282										
10/23/07		8,355,957	0		7.5	1.500			7.04	3.75		NA	NA
10/29/07		8,370,413	14,456	**October**									
10/30/07		8,370,413	0	**71,891**	7.4	1.900			NA	NA		NA	NA
	11/01/07	*8,372,575*											
11/05/07		8,377,912	7,499										
11/06/07		8,377,912	0	**November**	8.3	1.900	1.300		7.8	4.30		8.2	0.18
11/16/07		8,386,583	8,671	**21,587**									
	12/01/07	*8,394,162*											
12/03/07		8,395,372	8,789										
12/04/07		8,395,372	0		8.6	3.100	2.500		8.4	4.60		8.6	0.16
12/12/07		8,399,522	4,150	**December**									
12/21/07		8,402,508	2,986	**25,977**									
	01/01/08	*8,420,139*											
01/01/08		8,420,868	18,360										
01/02/08		8,420,868	0		8.7	1.300	1.200		8.4	4.50		8.7	0.62
01/02/08		8,421,628	760										
01/10/08		8,459,333	37,705										
01/15/08		8,479,244	19,911	**January**									
01/25/08		8,497,063	17,819	**84,612**									
	02/01/08	*8,504,750*											
02/01/08		8,505,562	8,499										
02/03/08		8,507,408	1,846	**February**									
02/04/08		8,507,408	0	**22,861**	8.9	1.700	1.600		8.7	2.60		8.8	0.70
	03/01/08	*8,527,611*											
03/02/08		8,528,931	21,523	**March**	9.0	2.9	2.500		8.7	3.60		8.8	2.50
03/31/08		8,653,211	124,280	**128,713**									
	04/01/08	*8,656,324*											
04/01/08		8,657,629	4,418		9.0	1.6	1.530		8.7	1.60		8.9	1.45
04/01/08		8,661,298	3,669										
04/04/08		8,682,788	21,490										
04/07/08		8,697,084	14,296										
04/08/08		8,697,084	0		9.1	0.063			8.7	1.40		8.9	0.54
04/14/08		8,790,128	93,044										
04/15/08		8,790,128	0		9.1	0.36			8.7	0.90		8.8	0.17
04/15/08		8,797,710	7,582					Installed			Installed		
04/16/08		8,804,525	6,815					1,074			2,804		
04/16/08		8,806,972	2,447					1,589			3,661		
04/21/08		8,826,834	19,862					5,176			11,176		
04/22/08		8,826,834	0		9.1	0.87		5,649	8.8	0.95	12,292	8.9	0.55
04/28/08		8,860,276	33,442	**April**				13,291			36,802		
04/29/08		8,860,276	0	**212,193**	9.1	0.51		14,721	8.8	0.96	40,534	9.1	0.43
	05/01/08	*8,868,517*											
05/05/08		8,890,994	30,718					22,372			59,203		
05/06/08		8,890,994	0		9.1	0.95	0.679	22,844	8.7	1.14	60,259	8.8	0.62
05/12/08		8,907,573	16,579					28,018			70,853		
05/13/08		8,907,573	0		9.2	0.69		28,487	8.8	1.00	71,555	9.0	0.34
05/19/08		8,920,045	12,472					32,756			79,328		
05/20/08		8,920,045	0		9.1	0.74		33,225	8.8	0.96	80,376	8.9	0.27
05/26/08		8,929,582	9,537	**May**				36,557			85,277		
05/27/08		8,929,582	0	**66,866**	9.0	0.60		37,025	8.9	1.04	85,979	8.9	0.16
	06/01/08	*8,935,384*											

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
06/02/08		8,936,965	7,383					39,411			90,202		
06/03/08		8,936,965	0		9.3	0.90	0.824	39,876	9.0	1.06	90,901	9.0	0.54
06/09/08		8,951,078	14,113					43,187			101,102		
06/10/08		8,951,078	0		9.2	0.85		44,118	9.0	1.53	106,505	9.0	0.38
06/11/08		8,960,258	9,180					45,176			112,396		
06/16/08		8,999,813	39,555					52,865			140,673		
06/16/08		8,999,813	0					52,865			141,398		
06/17/08		8,999,813	0		9.2	1.4		53,808	9.1	3.40	143,560	9.1	0.33
06/18/08		9,007,718	7,905					54,790			146,825		
06/23/08		9,016,923	9,205					57,605			153,557		
06/24/08		9,016,923	0		9.3	0.20		58,074	9.1	2.50	154,613	9.0	0.14
06/30/08		9,026,850	9,927	**June**				61,392			160,227		
06/30/08		9,026,850	0	**91,466**				61,392			160,573		
	07/01/08	*9,026,850*											
07/01/08		9,026,850	0		9.3	1.4	1.290	61,861	9.0	2.45	161,266	9.1	0.58
07/07/08		9,035,952	9,102					64,701			166,481		
07/08/08		9,035,952	0		9.4	1.2		65,168	9.1	1.90	167,518	9.2	1.05
07/10/08		9,041,071	5,119					66,138			170,315		
07/14/08		9,054,932	13,861					68,973			182,057		
07/15/08		9,054,932	0		9.4	0.82		69,444	9.0	1.80	184,517	9.2	0.54
07/21/08		9,083,663	28,731					74,198			206,929		
07/22/08		9,083,663	0		9.4	0.74		75,898	9.2	2.52	211,453	9.2	0.31
07/25/08		9,114,297	30,634					81,242			230,374		
07/28/08		9,121,075	6,778					83,136			235,668		
07/29/08		9,121,075	0		7.4	0.70		83,609	7.2	3.30	237,073	7.2	0.30
07/29/08		9,123,409	2,334	**July**				83,646			237,455		
	08/01/08	*9,127,730*		**100,880**									
08/04/08		9,137,140	13,731					87,426			248,221		
08/05/08		9,137,140	0		7.6	1.30	1.260	87,426	7.2	2.72	250,342	7.2	0.41
08/05/08		9,141,581	4,441					87,938			252,120		
08/09/08		9,151,886	10,305					90,785			260,213		
08/11/08		9,154,723	2,837					91,732			262,298		
08/12/08		9,154,723	0		7.5	1.2		92,206	7.2	2.45	263,337	7.3	0.25
08/13/08		9,157,388	2,665					92,710			264,058		
08/18/08		9,162,704	5,316					94,604			267,897		
08/19/08		9,162,704	0		7.5	0.98		95,077	7.2	2.08	268,595	7.2	0.20
08/19/08		9,163,932	1,228					95,106			268,623		
08/21/08		9,166,109	2,177					96,049			270,020		
08/24/08		9,168,274	2,165					96,993			271,417		
08/26/08		9,168,274	0	**August**	7.5	1.1		97,465	7.1	2.25	272,112	7.1	0.22
	09/01/08	*9,173,323*		**45,593**									
09/01/08		9,173,586	5,312					99,390			274,587		
09/02/08		9,173,586	0		7.6	1.4	1.290	99,863	7.3	2.50	274,936	7.3	0.21
09/02/08		9,174,445	859					99,894			274,962		
09/06/08		9,176,960	2,515					100,837			276,718		
09/08/08		9,176,960	0		7.5	1.3		101,310	7.2	2.25	277,071	7.3	0.16
09/15/08		9,182,218	5,258					103,257			279,911		
09/16/08		9,182,218	0		7.6	1.3		103,731	7.3	2.60	280,611	7.6	0.37
09/18/08		9,185,245	3,027					104,715			281,689		
09/22/08		9,187,538	2,293					105,663			283,095		
09/23/08		9,187,538	0		7.5	1.6		106,137	7.3	3.05	283,475	7.5	0.17
09/28/08		9,191,553	4,015					107,560			285,589		
09/30/08		9,191,553	0	**September**	7.6	1.8		108,035	7.4	3.70	285,942	7.4	0.18
	10/01/08	*9,192,867*		**19,545**									

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
10/05/08		9,195,280	3,727					109,500			287,383		
10/07/08		9,195,280	0		7.7	2.2	2.000	109,975	7.4	4.38	288,093	7.8	0.12
10/07/08		9,196,521	1,241					110,012			288,124		
10/10/08		9,200,017	3,496					110,965			290,943		
10/12/08		9,200,017	0					111,919			291,644		
10/14/08		9,200,017	0		7.8	1.9		112,396	7.5	3.48	292,698	7.8	0.27
10/16/08		9,204,404	4,387					112,906			293,436		
10/18/08		9,206,201	1,797					113,861			294,504		
10/21/08		9,206,201	0		7.8			114,337	7.5	4.02	295,563	7.9	0.28
10/22/08		9,208,980	2,779					114,848			296,250		
10/26/08		9,211,601	2,621					116,279			297,676		
10/28/08		9,211,601	0	**October**	7.9	2.0		116,756	7.7	3.96	298,743	8.2	0.26
	11/01/08	*9,214,938*		**22,071**									
11/01/08		9,215,379	3,778					117,743			300,201		
11/04/08		9,215,379	0		8.0	2.1	1.880	118,698	7.7	4.32	301,273	8.1	0.20
11/04/08		9,217,467	2,088					118,732			301,305		
11/07/08		9,219,330	1,863					119,685			302,376		
11/10/08		9,220,422	1,092					120,162			303,090		
11/20/08		9,229,031	8,609					123,506			309,112		
11/24/08		9,231,935	2,904					124,939			310,833		
11/24/08		9,232,260	325					124,939			311,189		
11/26/08		9,233,464	1,204					125,702			311,660		
11/28/08		9,234,926	1,462	**November**				126,192			312,744		
	12/01/08	*9,234,926*		**19,988**									
12/02/08		9,234,926	0		8.2	2.3	2.190	127,656	7.8	3.57	314,118	8.3	0.18
12/12/08		9,242,670	7,744					130,122			316,912		
12/17/08		9,247,587	4,917	**December**				131,563			320,808		
	01/01/09	*9,266,230*		**31,304**									
01/02/09		9,268,140	20,553					136,435			338,229		
01/06/09		9,268,140	0		7.8	2.5	2.430	137,894	7.7	4.48	341,351	7.8	1.05
01/12/09		9,277,419	9,279	**January**				139,384			344,897		
	02/01/09	*9,287,182*		**20,952**									
02/01/09		9,287,326	9,907					143,256			351,798		
02/03/09		9,287,326	0		7.8	3.3	2.900	143,738	7.9	4.69	352,143	8.2	0.34
02/05/09		9,288,848	1,522	**February**				143,772			352,912		
	03/01/09	*9,334,332*		**47,151**									
03/01/09		9,335,249	46,401					153,077			393,568		
03/03/09		9,335,249	0		7.6	2.4	1.970	153,561	7.9	4.24	394,973	8.2	0.87
03/11/09		9,355,734	20,485					156,519			412,282		
03/30/09		9,463,572	107,838					182,357			500,471		
03/31/09		9,463,572	0	**March**				183,323			501,935		
	04/01/09	*9,467,680*		**133,348**									
04/01/09		9,469,538	5,966					184,290			504,856		
04/03/09		9,478,305	8,767					187,194			511,375		
04/06/09		9,485,542	7,237					189,607			516,807		
04/07/09		9,485,542	0		7.7	0.84	0.730	190,569	7.9	1.14	518,251	8.1	0.52
04/13/09		9,498,358	12,816					194,432			525,799		
04/14/09		9,498,358	0		7.7	0.59		194,908	8.0	1.20	525,799	8.2	0.27
04/20/09		9,507,740	9,382					198,262			532,295		
04/21/09		9,507,740	0		7.8	1.0		198,262	8.0	0.96	533,364	8.3	1.74
04/27/09		9,545,303	37,563					208,646			561,846		
04/28/09		9,545,303	0		8.0	1.2		210,663	7.7	1.89	566,157	7.5	0.28

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	**Date For Linear Interpolation**	**Metered Discharge Reading (gallons)**	**Gallons Discharged Between Meter Reading**	**Monthly Discharge (gallons)**	**pH**	**Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]**	**Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]**	**Flow Totalizer #1 Reading (gallons)**	**pH**	**Hexavalent Chromium Hach Test Kit (mg/L)**	**Flow Totalizer #2 Reading (gallons)**	**pH**	**Hexavalent Chromium Hach Test Kit (mg/L)**
	05/01/09	*9,568,209*		**April**									
05/01/09		9,574,025	28,722	**100,528**				217,567			582,471		
05/04/09		9,582,624	8,599					220,929			588,270		
05/05/09		9,582,624	0		7.6	0.76	0.724	221,884	8.0	1.29	589,714	8.0	0.33
05/11/09		9,599,171	16,547					227,170			599,566		
05/12/09		9,599,171	0		8.0	0.89		228,124	7.6	0.84	600,996	7.9	0.24
05/18/09		9,613,720	14,549					232,921			609,305		
05/19/09		9,613,720	0		7.4	0.79		233,874	7.0	0.84	610,378	7.2	0.38
05/19/09		9,615,798	2,078					233,908			610,421		
05/19/09		9,616,122	324					233,908			610,775		
05/25/09		9,624,219	8,097					237,697			615,786		
05/26/09		9,624,219	0		7.3	0.58		238,168	7.1	1.08	616,149	7.0	0.16
	06/01/09	*9,650,519*		**May**									
06/01/09		9,652,323	28,104	**82,310**				245,914			637,378		
06/02/09		9,652,323	0		7.3	0.23	0.648	246,871	6.9	1.05	638,835	7.2	0.26
06/03/09		9,658,104	5,781					248,350			641,072		
06/15/09		9,701,735	43,631					261,249			674,466		
	07/01/09	*9,727,520*		**June**									
07/01/09		9,727,975	26,240	**77,001**				272,082			691,914		
07/05/09		9,732,032	4,057					273,967			694,431		
07/07/09		9,732,032	0		7.4	0.96	0.878	274,443	7.1	2.20	695,508	7.1	0.20
07/20/09		9,742,289	10,257					278,743			700,527		
	08/01/09	*9,748,231*		**July**									
08/03/09		9,749,397	7,108	**20,712**				282,543			704,414		
08/04/09		9,749,397	0		7.5	1.9	1.680	283,019	7.1	2.80	704,768	7.3	0.14
08/08/09		9,752,139	2,742					284,005			706,115		
08/08/09		9,753,763	1,624					284,480			707,282		
08/09/09		9,757,508	3,745					284,962			710,677		
08/10/09		9,761,572	4,064					285,930			714,131		
08/10/09		9,762,328	756					286,411			714,491		
08/12/09		9,765,851	3,523					287,368			717,355		
08/13/09		9,767,253	1,402					287,846			718,430		
08/17/09		9,771,256	4,003					289,758			720,916		
08/30/09		9,785,737	14,481					295,976			730,538		
	09/01/09	*9,787,043*		**August**									
09/01/09		9,787,352	1,615	**38,811**	7.6	1.6	1.320	296,492	7.1	2.85	731,650	7.4	0.53
09/10/09		9,794,060	6,708					299,850			735,572		
09/21/09		9,800,194	6,134					303,204			738,803		
09/22/09		9,800,194	0					303,684			739,163		
	10/01/09	*9,806,949*		**September**									
10/01/09		9,807,491	7,297	**19,906**				306,569			743,395		
10/05/09		9,811,856	4,365					308,500			746,224		
10/06/09		9,811,856	0		6.9	1.8	1.700	308,983	6.8	2.48	746,576	7.1	0.55
10/15/09		9,827,819	15,963					314,838			757,329		
10/18/09		9,830,464	2,645					316,288			758,757		
	11/01/09	*9,871,202*		**October**									
11/02/09		9,875,106	44,642	**64,253**				329,981			793,417		
11/03/09		9,875,106	0		7.4	1.2	1.150	330,961	7.0	2.60	795,595	7.2	0.46
11/04/09		9,880,551	5,445					331,974			797,084		
11/05/09		9,882,809	2,258					332,950			798,526		
11/11/09		9,891,712	8,903					337,309			803,889		
11/12/09		9,893,927	2,215					338,274			805,324		
11/16/09		9,896,880	2,953					339,720			807,132		
11/17/09		9,897,695	815					340,200			807,495		
11/20/09		9,899,892	2,197					341,164			808,946		
11/30/09		9,914,595	14,703					346,476			819,664		

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
	12/01/09	*9,914,595*		**November**									
12/01/09		9,914,595	0	**43,393**	7.6	1.7	1.500	347,446	7.3	2.25	820,740	7.8	0.67
12/15/09		9,931,024	16,429					354,237			829,781		
12/18/09		9,933,254	2,230					355,200			831,213		
	01/01/10	*9,956,004*		**December**									
01/03/10		9,960,070	26,816	**41,409**				362,443			853,235		
01/05/10		9,960,070	0		6.9	2.3	2.220	362,924	7.2	5.36	855,045	7.2	0.68
01/14/10		9,969,979	9,909					365,847			860,488		
01/18/10		9,972,503	2,524					366,807			862,304		
01/31/10		9,991,034	18,531					370,664			878,832		
	02/01/10	*9,991,034*		**January**									
02/02/10		9,991,034	0	**35,030**	7.4	1.6	1.460	371,145	7.2	4.05	880,637	7.2	0.46
02/03/10		9,994,392	3,358					371,664			881,364		
02/16/10		10,002,996	8,604					374,543			887,937		
02/28/10		10,009,542	6,546					376,928			892,655		
	03/01/10	*10,009,542*		**February**									
03/02/10		10,009,542	0	**18,508**	7.6	1.6	1.340	376,928	7.4	2.70	893,732	7.4	1.41
03/06/10		10,015,341	5,799					377,919			898,085		
03/13/10		10,048,616	33,275					383,764			927,938		
03/17/10		10,065,891	17,275					388,140			942,069		
03/23/10		10,077,601	11,710					392,478			950,481		
03/31/10		10,088,487	10,886					396,786			958,091		
	04/01/10	*10,088,725*		**March**									
04/01/10		10,088,817	330	**79,183**				396,786			958,456		
04/04/10		10,092,465	3,648					398,207			961,014		
04/06/10		10,092,465	0		7.4	1.3	1.180	399,166	7.2	2.00	962,110	7.2	0.20
04/19/10		10,151,166	58,701					416,846			1,005,028		
	05/01/10	*10,189,439*		**April**									
05/03/10		10,196,869	45,703	**100,715**				432,284			1,038,553		
05/04/10		10,196,869	0		7.3	0.98	0.902	433,730	7.1	1.12	1,040,370	7.2	0.37
05/17/10		10,258,463	61,594					453,256			1,083,344		
06/01/10		10,294,510	36,047					466,168			1,109,480		
	06/01/10	*10,294,510*		**May**									
06/01/10		10,294,510	0	**105,071**	7.6	0.85	0.762	467,117	7.2	1.44	1,110,569	7.3	0.28
06/21/10		10,372,589	78,079					488,138			1,171,628		
06/30/10		10,400,340	27,751					495,720			1,193,925		
06/30/10		10,400,889	549					496,193			1,194,286		
	07/01/10	*10,401,954*		**June**									
07/01/10		10,402,536	1,647	**107,444**				496,664			1,195,375		
07/05/10		10,409,431	6,895					499,493			1,200,058		
07/06/10		10,409,431	0		7.3	1.1	0.988	499,963	7.3	1.92	1,200,783	7.5	0.41
07/12/10		10,426,614	17,183					504,247			1,213,873		
07/21/10		10,506,902	80,288					525,545			1,275,358		
07/22/10		10,515,567	8,665					527,488			1,282,668		
07/23/10		10,532,459	16,892					531,679			1,283,332		
	08/01/10	*10,586,662*		**July**									
08/02/10		10,594,781	62,322	**184,709**				549,129			1,283,332		
08/03/10		10,594,781	0		7.8	0.54	0.515	549,601	7.4	1.20	1,283,332	7.5	0.20
08/04/10		10,599,046	4,265					550,588			1,283,332		
08/04/10		10,599,046	0					550,588			1,283,358		
08/04/10		10,599,046	0					550,588			1,283,358		
08/05/10		10,600,937	1,891					551,531			1,284,413		
08/06/10		10,602,372	1,435					552,002			1,285,481		
08/07/10		10,604,242	1,870					552,943			1,286,560		
08/12/10		10,621,705	17,463					558,442			1,299,650		
08/18/10		10,644,322	22,617					565,095			1,317,296		

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
	09/01/10	*10,664,511*		**August**									
09/06/10		10,672,363	28,041	**77,849**				575,879			1,336,978		
09/07/10		10,672,363	0		7.7	0.64	0.588	575,879	7.2	1.28	1,337,698	7.4	0.19
09/09/10		10,675,017	2,654					576,846			1,338,823		
09/09/10		10,675,348	331					576,846			1,339,184		
09/15/10		10,681,923	6,575					579,656			1,343,454		
09/20/10		10,688,747	6,824					582,004			1,348,431		
09/28/10		10,712,898	24,151					588,142			1,368,075		
09/28/10		10,713,225	327					588,142			1,368,432		
	10/01/10	*10,717,803*		**September**									
10/01/10		10,718,374	5,149	**53,291**				590,497			1,371,651		
10/03/10		10,721,339	2,965					591,909			1,373,451		
10/05/10		10,721,339	0		7.6	0.80	0.763	592,849	7.3	1.32	1,374,902	7.5	0.10
10/15/10		10,733,086	11,747					597,097			1,380,767		
10/17/10		10,734,957	1,871					598,030			1,381,848		
10/31/10		10,760,102	25,145					605,549			1,401,547		
	11/01/10	*10,760,102*		**October**									
11/02/10		10,760,102	0	**42,299**	7.8	0.65	0.639	606,486	7.6	1.44	1,403,369	7.9	0.20
11/11/10		10,773,294	13,192					611,203			1,410,005		
11/14/10		10,775,484	2,190					612,137			1,411,471		
11/17/10		10,778,424	2,940					613,539			1,413,301		
11/28/10		10,790,717	12,293					618,231			1,422,421		
	12/01/10	*10,794,632*		**November**									
12/04/10		10,800,013	9,296	**34,530**				622,006			1,428,648		
12/07/10		10,800,013	0		7.6	1.0	0.989	623,423	7.8	1.80	1,430,482	7.9	0.24
12/15/10		10,811,058	11,045					627,228			1,435,313		
12/20/10		10,814,659	3,601					628,621			1,437,887		
12/23/10		10,816,825	2,166					629,558			1,439,358		
	01/01/11	*10,827,569*		**December**									
01/02/11		10,829,348	12,523	**32,938**				632,850			1,449,967		
01/04/11		10,829,348	0		8.0	1.6	1.500	633,803	7.9	5.31	1,452,901	8.0	0.53
01/17/11		10,845,438	16,090					638,076			1,462,175		
01/28/11		10,852,203	6,765					640,437			1,467,352		
01/30/11		10,853,317	1,114					640,910			1,468,093		
	02/01/11	*10,853,317*		**January**									
02/01/11		10,853,317	0	**25,748**	7.9	2.1	2.100	641,382	7.7	4.90	1,468,834	7.6	0.18
02/02/11		10,854,899	1,582					641,426			1,469,273		
02/14/11		10,859,963	5,064					643,318			1,472,988		
02/21/11		10,876,100	16,137					646,167			1,488,233		
02/21/11		10,876,705	605					646,167			1,488,978		
02/24/11		10,880,277	3,572					647,105			1,491,974		
02/27/11		10,883,601	3,324					648,128			1,494,713		
	03/01/11	*10,883,601*		**February**									
03/01/11		10,883,601	0	**30,284**	7.8	1.8	1.530	648,594	7.7	4.95	1,496,572	7.8	0.52
03/21/11		10,957,602	74,001					664,834			1,558,957		
	04/01/11	*11,023,291*		**March**									
04/04/11		11,045,838	88,236	**139,690**				687,442			1,632,177		
04/05/11		11,045,838	0		8.0	0.40	0.380	688,903	7.8	1.10	1,637,351	7.7	0.21
04/16/11		11,138,592	92,754					710,138			1,708,997		
04/26/11		11,216,566	77,974					731,830			1,771,918		
04/29/11		11,258,391	41,825					743,289			1,804,105		
04/29/11		11,262,451	4,060					744,757			1,807,043		
	05/02/11	*11,274,169*		**April**									
05/02/11		11,277,586	15,135	**250,878**				750,559			1,818,009		
05/03/11		11,277,586	0		7.8	0.37	0.338	751,514	7.6	0.68	1,819,601	7.8	0.20
05/16/11		11,310,055	32,469					763,336			1,841,085		
05/17/11		11,311,520	1,465					763,807			1,842,263		

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
	06/01/11	*11,344,383*		**May**									
06/02/11		11,347,664	36,144	**70,214**				778,512			1,868,238		
06/06/11		11,354,057	6,393					781,832			1,872,152		
06/07/11		11,354,057	0		7.7	0.46	0.447	782,305	7.6	0.85	1,872,545	7.7	0.14
06/17/11		11,368,867	14,810					788,961			1,881,915		
06/20/11		11,373,134	4,267					790,860			1,884,626		
	07/01/11	*11,419,112*		**June**									
07/04/11		11,434,679	61,545	**74,729**				811,146			1,932,424		
07/05/11		11,434,679	0		7.9	0.78	0.752	811,621	7.6	1.50	1,933,199	7.5	0.19
07/18/11		11,450,616	15,937					818,915			1,942,544		
07/27/11		11,470,412	19,796					825,753			1,958,375		
07/28/11		11,473,213	2,801					826,666			1,960,688		
	08/01/11	*11,483,192*		**July**									
08/01/11		11,484,004	10,791	**64,080**				830,795			1,968,801		
08/02/11		11,484,004	0		7.9	0.86	0.800	831,711	7.5	1.26	1,970,342	7.5	0.42
08/04/11		11,492,474	8,470					834,025			1,975,014		
08/05/11		11,493,370	896					834,506			1,975,820		
08/15/11		11,509,618	16,248					841,800			1,986,618		
08/31/11		11,524,004	14,386					849,495			1,994,794		
	09/01/11	*11,524,179*		**August**									
09/01/11		11,524,431	427	**40,987**				849,948			1,994,794		
09/03/11								850,953			1,997,262		
09/05/11		11,533,935	9,504					852,322			2,003,014		
09/06/11		11,533,935	0		8.0	1.2	1.180	852,778	7.7	1.65	2,004,161	7.7	0.55
09/08/11		11,538,054	4,119					854,174			2,005,726		
09/19/11		11,547,336	9,282					859,158			2,011,134		
09/20/11		11,548,416	1,080					859,611			2,011,902		
09/28/11		11,562,993	14,577					863,696			2,024,247		
	10/01/11	*11,568,104*		**September**									
10/03/11		11,572,412	9,419	**43,925**				867,344			2,031,123		
10/04/11		11,574,566	2,154					868,253			2,032,650		
10/05/11		11,574,566	0					868,707			2,033,029		
10/06/11		11,574,566	0					869,161			2,033,785		
10/08/11		11,579,097	4,531					870,519			2,036,082		
10/10/11		11,579,097	0		7.5	1.2	1.090	870,972	7.4	2.15	2,036,082	7.5	0.22
10/26/11		11,603,315	24,218					879,056			2,054,141		
10/30/11		11,606,358	3,043					880,416			2,055,759		
	11/01/11	*11,607,509*		**October**			**Pounds Cr**						
11/01/11		11,608,102	1,744	**39,405**			**0.358**	881,323			2,055,759		
11/02/11		11,608,233	131					881,362			2,055,792		
11/03/11		11,608,233	0		8.2	1.3	1.220	881,378	8.1	2.46	2,055,818	8.0	0.03
11/05/11		11,611,395	3,162					882,340			2,059,467		
11/06/11		11,614,756	3,361					883,608			2,062,594		
11/07/11		11,616,924	2,168					883,718			2,063,343		
11/08/11		11,618,636	1,712					884,345			2,065,014		
11/12/11		11,651,616	32,980					890,384			2,094,235		
11/15/11		11,662,529	10,913					894,135			2,102,462		
11/23/11		11,677,899	15,370					900,936			2,112,833		
11/29/11		11,687,640	9,741				**Pounds Cr**	905,028			2,119,690		
	12/01/11	*11,689,609*		**November**			**0.834**						
12/01/11		11,687,640	0	**82,100**	7.4	1.7	1.700	905,938	7.8	2.65	2,119,690	8.0	0.72
12/06/11		11,706,691	19,051					910,893			2,134,888		
12/15/11		11,724,224	17,533					918,198			2,147,141		
12/26/11		11,737,368	13,144					924,102			2,155,863		
12/31/11		11,742,107	4,739					926,371			2,158,911		

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
	01/01/12	*11,742,204*		**December**			**Pounds Cr**						
01/04/12		11,744,667	2,560	**52,595**			**0.745**	927,731			2,158,911		
01/05/12		11,744,667	0		6.9	0.98	0.862	928,184	7.5	1.84	2,161,198	7.3	0.27
01/19/12		11,754,619	9,952					932,303			2,166,977		
01/27/12		11,758,987	4,368					934,572			2,169,652		
01/31/12		11,761,124	2,137				**Pounds Cr**	935,480			2,171,180		
	02/01/12	*11,761,228*		**January**			**0.137**						
02/02/12		11,761,124	0	**19,024**	7.4	2.1	1.860	936,191	7.7	2.50	2,172,687	7.7	6.1
02/07/12		11,763,586	2,358					938,043		2.80	2,176,546		1.71
02/22/12		11,778,355	14,769					941,736			2,183,827		
02/24/12		11,780,157	16,571					942,642			2,184,964		
02/28/12		11,782,379	18,793				**Pounds Cr**	943,547			2,186,478		
	03/01/12	*11,783,379*		**February**			**0.329**						
03/01/12		11,782,379	0	**21,255**	7.1	2.6	2.560	944,002	7.3	3.45	2,186,478	7.6	2.04
03/14/12		11,824,851	41,472					956,400			2,221,364		
03/21/12		11,839,925	15,074					962,783			2,231,770		
03/25/12		11,848,965	9,040					965,591			2,239,149		
	04/01/12	*11,865,023*		**March**			**Pounds Cr**						
04/03/12		11,871,806	22,841	**81,644**			**1.740**	973,817			2,256,557		
04/05/12		11,871,806	6,783		7.6	0.83	0.730	975,189	7.9	1.28	2,258,866	7.8	0.48
04/18/12		11,896,899	25,093					984,322			2,273,887		
04/21/12		11,906,449	9,550					986,147			2,282,902		
	05/01/12	*11,923,538*		**April**			**Pounds Cr**						
05/02/12		11,930,935	24,486	**58,515**			**0.356**	996,194			2,300,258		
05/03/12		11,933,848	2,913					997,107			2,302,572		
05/09/12		11,989,964	56,116					1,010,822			2,349,979		
05/14/12		12,005,061	15,097					1,016,338			2,361,277		
05/16/12		12,005,061	0		6.5	0.67	0.581	1,018,169	7.4	0.63	2,363,951	7.6	0.15
05/20/12		12,016,709	11,648					1,021,100			2,368,989		
05/22/12		12,018,570	1,861					1,022,007			2,370,141		
05/24/12		12,021,249	2,679					1,023,245			2,372,066		
05/31/12		12,028,808	7,559					1,027,317			2,378,556		
	06/01/12	*12,029,342*		**May**			**Pounds Cr**						
06/02/12		12,030,994	2,186	**105,804**			**0.512**	1,027,317			2,378,556		
06/05/12		12,033,617	2,623					1,028,676			2,380,101		
06/07/12		12,033,617	0		6.8	0.55	0.507	1,029,581	7.4	0.99	2,381,259	7.7	0.17
06/19/12		12,046,851	13,234					1,034,134			2,389,253		
06/29/12		12,056,747	9,896					1,038,653			2,395,689		
	07/01/12	*12,057,998*		**June**			**Pounds Cr**						
07/03/12		12,059,332	1,334	**28,656**			**0.121**	1,040,009			2,397,210		
07/05/12		12,059,332	0		6.1	0.98	0.906	1,040,913	6.2	1.24	2,397,969	6.6	0.19
07/10/12		12,064,003	4,671					1,042,739			2,402,552		
07/20/12		12,069,263	5,260					1,045,446			2,402,552		
	08/01/12	*12,078,083*		**July**			**Pounds Cr**						
08/01/12		12,078,359	9,096	**20,085**			**0.152**	1,049,510			2,408,561		
08/02/12		12,078,359	0		6.2	1.20	1.120	1,049,969	6.2	1.72	2,408,954	6.0	0.56
08/07/12		12,082,510	4,151					1,051,808			2,410,869		
08/16/12		12,098,108	15,598					1,056,800			2,423,447		
	09/01/12	*12,111,167*		**August**			**Pounds Cr**						
09/01/12		12,111,772	13,664	**33,084**			**0.309**	1,063,135			2,432,088		
09/09/12		12,116,611	4,839					1,065,875			2,434,745		
09/11/12		12,117,783	1,172			1.70	1.520	1,066,747	6.4	0.72	2,435,127	6.3	0.21
09/18/12		12,121,226	3,443					1,068,577			2,437,061		
09/26/12		12,125,024	3,798					1,070,837			2,438,957		

TABLE 1

Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
	10/01/12	*12,126,164*		**September**			**Pounds Cr**						
10/04/12		12,127,304	2,280	**14,997**			**0.190**	1,072,193			2,440,091		
10/04/12		12,127,304	1,140			1.50	1.370	1,072,193	6.4	1.44	2,440,091	6.2	0.32
10/05/12		12,129,085	1,781					1,073,276			2,440,999		
10/09/12		12,129,791	706					1,073,696			2,441,370		
10/19/12		12,163,907	34,116					1,081,043			2,471,345		
10/30/12		12,189,653	25,746					1,092,239			1,289,448		
	11/01/12	*12,191,094*		**October**			**Pounds Cr**						
11/06/12		12,196,769	7,116	**64,930**			**0.741**	1,096,343			2,493,654		
11/09/12		12,198,437	1,668		NA	1.1	1.040	1,097,450	NA	1.34	2,494,750	NA	0.21
11/22/12		12,212,741	14,304					1,103,179			2,504,679		
11/30/12		12,218,011	5,270					1,106,155			2,507,598		
	12/01/12	*12,218,663*		**November**			**Pounds Cr**						
12/03/12		12,219,752	1,089	**27,569**			**0.239**	1,107,006			2,508,689		
12/10/12		12,223,289	3,537		8.0	1.00	1.100	1,109,121	7.7	1.60	2,510,506	8.0	0.27
12/26/12		12,234,632	11,343					1,114,683			2,517,462		
12/31/12		12,239,248	4,616					1,117,237			2,520,012		
	01/01/13	*12,239,543*		**December**			**Pounds Cr**						
01/01/13		12,239,958	710	**20,880**			**0.191**	1,117,663			2,520,377		
01/10/13		12,246,590	6,632			1.90	1.720	1,120,640	7.7	1.68	2,524,770	8.0	1.32
01/24/13		12,278,928	32,338					1,130,141			2,550,847		
01/28/13		12,282,035	3,107					1,131,414			2,553,042		
01/31/13		12,287,892	5,857					1,132,425			2,558,715		
	02/01/13	*12,288,247*		**January**			**Pounds Cr**						
02/01/13		12,289,018	1,126	**48,644**			**0.697**	1,132,680			2,559,456		
02/07/13		12,293,874	4,856		7.9	0.82	0.663	1,134,376	7.6	1.35	2,563,137	8.0	0.22
02/20/13		12,308,445	14,571					1,038,672			2,575,057		
02/27/13		12,313,181	19,307					1,140,359			2,578,725		
	03/01/13	*12,314,165*		**February**			**Pounds Cr**						
03/03/13		12,315,958	2,777	**25,918**			**0.143**	1,141,206			2,580,927		
03/07/13		12,318,024	2,066		7.9	0.83	0.753	1,142,054	7.7	1.44	2,582,395	7.8	0.27
03/18/13		12,361,201	43,177					1,151,536			2,619,703		
03/20/13		12,365,136	3,935					1,153,250			2,622,317		
03/27/13		12,378,442	13,306					1,159,233			2,630,884		
03/31/13		12,400,821	22,379					1,164,838			2,649,804		
	04/01/13	*12,403,728*		**March**			**Pounds Cr**						
04/01/13		12,407,465	3,737	**89,563**			**0.562**	1,165,570			2,655,346		
04/11/13		12,461,497	54,032		7.4	0.42	0.431	1,180,148	7.0	0.60	2,700,747	7.4	0.14
04/17/13		12,522,138	60,641					1,196,092			2,749,790		
	05/01/13	*12,570,545*		**April**			**Pounds Cr**						
05/01/13		---	---	**166,817**			**0.599**						
05/01/13		12,571,333	49,195		8.1	0.56	0.553	1,215,096	7.3	0.38	2,785,968	7.8	0.09
05/19/13		12,623,298	51,965					1,235,753			2,823,953		
	06/01/13	*12,647,282*		**May**			**Pounds Cr**						
				76,737			**0.353**						
06/06/13		12,657,605	34,307		7.6	0.96	0.826	1,251,551	7.4	0.47	2,849,502	7.8	0.73
06/12/13		12,669,485	11,880					1,256,351			2,857,966		
06/17/13		12,680,642	11,157					1,259,722			2,867,078		
	07/01/13	*12,727,950*		**June**			**Pounds Cr**						
				80,668			**0.555**						
07/18/13		12,767,116	86,474		7.4	0.73	0.694	1,286,165	6.7	0.73	2,938,280	7.5	0.07
07/31/13		12,780,876	13,760					1,293,015			2,947,351		

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

Date Actual	OUTFALL 001							Manhole #1			Manhole #2		
	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
	08/01/13	*12,781,814*		**July**			**Pounds Cr**						
				53,864			**0.311**						
08/04/13		12,784,628	3,752					1,293,015			2,947,351		
08/07/13		12,786,184	1,556					1,295,588			2,951,110		
08/08/13		12,786,555	371		7.5	0.83	0.775	1,296,442	6.8	0.68	2,951,801	7.2	0.16
08/19/13		12,795,058	8,503					1,298,966			2,954,811		
08/21/13		12,795,638	580					1,300,287			2,956,243		
08/26/13		12,797,295	1,657					1,301,154			2,957,147		
08/28/13		12,800,434	3,139					1,302,541			2,958,987		
	09/01/13	*12,803,511*		**August**			**Pounds Cr**						
09/01/13		12,803,511	6,216	**21,697**			**0.140**	1,303,580			2,961,265		
09/05/13		12,808,096	4,585					1,305,282			2,964,435		
09/09/13		12,811,883	8,372					1,306,947			2,966,675		
09/11/13		12,815,166	7,070					1,309,139			2,968,968		
09/14/13		12,818,151	6,268					1,310,005			2,970,501		
09/18/13		12,822,283	7,117		7.3	1.3	1.170	1,311,729	7.1	0.99	2,973,533	7.3	0.19
09/30/13		12,833,637	11,354					1,317,815			2,980,475		
	10/01/13	*12,834,025*		**September**			**Pounds Cr**						
10/01/13		12,834,025	388	**30,514**			**0.297**	1,318,244			2,980,475		
10/08/13		12,843,796	9,771					1,321,693			2,988,064		
10/16/13		12,852,554	8,758					1,325,559			2,994,143		
10/18/13		12,855,027	2,473		7.7	1.20	1.120	1,326,419	7.5	1.04	2,996,041	7.8	0.14
	11/01/13	*12,867,815*		**October**			**Pounds Cr**						
11/01/13		12,867,815	12,788	**33,790**			**0.315**	1,332,902			3,004,777		
11/05/13		12,876,841	9,026					1,335,488			3,012,422		
11/13/13		12,903,367	26,526		7.8	1.00	0.920	1,345,039	8.1	0.66	3,033,152	7.9	0.11
11/20/13		12,924,566	21,199					1,350,740			3,051,316		
	12/01/13	*12,940,971*		**November**			**Pounds Cr**						
12/02/13		12,944,252	19,686	**73,156**			**0.560**	1,360,688			3,063,995		
12/10/13		12,954,971	10,719		7.6	1.4	1.320	1,365,411	7.4	2.70	3,071,689	7.1	0.07
12/12/13		12,957,411	2,440					1,366,744			3,073,244		
12/23/13		12,965,941	8,530					1,371,029			3,078,956		
12/31/13		12,970,459	4,518					1,373,592			3,081,611		
	01/01/14	*12,970,599*		**December**			**Pounds Cr**						
01/01/14		12,970,772	313	**29,628**			**0.326**	1,373,592			3,081,991		
01/15/14		12,976,884	6,112		7.5	1.2	1.050	1,376,582	7.1	2.20	3,086,176	7.6	0.11
01/31/14		12,983,061	6,177					1,379,605			3,090,406		
	02/01/14	*12,983,265*		**January**			**Pounds Cr**						
02/02/14		12,983,747	686	**12,666**			**0.111**	1,380,032			3,090,789		
02/13/14		12,987,155	3,408		8.0	1.8	1.610	1,381,726	8.1	2.88	3,093,093	8.3	0.19
02/28/14		12,993,603	6,448										
	03/01/14	*12,993,783*		**February**			**Pounds Cr**						
03/01/14		12,993,909	306	**10,518**			**0.141**						
03/13/14		13,005,882	11,973		7.6	0.38	0.434	1,385,639	7.7	5.80	3,112,477	8.0	0.30
03/31/14		13,059,539	53,657										
	04/01/14	*13,059,979*		**March**			**Pounds Cr**						
04/01/14		13,061,650	2,111	**66,196**			**0.239**	1,399,014			3,165,447		
04/12/14		13,091,485	29,835					1,411,117			3,187,701		
04/13/14		13,099,571	8,086					1,412,822			3,195,631		
04/15/14		13,135,912	36,341					1,424,711			3,224,028		
04/18/14		13,165,955	30,043					1,434,115			3,247,300		
04/22/14		13,210,016	44,061		7.6	0.44	0.377	1,440,204	7.4	0.72	3,258,396	7.5	0.31
	05/01/14	*13,211,258*		**April**			**Pounds Cr**						
05/01/14		13,211,345	1,329	**151,279**			**0.475**	1,451,524			3,282,450		
05/13/14		13,267,656	56,311		7.5	0.28	0.273	1,471,868	7.3	0.73	3,326,392	7.4	0.20
05/14/14		13,280,912	13,256					1,475,015			3,337,773		
05/15/14		13,286,754	5,842					1,476,780			3,342,511		
05/20/14		13,304,068	17,314					1,483,692			3,355,729		
	06/01/14	*13,332,599*		**May**			**Pounds Cr**						
06/02/14		13,336,115	32,047	**121,341**			**0.276**	1,495,755			3,382,176		

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
06/12/14		13,372,027	35,912		7.9	0.40	0.381	1,508,756	7.6	0.60	3,410,073	7.8	0.20
06/14/14		13,374,936	2,909					1,510,080			3,412,070		
06/17/14		13,379,348	4,412					1,512,220			3,415,268		
06/19/14		13,394,274	14,926					1,514,826			3,429,626		
06/20/14		13,401,646	7,372					1,517,014			3,436,003		
06/30/14		13,444,046	42,400					1,531,745			3,470,067		
	07/01/14	*13,445,046*		**June**			**Pounds Cr**	1,532,601			3,472,302		
07/01/14		13,446,138	2,092	**112,447**			**0.357**						
07/02/14		13,449,088	2,950					1,533,460			3,475,127		
07/09/14		13,463,816	14,728		7.7	0.68	0.689	1,539,906	7.4	1.0	3,486,800	7.4	1.0
07/14/14		13,472,104	8,288					1,543,805			3,492,830		
07/28/14		13,480,642	8,538	**July**			**Pounds Cr**	1,551,065			3,501,179		
	08/01/14	*13,481,746*		**36,700**			**0.211**						
08/01/14		13,481,837	1,195					1,552,341			3,502,760		
08/13/14		13,495,032	13,195		7.9	0.681	0.72	1,557,877	7.5	1.16	3,511,069	7.7	0.92
08/17/14		13,502,593	7,561					1,560,483			3,517,406		
08/19/14		13,509,446	6,853					1,562,278			3,523,163		
08/20/14		13,517,300	7,854					1,563,989			3,530,111		
08/22/14		13,525,676	8,376					1,567,014			3,536,533		
08/25/14		13,534,424	8,748					1,571,333			3,542,173		
08/29/14		13,539,488	5,064					1,573,914			3,545,371		
08/30/14		13,542,314	2,826	**August**			**Pounds Cr**	1,575,198			3,547,361		
	09/01/14	*13,543,999*		**62,253**			**0.37**						
09/02/14		13,546,601	4,287					1,577,338			3,550,419		
09/05/14		13,550,482	3,881					1,579,481			3,553,370		
09/08/14		13,562,709	12,227					1,582,918			3,564,025		
09/17/14		13,579,703	16,994		7.9	0.60	0.546	1,589,348	7.6	1.16	3,577,644	7.3	0.36
09/24/14		13,593,114	13,411	**September**			**Pounds Cr**	1,595,011			3,577,644		
	10/01/14	*13,602,541*		**58,542**			**0.27**	1,600,155			3,577,644		
10/01/14		13,603,009	9,895					1,600,155			3,577,644		
10/16/14		13,633,400	30,391		7.3	0.67	0.596	1,610,440	7.8	1.28	3,619,044	7.4	0.36
10/28/14		13,658,462	25,062	**October**			**Pounds Cr**	1,621,724			3,636,660		
	11/01/14	*13,662,568*		**60,027**			**0.298**						
11/01/14		13,663,621	5,159					1,624,238			3,640,194		
11/12/14		13,672,756	9,135		8.1	1.1	0.980	1,629,780	7.6	1.62	3,648,121	8.1	1.08
11/30/14		13,695,977	23,221					1,640,533			3,663,353		
	12/01/14	*13,696,416*		**November**			**Pounds Cr**						
12/01/14		13,697,118	1,141	**37,515**			**0.306**	1,640,533			3,663,353		
12/04/14		13,701,386	4,268					1,643,108			3,666,947		
12/08/14		13,705,980	4,594					1,645,245			3,670,118		
12/12/14		13,709,486	3,506		8.1	1.5	1.320	1,646,957	7.7	2.72	3,672,490	8.5	0.35
12/31/14		13,768,265	58,779					1,666,522			3,720,581		
	01/01/15	*13,769,665*		**December**			**Pounds Cr**						
01/01/15		13,770,654	2,389	**73,249**			**0.805**	1,667,388			3,722,195		
01/12/15		13,785,790	15,136		8.2	0.65	0.597	1,674,271	7.8	1.36	3,733,018	7.3	0.20
01/31/15		13,798,407	12,617					1,679,866			3,742,191		
	02/01/15	*13,798,602*		**January**			**Pounds Cr**						
02/01/15		13,798,727	320	**28,937**			**0.144**	1,679,866			3,742,588		
02/04/15		13,800,127	1,400		8.1	0.74	0.721	1,680,719	7.9	1.48	3,743,379	7.1	0.17
02/16/15		13,804,943	4,816					1,682,892			3,746,962		
02/20/15		13,805,957	1,014					1,683,320			3,747,752		
02/24/15		13,806,974	1,017					1,683,745			3,748,542		
02/28/15		13,808,369	1,395					1,684,600			3,749,334		
	03/01/15	*13,808,507*		**February**			**Pounds Cr**						
03/01/15		13,808,690	321	**9,905**			**0.059**	1,684,600			3,749,728		
03/18/15		13,815,075	6,385		8.2	0.80	0.713	1,687,150	7.2	1.00	3,757,618	8.0	0.34
03/23/15		13,815,928	853					1,688,046			3,759,604		
03/25/15		13,816,332	404					1,688,901			3,759,889		
03/26/15		13,816,697	365					1,689,329			3,760,382		
	04/01/15	*13,822,714*		**March**			**Pounds Cr**						

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N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
04/07/15		13,823,071	6,374	**14,207**			**0.084**	1,694,467			3,765,931		
04/15/15		13,856,854	33,783		7.4	0.92	0.858	1,704,938	7.7	1.92	3,792,943	7.0	0.25
04/30/15		13,885,187	28,333					1,718,370			3,812,262		
	05/01/15	*13,885,585*		**April**			**Pounds Cr**						
05/04/15		13,889,467	4,280	**62,871**			**0.449**	1,720,520			3,815,063		
05/13/15		13,898,048	8,581		8.0	0.60	0.554	1,724,812	7.8	0.92	3,820,667	8.1	0.37
05/18/15		13,905,897	7,849					1,727,444			3,827,133		
05/19/15		13,909,365	3,468					1,728,740			3,830,304		
05/23/15		13,914,964	5,599					1,731,329			3,834,357		
05/25/15		13,920,921	5,957					1,733,052			3,839,818		
05/28/15		13,937,530	16,609					1,736,965			3,854,997		
	06/01/15	*13,958,452*		**May**			**Pounds Cr**						
06/02/15		13,967,174	29,644	**72,867**			**0.336**	1,746,201			3,878,793		
06/03/15		13,970,819	3,645					1,747,948			3,881,197		
06/10/15		13,986,712	15,893		7.4	0.60	0.547	1,755,299	7.1	0.66	3,892,044	7.2	0.27
06/16/15		14,018,102	31,390					1,765,062			3,917,649		
06/19/15		14,042,191	24,089					1,772,128			3,937,351		
06/28/15		14,066,780	24,589					1,781,741			3,956,167		
06/30/15		14,069,200	2,420					1,783,061			3,957,962		
	07/01/15	*14,069,642*		**June**			**Pounds Cr**						
07/01/15		14,069,914	714	**111,190**			**0.506**	1,783,061			3,957,962		
07/08/15		14,077,301	7,387		7.7	0.37	0.351	1,787,623	7.2	0.68	3,963,593	7.5	0.23
07/14/15		14,085,720	8,419					1,790,678			3,970,192		
07/29/15		14,114,029	28,309					1,804,056			3,993,110		
	08/01/15	*14,115,454*		**July**			**Pounds Cr**						
08/05/15		14,117,883	3,854	**45,812**			**0.134**	1,807,395			3,995,776		
08/12/15		14,131,529	13,646			0.41	0.371	1,812,749	7.2	0.51	4,006,460	7.1	0.19
08/17/15		14,137,372	5,843					1,816,582			4,010,201		
08/18/15		14,138,406	1,034					1,817,349			4,011,060		
08/27/15		14,145,800	7,394					1,822,802			4,016,771		
	09/01/15	*14,151,425*		**August**			**Pounds Cr**						
09/04/15		14,155,393	9,593	**35,971**			**0.111**	1,828,088			4,025,183		
09/09/15		14,175,870	20,477		7.6	0.23	0.208	1,833,613	7.2	0.72	4,041,266	7.0	0.14
09/18/15		14,191,902	16,032					1,843,839			4,055,798		
09/28/15		14,211,188	19,286					1,852,031			4,069,063		
09/29/15		14,211,559	371					1,852,459			4,069,894		
	10/01/15	*14,212,577*		**September**			**Pounds Cr**						
10/01/15		14,212,781	1,222	**61,152**			**0.106**	1,853,738			4,071,365		
10/07/15		14,220,473	7,692			0.72	0.661	1,856,721	7.2	1.26	4,071,365	7.3	0.16
10/13/15		14,226,617	6,144					1,859,329			4,079,148		
10/21/15		14,233,700	7,083					1,863,168			4,082,924		
10/27/15		14,241,197	7,497					1,865,726			4,088,517		
	11/01/15	*14,260,606*		**October**			**Pounds Cr**						
11/02/15		14,266,255	25,058	**48,029**			**0.264**	1,872,203			4,108,562		
11/12/15		14,288,543	22,288		7.7	0.73	0.700	1,882,551	7.3	1.20	4,122,107	7.6	0.26
11/30/15		14,334,387	45,844					1,898,090			4,155,815		
	12/01/15	*14,336,677*		**November**			**Pounds Cr**						
12/01/15		14,339,197	4,810	**76,072**			**0.443**	1,899,821			4,159,227		
12/10/15		14,364,604	25,407		7.9	0.69	0.627	1,910,218	7.4	0.66	4,176,267	7.3	0.30
12/21/15		14,458,622	94,018					1,937,179			4,246,823		
	01/01/16	*14,487,544*		**December**			**Pounds Cr**						
01/01/16		14,488,585	29,963	**150,867**			**0.788**	1,949,306			4,267,333		
01/07/16		14,499,288	10,703		7.9	0.62	0.572	1,954,033	7.4	0.87	4,274,451	7.6	0.40
	02/01/16	*14,532,622*		**January**			**Pounds Cr**						

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
02/01/16		14,533,138	33,850	**45,078**			**0.215**	1,971,254			4,316,580		
02/10/16		14,562,012	28,874		8.1	0.87	0.858	1,973,902	7.6	0.61	4,324,057	8.1	0.70
02/29/16		14,601,368	39,356					1,982,872			4,359,110		
	03/01/16	14,602,713		**February**			**Pounds Cr**						
03/01/16		14,603,747	2,379	**70,091**			**0.501**	1,983,300			4,361,401		
03/10/16		14,625,282	21,535		7.9	0.63	0.609	1,988,471	7.3	1.44	4,380,928	7.4	0.37
03/31/16		14,728,685	103,403					2,017,845			4,463,804		
	04/01/16	14,733,540		**March**			**Pounds Cr**						
04/02/16		14,751,888	23,203	**130,827**			**0.663**	2,023,638			4,482,114		
04/06/16		14,770,034	18,146		7.8	0.38	0.244	2,029,748	7.2	0.53	4,495,836	7.2	0.24
	05/01/16	14,827,634		**April**			**Pounds Cr**						
05/03/16		14,834,742	64,708	**94,094**			**0.191**	2,057,059			4,539,976		
05/12/16		14,846,704	19,070		7.6	0.70	0.645	2,062,615	7.2	0.47	4,547,811	7.1	0.69
05/17/16		14,856,181	9,477					2,067,406			4,553,472		
	06/01/16	14,889,570		**May**			**Pounds Cr**						
06/06/16		14,902,417	46,236	**61,936**			**0.333**	2,086,371			4,585,701		
06/08/16		14,906,067	3,650		7.5	0.43	0.406	2,088,096	7.1	0.69	4,587,959	7.1	0.25
06/19/16		14,946,108	40,041					2,101,451			4,617,396		
	07/01/16	14,980,911		**June**			**Pounds Cr**						
07/01/16		14,983,214	37,106	**91,341**			**0.309**	2,113,474			4,646,051		
07/07/16		14,998,455	15,241		7.4	0.50	0.430	2,119,487	7.0	0.87	4,656,766	7.1	0.20
07/31/16		15,036,518	38,063					2,138,364			4,681,191		
	08/01/16	15,036,760		**July**			**Pounds Cr**						
08/01/16		15,037,244	726	**55,849**			**0.200**	2,138,788			4,682,282		
08/11/16		15,047,013	9,769		7.4	0.61	0.583	2,144,319	7.1	0.98	4,687,103	7.1	0.12
08/24/16		15,065,460	18,447					2,152,060			4,700,186		
	09/01/16	15,080,715		**August**			**Pounds Cr**						
09/02/16		15,081,239	15,779	**43,955**			**0.213**	2,159,787			4,709,523		
09/08/16		15,093,858	12,619		7.2	0.41	0.355	2,164,508	7.1	0.60	4,718,876	6.9	0.17
09/15/16		15,117,114	23,256					2,173,196			4,734,824		
09/30/16		15,161,513	44,399					2,190,037			4,766,164		
	10/01/16	15,162,610		**September**			**Pounds Cr**						
10/01/16		15,162,976	1,463	**81,895**			**0.242**	2,190,896			4,766,917		
10/05/16		15,170,280	7,304		7.5	0.76	0.707	2,194,329	7.1	1.17	4,771,417	7.2	0.24
	11/01/16	15,218,316		**October**			**Pounds Cr**						
11/01/16		15,218,916	48,636	**55,706**			**0.328**	2,214,974			4,803,706		
11/09/16		15,231,072	12,156		7.7	0.58	0.550	2,221,415	7.3	1.02	4,810,434	7.2	0.17
11/30/16		15,257,768	26,696					2,231,705			4,829,512		
	12/01/16	15,259,593		**November**			**Pounds Cr**						
12/01/16		15,262,085	4,317	**41,277**			**0.189**	2,233,005			4,832,948		
12/08/16		15,278,159	16,074		7.7	0.90	0.832	2,240,348	7.4	1.41	4,843,138	7.3	0.26
	01/01/17	15,320,273		**December**			**Pounds Cr**						
01/05/17		15,328,203	50,044	**60,680**			**0.420**						
01/05/17		15,328,203	0			1.00	0.895	2,259,750	7.5	1.44	4,878,940	7.4	0.47
01/31/17		15,387,622	59,419					2,272,198			4,933,594		
	02/01/17	15,387,845		**January**			**Pounds Cr**						
02/01/17		15,388,387	765	**67,572**			**0.504**	2,272,625			4,933,971		
02/09/17		15,399,455	11,068		7.8	0.56	0.542	2,277,351	7.5	0.99	4,941,836	7.1	0.13
	03/01/17	15,452,749		**February**			**Pounds Cr**						
03/08/17		15,476,369	76,914	**64,904**			**0.305**						
03/08/17		15,476,369	0		7.8	0.59	0.539	2,302,121	7.3	1.14	5,002,178	7.3	0.26
03/14/17		15,497,125	20,756					2,309,539			5,016,906		
03/25/17		15,528,765	31,640					2,321,231			5,039,669		
03/29/17		15,542,291	13,526					2,325,638			5,049,699		
	04/01/17	15,558,808		**March**			**Pounds Cr**						
04/02/17		15,562,275	19,984	**106,059**			**0.476**	2,333,037			5,064,049		
04/06/17		15,582,526	20,251		7.7	0.43	0.405	2,340,089	7.3	0.57	5,064,049	7.3	0.27
04/27/17		15,676,954	94,428					2,372,953			5,146,405		

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
	05/01/17	*15,703,639*		**April**			**Pounds Cr**						
05/04/17		15,728,166	51,212	**144,831**			**0.488**						
05/04/17		15,728,166	0		7.6	0.28	0.257	2,387,552	7.1	0.36	5,185,807	6.8	0.21
	06/01/17	*15,796,047*		**May**			**Pounds Cr**						
06/08/17		15,812,038	83,872	**92,408**			**0.198**						
06/08/17		15,812,038	0		7.5	0.35	0.325	2,421,837	7.1	0.36	5,243,312	7.2	0.16
	07/01/17	*15,888,740*		**June**			**Pounds Cr**						
07/01/17		15,891,390	79,352	**92,693**			**0.251**						
07/06/17		15,902,647	11,257		7.5	0.57	0.525	2,453,044	7.1	0.69	5,309,639	7.0	0.50
07/31/17		15,945,154	42,507					2,472,011			5,337,122		
	08/01/17	*15,945,504*		**July**			**Pounds Cr**						
08/01/17		15,945,880	726	**56,764**			**0.248**	2,472,438			5,337,492		
08/09/17		15,958,437	12,557		7.4	0.68	0.624	2,478,016	7.0	0.66	5,347,291	6.9	0.38
	09/01/17	*15,992,489*		**August**			**Pounds Cr**						
09/07/17		16,001,926	43,489	**46,985**			**0.244**	2,472,438			5,337,492		
09/07/17		16,001,926	0		7.4	0.50	0.488	2,497,770	7.1	0.68	5,375,524	6.9	0.14
09/29/17		16,031,780	29,854					2,510,609			5,395,101		
	10/01/17	*16,034,956*		**September**			**Pounds Cr**						
10/03/17		16,035,404	3,624	**42,467**			**0.173**	2,512,318			5,397,338		
10/05/17		16,037,996	2,592		7.5	0.44	0.410	2,513,176	7.1	1.14	5,399,232	6.7	0.12
	11/01/17	*16,080,246*		**October**			**Pounds Cr**						
11/07/17		16,090,463	52,467	**45,290**			**0.155**	2,536,891			5,436,850		
11/09/17		16,092,667	2,204		7.6	0.76	0.718	2,538,180	7.2	0.99	5,437,985	7.2	0.22
11/15/17		16,098,379	5,712					2,541,643			5,441,055		
11/30/17		16,109,689	11,310					2,549,030			5,450,173		
	12/01/17	*16,110,147*		**November**			**Pounds Cr**						
12/03/17		16,112,117	2,428	**29,901**			**0.179**	2,550,308			5,451,687		
12/07/17		16,115,265	3,148		7.4	0.82	0.755	2,551,590	7.4	1.29	5,453,973	7.4	0.20
12/14/17		16,121,000	5,735					2,551,590			5,453,973		
12/31/17		16,131,936	10,936					2,560,147			5,464,203		
	01/01/18	*16,132,116*		**December**			**Pounds Cr**						
01/01/18		16,132,328	392	**21,969**			**0.138**	2,560,571			5,464,203		
01/04/18		16,133,697	1,369		--	0.78	0.734	2,560,993	--	0.41	5,465,331	--	0.04
	02/01/18	*16,144,665*		**January**			**Pounds Cr**						
02/01/18		16,144,863	11,166	**12,549**			**0.077**	2,566,068			5,472,876		
02/08/18		16,147,315	2,452		7.8	0.75	0.906	2,567,326	7.4	1.68	5,474,376	7.2	0.16
02/28/18		16,155,889	8,574					2,570,306			5,481,207		
	03/01/18	*16,156,053*		**February**			**Pounds Cr**						
03/01/18		16,156,211	322	**11,388**			**0.086**	2,570,306			5,481,586		
03/08/18		16,163,746	7,535		7.7	0.52	0.526	2,574,570	7.4	0.78	5,485,747	7.2	0.20
03/27/18		16,183,153	19,407					2,585,717			5,495,623		
03/31/18		16,188,615	5,462					2,472,869*			5,499,048		
	04/01/18	*16,189,199*		**March**			**Pounds Cr**						
04/01/18		16,190,057	1,442	**33,146**			**0.145**	2,473,316			5,500,204		
04/05/18		16,195,349	5,292		7.7	0.60	0.585	2,476,332	7.3	0.84	5,502,874	7.4	0.35
04/10/18		16,203,721	8,372					2,480,242			5,508,217		
04/25/18		16,302,239	98,518					2,508,161			5,586,326		
04/30/18		16,328,835	26,596					2,516,938			5,606,361		
	05/01/18	*16,330,212*		**April**			**Pounds Cr**						
05/01/18		16,331,044	2,209	**141,013**			**0.687**	2,517,809			5,607,864		
05/04/18		16,360,268	29,224					2,526,963			5,630,632		
05/10/18		16,409,694	49,426		7.6	0.30	0.315	2,541,347	7.2	0.51	5,667,843	6.8	0.19
05/22/18		16,428,757	19,063					2,547,991			5,681,939		
05/24/18		16,455,003	26,246					2,557,801			5,698,300		
05/29/18		16,462,967	7,964					2,562,178			5,702,537		
	06/01/18	*16,466,594*		**May**			**Pounds Cr**						
06/01/18		16,467,299	4,332	**136,382**			**0.358**	2,563,476			5,705,975		
06/05/18		16,476,100	8,801					2,566,515			5,712,597		
06/07/18		16,480,044	3,944		7.6	0.38	0.382	2,568,258	7.1	0.53	5,715,101	7.3	0.21
06/30/18		16,537,167	57,123					2,588,614			5,756,117		

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N.W. Mauthe Superfund Site
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Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
	07/01/18	*16,537,690*		**June**			**Pounds Cr**						
07/01/18		16,538,238	1,071	**71,096**			**0.226**	2,589,032			5,756,879		
07/05/18		16,542,427	4,189		7.6	0.31	0.311	2,591,176	7.2	0.57	5,759,920	7.1	0.16
07/12/18		16,545,145	2,718					2,594,639			5,763,368		
07/19/18		16,553,309	8,164					2,597,639			5,766,777		
07/31/18		16,571,725	18,416					2,604,452			5,779,752		
	08/01/18	*16,571,996*		**July**			**Pounds Cr**						
08/01/18		16,572,495	770	**34,306**			**0.089**	2,589,032			5,756,879		
08/08/18		16,581,462	8,967		--	0.43	0.438	2,608,818	7.1	0.55	5,785,813	7.0	0.27
08/31/18		16,637,913	56,451					2,629,840			5,828,591		
	09/01/18	*16,640,165*		**August**			**Pounds Cr**						
09/01/18		16,641,711	3,798	**68,169**			**0.125**	2,631,151			5,831,336		
09/06/18		16,695,169	53,458		7.5	0.24	0.256	2,646,502	7.1	0.59	5,871,311	6.7	0.08
09/17/18		16,734,724	39,555					2,659,921			5,899,762		
09/18/18		16,738,499	3,775					2,660,806			5,903,277		
09/30/18		16,775,825	37,326					2,672,955			5,932,062		
	10/01/18	*16,776,168*		**September**			**Pounds Cr**						
10/01/18		16,776,700	875	**136,003**			**0.290**	2,673,387			5,932,454		
10/03/18		16,785,853	9,153		7.8	0.30	0.303	2,675,556	7.3	0.60	5,940,463	7.1	0.22
10/25/18		16,899,216	113,363					2,709,668			6,027,153		
	11/01/18	*16,908,245*		**October**			**Pounds Cr**						
11/01/18		16,908,712	9,496	**132,077**			**0.333**	2,713,560			6,033,788		
11/07/18		16,921,099	12,387		7.7	0.38	0.424	2,717,458	7.1	0.36	6,044,211	6.8	0.34
11/12/18		16,936,140	15,041					2,723,181			6,054,634		
11/14/18		16,940,487	4,347					2,725,362			6,057,406		
11/16/18		16,944,318	3,831					2,727,099			6,059,771		
11/19/18		16,949,417	5,099					2,729,266			6,063,298		
	12/01/18	*16,964,903*		**November**			**Pounds Cr**						
12/06/18		16,972,133	22,716	**56,658**			**0.200**	2,738,784			6,080,566		
12/06/18		16,972,133	0		8.0	0.52	0.521	2,738,784	7.4	0.53	6,080,566	7.2	0.45
	01/01/19	*17,020,007*		**December**			**Pounds Cr**						
01/04/19		17,021,076	48,943	**55,104**			**0.239**	2,757,483			6,116,420		
01/10/19		17,051,054	29,978		7.8	0.26	0.246	2,765,903	7.2	0.41	6,140,244	7.0	0.18
	02/01/19	*17,085,876*		**January**			**Pounds Cr**						
02/01/19		17,086,762	35,708	**65,869**			**0.135**	2,779,438			6,166,376		
02/07/19		17,092,183	5,421		8.0	0.36	0.398	2,781,163	7.5	0.37	6,170,668	7.3	0.35
	03/01/19	*17,108,085*		**February**			**Pounds Cr**						
03/01/19		17,108,314	16,131	**22,209**			**0.074**	2,786,817			6,183,118		
03/07/19		17,112,149	3,835		7.9	0.29	0.296	2,788,121	7.4	--	6,186,219	7.4	--
03/26/19		17,201,867	89,718					2,810,744			6,261,318		
	04/01/19	*17,220,303*		**March**			**Pounds Cr**						
04/02/19		17,221,255	19,388	**112,218**			**0.277**	2,818,615			6,274,417		
04/02/19		17,221,255	0		7.7	0.40	0.408	2,818,615	7.2	0.53	6,274,417	7.2	0.15
04/18/19		17,270,735	49,480					2,834,848			6,312,336		
04/30/19		17,336,326	65,591					2,855,668			6,362,011		
	05/01/19	*17,338,042*		**April**			**Pounds Cr**						
05/01/19		17,340,509	4,183	**117,739**			**0.400**	2,856,981			6,365,212		
05/09/19		17,366,641	26,132		7.8	0.43	0.441	2,866,635	7.2	0.39	6,383,940	7.2	0.66
	06/01/19	*17,467,893*		**May**			**Pounds Cr**						
06/06/19		17,492,562	125,921	**129,851**			**0.477**	2,856,981			6,365,212		
06/06/19		17,492,562	0		7.6	0.23	0.249	2,908,632	7.2	0.32	6,478,871	7.0	0.22
06/11/19		17,502,105	9,543					2,912,952			6,486,321		
06/18/19		17,525,532	23,427					2,920,258			6,503,730		
	07/01/19	*17,581,030*		**June**			**Pounds Cr**						
07/08/19		17,613,923	88,391	**113,137**			**0.235**	2,947,437			6,572,415		
07/10/19		17,619,393	5,470		7.6	0.25	0.229	2,949,581	7.1	0.48	6,576,370	7.0	0.12
07/22/19		17,636,628	17,235					2,956,444			6,590,064		
07/23/19		17,644,137	7,509					2,958,908			6,596,369		
07/26/19		17,655,780	11,643					2,961,918			6,602,890		
07/31/19		17,662,536	6,756					2,965,324			6,606,751		

TABLE 1
Influent - Effluent Compliance Summary

N.W. Mauthe Superfund Site
Appleton, Wisconsin
Terracon Project No. 58117057

	OUTFALL 001							Manhole #1			Manhole #2		
Date Actual	Date For Linear Interpolation	Metered Discharge Reading (gallons)	Gallons Discharged Between Meter Reading	Monthly Discharge (gallons)	pH	Hexavalent Chromium Lab Analysis (mg/L) [Local Limit 4.5 mg/L]	Total Chromium Lab Analysis[1] (mg/L) [Local Limit 7.0 mg/L]	Flow Totalizer #1 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)	Flow Totalizer #2 Reading (gallons)	pH	Hexavalent Chromium Hach Test Kit (mg/L)
	08/01/19	*17,662,953*		**July**			**Pounds Cr**						
08/01/19		17,663,650	1,114	**81,923**			**0.156**	2,965,752			6,607,522		
08/07/19		17,674,432	10,782		7.7	0.37	0.383	2,969,223	7.3	0.38	6,615,773	7.5	0.30
08/31/19		17,712,769	38,337					2,984,986			6,643,285		
	09/01/19	*17,713,001*		**August**			**Pounds Cr**						
09/01/19		17,713,872	1,103	**50,048**			**0.160**	2,985,412			6,644,057		
09/05/19		17,719,385	5,513		7.8	0.48	0.489	2,987,590	7.3	0.50	6,644,933	7.3	0.43
09/18/19		17,790,650	71,265					3,009,066			6,701,147		
09/30/19		17,829,959	39,309					3,022,795			6,730,481		
	10/01/19	*17,830,522*		**September**			**Pounds Cr**						
10/01/19		17,831,112	1,153	**117,521**			**0.479**	2,985,412			6,644,057		
10/10/19		17,895,551	64,439		7.7	0.23	0.239	3,042,581	7.4	0.35	6,779,975	7.2	0.16

Italicized red type metered discharge reading was calculated by linear interpolation to 12 midnight.

Industrial User (Wastewater Discharge) Permit 18-21 Outfall 001 Effluent Limits		
pH	Hexavalent Chromium	Total Chromium
Between 5.0 and 12.4 s.u.	<4.5 mg/L	<7.0 mg/L

[1] Beginning in September 2018, the Total Chromium lab sample was not filtered. Previously, through August 2018, the sample was filtered (0.45 micron filter).

* On 3/31/18, the MH1 flowmeter face was blank. Upon replacing the batteries, the totalizer reading reverted to 2,472,869 gallons, a difference of -112,848 gallons from the previous known total.

TABLE 2

City of Appleton Compliance Limits, Outfall 001

N.W. Mauthe Superfund Site - Appleton, WI

Sampler	Sample Date	Aluminum (mg/L)	Arsenic (mg/L)	Cadmium (mg/L)	Chromium Total[1] (mg/L)	Copper (mg/L)	Cyanide (mg/L)	Lead (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Zinc (mg/L)	Hexavalent Chromium (mg/L)
Permit #18-21 Limits		70	1.0	0.3	7.0	3.5	1.0	2.0	0.002	2.0	10.0	4.5
CH2M Hill	02/20/97	<.02	<.003	<.00050	0.04	<.01	<.00001	<.005	<.0002	<.005	0.0051	<.01
CH2M Hill	03/24/98	0.0152	<.002	<.00004	0.0637	<.0095	<.0017	<.0006	<.000015	<.0095	0.0046	0.1000
Appleton	04/29/98	<.011	<.002	<.005	0.2200	<.05	0.0020	<.1	<.0002	<.04	<.005	NA
Appleton	10/07/98	<.011	<.002	0.0050	0.1700	<.05	<.001	<.1	<.0002	<.04	0.0250	NA
MCO	03/18/99	<.009	<.003	<.00031	NA	.00068****	<.000032	<.0024	<.00005	.00351****	<.012	<.0036
Appleton	03/18/99	<.011	<.002	<.005	<0.05	<.05	0.0010	0.1000	<.00005	0.0400	0.0180	NA
Appleton	09/21/99	<.011	<.002	<.005	<.05	<.05	0.0030	<.1	<.00015	<.04	0.0080	NA
Appleton	02/15/00	<.015	<.0020	<.005	0.0900	<.05	<.001	<.1	<.00013	<.04	0.0280	NA
MCO	03/13/00	<.009	<.003	<.00031	0.1400	<.0006	<.0044	<.0024	<.00005	0.0012	<.012	NA
Appleton	02/21/01	<0.15	<.002	<.005	0.11	<.05	0.001	<.1	<.00013	<.04	0.042	NA
MCO	03/01/01	<.034	<.0027	.012 ****	0.25	.0088 ****	<.0033	<.17	<.00005	.036 ****	0.015	<.0036
Appleton	10/02/01	0.016	<.002	<.005	0.14	<.05	<.001	<.1	<.00013	<.04	0.065	NA
MCO	03/19/02	<.034	<.0027	<.0075	0.36	<.0077	<.0027	<.17	<.00005	<.017	<.012	<.0036
Appleton	05/02/02	<.049	<.012	<.014	0.362	<.015	<.0014	<.060	<.00011	<.011	<.009	NA
Appleton	11/12/02	0.027	<.0082	<.00053	0.23	<.009	<.0007	<.00084	<.000028	0.0044	0.0081	NA
Appleton	02/11/03	<0.027	<.0082	<.00053	0.086	<.0009	<.0014	<.0013	<.000028	0.0036	<.0025	NA
Appleton	03/24/03	<.045	<.0027	<.0088	0.13	0.075	<.0050	<.16	<.000050	<.019	<.0044	<.0036
Appleton	10/23/03	0.0045	0.0013	<0.0001	0.221	<0.0008	<0.005	<0.0006	0.0002	<0.025	<0.010	NA
Appleton	03/24/04	<0.050	<0.0026	<0.010	0.15	<0.0060	<0.0050	<0.16	<0.000025	<0.020	<0.010	NA
Appleton	11/09/04	0.0071	<0.0012	<0.0001	0.04	0.0008	<0.005	<0.008	<0.0002	0.0013	<0.01	NA
MCO	08/08/05	0.023	<0.0035	<0.0003	0.039	0.0019	<0.0037	<0.0011	<0.000026	<0.0044	0.0024	<0.005
Appleton	11/05/06	0.0052	<0.0012	<0.0001	0.088	<0.0005	<0.005	<0.0008	<0.0002	0.0017	<0.010	NA
Appleton	02/23/06	0.0021	<0.0012	<0.0001	0.08	<0.0005	<0.0005	<0.0008	<0.0002	0.0022	<0.010	NA
MCO	03/23/06	<0.20	<0.0076	<0.00074	0.32	0.0018	0.0043	<0.0034	<0.000026	0.0033	<0.020	NA
Appleton	06/27/06	<0.200	<0.0076	<0.00074	0.700	0.0016	<0.0094	<0.0034	<0.000072	0.0021	<0.020	<0.350
Appleton	10/05/06	0.037	<0.00011	<0.0001	4.575	0.0068	0.01	<0.001	<0.0002	0.0026	<0.010	NA
Appleton	03/22/07	<0.07	<0.07	<0.01	1.9	3.5	<0.004	<0.03	<0.0002	<0.04	<0.01	NA
MCO	04/02/07	0.0383	0.00024	0.000086	1.41	0.0041	<0.0094	0.00013	<0.00019	0.0035	0.009	NA
Appleton	12/04/07	<0.07	<0.001	<0.01	3.4	<0.01	0.008	<0.03	<0.0002	<0.04	<0.01	1.5
Appleton	01/16/08	0.21	<0.005	<0.01	<0.03	0.02	0.017	0.06	0.0003	<0.04	0.04	NA
OMNNI	04/08/08	0.0114	0.00043	0.00011	0.864	0.0043	0.014 J	0.000095 J	<0.0001	0.0024	0.0071	0.063
Appleton	08/19/08	<0.08	<0.001	<0.01	0.95	<0.01	0.005	<0.03	0.0002	<0.02	<0.01	NA
Appleton	03/31/09	<0.09	<0.012	<0.01	0.99	<0.01	<0.008	<0.05	<0.0002	<0.02	<0.01	NA
OMNNI	04/07/09	<0.0151	0.003 J	0.00040 J	0.767	0.0024 J	<0.0060	<0.0014	<0.00010	0.0016 J	0.0137 J	0.84
Appleton	09/22/09	<0.08	<0.006	<0.01	2.3	<0.01	<0.008	<0.05	<0.0002	<0.02	<0.01	NA
Appleton	03/02/10	<0.06	<0.002	<0.01	1.6	<0.01	<0.008	<0.03	<0.0002	<0.01	<0.01	NA
OMNNI	04/06/10	0.0501 J	<0.0014	0.00043 J	1.16	0.0024 J	<0.0061	<0.00075	<0.0001	0.0023 J	0.0046 J	1.3
Appleton	11/02/10	<0.10	<0.010	<0.01	0.71	<0.01	<0.008	<0.03	<0.0002	<0.01	<0.01	NA
Appleton	02/24/11	<0.08	<0.001	<0.01	1.5	<0.01	0.008	<0.04	<0.0002	<0.02	<0.01	NA
OMNNI	04/05/11	0.0725 J	0.0025 J	<0.00026	0.401	0.0028 J	<0.0061	<0.0014	<0.00010	0.00053 J	0.0023 J	0.40
Appleton	10/26/11	<0.08	<0.005	<0.01	1.2	<0.01	0.007	<0.04	<0.0002	<0.02	<0.01	NA
Appleton	03/21/12	<0.11	<0.004	<0.01	1.3	0.01	0.007	<0.04	<0.0002	<0.02	<0.01	NA
Terracon	04/05/12	<0.0695	<0.0047	<0.00039	0.696	0.014 J	<0.0061	<0.0014	<0.00010	0.001 J	<0.0053	0.83
Appleton	10/04/12	0.0865	0.0051	0.00049	1.43	0.0028 J	0.026	0.0022	0.0001	0.00019 J	<0.0053	NA
Terracon	04/11/13	0.078	<0.004	<0.00048	0.431	0.0024 J	<0.0038	<0.027	<0.00010	0.00013 J	<0.0024	0.42
Appleton	04/17/13	<0.0714	<0.0042	<0.00048	0.279	0.0029 J	<0.0038	<0.027	<0.00010	0.00062 J	<0.0024	NA
Appleton	11/20/13	<0.0714	<0.0042	<0.00048	1.13	0.0018 J	0.0044 J	<0.027	<0.00010	0.00085 J	0.0034 J	NA
Appleton	04/15/14	0.119 J	<0.0068	<0.001	0.27	0.0036 J	<0.060	<0.0016	<0.00010	<0.0013	<0.0058	NA
Terracon	05/13/14	0.116 J	<0.0068	<0.001	0.273	0.0034 J	<0.060	0.0040 J	<0.00010	<0.0013	0.0064 J	0.28
Appleton	9/24/2014	<0.0655	<0.0068	<0.001	0.757	<0.0034	<0.010	<0.0016	<0.00010	<0.0013	<0.0058	NA
Terracon	4/15/2015	0.054 J	<0.0072	<0.00060	0.858	0.0041 J	<0.010	<0.0030	<0.00010	<0.0014	0.0026 J	0.92
Appleton	6/3/2015	<0.0655	<0.0068	<0.001	0.504	<0.0034	<0.020	<0.0016	<0.00010	0.0013 J	<0.0058	NA
Appleton	10/21/2015	0.105 J	<0.0068	<0.0010	0.676	<0.0034	<0.010	0.0024 J	<0.00010	<0.0013	0.0078 J	NA
Terracon	5/12/2016	0.0637 J	<0.0072	<0.00060	0.645	<0.0036	<0.0068	<0.0030	<0.00013	0.0018 J	<0.0013	0.70
Appleton	5/17/2016	<0.090	<0.001	<0.010	0.530	<0.010	<0.007	<0.030	<0.0002	<0.020	<0.01	NA
Appleton	11/1/2016	<0.090	<0.010	<0.010	0.560	<0.010	<0.007	<0.030	<0.0002	<0.020	<0.010	NA
Appleton	4/27/2017	<0.060	<0.001	<0.010	0.370	<0.010	0.007	<0.030	<0.0002	<0.020	<0.010	NA
Terracon	6/8/2017	<0.0555	<0.0083	<0.0013	0.345	<0.0063	<0.0068	<0.0043	<0.00013	<0.0026	<0.0093	0.35
Appleton	11/9/2017	<0.060	0.001	0.010	0.770	<0.010	<0.007	<0.030	<0.0002	<0.020	<0.010	NA
Appleton	5/22/2018	NA	<0.015	<0.0006	0.319	0.005	0.010	<0.005	<0.0002	0.005	<0.002	NA
Terracon	6/7/2018	0.0713 J	<0.0083	<0.0013	0.382	<0.0063	<0.014	<0.0043	<0.00013	<0.0026	<0.0093	0.38
Appleton	11/14/2018	NA	0.020	0.001	0.325	0.004	<0.009	<0.005	<0.0002	0.004	0.004	NA
Appleton	4/18/2019	NA	<0.015	<0.0006	0.519	0.005	<0.005	<0.009	<0.0002	0.005	<0.002	NA
Terracon	7/10/2019	NA	0.0091 J	<0.0013	0.229	<0.0063	0.011 J	0.006 J	<0.00013	0.0029 J	<0.0116	0.25
Appleton	9/18/2019	NA	Results not yet available									NA

J = Estimated concentration detected above the limit of detection and below the limit of quantitation

[1] Beginning in September 2018, the Total Chromium lab sample was not filtered. Previously, through August 2018, the sample was filtered (0.45 micron filter).

TABLE 3
Groundwater Collection and Treatment System Operational Parameters
N.W. Mauthe Superfund Site - Appleton, WI

	System Operational Parameters, April 2006 to October 2019											
	Flow[1] (gpd)			pH[1]			Hexavalent Chromium[1] (mg/L)			Total Chromium[2] (mg/L)		
Sample ID	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Outfall 001	326	8,247	2,188	6.1	9.4	7.8	0.06	3.30	0.98	0.003	4.58	0.95
Manhole #1	129	5,273	814	6.2	9.2	7.5	0.32	5.80	1.71	NA	NA	NA
Manhole #2	209	17,565	1,877	6.0	9.2	7.6	0.03	6.10	0.41	NA	NA	NA

	System Operational Parameters, November 2018 to October 2019											
	Flow[1] (gpd)			pH[1]			Hexavalent Chromium[1] (mg/L)			Total Chromium[3] (mg/L)		
Sample ID	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
Outfall 001	730	4,342	2,969	7.6	8.0	7.8	0.23	0.52	0.35	0.003	0.52	0.27
Manhole #1	288	5,273	1,599	7.1	7.5	7.3	0.32	0.53	0.42	NA	NA	NA
Manhole #2	715	11,543	3,451	6.8	7.5	7.2	0.12	0.66	0.31	NA	NA	NA

[1]Minimum, maximum, and average flow, pH, and hexavalent chromium concentrations based on data included in Table 1

[2]Minimum, maximum, and average total chromium concentrations based on data included in Table 2, from April 2006 to October 2019

[3]Minimum, maximum, and average total chromium concentrations based on data included in Table 2, from November 2018 to September 2019

TABLE 4

Cost Estimates, Remedial Action Options

N.W. Mauthe Superfund Site - Appleton, WI

Terracon Project No. 58117057

	Capital Costs					Initial Costs					Annual Costs							
Remedial Action Option	Pre-Treatment Filter and Transfer Pump[1]	Treatment Canisters[2]	Piping/Valves/ Installation[3]	Electrical/PLC Upgrades[4]	Capital Cost Subtotal	Design[5]	Treatability Analysis[6]	Installation Oversight[7]	Startup Monitoring[8]	Initial Cost Subtotal	System Sampling and Maintenance[9]	Laboratory Analysis[10]	Canister Changeout and Regeneration[11]	Reporting[12]	Annual Costs Subtotal - 1 Year	Annual Cost - 5 years	Annual Cost - Present Worth[13]	Total Estimated Present Worth Cost
No Action	$0	$0	$0	$0	$0	$3,000	$0	$0	$0	$3,000	$5,000	$17,000	$0	$6,000	$28,000	$140,000	$139,000	$142,000
Granular Activated Carbon	$7,000	$2,500	$5,000	$10,000	$24,500	$9,000	$3,000	$4,000	$6,000	$22,000	$7,000	$17,000	$2,500	$6,000	$32,500	$162,500	$161,000	$207,500
Ion Exchange	$7,000	$2,100	$5,000	$10,000	$24,100	$9,000	$3,000	$4,000	$6,000	$22,000	$7,000	$17,000	$4,500	$6,000	$34,500	$172,500	$171,000	$217,100

[1]CSD 042L Bag Filter Vessel, or equivalent, and a new transfer pump and associated controls.

[2]Granular activated carbon consists of two Evoqua canisters or equivalent. Ion exchange consists of two Evoqua canisters or equivalent.

[3]Estimated cost for plumbing contractor.

[4]Estimated cost for electrical contractor. Terracon contacted Suburban Electric, and costs for previously discussed system upgrades were unavailable.

[5]Cost for preparation of remedial design report. For 'no action' option, cost is for report describing modifications to existing monitoring program.

[6]Collection of groundwater sample for PFAS, total organic carbon, and total suspended solids analysis to size canisters and pre-treatment filter.

[7]Assumes 2 days of oversight/support of system installation.

[8]Assumes 1 day of troubleshooting/sample collection from influent, effluent, and between lead/lag canisters, and 2 additional days of startup troubleshooting during first 2 weeks of system operation.

[9]Incremental cost for system maintenance and PFAS sampling during current monthly sampling visits. For 'no action' option, includes PFAS sampling from Manhole #s 1 and 2 and effluent.

[10]Cost for 3 PFAS samples per month from influent, effluent, and between lead/lag canisters. For 'no action' option, includes PFAS analysis from Manhole #s 1 and 2 and effluent.

[11]Assumes two canister changeouts per year. Ion exchange includes a monthly rental fee.

[12]Incremental additional cost for inclusion of PFAS and system data into monthly, quarterly, and annual reports.

[13]Present work cost based on interest rate of 0.3 percent, for 5-year Treasury yield for September 4, 2020.

TABLE 5

Cost Estimates, Interim Action Options

N.W. Mauthe Superfund Site - Appleton, WI
Terracon Project No. 58117057

	Initial Costs						Implementation Costs - 6 Months								
Interim Action Option	Design[1]	Treatability Analysis[2]	Installation Oversight[3]	Startup Monitoring[4]	Treatment System Delivery and Installation[5]	Initial Cost Subtotal	System Sampling and Maintenance[6]	Laboratory Analysis[7]	Treatment System Rental[5]	Treatment System Demobilization and Media Disposal[5]	Offsite Water Transport[8]	Offsite Water Disposal[8]	Reporting[9]	Implementation Cost - 6 Months	Total Estimated Cost
No Action	$3,000	$0	$0	$0	$0	$3,000	$2,000	$9,000	$0	$0	$0	$0	$4,000	$15,000	$18,000
Temporary Treatment System	$7,000	$3,000	$2,000	$6,000	$20,000	$38,000	$4,000	$9,000	$21,300	$16,000	$0	$0	$4,000	$54,000	$92,000
Offsite Water Disposal	$3,000	$2,000	$0	$0	$0	$5,000	$0	$0	$0	$0	$560,000	$1,044,000	$4,000	$1,608,000	$1,613,000

[1]Cost for preparation of interim action design report.
[2]Collection of groundwater sample for PFAS, total organic carbon, and total suspended solids analysis for temporary treatment system; or VOCs, metals, and PFAS for water disposal waste stream profile.
[3]Assumes 1 day of oversight/support of temporary treatment system installation.
[4]Assumes 1 day of troubleshooting/sample collection from influent, effluent, and between lead/lag canisters, and 2 additional days of startup troubleshooting during first 2 weeks of system operation.
[5]Cost based on discussions with Clean Harbors and associated estimate, connections with existing system, and winterization.
[6]Incremental cost for system maintenance and PFAS sampling during current monthly sampling visits.
[7]Cost for 3 PFAS samples per month from influent, effluent, and between lead/lag canisters. For 'no action' option, includes PFAS analysis from Manhole #s 1 and 2 and effluent.
[8]Cost based on discussions with Clean Harbors. Assumes offsite disposal of 3,000 gallons of effluent per day, 5 days per week. Disposal in Sarnia, Ontario via incineration.
[9]Incremental additional cost for inclusion of PFAS and system data into monthly, quarterly, and annual reports.

APPENDIX C

VENDOR-PROVIDED INFORMATION

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ENSURING QUALITY & SAFETY

STANDARD FEATURES:

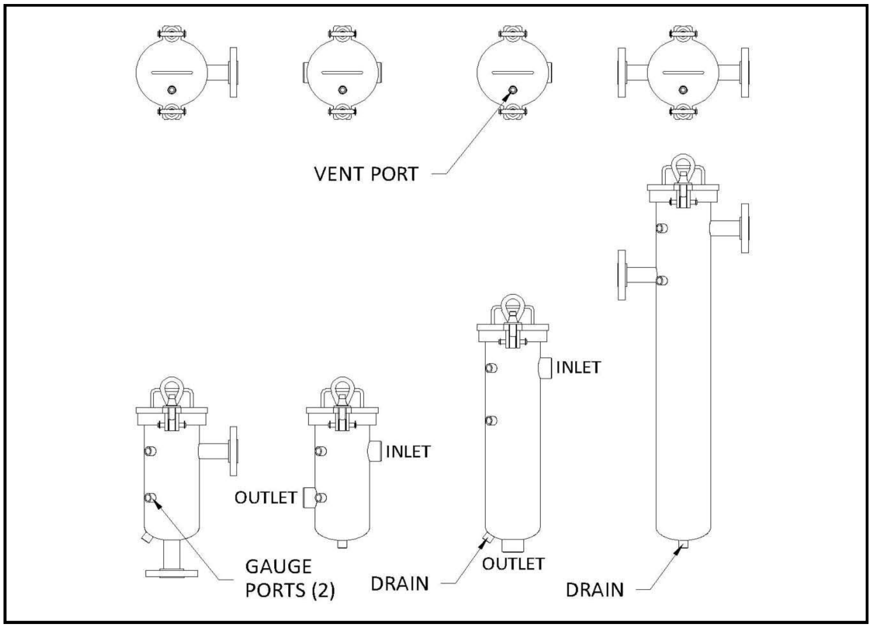
- ⇒ CARBON STEEL, 304L STAINLESS STEEL
- ⇒ PERMANENTLY PIPED VESSELS
- ⇒ STAINLESS STEEL RESTRAINER BASKETS
- ⇒ 150 P.S.I.
- ⇒ 2-LUG HINGED LID DESIGN
- ⇒ OUTLETS AVAILABLE: BOTTOM OR OPPOSITE SIDE
- ⇒ NPT OR FLANGED CONNECTIONS
- ⇒ VENT, GAUGE, DRAIN PORTS
- ⇒ BUNA SEALS

OPTIONS:

- ⇒ INLET / OUTLET CONNECTION
- ⇒ INLET / OUTLET LOCATIONS
- ⇒ MANUAL / AUTOMATIC DUPLEXING
- ⇒ SEAL MATERIAL: EPDM, VITON, TEFLON ENCAPSULATED VITON
- ⇒ MESH LINED RESTRAINER BASKETS
- ⇒ OMEGA SPRING (BAG HOLD DOWN)
- ⇒ HIGHER PRESSURE RATING
- ⇒ SPECIALTY DESIGNED VESSELS
- ⇒ ADJUSTABLE TRIPOD LEGS

Cleaning CSD Your World

BAG FILTER VESSEL



Bag Sizes	Industry Standard #3, #4 and #5 Bags
Basket Length	6", 12", 24"
Basket Material	Stainless Steel with 9/64" Perforation
Housing Lid	2-Lug Hinged Lid with 0.25" (F) NPT Vent Port and Handle
Connection Size	0.75", 1.0", 1.25", 1.5" or 2"
Connection Style	NPT or Flanged
Inlet / Outlet Locations	Outlets Available: Bottom, Opposite Side, Same Side, Bottom Elbowed Away
Seals	Buna, EPDM, Viton, Teflon Encapsulated Viton
Construction / Finish	Carbon Steel w/ Standard Exterior Finish; Stainless Steel w/ Bead Blast Satin Finish
Pressure Rating	150 PSI @ 250˚ F
Additional Ports	Two 0.25" (F) NPT Gauge Ports; One 0.25" (F) NPT Drain Port
Base	Optional Adjustable Tripod Legs

Build A CSD Part Number

0	04	01	12	2L	010	N	1	B	C
Type	Vessel size	# of Baskets / Elements	Element Length	# of Lugs	Connection Size	Connection Style	Outlet Location	Seals	Material Of Construction

*** For specific vessel dimensional cut sheets, call factory or consult website***

CSD **Custom Service & Design, Inc.**
Auburn Hills, MI

Phone: 248.340.9005
Fax: 248.340.9002

www.customserviceanddesign.com

Cleaning CSD Your World

evoqua WATER TECHNOLOGIES

Rev. 5 – 05/26/15

Aqua-Scrub® 200

GAC ADSORPTION SYSTEM SPECIFICATION SUMMARY

The **Aqua-Scrub® 200** Liquid Phase Adsorption Filter is designed to treat a wide range of contaminated process streams, with economical carbon usage and ease of handling. This adsorber is capable of maximum flow rate of 10 GPM.

FILTER DATA:

Vessel Dimensions .... 22" dia x 34" high
Maximum Working Pressure .... 6 psig
Vessel Volume .... 7.4 Ft^3
Carbon Capacity .... 200 lbs.
Carbon Bed Volume-Typical (29.5 lb/cu-ft).. 6.8 Ft^3
Maximum Flow..10 gpm
Material..Carbon Steel
Maximum Operating Temperature .... 140°F
Interior Surface Coating ....Epoxy
Exterior Surface Coating ....Enamel
Standard Color..Blue

CONNECTIONS:

Inlet / Outlet .... 2" FNPT / 2" MNPT

UNDERDRAIN:

Slotted Pipe .... 2" x 18" PVC

WEIGHT:

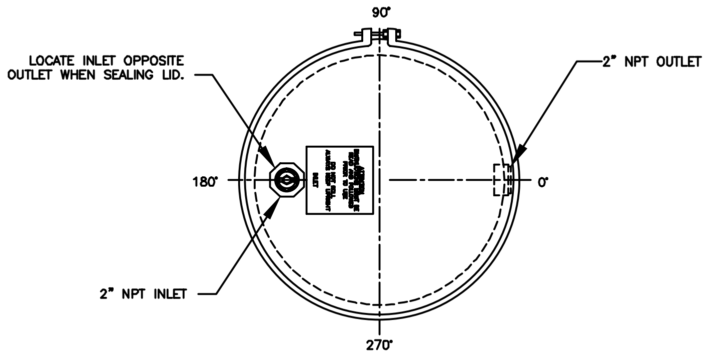
Shipping..250 lb
Operating ....500 lb

FOR ADDITIONAL INFORMATION, PLEASE CONTACT YOUR NEAREST CARBON SERVICE BRANCH AT:

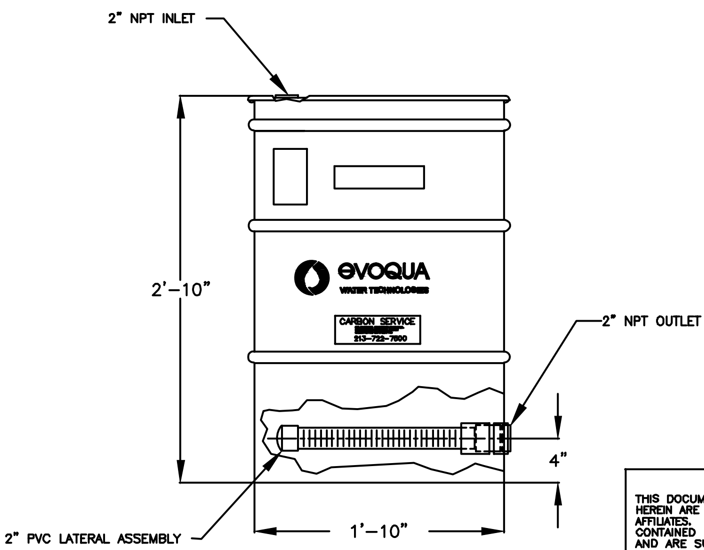
866-613-5620

GRANULAR ACTIVATED CARBON CANISTER

STD: BORDER-0106-8X11A | INTL REF: | BAR = 1" AT PLOT SCALE



PLAN



ELEVATION

NOTES:

1. MATERIALS OF CONSTRUCTION:
   - VESSEL: .... 55 GAL. CARBON STEEL
   - EXTERNAL COATING: .... BLUE ENAMEL
   - INTERNAL COATING: .... EPOXY PHENOLIC
   - INTERNAL DISTRIBUTION: .... PVC
2. SPECIFICATIONS:
   - FLOW * – CFM (MAX): 100
   - PRESSURE – PSIG (MAX): 6
   - TEMPERATURE – DEG F (MAX): 140
   - CARBON FILL VOLUME – CU FT: 6.8
   - CROSS SECTION – SQ FT: 2.8
   - SHIPPING WEIGHT – LBS: (APPROX,) 250
   - OPERATING WEIGHT – LBS: (APPROX,) 250
   - DOT .... UN 1A2/Z200/S MIN.
3. ALL DIMENSIONS ARE ±1"

* NOTE: ACTUAL DESIGN SHOULD BE BASED ON SUPERFICIAL BED VELOCITY (SBV) AS REQUIRED FOR SPECIFIC CONTAMINANTS.

DESIGNER: CAR	DATE: 10-14-15
CHECKER	DATE
ENGINEER	DATE
MANAGER	DATE
FILE:	
SCALE: NONE	

TITLE: ASC200
AQUA SCRUB 200 LB ADSORBER

CLIENT

EVOQUA WATER TECHNOLOGIES
WATER TECHNOLOGIES
RED BLUFF, CA
530-527-2664

PROJECT	CODE	DRAWING	SHEET	REV
	S	ASC200S	OF	

Product Data Sheet

DOWEX™ PSR2 Plus Cl Ion Exchange Resin

For Selective Removal of Perchlorate from Potable Water

Description

DOWEX™ PSR2 Plus Cl Ion Exchange Resin is a strong base anion exchange resin for the selective removal of perchlorate from potable water.

Designed to offer exceptional selectivity for perchlorate, the gel matrix also helps achieve high capacity while the uniform particle size (UPS) allows operation at lower pressure losses compared to conventional perchlorate removal resins.

Typical Physical and Chemical Properties

Matrix	Styrene-divinylbenzene, gel
Type	Strong base anion
Physical Form	White to yellow spherical beads
Ionic Form as Shipped	Cl^- Form
Total Exchange Capacity	≥ 0.7 eq/L
Water Retention Capacity	25 – 35%
Particle Size	
Particle Diameter [b]	700 ± 50 µm
Uniformity Coefficient	≤ 1.1
< 300 µm	1% max
Particle Density	1.07 g/mL
Bulk Density, as Shipped [c]	690 g/L (43 lb/ft^3)

[b] For additional particle size information, please refer to the Particle Size Distribution Cross Reference Chart (Form No. 177-01775).
[c] As per the backwashed and settled density of the resin, determined by ASTM D-2187.

Form No. 177-03587, Rev. 1
May 2016

Suggested Operating Conditions

Maximum Operating Temperature	60°C (140°F)
pH Range	0 – 14
Bed Depth, min.	1000 mm (3.1 ft)
Typical Service Flowrate	4 – 64 BV*/h (0.5 – 8 gpm/ft^3)
Typical Linear Velocity	12 – 54 m/h (5 – 22 gpm/ft^2)

* 1 BV (Bed Volume) = 1 m^3 solution per m^3 resin or 7.5 gal per ft^3 resin

Please contact your Dow representative for system design and application testing details.

Commissioning and Limits of Use

DOWEX™ PSR2 Plus Cl Resin is suitable for use in potable water applications after an initial commissioning pretreatment at ambient temperature.

Note

These resins may be subject to drinking water application restrictions in some countries.

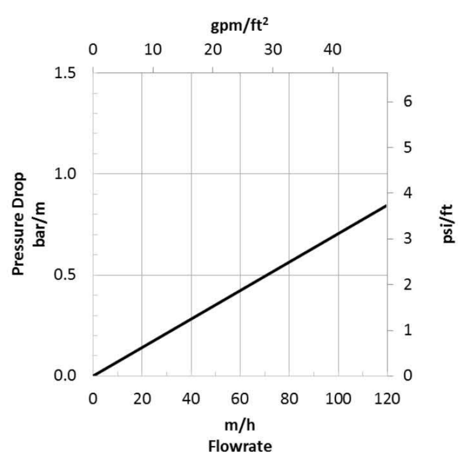
Please check the application status before use and sale.

Hydraulic Characteristics

Pressure drop data for DOWEX™ PSR2 Plus Cl Resin as a function of service flowrate at 20°C (68°F) is shown in Figure 1. The pressure drop for other water temperatures can be calculated with the provided equations. Pressure drop data are valid at the start of the service run with clean water and a correctly classified bed.

Figure 1: Pressure Drop

Temperature = 20°C (68°F)



For other temperatures use:

$P_T = P_{20°C} / (0.026\ T_{°C} + 0.48)$, where P ≡ bar/m

$P_T = P_{68°F} / (0.014\ T_{°F} + 0.05)$, where P ≡ psi/ft

Packaging

- 5-ft^3 (0.14-m^3) fiber drums
- 1000-L (264-gal) super sacks

Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products—from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including safety data sheets, should be consulted prior to use of Dow products. Current safety data sheets are available from Dow.

For more information, contact our Customer Information Group:

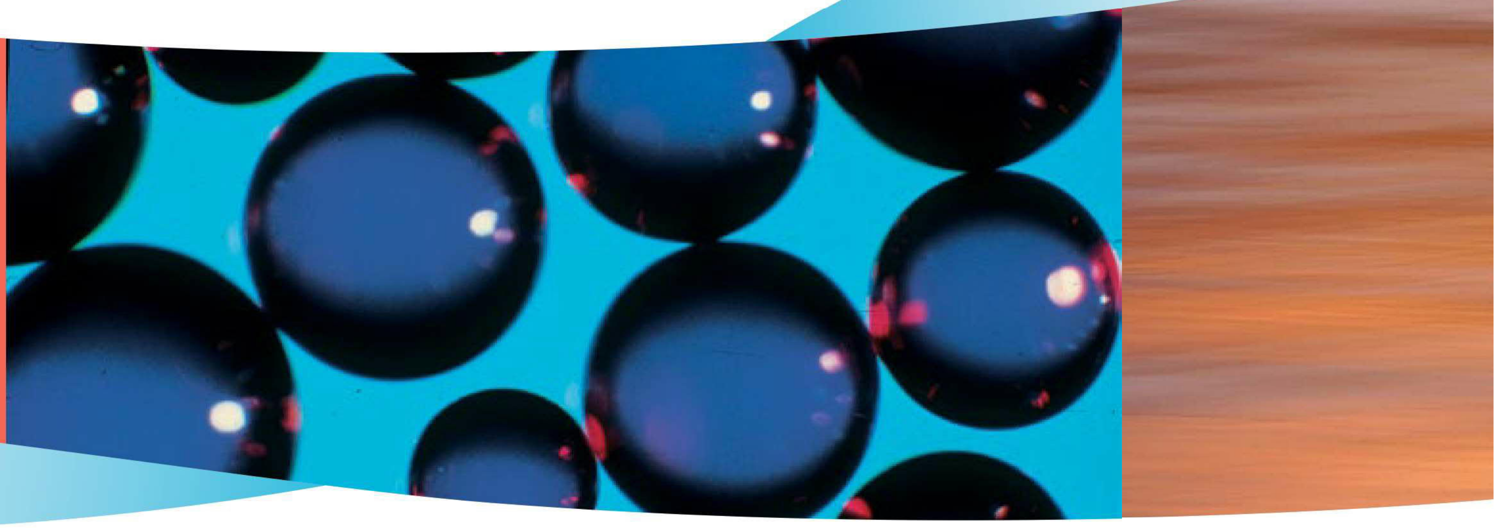
Asia Pacific	+86 21 3851 4988
Europe, Middle East, Africa	+31 115 672626
Latin America	+55 11 5184 8722
North America	1-800-447-4369

www.dowwaterandprocess.com

WARNING: Oxidizing agents such as nitric acid attack organic ion exchange resins under certain conditions. This could lead to anything from slight resin degradation to a violent exothermic reaction (explosion). Before using strong oxidizing agents, consult sources knowledgeable in handling such materials.

Form No. 177-03587, Rev. 1
May 2016

EVOQUA
WATER TECHNOLOGIES



WATER PURIFICATION THROUGH SERVICE DEIONIZATION

SERVICE DEIONIZATION (SDI)

Service Deionization (SDI) from Evoqua is a safe and economical way for you to obtain consistent, high-purity water from potable feed water. Our reliable SDI systems consist of activated carbon and ion exchange resin contained in portable tanks connected directly to your tap water supply. With SDI systems, there is no major capital investment or handling of hazardous chemicals and since there is no on-site regeneration required, Evoqua service deionization also conserves your water and energy resources.

Our large network of factory-trained local service representatives will deliver tanks, install and maintain the equipment. With Evoqua, you get the highest quality, most economical product, backed by the largest service network in the industry. We will custom-design and configure a SDI system to meet your water purity requirements, flow rates and budget.

SDI IS THE ANSWER IF YOU...

- Want a consistent source of high-purity water
- Need a system designed just for you
- Use a small amount of water and don't want to purchase a permanent system
- Have limited maintenance resources
- Have a limited capital equipment or operating budget
- Want to eliminate handling regeneration chemicals and hazardous waste neutralization
- Want to increase or decrease the size of your system as water requirements change
- Have a temporary need for deionized water

CONVENIENCE IS THE SDI DIFFERENCE

DEPENDABLE AND RELIABLE

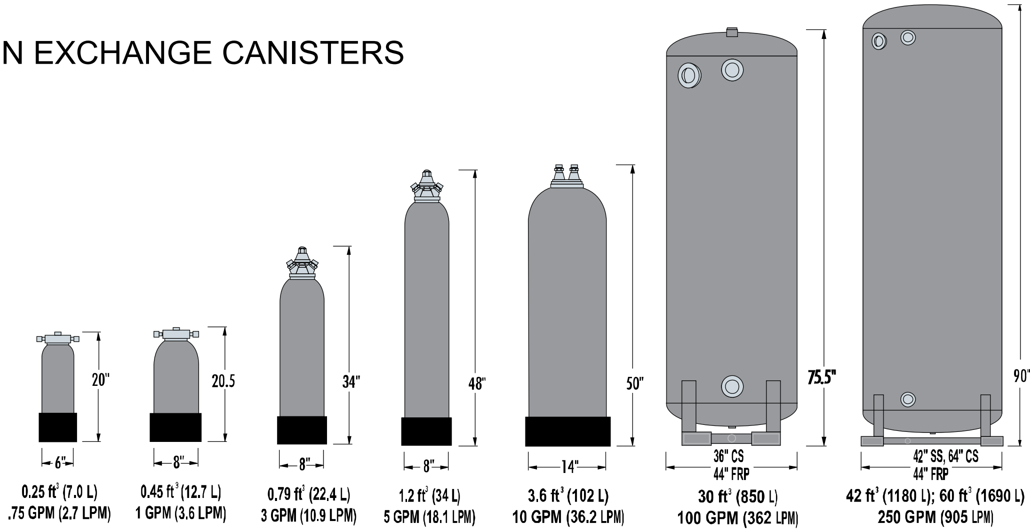
Unlike permanent-bed deionizers, Service Deionization (SDI) requires no system installation, chemical handling, waste neutralization or maintenance by you. When the resins in the tanks exhaust, our local service representatives remove and replace the tanks with freshly regenerated tanks. You have a constant supply of high-purity water and no chemicals are brought into your facility.

WE PUT THE "SERVICE" IN SERVICE DEIONIZATION

We understand how critical it is to have a reliable and continuous supply of high-purity water. Evoqua has been supplying companies like yours with high-quality SDI systems for years. With the largest local service network in the industry, we guarantee fast, first-rate service wherever and whenever you need it. And, with our 24/7, toll-free customer service hotline and team of technical support professionals, help is just a phone call away.

MATERIALS OF CONSTRUCTION

TANK SIZE FT3/LITERS	TANK	TANK LINING	TOP ADAPTER	TOP ADAPTER O-RING	RISER TUBE	BOTTOM DIFFUSER SCREEN	INLET SCREEN	CONN. NIPPLE	FILLER CAP	DUST CAP	INTERCONN. HOSES
0.25/7.0	FRP	ABS/ Polypro	PVC	BUNA N	P.P.	NORYL S.S.	S.S.	ACETAL	PVC	P.E.	P.E.
0.45/12.7	FRP	ABS/ Polypro	PVC	BUNA N	P.P.	NORYL S.S.	P.P.	NORYL	NORYL	P.E.	P.E.
0.79/22.4	FRP	ABS/ Polypro	NORYL	BUNA N	P.P.	NORYL S.S.	P.P.	NORYL	NORYL	P.E.	PVC
1.2/34	FRP	ABS/ Polypro	NORYL	BUNA N	P.P.	NORYL S.S.	P.P.	NORYL	NORYL	P.E.	PVC
3.6/102	FRP	ABS/ Polypro	NORYL	BUNA N	PVC	PVC	PVC	NORYL	ABS	P.E.	PVC
30/850	Carbon Steel	PVC Epoxy	N/A	N/A	N/A	PVC	PVC	SS	N/A	N/A	PVC
30/850	FRP	Polypro	PVC	BUNA N	PVC	PVC	PVC	SS	ABS	N/A	PVC
42/1180	SS	SS	N/A	N/A	N/A	PVC/SS	PVC/SS	SS	N/D	N/D	PVC
42/1180	FRP	Polypro	SS	BUNA N	PVC	PVC	PVC	SS	ABS	N/A	PVC
60/1690	Carbon Steel	Rubber Epoxy	N/A	N/A	N/A	PVC/SS	PVC/SS	SS	N/D	N/D	PVC



WE OFFER ACTIVATED CARBON UNITS AND DEIONIZERS IN FLOW RATES FROM 0.1 GPM (0.4 LPM) TO MORE THAN 250 GPM (900 LPM).

SOLUTIONS FOR EVERY FEEDWATER, FLOW RATE AND APPLICATION

We offer a wide range of systems and resin types for general manufacturing and industrial rinsing, as well as special grades of resin for critical applications such as food & beverage, healthcare, biopharmaceutical and microelectronics.

ACTIVATED CARBON

These units remove chlorine, chloramines and dissolved organic contaminants. Each replacement carbon unit contains specially selected carbon to assure maximum water quality and service life.

CATION DEIONIZERS

Cation resins remove positively charged dissolved ionic contaminants such as calcium, sodium, magnesium, potassium, iron and manganese. The cation resins used are very durable to provide stability against osmotic, thermal and impact shock.

ANION DEIONIZERS

Anion resins remove negatively charged dissolved ionic contaminants such as carbonate, bicarbonates, sulfates, chlorides, nitrates and silica. The anion resins used offer stability against osmotic, thermal and impact shock. A variety of anion resins are available suitable for any water application.

PREMIUM MIXED BED DEIONIZERS

For higher quality water with a more neutral pH than separate bed systems, as well as enhanced silica and CO_2 removal mixed bed deionizers are recommended. Evoqua's service deionization produces the quality of water required for any application, up to 18.2 megohm-cm resistivity at 77°F (25°C). In-line quality monitors immediately alert users when resin tanks need to be changed.

SCAVENGING RESINS

With extra large internal surface areas, the microporous scavenging resins provide high adsorption of dissolved and undissolved organic contaminants. The colloidal scavenging resins remove inorganic and organic anions. Both types of resins are extremely resistant to organic fouling.

MAXIMUM OPERATING PARAMETERS

Operating Conditions:

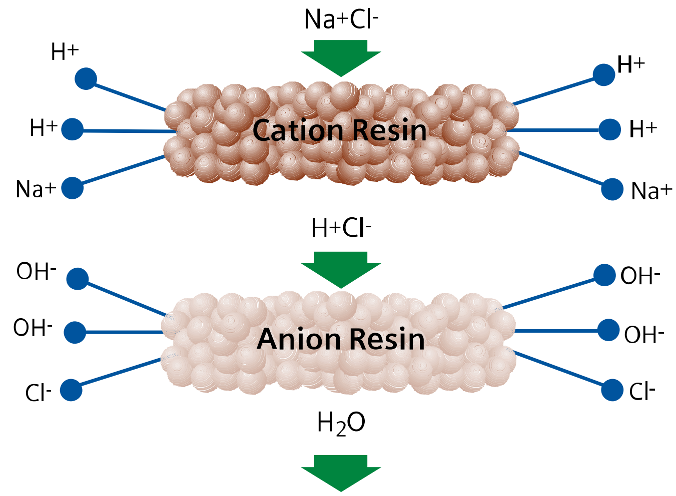
- Pressure
  - 0.25-28 ft3 (7.0-793 liters) — 80 psig (5.5 bar)
  - 30-60 ft3 (850-1690 liters) — 100 psig (7.0 bar)
- Temperature
  - 0.25-28 ft3 (7.0-793 liters) — 95°F (35°C)
  - 30-60 ft3 (850-1690 liters) — 100°F (38°C)
- Turbidity — 5 NTU
- Color — 5 units
- Organics — 3 mg/L
- Manganese & Iron — 0.3 mg/L
- Free Chlorine — 0.2 mg/L

HOW DEIONIZATION WORKS

Hydrogen ions on resins replace cations in water

Hydroxide ions on resins replace anions in water

DEIONIZATION (DI) IS ONE OF THE MOST EFFICIENT PROCESSES FOR REMOVING DISSOLVED IONIC MINERALS AND SALTS, AS WELL AS SOME DISSOLVED ORGANICS, FROM WATER.



CONDUCTIVITY AND RESISTIVITY

($CaCO_3$ solutions at 77°F / 25°C)

CONDUCTIVITY (MICROSIEMENS)	RESISTIVITY (OHMS-CM)	DISSOLVED SOLIDS (PARTS PER MILLION) (AS $CaCO_3$)	GRAINS/GALLON (AS $CaCO_3$)
0.056	18,000,000	0.0277	0.00164
0.063	16,000,000	0.0313	0.00181
0.072	14,000,000	0.0357	0.00211
0.084	12,000,000	0.0417	0.00240
0.100	10,000,000	0.0500	0.00292
0.125	8,000,000	0.0625	0.00368
0.167	6,000,000	0.0833	0.00485
0.250	4,000,000	0.125	0.00731
0.500	2,000,000	0.250	0.0146
1.00	1,000,000	0.500	0.0292
1.25	800,000	0.625	0.0368
1.67	600,000	0.833	0.0485
2.00	500,000	1.00	0.0585
2.50	400,000	1.25	0.0731
5.00	200,000	2.50	0.146
10.0	100,000	5.00	0.292
20.0	50,000	10.0	0.585

CONVERSIONS

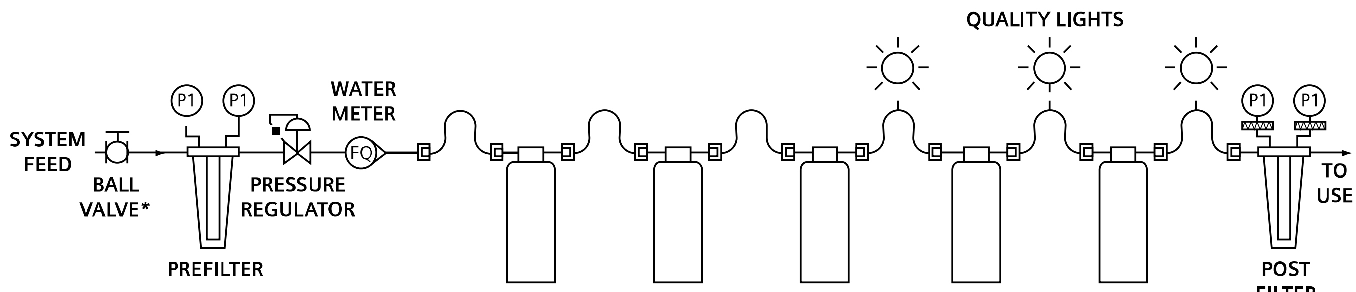
Resistivity/Conductivity

$$\text{ohm-cm} = \frac{1}{\text{mho/cm}} = \frac{1}{\text{siemens/cm}}$$

Total Dissolved Solids

1 grain per gallon = 17.1 parts per million (ppm)

1 part per million 1 milligram per liter (mg/L)



*To be supplied and installed by the user.

FOR WATER QUALITY GREATER THAN 1 MEGOHM-CM, WHERE LARGE VOLUMES OF WATER ARE REQUIRED, AN SDI SYSTEM TYPICALLY INCLUDES A CARBON TANK FOLLOWED BY CATION, ANION AND TWO MIXED-BED TANKS IN SERIES.

A TOTAL COMMITMENT TO QUALITY CONTROL

At Evoqua, there are no shortcuts on quality. Proper regeneration is critical for optimum performance, exchange capacity, total volume output and low operating cost. Our quality control specialists carefully pretest, then select only resin lots that meet our stringent requirements, assuring you the highest quality water and maximum performance from each regenerated deionizer.

QUALITY CONTROL

Incoming QC: Raw materials must meet quality specifications.

In-Process QC: Each component has its own operating criteria, and the entire process is monitored.

Final Product QC: Materials are double-checked for quality with results recorded in the batch record

SANITIZATION

Each service unit is chemically sanitized before refilling.

DOCUMENT CONTROL

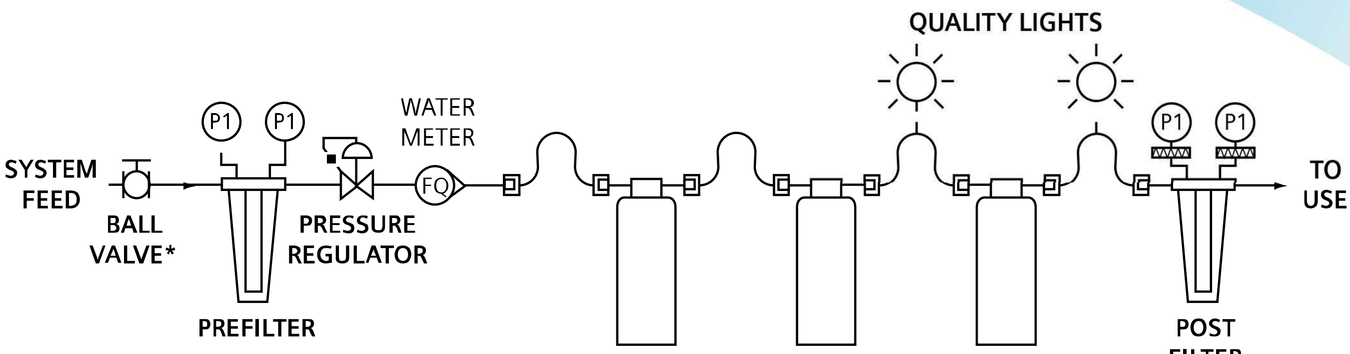
We have a comprehensive document control system. No process changes are made without proper notification and approval.

TANK TRACEABILITY

The processed resin batch number is recorded on each SDI vessel for traceability.

YOU CAN DEPEND ON OUR SERVICE PROFESSIONALS FOR:

- Emergency Service
- Preventive Maintenance
- Back-up Systems
- Field Engineering and Evaluation
- System Installations and Upgrades
- Water Sampling and Analysis
- Mobile Water Treatment
- Turn-key Projects
- Resin Regeneration
- Membrane Cleaning and Regeneration
- Membrane Replacement
- Loop Piping Sanitization
- Custom Resin Processing
- Troubleshooting



*To be supplied and installed by the user.

WHERE WATER QUALITY GREATER THAN 1MEGOHM-CM IS REQUIRED BUT WITH LOW WATER VOLUMES, A SYSTEM COMMONLY CONSISTS OF A CARBON TANK FOLLOWED BY TWO MIXED BED TANKS.

DESIGNED JUST FOR YOU

CUSTOMIZED TO MEET YOUR WATER QUALITY AND QUANTITY REQUIREMENTS

We work with you to determine what system configuration best suits your current and future needs. Flexibility in design sets our Service Deionization (SDI) systems apart from other deionization options. The components for your SDI system will be selected based on your feedwater quality, flow rate and product water quality requirements. For water quality greater than 1 megohm-cm, where large volumes of water are required, an SDI system typically includes a carbon tank followed by cation, anion and two mixed-bed tanks in series.

ACCESSORIES AND SPARE PARTS WHEN AND WHERE YOU NEED THEM

We understand that keeping your water systems running at peak performance requires the highest quality replacement filter cartridges, membranes, parts and accessories. Evoqua offers a wide variety of accessories for SDI systems and maintains the industry's largest inventories of spare parts for ours and competitor systems. We can maintain your system with a comprehensive service contract. Our products and services will keep you up and running.

QUALITY ACCESSORIES AND SPARE PARTS:

- Ion Exchange Resins
- Filter Media
- RO, NF and UF Membranes
- Disposable Cartridge Filters
- Filter Housings
- Carbon Filters
- Resistivity and Conductivity Monitors
- Multimedia Filters
- Storage Tanks
- Lab System Replacement Cartridges
- UV Lamps
- pH and Flow Meters
- Chemical Feed Systems
- Pumps
- Carbon
- and more...

ION EXCHANGE CANISTERS

4800 North Point Parkway, Suite 250, Alpharetta, GA 30022

+1 (866) 926-8420 (toll-free) **+1 (978) 614-7233** (toll) **www.evoqua.com**

4030 Columbus Drive NE
Kalkaska, MI 49646
231.258.8014
www.cleanharbors.com
remediationequipment.com

September 11, 2020

Ed Buc, P.E., CHMM
Terracon
9856 South 57th Street
Franklin, WI 53132

Proposal submitted via email to edmund.buc@terracon.com

RE: Proposal for Water Treatment System (PTS-80) Rental, Appleton, WI

Mr. Buc:

Clean Harbors appreciates the opportunity to provide this proposal to offer rental of a water treatment system for Terracon at the project site located in Appleton, Wisconsin. Our understanding is that Clean Harbors will provide a basic water treatment system designed to treat approximately 3,000 gallons of water contaminated with minor concentrations of per- and polyfluoroalkyl substances (PFAS). Because no analytical data has been provided, the treatment system provided herein is designed to remove mid- to long chain PFAS compounds in parts per trillion range. Upon the availability of laboratory analytical data, we request these be shared with Clean Harbors for review to ensure we are providing a system design sufficient for the removal of PFAS concentrations to meet discharge criteria.

Water Treatment System Design – PTS-80

For your application we recommend our PTS-80 mobile treatment system. The PTS-80 can accommodate a hydraulic through-put of between 15 and 40 gpm while meeting/exceeding the empty bed contact time (EBCT) recommended for PFAS removal. The following equipment will be included with the PTS-80 system rental.

- Two (2) 2K media vessels with 4,000 lbs. of CH-R830 (8x30 reactivated carbon)
- One (1) Bag Filter Housing w/ 3 cases of 0.5 micron bag filters
- Interconnecting hoses, fittings, valves, pressure gauges, sample ports, flow meter, etc.
- Secondary containment / spill berm
- Electric submersible pump (Little Giant 20E Series) for transferring water from equalization tank through the treatment system
- Adjustable Float Switch
- 2" Suction hose
- 2" Layflat / discharge hose

Mobilization and Water Treatment System Setup

The mobilization will include the coordination and delivery of all system components to the project site. Two (2) Clean Harbors' technicians will mobilize to the site to stage the equipment and setup the treatment system.

We plan to mobilize to the project site and setup the system during the first day of on-site work. Treatment operations will be planned to begin on the morning of the second day on-site. Electrical service for incorporating the level switch to the pump is not included in this budget and is expected to be provided by others during the system setup.

Water Treatment System Rental

The PTS-80 rental costs are provided on a monthly basis and includes media vessels, bag filter housing unit, pump, level switch, hoses, totalizing flow meter, and secondary containments. Media vessels will be pre-filled with filtration media and will be charged separately from the treatment system rental.

Water Treatment Operator Labor

Based on our understanding of the project, no labor for the operation of the treatment system will be needed.

Possible Treatment System Winterization Needs

It is our understanding the PTS-80 will be housed inside a climate controlled structure. However, should the system be exposed to temperatures below freezing, winterization of the media vessels may be required to prevent freezing of the filtration media. If required, winterization materials will be invoiced at a rate of cost plus 15%.

Media Removal, System Decontamination and Spent Media Transport & Disposal

Following the completion of the on-site treatment operations, the PTS-80 and all ancillary equipment will require decontamination. Clean Harbors will remove spent filtration media from vessels on-site and properly containerize media for transport and disposal. A sample of spent media will be collected for TCLP analysis of compounds of concern at an accredited analytical laboratory to characterize the waste stream for proper disposal. Spent media will be disposed of at a Clean Harbors' approved disposal facility. Please note the transport and disposal rates provided herein are budgetary estimates. An accurate quote will for T&D will be established and provided to Terracon prior to mobilization to the site.

Project Budget

The following table summarizes costs associated with water treatment system rental and operating labor.

Description	Unit	Estimated Quantity	Unit Price	Subtotal
Mobilization & System Setup	Ea.	1	$ 5,795.00	$ 5,795.00
Purchase of Filtration Media: CH-R830	Lbs.	4,000	$ 0.79	$ 3,160.00
Purchase of Bag Filters (3 Cases of 0.5-micron)	Ea.	150	$ 8.00	$ 1,200.00

Description	Unit	Estimated Quantity	Unit Price	Subtotal
Water Treatment System Rental	Month	6	$ 3,550.00	$ 21,300.00
Spent Media Removal, Waste Containerization, Profile Analytical and System Decontamination	Ea.	1	$ 5,575.00	$ 5,575.00
Spent Media T&D	Bin	6	$ 1,175.00	$ 7,050.00
Demobilization	Ea.	1	$ 3,150.00	$ 3,150.00
Treatment Operations Budget Estimate				**$ 47,230.00**

The items and quantities provided in the preceding table are estimated based on our current understanding of the project scope. These items shall be charged per quantities used during the water treatment project.

Thank you for the opportunity to provide this quote. Should you have any questions regarding our proposal, please feel free to contact me at (231) 342-5890 or ward.jeffrey@cleanharbors.com.

Sincerely,

Jeff Ward, PG
Senior Field Project Manager

Attachment: PTS-80 Cut Sheet
CH-R830 Product Data Sheet
Clean Harbors PFAS Treatment Information

cc: Rick Peck, Clean Harbors
Matt McLeod, Clean Harbors

Assumptions / Clarifications

- The water treatment system proposed herein is designed to treat suspended solids and PFAS. Other contaminants present may impede the performance of the treatment system. We intend to treat suspended solids by bag filtration. High solids concentrations or ultra-fine sediment may require additional measures for treatment such as sand filtration, which is not included in this budget.

- The treatment system proposed herein is designed to remove mid- to long chain PFAS compounds in the parts per trillion range. Clean Harbors reserves the right to address system modifications upon the receipt of laboratory analytical data to ensure we are providing a system design sufficient for the removal of PFAS concentrations to meet discharge criteria.

- The treatment system proposed herein is not designed for the removal of chromium. It is Clean Harbors' understanding that chromium removal is not required as effluent chromium concentrations are below discharge criteria.

- Rental and material rates will be billed based on actual quantities consumed, per the above listed rates.

- Level and accessible project location is required to place treatment system; to be prepared by others prior to arrival.

- General permit compliance is to be provided by others. Sample collection and analyses needed for permit compliance or for tracking media consumption are not included.

- On-site electrical service is not included.

- Winterization materials (if needed) will be invoiced at a rate of cost plus 15%.

- We assume that solid waste will classify in the Clean Harbors system as CCRK waste. The following conditions must apply to the waste, otherwise additional costs on top of the unit rates provided may apply:

  Drum or Flexbin Specification- with the primary disposal method as destruction incineration.

  i. No large metal pieces (rebar)
  ii. Source of PCB < 50 ppm
  iii. Mercury limited to 10 ppm maximum
  iv. Iodine less than 0.5 percent
  v. Bromine less than 0.5 percent
  vi. Fluorine less than 0.5 percent
  vii. Sulfur less than 5 percent
  viii. No reactive cyanides
  ix. No reactive sulfides
  x. No air or water reactives
  xi. Palletized material maximum dimensions 4'x4'x4'

General Conditions

- This proposal is submitted contingent upon the right to negotiate mutually acceptable contract terms and conditions, which are reflective of the work contemplated in the Request for Proposal documents, and an equitable distribution of the risks involved therein. In the event that such agreement cannot be reached, Clean Harbors reserves the right to decline to enter into such an agreement without prejudice or penalty.
- Except where superseded by an existing services agreement the following terms and conditions apply to this quoted business.
- Clean Harbors guarantees to hold these prices firm for 60-days.
- This proposal is contingent on that property owner provides full and complete access to the project site. Customer represents and warrants to Clean Harbors that the customer has the legal right, title and interest necessary to provide access to the property. In addition, customer warrants that it has supplied Clean Harbors with a complete and accurate information regarding the site, subsurface conditions, utility locations, site ownership, hazardous materials or wastes and other substances or hazards likely to be present and any other reports, documentation or information concerning the scope of work.
- For work to begin we ask that you acknowledge the quotation with a signature and provide the appropriate purchase order number. Where modifications to the scope of services become necessary, Clean Harbors will notify the customer promptly and obtain customer authorization for such modifications and a revised contract price will be established in order to finish the project.

Acknowledgement

Your signature below indicates your acceptance of the pricing and terms detailed in the quote above.
Please forward a purchase order number in order for us to proceed.

Accepted by: ______________________________________ Date: ______________________________

Company: ____ Purchase Order #: ____________________

Billing Address: ____

INTERIM ACTION TEMPORARY WATER TREATMENT SYSTEM

ACTIVATED CARBON & SERVICES

CH-R830 (FILTRATION MEDIA)

LIQUID PHASE REACTIVATED CARBON

CH-R830 (8x 30) is a hard, reactivated carbon manufactured from pooled spent carbon which is recommended for a variety of wastewater and process water treatment. CH-R830 (8 x 30) efficiently removes chlorine, taste and odor compounds, and volatile organics, even with brief contact times.

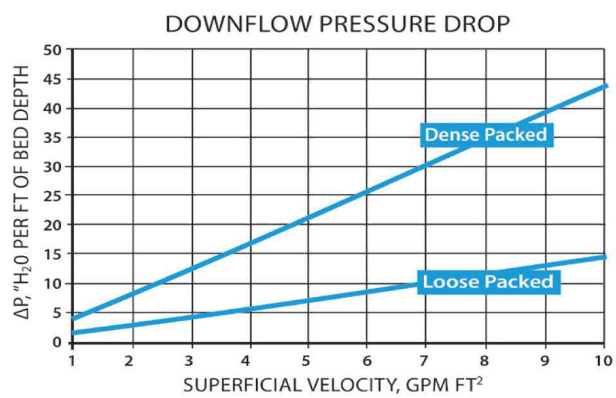
SPECIFICATIONS	CH-R830	ASTM TEST M
Iodine Number, min	800	-
Bulk Density, min	0.50g/cc	D-2854
Abrasion No., min	75	-
Effective Size, mm	0.8-1.0	-
Moisture as packed	2%	D-2867
U.S. Standard Sieve Size	8 x 30	-
Larger than No. 8, max	15%	
Smaller than No. 30, max	5%	

Applications

- Remediation
- Wastewater Treatment
- Condensate Water Treatment
- Range of Process Water Treatment

Standard Packaging

- 55 lb or 27. 5 lb polylined polypropylene bags
- 200 lb fiber drums
- 1100 lb supersacks



*This information is offered solely for your consideration and verification. It has been gathered from reference materials and/or test procedures and is believed to be true and accurate. None of this information shall be constituting a warranty or representation, expressed or implied, for which we assume legal responsibility or that the information or goods described is fit for any particular use either alone or in combination with other goods or processes.

MEMBER Water Quality ASSOCIATION

AWWA MEMBER

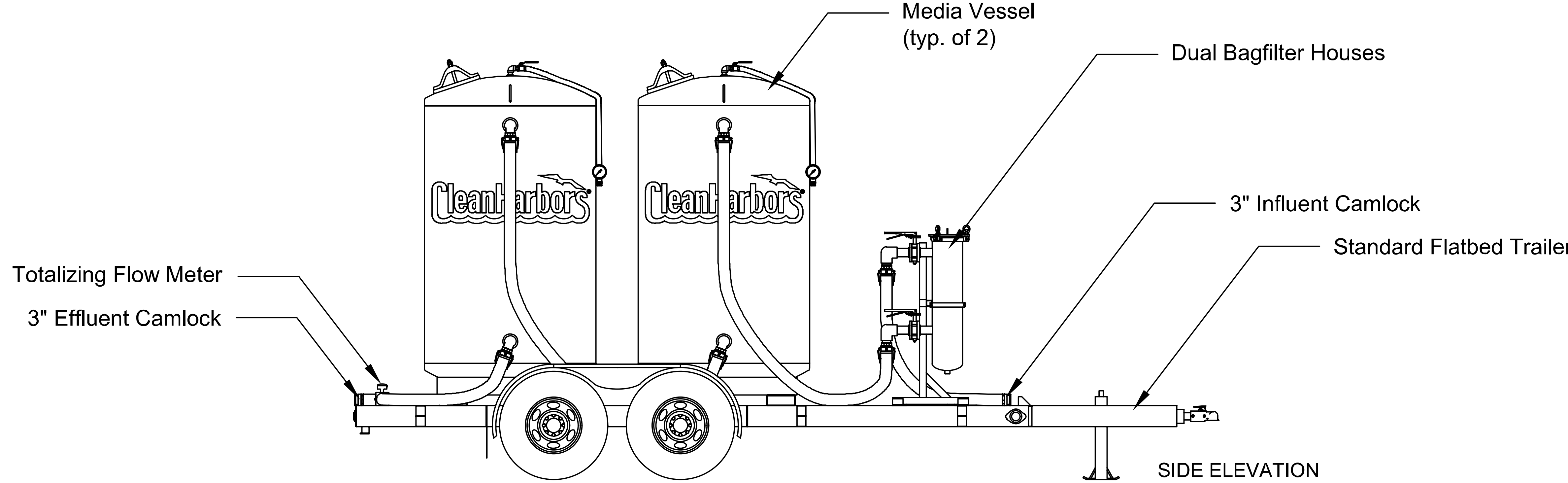
Certified System SAI GLOBAL ISO 9001 Quality

NSF

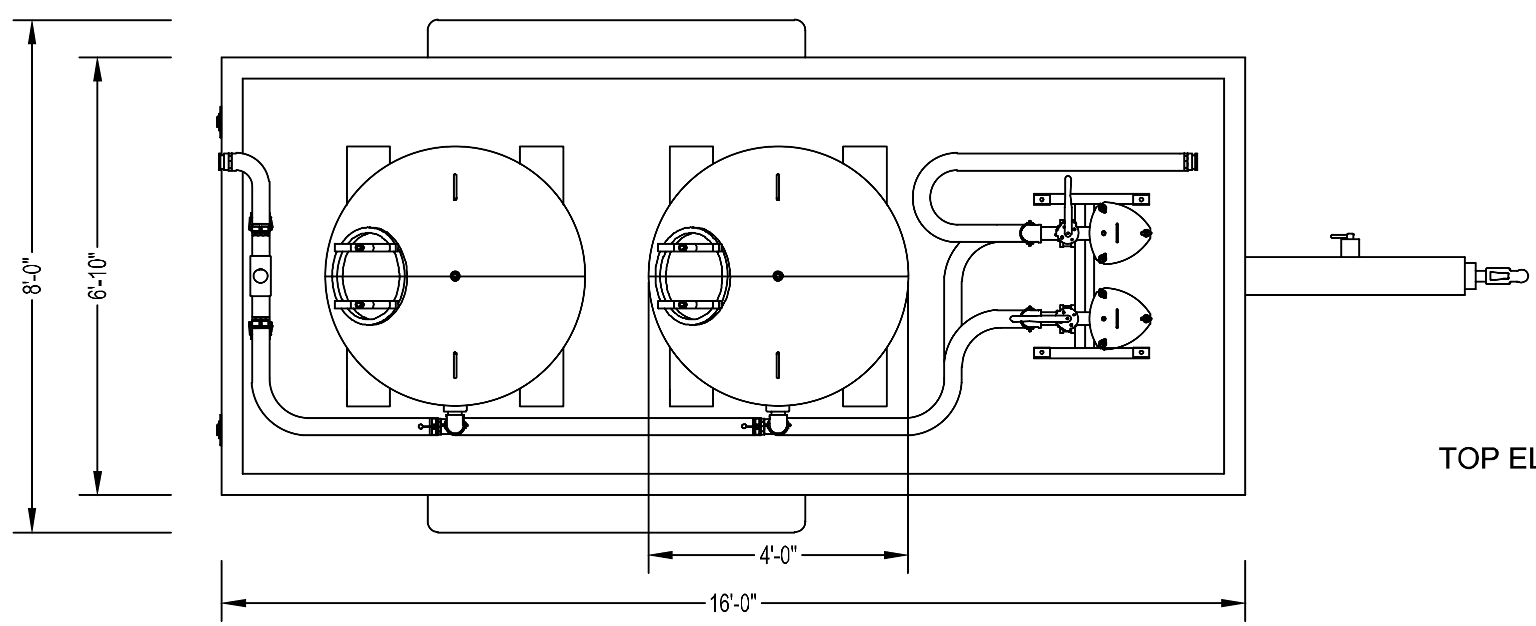
CleanHarbors

Remediation Technologies • 4030 Columbus Drive NE • Kalkaska, MI 49646 • 800.OIL.TANK • 231.258.8014
www.cleanharbors.com • www.remediationequipment.com

INTERIM ACTION TEMPORARY WATER TREATMENT SYSTEM



SIDE ELEVATION



TOP ELEVATION

SHEET: 1 of 1

Typical Layout

SCALE: As Shown

DATE: 1 Jul 2019
DRAWN BY: R. Fuller
CHECKED BY: M. McLeod

	REVISION	DATE:		REVISION	DATE:
1			4		
2			5		
3			6		

CleanHarbors
Clean Harbors Environmental Services
4030 NE Columbus Drive, Kalkaska, MI 49646
(231) 258-8014

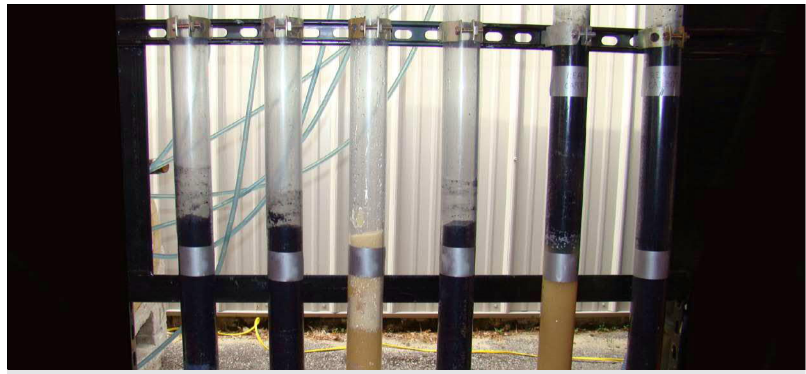
Trailer-mounted Treatment System

PTS-80

INTERIM ACTION TEMPORARY WATER TREATMENT SYSTEM

ENVIRONMENTAL SERVICES

PFAS Treatment for Industrial and Municipal WWTPs



Clean Harbors has been at the forefront of treating PFAS impacted industrial and municipal wastewater for clients across the United States. Our systems are installed at AFFF impacted sites, plating facilities, manufacturing facilities, refinery facilities and municipal WWTPs. Our team of experts work with and assist engineering firms and end-user clients to treat the full lifecycle of the project from analytical review of influent water to the design, installation, operation and maintenance of these systems. Clean Harbors also has MACT compliant hazardous incineration facilities with the strictest discharge requirements to destroy spent media and solids associated with PFAS treatment.

Life Cycle of Project Services Offered:

- Sample Collection
- Analytical Data Review
- Treatment Approach Development
- Piloting Systems Including Piloting Trailers
- Temporary and Permanent Equipment Including Media
- Operation and Maintenance of Systems
- Change-Out Services
- Media Destruction with Certificate of Destruction

Clean Harbors can evaluate the analytical data and project objectives to help develop the most cost-effective treatment plan. Treatment plans will vary depending upon a number of factors and we can work with you to gather the information required to make the most informed decisions. Whether you are in the analytical investigative stage or require an immediate system delivery we are ready to provide you with assistance and services

North American Remediation

Treating PFAS impacted wastewater requires experience with difficult to treat influent water. For many PFAS wastewater applications the pretreatment approach is as important as the actual PFAS treatment. Every industry and application has a unique water chemistry and our complete SCID* approach allows our customers to meet their strictest discharge criteria including PFAS, metals, TOC, VOCs, SVOCs and TSS. Through our broad selection of adsorptive and IX medias we can identify and implement a treatment train to meet targeted goals including shorter chained PFAS compounds.

SCID*

Separation- Through varied adsorptive and IX medias depending upon water chemistry PFAS and other target analytes are separated from the influent.

Concentration- PFAS and other target analytes are concentrated and captured onto the media.

Isolation- PFAS and other targeted contaminants are isolated onto spent media and dewatered solids.

Destruction- MACT compliant Incineration is the BDAT (best demonstrated available technology) for PFAS. Clean Harbors has 70% of the hazardous incineration capacity in North America.

For more information about our services please call 231.258.8014 or email PFAS@cleanharbors.com

CleanHarbors®

800.282.0058 • www.cleanharbors.com