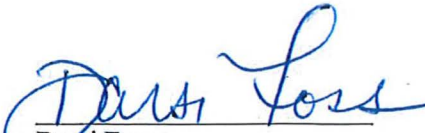


FIVE-YEAR REVIEW REPORT FOR
CAMPMARINA
SHEBOYGAN, WISCONSIN



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Date

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LIST OF ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirements
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CBSQG	Consensus Based Sediment Quality Guidelines
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DNR	Wisconsin Department of Natural Resources
EPA	United States Environmental Protection Agency
ES	Enforcement Standard
FS	Feasibility Study
GIS	Geographic Information System
HDPE	High Density Polyethylene
IC	Institutional Control
OU	Operable Unit
MGP	Manufactured Gas Plant
ug/kg	micrograms/kilogram
mg/kg	milligrams/kilogram
MNA	Monitored Natural Attenuation
NAPL	Non Aqueous Phase Liquid
NCP	National Contingency Plan
NRT	Natural Resources Technology, Inc.
PAH	Poly-Aromatic Hydrocarbons
PAL	Preventive Action Limit
PCB	Polychlorinated Biphenyl
PRG	Preliminary Remediation Goal
PRS	Pollution Risk Services, Inc.
QAPP	Quality Assurance Project Plan
RI/FS	Remedial Investigation/Feasibility Study
RAO	Remedial Action Objective
RCL	Residual Contaminant Level
ROD	Record of Decision
ROW	Right-of-Way
SARA	Superfund Amendments and Reauthorization Act
SWAC	Surface Area Weighted Average Concentration
TI	Technical Impracticability
TPH	Total Petroleum Hydrocarbons
TSCA	Toxic Substances Control Act
VPLE	Voluntary Party Liability Exemption
WPSC	Wisconsin Public Service Corporation

EXECUTIVE SUMMARY

Campmarina was the site of a manufactured gas plant (MGP) that operated in the late 18th to early 20th century on the Sheboygan River, approximately one mile from the Sheboygan Harbor on Lake Michigan. Operations left MGP residuals in soil, groundwater, and river sediment. City workers discovered contamination in 1990 when installing footings for a floating dock that was to be used at the recreational vehicle (RV) campground, which was the land use at the time.

Under a state environmental repair contract written to follow the Superfund National Contingency Plan (NCP) process for a remedial site, the responsible party, Wisconsin Public Service, Co. (WPSC), conducted investigations in the upland in the early to mid-1990s with their consultant, Natural Resource Technology, Inc. (NRT). NRT found isolated areas of soil contamination in the unsaturated zone consisting of benzene, toluene, ethylbenzene, and xylene (BTEX), poly-aromatic hydrocarbons (PAHs), cyanide, and coal tar on site, and in the adjacent Center Street right-of-way (ROW). Contamination was found to be more extensive in soil below the water table, especially coal tar. Groundwater contamination mirrored the soil contamination, but was shown to be limited at depth by a clay layer.

A Wisconsin Department of Natural Resources (DNR) written Record of Decision (ROD) was finalized in the spring of 2000, and remedial actions in the upland took place in 2000 and 2001. Initial phase remedial activities consisted of unsaturated zone soil excavation, grading, thermal treatment, and material management. Second phase remedial activities consisted of installing a vertical sheet pile barrier (a Waterloo groundwater barrier) wall around the affected area within Campmarina and the Center Avenue ROW, installing a biosparge system, installing a multi-layer impervious cap, restoring the site to pre-existing grade, and redeveloping the site as a city park and river-walk. The state ROD committed the DNR to conduct Five Year Reviews for the site to determine if the remedy remains protective.

In May of 2007, the state contract was terminated by request of WPSC, and oversight was transferred to the United States Environmental Protection Agency (EPA) under an administrative order on consent. Terminology changed to Upland Operable Unit (OU) for the upland part of the site, and River OU for the sediment portion.

NRT completed a sediment study in 1998 that identified coal tar, PAH, and BTEX contaminants in sediments adjacent to and approximately 600 feet downstream of the site. Soft sediments were determined to be 2-4 feet thick, with the shallowest coal tar accumulation at one foot below the top of the soft sediments, and two feet or more below the upper soft sediments downstream from the site. NRT conducted a River OU Remedial Investigation/Feasibility Study (RI/FS) that was completed in 2009.

Remedial action in the river occurred under an EPA Time Critical Removal ahead of dredging for poly-chlorinated biphenyls (PCBs) for the Sheboygan River and Harbor Superfund dredge project. Remedial action dredging and shoreline soil excavation took place mainly in two phases, the first being conducted in 2011 by WPSC contractors. Following WPSC and PCB dredging, river improvement dredging was conducted by the Great Lakes National Program Office (GLNPO) of EPA with Great Lakes Legacy Act (GLLA) funding in 2012 and 2013.

GLNPO conducted additional post dredge sampling on a grid to confirm the effectiveness of the remedial dredging. Based on sample data at the end of the dredging projects, the GLLA project team calculated a surface area weighted concentration (SWAC) for the Campmarina River OU as 11.9 mg/kg total PAHs, and lower than that after a six-inch final sand cover was placed over river

bed at locations with total PAHs over 18 mg/kg. This was well below the site specific risk-based sediment remedial action goal of 45 mg/kg total PAH established by NRT.

In 2011, WPS applied to Wisconsin's Voluntary Party Liability Exemption Program for the Campmarina site, a process under which an applicant limits future liability for historic contamination after completing a complete site investigation and cleanup of a property. At the time, it was uncertain that the exemption would apply to sediment in the river. However, in 2016, a new state law was passed that added sediments to the program under Wis. Stats § 292.15(2)(af).

In 2013, at the request of the EPA, the DNR imposed institutional controls (ICs) on the site concurrent with the supplemental remediation system shutdown approval (upland air-sparge system) under the authority of Wis. Stats § 292.12. The DNR letter describing general site restrictions and a GIS Registry package prepared by NRT describing the institutional controls are posted on Wisconsin's public GIS database, including a cover maintenance plan with cover inspection and maintenance requirements described. The subsurface portions of the remediation system consisting of the Waterloo barrier wall, geo-synthetic cap, soil cover, drainage system are displayed in as-built drawings. However, these subsurface components of the remedial system are not referenced as needing maintenance or inspection in the maintenance plan.

NRT submitted a closure request package concurrent with the requested cover maintenance plan IC pursuant to Wis. Stats. § 292 and Wis. Admin. §§ NR 726. The DNR responded on September 11, 2013, with a letter that requested additional information and stated that the case could not be closed because the DNR had not approved the off-site investigation and remedial actions, specifically of the sediments, and had a list of questions regarding site details, including concerns in regards to the completeness of the upland site investigation. WPS and their consultant NRT subsequently met with DNR to discuss issues in the letter, but have not formally replied in writing to the DNR.

In July of 2014, NRT submitted a Technical Impracticability Report. The purpose of the report was to justify and request a waiver from meeting the groundwater Applicable or Relevant and Appropriate Requirements (ARARs) within the upland containment zone in order to meet requirements of the EPA's proposed ROD for the Upland OU. The EPA's ROD would serve to confirm EPA concurrence with the appropriateness of the upland remedy under the state ROD. However, this approach is not compatible with Wisconsin's case closure regulations, specifically Wis. Admin. § NR 726.05(6)(b), which states that as a condition of case closure, it must be documented that natural attenuation must bring the groundwater into compliance with state Enforcement Standards within a reasonable period of time. As of December 15, 2016, the EPA has not finalized a ROD for the Upland OU (Reference 1).

Groundwater monitoring has continued at the site, with the last sampling report submitted by NRT to the DNR on July 21, 2015. The DNR also continues to receive monthly updates from NRT, the most recent of which references continued groundwater sampling in 2017, and work on the EPA Five-Year Review Report for the Upland OU.

PROTECTIVENESS STATEMENT

This review finds that the Upland OU and River OU remedies are protective. The remedies are functioning as intended, based on more than 19 years of groundwater monitoring with stable contaminant concentrations in the Upland OU, and extensive post-dredge sampling in the River OU that indicated post-remediation contaminant levels in sediments far below the Remedial Action Objectives (RAOs).

The DNR identified the following issues based on this Five-Year Review which, if not addressed, may affect the long-term protectiveness of the remedies:

- Lack of means or method in the maintenance plan to check the integrity of the Waterloo barrier for corrosive failure.
- Potential leakage of the containment system.
- Possible minor rebound in groundwater contaminant concentrations in certain wells since shutdown of the air-sparge system.

The DNR recommends the following actions to address these issues:

- WPSC should provide a supplement to the cover/barrier maintenance plan that has a means or method to check the integrity of the Waterloo barrier for corrosive failure on a regular, long-term basis.
- WPSC should continue long-term groundwater monitoring, including natural attenuation parameters.
- WPSC should continue to collect groundwater elevation data to assess the hydraulic gradient inside the containment barrier and the groundwater flow pattern outside the barrier.

SITE IDENTIFICATION

Site Name: Campmarina
EPA ID: WIN000510058, EPA Region 5, Campmarina webpage:
<http://www3.epa.gov/region5/cleanup/campmarina/>
Wisconsin ID: BRRTS #: 0260000095, FID #: 460134950
NPL Status: The EPA has proposed no further action status for both the Upland OU, and the River OU.

SITE STATUS

Multiple OUs? Yes: River OU, Upland OU
Construction completion? Yes: Both River OU and Upland OU

REVIEW STATUS

Lead Agency: Upland OU: The DNR was the lead agency under a state environmental repair contract which was terminated on July 26, 2006, and then the EPA became lead with the issuance of an EPA administrative order on consent. The EPA may return lead authority to the DNR. If the DNR reassumes primary authority, it is unknown at this time if the state would write a new environmental contract under Wis. Stats §. 292.31, or regulate the site solely under Wis. Admin. § NR 700.
River OU: The DNR was the lead agency under a state environmental repair contract which was terminated on July 26, 2006, and then the EPA became lead with the issuance of an EPA administrative order on consent. The EPA may return lead authority to the DNR. If the DNR reassumes primary authority, it is unknown at this time if the state would write a new environmental contract under Wis. Stats §. 292.31, or regulate the site solely under Wis. Admin. § NR 700.

Author Name: John Feeney
Author Affiliation: DNR
Review Period: March 4, 2003 (1st remedial actions) to March 2017
Date of Site Inspection: September 16, 2015
Type of Review: 5-year
Review Number: 1
Triggering Action Date: March 4, 2003 for the Upland OU; June 15, 2011 for the River OU
Due Date: March 4, 2008 for the Upland OU; June 15, 2016 for the River OU

ISSUES/RECOMMENDATIONS

OUs with Issues: Upland OU
Issue 1: Potential future corrosive failure of the groundwater containment system.

Issue Category: Long term protectiveness.
 Recommendation 1: Implement solution to monitor the degree of corrosion of the groundwater containment wall (Waterloo Wall).
 Recommendation 2: Continue long term groundwater monitoring.
 Affect Current Protectiveness: No.
 Affect Future Protectiveness: Potential.
 Implementing Party: WPSC
 Oversight Party: DNR or EPA
 Milestone Date: Unknown

Issue 2: Potential for leakage of groundwater from the containment barrier.

Issue Category: Long term protectiveness.
 Recommendation: Continue to collect groundwater elevation data to assess the gradient inside the containment barrier, and the groundwater flow pattern outside the barrier.
 Affect Current Protectiveness: No.
 Affect Future Protectiveness: Potential.
 Implementing Party: WPSC
 Oversight Party: DNR or EPA
 Milestone Date: Unknown

Issue 3: Possible minor rebound in groundwater contaminant concentrations in certain wells since shutdown of the air-sparge system.

Issue Category: Long term protectiveness.
 Recommendation: Continue groundwater monitoring.
 Affect Current Protectiveness: No.
 Affect Future Protectiveness: Potential.
 Implementing Party: WPSC
 Oversight Party: DNR or EPA
 Milestone Date: Unknown

PROTECTIVENESS STATEMENT

Operable Unit: River OU

Protectiveness Determination: **Remedy is protective** based on the following line of evidence:
 (a) Extensive post-dredge sampling SWAC concentrations are well below site specific risk based RAOs.

PROTECTIVENESS STATEMENT

Operable Unit: Upland OU

Protectiveness Determination: **Remedy is protective** based on the following lines of evidence:
 (a) Gradient inside groundwater barrier system decreased by a factor of three post remediation and has remained steady (shows much reduced contaminant transport), (b) Stable contaminant concentrations in groundwater over the 19+ year monitoring

period, (c) The upgradient groundwater flow pattern shows diversion around groundwater barrier system.

Protectiveness Statement for
Entire Site:

The remedies are protective.

Introduction

Campmarina was the site of a MGP that operated in the late 18th to early 20th century on the Sheboygan River approximately one mile from the Sheboygan Harbor on Lake Michigan. As is typical of MGP sites across the nation, operations left MGP residuals in soil, groundwater, and river sediment.

The responsible party, WPSC, conducted site investigations and remedy feasibility studies in these media from the early 1990s until 2009. These efforts culminated in remedial and redevelopment constructions from 2000 until 2013 under state and federal oversight under the Superfund Alternatives Program. This document is written to fulfil DNR's commitment to conduct a five-year review of this work in accordance with the DNR November 22, 2000, ROD.

Site Chronology

A detailed chronology of Campmarina based on DNR files is provided in Appendix A.

Background

Coal-gas was manufactured at the Campmarina facility, which is within the boundaries of the Sheboygan River and Harbor Superfund site, beginning in approximately 1880 until about 1929. Most cities in the US had an MGP at that time. Gas was made by cracking hydrocarbons from coal and heavy oil feedstock (Reference 2), and was used for household and commercial cooking, lighting, and heating. By-products from gas production were used for raw materials in other industries. Initially, gas was made at the Campmarina facility by heating coal in large retorts. Later, a carbureted water gas process was used (passing air, steam, and a mist of oil over white-hot coal). Gas generated during the process was collected, purified, and stored in large aboveground containers. The refined gas was distributed to neighborhood homes and businesses.

The process of manufacturing gas produced byproducts including coal tar, oils, and woodchips contaminated with cyanide from the gas purification process. These byproducts were typically sold, especially the coal tar, which could be distilled and used in dozens of products including fuels, fertilizer, creosote, and pharmaceuticals. Byproducts that could not be sold may have been disposed of on-site. Storage tanks constructed of wood or brick with piping and other equipment may have leaked.

Surface MGP structures were removed from 1955 to 1965, and this 2 1/3-acre site became a parking lot for the G. Heilman Brewing Company and the Garten Toy factory. In 1985, it became a free campground for RVs.

City workers discovered contamination when installing footings for a floating dock that was to be used for the campground and for the adjacent Sheboygan Outboard Motor Club. The site is currently a city park which was largely expanded when it became Worker's Water Street Park, after bordering sections of Water Street and New York Avenue were demolished and converted to greenspace. To the east of the park are government office buildings, condominiums, and single-family housing. To the south are two empty lots along the shore of the river that have been awaiting development as condominium sites for several years, and a third lot, furthest from the site, was developed in the early 2000s. There is a man-made island mid-river to the west of the site used by the Sheboygan Outboard Motor Club.

The release was reported to DNR spills personnel by the City of Sheboygan in August of 1990. Laboratory results received in September of that year confirmed high levels of total petroleum hydrocarbons (TPH), and BETX in soil and groundwater. Immediately, it was suspected that the source for the contamination was the former coal gas plant. Early on, the responsible parties were thought to be the City of Sheboygan, WPSC, and G. Heileman Brewing Company (the brewery was shortly dropped thereafter from the list of potentially responsible parties).

Site Investigations

Site investigations were conducted in the Upland OU in the early to mid-1990s. WPSC's consultant, NRT, found isolated areas of unsaturated BTEX, PAH, cyanide, and coal tar soil impacts on site and in the former Center Street ROW. NRT also found PAH, BTEX, and coal tar contamination in the saturated zone and in groundwater on site.

Prior to DNR approval of the Phase II investigation, DNR requested full suite of volatile organics (VOC) testing. WPCS countered with the statement that the established VOC contaminants of concern at MGP sites are BETX only.

Two comprehensive river sediment studies were conducted by NRT. The first was completed in the 1998, and the second in 2009, after EPA became the lead regulatory agency on request from WPSC. The 1998 study found coal tar, PAH, and BTEX in sediments adjacent, and approximately 600 feet downstream of the site. Soft sediments were determined to be 2-4 feet thick, with the shallowest coal tar accumulation at one foot below the top of the soft sediments, and two feet or more below the upper soft sediments downstream from the site.

On May 7, 2008, EPA granted conditional approval of Revision 0 of the River OU RI/FS. In 2009, the RI/FS was revised and included comprehensive sediment investigations and presented a recommended remedial action. The investigation established an ambient background total PAH concentration in the river of 14 mg/kg, based on 13 parent PAH compounds. The report concluded that the contamination from the MGP site extended from transect T-14 on the upstream side to transect T-17 downstream, and from the eastern bank of the Campmarina site to the western shore of Boat Island. BTEX contamination generally followed the definition of PAH contamination with concentrations over 1 mg/kg BTEX where total PAHs were found to be over 100 mg/kg. The maximum total PAH concentration reported was 22,301 mg/kg. PCBs were determined to not follow the footprint of the MGP residuals, as expected. NRT found a maximum concentration of PCBs of 270 mg/kg. The area of PCB impacts is within the boundaries of the Sheboygan River and Harbor Superfund PCB cleanup site.

Regulatory History

Upland Operable Unit

In November of 1990, the DNR urged the responsible parties to enter a state contract pursuant to the state spills law, at that time enumerated Wis. Stats § 144.442, to require Superfund Equivalent regulation (currently called the Superfund Alternatives Program) of the site. DNR proposed that if the parties signed the contract, the site would not need to be incorporated into the larger Sheboygan River and Harbor Superfund site as Campmarina is located within the Sheboygan River and Harbor Superfund site boundaries. In July of 1991, the DNR again urged the parties to sign, and provided a draft contract. In February of 1992, the DNR sent the parties a statement of work required for a RI/FS, a preliminary step in the regular Superfund process. In April of 1992, the DNR, City of Sheboygan, and WPSC signed the contract agreement pursuant to section Wis. Stats 144.442 and Comprehensive Environmental Response, Compensation, and Liability Act

(CERCLA), 42 U.S.C. ss 9601, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). In July of 1990, while working on a draft of the contract, the parties agreed to call the site Campmarina.

After Phase I and II site investigations were conducted on the upland side in the early to mid-1990s, DNR Water Resources Program expressed concern that the sediments in the Sheboygan River off shore from the site were not getting proper investigation. In a letter dated April 25, 1995, WPSC proposed to handle the sediment issue separate from the upland issue. On May 2, 1995, DNR and WPSC held a meeting where file documents confirm that DNR approved this approach.

On May 7, 1999, NRT submitted an FS report for the Upland OU on behalf of WPSC. Three remedial alternatives were selected for detailed analysis: Option 1, source area excavation and off-site treatment; Option 2, source containment combined with bioremediation; and Option 3, steam enhanced vapor extraction. Option 1 was ruled out due to depth of contaminants (21 feet), double to triple the costs of the other options (\$6,000,000 estimated), the possibility of incomplete removal, and exposure considerations to the nearby condominiums and residences. Option 3 was ruled out due to uncertainty of effectiveness and cost. Option 2 was selected with a sheet metal Waterloo Wall barrier rather than a clay and concrete slurry wall due to concerns that river flood stage would render a slurry wall ineffective. This option was deemed to have the lowest cost with the most effectiveness, and to present the least amount of exposure of short term, direct contact, and fugitive emissions, which was an important consideration at the time because there was a proposed condominium construction project very close to the south end of the site. A minimum groundwater monitoring period of 30 years was used for costing purposes for the recommended option.

The DNR granted conceptual approval to the recommended remedial alternative on October 25, 1999; however, the DNR recommended that additional hot-spot, or “targeted,” soil remediation be added to the plan. WPSC did comply with this request, and submitted an addendum that called for thermal treatment of unsaturated soils. The treatment criteria was 50 mg/kg for total non-carcinogenic PAHs, 10 mg/kg for carcinogenic PAHs, 50 mg/kg for total cyanide, and (at the time current) Wis. Admin. § NR 720 groundwater pathway residual contaminant levels (RCLs) for BETX. A foot of imported clean fill was to cover the treated material. On November 7, 2000, the DNR completed and signed a ROD for the Upland OU that followed NRT’s recommended remedial alternative and included DNR’s suggested hot-spot soil remediation.

River Operable Unit

In 2003, the DNR and NRT began discussions regarding the River OU in light of the soon to come remedial dredging activity for the Sheboygan River and Harbor Superfund site. Pollution Risk Services (PRS), the responsible party, was to dredge, dewater, and properly dispose of, under TSCA, all soft sediments contaminated with PCBs. This presented a logistical problem due to the risk of mobilizing coal tar and other residuals in the river near Campmarina while dredging.

In August of 2004, the DNR, WPSC, and NRT met to discuss sediment investigation and remedial strategies. In a follow-up letter to the meeting, DNR was in favor of using 34 PAH constituents for total PAH measurements (which the cleanup standard was to be based on), and Consensus Based Sediment Quality Guidelines (CBSQG). WPSC and NRT were in favor of using fewer PAH constituents in the measurement and using a risk-based remedial approach. Then, in 2005, DNR received a request from WPSC to transfer the case to EPA jurisdiction. DNR sent a letter to WPSC in support of this request. This letter mentioned that the contract needed to

be terminated when a similar agreement was reached with EPA. In July of 2006, EPA sent WPSC a draft administrative order on consent between EPA and WPSC. In an agreement document dated April 1, 2007, The DNR, City of Sheboygan, and WPSC terminated the state contract.

In 2009, NRT's subcontractor performed site-specific laboratory toxicity testing on benthic organisms and determined 100% survival rate at a total PAH concentration of 45 mg/kg. Later that year, the EPA commented on the preliminary remediation goals, and remedial action objectives. EPA required that the FS include in the list of remedial options the removal of all soft sediments contaminated above 45 mg/kg total PAHs. Revision 1 of the RI/FS included this, and it also included the statement that near surface sediments may pose a risk to benthic organisms due to prop-wash and flood-scour events. EPA had expressed concerns with the vulnerability of a sediment cap/armor to boat anchoring and prop-wash in an EPA comment letter to NRT regarding the RI/FS Revision 0.

In December of 2009, WPSC applied to enter the Campmarina site in the Voluntary Party Liability Exemption (VPLE) program. In January 2011, WPSC submitted an advance deposit so that RR staff could begin to review reports and documents necessary to obtain the liability exemption. In January of 2010, DNR, WPSC, and NRT met to discuss VPLE and sediment cleanup issues. Later, an internal DNR memo noted that a deed on the river bed was not necessary for VPLE certificate of completion at the site. In 2016, a new state law was passed that added sediments to the program under Wis. Stats § 292.15(2)(af).

The EPA approved the site River OU site investigation on December 11, 2009. Shortly after, NRT submitted Revision 1 of the RI/FS in February of 2010, which recommended excavation and disposal of 4,800 cubic yards of near-shore sediments containing non aqueous phase liquid (NAPL), excavation and disposal of 3,100 cubic yards of shoreline soils, capping sediments above 129 mg/kg total PAHs with no NAPL present, and monitored natural attenuation of uncapped sediments with total PAH concentrations above 45 mg/kg. That Spring, EPA inquired about the cap holding up to scour, prop-wash, and how institutional controls would be enforced. EPA also suggested that additional sediments be added to the excavation and disposal option, and that dredging of sediments be conducted within a sheet-pile cofferdam.

In a response letter from NRT to the EPA dated November 12, 2010, NRT agreed to employ a sheet-pile cofferdam for dredging sediments either by driving in sheet pile and pumping out the river water, "in the dry", or without pumping, "in the wet". The letter states that EPA was considering a removal action at the site and that further revisions to the RI/FS would be suspended until EPA's course of action was known.

In February 2011, the EPA issued a public information flyer describing a proposed emergency removal action at the site. The flyer gave basic background information on the site and on the sediment removal plan to be completed by WPSC, with dredging done in the wet within a cofferdam under EPA oversight. The flyer said that GLLA funding would be used to conduct additional dredging and other fish and wildlife work.

Later that Spring, NRT submitted a work-plan called "Focused NAPL and Sediment Removal Action Plans and Specifications." The cover letter to the DNR stated that the FS has been submitted to EPA in accordance with the EPA Order on Consent and Statement of Work, CERCLA Docket N. V-W-07-C-862, dated January 26, 2007. The plan called for cofferdam installation followed by in the wet dredging and disposal of NAPL, PAH, BETX, and PCB contaminated sediments. Later, WPSC added dredging of sediments above 45 mg/kg total PAHs outside the coffer dam to the plan, in response to EPA comments. On April 26, 2012, NRT issued

a progress report that mentioned EPA's statement that Revision 2 of the River OU FS did not require modification and that the removal action Focused NAPL and Sediment Removal Action Plans and Specifications met the requirement to complete the River OU ROD.

On October 1, 2012, the DNR issued a letter to EPA to concur with EPA's removal action. This was described as a time-critical removal action. The timing concern was that the coming PCB dredging activities to be conducted by PRS for the Sheboygan River and Harbor Superfund remedial activities could mobilize and spread tar and other MGP residuals downstream from the site if WPSC Campmarina dredging did not occur in advance of the PCB dredging. The removal action called for cover materials to be placed over sediments contaminated over 45 mg/kg total PAHs, but the letter noted that these were not put in place in anticipation of additional river improvement dredging to be conducted by the EPA's GLNPO.

In June of 2013, the DNR approved shut-down of the air sparge system at the Upland OU. The DNR approval letter placed institutional controls on the Upland OU in the form of a GIS registry requirement under the authority of Wis Stats § 292.12. This letter and a copy of a the maintenance plan for the Upland OU and is posted on the DNR's public database.

On June 26, 2013, EPA issued a public information flyer to seek public comments after proposing No Further Action Status for the River OU. In August, the EPA's draft Upland OU ROD states that No Further Action Status is recommended. On April 17, 2014, EPA approved WPSC's construction completion report for the River OU.

On May 30, 2013, NRT submitted a case closure request on behalf of WPSC to DNR for the Upland OU. That September the DNR denied case closure and sent WPSC a letter that included a list of questions and concerns regarding case closure and VPLE issues. WPSC and DNR had a follow-up meeting on October 1, 2013, to discuss responses to the letter, but a written response to the DNR's concerns was not submitted.

Current Regulatory Status

In 2014, an unforeseen regulatory issue created a delay in finalizing the EPA Upland OU ROD. At that time, due to the unlikelihood of ever attaining groundwater ARARs at the site inside the containment barrier, it was determined that WPSC needed a technical infeasibility waiver for areas inside the containment barrier for the groundwater media. That year, NRT submitted a Technical Infeasibility (TI) Report to present an argument for EPA issuance of non-attainment of the groundwater ARARs (a TI Waiver), and to request a technical infeasibility exemption to those ARARs inside the containment zone. Presently, the parties involved are considering moving regulation of the entire site back to the DNR's jurisdiction.

Remedial Actions

Upland Operable Unit

Upland remedial action took place in 2000 and 2001. Initial phase remedial activities consisted of unsaturated soil excavation, grading, thermal treatment, and material management. About 10,500 tons of contaminated soils were excavated and thermally treated at WPSC Wildwood Sheboygan facility, then returned to the site as backfill. In the course of remedial construction, about 8,700 tons of debris from former gas plant infrastructure were removed and properly disposed of, consisting of storm sewer lines, foundations, retaining walls, and piping.

Thermal treatment logs for these soils completed by Dustcoating, Inc. can be found in the February 2003 Phase I and II remedial construction report (Reference 3). Pre- and post-treatment soil samples were run for PAHs and BTEX. According to NRT, average pre-treatment concentrations for total BTEX and total PAHs were 5.3 mg/kg and 231 mg/kg respectively; average post-treatment results were 0.07 mg/kg and 0.06 mg/kg respectively. Saturated soils were left in place.

The second phase of remedial construction consisted of installation of the Waterloo Wall vertical barrier, air-sparge system, multi-layer cover/drainage/venting system, backfilling, site restoration, and park construction. The riverbank was restored with geosynthetic materials and rip-rap.

A Waterloo Wall is a barrier designed for groundwater containment applications consisting of sheet pile with interlocking joints sealed with grout. 41,300 square feet of sheet pile was driven 20 to 30 feet below land surface into a clay layer to completely encompass the remaining saturated soil contaminated with MGP residuals, and contaminated groundwater.

The base of the cover system is a geocomposite/geonet fiber under a six-inch perforated venting/drainage pipe surrounded by a filter gravel trench that goes around the interior perimeter of the sheet pile. Above that is six inches of thermally treated material, followed by a 40 mil high density polyethylene (HDPE) layer that was carefully welded at the joints, and booted and welded to the monitoring wells. Above that is a foot of compacted thermally treated material covered by a geocomposite fabric marker layer, followed by another foot of thermally treated material amended with organic material, with a final minimum one-foot clean imported soil cover. The exterior of the barrier wall has an exterior perimeter drainage piping system similar to the interior perimeter drainage/venting piping.

The air-sparge system consisted of 18 low-flow air-sparge wells and associated piping inside the containment wall. Electricals and mechanicals for this system were housed in a building constructed by WPSC on site. The building was to be donated to the Sheboygan Outboard Motor Club upon system shut-down which occurred with DNR approval in about November of 2011 after NRT determined that the measured emissions from the system showed that the system had reached its limit of effectiveness.

Monitored Natural Attenuation of Groundwater

Groundwater has been sampled long-term for VOCs, PAHs, natural attenuation parameters, and groundwater elevations since before the upland remedy was put in place. Wells and piezometers that have been sampled quarterly for VOCs, and semi-annually for PAHs from 1995 to at least 2013 include MW-701/701R, MW706, and PZ-701. In December 1998, wells and piezometers added to this program included MW-708, MW-709/MW-709R, PZ-702, and PZ-703. Wells sampled from 1995 until 1998 include MW-703, MW-704, MW-705, and MW-707/MW-707R. Biosparge well BW06 was sampled eight rounds from May of 2004 to December of 2013. Biosparge well BW15 was sampled once. The biosparge system was shut down in November of 2012. Some rebound could potentially be expected.

Sampling for cyanide and metals in groundwater was conducted for the 1995 site investigation. Metals sampled included arsenic, barium, chromium, lead, and silver. The Wis. Admin. § NR 140 Preventive Action Limit (PAL) was exceeded with respect to free (dissociable) cyanide in wells MW-702, MW-704, and MW707. A follow up sample taken a month later had PAL exceedances in the same wells with the exception of MW-702, which was below the standard. Sampling in 1998 had no free cyanide PAL exceedances, with the exception of MW-701. None of the selected

metals were detected above the ESs in 1995, no additional metals sampling was done. Cyanide monitoring continued with no ES exceedances in any well until it was dropped from the program in 2005.

According to the recent NRT update reports submitted to EPA, groundwater monitoring is still being done as of July, 2015.

River Operable Unit

Initial sediment remediation occurred under an EPA Time Critical Removal Action. The workplan for this activity, dated April 6, 2011, was titled “Focused NAPL and Sediment Removal Action Plans and Specifications,” and was written and carried out by NRT under EPA jurisdiction. In 2011, WPSC conducted sediment dredging and shoreline excavation remedial actions. In 2012 and 2013, additional sediment dredging was conducted in the river with GLLA funding. On October 30, 2013, NRT submitted a construction completion report for dredging activities in the Campmarina River OU and a summary of the GLNPO river improvement dredging, which was done a considerable distance both up and downstream from Campmarina. At the end of the project, the GLLA project team calculated a SWAC concentration for the Campmarina River OU as 11.9 parts per million total PAHs prior to final sand cover.

Extensive support efforts were undertaken in May and June of 2011 for dredging operations, including the installation of 41 concrete pilings and wales to support the upland Waterloo Wall, construction of a sheet pile cofferdam in the river to contain any mobilized MGP residuals while dredging occurred in the wet, and pads constructed in the city park for sediment staging, draining, stabilization, and heavy equipment decontamination. A heavy equipment decontamination pad was also constructed. Wastewater was contained and treated on site, under permit.

Dredging work by WPSC was performed from June to December of 2011 using Envirocon Inc. and PRS contractors. In total, 29,225 tons of non-TSCA and 1,925 tons of PCB TSCA contaminated sediment were dredged and properly disposed of offsite. NAPL, PAH, and PCB sediments were dredged from both inside and outside (outside using sediment curtains) the cofferdam. Sediments were excavated then placed on a barge for initial dewatering. From there, the sediments were moved to the dewatering/stabilization pad for two days of drying and for the stabilization amendment, Calciment, to take effect. Trucks were loaded at the site for offsite disposal of the sediment waste under the coordination of PRS in order to separate non-TSCA waste, transported to Hickory Meadows Landfill, from TSCA wastes, which were transported and disposed of by PRS.

During the installation of the 41 buttress piles (42-inch shaft diameter), 1,087 tons of contaminated soil waste was generated and disposed at Veolia Hickory Meadows Landfill. In addition, 1,678 cubic yards of soil contaminated by the dewatering pad leakage were excavated and disposed of at the same location.

GLLA funded dredging took place from August through December of 2012, then again in May of 2013, for a total of 18,046 additional cubic yards of contaminated sediment removed from the footprint of the cofferdam and from what NRT termed the north and south dredge areas based on post-dredge sampling done in late December of 2012.

GLNPO conducted supplemental post dredge sampling on a grid to confirm the effectiveness of the remedial dredging. Based on sample data at the end of the dredging projects, the GLLA project team calculated a SWAC concentration for the Campmarina River OU as 11.9 mg/kg total

PAHs, and lower than that after a six inch final sand cover was placed over river bed at locations with total PAHs above 18 mg/kg (Reference 4).

Five Year Review Process

Site Inspection

DNR personnel conducted a site inspection on September 16, 2015. The visible portions of the cover were in good shape. There was adequate sod cover with no exposed soil and no erosion occurring on the slope towards the river. The pavement of sidewalks, courtyards, and play areas were all in good repair. There were no open or broken monitoring well or clean-out covers. The site was dry and appeared well drained. The rip-rap on the shore line had good coverage of the shore with no exposed soil between blocks. There were no visible blobs of sheen on or floating up from the water column as was common before remedial actions took place in the river.

Notifications

DNR sent a letter notification of intention to conduct a five-year review to the City of Sheboygan on October 15, 2015, and one to WPSC on November 6, 2015.

Technical Assessment

Performance and Monitoring Results

In general, groundwater concentrations have been stable. The upgradient sentinel wells MW-708, MW-705, and MW7-09R outside the barrier wall have been consistently clean or at very low levels of detections. The upgradient well within the barrier wall, MW-706, has shown high levels of benzene, total BTEX, and total PAHs, and has had three significant spikes in contaminant concentrations from 2002 until 2013. These spikes in the concentration were not observed in the piezometer nested below it, PZ-702, which has had concentrations steady at very low to no-detect levels.

The centrally located, downgradient well within the barrier wall, MW-701R has had significant, but stable, concentrations of benzene, total BTEX, and PAHs. The piezometer nested below it, PZ-701, has had steady, consistent low to no-detect concentrations. The downgradient well nest located within the south end of the containment barrier, MW-707R/PZ-703 has shown significant, but relatively stable concentrations of benzene, total BTEX, naphthalene, and total PAHs. The concentrations in PZ-703 are higher than the other piezometers within the contaminant area, but are approximately one half to one third less than the concentrations measured in the well nested above it

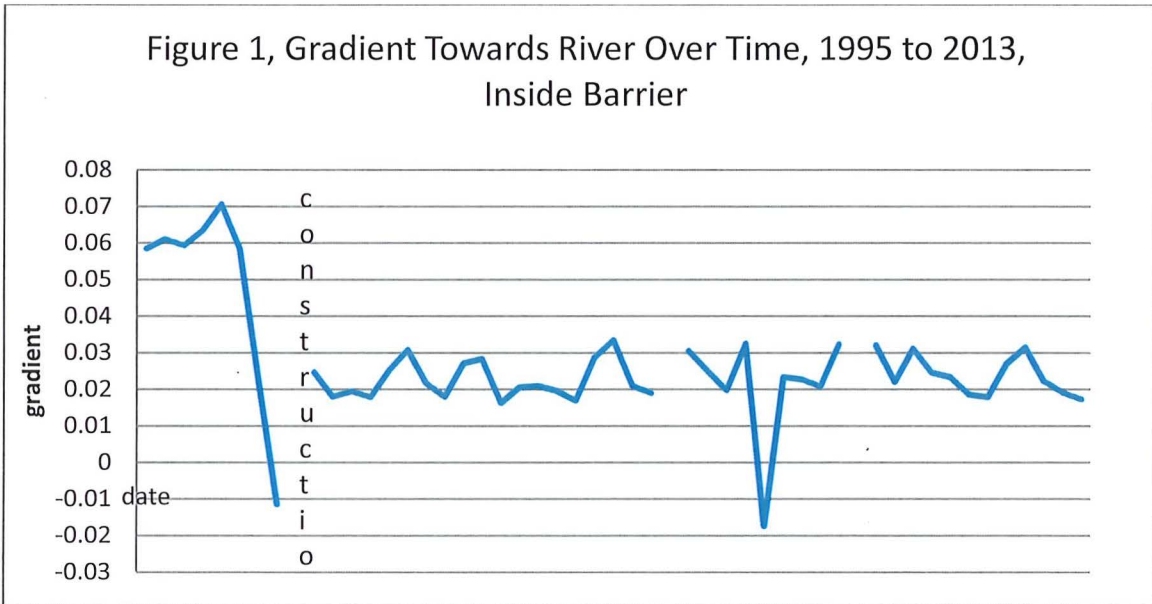
Natural attenuation parameters have been collected on a mostly quarterly basis. In general, oxygen, sulfate, and nitrate levels are lower and the methane levels are higher inside the containment system, indicating natural attenuation is occurring. Note that natural attenuation is a secondary remedial mechanism at the Upland OU, the primary being containment.

The water table gradient towards the river inside the containment barrier decreased by a factor of about three after the barrier was put in place, and then quickly reached steady-state based on data from 2013 and prior (Figure 1). If the assumption is made that the gradient inside the containment barrier represents groundwater leakage into the river, then a simple model can be used to calculate worst-case contaminant load to the river. In this simplified calculation, it is assumed that

contaminant flux occurs across the entire cross-section of the containment wall, the flux is driven by the small horizontal gradient between the containment area and the river, and that the flux in the underlying clay layer is negligible. Even using these worst-case assumptions, the resulting calculated contaminant load is well below surface water standards for the Sheboygan River (see Appendix B).

In 2017, the EPA conducted a Five-Year Review of the River OU and, prior to finalizing that report, required additional sediment sampling in a Technical Memorandum dated June 6, 2017. The goal of the sampling was to determine the current degree of contamination in Grid 36 of the EPA Time Critical Removal Action. Grid 36 had the only grid exceedance of the EPA sediment cleanup goal of 45 mg/Kg total PAHs post-dredge (Reference 5). Results of the 2017 sediment sampling were compliant with both the stated RAO and the more stringent GLLA cleanup goal.

Note that PRS is required to sample the Sheboygan River and Harbor Superfund site for PCBs as part of the Five-Year review process (Reference 6).



Institutional Controls

Institutional controls, including a cover maintenance plan, were imposed on the site in 2013 by DNR under the authority of Wis. Stats. § 292.12. The continuing obligations were described by the DNR in the June 6, 2013, letter:

- Groundwater contamination is present above Wis. Admin. § NR 140 enforcement standards.
- Residual soil contamination exists.
- The barrier system must be maintained over and surrounding contaminated soil, and the department must approve any changes to this barrier.
- If the land use is ever changed, additional environmental work must be completed.

The cover maintenance plan for Campmarina can be viewed online at DNR's public database by following this link:
<http://dnr.wi.gov/botw/GetActivityDetail.do?siteId=4231800&adn=0260000095>.

Changes in Land Use, Exposure Pathways, Toxicity Data, Cleanup Levels or Remedial Action Objectives (RAOs)

Following the upland remediation and redevelopment, land use at the site has been a city park and is anticipated to remain a city park into the foreseeable future. The surrounding use has remained residential, recreational, and office space. It is anticipated that the remaining two lots slated for condominium construction will be developed as soon as economics are favorable.

Since the Upland OU ROD was written, DNR's BTEX and PAH soil cleanup standards have undergone changes to mirror the EPA's soil screening values. Since the Upland OU remedial action is based on the performance of the barrier and cover system, these changes are not relevant. However, post remediation soil testing at the dewatering pad area showed direct contact level exceedances. Subsequently, 1,678 tons of soil were excavated and disposed of to remediate this area. Confirmation soil samples had no PAHs above March 2017 non-industrial direct-contact soil standards.

In sediment, River Improvement dredging conducted by EPA's GLNPO achieved a cleanup level far in exceedance of the risk based sediment RAOs developed by NRT in cooperation with EPA.

New Information Regarding Protectiveness of the Remedy

Clay thickness information useful to the effectiveness evaluation of the groundwater barrier was collected and tabulated by NRT when installing 41 pilings installed to support the waterside edge of the Waterloo Wall as shore and sediments were excavated and dredged. Similarly, two post remedial geotechnical borings were collected for construction purposes that revealed depth to bedrock information.

Issues

The following issues are identified by this review as having potential implications to the short and/or long term effectiveness of the Upland OU and River OU remedy.

- Lack of means or method in the maintenance plan to check the integrity of the Waterloo barrier for corrosive failure.
- Possible minor rebound in groundwater contaminant concentrations in certain wells since shutdown of the air-sparge system.
- Potential leakage of the containment system.

Recommendations and Follow-up Actions

- WPSC should provide a supplement to the cover/barrier maintenance plan that has a means or method to check the integrity of the Waterloo barrier for corrosive failure on a regular basis.
- WPSC should continue long-term groundwater monitoring, including natural attenuation parameters.

- WPSC should continue to collect groundwater elevation data to assess the hydraulic gradient inside the containment barrier and the groundwater flow pattern outside the barrier.

Protectiveness Statement

This review finds that the Upland OU and River OU remedies are functioning as intended based on more than 19 years of groundwater monitoring with stable contaminant concentrations in the Upland OU, and extensive post-dredge sampling in the River OU confirming that RAOs have been met. The DNR's recommended actions listed above should be addressed to ensure the long-term protectiveness of the remedy

Next Review

The next review is due in Spring of 2022.

References

- 1 US EPA letter to WEC Energy Group, Re: Start of Five Year Review for WPSC Camp Marina Site, Sheboygan, Wisconsin, December 15, 2016.
- 2 US EPA, A Resource for MGP Site Characterization and Source Remediation, EPA 542-R-00-005, July 2000.
- 3 Natural Resources Technology, Inc; Final Phase I and II Remedy Documentation Report, Campmarina and the Center Street Right-of-Way, Sheboygan, Wisconsin; March 4, 2003.
- 4 Natural Resources Technology Inc, Construction Completion Report for Focused NAPL and Sediment Removal Action, October 30, 2013.
- 5 Natural Resources Technology, Inc., Five Year Review Technical Memorandum, July 5, 2017.
- 6 Conversation with Victor Pappas, DNR NR Region Basin Supervisor, on March 16, 2016.

Appendix A: Detailed Chronology of Campmarina from the DNR Files

Appendix A Detailed Chronology of Campmarina from DNR files

January 1990	Blueprints for floating dock
August 20, 1990	Photos of site.
August 27, 1990	DNR spills coordinator report, oil-like substance found in the subsurface by city while digging footings for a river dock.
September 27, 1990	Soil sampling results from contractor working for City. Results show high levels of TPH and BETX.
September 28, 1990	DNR letter to City discouraging City from putting in dock.
October 29, 1990	City letter to DNR asking DNR for course of action
November 5, 1990	DNR Superfund Unit letter and draft contract to Richard Schneider, WPSC, and Heileman Brewery Company stating that DNR will require a State contract or the site may be incorporated into the Superfund project it is located within. Letter urges parties to sign.
July 16, 1991	DNR Legal Services letter and draft contract to City attorney. Letter urges City to sign contract.
July 29, 1991	Hydro Search, Inc. workplan for a Phase I site investigation.
November 11, 1992	Workplan for phase two investigation
August 21, 1991	DNR workplan review letter to WPSC attorney.
August 22, 1991	DNR site screening worksheet.
September 18, 1991	DNR letter discussing draft contract modifications. DNR agrees to call the site "Campmarina".
October 24, 1991	DNR letter to WPSC for additional sampling in their site investigation, including sampling from an added 14 test-pits.
October 29, 1991	DNR Legal Services letter to City regarding modification to Contract.
December 3, 1991	DNR letter to WPSC and City approving Phase I site investigation.
March 3, 1992	DNR letter to City, Margaret Graefe taking over for Steve Ales as DNR PM
February 3, 1992	DNR internal memo requesting information from DNR project manager.
February 17, 1992	DNR letter to WPSC attorney and City of Sheboygan including a statement of work required for completion of a remedial investigation/feasibility study (RI/FS) for the source control operable unit.
March 3, 1992	DNR letter to City and WPSC noting DNR project manager had changed.
April 1, 1992	Signed State contract binding parties to investigate and remediate the site using a process equivalent to Superfund. Parties bound are the DNR, WPSC, and the City of Sheboygan. Authority is pursuant to section 144.442 Wis. Stats and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. ss 9601 as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA).
May 26, 1992	DNR letter to a Chicago attorney regarding FOYA request.
June 30, 1992	Simon Hydro-Search Phase I investigation report. Concludes (a) source areas are in the central part of the site in the area of the former location of the water and gas meter shop, and the purifier and tar storage tanks; (b) cyanide, arsenic and nickel <u>were not</u> detected in high concentrations in soil samples detected from test pit samples; (c) groundwater impacts are likely; (d) additional investigation needed.
September 4, 1992	Site investigation report cover letter.
November 11, 1992	Simon Hydro-Search workplan for Phase II site investigation. Plan proposes 12 soil borings, seven of which are to be converted to

Appendix A Detailed Chronology of Campmarina from DNR files

	monitoring wells, one of which is to be converted to a piezometer. Plan also proposes a soil-gas survey.
February 1, 1993	DNR Water Resources to DNR Environmental Repair internal memo from Water Resource to PM regarding lack of sediment and surface water sampling and characterization of river sediments.
February 18, 1993	DNR internal memo regarding sediments.
June 16, 1994	WPSC letter to DNR summarizing a meeting with DNR.
June 27, 1994	DNR notes on meeting with WPSC.
August 24, 1994	DNR letter to WPSC regarding the need for sediment and surface water sampling.
April 25, 1995	WPSC letter to DNR. Sediment sampling will be handled separately.
April 27, 1995	WPSC letter regarding meeting with DNR.
May 2, 1995	DNR notes on meeting with WPSC. "Conduct on land first then decide if sediment sampling is necessary."
May 3, 1995	DNR internal memo regarding sediment sampling.
May 12, 1995	DNR letter to WPSC conditional approval of phase two site investigation workplans. DNR requires full VOC testing in soil rather than only BETX.
June 14, 1995	Natural Resources Technology, Inc. (NRT, WPSC's consultant) letter response to DNR letter of May 12, 1995 regarding site investigation workplan comments. NRT states that full VOC testing in soil is not needed at an MGP site.
August 22, 1995	WPSC status report letter.
August 31, 1995	NRT sediment sampling workplan. Plan proposes five sediment sampling transects to extend partway into the river.
September 19, 1995	NRT status report letter.
October 13, 1995	Status report, WPSC letter regarding DNR verbal approval of sediment sampling plan.
December 1, 1995	WPSC status report to DNR.
December 28, 1995	WPSC status report to DNR.
March 22, 1996	WPSC letter to DNR regarding soil sampling.
June 4, 1996	NRT status report to DNR regarding sediment sampling.
June 28, 1996	NRT Phase II site investigation report. Report concludes (a) the plant operated from 1872 to 1929; (b) WPSC sold the property in 1966, then it went through various ownerships, and it is currently owned by the City of Sheboygan; (c) near surface soils are clayey and silty sand, and sandy clay fill with ash, cinders, bricks, glass, and wood from 6 to 14 feet. Below that are clay soils to at least 30 feet below ground surface; (d) coal tar was present at eight sample locations; (e) unsaturated source areas seemed limited in extent; (f) benzene, ethylbenzene, toluene, xylene (BETX) and poly aromatic hydrocarbons (PAH) groundwater impacts are widespread across the site; (g) piezometers showed groundwater impacts decreasing with depth significantly; (h) more investigation recommended.
September 15, 1998	NRT report for investigations done in the Center Avenue Right-of-Way (ROW).
November 10, 1998	<u>NRT Sediment investigation report.</u> Majority of tar accumulation in sediments is 50 to 125 feet from shore and adjacent to, and to about 450 feet downstream from the MGP site. The primary contaminants of concern (from the site itself) are coal tar, and PAH contaminated sediment. Soft sediments are 2-4 feet thick, with the shallowest tar at 1

Appendix A Detailed Chronology of Campmarina from DNR files

	foot below the top of the soft sediments, and two feet or more below downstream from Center Avenue.
November 24, 1998	<u>Natural Resources Technology (NRT) soil boring soil sample results report. Soils under Condominium Number 1 site were free from indications of MGP residuals, and tested non detect for BETX, in borings SB-721 and SB-722 that went to river depth (16 feet below surface).</u>
December 4, 1998	NRT feasibility study workplan. Summary states the remedial strategy is hot-spot (targeted) remedial excavations followed by hydraulic containment. Report recommends additional investigation.
February 10, 1999	NRT soil boring soil sample results report for three additional soil borings, SB-724 to SB-726, with soil samples at the condominium project area south of Center Street ROW. Borings reached depth of the river. Results did not indicate the presence of MGP residuals with BTEX below detection limits and very low-level total PAH detects.
March 10, 1999	WPSC meeting agenda for a project status meeting with DNR.
March 24, 1999	Miller Engineers letter to DNR, geotechnical boring logs for adjacent parcel (parcel for planned condominiums).
May 7, 1999	Feasibility study report (FS). Three remedial alternatives were selected for detailed analysis: (1) source area excavation and off-site treatment, (2) source containment combined with bioremediation, (3) Steam enhanced vapor extraction. Option 1 ruled out due to depth of contaminants (21 feet), double to triple the costs (\$6,000,000), possibility of incomplete removal, and exposure considerations to the nearby condominiums and residences. Option 3 ruled out due to uncertainty of effectiveness and cost. Option 2 selected with a sheet metal barrier rather than a clay and concrete slurry wall due to concerns that river flood stage would render a slurry wall ineffective. Option 2 deemed to have nearly the lowest cost with the most effectiveness, and least amount of exposure in the short term, direct contact and air exposure. Note that at that time there was a proposed condominium very close to the south end of the site. Also note that a minimum groundwater monitoring period of 30 years was used for costing purposes.
May 10, 1999	DNR internal memo regarding review team for the site.
May 26, 1999	EPA press release about the Sheboygan River and Harbor Superfund site cleanup. Proposes about 120,000 cubic yards poly chlorinated biphenyl (PCB) contaminated sediment to be dredged and properly disposed.
July 9, 1999	EPA flyer regarding an extension of the public comment period for Superfund remedial action.
July 13, 1999	Discharge permit.
October 25, 1999	<u>DNR conceptual approval letter to WPSC for remedial strategy of source area encapsulation and biosparging.</u> DNR requests hot-spot removal (targeting remedial soil excavations) and capping be added to the strategy.
January 13, 2000	WPSC request for grading permit for new condominium project to DNR water specialist. Includes condominium project layout.
February 2, 2000	<u>NRT phase one remedial action workplan report for remedial excavations and grading. In the initial phase of remediation, unsaturated soils at Campmarina and the Center Street ROW are to be excavated and thermally treated, then returned to the site.</u>
February 8, 2000	WPSC letter to DNR summary of Campmarina reports and correspondence.

Appendix A Detailed Chronology of Campmarina from DNR files

February, 15, 2000	WPSC's attorney letter to DNR summarizing responsibilities and steps under the contract.
February 23, 2000	City letter to DNR commenting on problems they have with the river-walk because the remediation project is causing a delay.
March 14, 2000	DNR internal memo with attached examples of Record of Decisions.
March 15, 2000	DNR notes for a public meeting.
March 28, 2000	DNR notes on public fact-sheet.
March 30, 2000	NRT air-sparge pilot test workplan. Plan calls for one air-sparge well and some soil vapor gas probes.
April 13, 2000	NRT letter to DNR. No injection exemption needed for pilot test to inject air.
April 10, 2000	DNR internal memo regarding file documents to be put on file at the library.
April 11, 2000	WPSC letter answering DNR questions regarding thermal desorption related to potential PCBs in soil. None are expected at the upland part of the site.
April 13, 2000	WPSC letter stating that they don't need exemption to inject air into the subsurface
April 15, 2000	DNR public factsheet on the Campmarina site.
April 17, 2000	<u>NRT phase two remedial work plan report. This report details plans for the vertical barrier wall, air-sparge system, cover/drainage system, backfilling and site restoration.</u>
April 24, 2000	Public meeting notes
July 11, 2000	DNR telephone conversation memo regarding results of air-sparge pilot test.
July 12, 2000	DNR approval letter of NRT phase one and phase two remedial action workplans.
August 14, 2000	NRT report, Phase one and phase two remedial action technical specifications.
August 23, 2000	DNR internal memo regarding draft DNR record of decision (ROD) for upland part (the Upland Operable Unit terminology had not been in use at this time) of the site.
September 19, 2000	DNR internal memo regarding draft DNR record of decision (ROD).
October 12, 2000	NRT technical engineering specifications report for phase one and two of the remedy.
October 26, 2000	DNR email regarding thermal desorption project.
October 30, 2000	DNR email regarding thermal desorption project.
November 2, 2000	Dustcoating, Inc. (thermal treatment contractor) plan modification request letter to DNR Waste Program.
November 7, 2000	WPSC addendum to remedial workplan with a table of thermal treatment goals. Benzene thermal treatment criteria set for 25 ug/kg near river and 458 ug/kg (micro grams/kilogram) above the cover system with a 6" topsoil layer above thermally treated soils. Also addresses DNR concerns about PAH runoff potential into river, post remedial action.
November 10, 2000	NRT phase one and two remedial design plans and technical specifications report.
November 17, 2000	DNR draft internal memo regarding PAH runoff potential into river, post remedial action.
November 22, 2000	DNR signed ROD for the upland part of site.
March 8, 2001	WPSC letter response to DNR surface water runoff (into river) concerns.

Appendix A Detailed Chronology of Campmarina from DNR files

July 26, 2001	Factsheet about remedial actions.
April 8, 2002	DNR memo describing NRT statement that sediment project schedule will be given to DNR in this spring.
April 9, 2002	Dustcoating, Inc, plan mod request to DNR Waste program (for thermal desorption project at other sites).
April 16, 2002	DNR Waste Program approval of thermal treatment contractor Dustcoating, Inc. Solid Waste Plan of Operation.
April 29, 2002	WPSC letter to DNR Northeast Region regarding Wisconsin MGP sites.
February 28, 2003	Upland remedial action construction documentation report. Construction details of contaminated unsaturated soil excavation and thermal treatment (10,500 tons), Waterloo sheet pile barrier wall installation to 20-30 feet below ground surface, air-sparging system with 18 air-sparge wells, backfilling, grading, HDPE cover with drainage system, surface cover with drainage system, shoreline restoration, and some details regarding final construction of a city park on the site.
March 5, 2003	Note on phone conversation with NRT stating that they mailed the remedial action report to the wrong address.
March 11, 2003	DNR authored chronology of the site.
June 10, 2003	DNR internal memo regarding the Pollution Risk Services (PRS) plan to remove all soft sediment in the Upper and Lower Sheboygan river and how that will affect the sediments (River Operable Unit) at Campmarina.
July 23, 2003	WPSC multi site progress report to DNR.
October 29, 2003	DNR file note regarding contact at PRS.
October 31, 2003	DNR email regarding site progress.
November 25, 2003	Meeting between NDR, NRT, WPSC agenda. Attached are site photos showing the site remediation in progress, and DNR notes.
December 31, 2003	2003 operation and maintenance (biosparge system) and groundwater monitoring report. Report notes that groundwater contours increasing outside the containment system, and decreasing inside the containment system; coupled with groundwater chemistry inside, outside, and under the containment system indicates that the (containment) remedy is effective.
July 9, 2004	NRT draft Remedial Investigation Feasibility Study (RI/FS) work-plan report for sediment investigation. Report proposes to use risk-based evaluation for human health and environmental concerns.
August 9, 2004	Meeting notes from meeting between DNR and WPSC regarding sediment investigation proposals.
August 30, 2004	DNR letter to WPSC. DNR review comments regarding draft RIFS for sediments work plan. <u>DNR suggests using 34 PAH constituents for total PAH measurements, and suggests using consensus based sediment quality guidelines (CBSQG).</u>
October 22, 2004	Multi-site meeting notes from meeting between DNR, WPSC, and NRT. Participants discussed remedial action progress for upland and sediments. DNR notes that consultant "not on board" with CBSQG.
November 15, 2004	DNR letter to EPA asking EPA to review the draft RIFS work plan.
December 22, 2004	2004 operation and maintenance (biosparge system) and groundwater monitoring report. Report notes that groundwater elevations have increased inside the containment system, and that the concentration of benzo(a)pyrene has increased in piezometer PZ-703. The report notes an unusually wet Spring in 2004.

Appendix A Detailed Chronology of Campmarina from DNR files

June 28, 2005	Memo from DNR to DNR file documenting that (a) WPSC had requested that the regulation of the sediment cleanup portion of the site be taken over by EPA, (b) DNR sent a letter to WPSC in support of their request, (c) <u>DNR needs to terminate the Environmental Repair contract after EPA has a consent order with WPSC.</u>
November 28, 2005	2005 operation and maintenance (biosparge system) and groundwater monitoring report. Report notes that the primary performance measure of the containment system is groundwater elevation data, with the secondary performance measure being groundwater contaminant trends. Report concludes containment is being achieved as evidenced by groundwater flow contours showing groundwater flow around the containment barrier and groundwater elevations decreasing inside the barrier and increasing outside the barrier. Concentrations in piezometer PZ-703 had gone back down over the increase that happened in 2004.
November 30, 2005	<u>WPSC letter to EPA to confirm that data collected to date will not be contested when transferring site to EPA Superfund Alternatives Program.</u>
April 28, 2006	Cover pages for consent order between EPA and WPSC for six WPSC MGP cases in Wisconsin (not including Campmarina).
June 30, 2006	Email from Wisconsin Department of Health and Family Services regarding potential human health risks posed by the Campmarina site (direct contact for people swimming or wading in the river).
June 30, 2006	Email from DNR Water Program regarding ecological risks posed by the Campmarina site (direct contact for people swimming or wading in the river).
July 19, 2006	Personal notes regarding conducting a Preliminary Assessment for the Campmarina site.
July 26, 2006	EPA letter to WPSC Special Notice for the WPSC Camp Marina Site in Sheboygan, Wisconsin draft Administrative Order on Consent between EPA and WPSC.
July 27, 2006	EPA letter to WPSC regarding not contesting existing site data.
December 4, 2006	NRT health and safety plan.
December 4, 2006	NRT draft quality assurance project plan (QAPP).
March 22, 2007	Natural Resources Technology (NRT) technical report that describes field data collection tasks for the River Operable Unit (River OU).
April 10, 2007	NRT conceptual site model, multi-site risk assessment framework, and multi-site field sampling and analysis plan reports. These reports were written in accordance with the administrative order with EPA.
April 15, 2007	EPA community involvement plan for the WPSC Campmarina site.
April 25, 2007	NRT technical report on the Upland Operable Unit (Upland OU). Report states evidence of containment is the contrast in groundwater elevation between MW-708 (outside barrier) and MW-706 (inside barrier). Also notes again that contaminant concentrations have continued to decline after initially increasing post-remedial action, in piezometer PZ-703.
May 17, 2007	EPA Community Involvement Plan.
May 22, 2007	Termination agreement document. Terminates the State of Wisconsin's April 1, 1992 agreement between DNR, WPSC, and the City of Sheboygan. This original contract agreement was pursuant to section 144.442 Wis. Stats and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. ss 9601 as amended by the Superfund Amendments and

Appendix A Detailed Chronology of Campmarina from DNR files

	Reauthorization Act of 1986 (SARA), and was now replaced by a consent agreement between WPSC and EPA.
September 30, 2008	NRT Progress Report regarding preliminary sediment and surface water work.
December 18, 2008	NRT Progress Report regarding preliminary sediment work, and groundwater monitoring.
April 10, 2007	NRT conceptual site model report.
April 10, 2007	NRT risk assessment framework report. States that both human and ecological risks will be evaluated on a site-specific basis.
April 10, 2007	NRT sampling and sampling analysis plan.
October 17, 2007	DNR signature page for DNR Preliminary Assessment Report for Campmarina with a cover page from EPA.
April 9, 2007	EPA review letter with comments regarding the River Operable Unit (OU) technical report.
December 6, 2007	EPA review letter with comments regarding the Upland OU technical report. <u>The letter notes that water table contour map assumes that the barrier wall is impermeable, but that only the outside upgradient well has much of a difference in elevation over the inside wells. Letter states that the gradient is not flat inside the "cell" therefore it indicates that the downgradient side of the cell leaks, because the cell has not filled up (with water), and that the downgradient contaminant flux to the river should be evaluated for risk.</u>
January 15, 2008	NRT response to EPA review comments on the technical reports for the River OU and the Upland OU. States that there are potentially residual isolated pockets of untreated MGP residuals in soil along the Center Street right-of-way, and along the former Water Street Right of Way, but are under cap.
February 20, 2008	Integrys multi-site sampling plan for MGP sites in Illinois and Wisconsin.
March 13, 2008	NRT remedial investigation/feasibility study (RI/FS) Workplan Revision 0 report <u>cover letter and CD</u> for River OU. Cover letter is from Inegrys Business Support, LLC (Integrys is part of WPSC).
March 26, 2008	NRT progress report letter to EPA.
March 26, 2008	NRT groundwater monitoring report.
April 23, 2008	Integrys letter response to EPA comments regarding River OU RI/FS Workplan.
April 28, 2008	NRT progress report discussing River OU RI/FS risk approach and sediment field decision issues in a meeting with EPA.
May 7, 2008	<u>EPA letter of conditional approval of the River OU RI/FS.</u>
May 21, 2008	NRT progress report. Groundwater sampling and RI/FS revisions.
May 30, 2008	DNR internal email discussing groundwater to surface water pathway concern.
June 30, 2008	NRT progress report. Quotes from subcontractors for remedial investigation (RI) activities.
July 17, 2008	NRT progress report. Sediment poling work, access agreements, surveying work.
August 26, 2008	NRT progress report. Sediment sampling.
October 21, 2008	NRT progress report. Working on draft remedial investigation tables.
December 4, 2008	NRT progress report letter to EPA.
December 11, 2008	NRT RI/FS Workplan Revision 1.
January 20, 2009	NRT progress report report to EPA. Remedial investigation issues.

Appendix A Detailed Chronology of Campmarina from DNR files

January 22, 2009	<p>NRT Sediment site investigation report for the River OU, revision 0.</p> <ul style="list-style-type: none">• Some of NRT’s goals of sediment sampling included determining, (a) the vertical and horizontal extent of sediment contamination, (b) potential offsite sources, (c) mobility of the tar, (d) identify risk zones for a risk based remedial approach.• The investigation established the ambient PAH concentration in the river of 14 mg/kg (milligram/kilogram) <u>based on 13 parent PAH compounds.</u>• MGP residuals were found in soft sediment only, visually evident between Transect T3 upstream, and Transect T17 downstream, from the eastern river shore to Boat Island, with staining in sediments from the shoreline excavation confirmation sample at excavation area EZ-403 to 15 feet depth. The extent of soft sediments impacted above ambient PAH concentrations is defined between transect T14 upstream and Transect T2 downstream with a pocket under that concentration near Boat Island from T18B/T18C to T9C/T10D.• Maximum concentration of PAHs was 22,310 mg/kg at T6A, 6.3 to -7.4 feet.• BTEX concentrations over 1 mg/kg are present generally, where PAH concentrations are above 100 mg/kg, and are generally defined the same as the PAHs. The highest concentrations of BTEX were found at borings TB403, T6A, and T8A.• PCBs ranged from 16 to 270, 000 ug/kg and were not defined within the MGP contamination, as expected.• Report concludes that the extent is determined, remedial action objectives will be determined in the feasibility study, and that enough data has been collected to develop a remedial alternatives analysis.
February 20, 2009	NRT progress report letter to EPA. Risk assessment work.
February 2009	EPA comment letter on Revision 0 of the site investigation report. Among other comments, the letter questions if the “ambient” concentration used is too high. Most comments are informational or correctional requests.
March 19, 2009	NRT monthly progress report. Work on Feasibility Study (FS) for River OU started.
March 19, 2009	NRT groundwater monitoring report for 2008.
April 2, 2009	NRT groundwater monitoring report. Includes annual cover system inspection with a description of external drainage system cleanout inspections. The head difference between interior piezometers PZ-702 and PZ-703 was 10 feet.
April 2, 2009	EPA comment letter on NRT’s proposed remedial action objectives (ROAs) and preliminary remediation goals (PRGs). <u>Memo from NRT subcontractor to EPA is attached, with a table that indicates “no significant risk” at the 18 to 45 mg/kg total PAH concentration based on benthic organism toxicity testing.</u>
April 27, 2009	NRT status progress report to EPA. Eight points of progress.

Appendix A Detailed Chronology of Campmarina from DNR files

May 19, 2009	EPA comment letter regarding comment response letter from NRT regarding Remedial Action Objectives (RAO) and preliminary remediation goals (PRG) in light of future PCB dredging activities.
July 8, 2009	EPA comment letter regarding Integrys' draft FS report. Removal of all sediments contaminated above the preliminary remediation goal should be one of the alternatives outlined in the RI/FS.
July 15, 2009	NRT progress report. Verbal approval from EPA to finalize River OU RI/FS Revision 1.
July 16, 2009	Integrys multi-site feasibility study (FS) support document.
July 21, 2009	NRT River OU RI/FS Revision 1. This report included the conclusion that near surface sediments may pose a risk to benthic organisms due to prop wash, flood scour events, and the planned Sheboygan River and Harbor Superfund PCB contaminated sediment dredge project.
August 14, 2009	NRT progress report letter to EPA. Groundwater analytical data table is attached with data through June of 2009.
August 21, 2009	NRT response letter to EPA on EPA comments on Revision 0, River Operable Unit Feasibility Study Report. NRT agrees to changes/additions, and answers questions. <u>NRT agrees to add dredging options for 129 mg/kg and 45 mg/kg total PAHs, though they argue that it adds no incremental risk reduction compared to capping or natural attenuation. EPA is concerned with mechanism to enforce future institutional controls given the vulnerability of a cap over sediments to boat prop-wash and boat anchoring.</u>
September 15, 2009	NRT status progress report to EPA.
October 14, 2009	NRT status progress report letter to EPA. Discusses progress on the FS and a cover system inspection.
October 16, 2009	Proposed meeting agenda from law firm regarding having the site responsible party obtain a Certificate of Completion under the State of Wisconsin's Voluntary Party Liability Exemption (VPLE) process, and the use of Great Lakes Legacy Act (GLLA) funding to help 'meet environmental goals'.
November 11, 2009	NRT status progress report letter to EPA. Discusses proposed PCB dredge cut lines and the biosparge system.
November 12, 2009	DNR internal memo regarding the site in the Voluntary Party Liability Exemption (VPLE) process.
December 11, 2009	NRT status progress report letter to EPA. Discusses PCB dredge cut lines.
December 11, 2009	<u>EPA letter to NRT, approving the remedial investigation report for the River OU.</u>
February 12, 2010	<u>NRT River OU Feasibility Study Report, Revision 1. NRT recommends Alternative 2: excavation and disposal of sediments in Zone E (near shore sediment with NAPL, (4,800 cubic-yards), excavation and disposal of shoreline soils with NAPL (3,100 yds³), monitored natural attenuation (MNA) of zones D (sediments with greater than 129 mg/kg total PAH, but no non-aqueous phase liquid (NAPL), MNA of zone C (sediments with total PAH concentrations between 45 mg/kg and 129 mg/kg).</u>
February 23, 2010	NRT progress report to EPA.
March 10, 2010	NRT progress report to EPA.
April 12, 2010	NRT progress report to EPA.
May 5, 2010	EPA letter to Integrys. Letter states that: (a) It is inaccurate to say that there is no risk from surface sediments, (b) NRT capping argument needs

Appendix A Detailed Chronology of Campmarina from DNR files

	work – how would a cap be maintained in prop-wash areas? (c) more evaluation needed.
May 14, 2010	EPA letter to Integrys: Letter asks for: (a) more details on cap and how it will hold up to scour, and that institutional controls on the use of the river (low wake zone) cannot be relied on to protect the cap, (b) asked for details regarding how MNA will address risks and timeframe to achieve ARARs, (c) suggests sheet piling for wet dredging, (d) asks Zone B be included in proposed remedial alternatives.
May 19, 2010	Internal DNR memo discussing Zone B (17-45 mg/kg total PAHs).
May 26, 2010	NRT progress report to EPA.
April 12, 2010	NRT progress report to EPA. Groundwater and biosparge system work.
June 2, 2010	NRT progress report to EPA. Discussions with EPA.
June 21, 2010	NRT progress report to EPA. Still working on River OU FS Revision 1 (February 12, 2010 is the report date, not the final submittal date).
June 28, 2010	DNR notes regarding meeting with Integrys to discuss sediment cleanup and VPLE process.
July 26, 2010	NRT progress report to EPA.
October 28, 2010	NRT technical memorandum recommending shut-down of the biosparge system part of the Upland OU.
August 12, 2010	NRT groundwater monitoring report for groundwater samples taken through June of 2010.
August 20, 2010	NRT response letter to May 5, 2010 EPA comment letter on the River OU FS. Discusses risk, risk reduction, risk calculations, and other issues.
August 24, 2010	NRT progress report letter to EPA.
September 22, 2010	NRT progress report letter to EPA. Looking at Sheboygan River and Harbor PCB dredge areas and depths. This surface will be considered starting surface for the remedial alternatives analysis at Campmarina.
October 15, 2010	NRT progress report letter to EPA. Still looking at Sheboygan River and Harbor PCB dredge areas and depths for a starting condition for the remedial alternatives analysis at Campmarina for revision 2 of the River OU FS.
November 10, 2010	NRT progress report to EPA. Submitted technical memorandum to support shutting down the biosparge system.
November 12, 2010	NRT response letter to EPA 10/27/1010 comment letter on the River OU FS. NRT agrees to add options for using sheet pile for either in the wet or in the dry dredging. <u>Letter mentions that EPA is considering a removal action, and that Integrys proposes not to finalize the River OU FS until EPA determines what its course of action will be.</u>
November 18, 2010	DNR memo to WPSC attorney regarding VPLE fees.
December 15, 2010	NRT progress report letter to EPA. Aiming for January 2011 submittal of revision 2 of the River OU FS.
January 10, 2011	DNR notes on a meeting between DNR, WPSC, WPSC attorney, and consultant regarding VPLE and sediment remediation issues.
January 11 th , 2011	Internal DNR memo regarding VPLE. Don't need a deed for the river bed for VPLE .
January 17, 2011	Wisconsin Public Service cover letter for VPLE fee submittal.
January 17, 2011	WPSC fee submittal.
January 26, 2011	NRT progress report letter to EPA. Revision 2 of River OU FS mostly complete. Discussions with EPA about near shore sediment removal.
February 28, 2011	EPA public information flyer and public meeting announcement. Gives basic background information on the site and basic information on the

Appendix A Detailed Chronology of Campmarina from DNR files

	sediment removal plan to be done as an emergency with EPA oversight of Integrys doing the dredging work in a coffer dam in the wet. Describes how Great Lakes Legacy Act (GLLA) funding will be used to conduct additional dredging and other fish and wildlife work.
February 28, 2011	NRT progress report letter to EPA. NRT incorporating EPA's Great Lakes National Program Office (GLNPO) data. Met with DNR to discuss sediment removal options. Did geotechnical borings for sheet pile and containment wall bracing systems.
March 24, 2011	NRT groundwater monitoring report. Data collected in the report is through December 2010.
April 6, 2011	<u>NRT submittal (on compact disk) of Focused NAPL and Sediment Removal Action Plans and Specifications. Cover letter states that this plan is submitted in anticipation of the forthcoming EPA Removal Action Administrative Order on Consent. Also states that the River OU FS has been submitted to EPA in accordance with the previous Administrative Order on Consent and Statement of Work, CERCLA Docket N. V-W-07-C-862, dated January 26, 2007.</u> <ul style="list-style-type: none">• Excavation/dredging and disposal of soil and river sediments in and along the shoreline for the NAPL, PAH, and PCB remediation.• Installation of sheet piling and cofferdam to accomplish this task in isolation in the wet.• Installation of pilings to support the upland containment barrier as soil and river sediments adjacent to it are excavated/dredged.• Backfill, site preservation, and restoration. <p>[note: DNR RR Program apparently did not get a copy of Revision 2 of the River OU FS, and the Focused NAPL and Sediment Removal Action Plans and Specifications report has sediment PAH removal maps, but no discussion of what sediment cleanup number was chosen to generate them]</p>
April 25, 2011	NRT progress report to EPA. Coordination and pre-construction meetings.
May 23, 2011	NRT progress report to EPA. Meetings with remedial contractors.
June 15, 2011	DNR email to EPA. Review comments.
June 27, 2011	NRT progress report to EPA. Sediment removal actions preparation work.
June 29, 2011	NRT response letter to EPA regarding EPA's comments on NRT's Focused NAPL and Sediment Removal Plan. <u>The letter mentions an EPA June 3, 2011 letter requiring sediments outside the cofferdam area within the top 2 ½ feet contaminated with PAH above 45 mg/kg be subject to removal actions.</u>
July 15, 2011	EPA draft press release.
July 26, 2011	NRT Progress report to EPA. NRT received EPA final Removal Action Memorandum, signed June 23. Awarded contract to dredging contractor.
July 30, 2011	Sheboygan Press newspaper article on progress of sediment removal.
August 26, 2011	<u>NRT progress report to EPA. Sheet pile cofferdam completed on July 18. Dredging (and stabilization of TSCA regulated sediments) started on July 20th.</u>
September 26, 2011	NRT progress report to EPA. Dredging. Completed piles and started installing walers to support containment wall for upland OU. Started

Appendix A Detailed Chronology of Campmarina from DNR files

	load-out of Toxic Substances Control Act (TSCA) regulated contaminated sediments on August 4. PRS, the Sheboygan River and Harbor Superfund site contractor handled proper transportation and disposal.
October 23, 2011	Sheboygan Press newspaper article on dredging progress, and status of park restoration.
October 24, 2011	NRT progress report to EPA. Continued dredging, completed load out of TSCA regulated wastes, loading out non-TSCA stabilized sediments to Hickory Meadows landfill.
December 22, 2011	NRT Progress report letter to EPA. Finished installation of walers to support containment barrier, finished dredging inside the coffer dam, finished post dredge core sampling, finished hauling non TSCA soils to Hickory Meadows Landfill.
January 26, 2012	NRT progress report letter to EPA. Completed shoreline backfill and restoration. Coordinating with EPA GLNPO about using upland support area at Campmarina for GLNPO follow-up dredging project.
February 17, 2012	NRT progress report letter to EPA.
March 26, 2012	NRT Progress report letter to EPA.
April 26, 2012	NRT Progress report letter to EPA. <u>Agreement with EPA that Revision 2 of the River OU FS does not need to be modified, instead the Focused NAPL and Sediment Removal construction completion report will be used to complete the River OU ROD.</u>
May 30, 2012	NRT Progress report letter to EPA.
June 25, 2012	NRT Progress report letter to EPA.
July 16, 2012	EPA public information flyer, EPA Proposes No Further Action After Emergency River Cleanup.
July 26, 2012	NRT Progress report letter to EPA. Restoration of park.
August 24, 2012	NRT Progress report letter to EPA. Restoration of park.
September 21, 2012	NRT Progress report letter to EPA.
October 1, 2012	DNR letter to EPA concurrence with River OU Record of Decision (ROD). ROD is described as a time-critical removal action of NAPL contaminated sediments, and sediments contaminated over 45 ppm mg/kg total PAHs. Any sediment found by confirmation sampling post-dredge are to be covered with clean materials. The cover is to be monitored and maintained. The site was subject to a time-critical removal action due to the risk of mobilization of NAPL during the upcoming dredging operations for PCB contaminated sediments for the Sheboygan River and Harbor Superfund site corrective action. The letter notes that cover materials have not been put in place in anticipation of planned additional dredging funded by the Great Lakes Legacy Act.
November 9, 2012	DNR notes regarding telephone conversation with EPA. EPA wants institutional controls (ICs) imposed at this time.
November 15, 2012	NRT Progress report letter to EPA.
January 31, 2013	NRT Progress report letter to EPA.
February 25, 2013	NRT Progress report letter to EPA. Preparing re-dredge calculations for EPA GLNPO.
March 22, 2013	NRT Progress report letter to EPA.
May 30, 2013	NRT case closure request/GIS registry form submittal to DNR.
June 6, 2013	DNR approval letter for air-sparge system shut down. Letter imposes institutional controls (ICs) for the site under the authority of § 292.12

Appendix A Detailed Chronology of Campmarina from DNR files

	Wis Stats. Letter includes a copy of a cover maintenance plan. ICs are to be posted online on the DNR Geographic Information System (GIS) website and BRRTS public database.
June 26, 2013	EPA public information flyer, EPA Proposes No Further Action and seeks comments.
July 2, 2013	DNR internal notes for VPLE discussions.
July 26, 2013	NRT progress report letter report to EPA. <u>Groundwater monitoring results through June 2013.</u>
September 11, 2013	DNR letter to WPSC denying case closure. Letter includes VPLE issues also , and includes a laundry list of informational and reporting submittal requests mostly maps and tables).
October 1, 2013	DNR notes from a meeting with WPSC. WPSC gave some verbal responses to questions in the closure denial letter.
October 22, 2013	NRT progress report to EPA. Revision 1 of construction completion report.
August 15, 2013	EPA draft Upland OU ROD. States no additional remedial action is required, and that the state ROD is substantially equivalent to what would be required under CERCLA.
August 21, 2013	DNR comment memo to EPA on draft Upland OU ROD.
August 23, 2013	NRT progress report letter to EPA. Communicating with GLNPO regarding dredging information.
September 24, 2013	NRT progress report letter to EPA. Communicating with GLNPO regarding dredging information.
October 22, 2013	NRT progress report letter to EPA. Working on Revision 1 of the Construction Completion Report for the Time Critical Removal Action in the River OU.
October 30, 2013	NRT Construction Completion Report, Focused NAPL and Sediment Removal Action Revision 1. WPSC contractor removes contaminated sediments with NAPL and above 45 ppm total PAH inside the cofferdam area, and some outside. The Great Lakes Legacy Act funding does a follow up dredging project to 18 ppm total PAH at the site and up and downriver from the site, from above the 14 th Street Bridge to the 8 th Street Bridge. <u>At the end of the project, the GLLA project team calculated a SWAC concentration for the Campmarina River OU as 11.9 ppm total PAHs.</u>
November 26, 2013	NRT progress report letter to EPA. Submitted Revision 1 of the Construction Completion report to EPA.
December 20, 2013	NRT progress report letter to EPA.
January 22, 2014	NRT progress report letter to EPA.
February 21, 2014	NRT progress report letter to EPA.
February 26, 2014	NRT Technical Impracticability Report. This report is a request and a justification argument for a federal waiver from attaining the groundwater ARARs within the containment zone of the Upland OU. The ARAR in this case is the Ch NR 140 Wis Admin Code groundwater enforcement standards, and the EPA Safe Drinking Water Act national primary drinking water standards (in this case the maximum contaminant level (MCL).
March 13, 2014	NRT groundwater monitoring report for 2013 data.
March 25, 2014	NRT progress report letter to EPA.
April 17, 2014	EPA approval letter for the Construction Completion Report for the Focused NAPL and Sediment Removal Action for the Wisconsin

Appendix A Detailed Chronology of Campmarina from DNR files

**Public Service Corporation (WPSC) Former Campmarina
Manufactured Gas Plant (MGP) Site, Sheboygan, Wisconsin.**

May 20, 2014	NRT progress report letter to EPA. Revised Technical Impracticability Report.
June 19, 2014	NRT progress report letter to EPA. NRT received comments from EPA on Technical Impracticability Report.
July 1, 2014	NRT Technical Impracticability Report Revision 1.
July 22, 2014	NRT progress report letter to EPA.
August 15, 2014	NRT progress report letter to EPA.
September 22, 2014	NRT progress report letter to EPA.
October 22, 2014	NRT progress report letter to EPA.
November 10, 2014	NRT progress report letter to EPA.
December 18, 2014	NRT progress report letter to EPA.
January 19, 2014	NRT progress report letter to EPA.
February 18, 2014	NRT progress report letter to EPA.
January 19, 2015	NRT progress report letter to EPA.
February 18, 2015	NRT progress report letter to EPA.
March 24, 2015	NRT progress report letter to EPA.
May 26, 2015	NRT progress report letter to EPA.
June 18, 2015	DNR internal memo regarding site discussions.
June 25, 2015	NRT progress report letter to EPA. Continued discussions on TI Waiver.
August 15, 2015	NRT progress report letter to EPA.
August 15, 2015	DNR hand drawn coal tar map on old site investigation base map.
August 21, 2015	NRT progress report letter to EPA. Continued discussion regarding the need for Technical Impracticability waiver.
July 21, 2015	NRT progress report letter to EPA. Conducted 1 st semi-annual groundwater sampling for 2015.
September 28, 2015	NRT progress report letter to EPA.
October 15, 2015	DNR letter to City of Sheboygan notifying City of DNR's intentions to conduct a five-year review.
November 6, 2015	DNR letter to WPSC notifying of DNR's intentions to conduct a five-year review.
November 12, 2015	NRT Progress report letter to EPA. Continued discussion regarding the need for (TI) waiver.
December 22, 2015	NRT memo regarding addendum to multi-site risk assessment framework for many MGP sites in the Superfund Alternative Sites Program.
January 21, 2016	NRT Progress report letter to EPA. Continued discussion regarding the need for (TI) waiver.

Appendix B Contaminant Flux Calculations

CORRESPONDENCE/MEMORANDUM

DATE: September 20, 2017

FILE REF: BRRTS #: 02-60-000095

TO: file

revised 11/3/17

1/14

FROM: JMF

SUBJECT: Campmarina flux calculations

Campmarina is an MGP site that underwent thermal treatment of contaminated soils to the water table followed by encapsulation of soils contaminated with coal tar and MGP residuals below the water table with grouted sheet pile Waterloo walls keyed to a clay layer at depth, and capped with an impermeable cover including booted and welded penetrations (wells) and a surface drainage system.

Assumptions Although the hydraulic gradient inside the containment barrier went from 0.07 to 0.02 post construction, it stabilized at 0.02. If the assumption is made that this represents leakage, then a simple model can be used to calculate worst-case contaminant load into the river as if the barrier was not there, but the lower gradient is. It is also assumed that contaminant flux through the underlying clay layer is negligible.

CORRESPONDENCE/MEMORANDUM

DATE: September 20, 2017

FILE REF: BRRTS #: 02-60-000095

TO: file

2/14

FROM: JMF

SUBJECT: Campmarina flux calculations

$$\text{flux} = \text{Concentration} \times \frac{\text{Volume Water}}{\text{time}}$$

$$\text{volume water} = \text{gw flow distance} \times \text{area of aquifer cross section}$$

$$\text{gw flow velocity } v = K I$$

(note that porosity is not used for bulk flow conditions)

$K = \text{hydraulic conductivity}$
 $I = \text{gradient}$

$$\text{flux} = \text{concentration} \times K I \times \text{area aquifer x-section to river}$$

$$\text{flux total} = \sum_z^A \uparrow$$

example: flux at 25 $\mu\text{g/L}$ ^{benzene} across 60' of river bank and 17' of aquifer thickness

$$\text{flux}_{25} = \frac{25 \mu\text{g}}{\cancel{L}} \times \frac{4.87 \cdot 10^{-5} \text{ cm}}{\text{sec}} \times \frac{0.023 \text{ ft}}{\text{ft}} \times 3264 \text{ ft}^2 \times \frac{929.03 \text{ cm}^2}{1 \text{ ft}^2} \times \frac{1}{1000 \text{ cm}^3}$$

$$\text{flux}_{25}^{\text{benzene}} = 0.08 \text{ mg/sec}$$

CORRESPONDENCE/MEMORANDUM

DATE: September 20, 2017
TO: file
FROM: JMF
SUBJECT: Campmarina flux calculations

FILE REF: BRRTS #: 02-60-000095

3/14

$$\begin{aligned}
 \text{flux} &= \frac{K_{oc} \cdot C_w}{d} \times \text{area} \\
 &= \frac{10 \cdot 4.87 \cdot 10^{-5} \frac{\text{cm}^3}{\text{Sec}}}{0.003 \frac{\text{ft}}{\text{ft}}} \times \frac{929.03 \text{ cm}^2}{1000 \text{ cm}^2}
 \end{aligned}$$

X = Concentration

CORRESPONDENCE/MEMORANDUM

DATE: September 20, 2017

FILE REF: BRRTS #: 02-60-000095

TO: file

4/14

FROM: JMF

SUBJECT: Campmarina flux calculations benzene

benzene concentration µg/L	length of river bank ft	thickness aquifer ft	area ft ²	flux µg/sec
25	192	17	3264	0.02
100	100	15	1500	0.15
500	60	14	840	0.43
1000	162	13	2106	2.16
2000	49	14.5	710.5	1.46
3000	34	14.5	493	1.52
5000	43	18	774	26.36
total	640'		total	12.17

CORRESPONDENCE/MEMORANDUM

DATE: September 20, 2017

FILE REF: BRRTS #: 02-60-000095

TO: file

5/14

FROM: JMF

SUBJECT: Campmarina flux calculations naphthalene

naphthalene concentration ug/L	length of river bank ft	thickness aquifer ft	area ft ²	flux ug/sec
25	110	16	1760	0.05
100	250	13.5	3375	0.35
500	150	13.5	2025	1.04
2000	40	14	560	1.15
3000	45	14	630	1.94
6000	45	17.5	787.5	4.85
total	640'		total	9.38

CORRESPONDENCE/MEMORANDUM

DATE: September 20, 2017

FILE REF: BRRTS #: 02-60-000095

TO: file

G/14

FROM: JMF

SUBJECT: Campmarina flux calculations

Concentration added to River at low flow
 typical low flow = 100 ft³/second
 (USGS Water Resources)

benzene

$$12.17 \frac{49}{\text{sec}} \times \frac{1 \text{ sec}}{100 \text{ ft}^3} \times \frac{1 \text{ ft}^3}{28.3 \text{ L}} = 0.0043 \frac{49}{\text{L}}$$

naphthalene

$$9.38 \frac{49}{\text{sec}} \times \frac{1 \text{ sec}}{100 \text{ ft}^3} \times \frac{1 \text{ ft}^3}{28.3 \text{ L}} = 0.0033 \frac{49}{\text{L}}$$

102
 NR103
 105

From: Lent, Nicholas M - DNR
Sent: Friday, September 22, 2017 2:30 PM
To: Feeney, John M - DNR
Cc: Burzynski, Marsha B - DNR
Subject: Water Quality Criteria & Secondary Values, Benzene and Napthalene

714

Hi John,

Marsha mentioned you were curious about the water quality numbers for benzene and naphthalene that would be applicable at a site in Sheboygan that is along the Sheboygan River.

The following tables list the water quality criteria or secondary values calculated as described in ch. NR 105, Wis. Adm. Code. All concentrations are expressed in terms of micrograms per Liter ($\mu\text{g/L}$).

Acute Toxicity Criteria (ATC):

SUBSTANCE	ATC or Secondary Value*
Napthalene	344.26*

*Criteria unavailable in ch. NR 105, Wis. Adm. Code for this substance, secondary value calculation.

Chronic Toxicity Criteria (CTC):

SUBSTANCE	CTC or Secondary Value
Benzene	108.49 *
Napthalene	19.12 *

*Criteria unavailable in ch. NR 105, Wis. Adm. Code for this substance, secondary value calculation.

Human Threshold Criteria (HTC):

SUBSTANCE	HTC or Secondary Values *
Benzene	610
Napthalene	436*

*Criteria unavailable in ch. NR 105, Wis. Adm. Code for this substance, secondary value calculation.

There are no other forms of water quality criteria or secondary values available for these substances in the Department's wheelhouse.

As I discussed with Marsha, these numbers could be taken a step further if we had an idea of how much "discharge" flow rate is happening, versus the low flow of the Sheboygan River near the location in question.

If a decent estimate of discharge flow rate is available, I could plug in the numbers to adjust these values from "criteria to limits" for the specific location pretty quickly.

From: Schmidt, James W - DNR
Sent: Monday, October 23, 2017 10:59 AM
To: Sellwood, Alyssa A - DNR
Subject: RE: Question: Groundwater Contaminant Flux to Surface Water

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There are no mass criteria. What I would do is to convert the mass flux to a concentration using the streamflow and compare that concentration to the available surface water quality criteria (which are in concentrations). So basically I wouldn't need the mass at all, it's just a matter of using dilution of the applicable streamflow to the estimated groundwater flow.

I hope this helps.

We are committed to service excellence.

Visit our survey at <http://dnr.wi.gov/customersurvey> to evaluate how I did.

James W. Schmidt

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Effluent Limits Calculator
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Wisconsin Department of Natural Resources
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"W for Water"

dnr.wi.gov

From: Sellwood, Alyssa A - DNR
Sent: Monday, October 23, 2017 10:57 AM
To: Schmidt, James W - DNR
Subject: Question: Groundwater Contaminant Flux to Surface Water

Hi Jim

In process of reviewing a calculation for a colleague in the R&R program, a fundamental question presented itself, to which I was directed to you for an answer.

In this case we are dealing with contaminated groundwater assumed to discharge to a river. For these situations, as we concerned with the mass flux to the river or the resulting concentration in the surface water once the river flow is taken into consideration? If mass flux is the concern, what criteria apply?

Glad to provide additional detail or discuss further, if needed for you to address this question.

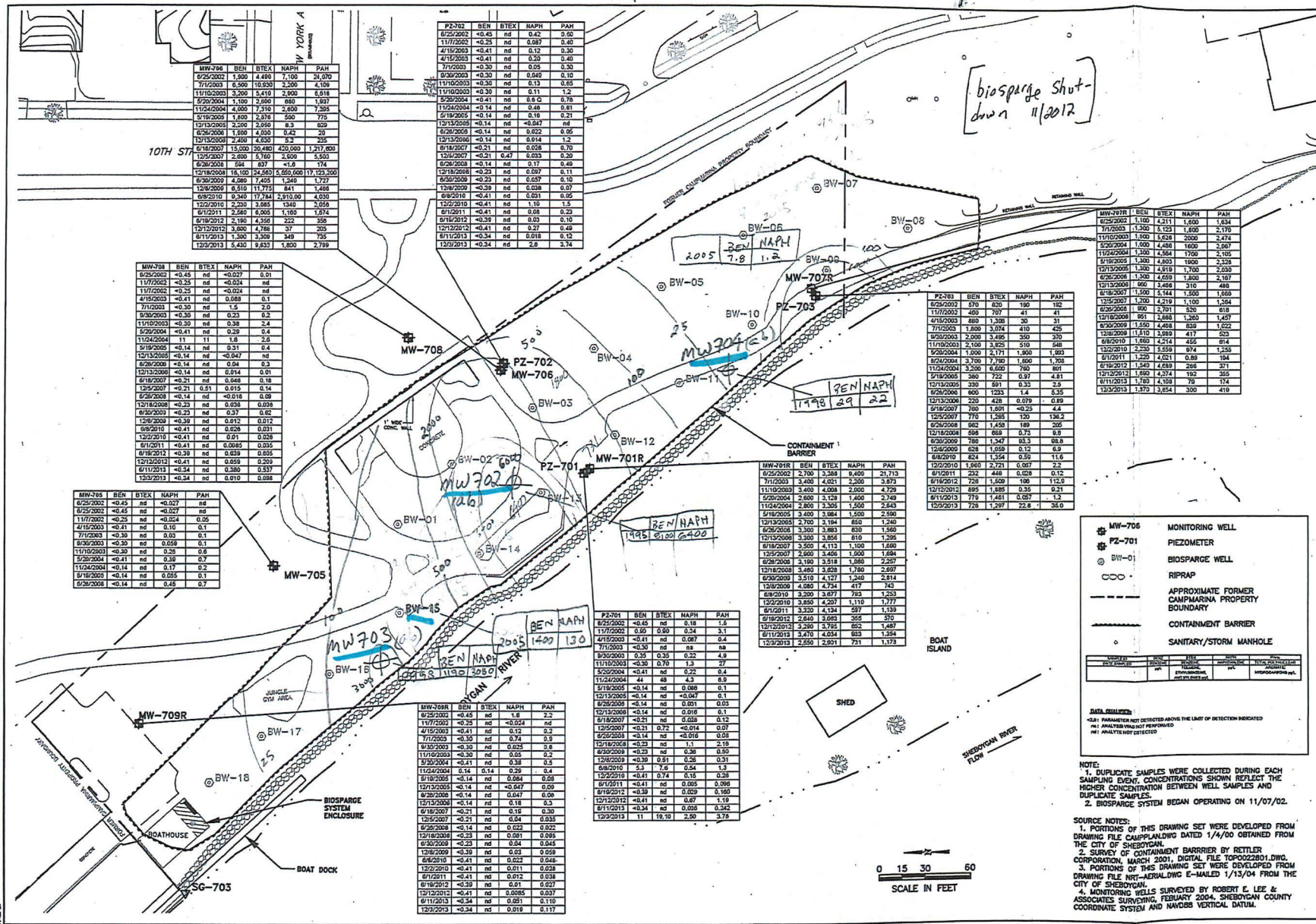
Thank you,

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Visit our survey at <http://dnr.wi.gov/customersurvey> to evaluate how I did.

Naphthalene isoc concentration water table wells

9/14



MW-706	BEN	BTEX	NAPH	PAH
6/25/2002	1.500	4.490	7.100	24.070
7/1/2003	6.500	10.630	2.200	4.100
11/10/2003	3.200	3.410	2.900	5.518
5/20/2004	1.100	2.000	880	1.607
11/24/2004	4.000	7.310	2.600	7.585
5/19/2005	1.600	2.010	500	775
12/13/2005	2.200	2.050	6.3	600
6/26/2006	1.000	4.000	0.45	20
12/13/2006	2.400	4.607	9.2	765
6/18/2007	15.000	20.480	450.000	1,217.800
12/5/2007	2.800	5.100	2.000	5.503
6/26/2008	264	837	>10.8	174
12/18/2008	16.100	24.560	5,650.000	11,123.200
6/30/2009	4.400	7.653	1.248	1,727
12/9/2009	0.810	11.775	841	1,468
6/2/2010	0.340	17.784	2,910.000	4,030
12/2/2010	2.250	3.853	1,340	2,058
6/1/2011	2.580	6.000	1,190	1,912
6/18/2012	2.190	4.350	222	350
12/12/2012	3.400	4.788	37	200
6/1/2013	1.300	3.300	349	730
12/2/2013	5.430	6.833	1.800	2,739

PZ-702	BEN	BTEX	NAPH	PAH
6/25/2002	<0.45	nd	0.47	0.83
11/7/2002	<0.25	nd	0.987	0.40
4/15/2003	<0.41	nd	0.12	0.30
4/15/2003	<0.41	nd	0.20	0.40
7/1/2003	<0.30	nd	0.05	0.30
6/30/2003	<0.30	nd	0.040	0.10
11/10/2003	<0.30	nd	0.13	0.85
5/19/2005	<0.14	nd	0.16	0.21
5/20/2004	<0.41	nd	0.8 C	0.38
11/24/2004	<0.14	nd	0.46	0.81
6/26/2006	<0.14	nd	0.622	0.85
12/13/2006	<0.14	nd	0.014	1.2
12/13/2005	<0.14	nd	<0.047	nd
6/26/2006	<0.14	nd	0.022	0.85
6/18/2007	<0.21	nd	0.028	0.30
12/5/2007	<0.21	nd	0.037	0.10
6/26/2008	<0.21	nd	0.117	0.49
12/18/2008	<0.21	nd	0.097	0.11
6/30/2009	<0.23	nd	0.037	0.10
12/9/2009	<0.39	nd	0.038	0.07
6/2/2010	<0.41	nd	0.021	0.25
12/2/2010	<0.41	nd	1.10	1.3
6/1/2011	<0.41	nd	0.08	0.23
6/18/2012	<0.39	nd	0.010	0.10
12/12/2012	<0.41	nd	0.27	0.48
6/1/2013	<0.34	nd	0.018	0.12
12/2/2013	<0.34	nd	2.6	3.74

MW-708	BEN	BTEX	NAPH	PAH
6/25/2002	<0.45	nd	<0.027	0.91
11/7/2002	<0.25	nd	<0.024	nd
4/15/2003	<0.41	nd	<0.024	nd
7/1/2003	<0.30	nd	1.5	2.0
6/30/2003	<0.30	nd	0.23	0.2
11/10/2003	<0.30	nd	0.38	0.4
5/20/2004	<0.41	nd	0.23	0.4
11/24/2004	11	11	1.8	2.6
12/13/2006	<0.14	nd	0.31	0.4
12/13/2005	<0.14	nd	<0.047	nd
6/26/2006	<0.14	nd	0.04	0.3
12/9/2009	<0.14	nd	0.044	0.18
12/5/2007	<0.21	0.51	0.015	0.14
6/26/2008	<0.14	nd	<0.018	0.18
12/18/2008	<0.23	nd	0.036	0.038
6/30/2009	<0.23	nd	0.37	0.02
12/9/2009	<0.39	nd	0.012	0.12
6/2/2010	<0.41	nd	0.028	0.031
12/2/2010	<0.41	nd	0.01	0.028
6/1/2011	<0.41	nd	0.046	0.035
6/18/2012	<0.39	nd	0.038	0.055
12/12/2012	<0.41	nd	0.059	0.209
6/1/2013	<0.34	nd	0.380	0.317
12/2/2013	<0.34	nd	0.010	0.038

MW-705	BEN	BTEX	NAPH	PAH
6/25/2002	<0.45	nd	<0.027	0.91
11/7/2002	<0.25	nd	<0.024	nd
4/15/2003	<0.41	nd	<0.024	nd
7/1/2003	<0.30	nd	1.5	2.0
6/30/2003	<0.30	nd	0.23	0.2
11/10/2003	<0.30	nd	0.38	0.4
5/20/2004	<0.41	nd	0.23	0.4
11/24/2004	11	11	1.8	2.6
12/13/2006	<0.14	nd	0.31	0.4
12/13/2005	<0.14	nd	<0.047	nd
6/26/2006	<0.14	nd	0.04	0.3
12/9/2009	<0.14	nd	0.044	0.18
12/5/2007	<0.21	0.51	0.015	0.14
6/26/2008	<0.14	nd	<0.018	0.18
12/18/2008	<0.23	nd	0.036	0.038
6/30/2009	<0.23	nd	0.37	0.02
12/9/2009	<0.39	nd	0.012	0.12
6/2/2010	<0.41	nd	0.028	0.031
12/2/2010	<0.41	nd	0.01	0.028
6/1/2011	<0.41	nd	0.046	0.035
6/18/2012	<0.39	nd	0.038	0.055
12/12/2012	<0.41	nd	0.059	0.209
6/1/2013	<0.34	nd	0.380	0.317
12/2/2013	<0.34	nd	0.010	0.038

MW-709R	BEN	BTEX	NAPH	PAH
6/25/2002	<0.45	nd	1.8	2.2
11/7/2002	<0.25	nd	<0.024	nd
4/15/2003	<0.41	nd	0.12	0.2
7/1/2003	<0.30	nd	0.23	0.8
6/30/2003	<0.30	nd	0.23	0.8
11/10/2003	<0.30	nd	0.35	0.2
5/20/2004	<0.41	nd	0.5	0.39
11/24/2004	0.14	0.14	0.29	0.4
6/18/2007	<0.14	nd	0.084	0.09
12/5/2007	<0.14	nd	<0.007	0.09
6/26/2008	<0.14	nd	0.047	0.06
12/13/2006	<0.14	nd	0.18	0.3
12/9/2009	<0.21	nd	0.03	0.033
6/2/2010	<0.14	nd	0.022	0.022
12/18/2008	<0.23	nd	0.091	0.099
6/30/2009	<0.23	nd	0.04	0.045
12/9/2009	<0.39	nd	0.03	0.039
6/2/2010	<0.41	nd	0.011	0.028
12/2/2010	<0.41	nd	0.012	0.038
6/1/2011	<0.41	nd	0.072	0.038
6/18/2012	<0.39	nd	0.01	0.027
12/12/2012	<0.41	nd	0.005	0.037
6/1/2013	<0.34	nd	0.051	0.119
12/2/2013	<0.34	nd	0.019	0.117

PZ-701	BEN	BTEX	NAPH	PAH
6/25/2002	<0.45	nd	0.18	1.6
11/7/2002	0.60	0.80	0.34	3.1
4/15/2003	<0.41	nd	na	na
7/1/2003	<0.30	nd	na	na
6/30/2003	0.35	0.35	0.22	4.8
11/10/2003	<0.30	0.19	1.3	77
5/20/2004	<0.41	nd	0.22	0.4
11/24/2004	47	48	4.3	6.3
11/10/2003	<0.30	0.19	1.3	77
12/13/2005	<0.14	nd	<0.047	0.1
6/26/2006	<0.14	nd	0.011	0.03
12/13/2006	<0.14	nd	0.016	0.1
6/18/2007	<0.21	nd	0.038	0.12
12/5/2007	<0.21	0.72	<0.014	0.07
6/26/2008	<0.14	nd	<0.016	0.09
12/18/2008	<0.23	nd	1.1	2.18
6/30/2009	<0.23	nd	0.36	0.50
12/9/2009	<0.39	0.41	0.58	0.31
6/2/2010	5.3	7.6	0.54	1.3
12/2/2010	<0.41	0.74	0.13	0.38
6/1/2011	<0.41	nd	0.095	0.390
6/18/2012	<0.39	nd	0.029	0.160
12/12/2012	<0.41	nd	0.07	1.10
6/1/2013	<0.34	nd	0.009	0.365
12/2/2013	11	18.10	2.50	3.78

MW-701R	BEN	BTEX	NAPH	PAH
6/25/2002	2.700	3.389	8.400	21,713
7/1/2003	3.400	4.021	2.300	3,975
11/10/2003	3.400	4.000	2.600	4,729
5/20/2004	2.800	3.120	1.400	2,748
11/24/2004	3.600	3.300	2.600	2,843
5/18/2005	3.400	3.061	1.500	2,500
12/13/2005	2.700	3.194	850	1,240
6/26/2006	3.300	3.683	830	1,560
12/13/2006	3.300	3.854	810	1,295
6/18/2007	3.500	4.113	1,100	1,680
12/5/2007	3.600	3.400	1,600	1,884
6/26/2008	3.100	3.518	1,680	2,257
12/18/2008	3.400	3.620	1,780	2,897
6/30/2009	3.510	4.121	1,200	2,814
12/9/2009	4.080	4.734	417	743
6/2/2010	3.200	3.677	763	1,250
12/2/2010	3.650	4.201	1,110	1,777
6/1/2011	3.320	4.134	507	1,139
6/18/2012	3.440	3.695	395	570
12/12/2012	3.280	3.795	852	1,484
6/1/2013	3.470	4.034	653	1,354
12/2/2013	2.650	2.601	721	1,173

PZ-703	BEN	BTEX	NAPH	PAH
6/25/2002	970	820	180	192
11/7/2002	400	707	41	41
4/15/2003	880	1,100	30	31
7/1/2003	1,800	3,074	410	426
12/2/2003	3,200	3,495	350	370
11/10/2003	2,100	3,625	510	548
5/20/2004	1,800	2,171	1,800	1,083
6/26/2006	3,700	7,760	1,600	1,700
11/24/2004	3,300	6,600	760	801
5/18/2005	380	722	0.97	4.81
12/13/2006	330	691	0.33	2.3
6/26/2008	800	1,333	1.4	5.35
12/13/2006	220	426	0.079	0.89
6/18/2007	770	1,385	120	134.3
6/26/2008	682	1,430	189	205
12/18/2008	668	868	0.73	0.8
6/30/2009	788	1,347	83.3	68.8
12/9/2009	628	1,050	0.12	6.9
6/2/2010	624	1,354	0.50	11.6
12/2/2010	1,600	2,721	0.067	2.2
6/1/2011	232	446	0.026	0.12
6/18/2012	728	1,509	198	110.9
12/12/2012	895	1,885	0.38	0.21
6/1/2013	1,780	4,108	78	174
12/2/2013	1,970	3,854	300	419

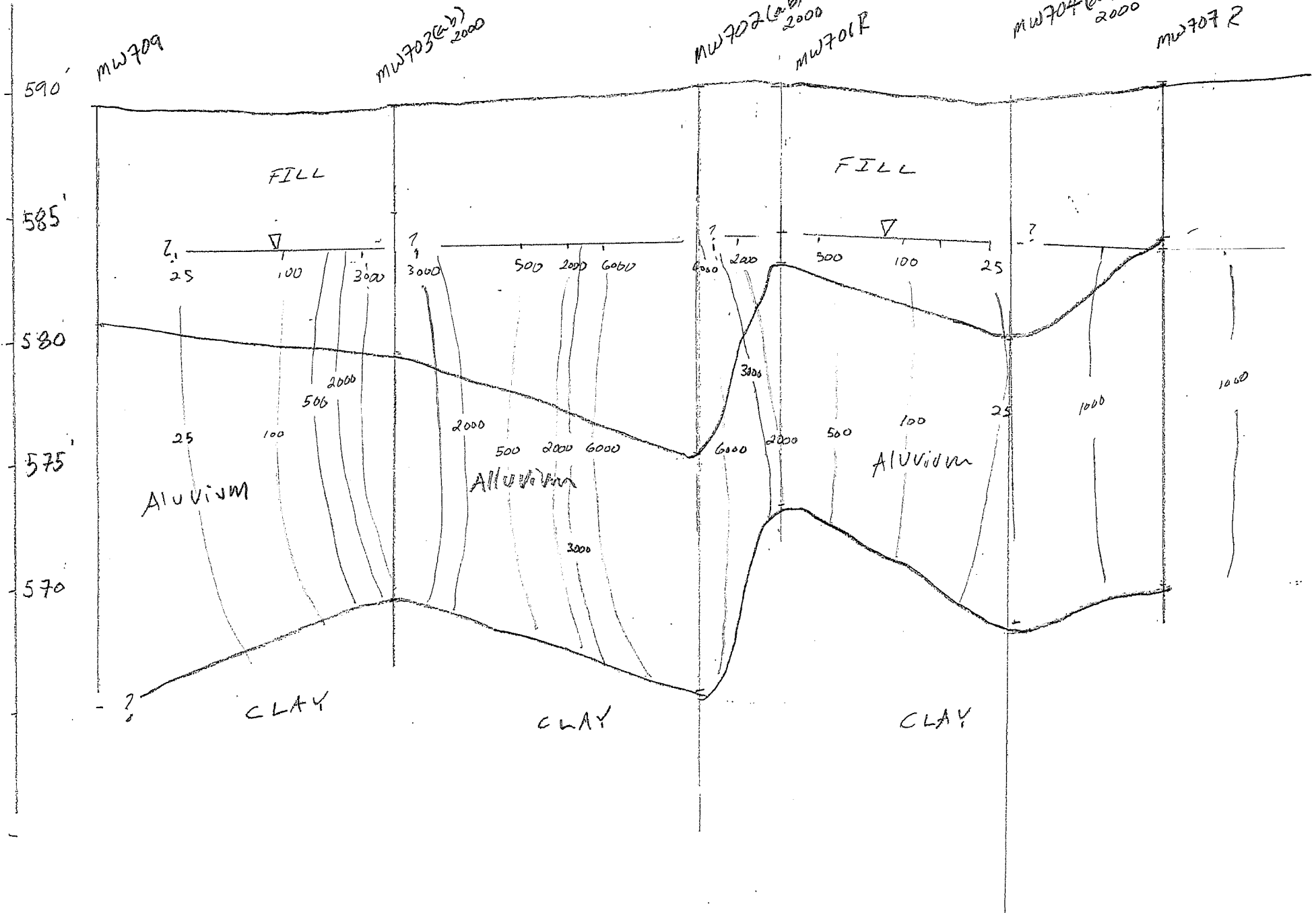
DATE	PARAMETER	CONCENTRATION	UNIT	DETECTION LIMIT
6/25/2002	BEN	2.700	mg/L	0.45
6/25/2002	BTEX	3.389	mg/L	0.45
6/25/2002	NAPH	8.400	mg/L	0.45
6/25/2002	PAH	21,713	mg/L	0.45

DATE	PARAMETER	CONCENTRATION	UNIT	DETECTION LIMIT
6/25/2002	BEN	2.700	mg/L	0.45
6/25/2002	BTEX	3.389	mg/L	0.45
6/25/2002	NAPH	8.400	mg/L	0.45</

ELE $\frac{1}{2}$
A

X-SECTION NAPHTHALENE PPB AT RIVER

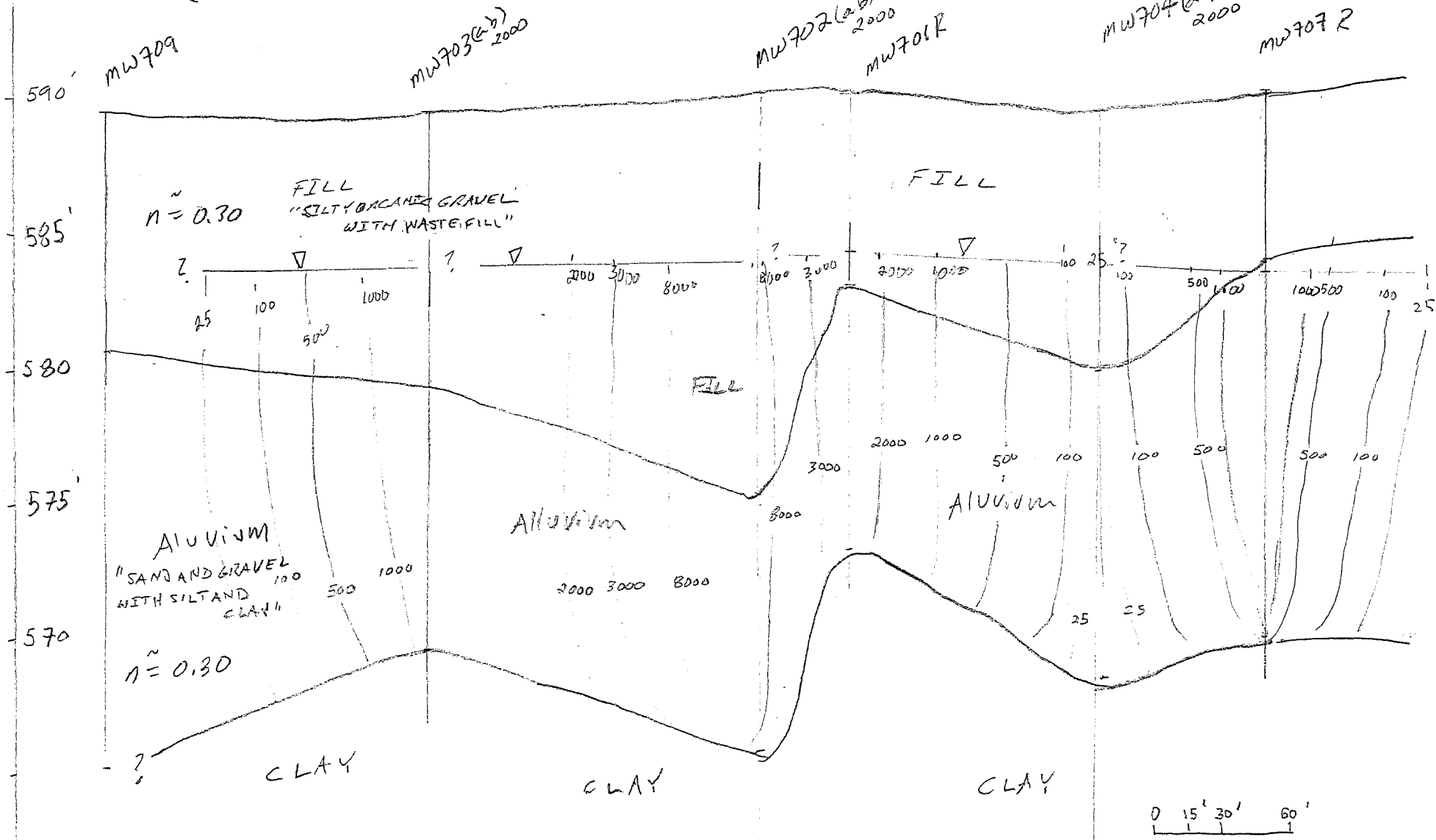
A'



ELE A 12/14

X-SECTION BENZENE PPB AT RIVER

A'



MW709

MW703(a) 2000

MW702(a,b) 2000

MW701R

MW704(a,b) 2000

MW707R

$n \approx 0.30$

FILL
"SILTY ORGANIC GRAVEL
WITH WASTE FILL"

FILL

25 100 500 1000

2000 3000 8000

8000 3000 2000 1000

100 25 100 500 100 500 1000 500 100 25

FILL

3000 2000 1000 500 100 100 500 500 100

ALLUVIUM

ALLUVIUM

ALLUVIUM
"SAND AND GRAVEL
WITH SILT AND
CLAY"

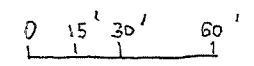
$n \approx 0.30$

2000 3000 8000

CLAY

CLAY

CLAY



CORRESPONDENCE/MEMORANDUM

14/14

DATE: September 20, 2017

FILE REF: BRRTS #: 02-60-000095

TO: file

FROM: JMF

SUBJECT: Campmarina flux calculations

NRT Slug test data from 6/28/1996
Shallow wells

Well	K ft/min	K $\frac{cm}{sec}$
MW701	$6.21 \cdot 10^{-5}$	$3.15 \cdot 10^{-5}$
MW702	$4.50 \cdot 10^{-5}$	$2.29 \cdot 10^{-5}$
MW703	$2.5 \cdot 10^{-4}$	$1.27 \cdot 10^{-4}$
MW705	$2.45 \cdot 10^{-5}$	$1.27 \cdot 10^{-5}$
MW707	$1 \cdot 10^{-4}$	$5.09 \cdot 10^{-5}$
	Ave	$4.87 \cdot 10^{-5}$

Well	top of alluvium	to top of clay
MW709	8'	24' (?)
MW703	4'	20'
MW702	15'	24'
MW701		
MW701R	7'	17'
MW704	10'	22'
MW707R	6'	20'

$$\frac{6.21 \cdot 10^{-5} \text{ ft}}{\text{min}} \times \frac{1 \text{ min}}{60 \text{ sec}} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \text{ in}} = 3.15 \cdot 10^{-5} \frac{\text{cm}}{\text{sec}}$$