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Construction Quality Assurance Project Plan
Focused NAPL and Sediment Removal Action
Former Marinette MGP Site
City of Marinette, Marinette County, WI
Revision 1

October 16, 2012

NRT Project Number: 2098

NATURAL RESOURCE TECHNOLOGY

ENVIRONMENTAL CONSULTANTS

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ACRONYMS AND ABBREVIATIONS

Acronyms and abbreviations used in this Construction Quality Assurance Project Plan include the following:

ACC	Acceptable Ambient Concentration
AOC	Administrative Order on Consent
ASTM	American Society for Testing and Materials
BMP	Best Management Practice
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
cfs	Cubic feet per second
COC	Contaminant or constituent of concern
CQA	Construction Quality Assurance
CQAPP	Construction Quality Assurance Project Plan
CQC	Construction Quality Control
CY	Cubic yard
DHFS	Department of Health and Family Services
DGPS	Differential global positioning system
DMU	Dredge Management Unit
FEMA	Federal Emergency Management Administration
FSP	Field Sampling Plan
GAC	Granular Activated Carbon
HAZWOPER	Hazardous Waste Operations and Emergency Response
IBS	Integrys Business Support, LLC
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
MS/MSD	Matrix spike/Matrix spike duplicate
MGP	Manufactured Gas Plant
NRT	Natural Resource Technology, Inc.
NTU	Nephelometric turbidity unit
NAPL	Non-aqueous phase liquid
NAVD88	North American Vertical Datum of 1988
OSHA	Occupational Safety and Health Administration
PACE	Pace Analytical Services
PAH	Polycyclic aromatic hydrocarbon
ppm	Parts per million
QA	Quality assurance
QAM	Quality Assurance Manual
QAPP	Quality Assurance Project Plan
QC	Quality control
RTK-GPS	Real-time kinematic global positioning system
RI/FS	Remedial Investigation/Feasibility Study

Removal AOC	Removal Action Administrative Order by Consent
RPM_{10}	Respirable Particulates
Settlement Agreement	Settlement Agreement and Administrative Order on Consent
SOP	Standard operating procedure
s.u.	Standard unit
STAT	STAT Analysis Corporation
SAS	Superfund Alternatives Site
TVOC	Total Volatile Organic Compounds
TSCA	Toxic Substances Control Act
TSS	Total suspended solids
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Society
VOC	Volatile Organic Compounds
WDNR	Wisconsin Department of Natural Resources
WPDES	Wisconsin Pollution Discharge Elimination System
WPSC	Wisconsin Public Service Corporation
WWTP	Waste Water Treatment Plant

1 INTRODUCTION

This Construction Quality Assurance Project Plan (CQAPP) was prepared as part of a non-time critical removal action to remove NAPL and near shore sediment with total PAH (13) concentrations equal to or exceeding 22.8 milligrams per kilogram (mg/kg) at the former Marinette Manufactured Gas Plant (MGP) in the Menominee River, Marinette, Wisconsin. Wisconsin Public Service Corporation (WPSC), a subsidiary of Integrys Energy Group (IEG), formally owned the MGP. The Site is managed by Integrys Business Support, LLC (IBS). WPSC and United States Environmental Protection Agency (USEPA) entered into a Multi-Site Settlement Agreement and Administrative Order on Consent (Settlement Agreement), CERCLA Docket No. V-W-06-C-847, effective May 5, 2006, to perform Remedial Investigation/Feasibility Study activities for six former MGPs including the Marinette Site in the Superfund Alternatives Site (SAS) Program. Under the RI/FS Settlement Agreement, sediment at the Marinette Site has been investigated in accordance with the USEPA-approved Site-Specific Work Plan, Revision 3, dated May 7, 2012. An Engineering Estimate/Cost Analysis (EE/CA) Report was prepared pursuant to the requirements of an Administrative Settlement Agreement and Order on Consent (AOC) for EE/CA, between the United States Environmental Protection Agency (USEPA) and WPSC, CERCLA Docket No. V-W-12-C-005, effective July 27, 2012, and in accordance with "Guidance on Conducting Non-Time Critical Removal Actions under CERCLA", EPA/540-R-93-057, Publication 9360.32, PB 93-963402, dated August 1993.

1.1 Purpose

This CQAPP is a companion document to the Focused NAPL Removal Plans and Specifications for the Menominee River and also relies on elements of the Remedial Investigation/Feasibility Study (RI/FS) Multi-Site Quality Assurance Project Plan (QAPP) - Revision 2, dated September 4, 2007. This CQAPP establishes requirements for managing and implementing the quality assurance (QA) and Quality Control (QC) systems. It provides the framework and criteria for task specific QC requirements and project specific QA plans. Implementation of the CQAPP will ensure the work is completed in accordance with the project goals.

This CQAPP was developed in general accordance with *Requirements for Quality Assurance Project Plans* (USEPA, 2001), *Guidance for Quality Assurance Project Plans* (USEPA, 2002), *Guidance on Systematic Planning Using the Data Quality Objective Process* (USEPA, 2006), *Construction Quality Management Guidance* (United States Army Corps of Engineers (USACE)), and *Quality Control* (USACE, 2008). To the extent possible, this CQAPP includes Standard Operating Procedures (SOP) from the USEPA-approved Multi-site Field Sampling Plan (FSP) – Revision 4, dated September 8, 2008, prepared for IBS.

The CQAPP establishes the requirements for the following:

- Personnel responsibilities and authority
- Procedures, guidelines, checklists, and forms for inspection, sampling, testing, and documentation of construction activities
- Deficiencies, noncompliance, and corrective actions
- Identification of proposed sampling activities

1.2 Scope

Remedial work activities addressed in this CQAPP include:

- Erosion control
- Site security
- Roadway/sidewalk/parking lot condition documentation
- Temporary sheet pile cofferdam
- Shoreline structure protection measures
- Upland barrier installation
- Bathymetric surveys
- Turbidity monitoring
- Post dredge sampling
- Verification sampling in NAPL-areas
- Verification sampling for PAHs
- Residual sand layer placement
- Sediment stabilization, transport, and disposal
- Water treatment and discharge into the Menominee River
- Fugitive emissions monitoring and mitigation
- Site restoration

1.3 Project Setting

1.3.1 Site Description

The former MGP is located at Latitude 45.100230° North, Longitude 87.632005° West, T30N, R24E, Section 6, SE ¼, NE ¼, 1603 Ely Street, Marinette, Marinette County, Wisconsin (Figure 1). The former MGP encompassed approximately 1 acre and is currently owned by the City of Marinette (City). The City operates a wastewater treatment plant (WWTP) at this property. The WWTP property is bounded on the north by Mann Street and railroad tracks, on the southwest by Ludington Street and then Ely Street on the southeast (Figure 2).

The former MGP was located within 700 feet of the Menominee River. MGP residuals in the Menominee River likely migrated from the MGP via a former slough that drained into the Menominee River at approximate river mile 185+00 (USACE) through what is now the City of Marinette's Boom Landing boat launch facility (Figure 2).

The River Portion of the Site is located approximately 2 miles from the river mouth draining into Lake Michigan. The River Portion of the Site includes a portion of the area between Boom Landing and Strawberry Island (Figure 2). Strawberry Island is located approximately 400 feet north of Boom Landing. This island has been mistakenly referred to as Boom Island in some previous reports.

The Menominee River is a gaining stream that receives groundwater and surface water from the Marinette area and discharges into Lake Michigan. The river separates Wisconsin from Michigan's Upper Peninsula along the northeast boundary of Wisconsin. The river is approximately 118 miles long as it flows into Lake Michigan. The drainage area for the Menominee River is 4,070 square miles according to the United States Geological Survey (USGS). Water depths in the River Portion of the Site range from 1 to 15 feet according to bathymetric survey conducted in November 2011. The river is approximately 1,075 feet wide near the River Portion of the Site.

The USGS had a stream monitoring station (USGS 04067651) in the mouth of the river until October 1995. The total flow from November 1994 until October 1995 was 36,933 cubic feet per second (cfs) with the greatest monthly flow of 5,585 cfs (May 1995) and the lowest monthly flow of 1,920 cfs (February 1995). The average daily flow during this period was 3,085 cfs.

Currently, the closest USGS stream monitoring station (USGS 04067500) to the Site is 18 miles upstream. The total flow at this station from October 1994 to September 1995 was 35,522 cfs with the greatest monthly flow of 5,391 cfs (May 1995) and the lowest monthly flow of 1,854 cfs (February 1995). The average daily flow during this period was 2,570 cfs. The total flow from September 2007 to September 2008 (most recent data) was 31,199 cfs with the greatest monthly flow of 7,786 cfs

(April 2008) and the lowest monthly flow of 1,170 cfs (September 2008). The average daily flow during this period was 2,668 cfs.

The 1978 Federal Emergency Management Agency (FEMA) map indicates the 100 year floodplain is at Elevation 585 feet above mean sea level (msl, referenced to the National Geodetic Vertical Datum of 1929).

1.3.2 Contaminants of Concern

The primary contaminants of concern (COC) associated with the Removal Action AOC are PAHs.

NAPL in the form of oil-coated/oil-wetted sediment and the highest sediment PAH are adjacent to the former MGP slough, at the southern shore of the Menominee River. Approximately 550 feet of the shoreline and 1.3 acres of the river are expected to be addressed under the Removal Action AOC. The concentrations and distributions of COCs have been studied and were used as the basis for the cleanup design, including excavation depths and the delineation of the dredge areas.

1.3.3 Cleanup Goals

The primary cleanup goal for the Removal Action AOC is removing sediment with visual observations of NAPL. NAPL is defined for this action as oil-wetted or oil-coated near-shore sediment. In addition to the NAPL-affected near-shore sediment, near shore sediment with PAHs above 22.8 mg/kg in the sediment have also been identified for removal.

1.3.4 Dredge Plan Summary

The work to be undertaken involves installation of a sheet pile cofferdam to contain the working area, securing shoreline features, mechanical dredging of sediment, stabilization of the sediments with reactive blending materials as needed, water treatment of MGP contact water, and disposal of approximately 8,500 cubic yards (CY) of contaminated sediments and 230 CY of non-contaminated sediments from the site. Dredge cut lines and the delineation of the dredge areas have been developed by Natural Resource Technology based on RI data collected in 2012.

Mechanically-dredged sediments are anticipated to be loaded into scows. Sediments will then be stabilized (e.g., blended with Portland cement or lime kiln dust) in the scows or directly loaded from the scows on to the sediment stabilization pad and be stabilized on the pad as needed to meet solid waste landfill disposal criteria. Following stabilization, sediments will be transported to Waste Management's Menominee Landfill in Menominee, Michigan.

The design plans and specifications for the project contain requirements that the Contractor include the following minimum water treatment process steps, which are deemed the best available treatment technology reasonably achievable considering other successful contaminated sediment cleanup projects of a similar nature: solids settling/clarification, multi-media filtration, and granular activated carbon filtration/polish. The Contractor will decide whether bag filters and an oil-water separator are also needed in the process train to comply with effluent limits, established by the Wisconsin Department of Natural Resources (WDNR) using Substantive Requirements of the Wisconsin Pollution Discharge Elimination System (WPDES) General Permit for Carriage and/or Interstitial Water Resulting from Dredging Operations (#WI-0046558-05-0). The Contractor will also decide the flow capacity and operating timeframe for the water treatment system, but given the anticipated relatively small volume of water to be treated from the mechanical dredging operations, it is anticipated that batch treatment will be utilized instead of near continuous operation.

2 PERSONNEL RESPONSIBILITY AND AUTHORITY

2.1 Overview

This section describes and documents the roles and responsibilities of the project personnel responsible for developing, approving, and implementing the CQAPP. The duties, responsibilities and authorities of project personnel are described in the following subsections. Role relationships are depicted in Figure 3 indicating direct and collaborative lines of communication. Direct lines reflect general reporting responsibilities for each of the identified roles. Key project roles and general reporting responsibilities are described in the following sections.

2.2 Project Manager

The Project Manager will be responsible for overall execution and progress of the remedial construction. The Project Manager's duties include:

- Coordinate with WPSC, USEPA, WDNR, and other project personnel, as necessary.
- Maintaining daily contact with the Project Engineer during progress of work.
- Evaluating the progress and performance of the remedial construction with respect to planned requirements and authorizations and the construction schedule.
- Reviewing and assessing site-specific documents, including the Contractor's scope of work, contract terms, and CQAPP.
- Monitoring budgetary expenditures and developing budgetary projections throughout the duration of the project.
- Providing technical support to Project Engineer as required to address potential modifications or changes to the Technical Specifications and Contract Drawings.
- Acquiring and applying technical and corporate resources, as needed, to ensure performance within budget and schedule constraints.
- Developing and meeting ongoing project and/or task staffing requirements.
- Reviewing the work performed on each task to ensure its quality, responsiveness, and timeliness.
- Reviewing and/or approving, or designating the review and approval of, project deliverables from the Contractor.

- Preparing and submitting, or designating such for, the reports listed in Section 5 of this document.
- Representing the Project team at meetings, as required.

The Project Manager for this site is Eric Tlachac.

2.3 Project Engineer

The Project Engineer is responsible for ensuring implementation of the approved Technical Specifications and Contract Drawings. The Project Engineer will report directly to the Project Manager. Duties of the Project Engineer include:

- Reviewing and becoming familiar with the Contractor's CQCP and quality procedures for each definable feature of work.
- Providing daily coordination and communication with the Field Engineer and Construction Quality Assurance (CQA) Engineer.
- Reviewing and approving Contractor Construction Quality Control (CQC) data for conformance with the Technical Specifications and Contract Drawings.
- Reviewing material certifications and related test results for compliance with the Technical Specifications, and reporting any deficiencies to the Contractor.
- Monitoring budgetary expenditures and developing budgetary projections throughout the duration of the project.
- Tracking various material quantities such as volumes of dredge material, tonnages of stabilized material, tonnages of material hauled off site for disposal, and tonnages and volumes of cap material placed.
- Reviewing Contractor draft applications for payment with respect to quantities claimed and conformance with approved change orders or field directives.
- Reviewing daily field engineering reports.
- Overseeing daily on-site field office administration with regard to tracking and filing project submittals and documents.
- Communicating daily with the CQA Engineer on the status of the sampling activities and geotechnical and chemical laboratory data.
- Providing daily oversight of the CQA operations.
- Leading weekly progress meetings with the Contractor, WPSC, USEPA, and WDNR.
- Preparing and distributing weekly electronic progress reports and updates to the overall construction schedule.

- Coordinating with the Contractor and relevant subcontractors to eliminate redundancy in QC/QA testing, where possible.

- Reviewing field directives and/or requests for change orders in cases where construction deviates from the intended design and/or Technical Specifications and Contract Drawings with the Project Manager.

The Project Engineer is Kenneth R Mika.

2.4 Corporate Safety Officer

The Corporate Safety Officer is responsible for reviewing, approving, and auditing the implementation of all site health and safety program elements and has direct access to corporate executive staff, as necessary, to resolve any health and safety issues. The Corporate Safety Officer, as well as any project personnel, has sufficient authority to stop work on the project as deemed necessary in the event of serious health and safety issues. The Corporate Safety Officer will report directly to the Off-site Project Manager. Duties of the Corporate Safety Officer include:

- Reviewing and approving health and safety plans and procedures.

- Providing health and safety consultation to project staff.

Complete details of the site health and safety program will be presented in the Contractor's and the Natural Resource Technology's (NRT's) Site-Specific Health and Safety Plan.

The Corporate Safety Officer for this site is Steve Wiskes.

2.5 On Site Health and Safety Officer

The On Site Health and Safety Officer is responsible for daily implementation of the approved, Site-Specific Health and Safety Plan. The On Site Health and Safety Officer has direct access to corporate executive staff, as necessary, to resolve any health and safety issues. The On Site Health and Safety Officer, as well as any project personnel, has sufficient authority to stop work on the project as deemed necessary in the event of serious health and safety issues. The On Site Health and Safety Officer will report directly to the Corporate Safety Officer.

The On-site Health and Safety Officer for this site is Chris Musson.

2.6 Field Engineer

The Field Engineer will report directly to the Project Engineer and have responsibility for general project and technical implementation of the project. The Field Engineer, or designee, will be present on site whenever work is in progress to ensure implementation of the approved Technical Specifications and Contract Drawings. The Field Engineer's duties include:

- Maintaining daily contact with the Project Engineer during progress of work.
- Evaluating the progress and performance of the construction with respect to planned requirements and authorizations and the construction schedule.
- Reviewing and assessing site-specific documents, including the contractors scope of work, contract terms, and CQAPP.
- Tracking various material quantities such as volumes of dredge material, tonnages of stabilized material, tonnages of material hauled off site for disposal, and tonnages and volumes of cap material placed.
- Developing and meeting ongoing project and/or task staffing requirements.
- Reviewing the work performed on each task to ensure its quality, responsiveness, and timeliness.
- Reviewing and/or approving, or designating the review and approval of, project deliverables before their submission to the Project Engineer.
- Preparing and submitting, or designating such for, the reports listed in Section 5 of this document.
- Representing the Project team at meetings, as required.
- Providing daily coordination and communication with the field staff during construction.
- Reviewing and approving subcontractor CQC data for conformance with the Technical Specifications and Contract Drawings.
- Reviewing material certifications and related test results for compliance with the Technical Specifications, and reporting any deficiencies to the Project Engineer.
- Preparing or reviewing daily field reports.
- Overseeing daily on-site field office administration with regard to tracking and filing project submittals and documents.
- Communicating daily with the On-site CQC Staff on the status of the sampling activities.
- Reviewing field directives and/or requests for change orders in cases where construction deviates from the intended design and/or Technical Specifications and Contract Drawings with the Off-site Project Manager.

The Field Engineer for this site is Chris Musson.

2.7 CQA Engineer

The CQA Engineer will be on site during all phases of construction requiring CQC or CQA testing by the Technical Specifications, Contract Drawings and this document. The CQA Engineer will report directly to the Project Engineer. The CQA Engineer's duties include:

- Reviewing and becoming familiar with the Contractor's CQCP and quality procedures for each definable feature of work.
- Coordinating collection and testing of CQA samples, as necessary, and shipping of test samples to off-site laboratories, as required.
- Post-dredge confirmation sampling.
- Perimeter ambient air concentration sampling and monitoring.
- Preparing samples for shipment and documenting delivery to the laboratories.
- Communicating and coordinating with the geotechnical and chemical laboratories on the status of sample shipments.
- Monitoring river turbidity and perimeter ambient air concentrations.
- Receiving and reviewing geotechnical and chemical data for completeness and that the results meet the required CQA performance criteria.
- Filing and transmitting analytical data into the project database.
- Reviewing geotechnical and chemical laboratory analytical data with the Project Engineer.
- Collecting photographs to document construction progress and CQC/CQA monitoring/testing.
- Preparing CQA sampling reports for review by the Project Engineer and Contractor, including:
    - Descriptions of CQA/CQC tests and measurements performed and any relevant observations
    - Results of CQA/CQC laboratory testing
    - Testing results that do not meet the applicable CQA criteria

The CQA Engineer for this site is Edwards Effiong.

2.8 Quality Manager

The Quality Manager will report directly to the Project Manager and be responsible for ensuring that quality processes are implemented correctly and that quality objectives are being met for the project. The Quality Manager has authority to stop any work that is not in compliance with the Contract Documents and has direct access to corporate executive staff, as necessary, to resolve any CQC disputes. The Quality Manager, or a designated alternate, will be on site at all times during active construction. The Quality Manager is responsible for overall management of CQC and is responsible for auditing the implementation of the CQC program for each definable feature of work and determining conformance with corporate policies and project requirements. Duties of the Quality Manager, or designee, include:

- Performing CQC audits on various phases of the field operations.
- Reviewing and approving CQC plans and procedures.
- Providing CQC technical assistance to the Project Manager and other project staff.
- Regularly reporting on the adequacy, status, and effectiveness of the CQC program to the Off-site Project Manager.

The Quality System Manager for this site is Steve Wiskes.

2.9 Project Superintendent

The Contractor's Site Superintendent will report directly to the Field Engineer and have responsibility for dredging progress and construction quality. The Site Superintendent, or designee, will be present on site whenever work is in progress to ensure implementation of the approved Technical Specifications and Contract Drawings. The Site Superintendent's duties include:

- Assisting the Field Engineer with evaluating the progress and performance of the dredges.
- Assisting the Field Engineer with monitoring resource needs throughout the duration of the project.
- Providing construction support to the Field Engineer, as required, to address potential modifications or changes to the Technical Specifications and Contract Drawings.
- Developing and meeting ongoing task staffing requirements and schedule.
- Leading the Contractor's team at meetings, as required.
- Providing daily coordination and communication with the dredging foremen.

The Contractor's Site Superintendent for this project is Kelly Pecka with Envirocon,Inc..

2.10 Support Staff

The Support Staff will report directly to the Field Engineer and CQA Engineer. Primary responsibilities will include: day-to-day field oversight; CQC testing; preparing, labeling, and shipping CQC samples; maintaining CQC monitoring equipment; preparing sampling and testing reports and documentation; and daily coordination and communication with the CQC team.

The Support Staff members will be determined as needed.

2.11 Laboratory

Pace Analytical Services (Pace), in Green Bay, Wisconsin and STAT Analysis Corporation (STAT) in Chicago, Illinois were previously approved by USEPA to provide analytical laboratory services during the RI activities. Pace will analyze turbidity and TSS of river water samples, wastewater treatment discharges per the WPDES permit requirements and post-dredge sediment samples for PAHs, and if required, chemical and geotechnical analyses of imported general fill, sand, and gravel backfill materials. STAT will analyze air samples to assess ambient air during the remedial action.

The laboratories roles and responsibilities are defined in the RI/FS Multi-Site QAPP – Revision 2 (September 4, 2007).

3 SAMPLE MANAGEMENT, DOCUMENTATION AND RECORD KEEPING

The Field Engineer or Support Staff will collect samples throughout the duration of the project for such purposes as monitoring turbidity, post-dredge sediment samples, and fugitive air emission samples. The procedures for managing and documenting the sampling and analysis are described in this section. All sampling will be conducted by NRT, with possible support of a subcontractor under NRT direction.

3.1 Special Training Requirements/Certification

This section addresses any specialized or non-routine training requirements necessary for completion of sampling. Sufficient information will be provided to ensure that special training skills can be verified, documented, and updated as necessary.

3.1.1 Training

All team members who will be collecting samples will have had training and experience in field sampling and documentation techniques required for this project. Routine sampling will be conducted according to SOP provided in the USEPA-approved Multi-Site FSP (September 8, 2008).

3.1.2 Certification

All on-site team members will have had 40-hour training for Hazardous Waste Operations and Emergency Response (HAZWOPER) and Occupational Safety and Health Administration (OSHA) 8-hour Annual HAZWOPER Refresher training in accordance with 29 CFR 1910.120. In addition, all employees entering the site are provided the Site-Specific Health and Safety Plan.

3.1.3 Laboratory Qualifications

IEG will retain Pace and STAT to perform laboratory analysis as summarized on Table 1. Both laboratories were included as an analytical laboratory in the USEPA-approved RI/FS Multi-Site QAPP – Revision 2, September 4, 2007 which included the Quality Assurance Manual (QAM) and a written QA plan to ensure that all laboratory operations are conducted in a controlled manner and in accordance with state and federal certification requirements.

3.2 Sampling Documentation and Records

This section identifies sampling documents and records to be generated throughout the project and information to be included in these documents and records. A description of the data management system and types of data that will be collected are also presented in this section.

Documentation and record-keeping related to laboratory performance and deliverables will be handled by the Quality Manager.

3.2.1 Anticipated Documents and Records

Field Documentation

Sampling performed during the project will be documented in bound, dedicated logbooks (NRT SOP 07-02-01). All entries will be made in ink and no erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single line that is initialed and dated. If pages are left intentionally blank, a diagonal line will be drawn across the page and the field team member will sign the page. The sampling team will provide a comprehensive description of sampling activities to allow reconstruction of events, review of data, and interpretation. All documents, records, photographs, and information relating to sampling activities will be maintained in the project file via electronic and/or hard copy.

Recorded sampling information will include:

- Project name
- Dates of sampling
- The names of the sampling support staff members conducting the sampling and any oversight personnel
- Climatic conditions
- Description of sample collection points
- Location of sample collection points using differential global positioning system (DGPS)
- A map indicating sampling locations
- Equipment and methods used
- Sample collection methods (in accordance with SOPs in the USEPA Multi-Site FSP, dated September 8, 2008)
- Any deviations from the CQAP and/or SOPs

- Equipment calibration results
- Field observations
- A description of photographs that may have been taken

Additional field forms will be used as necessary, including:

- Field sampling forms that include sample type, name, date, time, location, depth, samplers, and sampling equipment (see Appendix A for example forms).
- Sample control logs (includes sample type, date, time, analysis requested, sample depth, number of containers, identification of duplicate samples, matrix spike/matrix spike duplicates (MS/MSD), equipment rinsate blanks and trip blanks).
- Chain-of-custody forms and custody seals.

All forms will include the project name, date and time, sample location and sample number(s), and the name of the sampling support staff members completing the forms, with signature.

Photographs

Digital photographs may be taken during sampling activities, as appropriate. The digital photographs will be stored electronically with the date and time of the photograph. Field notes will describe the activity or conditions, location and direction of the photograph, and the name of the person taking the photograph.

Data Handling Records

All data generated through field activities will be reduced, verified, and validated prior to reporting.

Data Reduction

Field measurements (e.g., location data and turbidity) will be read directly in the units of final use as provided in Table 7 of the USEPA-approved Multi-Site QAPP, dated September 4, 2007. Field team members are responsible for monitoring the collection and reporting of field data. Field team members will review field measurements at the time of measurement and may re-measure a parameter, as necessary, to ensure accuracy and precision are maintained. Results of laboratory analyses will be reported in units of final use as provided in Table 7 of the USEPA-approved Multi-Site QAPP, dated September 4, 2007. Laboratory calculations will be performed in conformance with acceptable laboratory and method standards.

Data Verification

The Quality Manager, or designee, will review field procedures and compare field data to previous measurement to verify comparability and accuracy of the field data measurements.

Data Validation

Field data will be validated by performing the sampling/monitoring according to the USEPA-approved Multi-site FSP (September 8, 2008) SOPs. Responsibilities of the Field Engineer and/or Quality Manager will include the performance of all field activities, calibration checks on all field instruments at the beginning and end of each day of use, manual checks of field calculations, checks for transcription errors, and review of field log books.

3.2.2 Data Reporting Package Format and Documentation Control

Field screening or monitoring data to be generated by the Contractor will consist of “results only” field data and will not generate or require extensive supporting documentation. Field data will be reported in the Daily Report in standard figures and tables of a format acceptable to the Project Manager. Information such as field instrument calibration, sampling narrative, and field notes will be maintained in the project logbooks and files.

3.2.3 Data Reporting Package Archiving and Retrieval

All project sampling documents will be accounted for when they are completed. Accountable documents include items such as field notebooks, sample logs, field data records, photographs, data packages, computer storage devices, and reports. Field screening and monitoring results may be incorporated into reports as data tables, maps showing sampling locations and screening results, and supporting text.

All project data and reports will be stored in project files and made available to the Agency upon request. Files and analytical data will be maintained by NRT in hard copy and electronic format on site, and in electronic format at the NRT’s offices in Pewaukee, WI.

3.3 Decontamination of Equipment/Sample Containers

3.3.1 Equipment Decontamination

Equipment decontamination procedures will be kept to a minimum through the use of either dedicated or disposable sampling equipment. Nevertheless, some sampling equipment will require decontamination, including equipment made of glass, metals, Teflon™, and other plastic materials. Additionally, some devices are non-disposable and are necessary for completion of the various sampling activities, including instruments used to measure field parameters, grab samplers for water sampling, and other similar devices that are used repeatedly at more than one sampling location. In general, sediment sampling equipment and tools (e.g., core tubes, caps, and nut drivers) will not require decontamination between sampling locations because they are either single use or do not directly come into contact with the sediment.

Equipment decontamination procedures are described in the USEPA-approved Multi-site FSP (dated September 8, 2008) SOP SAS-04-04.

3.3.2 Sample Container Decontamination

Contaminant-free sample containers will be purchased from an approved vendor or prepared by the subcontracted laboratory.

3.4 Inspection and Acceptance Requirements for Supplies/Sample Containers

Sample containers will be provided by the laboratory. The general condition of the containers will be reviewed upon receipt to ensure that the containers are intact and their integrity is unquestionable. Containers found to be of questionable integrity will be returned to the laboratory for new containers. Example integrity issues that have been experienced in the past include, but are not limited to, the following:

- The lid of sample containers containing liquid preservative(s) are not securely tightened causing preservative to leak onto the outside of the container. This reduces the quantity of preservative available for a sample and can result in poor preservation (e.g., not enough nitric acid in a metals sample to lower the pH to 2 standard units (s.u.) or less).
- The containers or lids are cracked or broken.
- The wrong container(s) or preservative(s) have been provided by the laboratory for the planned sampling.

The sample containers will only be accepted and used if there are no integrity issues following inspection.

Similarly, all other supplies and sampling devices that are used for completing the activities described in this CQAP will be inspected prior to use on the site. Examples of the equipment and supplies that will be inspected prior to use include, but are not limited to, the following:

- Core liners
- Surface water sampling device
- Water sampling materials

Similar to the laboratory-provided containers, equipment and supplies will be inspected and used only if there are no questions regarding their integrity.

Labels indicating the following information on receipt and testing are to be used for critical supplies and consumables.

3.5 Sample Collection, Handling and Custody Requirements

Section 2.3 of the USEPA-approved Multi-Site QAPP, September 4, 2007, provides details on sample collection, handling and custody requirements. The following section describes the sample handling and custody requirements.

3.5.1 Sample Collection and Handling

Sample Identification

A unique nine-digit code will be applied to each sample in the format presented in the USEPA-approved FSP, September 8, 2008, SOP SAS-03-01.

Sample Delivery

Transportation of the samples will occur through the use of the laboratory courier service whenever possible. If a courier service is not available, the samples will be delivered to the laboratory, under chain-of-custody, via an overnight carrier such as FedEx. All samples will be transported in accordance with the *Final National Guidance Package for Compliance with Department of Transport Regulations in the Shipment of Environmental Sample*.

Sample Container, Volume, Preservation and Holding Times

The media to be sampled at the site will include air, concrete, sediment, soil and water. The sample containers, volumes, preservatives, and holding times for air, concrete, sediment, soil and water samples are listed in Table 1.

3.5.2 Sample Custody

Chain-of-custody procedures will be used to control and maintain sample custody, whereby the sample possession and handling will be tracked from the field (i.e., sample source) to final disposition at the laboratory. A sample is considered to be in a person's custody if one of the following conditions apply:

- The sample is in the person's possession.
- The sample is in the person's view after being in his or her possession.
- The sample was in the person's possession and that person has secured it in a vehicle or room.

Chain-of-custody will be maintained according to Section 9.2.2.7 of *Test Methods for Evaluating Solid Waste, Physical/Chemical Method* (USEPA, 1996), and as described in USEPA-approved FSP, September 8, 2008, SOP SAS-03-02.

Documentation

Documentation requirements for recording day-to-day sample and data collection activities during the remediation is discussed in Section 5.1 and example forms to be completed are provided in Appendix A.

Laboratory Custody Procedures and Documentation

Laboratory custody procedures and documentation will be in accordance with the Section 2.3 of the USEPA-Multi-site QAPP (September 4, 2007) and the laboratory's Quality Management Plan.

3.5.3 Final Evidence Files

The central repository for all documents related to the site (final data, field notes, and other pertinent documents produced by or delivered to NRT) discussed herein will be NRT's project-specific file. A summary of documents to be maintained in the files include the following:

- Correspondence, reports, memoranda, etc., either issued or received by NRT.
- Data collected in the field during the project.
- Data provided to NRT from outside sources (e.g., laboratory reports, survey data, etc.).

3.6 Equipment Maintenance, Testing, and Inspection Requirements

Section 2.3 of the USEPA-Multi-site QAPP (September 4, 2007) discusses instrument/equipment calibration, testing, inspection and maintenance requirements. All equipment to be used for testing and inspections (e.g., turbidity monitors, DGPS, bathymetric survey equipment, cameras, etc.) to gather field data will be calibrated, maintained, and checked according to the manufacturer's directions to ensure proper maintenance and performance. All maintenance, testing, and inspections performed for monitoring equipment will be logged in site log books and/or maintenance logs.

4 QUALITY PROGRAM

This section discusses the methodology that will be used to confirm the remedial design is being implemented to meet the design criteria as specified in the plans and specifications. This section includes the specific performance objectives and criteria, the measurements or inspections that will be performed to verify compliance with the objectives and criteria, and contingency or response actions if the objectives and criteria are not met.

Table 2 summarizes the following:

- Design element
- Specific performance objective and criteria
- Required monitoring or inspections to verify compliance
- Frequency of monitoring/inspection
- Contingency or response actions, if necessary

All sampling and inspection activities will be performed in accordance with the Health and Safety Plan, and the USEPA-approved RI/FS Multi-Site SOPs.

4.1 Erosion Control Measures

Erosion control measures will be installed in accordance with the Chapters NR 216 and 151, Wisconsin Administrative Code. The Contractor will maintain erosion control measures to minimize to the extent practicable the amount of soil/sediment and other pollutants carried by runoff or discharged from land disturbing activities into the river. Erosion control measures will follow best management practices and will include silt fences, gravel tracking pads and on-site truck routes, and maintaining the use and storage of materials such as dewatering additives, etc. in a way to prevent their entrance into the river. In addition, the treated wastewater will be discharged in a manner that does not cause erosion of the site. Existing storm water drain inlets will be protected with a straw bale, filter fabric, or equivalent barrier.

Erosion control measures will be maintained for the duration of the project and will be visually inspected on a daily basis. The inspections will be completed on the Erosion Control Inspection Observation section of the Daily Construction Report (Appendix A). If damage to erosion control measures are observed or channelizing at the wastewater discharge point is observed, NRT will notify the Contractor’s Site Superintendent so that the erosion control measures are repaired in an orderly fashion.

4.2 Site Security Fence Monitoring

A temporary site security fence will be installed around the perimeter of the upland staging area, down to the river's edge, and across the parking lot to the existing Marinette Marine fence, as shown on the project plans. The security fence will protect the public from the work zone areas. One vehicle gate and four man gates will be installed along the fence perimeter to serve as entrances and exits for authorized vehicles and project personnel. The gates will be locked during non-working hours.

The site security fence will be maintained for the duration of the project and will be visually inspected on a daily basis. The inspections will be recorded on the Site Security Fence Inspection Log Observation section of the Daily Construction Report (Appendix A). If damage to fence is observed, NRT will notify the Contractor's Site Superintendent so that the fence or gates are repaired in an orderly fashion.

4.3 Construction Access Area Existing Conditions Survey

The area that has been identified for the upland staging area is owned by the City. Prior to mobilizing contractor equipment and supplies to the construction site, a pre-conditions survey will be completed on approximately 2.7 acres of the City of Marinette Boom Landing property.

The pre-conditions survey will be performed to document existing environmental soil quality. Samples will be taken at an interval of 10 per acre, from ground surface to one foot below ground surface, which the project will be occupying. Sample locations will be evenly spaced out. Soil samples locations and elevations will be recorded with a real-time kinetic global positioning system (RTK-GPS) or total survey station by the Contractor and samples will be collected using a hand auger or shovel in accordance with USEPA-approved Multi-site FSP, September 8, 2008 SOP-06-01, by the CQA Engineer. Samples will be submitted under chain of custody to Pace Analytical Services for analysis of PAHs. Table 1 provides a sampling and analysis summary with the analytical methods, sample bottle/preservation requirements, and QA/QC samples.

Just before the security fence is scheduled for removal during the final phases of demobilization, the pre-conditions survey locations will be re-occupied (with an off-set up to 10 feet from the original location) to document any degradation to the soil quality as a result of the property being used as a construction area.

If the average pre and post soil quality results are within 20% of each other, no action will be required. If the average post soil quality results are more than 20% higher compared to the average pre soil quality results, the individual pre and post samples will be compared to determine which sample(s) is contributing to the elevated results. Then this location will be re-sampled, and step-out samples will be taken to verify the post sample result and quantify the potential area of project impact. Step out samples are four additional samples taken on the four axes centered on the suspect location; the step-out distance will be determined based on field conditions. If the average of the re-sample and four step-out samples (average of five new post samples) is less than the pre-construction average, no further action will be needed. However, if this average post soil quality result is more than 20% higher compared to the average pre soil quality result, then with permission of the property owner six to twelve inches of soil will be removed from contiguous areas and replaced. The excavated soil will be transported and disposed at the same landfill used for the project.

4.4 Parking Lot/Roadway/Sidewalk Condition Documentation

As part of the construction activities, heavy equipment will be staged on City parking lots and may be traveling on City streets. These streets may not be able to handle the heavier equipment or truck traffic anticipated during phases of the project.

At the beginning of the project or at the beginning of a phase of the project that requires a new access route to/from the site, access routes will be surveyed to document the existing conditions in an effort to identify incremental damage that may occur. The survey will consist of the CQA Engineer driving or walking the access route to record the location of existing pot holes, excessive settling, and other stressed conditions. The CQA Engineer will take notes, photos and/or videotape, and measurements of the features to document pre-construction conditions.

On a weekly basis, the CQA Engineer will drive the non-industrial truck routes to observe for potential project-related damage that may require temporary repair. At the end of the project, a final survey will be performed on the parking lot, any non-industrial access route, and on sidewalks that were accessed during the construction activities. If incremental damage is identified, these areas will be repaired to the extent practical to pre-construction conditions following completion of the project. Depending on the area and extent of damage, if any, an alternate arrangement may also be discussed with the City.

4.5 Temporary Sheet Pile Cofferdam

The temporary sheet pile cofferdam relies on specific target elevations to ensure adequate embedment depth to maintain structural integrity in order to withstand the water and earth pressures. The target elevations and design lengths are shown on the project plans.

Prior to installing the sheet pile sections, the total length of the sheet piling will be measured to the nearest 0.1 feet to ensure they are equal to or greater than the design length of 22 feet. If the length varies, each section will be measured. The design top of the cofferdam is elevation 582 (North American Vertical Datum [NAVD88]) and the design bottom is elevation 563 (anticipated bedrock elevation). The

Contractor will number each section sequentially with paint before or immediately after it is driven, and a driving record kept of length, and actual driven top and bottom elevations. Elevations will be determined by the Contractor's RTK-GPS or conventional survey equipment. Alternatively, elevations can be referenced to the water surface, with the water surface elevation measured at benchmark BM-SG located at the east end of boat launch sheet pile, as shown on the Contract Drawings (if the water surface is used as the datum, its elevation should be checked three times throughout the day to monitor for fluctuation - e.g., start, middle, and end of day). Elevations will be recorded to the nearest 0.1 feet. The installed cofferdam's X-Y coordinates will also be determined at the shoreline beginning and ending points, as well as at the points of alignment change. Coordinates will be in the Marinette County Coordinate system, to the nearest 0.1 foot. All of the elevations and total drive depths, along with dates of installation and notes, will be recorded on the Sheet Pile Cofferdam Installation form (Appendix A).

If the target elevations are not met due to refusal during either the cofferdam installation, the geotechnical engineer will be contacted and a contingency plan will be developed.

As required in the Contract Documents, the contractor is required to monitor the temporary cofferdam for ice buildup. The Field Engineer will also monitor the temporary cofferdam and provide daily comments of their observations.

4.6 Shoreline Sheet Pile Monitoring

The existing sheet pile walls in the dredge area will be monitored during dredging operations. These include sheet pile walls at the boat ramp and at Nestegg Marine. The existing sheet pile wall at the sewer outfall pipes will not be part of the monitoring plan because the outfall will be reconstructed as part of the upland barrier construction. Optical survey points will be established every 25 feet along the tops of the existing sheet pile walls. Optical surveys will be performed using conventional survey equipment that will permit measurement to the nearest 0.01 feet in the Marinette County Coordinate system and NAVD88 datum.

A baseline x-y-z position will be recorded at the top of wall survey points at the beginning of the project prior to dredging adjacent to the existing sheet pile walls. These measurements will serve as the standard to which subsequent measurements are compared and the need for contingency response actions to protect the structures are evaluated. Readings will be recorded on the Sheet Pile Wall Deflection Monitoring forms (Appendix A). Each location will have a separate form to easily identify potential differential measurements.

4.7 Upland Barrier Installation

The upland barrier installation will rely on specific target elevations to ensure adequate embedment and total drive depth of sheet pile to prevent potential migration of MGP-residuals in the upland area to the river. The target elevations and design lengths are shown on the project plans.

Prior to installing the sheet pile sections, the total length of the sheet piling will be measured to the nearest 0.1 feet to ensure they are equal to or greater than the design length of 15.3 feet. If the length varies, each section will be measured. The design top of the sheet pile is elevation 579.3 (NAVD88) and the design bottom is approximately elevation 564. The Contractor will record drive length and actual driven top elevation and bottom elevations. Elevations will be determined by the Contractor's RTK-GPS or conventional survey equipment. Elevations will be recorded to the nearest 0.1 feet. The installed end corners for the upland barrier X-Y coordinates will also be determined at the shoreline beginning and ending points, as well as at the points of alignment change. Coordinates will be in the Marinette County Coordinate system, to the nearest 0.1 foot. All of the elevations and total drive depths, along with dates of installation and notes, will be recorded on the Upland Barrier Installation form (Appendix A).

4.8 Outfall Reconstruction

As part of the construction, the existing storm water and sanitary sewer outfall may be removed to install the upland barrier. Also, a new outfall structure will be built as part of the upland barrier.

During the concrete pour of the cast-in-place concrete the CQA Engineer will collect three test cylinders per 25 cubic yards of concrete placed each day. The molds will be tested by a geotechnical laboratory (to be determined) for compressive strength; one mold at 7-days and two at 28-days. While the pour is occurring, concrete will be sampled to determine air content and slump. Table 1 provides a sampling and analysis summary with the analytical methods, sample bottle/preservation requirements, and QA/QC samples.

4.9 Bathymetric Surveying – Dredge Volume and Backfill Placement

Bathymetric surveying will be performed to establish riverbed elevations and contours within the project area. The Contractor will perform QC bathymetric surveys for their own purposes, such as measuring daily or weekly progress. The Contractor will also perform QA bathymetric surveys, but under the observation of NRT's CQA Engineer. Pre- and post-dredge QA bathymetric surveys will be used to calculate the total volume of sediment dredged and backfill thickness placed in the project area. Progress QA bathymetric surveys will also be used to compute dredge volumes to support monthly invoicing.

The pre-dredge QA survey will likely be performed immediately before the sheet pile cofferdam is installed, and will serve to document existing conditions. NRT will compare this survey to the RI bathymetric survey performed in November 2011 for informational purposes only to determine changes that occurred in the ensuing year. There is no performance standard for this pre-dredge QA survey. Post-dredge QA surveys will be completed when a definable work area (e.g., dredge management unit) is complete. The performance standard for post-dredge QA bathymetric surveying following sediment removal is to achieve the target neat line depth of contamination design elevation within the defined work area (as specified on the project plans), with up to a six inch over-dredge allowance.

Single or multi-beam surveys may be used, with surveying transects located between 10 and 25 feet apart. If there are portions of the project area that are not accessible for the marine survey equipment to access, bathymetric measurements may be collected using conventional survey methods (e.g., a survey rod) in accordance with the USEPA-approved Multi-Site FSP, September 8, 2008) SOP SAS-07-01).

Pre- and post-dredge QA bathymetric results will be presented in a format to show the total area dredged compared to the target area, the total volume dredged, and identify areas above and below the target elevations.

If it is determined that the post-dredge QA survey has not achieved the target design elevation in 90% or more of the work area, additional dredging will be performed to reach the target elevation. In addition, in the portion of the dredge area where the target elevation has not been met (i.e., dredge elevation higher than target elevation), if the dredge elevation is in excess of 6 inches higher than the target elevation, additional dredging will be performed in these high areas. If additional dredging is performed, the post-dredge QA survey will be performed again.

If bedrock, or another confining layer to contaminant migration, is encountered prior to reaching (at a higher elevation than) the design target elevation, dredging will be considered complete at that elevation. USEPA will be notified if these conditions are encountered.

After it is established that the target elevation was reached in accordance with the criteria above, dredging will be considered complete, and residual sand layer placement may be necessary depending on the post-dredge confirmation/verification sample results (discussed in Section 4.11).

In areas along the shoreline, backfill is required once dredging is considered complete to protect the existing sheet pile walls. Push cores will be used to determine if the appropriate amount of backfill has been placed. Field measurements will be recorded on the Backfill Placement Sampling Form (Appendix A). In areas practical where sufficient amount of backfill has been placed, an additional bathymetric survey will be taken.

4.10 TSS and Turbidity Sampling and Monitoring

Water column monitoring will be conducted to ensure that the in-water construction operations do not cause total suspended solid (TSS) concentrations at the downstream compliance point to increase more than 70 milligrams per liter (mg/L) above the background levels (i.e., upstream sampling locations); both measurement points are outside the cofferdam. These in-water measurements are not related to compliance with the WPDES discharge permit requirements.

Prior to dredge operations, a minimum of ten surface water grab samples will be collected for laboratory turbidity and TSS analyses; a range of field-measured turbidities will be collected if possible, with a difference of at least 70 Nephelometric turbidity unit (NTU) to represent the 70 mg/L TSS criterion listed above. The turbidity measurements and analytical results will be used to develop the site specific turbidity to TSS correlation. Up to fourteen additional field surface water samples may be collected in the first week of dredging to expand the range of the initial correlation. Surface water sample locations will be recorded with a hand held DGPS unit and will be collected using a peristaltic pump or grab sampler in accordance with USEPA-approved Multi-Site FSP, September 8, 2008, SOP SAS-03-03. Samples will be submitted under chain of custody to Pace Analytical Services for analysis of TSS and turbidity. Table 1 provides a sampling and analysis summary.

It is assumed that turbidity and TSS measurements will correlate at or very near to 1:1. Therefore, for a TSS action level of 70 mg/L above background, the equivalent turbidity action level will be 70 NTU based on an initial assumed site-specific 1:1 correlation. The turbidity criterion of 70 NTU may be adjusted if necessary based the actual correlation. In addition to the action level, an advisory level equal to one-half the action level will be used as an early warning of possible dredge effects on water column suspended solids. Therefore, the advisory level will be a TSS of 35 mg/L or a turbidity of 35 NTU above background.

During dredging activities, turbidity measurements will be collected within 150 feet upstream of the cofferdam and within 300 feet downstream of the cofferdam (on the outside of the cofferdam) or from the dredge located outside of the cofferdam at 30-minute intervals with in-situ nephelometers mounted on buoys. Turbidity buoys will be moved as necessary and will be anchored in the river and turbidity measurements will be obtained automatically, and results will be transmitted to a base station in the job trailer, to be located at upland staging area. A hand-held turbidity meter will be used to check the buoy-mounted, real-time turbidity meters at least weekly. Each piece of equipment will be calibrated in accordance with the manufacturer’s recommendations and the USEPA-approved SOPs. Hand-held turbidity measurements will be recorded on Turbidity Sampling (Appendix A) and will also record the continuous measurement that best represents the time that the hand-held measurement was collected.

To monitor for seiche effects, an Acoustic Doppler Current Profiler (ADCP) with telemetry will be deployed outside of the cofferdam to monitor the river flow / current. Flow measurements will be taken from the ADCP at the same intervals as the turbidity measurements and will be displayed with the real-time turbidity monitoring data so that it can be determined which turbidity measurement is upstream and which is downstream at any given time (flow direction will be indicated by positive or negative measurements).

If the average downstream turbidity over four consecutive half-hour readings (i.e., 2 hours) exceeds the advisory level of 35 NTU above upstream background, and the condition of the elevated turbidity is reasonably attributable to the removal action and not other factors, like boat propeller wash, the Contractor will be notified. Dredging will be suspended if the average downstream turbidity over four consecutive readings (i.e., 2 hours) exceeds the action level of 70 NTU above upstream background, and the condition of the elevated turbidity is reasonably attributable to the removal action. The Contractor will then evaluate and possibly modify dredging operations to maintain dredging best management practices (BMPs). Response actions will be documented in the daily field reports. Also, two-hour average turbidity readings above the 70 NTU action level that are determined not to be related to sediment dredging will be explained to the extent possible in the daily reports.

The turbidity buoys and ADCP will be pulled from the river when ice begins to form. At this time, turbidity monitoring will be suspended for the remainder of the project.

The turbidity of the water within the cofferdam will be measured prior to removing the cofferdam sheet pile. At the end of dredging and backfilling, before the cofferdam sheet piles are extracted from the river, the turbidity of the water within the cofferdam will be measured to confirm the turbidity is at or below the 70 NTU action level. The turbidity will be measured at five equally distributed locations within the cofferdam using a hand-held turbidity meter. If the average turbidity is above the 70 NTU action level, additional time may be allowed for the dredge residuals to settle, or water may be pumped from the cofferdam to the on-site wastewater treatment plant for treatment, while replenishing the water inside the cofferdam with river water from outside the cofferdam.

4.11 Post-dredge Sampling

Table 1 summarizes post-dredge sampling and the necessary QA/QC samples to be collected.

This section discusses how post-dredge verification sampling will be collected within the project area and how these data will be evaluated to determine management alternatives for dealing with the new sediment surface. Post-dredge sediment sampling will be performed after the bathymetric survey confirms that the target elevation has been achieved in 90% or more of the dredge management unit (DMU) and areas of the DMU that are higher than the target elevation do not exceed 6 inches higher than the target elevation. There are three DMUs; areas 1, 2, and 3. Post-dredge sediment sampling will not occur in area 3. All sediment sampling will be performed in accordance with USEPA-approved RI SOP SAS-07-03 using a push core sampler. Coordinates for sediment sample locations will be randomly located within DMUs and will not be provided to the dredging contractor. The actual sediment sample locations will be recorded in accordance with SOP SAS-02-02. Sediment cores will be logged in accordance with SOP SAS 07-02.

Sediment cores will be advanced 1.5- feet into the sediment. If refusal is encountered before 1.5-feet is advanced, the core location will be offset approximately two to five feet and another attempt will be made. Up to three attempts will be made to recover 1.5-feet of sediment, and the core with the greatest recovery will be selected for analysis.

In certain areas, where dredging goes to refusal, a 1.5-feet core sample may not be obtainable due to the minimal amount of soft sediments remaining or the dredge extending to the top of bedrock or a confining unit. In the event where a core is unattainable, after three attempts at two different offsets from the initial location, a ponar sampler or dredge bucket will be utilized to collect any soft sediment still in the location of the original sample location. If after three attempts using a ponar sampler or dredge bucket there is still no recovered soft sediment, sampling in that location will be suspended, and the area will be considered complete.

4.11.1 Verification Sampling in NAPL Areas

The objective for post-dredge sampling in the NAPL area is to verify that dredging to the target elevation no longer exhibits visual evidence of MGP-residuals in the form of oil-wetted or oil-coated sediment.

The NAPL area is 0.8 acres (refer to the Contract Drawings). To achieve a sample density of ten cores per acre, eight sediment core samples will be collected within the NAPL footprint boundary. Each core will be photographed and observations of NAPL and field screening for the presence of volatiles will be noted in the field logs. If there is none or up to six inches of disturbed visual evidence of MGP-residuals in the form of oil-wetted or oil-coated sediment in each core, the 1.5-feet core will be subdivided into a 0 to 6-inch sample and a 6 to 18-inch sample. Sample intervals will be composited and submitted to Pace for analysis of PAHs to document the sediment quality prior to backfill placement.

If there is visual evidence greater than six inches of disturbed or any non-disturbed MGP-residuals in the form of oil-wetted or oil-coated sediment in a NAPL area post-dredge core, the approximate elevation will be determined and additional cores may be advanced to visually delineate the lateral extent of the MGP-residuals. After the approximate area and elevation are established, additional dredging will be performed. At the completion of the additional dredging, post-dredge sampling will be performed again in the subject area to verify that the visual evidence of MGP-residuals in the form of oil-wetted or oil-coated sediment has been removed. Then, each core will be subdivided as described above, composited, and submitted to Pace for analysis of PAHs to document the sediment quality prior to backfilling as described above. The whole process for verification sampling is shown in Figure 4.

4.11.2 Verification Sampling for PAHs

The objective for post-dredge sampling in near shore areas where total PAH (13) concentrations were identified above 22.8 mg/kg is to verify the new surface sediment quality.

The PAH dredge areas inside and outside the cofferdam are approximately 0.3 acres and 0.2 acres in size, respectively (refer to the Contract Drawings).). To achieve a sample density of ten cores per acre, three sediment cores will be collected from the PAH dredge inside the cofferdam and two in the area outside the cofferdam. Each core will be advanced up to 1.5-feet core or to refusal, whichever is less and will be subdivided into a 0 to 6-inch sample and a 6 to 18-inch sample. Sample intervals will be composited and submitted to Pace for analysis of PAHs. If the PAH concentrations are below the cleanup goal discussed in Section 1.3.3 (i.e., total PAH (13) <22.8 mg/kg), dredging will be considered completed. If a PAH concentration is above the PAH cleanup goal, dredging will continue an additional 6 inches or 18-inches, depending on the interval above the goal, dredging conditions (have not encountered bedrock or another barrier to contaminant migration), and the potential for additional dredging to destabilize nearby shoreline structures. The re-dredge boundary will consider the concentrations of adjacent cores where the total PAH (13) concentrations below the cleanup goal. Upon completion of dredging, an additional sample will be obtained. If the total PAH (13) concentration is > 22.8 mg/kg, the dredging process will continue. Dredging will be considered complete when:

- Post-dredge verification samples indicates the remaining total PAH(13) levels are <22.8 mg/kg
- Top of bedrock or a confining unit as determined by push core refusal and/or visual inspection of the cores, has been encountered
- Additional dredging presents the risk of destabilizing nearby shoreline structures

This process is also shown in Figure 4.

USEPA will be notified if bedrock or other confining unit is encountered or additional dredging presents the risk of destabilizing nearby shoreline structures.

4.12 Residual Sand Layer Placement Sampling

A minimum six inch residual sand layer will be placed in dredged areas where the verification sample results are above 22.8 mg/kg total PAH (13) but it is impractical to continue dredging (i.e., dredging residuals are less than six inches in thickness, bedrock or other barrier to contaminant migration is encountered, etc.) to manage dredging residuals. If total PAH(13) results are above 50 ppm, additional dredging will be conducted to the extent practical to remove soft sediments with the limitations noted above with regard to the presence of bedrock, or other confining unit, or risk to nearby shoreline structures. The process for determining residual sand layer placement is depicted in Figure 4.

Push cores will be the primary method of verifying sand layer thickness. If push cores are not practical (i.e., dredging has extended to the top of the bedrock), buckets will be deployed on top of the final dredge surface prior to the sand being placed to verify the sand backfill thickness meets the objective of six inches. Bathymetric surveys will be performed to also document backfill placement. Field measurements will be recorded on the Cover Thickness Sampling Form (Appendix A).

If the sand layer is measured to be six inches thick to the target lateral extent, with a tolerance of minus 0 feet and plus 0.5 feet, then the backfill placement will be considered complete. If the sand layer is less than 0.5 feet thick, the area will be evaluated to identify locations were additional sand placement might be performed.

4.13 Sediment Stabilization, Transport, and Disposal

The dredged sediment will be loaded into scows/barges (or equivalent). Free water on top of the sediment will be pumped directly from the scow to the on-site water treatment system. After free water is pumped out, and if needed, the excavator bucket will mix the sediment with a suitable quantity of stabilization additive (e.g., Portland cement or lime kiln dust) until the sediment has no remaining free liquids and can pass a paint filter test, as well as meet certain physical requirements (e.g., unconfined compressive strength; see below).

Stabilized sediment will be loaded directly into a truck trailer, with a leak-proof gate and tarp, staged along the river adjacent to the cofferdam. Once the truck is loaded, the bed will be covered and the exterior of the trailer will be cleaned (dry brush or pressure wash, as needed) to remove visible sediment and soil. Each truck will be placarded and given a manifest, and then will depart the site and transport sediment via established truck routes to the extent practical to an approved offsite landfill.

To comply with physical disposal requirements, stabilized sediment will need to meet the following requirements:

- No free liquids.
- Be able to support its own weight.
- Support the weight of material placed over it.

- Be capable of being worked and managed by the landfill's low ground pressure bulldozers.
- Minimum unconfined compressive strength 0.8 tons per square foot.
- A minimum cohesive strength of 800 pounds per square foot.
- A minimum short term friction angel of 25 degrees.
- Defined combinations of cohesive and short term frictional strength for the landfill slopes as determined through slope stability modeling at least equivalent to minimum required cohesive strengths and short term friction angle.

Prior to landfill acceptance, characterization testing of the stabilized sediment needs to done. The following tests are required for characterization;

- Percent solids/moisture content (American Society of Testing and Materials [ASTM] D2216 or D2974)
- Grain size distribution (ASTM D422)
- Liquid limit, plastic limit, and plasticity index of soils (ASTM D4318)
- Hydraulic conductivity testing (ASTM D5856 or D2434)

Even if the stabilized sediment passes the paint filter test prior to truck departure from the site, there is a potential for water to be released during transportation.

Testing shall be conducted at a minimum frequency of one sample every 1,000 CY for the first 10,000 CY of material and then at a rate of one sample every 5,000 CY thereafter.

4.14 Water Treatment and Discharge into the Menominee River

Wastewater will be generated during the dredging, handling, and stabilization of sediment. Primarily, wastewater will be generated from the following sources:

- Free water on top of the sediment that is pumped out of the scow.
- Decontamination water.
- Backwash wastewater from the on-site water treatment system.
- Potentially pumping water from the cofferdam prior to cofferdam removal.

The design for the temporary on-site water treatment system is included in the Technical Specifications and Contract Drawings. The design plans and specifications contain requirements that the Contractor include the following minimum water treatment process steps, which are deemed the best available treatment technology reasonably achievable considering other successful contaminated sediment cleanup projects of a similar nature: solids settling/clarification, multi-media filtration, and granular activated carbon (GAC) filtration/polish. The Contractor will decide whether polymer, bag filters and an oil-water separator are also needed in the process train to comply with effluent limits, established by the WDNR using Substantive Requirements of the WPDES General Permit for Carriage and/or Interstitial Water Resulting from Dredging Operations (#WI-0046558-05-0). If polymer will be utilized, aquatic toxicity testing information will be submitted to WDNR for approval prior to its use, in accordance with the substantive requirements. The Contractor will also decide the flow capacity and operating timeframe for the water treatment system, but given the anticipated relatively small volume of water to be treated from the mechanical dredging operations, it is anticipated that batch treatment will be utilized instead of near continuous operation.

The treatment system controls and monitoring devices will include, but not limited to, the following:

- Variable speed pumps to regulate the flow through the system.
- Pressure gauges to monitor head loss across multi-media and GAC filters.
- Sampling ports to enable collection of samples of system influent and effluent, as well as at intermediate treatment steps.
- A real-time continuous-recording turbidity meter to monitor water quality of the effluent.
- A flow meter measuring volume of effluent discharged.

The sampling parameters and frequencies are summarized in Tables 3.

If there are any violations of effluent standards, the WDNR will be notified and a report describing the noncompliance will be submitted which describes the cause of noncompliance, the period of noncompliance, included dates and times, the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance, and if the noncompliance has not been corrected, the length of time it is expected to continue.

4.15 Air Monitoring Plan

4.15.1 Overview

Potential emissions to be managed and controlled during the course of the sediment removal include odor, fugitive respirable particulate matter, and vapor phase contaminants of concern. Potential sources of emissions include:

- Fugitive dust as part of stabilizing and loading sediment for transportation/disposal.
- MGP related vapor/odor from removal of oil-wetted or oil-coated sediment.

Air monitoring activities will be conducted by the CQA Engineer under the direction of the Field Engineer to evaluate these various sources of emissions. The air monitoring will consist of the following:

- A dedicated weather station will be established at the Site and operated to continuously monitor meteorological conditions during the removal action on a 24-hour, 7-day per week basis.
- Prior to initiating the sediment removal operations, background air sampling will be conducted over a period of 10 days (two weeks) to confirm baseline ambient air concentrations. Background air sampling will include 24-hour time-weighted sampling and 5 days of real-time monitoring of MGP related constituents.
- During the sediment removal operations, both real-time air monitoring and 24-hour time-weighted sampling will be conducted at the Site perimeter.
- 24-hour time-weighted average MGP constituent-specific sampling will be conducted by collecting SUMMA canisters for benzene, toluene, ethylbenzene, xylene (BTEX) and naphthalene for comparison with risk-based acceptable ambient concentrations (AACs). The Technical Memorandum establishing the AACs for the Site is included in Appendix B.
- Real-time air monitoring data for total volatile organic compounds (TVOCs), benzene, and respirable particulates will be collected at regular intervals from around the perimeter of the Site.

Examples of air monitoring reports and sample collection logs for SUMMAs are provided in Appendix A. Each of these activities is discussed in the following sections.

4.15.2 Time Weighted Average (24-Hour) Perimeter Air Monitoring

The proposed air sampling strategy for 24-hour SUMMA canisters is divided into three distinct categories consisting of background monitoring, full-scale startup, and full-scale operations. Each of these categories has distinct sampling frequencies and quantity requirements for SUMMAs. Frequencies and quantities may be revised and/or reduced during the course of the full-scale operations, depending on the conditions encountered. Sampling requirements are summarized below:

- Background: For the two weeks prior to startup of the full-scale MGP-affected sediment removal operations, background air sampling and monitoring will be conducted to establish baseline concentrations for comparison with AACs. SUMMA samples will be collected once per week for analysis of BTEX and naphthalene, respectively, from the three air sampling locations around the fence line. An additional sample will be collected from these three locations during background real-time monitoring for a total of 9 SUMMA samples.
- Full Scale Startup: During the first two weeks of full-scale operation, SUMMA samples will be collected from the three air sampling locations. Sampling events will be conducted three times per week for BTEX and naphthalene. Priority (3-day) laboratory turnarounds will be requested for rapid assessment of the analytical results. Additional sampling may be conducted near a sensitive receptor, to be evaluated on the basis of the full scale, post-startup analytical results.

- Full Scale: During the remaining months of full scale operations, SUMMA samples will be collected from the three air sampling locations once each week for analysis of BTEX and naphthalene. Additional sampling may be conducted near a sensitive receptor, to be evaluated on the basis of the full scale, post-startup analytical results.
- With the exception of the first two weeks of full scale startup (where samples will be analyzed within 3 days), samples will be analyzed within the 14-day holding time requirements; unless real-time monitoring results indicate that the sample analysis should be expedited to evaluate potential on-site conditions that would indicate exceedances of AACs.
- Field duplicates for the SUMMA canister samples will be collected at a frequency of one in 20 samples. Duplicates will be obtained by collecting two concurrent samples from a single location and having both analyzed by the laboratory.

Sampling methodologies and analytical requirements for the SUMMA canisters will be submitted for analysis of BTEX and naphthalene by USEPA Method TO-15.

4.15.3 Real Time Air Monitoring with Portable and Hand Held Equipment

Real-time monitoring using portable and handheld devices will be conducted prior to and during the sediment removal operations. Real time air monitoring equipment will operate 24-hours a day 7-days a week. Key requirements consist of the following:

- Monitoring for TVOCs using a photoionization detector.
- Monitoring for specific volatile organic compounds (VOCs) (i.e., benzene) using a photoionization detector calibrated for benzene when TVOC is detected above the action level.
- Continuous total suspended particulate monitoring will be conducted using portable DustTrac™ aerosol monitoring equipment, or similar, for respirable particulates (RPM_{10}) located at the three air monitoring locations around the fence line.
- Qualitative olfactory assessment of odor (e.g., naphthalene) that could indicate a concern for a public nuisance.
- Visual assessment of the presence of off-site dust due to on-site operations.

4.15.4 Assessment of Meteorological Conditions

An on-site meteorological station will be used to measure wind speed, wind direction, relative humidity, ambient air temperature, and barometric pressure. Data will be relayed to a dedicated computer that will receive continuous meteorological data and compute a 5-minute running average of the wind speed and direction. The 5-minute running average wind direction will be used to identify upwind and downwind sample locations and to monitor off-site receptors. The information will be stored electronically and included in daily reports. Average daily temperatures and barometric pressures will be used to calculate 24-hour time-weighted average air sample volumes for the SUMMA canisters. Meteorological data may also be obtained from an online weather website (e.g., wunderground.com) in the event of a malfunction of the on-site station.

4.15.5 Action Levels

Proposed Action Levels for real-time perimeter monitoring are consistent with those established in the August 24, 2004, *Health-based Guidelines for Air Management, Public Participation, and Risk Communication During the Excavation of Former Manufactured Gas Plants,* prepared by the Wisconsin Bureau of Environmental and Occupational Health, Department of Health and Family Services (DHFS). Exceedance of these Action Levels at the Site perimeter will require Contractor action to reduce vapor phase and/or fugitive dust emissions. These action levels are listed below:

Parameter	Action Level
Total Volatile Organic Compounds (TVOCs)	1.0 parts per million (ppm)
Benzene	0.5 ppm
Particulates	1.0 mg/m^3

The Action level for TVOCs reflects DHFS's recommended upper limit for initiating a response measure. Action Levels for benzene and particulates reflect DHFS recommended maximum 15 minute exposure concentrations.

4.16 Fugitive Emissions Management Plan

4.16.1 Overview

Action Levels will be used in a tiered approach to determine necessary response actions to different Site exposure conditions to fugitive air emissions. In addition to the Action Levels provided in Section 4.14.5, odor will be assessed as an Action Level on the basis of a qualitative assessment as to whether or not odors at the Site perimeter are perceived to present a concern as a public nuisance and /or there is a public complaint. Particulates, in addition to having an established numerical Action Level, will also be assessed as an Action Level on the basis of whether or not the Site operations are causing visible off-site fugitive dust.

4.16.2 Site Conditions

Site Conditions are generally defined as follows, and are depicted on Figure 5:

- **Site Condition 1:** Normal or ambient air conditions for either TVOCs or particulates exceed the Action Level. This Site Condition 1 may also be triggered on the basis of odor at the perimeter of the Site and/or presence of off-site visible fugitive dust regardless of the TVOC or particulate readings. This condition trips a "yellow" flag.

- **Site Condition 2:** Concentrations of benzene exceeds the Action Level or particulates continue to exceed the Action Level longer than 15 minutes, and Site Condition 1 measures are ineffective. This Site Condition will also be triggered if mitigation measures for a Site Condition 1 are ineffective in reducing odors or off-site visible fugitive dust. This condition trips an initial “red” flag.

- **Site Condition 3:** Readings for any of the Action Levels are continuously exceeded at the perimeter monitoring stations for an additional sustained period of 15 minutes, and Site mitigation measures for a Condition 2 are not effective in reducing concentrations below the Action Levels. This sustained Condition 2 triggers Condition 3, which is noted as a second “red” flag.

Yellow and red flags will be relayed verbally by the CQA Engineer to the Field Engineer and Contractor for Contractor response and mitigation measures.

4.16.3 Mitigation Measures

General types of mitigation measures that will be required by the remedial Contractor are divided into the following:

- Engineering Controls: Required engineering controls will consist primarily of the use of Rusmar™ Long Duration Foam (AC-645), or equal product approved by the Field Engineer. Rusmar product specifications. The AC-645 foam will be the most commonly used type of foam to directly control work zone emissions during operation and for routine overnight and weekend vapor phase, particulate, and odor control. Application produces thick viscous foam for immediate emission suppression. It is not specifically required for application under Site Condition 1 by the Remediation Contractor as along as perimeter air monitoring concentrations are below the Site Condition 2 Action Levels, but may be used on a discretionary basis for control of localized work zone emissions. In the event that a Site Condition 2 is identified, then the remediation Contractor will be required to apply foam as needed to reduce levels to a Site Condition 1 or lower status. The use of Rusmar AC-900 series may only be required under Site Condition 3. This type of foam provides a more extended duration life and higher level of suppression effectiveness than the Rusmar AC-645. The foam incorporates a latex emollient that following application coagulates into a relatively impermeable membrane, which is more ideal for areas or stockpiles that are not going to be disturbed for a period of time, or are posing a high level of concern for vapor phase, particulate, or odor emissions.

- Physical Controls: Physical controls represent the primary types of mitigation measures and incorporate a broad range of activities (e.g., good housekeeping practices, maintaining exclusion zones, and covering stockpiles) that the remediation Contractor will be responsible for implementing on a periodic (i.e., daily and/or weekly) basis. In the event that Site Condition 2 or 3 mitigation measures are required, modifications to the physical controls may include more aggressive activities such as daily covering of stockpiles and /or continuous use of water for dust suppression.

- Work Sequencing: Sequencing the work will limit emissions from freshly exposed dredged material and the amount of material that may require stockpiling pending further management (e.g., dewatering or stabilization). Other factors to be considered include planning the operations to avoid double-handling of impacted materials and scheduling loading and off-site hauling to minimize the duration that staged materials will need to be maintained. In the event that Site Condition 2 or 3 mitigation measures are required, modifications to the work sequencing may include reducing and/or modifying the rate of dredging or on-site processing to further reduce emissions.

- Site Layout: Requirements for site layout include planning by the remediation Contractor to locate proposed stockpile and material management areas away from potentially sensitive receptors, to the extent practicable. These requirements will also include reassessment of site layout requirements as the remedial operations progress.

5 REPORTING PROCEDURES

The Project Engineer and Quality Coordinator will establish a document control system to provide measures for issuing, distributing, storing and maintaining quality-related documents. These documents may be provided from the contractors, laboratory suppliers, vendors, disposal facilities, etc. Documents that require quality control include:

- Drawings and specifications
- Calculations
- Laboratory Reports
- Design Change Notices
- Field Change Requests

5.1 Documentation

Several forms have been developed to assist with documenting the remedial action. Examples of the following forms are provided in Appendix A:

- Daily Construction Report – This form will be used to document all daily activity overseen by the Field Engineer. Information on this form includes daily production, observations, field measurements, samples collected, results of data review, staff members present, interactions with the Contractor, and site conditions each day.
- Construction Deficiency Report – This form will be used to document deficiencies and non-conformances and follow-up actions.
- Construction Deficiency Report Log - This log will be used as document and track deficiencies and follow-up actions.
- Submittal Registry – this log will be used to track Contractor submittals, the Engineer's review, and submittal status.
- Turbidity Sampling – This form will be used to record turbidity measurements.
- Sampling Results Log – This log will be used to track field measurement and laboratory measurements for sediment and surface water.
- Post Dredge Verification Sampling Form – This form will be used to log the post dredge sampling cores.
- Residual Sand Layer Sampling Form – This form will be used to document the thickness of the cover that is placed following dredging.

Each of the forms is an example, only, and will be revised as necessary to maximize field utility. Additional field observations not included in the forms will be recorded in field logbooks maintained by the Site Engineer and Field Support.

5.2 Project Completion Report

A Project Completion Report will be prepared that includes the following or similar:

- Project summary
- Quality assurance results
- Environmental monitoring results
- Description of restorations
- All required submittals and updated submittal schedule

5.3 Storage, Maintenance, and Availability of Documents

The Project Engineer, or designee, will file, store, and maintain record documents, including completed forms, logbooks, and meeting minutes, in the field office and in electronic format at the NRT offices in Pewaukee, WI. Logbooks may also be stored in the custody of the Field Engineer/author until the logbook has been filled. Documents will be maintained in good order and in a clean, dry, legible condition, protected from deterioration and loss. Documents will be stored in such a way to provide access to project record documents for the Project Engineer’s reference during normal working hours. All records will be available for inspection and audit at any time by the persons authorized by the Project Manager.

6 REFERENCES

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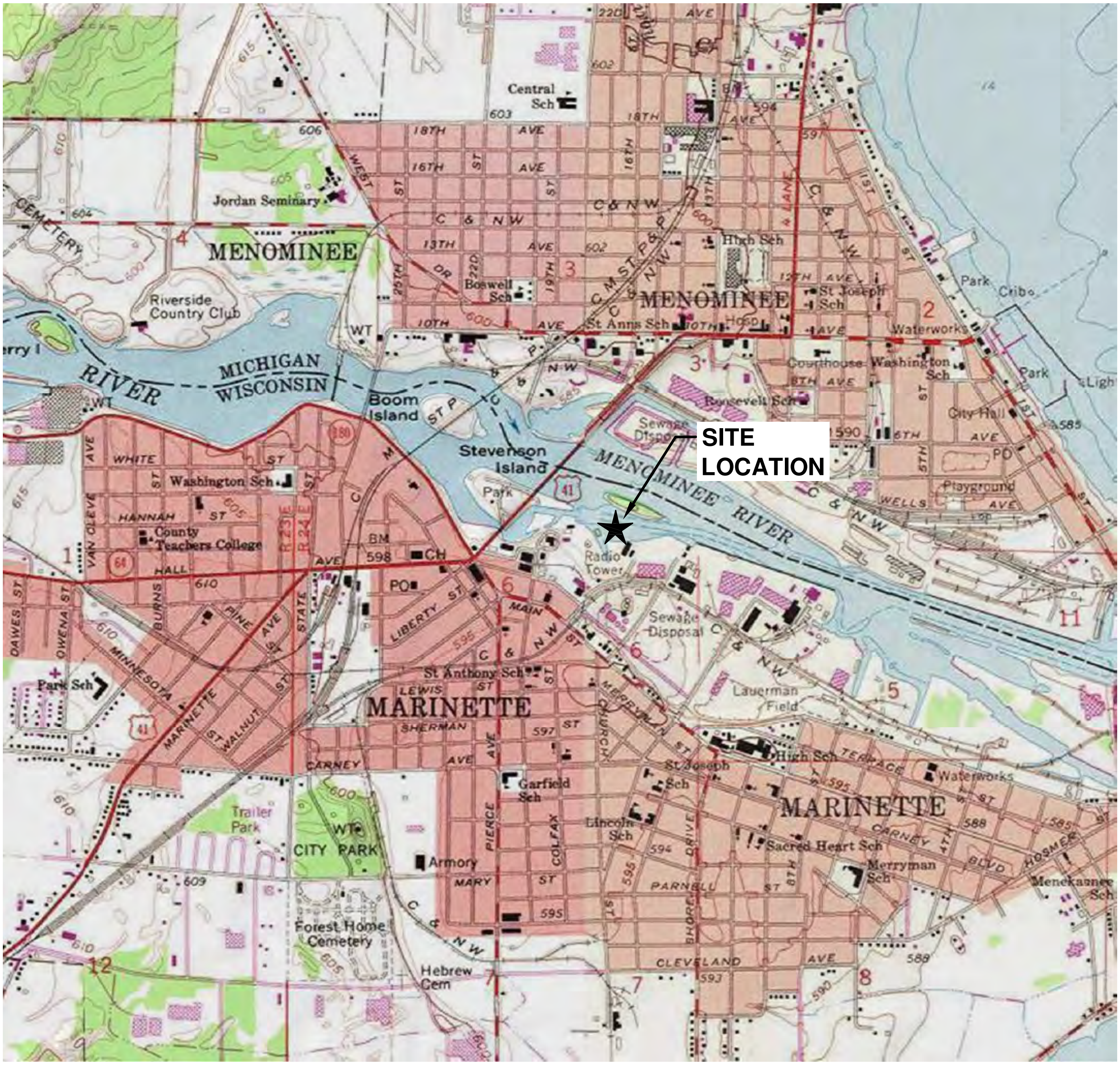
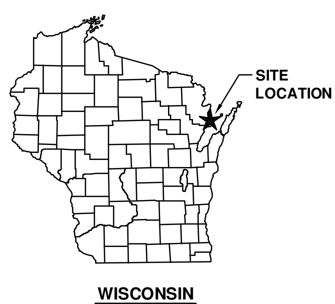
FIGURES





N

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SCALE IN FEET

CONTOUR INTERVAL 10 FEET

SOURCE NOTES:

1. NATIONAL GEOGRAPHIC TOPO. 1:24,000-SCALE MAPS FOR THE UNITED STATES. THE TOPO! MAPS ARE SEAMLESS, SCANNED IMAGES OF UNITED STATES GEOLOGICAL SURVEY (USGS) PAPER TOPOGRAPHIC MAPS. FOR MORE INFORMATION ON THIS MAP, VISIT US ONLINE AT HTTP://GOTO.ARCGISONLINE.COM/MAPS/USA_TOPO_MAPS COPYRIGHT:© 2011 NATIONAL GEOGRAPHIC SOCIETY, I-CUBED
2. COORDINATE SYSTEM IS WISCONSIN COUNTY COORDINATE SYSTEM. MARINETTE COUNTY. US FOOT.

SITE LOCATION MAP

NTC SEDIMENT REMOVAL ACTION CQAPP
FORMER MARINETTE MGP SITE
WISCONSIN PUBLIC SERVICE CORPORATION
MARINETTE, WISCONSIN

DRAWN BY: NWD 08/20/12 APP'D BY: KRM DATE: 08/30/12

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2098/2.0

DRAWING NO. 2098-2-A01C

FIGURE NO. 1

Aug 30, 2012 12:14pm PLOTTED BY: ndraskovich SAVED BY: ndraskovich
Y:\ACADdata\Projects\20\2098\2\2098-2-A01C-SITE LOCATION.dwg Layout1
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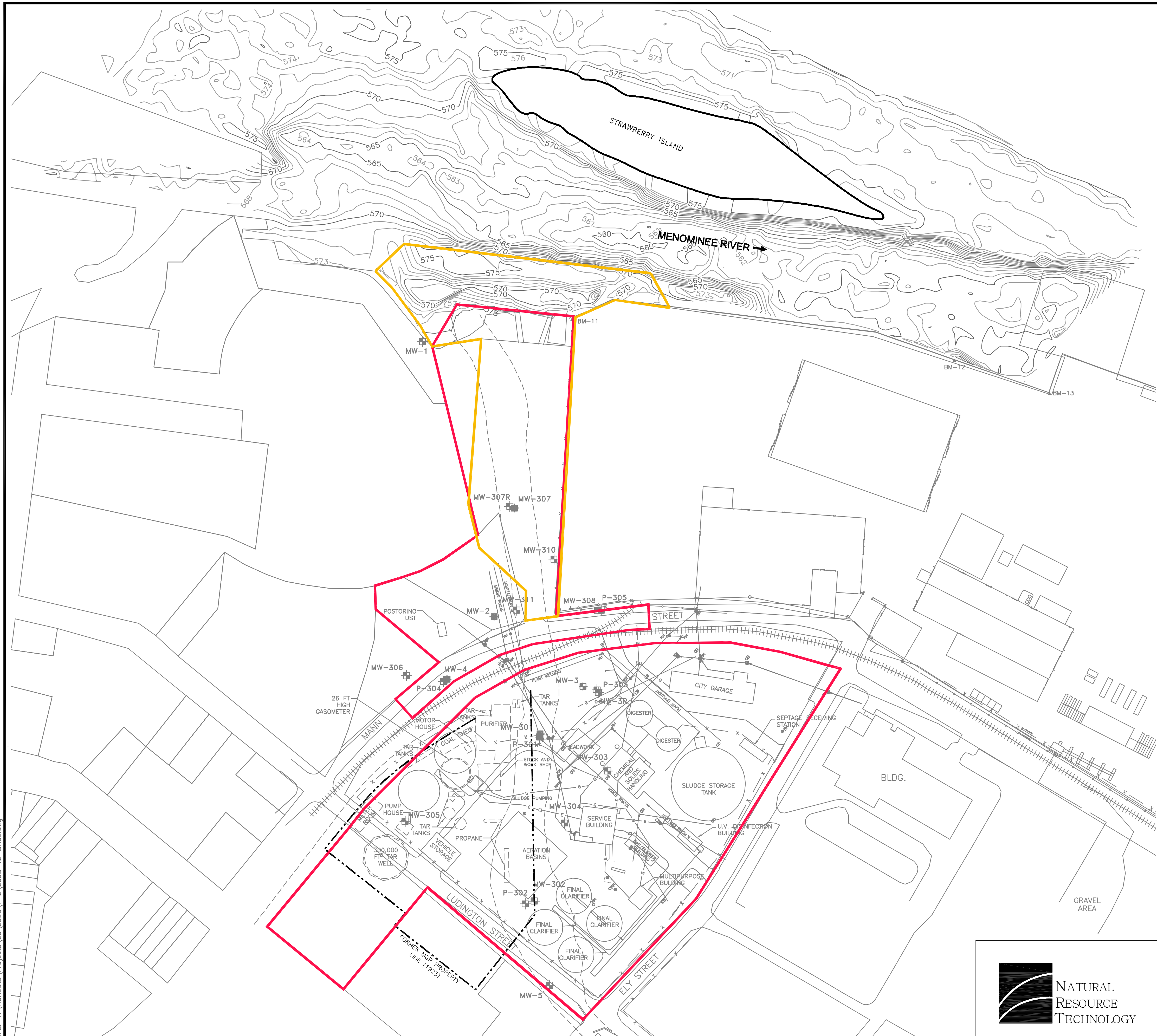


UPLAND PORTION OF THE SITE

RIVER PORTION OF THE SITE

PROPERTY BOUNDARY

MW-5 MONITORING WELL

P-302 PIEZOMETER

MW-2 ABANDONED MONITORING WELL

G GAS LINE

W WATER LINE

E ELECTRICAL LINE

FORMER SLOUGH

FORMER MGP STRUCTURE

EXISTING STRUCTURE

RAILROAD

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM A MAP BY THE CITY OF MARINETTE.
2. PORTIONS OF THE DRAWING ARE FROM A DIGITAL FILE FROM STS CONSULTANTS, LTD. CONSULTING ENGINEERS, GREEN BAY, WISCONSIN, PROJECT NUMBER 26936, REVISED JANUARY 2001. HYDROGRAPHIC SURVEY OF RIVER WAS PERFORMED BY AYRES AND ASSOCIATES ON JULY 24-26, 2001. VERTICAL CONTROL IS U.S.G.S. DATUM. BUILDING AND STREET LOCATIONS NORTH OF RAILROAD TRACKS WERE SUPPLIED BY MARINETTE MARINE CORPORATION.
3. PORTIONS OF THIS DRAWING ARE FROM HYDRO-SEARCH DRAWING.
4. EXISTING STRUCTURES AND UTILITIES FROM FOTH & VAN DYKE ENGINEERS/ARCHITECTS, GRADING PLAN, DIGITAL FILE 7m755c06.DWG, RECORD DRAWING REVISIONS 2/22/90.
5. WELL LOCATIONS FROM A SURVEY BY WPSC DATED OCTOBER 8, 2003, REVISED OCTOBER 31, 2003.
6. BRICK INTERCEPTOR SEWER REPLACEMENT TAKEN FROM DRAWING BY AYRES ASSOCIATES, GREEN BAY, WISCONSIN, JOB NO. 16-0189.10, DRAWING NO. P101, SHEET NO. 7, DATED 3/14/03.
7. MONITORING WELLS MW-2R, MW-3R, MW-307R INSTALLED OCTOBER 2004 AND MW-308, MW-310, P-305 INSTALLED JUNE 2004. SURVEYED BY WPSC IN JANUARY 2005. (NGVD88, MARINETTE COUNTY COORDINATES).

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2098/2.0	FORMER MGP PROPERTY AND SITE BOUNDARIES
DRAWN BY: RLH 08/20/12	NTC SEDIMENT REMOVAL ACTION CQAPP FORMER MARINETTE MGP SITE WISCONSIN PUBLIC SERVICE CORPORATION MARINETTE, WISCONSIN
CHECKED BY: KRM 08/20/12	
APPROVED BY: KRM 08/30/12	DRAWING NO: 2098-2-B02C-BOUNDARIES / REFERENCE: . / FIGURE NO. 2

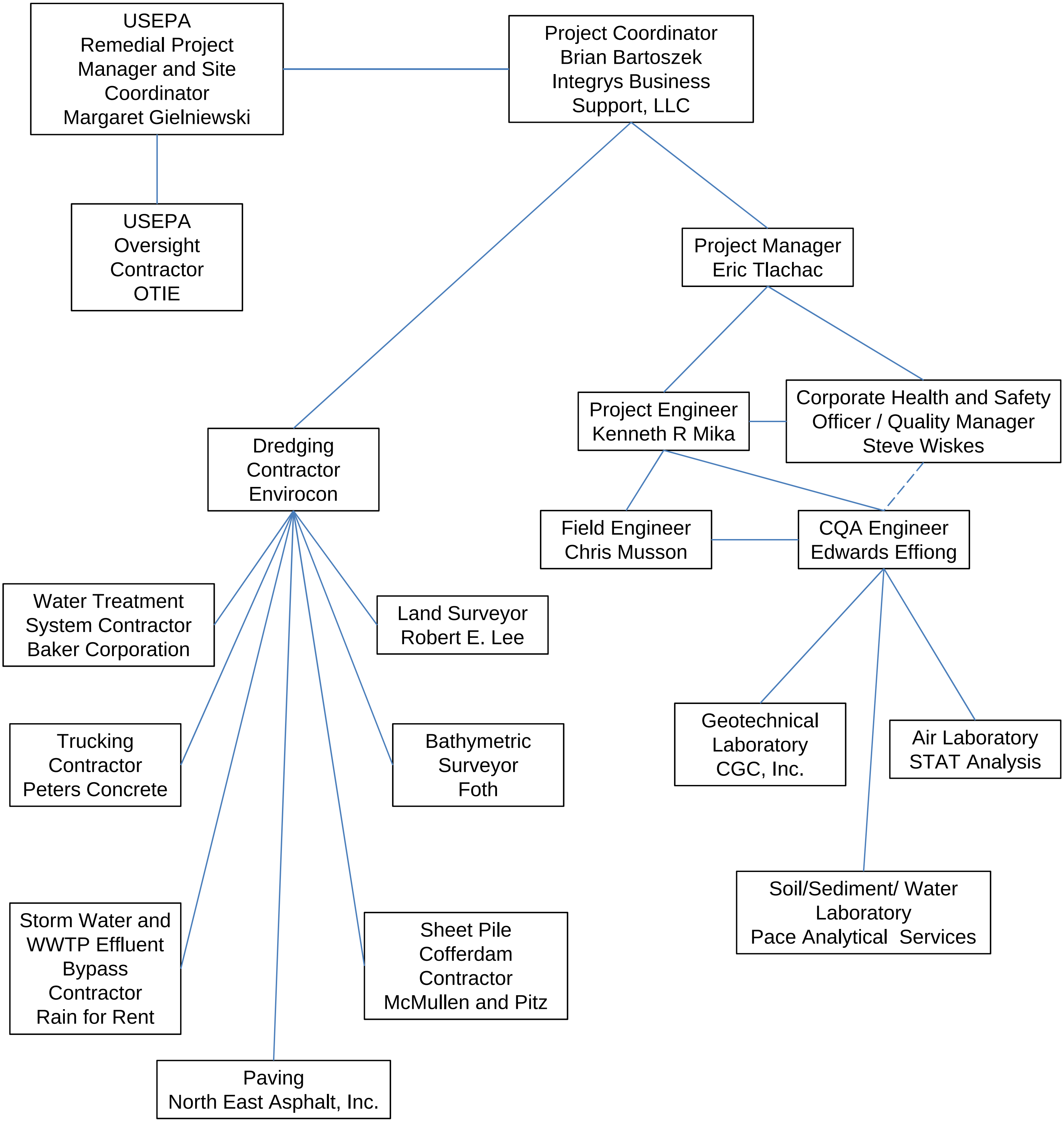


Figure 3
Focused NAPL and Sediment Removal Action
Former Marinette Manufactured Gas Plant
Wisconsin Public Service Corporation

Natural Resource Technology

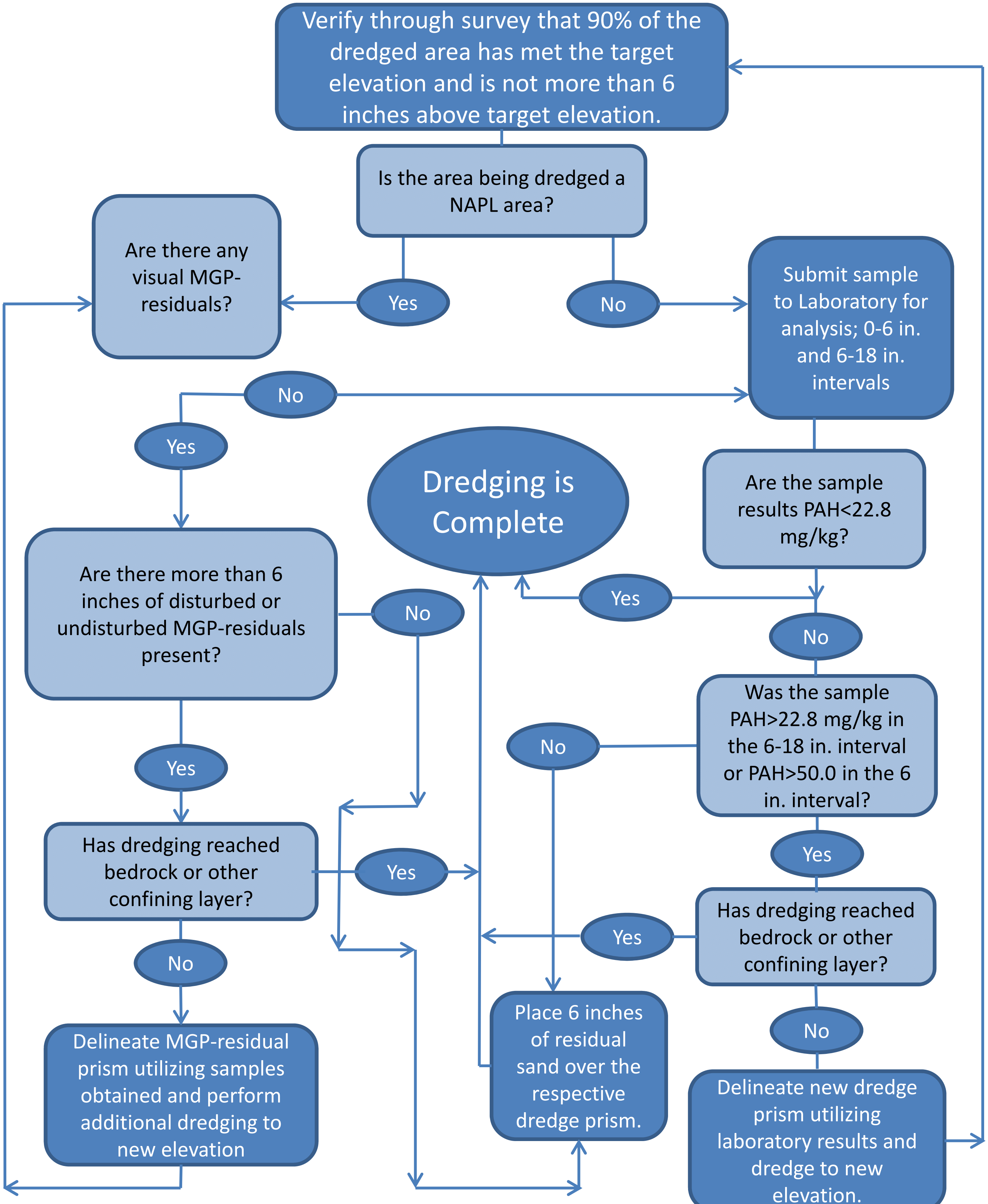
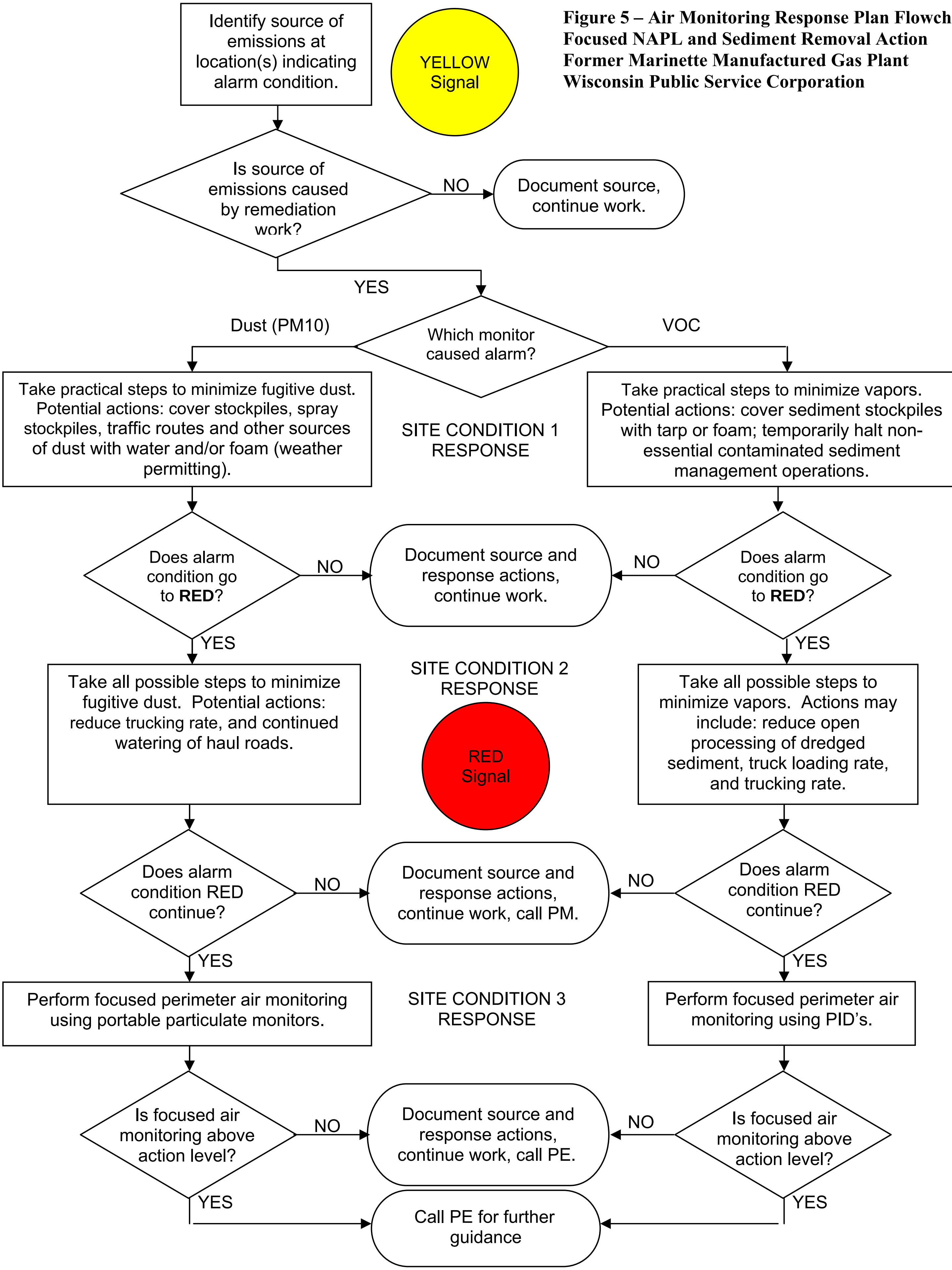


Figure 4
Focused NAPL and Sediment Removal Action
Former Marinette Manufactured Gas Plant
Wisconsin Public Service Corporation

Natural Resource Technology

Figure 5 – Air Monitoring Response Plan Flowchart
Focused NAPL and Sediment Removal Action
Former Marinette Manufactured Gas Plant
Wisconsin Public Service Corporation



TABLES

Table 1 - Sampling and Analysis Plan Summary
Focused NAPL and Sediment Removal Action
Former Marinette Manufactured Gas Plant
Wisconsin Public Service Corporation

Sample Type/Location	Proposed Number of Sampling Locations/ Frequency	Matrix	Parameter	Method	Estimated Sample Quantity	Field Duplicates [2]	Equipment Blanks [3]	MS/MSD [4]	Field Blanks [5]	TOTAL	Container Type	Minimum Volume	Preservation (Cool to 4° ≥ 2°C All Samples)	Holding Time from Sample Date
City of Marinette Boom Landing Park Property	3 pre-& post-con (10 per acre)	soil	PAHs	8270C or 8270-SIM	3	1	0	1	0	5	amber glass	4 oz.		14 days
River Surface Water	10	water	Total Suspended Solids	SM 2540D	10	1	0	1	0	12	plastic	100 ml	Cool to 4 °< 2°C	7 days
(TSS-turbidity correlation)			Field Measured Turbidity	Field	10	0	0	0	0	10	field measured			
River Surface Water	continuous	water	Field Measured Turbidity	Field	continuous									
(150 ft u/s and 500 ft d/s of dredge)			Hand Held Turbidity Meter	Field	1/week	0	0	0	0	0	field measured			
Post Dredge Sediment Surface (0-1.5 foot core in NAPL area)	8 (10 per acre)	sediment	PAHs	8270C or 8270-SIM	8	1	0	1	0	10	amber glass	4 oz.		14/40 days
Post Dredge Sediment Surface (0-1.5 foot core in PAH area)	4 (10 per acre)	sediment	PAHs	8270C or 8270-SIM	4	1	0	1	0	6	amber glass	4 oz.		14/40 days
Sediment Disposal Strength Requirements	pre-disposal	sediment	Percent solids/moisture content	ASTM D2216 or 2974	1					1				
			Grain Size Distribution	ASTM D422	1					1				
			Liquid limit, plastic limit, and plasticity index of soils	ASTM D4318	1					1				
			Hydraulic conductivity testing	ASTM D5856 or D2434	1					1				
Cast-in-place Concrete	1 per 25 CY per Day	Concrete	Compressive Strength Test	ASTM C39	1					1	Vertical Cylinder Capping Fixture, 6 x 12 in (15.2 x 30.5 cm)			
			Slump Test	ASTM C143	1					1				
			Air Content	ASTM C231	1					1				
Water Treatment and Discharge	influent/effluent	water			TBD									
			See Tables 4 and 5											
Background Air Monitoring	3 locations	air	**Time Weighted Average (24-hour) 1/week**											
(2 weeks)	1 week		BTEX and Naphthalene	TO-15	3	0	0	0	0	3	SUMMA	6L		30 days
	3 locations	air	**Time Weighted Average (24-hour) 2/week**											
	1 week		BTEX and Naphthalene	TO-15	6	1	0	0	1	8	SUMMA	6L		30 days
	3 locations	air	**Continuous Monitoring Real Time (24-hours/day 7-days/week)**											
	1 week		TVOC and PM10	PID for TVOC and DustTrak	21	0	0	0	0	21				
Full Scale Startup Air Monitoring	3 locations	air	**Time Weighted Average (24-hour) 3/week**											
	2 weeks		BTEX and Naphthalene	TO-15	18	1	0	0	1	20	SUMMA	6L		30 days
	3 locations	air	**Continuous Monitoring Real Time (24-hours/day 7-days/week)**											
3-day turnaround time	2 weeks		TVOC and PM10	PID for TVOC and DustTrak	21	0	0	0	0	21				
Full Scale Air Monitoring	3 locations	air	**Time Weighted Average (24-hour) 1/week**											
	11 weeks		BTEX and Naphthalene	TO-15	33	2	0	0	2	37	SUMMA	6L		30 days
	3 locations	air	**Continuous Monitoring Real Time (24-hours/day 7-days/week)**											
	11 weeks		TVOC and PM10	PID for TVOC and DustTrak	21	0	0	0	0	21				

Notes:
1. Field duplicates will be collected at a frequency of one per group of ten or fewer confirmation water samples and one per group of twenty or fewer confirmation sediment and air samples.
2. Equipment blanks will be collected at a frequency of one per sampling day with non-dedicated sampling equipment.
3. Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will be collected at a frequency of one per group of twenty or fewer investigative water samples. Additional volume will be determined per laboratory requirements.

Acronyms:
PAH = Polycyclic aromatic hydrocarbon
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes
TVOCs = Total Volatile Organic Compounds

Table 2 - Summary of Quality Program
Focused NAPL and Sediment Removal Action
Former Marinette Manufactured Gas Plant
Wisconsin Public Service Corporation

Design Element	Specific Performance Objective and Criteria	Required Monitoring or Inspections to Verify Compliance	Frequency	Contingency or Response Action
Erosion Control	WDNR NR 151 and 216	Visual inspection	Daily	Repair damage, channelizing, in an orderly fashion
Site Security Fence	Maintain fence to restrict public access	Visual inspection	Daily	Repair damage in an orderly fashion
Existing Conditions Survey	Establish pre- and post- construction soil quality	Surface soil sampling	Pre and post construction	If soil quality has been negatively affected, soil may be removed
Roadway/Sidewalk/Parking Lot of Boom Landing Condition	Document existing conditions to evaluate potential damages	Travel truck routes, inspect sidewalks, and parking lot of Boom Landing that equipment has traversed	Beginning of project and weekly	Repair damage to the extent practical at completion of project
Existing Sheet Pile Wall Deflection	Deflection less than 0.5 inches	Survey points located every 25-feet at the top of the vertical barrier wall to monitor deflection	Weekly	Adjust excavation activities to minimize exposed vertical barrier wall face
Sheet Pile Cofferdam Installation & Monitoring	Document target embedment elevation is achieved and monitor water levels inside and outside of the temporary cofferdam to ensure no greater than 1 foot difference	Measure total depth of sheet pile installation. Measure water levels inside and outside the cofferdam.	Every sheet pile section location. Measure water level depths daily.	Contact Geotechnical Engineer and develop a contingency plan, if necessary
Dredge Volume and Sand Backfill Placement	Document dredged elevation and placement of cover per project plans to the target elevation at 90% or more of the plan area and no more than 6 inches above target elevation across plan area	Perform bathymetric survey and poling (as necessary)	Post dredge and post backfill placement	Dredge or add additional backfill until target elevation is achieved
TSS and Turbidity	Downstream total suspended solid concentrations can not increase more than 70 parts per million above the background as established in a site-specific total suspended solid to turbidity correlation curve.	Measure turbidity 150 feet upstream and 300 feet downstream of the sheet pile wall cofferdam. Also monitor river flow/current for seiche effects.	Continuous	Modify dredging operations and implement dredging best management practices or draw down water and maintain an inward gradient into the cofferdam
Post Dredge Sampling	Removal of visual MGP-residuals in the form of oil-wetted or oil-coated sediment, total PAH concentrations less than 22.8 mg/kg	Collect post dredge 1.5 foot cores to evaluate PAH levels	Ten cores per acre; minimum of two cores per area	Document remaining sediment quality and evaluate need for backfill
Backfill Placement	Target backfill thickness is placed per the plan (lateral and vertical) or the post-dredge sampling results	Post backfill bathymetry, small sample buckets	Post backfill bathymetry, 5 small sample buckets per acre following backfill placement	Place additional backfill to establish target thickness and extent
Sediment Stabilization and Disposal	Pass the paint filter test for stabilization and meet the landfill requirements for acceptance	No free water. Refer to Sec 4.13 for landfill strength requirements.	Refer to Sec 4.13	Additional handling may be required by the landfill if the material is deemed unworkable.
Water Treatment and Discharge to Menominee River	Per WPDES permit	Refer to Table 3	Refer to Table 3	Report noncompliance to WDNR, take steps to prevent reoccurrence of noncompliance.
Fugitive Emissions	Manage fugitive emissions during the remediation	Refer to Section 4.15	Refer to Section 4.15	Implement Control Measures as described in Section 4.15

Table 3 - Water Treatment Monitoring Requirements and Limitations
Focused NAPL and Sediment Removal Action
Former Marinette Manufactured Gas Plant
Wisconsin Public Service Corporation

Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
EFFLUENT					
Flow Rate		MGD	Daily	Continuous	
Oil and Grease	Daily Maximum	15 mg/L	See Note A	Grab	
Suspended Solids, Total	Daily Maximum	40 mg/L	Weekly	Grab	
Benzene	Daily Maximum	1.95 mg/L	See Note A	Grab	
Naphthalene	Daily Maximum	0.344 mg/L	See Note A	Grab	
Pyrene	Daily Maximum	0.140 mg/L	See Note A	Grab	
Fluoranthene	Daily Maximum	3.2 µg/L	See Note A	Grab	
Benzo(a)pyrene	Daily Maximum	0.38 µg/L	See Note A	Grab	
Phenanthrene	Daily Maximum	61 µg/L	See Note A	Grab	
Mercury, Total Recoverable	N/A	N/A	Weekly	3-Hr Composite	Start-up Monitoring – See Note B Field Blank must be collected with each sample and analyzed at LOQ of less than 1.3 ng/L unless Mercury quantified above 1.3 ng/L
Lead, Total Recoverable	N/A	N/A	Weekly	3-Hr Composite	Start-up Monitoring – See Note B

Notes:
A: Samples shall be collected as follows:
- Twice during the 1st calendar week of discharge on different days
- Once per week during the 2nd through 5th calendar week of discharge
- Once per month after the 5th week for the remaining duration of the project if in compliance with the limits identified above (otherwise continue weekly until in compliance for 8 consecutive weeks)

B: Start-up monitoring parameters may be waived from the monitoring program if demonstrated to not be present in the effluent and authorized in writing by WDNR.
µg/L: micrograms per liter
ng/L: nanograms per liter
MGD: million gallons per day
mg/L: milligrams per liter

APPENDIX A

EXAMPLE DOCUMENTATION FORMS

NATURAL RESOURCE TECHNOLOGY, INC.
23713 WEST PAUL ROAD, UNIT D
PEWAUKEE, WI 53072
TEL: 262.523.9000

Construction Deficiency Report Log (Example)

DATE:

Contractor: ______________________ **PAGE:** 1 **OF** 1

Project Name: Focused NAPL and Sediment Removal Action
Former Marinette Manufactured Gas Plant

Project #: 2098

Item No.	Construction Deficiency Description	Originator	Date Recorded	Date to Contractor	Proposed Corrective Action By Contractor	Proposed Approved by Engineer	Corrective Action Date	Disposition Verification By

CONSTRUCTION DEFICIENCY REPORT (EXAMPLE)

NATURAL RESOURCE TECHNOLOGY

Project: **Focused NAPL and Sediment Removal Action**

Former Marinette Manufactured Gas Plant Site Project No: **2098**

Client: **Integrys Business Support, LLC** Location: **Marinette, WI**

Contractor: ________________________ Day-Date: ______________________

Report No:______________________________ Item: __________________________

Description of Construction Deficiency:	
Proposed Construction Action: ☐ Use as is ☐ Rework ☐ Repair	
Signed:	Date:
Field Engineer	
Corrective Action Taken	
Description of proposed corrective action:	
Signed:	Date:
Contractor	
Corrective Action Approval	
Recommendation and Remarks	
Proposed corrective action status: ☐ Approved ☐ Rejected	
Signed:	Date:
CQA Team Leader	

Cover Thickness Sampling Form

Form #________

General Information

Project Name/Site : Focused NAPL and Sediment Removal Action, Former Marinette Manufactured Gas Plant
Project # : 2098
Task # : ____________
Date : ____________
Samplers : ____________

Sampling Equipment: ____________
Coordinate System: ____________
Datum: ____________
Weather: ____________
River Section/DMU: ____________

Sample Location (ID)	Time (military)	Sample Type	Water Elevation[1]	Water Depth (ft)	Mix Layer Thickness (in)	Sand/Gravel Thickness (in)	Push Depth (in)	Sample Location (Northing)[2] Field Reading/Post Processed Reading	Sample Location (Easting)[2] Field Reading/Post Processed Reading	Sample Notes

Additional Comments: ____________

Staff Gauge Readings: **Time:** ________ **Readings:** ________ **ft** GPS File Name: ____________

Notes: (1) Water Elevation = Staff Gauge Elevation - Staff Gauge Reading, Calculated at end of day, based on a minimum of 2 staff gauge readings or direct reading by RTK equipment.
(2) Sample coordinates will be recorded after being post processed, when applicable.

n/a : Not Applicable

COC: Chain of Custody

Sampling/Processing Personnel Signature: ____________

Daily Construction Report

Daily Report

Project: Focused NAPL and Sediment Removal Action, Former Marinette Manufactured Gas Plant

Client: IBS

Report Name:

Start Date:

Project Code: 2098

Date	Cal. Wk #	Proj. Prod. Wk #

General Information:

Project Manager: ____________________

Quality Manager: ____________________

Site Engineer: ____________________

Field Support: ____________________

____

Coordinate System: ____________________

Datum: ____________________

River Conditions: ____________________

Average Temp: ____________________

Average Current Speed: ____________________

Weather Description: ____________________

High Temperature: ____________________

Low Temperature: ____________________

Highest Wind Speed: ____________________

Average Wind Speed: ____________________

Precipitation Total: ____________________

Observations

Erosion Control Inspection Observations

Site Security Fence Inspection Observations

Completion Inspections Today

Observations of Deviations from Plans or SOPs:

Observed Deviations: ____________________

Action(s) Taken: ____________________

VOC FIELD DATA LOG (Example Form)
Focused NAPL and Sediment Removal Action
Former Marinette Manufactured Gas Plant Site

Weather Conditions at Sample Set-Up:

	Start	Check	End
Wind:			
Visibility:			
Sky:			
Humidity:			

Operator: ____________________

Date

$\overline{P}_a$ = ____________________ mm Hg $\overline{T}_a$ = ____________________ °C = ____________________ °K ____________

Station #:	A01	A02	A03	A04
Cannister #:				
Controller #				
Start Date:				
Military Time$_i$ (hr):				
1 in.Hg				
2 in.Hg				
F in.Hg				
Military Time$_i$ (hr):				
Stop date:	1/1/1900	1/1/1900	1/1/1900	1/1/1900
Sample Number:	A01-summa-	A02-summa-	A03-summa-	A04-summa-

SAMPLE PROCEDURE -
*Fill out field form recording cannister, controller and sample ids;
*START SAMPLING - open controller valve, take initial vacum reading using controller gauge, record time (military);
*MIDPOINT CHECK - take vacum reading from controller gauge;
*END SAMPLE - take vacum reading using controller gauge, close controller valve, record time (military).

Field Comments:

= Information that may need to be changed - see side bar
= Formula, do not change

Post-Dredge Verification Sampling Form

Form #________

General Information

Project Name/Site : Focused NAPL and Sediment Removal Action, Former Marinette MGP Site
Project # : 2098
Task # : ____________
Date : ____________
Samplers : ____________

Sampling Equipment: ____________
Coordinate System: ____________
Datum: ____________
Weather: ____________
River Section/DMU: ____________

Sample Location (ID)	Time (military)	Water Elevation(1)	Water Depth (ft)	Penetration (ft)	Sediment Recovered (ft)	% Recovery	Sample Location (Northing)(2) Field Reading/Post Processed Reading	Sample Location (Easting)(2) Field Reading/Post Processed Reading	Sample Notes

Sample Intervals (in)	Sample Description	Date Processed	Sample Intervals (in) TOP	Sample Intervals (in) BOTTOM	COC Sample ID Number

Additional Comments: ____________

Staff Gauge Readings: **Time:** ____________ **Readings:** ____________ **ft** GPS File Name: ____________

Notes: (1) Water Elevation = Staff Gauge Elevation - Staff Gauge Reading, Calculated at end of day, based on a minimum of 2 staff gauge readings or direct reading by RTK equipment.
(2) Sample coordinates will be recorded after being post processed, when applicable.

n/a : Not Applicable

COC: Chain of Custody

Sampling/Processing Personnel Signature: ____________

NATURAL RESOURCE TECHNOLOGY, INC.
23713 WEST PAUL ROAD, UNIT D
PEWAUKEE, WI 53072
TEL: 262.523.9000

Project Title and Location:
Focused NAPL and Sediment Removal Action
Former Marinette Manufactured Gas Plant

					Subcontractor Action			**Approving Authority Action (NRT)**					
Submittal Item Number	Type of Submittal, Material or Product	Prov./Spec. Para. No.	Approval by NRT	Scheduled Submittal Date	Action Code	Date of Action	Date Fwd to NRT/ Date Rcvd from Contr.	Date Fwd to Other Reviewer	Date Rcvd from Other Reviewer	Act. Co.	Date of Action	Mailed to Subcontr./ Rcvd. from Appr. Auth.	Remarks

Approval Authority: Engineer/Owner:
Natural Resource Technology
Integrys Business Support, LLC

Submittal Codes:
D - FWD to Engineer/Action
E - FWD to Engineer/Record Purpose

Action Codes: A - Approved; B - Approved as Noted
C - Approved as Noted, resubmittal required
F - Disapproved; R - Received; N - No Action
FOI - For information only

SURFACE WATER SAMPLING FIELD FORM

Form #_________

General Information

Site : Focused NAPL and Sediment Removal Action, Former Marinette MGP Site
Project # : 2098
Task # : __________
Date : __________
Samplers : __________

Sampling Equipment: __________
Coordinate System: __________
Datum: __________
Weather: __________
River Section/DMU: __________

Sample/Location ID	Time (military)	Water Elevation [1] (ft)	Depth to Sediment	Depth to Refusal	Water Sample Depth	Turbidity (NTU)	Temp (^{o}C)	Sample Location [2] (Northing) Field Reading/Post Processed Reading	Sample Location [2] (Easting) Field Reading/Post Processed Reading	Sample Notes

Notes: (1) Water Elevation = Staff Gauge Elevation - Staff Gauge Reading, Calculated at end of day, based on a minimum of 2 staff gauge readings or direct reading by RTK equipment.
(2) Sample coordinates will be recorded after being post processed, when applicable.

Equipment Calibration:
Equipment: __________
Date Checked: ______ Reading: __________ PASS or FAIL
Equipment: __________
Date Checked: ______ Reading: __________ PASS or FAIL

Additional Comments: __________

Staff Gauge Readings: **Time:** ______ **Reading:** __________ ft **GPS File Name:** __________

n/a : **Not Applicable** **Sampling Personnel Signature:** __________

Sheet Pile Cofferdam and Vertical Barrier Wall Bracing System Installation

Project: Focused NAPL and Sediment Removal Action, Former Marinette MGP Site
Location: Marinette, WI
Project Number: 2098

Coordinate System: ____________________
Datum: ____________________

Date	Drilled Shaft Number or Sheet Pile Section Number	Coordinate X	Coordinate Y	Existing Ground/Sediment Surface Elevation	Total Depth of Shaft or Depth Pile was Driven, feet	Bottom of Shaft/Pile Elevation	Target Bottom of Shaft/Pile Elevation	Did Shaft/Pile Meet Target Bottom of Elevation?

Notes:

APPENDIX B

SITE-SPECIFIC SEDIMENT REMEDIATION PERIMETER AIR MONITORING ACCEPTABLE AIR CONCENTRATIONS – TECHNICAL MEMORANDUM

Exponent®
1800 Diagonal Road, Suite 500
Alexandria, VA 22314

Technical Memorandum
August 23, 2012

Site-Specific Sediment Removal Action, Perimeter Air Monitoring, Acceptable Air Concentrations

As part of the focused sediment removal action project to be performed at the Wisconsin Public Service Corporation's former Marinette Manufactured Gas Plant (MGP) (Site) in Marinette, Wisconsin, air monitoring will be conducted to measure the concentrations of MGP-related constituents associated with the sediment removal action. Two types of air monitoring will be conducted during the project.

The first type will be real-time air monitoring of specific constituents (total volatile organic compounds [TVOCs], particulate matter less than 10 μm in size [PM_{10}]), to be conducted with stationary air monitoring instruments as described in the air monitoring plan (AMP) presented in the *Construction Quality Assurance Project Plan* (CQAPP) developed by Natural Resource Technology, Inc. The real-time air monitoring stations will be located at the perimeter of the Site. These real-time measurements will be collected using automated air sampling and analysis devices at a specified sampling interval (e.g., every 15 minutes) over the entire day and compared in real time to the perimeter action levels presented in the AMP. Any exceedance of the action levels will require specific response measures by the sediment removal action contractor to reduce the vapor and/or particulate phase emissions.

The second type of air monitoring will be done using stationary sampling devices that take integrated air samples over a 24-hour period to measure the concentrations of MGP-related constituents at the Site perimeter (i.e., the fence line). These samples are then sent to an offsite laboratory for analysis. These air concentrations will be compared to the acceptable air concentrations (AACs) developed to be protective of public health, as described in this technical memorandum. The goal of the air monitoring program is to maintain air concentrations at the secured perimeter of the Site, as measured in the integrated 24-hour samples, at levels below applicable AACs.

Exponent was requested by Integrys Business Support, LLC (IBS), to develop AACs for the sediment removal action project. The AACs were developed to be protective of the residents living nearby, because they are the most sensitive population in the Site area. The AACs were developed using U.S. Environmental Protection Agency (EPA) risk assessment methods, the most current available toxicity data, and physical parameter information, and by applying site-specific exposure parameters that consider the nature of the sediment removal project (U.S. EPA 2009a–d, 2012a,b). These site-specific AACs were developed based on the fact that the only potential exposure pathway for nearby residents for chemicals associated with the sediment removal action project would be inhalation of fugitive air emissions, because the Site will remain secured with a perimeter fence. These fugitive air emissions would be in the form of dust for those MGP-related constituents that are relatively non-volatile (e.g., high-molecular-weight polycyclic aromatic hydrocarbons [PAHs]) and as chemical vapors for volatile MGP constituents (e.g., benzene and naphthalene). Because of the method used to calculate the AACs (described below), a worker[1] and resident who were exposed for the same amount of time would have the same potential exposure. Thus, AACs calculated under a residential scenario, which assumes exposures 24 hours per day, 7 days per week, would also be protective of a worker who would be exposed for fewer hours.

The specific MGP-related constituents for which AACs were developed were those that are typically evaluated for MGP projects because of their volatility and/or toxicity, including BTEX and eight specific PAHs. In addition, the health-based value developed by EPA for dust (i.e., PM_{10}) was adopted to address health concerns associated with particulate matter or dust.

The Site is located on the southern edge of the Menominee River in a mixed-use area. Commercial and industrial areas, as well as park-district property (i.e., Boom Landing), are adjacent to the Site, with a small residential area located about 400 ft from the upland staging area, which is Boom Landing. The removal action will consist of dredging contaminated sediments from an area of the river. The main dredging activities will occur within the river adjacent to Boom Landing, which is a City-owned boat launch. The perimeter fence is the closest location to the active sediment removal project where the general public could potentially be exposed to fugitive emissions, because the general public will not have access to the Site. The AACs were developed using a conservative approach, so that if exposure to MGP-related constituents occurred at the secured perimeter over the entire duration of the sediment removal project for 24 hours per day, the exposure would not pose a health concern to the general public. As distance from the Site increases, air concentrations will be diluted and reduced relative to those measured at or near the Site. The calculations used to derive the AACs are described below, followed by the specific exposure and toxicity factors used as inputs. The resultant AACs are presented in Table 1.

Equations and Methods Used to Derive AACs

Equations

The equations used to calculate the AACs were derived from current EPA guidance for inhalation exposures, as presented in the user's guide for EPA's regional screening levels (U.S. EPA 2012a).

For this Site, the exposure terms were simplified, because the exposure duration is short (i.e., less than a year) due to the nature of the planned sediment removal action, yielding the following site-specific equations for developing the AACs. The equations differ slightly for noncarcinogenic and carcinogenic effects of a chemical. The input values and definitions of all abbreviations are provided in Table 1.

---

[1] The term "worker" refers to commercial/industrial workers located within the portion of the industrial area outside of the secured fence surrounding the Site. The term "worker" does not refer to remediation contractor employees located on the Site.

Noncarcinogenic

$$\text{AAC noncarc (mg/m}^3\text{)} = \frac{\text{THQ} \times \text{AT(noncarc)}}{\text{EF} \times \text{ET} \times \text{(1 day/24 hrs)} \times \text{(1/RfC)}}$$

Carcinogenic

$$\text{AAC carc (mg/m}^3\text{)} = \frac{\text{TR} \times \text{AT(carc)}}{\text{EF} \times \text{ET} \times \text{(1 day/24 hrs)} \times \text{IUR} \times 1000}$$

For noncarcinogens, a target hazard quotient of 1 was used to estimate the AACs. For carcinogens, AACs were calculated using three different target risk levels of 1×10^{-4}, 1×10^{-5}, and 1×10^{-6}, so that values could be developed that spanned the risk range typically considered when assessing cancer risks at Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) sites. Cumulative risks within the risk range are considered potentially acceptable depending on site-specific circumstances that are evaluated by EPA. Cumulative risks above 1×10^{-4} are not typically considered acceptable. The goal will be to manage fugitive air emissions during the sediment removal action such that air concentrations are as low as practically possible. Thus, on average, the goal will be to meet AACs that are at the lower end of the risk range, and if possible, below the range presented in Table 1.

For chemicals for which both cancer- and noncancer-based toxicity values are available (i.e., benzene, ethylbenzene, and naphthalene), the AACs were calculated using both sets of toxicity values. When the noncancer-based AAC was lower than the cancer-based AAC (for a particular risk level), the noncancer-based AAC was selected to be health protective, and is indicated with a box in Table 1. Typically, at the 1×10^{-6} risk level, the cancer-based values are lower than the noncancer-based values, but as the target risk level for carcinogens is increased (i.e., from 1×10^{-6}, to 1×10^{-5}, to 1×10^{-4}), the noncancer-based AAC may be lower than the cancer-based value. This situation occurs for benzene and naphthalene at the 1×10^{-4} and the 1×10^{-5} risk levels and for ethylbenzene at the 1×10^{-4} risk level, indicating the noncancer-based value is more health protective in these instances and should be used as the AAC.

Exposure Factors

The following section explains the basis for the site-specific exposure factors used to develop the AACs for the residential population near the Site. The toxicity values addressed later in this document were developed in a conservative manner to be health protective for sensitive human populations, including children, and were used following the most current inhalation dosimetry method, and thus do not require normalization to body weight and daily inhalation rate (U.S. EPA 2009e).

Exposure Frequency and Exposure Time

The duration of the sediment removal action is planned to be approximately 14 weeks, with activities that could potentially lead to fugitive emissions (e.g., active excavation of sediment and amendment of contaminated sediment) potentially occurring during a total of 9 weeks during this 14-week period. Because this remediation project is a wet sediment dredging operation rather than a soil removal action, any contaminated sediments that are exposed prior to removal will be covered with water, which prevents fugitive emissions from occurring until they are exposed to air. Once sediments are removed from the river, they will be placed on land in a staging area inside the secured perimeter and stabilized with an amendment (e.g., Portland cement or lime). As soon as the sediments are appropriately stabilized, they will be loaded onto trucks and taken offsite so that staging of sediment stockpiles will be kept to a minimum. Stockpiles left during non-working hours will be covered with a vapor-phase suppressant foam and/or a tarp to minimize fugitive air emissions. If necessary, additional engineering controls, such as a misting system or fan, will be used to control fugitive emissions from the Site.

Work at this Site is expected to occur 10 hours per day for 5 days a week. However, the AACs were developed conservatively, using the assumption that emissions could occur 24 hours per day, 7 days per week during the entire year-long duration of the project (Table 1). These exposure assumptions also correspond to the air monitoring period (24 hours/day) that will be used for collecting the integrated air samples.

Averaging Time

For carcinogens, the averaging time is the full lifetime of an individual, assumed to be 70 years (equivalent to 25,550 days) based on EPA risk assessment guidelines (U.S. EPA 1989).

For noncarcinogens, the averaging time is limited to the duration over which exposure may occur based on the same EPA risk assessment guidelines (U.S. EPA 1989). For this site-specific scenario, the sediment removal action is expected to occur intermittently over the 14-week project period, so the averaging time for noncarcinogens is 98 days (14 weeks × 7 days/week). While exposure is expected to occur for only 63 days (i.e., equivalent to 9 weeks of exposure) during the project period (14 weeks), the exposure is averaged over the entire period of the project, because potential exposures will occur intermittently throughout the project period.

Toxicity Values

Toxicity values used are presented in Table 1. Values used were obtained from EPA's Integrated Risk Information System (IRIS, U.S. EPA 2012b), EPA's provisional peer-reviewed toxicity values (PPRTVs, U.S. EPA 2009a-d), and the California Environmental Protection Agency (Cal-EPA 2009). For noncarcinogenic effects of chemicals, reference concentrations (RfCs) were used to assess the toxicity of the MGP-related constituents. RfCs are available for BTEX and naphthalene. For carcinogenic effects, inhalation unit risk (IUR) factors were used to assess the MGP-related constituents. There are IUR values for benzene, ethylbenzene, and the eight PAHs.

For noncarcinogens, subchronic rather than chronic toxicity values were used. EPA defines a subchronic exposure duration as one lasting more than 30 days up to 10% of a lifetime in humans, which would be 7 years (U.S. EPA 2011). Thus, the 14-week total duration of this project is more appropriately considered a subchronic exposure period, rather than a chronic exposure period. EPA provides PPRTVs for subchronic exposures for benzene, ethylbenzene, and xylenes, which were used in Table 1 (U.S. EPA 2009a–c). For toluene, the PPRTV document recommends the use of the chronic value for subchronic exposures (U.S. EPA 2009d).

For naphthalene, there are no subchronic inhalation toxicity values. The EPA chronic RfC for naphthalene is based on a 2-year mouse study in which nasal inflammation was observed in mice chronically exposed to naphthalene. EPA did not note additional adverse effects at or near the dose level used to derive the RfC. Nasal inflammation is a reversible effect, meaning that once exposure ends, the inflammation will subside. The estimated human equivalent concentration of naphthalene that would cause the nasal inflammation based on this study was 9 mg/m^3 (U.S. EPA 1998, 2012b). This human equivalent concentration was used by EPA with an uncertainty factor of 3,000 to derive the chronic naphthalene RfC of 0.003 mg/m^3. The 3,000-fold uncertainty factor is based on the following:

- A 10-fold factor for extrapolation from an adverse-effect level to a no-adverse-effect level
- A 10-fold interspecies extrapolation factor to account for the differential sensitivity of humans compared to other animals (e.g., mice)
- A 10-fold intraspecies extrapolation factor to account for the difference in sensitivity among humans
- An additional 3-fold factor was included because there were deficiencies in the toxicology data available (e.g., lack of reproductive data).

Because the period of exposure for this short-term project will be clearly subchronic in nature, a subchronic RfC was desired to more closely match the short-term exposure period. To estimate a subchronic inhalation toxicity value for naphthalene, EPA's chronic RfC (0.003 mg/m^3) was multiplied by a 10-fold factor to adjust from a no-adverse-effect level over a *chronic* period of exposure to a no-adverse-effect level over a *subchronic* exposure period (i.e., 0.03 mg/m^3).

The seven PAHs listed in the attached table, other than naphthalene, are compounds that have been classified by EPA as probable human carcinogens for decades and are normally evaluated as such. Benzene is classified as a known human carcinogen, and there is an IUR available for it in IRIS. However, only oral cancer-based toxicity values (i.e., slope factors) have been developed for these seven PAHs by EPA. The oral cancer slope factor for benzo[a]pyrene is presented in IRIS, while the values for the other six PAHs are based on a potency factor relative to benzo[a]pyrene (U.S. EPA 1993). However, Cal-EPA has developed inhalation toxicity values for these seven PAHs, which were used in calculating the AACs. The classification of naphthalene and ethylbenzene as to whether they are considered carcinogens is currently under review by EPA (U.S. EPA 2004, 2012b). However, Cal-EPA has developed cancer-based inhalation toxicity values for these two compounds. AACs for naphthalene and ethylbenzene were developed using both cancer and noncancer toxicity values, with the lowest value being selected as the AAC.

Estimated AACs and Application of AACs

The estimated AACs are presented in Table 1. Integrated air sample results collected over a 24-hour period will be compared to the AACs in Table 1 for each of the volatile constituents (i.e., BTEX and naphthalene). While naphthalene is a volatile PAH that will be present in the vapor phase in air, the other seven PAHs for which AACs were developed (i.e., benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]-anthracene, and indeno[1,2,3-cd]pyrene) are relatively non-volatile. These seven non-volatile PAHs are bound on the particulate matter or dust generated during the sediment removal process, rather than being present as a vapor (like naphthalene) in air. For these seven PAHs, real-time air sampling of dust using a DustTrak monitor will be used to indirectly evaluate compliance with these seven PAH AACs in Table 1. In addition, the ambient air respirable dust concentration (i.e., PM_{10}) measured using the real-time DustTrak monitor over a 24-hour period will be used to directly evaluate compliance with the PM_{10} standard in Table 1.

As mentioned above, the real-time dust monitoring will be used to indirectly determine whether the AACs for the seven non-volatile PAHs are achieved when the PM_{10} standard is achieved. Based on the maximum concentrations of each of the seven non-volatile PAHs detected in sediment to be removed, the maximum air concentrations of each PAH that could be generated if the PM_{10} standard (i.e., 0.15 mg/m^3) is achieved were estimated (Table 2). The predicted maximum air concentration of each non-volatile PAH (assuming the dust concentration was equivalent to the PM_{10}) was compared to its AAC that was developed using a target cancer risk of 1×10^{-5}, which is in the middle of the acceptable target risk range (Table 2). In each case, the maximum predicted air concentration of each non-volatile PAH was much less than the selected AAC (Table 2). For this reason, as long as the PM_{10} air standard is achieved, the air concentrations of each of the seven non-volatile PAHs are predicted to be below their respective AACs based on a target risk of 1×10^{-5}.

Prior to beginning the sediment removal action, concentrations of the MGP-related constituents (BTEX, naphthalene, and PM_{10}) will be measured to evaluate baseline levels in the Site area. It is expected that the ambient or background air concentrations of the MGP-related constituents will be much lower than the AACs and will not contribute significantly to the daily air concentrations measured at the secured perimeter. If significant baseline air concentrations are detected (i.e., near the AACs), then the AACs will be reassessed to account for this contribution. Specifically, the AACs based on noncancer effects need to be achieved when considering the cumulative air emissions from both the sediment removal action and baseline ambient conditions to maintain protection of the public. For the AACs based on carcinogenic effects, the point of comparison will be the incremental increased air concentration attributable to the remedial action (i.e., the incremental air concentration measured above the baseline conditions).

Once the sediment removal action begins, the project will be managed to minimize fugitive air emissions. The first line of information used to make management decisions to control fugitive air emissions will be real-time monitoring and comparison to perimeter air action levels. These action levels are guidelines and not health-based concentration limits. The primary management goal will be to minimize fugitive air emissions to meet the AACs presented in Table 1, because the AACs are health-based concentrations.

For chemicals with only known noncarcinogenic effects (e.g., toluene and xylenes), there is a single noncarcinogenic-based AAC; thus, air concentrations above that value will be considered an exceedance of the AAC, which will require consideration of taking additional action to reduce fugitive emissions at the Site. For chemicals that are potentially carcinogenic, the daily incremental air concentrations above background will be considered acceptable if they are within the AAC target risk ranges presented within Table 1 (i.e., 1×10^{-4} to 1×10^{-6}), as long as the cancer-based AAC at a given target risk does not exceed the noncancer-based AAC (see Table 1). An incremental air concentration above background that is greater than the AAC based on a 1×10^{-4} target risk level will be considered an exceedance that requires considering additional action to reduce fugitive emissions. However, any air concentration greater than the lowest AAC for a specific analyte will be viewed by IBS and their contractors as indicating a need to review the process used to manage fugitive emissions. Because action levels will be used with real-time monitoring as the first line of defense to minimize fugitive air emissions, exceedances of the AACs will reflect a need to review action levels and the real-time monitoring program to determine if lower action levels are required, or if more focused real-time monitoring is needed to better manage fugitive emissions.

It is important to note that the AACs are representative of the average concentrations to which a residential receptor could be exposed without exceeding the target risk level over the exposure period (i.e., 14-week project duration). Therefore, cumulative averages over the duration of the project are a more appropriate comparison value than single-day measurements for meeting the overall project goal of protecting the public. While daily concentrations will be used as a guide to address the need for reviewing the fugitive emission controls, the overall goal of meeting the AACs will be based on the average concentrations achieved over the project duration. If the project duration is extended significantly because of unforeseen circumstances, AACs may need to be adjusted. However, whether adjusting the AACs is necessary will be determined based on the performance of the sediment removal action up to the time that a project extension is first anticipated. The expectation is that the average air concentrations measured during the sediment removal action will be maintained far enough below the calculated AACs that an extension of the project duration would not present any likelihood that the cumulative target risk goal (i.e., hazard quotient of 1 or within the risk range) would be exceeded. Therefore, unless this expectation is not met, the AACs should not need to be adjusted. A comparison of the integrated air monitoring data to the AACs will be part of the completion report prepared once the sediment removal action is complete.

Finally, these AAC values implicitly assume that a receptor will be near the Site for 24 hours/day during the entire project. If residents spend any of their time in a different location, actual risks will be lower.

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Table 1. Site-specific sediment removal action perimeter air monitoring acceptable air concentrations: Residential exposure scenario
Former Marinette Manufactured Gas Plant Site, Marinette, Wisconsin

					Site-Specific Acceptable Air Concentrations											
	Noncancer	Cancer			At Target Cancer Risk: 1E-04 at Target Hazard Quotient: 1				At Target Cancer Risk: 1E-05 at Target Hazard Quotient: 1				At Target Cancer Risk: 1E-06 at Target Hazard Quotient: 1			
Constituent	RfC (mg/m^3)	IUR (µg/m^3)$^{-1}$	Basis and Source of Toxicity Values		(mg/m^3)	(µg/m^3)	(ppmv)	(ppbv)	(mg/m^3)	(µg/m^3)	(ppmv)	(ppbv)	(mg/m^3)	(µg/m^3)	(ppmv)	(ppbv)
Benzene (cancer)	--	7.8E-06	C	IRIS	5.2	5,200	1.6	1,600	0.52	520	0.16	160	0.052	52	0.016	16
Benzene (noncancer, subchronic)	0.080	--	NC	PPRTV	0.12	120	0.039	39	0.12	120	0.039	39	0.12	120	0.039	39
Toluene	5.0	--	NC	IRIS	7.8	7,800	2.1	2,100	7.8	7,800	2.1	2,100	7.8	7,800	2.1	2,100
Ethylbenzene (cancer)[a]	--	2.5E-06	C	Cal-EPA	16	16,000	3.7	3,700	1.6	1,600	0.37	370	0.16	160	0.037	37
Ethylbenzene (noncancer, subchronic)	9.0	--	NC	PPRTV	14	14,000	3.2	3,200	14	14,000	3.2	3,200	14	14,000	3.2	3,200
Xylenes (subchronic)	0.40	--	NC	PPRTV	0.62	620	0.14	140	0.62	620	0.14	140	0.62	620	0.14	140
Naphthalene (cancer)[a]	--	3.4E-05	C	Cal-EPA	1.2	1,200	0.23	230	0.12	120	0.023	23	0.012	12	0.0023	2.3
Naphthalene (noncancer, subchronic)	0.030 [c]	--	NC	IRIS[c]	0.047	47	0.0089	8.9	0.047	47	0.0089	8.9	0.047	47	0.0089	8.9
Benz[a]anthracene[b]	--	1.1E-04	C	Cal-EPA	0.37	370	0.039	39	0.037	37	0.0039	3.9	0.0037	3.7	3.9E-04	0.39
Benzo[a]pyrene[b]	--	1.1E-03	C	Cal-EPA	0.037	37	0.0036	3.6	0.0037	3.7	3.6E-04	0.36	3.7E-04	0.37	3.6E-05	0.036
Benzo[b]fluoranthene[b]	--	1.1E-04	C	Cal-EPA	0.37	370	0.036	36	0.037	37	0.0036	3.6	0.0037	3.7	3.6E-04	0.36
Benzo[k]fluoranthene[b]	--	1.1E-04	C	Cal-EPA	0.37	370	0.036	36	0.037	37	0.0036	3.6	0.0037	3.7	3.6E-04	0.36
Chrysene[b]	--	1.1E-05	C	Cal-EPA	3.7	3,700	0.39	390	0.37	370	0.039	39	0.037	37	0.0039	3.9
Dibenz[a,h]anthracene[b]	--	1.2E-03	C	Cal-EPA	0.034	34	0.0030	3.0	0.0034	3.4	3.0E-04	0.30	3.4E-04	0.34	3.0E-05	0.030
Indeno[1,2,3-cd]pyrene[b]	--	1.1E-04	C	Cal-EPA	0.37	370	0.033	33	0.037	37	0.0033	3.3	0.0037	3.7	3.3E-04	0.33
PM_{10}	--	--	NAAQS for PM_{10}		0.15	150	--	--	0.15	150	--	--	0.15	150	--	--

Site-Specific Assumptions for Residential AAC Equations:

Averaging Time (AT) (carc)		70	years (lifetime)
	=	25,550	days
Averaging Time (AT) (noncarc)		98	days (reflects 14 weeks total duration of project)
Exposure Frequency (EF)		63	days (reflects number of days removal of contaminated material occurs and time a resident would be in area, 9 weeks × 7 days/week)
Exposure Time (ET)		24	hours/day (reflects number of hours a resident might be exposed)

Notes and Footnotes:

AAC equations, toxicity values, and sources based on EPA's regional screening levels (http://www.epa.gov/region9/superfund/prg/), which were last updated May 2012.

All AACs are rounded to two significant figures.

For noncarcinogenic effects, subchronic values were used when available. For toluene, the subchronic value was the same as the chronic value.

When both cancer-based and noncancer-based AACs were available for a particular chemical, the lowest value (for a particular risk level) was selected to be health protective, and is indicated with a box.

[a] Classification of napthalene and ethylbenzene is currently under review by EPA. Also see U.S. EPA (2004).

[b] The PM_{10} NAAQS of 150 µg/m^3 would also be protective of potential exposures to PAHs in dust.

[c] A subchronic RfC was estimated based on the chronic RfC. Refer to the text for details.

AAC – acceptable air concentration
Cal-EPA – California Environmental Protection Agency
C – AAC based on cancer endpoint
EPA – U.S. Environmental Protection Agency
IRIS – Integrated Risk Information System
IUR – inhalation unit risk
NAAQS – national ambient air quality standard
NC – AAC based on noncancer endpoint
PAH – polycyclic aromatic hydrocarbon
PM_{10} – particulate matter less than 10 µm in size
PPRTV – provisional peer-reviewed toxicity values (U.S. EPA; http://hhpprtv.ornl.gov/quickview/pprtv_papers.php)
RfC – reference concentration
THQ – target hazard quotient
TR – target risk (carcinogenic)

Air concentrations converted using the formula: (Concentration in mg/m^3) = (Concentration in ppm) × (Molecular Weight/24.45)
taken from U.S. EPA: http://www.epa.gov/iris/subst/0276.htm.
Molecular weights taken from EPA, regional screening values: http://www.epa.gov/region9/superfund/prg/.

Conversion 1 ppm to	mg/m^3
Benzene	3.19
Toluene	3.77
Ethylbenzene	4.34
Xylenes	4.34
Naphthalene	5.24
Benz[a]anthracene	9.34
Benzo[a]pyrene	10.32
Benzo[b]fluoranthene	10.32
Benzo[k]fluoranthene	10.32
Chrysene	9.34
Dibenz[a,h]anthracene	11.38
Indeno[1,2,3-cd]pyrene	11.30

Noncarcinogenic

$$\text{AAC noncarc (mg/m}^3\text{)} = \frac{\text{THQ} \times \text{AT(noncarc)}}{\text{EF} \times \text{ET} \times \text{(1 day/24 hrs)} \times \text{(1/RfC)}}$$

Carcinogenic

$$\text{AAC carc (mg/m}^3\text{)} = \frac{\text{TR} \times \text{AT(carc)}}{\text{EF} \times \text{ET} \times \text{(1 day/24 hrs)} \times \text{IUR} \times 1{,}000}$$

Table 2. Maximum predicted ambient concentrations in air for particulate-related constituents Former Marinette Manufactured Gas Plant Site, Marinette, Wisconsin

Constituent	Maximum Sediment Concentration[a] (mg/kg)	Maximum Predicted Air Concentration[b] (mg/m^3)	Residential Acceptable Air Concentration[c] (mg/m^3)	Risk Ratio[d] (unitless)
Benz[a]anthracene	188	0.000028	0.037	0.00076
Benzo[a]pyrene	168	0.000025	0.0037	0.0068
Benzo[b]fluoranthene	164	0.000025	0.037	0.00066
Benzo[k]fluoranthene	126	0.000019	0.037	0.00051
Chrysene	199	0.000030	0.37	0.000081
Dibenz[a,h]anthracene	26.3	0.000004	0.0034	0.0012
Indeno[1,2,3-cd]pyrene	86.1	0.000013	0.037	0.00035

[a] Maximum sediment concentrations listed are based on the highest concentration of each constituent sampled from within the proposed excavation areas. The highest concentrations were obtained from sediment boring locations T04HH and T03A3.

[b] Based on an action level for PM_{10} of 0.15 mg/m^3 and calculated using the concentration of each constituent in sediment as the assumed concentration of the constituent in airborne respirable dust.

$$\text{Maximum Predicted Air Concentration } (mg/m^3) = \text{Maximum Sediment Concentration } (mg/kg) \times PM_{10} \text{ Action Level } (mg/m^3) \times (1\times10^{-6} \text{ kg/mg})$$

[c] Acceptable air concentration (AAC) for a resident based on a 1×10^{-5} target risk (from Table 1).

[d] Risk ratio represents the ratio of the maximum predicted air concentration over the AAC. A value less than 1 represents an air concentration below the selected target risk level.