United States Environmental Protection Agency
Region V

Date: JAN 25 2016

Subject: Memo to the File.
Penta Wood Products Superfund Site (the Site); Siren, WI
Remediation System Shutdown Pilot Study Implementation

From: Linda Martin
Remedial Project Manager

Through: Donald Bruce
Chief, Remedial Response Section #6

Joan Tanaka, Chief
Remedial Response Branch #1

for Richard Karl, Director
Superfund Division

To: Project File

CC: Phil Richard
WDNR Project Manager

The U.S. EPA conducted a $2 million short-term action at the Site between April 1994 and June 1996. The Remedial Investigation and Feasibility Study was completed in May 1998. The Record of Decision (ROD) was signed on September 29, 1998. The Remedial Design (RD) was completed in November 1999. The Remedial Action (RA) was completed in September 2000. The RA consisted of the demolition of buildings, consolidation of pentachlorophenol (PCP) and arsenic-contaminated soils in a corrective action management unit (CAMU) protective of human health, installation of a groundwater pump and treatment system, and installation of bio-vent wells and capping of the CAMU. The treatment system was later upgraded and became operational in May 2004. The total cost of fund-financed remedial actions at the site amounted to $12.7 million. The site was in the operations, maintenance and monitoring phase until September 2014. In September 2014, WDNR assumed financial responsibility and oversight for the long-term remedial actions at the site.

In 2015, WDNR prepared a proposal for the implementation of a Remediation System Shutdown Pilot Study to support an alternate long term remedy of monitored natural attenuation (MNA). The pilot study includes the temporary shutdown of the groundwater and LNAPL remediation system, microcosm study, Bio-trap study and long term monitoring with quarterly groundwater sampling.

Following the review of the proposed study work plan, EPA approved the pilot study on December 16, 2015. A copy of the approved work plan is attached for reference. The study is expected to run during a four years period while data is collected to determine if MNA will address the remaining dissolved contaminations plume confined to the Site property.

Following the completion of the pilot study, EPA will review the data to determine if the pump and treat system should be turned back on and continue to run or if a remedy change is warranted.

attachment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

December 16, 2015

Phil Richard
Wisconsin Department of natural Resources
875 S. 4th Avenue
Park Falls, Wisconsin 54552

RE: Final approval: Remediation System Shutdown Pilot Study for the Penta Wood Projects Superfund Site, Siren, Wisconsin

Dear Phil,

This letter is a follow up to the November 17, 2015 Conditional approval letter for the Remediation System Shutdown Pilot Study Work plan for the Penta Wood Superfund Site. EPA has completed its review of the document and has no further comment. This letter is considered the final approval of the pilot study work plan.

EPA understands that shutdown of the groundwater remediation system was completed during the week of November 23, 2015 and the additional monitoring wells requested have been installed. We look forward to working with you as this pilot moves forward.

If you have any questions about this approval please feel free to contact me at 312-886-3854. Thank you.

Sincerely,

Linda Martin

Linda Martin
Remedial Project Manger
USEPA, R5

Cc Ed Gilbert, EPA
Dave Bartenfelder, EPA
Terry Stanuch, EPA
Tim Ree, GHD

Transmittal

Date: December 18, 2015 Reference No.: 086165 (8)

To: Mr. Phil Richard
Wisconsin Department of Natural Resources
875 S. 4th Avenue
Park Falls, Wisconsin 54552

Subject: Report Submittal

No. of Copies	Description/Title	Drawing No./ Document Ref.	Issue
1	Unbound Copy: Remediation System Shutdown Pilot Study Work Plan Penta Wood Products Superfund Site Siren, Wisconsin		

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Completed by: Stephanie Bruce [Please Print] Signed: Tim Ree

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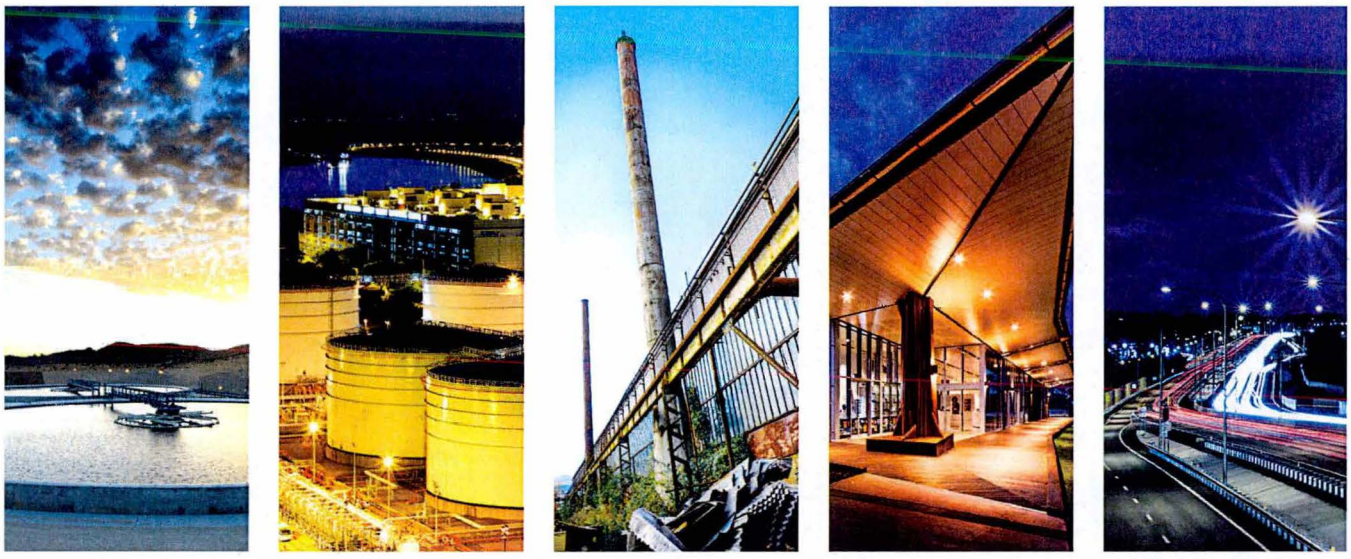
Final



Remediation System Shutdown Pilot Study Work Plan

Penta Wood Products Superfund Site
Siren, Wisconsin

Wisconsin Department of Natural Resources

1801 Old Highway 8 Northwest, Suite 114 St. Paul Minnesota 55112
086165 | 02 | 20 | Report No 8 | November 12 2015

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1. Introduction

GHD Services Inc. (GHD) prepared this Remediation System Shutdown Pilot Study Work Plan for the Penta Wood Products Superfund Site (Site) in Siren, Wisconsin on behalf of Wisconsin Department of Natural Resources (WDNR). The Site location is shown on Figure 1.1; the Site plan is shown on Figure 1.2; and residential well locations are shown on Figure 1.3.

1.1 Purpose

The purpose of this work plan is to temporarily shut down the remediation system during a pilot study and confirm lines of evidence to support an alternate long-term remedy of monitored natural attenuation for the Site. Lines of evidence that would be confirmed include:

- Light non-aqueous phase liquid (LNAPL) body and dissolved plume limits are not expanding
- Dissolved concentrations are stable or decreasing
- Degradation of contaminants is occurring through aerobic and/or anaerobic natural processes

This work plan proposes:

- Temporary shutdown of the remediation system
- New monitoring wells to further define the LNAPL and dissolved plume limits
- Baseline groundwater monitoring and sampling following shutdown of the remediation system
- Microcosm and bio-trap studies
- Groundwater and LNAPL level monitoring during the pilot study
- Groundwater monitoring well sampling during the pilot study
- Residential well sampling
- Contingency plan

Following United States Environmental Protection Agency (USEPA) concurrence with work plan, the remediation system will be immediately shut down. The system will remain temporarily shut down during the entire proposed monitoring period. The system will be shut down in November 2015 and remain off through at least December 2019. If monitoring results are not favorable, a contingency plan would be implemented.

2. Background

A detailed background and history of the Site and associated actions is provided in the Five-Year Review Report (USEPA, January 2015). Historical pentachlorophenol (PCP) concentrations and LNAPL thickness data are presented in Appendix A of this work plan.

2.1 Site Setting

The Site is a former wood treatment facility on an 82-acre property. The property is located in a rural and agricultural setting with residences located to the east, west, and south. Forested and

wetland areas border the property to the north/northeast. The residential properties contain drinking water wells. The Site is situated on a hill with approximately 110 feet of drop in elevation toward the north/northeast. The Site layout and residential well locations are shown on Figures 1.2 and 1.3, respectively.

Site use is controlled by continuing obligations and institutional controls (WDNR letter dated July 6, 2015).

2.2 Release History

Contaminants were released to the subsurface during operation from 1953 to 1992. Raw timber was treated with a 5 to 7 percent PCP solution in a fuel oil carrier or with a waterborne salt treatment chemical. The facility discharged wastewater from an oil/water separator through a gully into a lagoon located at the northeast corner of the property. Process wastes were discharged onto a wood-chip pile in the northwestern portion of the property. Beginning in the 1970s, the WDNR observed several large spills, stained soils, fires, and poor operating practices. The USEPA conducted a removal action during 1994 through 1996. Buildings were demolished and the remaining chemicals and sludge were disposed offsite. Highly contaminated soil was excavated and disposed offsite. Erosion control measures were implemented in 1998 to reduce washout of the contaminated wood debris from the lagoon into the wetlands. Thus, a substantial portion of the contaminant source was removed.

2.3 Compounds of Concern and Cleanup Goals

The Record of Decision (ROD) (USEPA, November 1998) identifies the following as compounds of concern (COCs):

- PCP
- Naphthalene
- Benzene, toluene, ethylbenzene, and xylenes (BTEX)
- Chloride
- Metals – arsenic, copper, iron, manganese, and zinc

The ROD also specifies the groundwater cleanup goals as the Preventative Action Limits (PALs) identified in Ch. NR 140, Wis. Adm. Code. Following completion of this pilot study, WNDR may request a ROD amendment to modify the cleanup goals from the PALs to the Enforcement Standards (ESs) as identified in Ch. NR 140 Wis. Adm. Code. The COCs and respective cleanup goals are summarized in Table 2.1.

2.4 Remedial History

Extensive remedial actions have been conducted at the Site since the USEPA issued the ROD in November 1998, including the following:

- Soil and sediment excavation and consolidation in an onsite corrective management unit (CAMU)
- Bioventing
- Groundwater extraction and treatment

- LNAPL recovery
- Monitored natural attenuation of the remaining dissolved contaminant plume outside of the groundwater capture area

Initial operation of the remediation system started in October 2000. Due to the presence of emulsified oil in the extracted groundwater, additional pretreatment studies, design, and facility construction were conducted. The full treatment system operation, including additional pretreatment, began in March 2004 and operated through August 2014. In 2010, three additional dual phase extraction wells were installed in an effort to accelerate cleanup activities.

The WDNR took over remediation system operations at the Site on September 1, 2014. During October 2014, the remediation system operation was modified to exclude the pretreatment portion of the system. In addition, LNAPL recovery was performed manually on a periodic basis.

2.5 Hydrogeology

The subsurface at the Site consists of unconsolidated soil and has been characterized with two aquifers, the unconfined aquifer (upper portion) and semiconfined aquifer (lower portion). The upper aquifer consists of sand and gravel with silt and clay to depths of 90 to 120 feet below ground surface. A glacial till separates the upper aquifer from the lower aquifer and consists of silt, silty sand, and sandy silts with gravel with thickness ranging between 3 to 45 feet. The till is present under most of the Site. The lower aquifer consists of sand and gravel. A cross-section location is shown on Figures 2.1 and 2.2. A general cross-section of the subsurface stratigraphy is shown on Figure 2.3.

The general groundwater flow direction appears to be toward the east-northeast based on measured groundwater elevations in wells at the Site and the dissolved PCP concentration distribution. The general horizontal hydraulic gradient across the source area is estimated to be approximately 0.0006 foot per foot (ft/ft), under non-pumping conditions.

2.6 LNAPL Body and Dissolved PCP Plume Extent

The areal extent of LNAPL based on measured in-well thicknesses is less than 2 acres in size within the property boundaries and limited to within the immediate vicinity of the onsite CAMU as shown on Figure 2.1. The LNAPL has remained stable (i.e., not expanding or migrating) from the time prior to implementing the remedy through more than 10 years of remediation system operation. The LNAPL extent may not be fully defined at the northeast portion of the source area. The LNAPL is present within the unconfined aquifer at depths ranging between approximately 80 and 115 feet below ground surface. Based on historical groundwater level monitoring data and the observed groundwater level fluctuations, the LNAPL smear zone is approximately 7 feet thick and is located exclusively in the unconfined (upper) aquifer at the groundwater table. The plots of the well gauging data over time (Charts 1 and 2, Long-Term Remedial Action Report, CH2M HILL, November 2014) indicate that the predominant LNAPL behavior (i.e., how LNAPL thickness in wells changes with fluctuations in water table depth) is consistent with unconfined conditions in that in-well LNAPL thickness decreases with a rising water table and vice versa.

Recently, LNAPL was present in two monitoring wells (MW18 and MW19). Historically, four monitoring wells (MW10S, MW18, MW19, and MW20) have contained measurable LNAPL at thicknesses of less than 1 foot. Since September 2014, LNAPL has been present in five extraction wells (EW05, EW06, EW10, EW12, and EW14). Three of these extraction wells (EW05, EW12, and

EW14) currently contain LNAPL thicknesses less than 1 foot. Two of these extraction wells (EW06 and EW10) currently contain LNAPL thicknesses greater than 1 foot. Historical LNAPL thickness data prior to September 2014 are not available for the extraction wells.

The dissolved PCP plume has been reduced at the Site. The dissolved PCP plume with concentrations exceeding 1,000 micrograms per liter (µg/L) is currently approximately 2 acres in the unconfined (upper) aquifer and appears to be limited to the immediate vicinity of the LNAPL as shown on Figure 2.1. PCP is no longer present in the semiconfined (lower) aquifer at concentrations exceeding 1,000 µg/L. The dissolved PCP plume with concentrations exceeding 1 µg/L encompasses approximately 7 acres in the unconfined (upper) aquifer and approximately 4 acres in size in the semiconfined (lower) aquifer as shown on Figures 2.1 and 2.2, respectively.

3. Proposed Temporary Remediation System Shutdown Pilot Study and Monitoring Plan

This section provides a discussion of the proposed monitoring plan during the temporary remediation system shutdown pilot study.

Following USEPA concurrence with this work plan, the remediation system will be immediately shut down. The system will remain temporarily shut down during the entire proposed monitoring period for this pilot study. The system will be shut down in November 2015 and is expected to remain off through December 2019. LNAPL recovery (i.e., bailing and pumping) will not be conducted during the shutdown. The temporary system shutdown will be conducted in general accordance with the Site Shutdown Plan (CH2M HILL). The primary shutdown tasks would include:

- Turning off the groundwater extraction pumps in all extraction wells
- Removing all LNAPL and groundwater extraction pumps from the extraction well casings
- Draining all piping
- Draining and cleaning all system tanks, sumps, vessels, and pumps
- Removing, profiling, and disposing spent activated carbon and recovered LNAPL
- Profiling and disposing sludge and liquid removed from system components

All equipment, water treatment chemicals, and supplies will remain at the Site during the temporary system shutdown and pilot study if a contingency plan is implemented and a restart of the system is required (refer to Section 4.). The system could be restarted within 30 days.

The following sections discuss the proposed monitoring plan including:

- New monitoring wells to further define the LNAPL body and dissolved plume limits
- Microcosm study to evaluate biodegradation rates within the dissolved plume
- Bio-trap study to quantify microbial populations and confirm biodegradation
- Groundwater and LNAPL level monitoring
- Groundwater sampling
- Residential well sampling

- Reporting

The proposed pilot study schedule is provided in Table 3.1. The work would be conducted in general accordance with the Field Sampling Plan (FSP) (CH2M HILL, November 1999 and November 2010) and Quality Assurance Project Plan (QAPP) (CH2M HILL, February 2005) with subsequent addendums (most recent is Addendum No. 6 dated July 2014). The FSP and QAPP with addendums will be updated, as necessary, to include the work associated with the microcosm and bio-trap studies.

3.1 Proposed New Monitoring Wells

Three new wells (MW29, MW30, and MW31) are proposed to confirm the LNAPL body and dissolved plume limits. Drilling and well installation work would be conducted in general accordance with State of Wisconsin Administrative Code (WAC) ch. NR 141 requirements.

Existing monitoring wells MW2, MW5, and MW18 are located near the presumed downgradient limit of the source area. However, the screen intervals for these wells are below the groundwater table surface. A new well, MW29, is proposed in the vicinity of these wells. The purpose of well MW29 is to potentially define the LNAPL body limit and provide soil and groundwater samples close to the LNAPL limits and elevated PCP concentrations for the microcosm study (refer to Section 3.2). Two new wells, MW30 and MW31, are also proposed to provide delineation of the northwest and southeast sides of the dissolved downgradient plume. The proposed well locations are shown on Figure 2.1. Drilling and well installation work will be conducted during November and December 2015. The proposed drilling and well installation schedule is provided in Table 3.1.

3.1.1 Drilling Protocol

A driller, licensed by the State of Wisconsin, would utilize a sonic drilling rig to advance the boreholes for the new monitoring wells (MW29, MW30, and MW31). In addition, another borehole would be advanced at location SB1 to collect soil and groundwater samples for the microcosm study (refer to Section 3.2). The boreholes would be approximately 6 inches in diameter and advanced to approximately 10 feet below the groundwater table. The drilling equipment would be decontaminated prior to use at each borehole location.

3.1.2 Well Installation

Monitoring wells would be installed in boreholes MW29, MW30, and MW31. Each well would consist of 2-inch diameter, Schedule 80, polyvinyl chloride (PVC) casing. The PVC screen interval would consist of casing with 0.010-inch slots installed between approximately 975 and 995 feet above mean sea level (ft msl) (10 feet above and below the groundwater table). Solid casing will extend from the top of the screened interval to approximately 2 feet above ground surface. The proposed well screen intervals are illustrated on Figure 2.3.

The annular space around the screened interval would be backfilled with a silica sand filter pack. The sand would extend from the bottom of the borehole to approximately 2 feet above the top of the screen. A 2-foot thick fine sand filter pack seal would be placed above the top of the filter pack. A neat cement grout would be installed, via a tremie pipe, in the annular space immediately above the filter pack seal to ground surface. A lockable steel protective casing (6-inch diameter, steel) would be installed around the above ground well casing and set in concrete.

Following installation, each well would be developed by surging and purging groundwater until the turbidity of the water is reduced.

A neat cement grout would be placed, via a tremie pipe, in the annular space to abandon and seal borehole SB1.

The drilling and well installation work would be completed within 60 days of receiving USEPA approval of this work plan.

3.1.3 Soil Cuttings and Water Management and Disposal

Soil cuttings removed from the boreholes for monitoring wells MW29, MW30, and MW31 above an elevation of approximately 970 ft msl, which is approximately 15 feet above the current groundwater table would be segregated placed into a stockpile. Soil cuttings removed below this elevation would be placed in a separate stockpile at the Site. Because borehole SB1 would be advanced through the CAMU at the Site, all cuttings from this location would be placed in a separate stockpile at the Site.

Each stockpile would be lined and covered with plastic sheeting. A composite soil sample would be collected from each stockpile for laboratory analysis of PCP, BTEX, and naphthalene and other parameters if required for profiling and offsite disposal.

If the soil sample results meet the State of Wisconsin standards, the drill cuttings would be thinspread at the Site. If the results exceed the standards, a waste profile will be developed for authorized disposal at an offsite facility. Disposal would be completed within 90 days of generating the soil cuttings.

Development/decontamination water would be discharged to the ground surface within the CAMU limits at the Site, and the quantity will be documented. Any LNAPL recovered during the drilling or well development activities would be stored in a drum at the Site and subsequently profiled and disposed at an authorized offsite facility.

3.2 Proposed Microcosm Study

Monitored natural attenuation (MNA) is a remedial approach that relies on natural subsurface mechanisms that are classified as either destructive or nondestructive. Biodegradation is the most important in situ destructive mechanism, while nondestructive mechanisms include sorption, dispersion, dilution, and volatilization. To support successful implementation of MNA, a microcosm study is proposed as a line of evidence to demonstrate that the degradation of the Site contaminants is occurring at rates sufficient to be protective of human health and the environment. The objectives of this proposed laboratory study are to gather the data necessary to:

- Determine whether natural attenuation of PCP is occurring at the Site
- Determine whether natural attenuation is occurring under aerobic conditions, anaerobic conditions, or both
- Determine a Site-specific biodegradation rate for PCP

Soil and groundwater samples will be collected at borehole locations SB1 and MW29. Location SB1 is located downgradient from the LNAPL where the groundwater is expected within the aerobic (i.e., oxygen rich) zone. MW29 is located closer to the LNAPL and elevated PCP concentrations

where the groundwater is within the anaerobic (i.e., oxygen poor) zone. Approximately 4 gallons of groundwater and 5 pounds of soil will be collected from each zone. The soil samples would be collected from the interval immediately above the groundwater table. The samples would be submitted to the GHD Innovative Technology Group (ITG) laboratory located in Niagara Falls, New York. The samples would be subjected to the testing described below.

The proposed microcosm study schedule is provided in Table 3.1

3.2.1 Initial Characterization

Upon arrival at the laboratory, the soil and groundwater samples would be analyzed for the following parameters to provide a characterization of baseline conditions for the study:

- pH
- PCP
- Diesel range organics
- Ammonia-nitrogen
- Orthophosphate-phosphorus
- Total and dissolved iron and manganese (groundwater)
- Total iron and manganese (soil)

3.2.2 Aerobic Microcosm Testing

Microcosms would be set up to assess the potential for natural attenuation of PCP under aerobic conditions using soil and groundwater samples collected from the aerobic zone at the Site. Soil will be placed in serum bottles with groundwater, and the following treatments will be performed:

- Soil and groundwater only (biotic control)
- Soil, groundwater, and oxygen
- Soil, groundwater, oxygen, and sodium azide (abiotic control)

After 0, 3, 6, and 12 months, duplicate microcosms for each treatment would be sacrificed and the soil and groundwater samples would be analyzed for PCP. Depending on the results, additional testing may be conducted at extended durations.

3.2.3 Anaerobic Microcosm Testing

Microcosms would be set up to assess the potential for natural attenuation of PCP under anaerobic conditions using soil and groundwater samples collected from the anaerobic zone at the Site. Soil will be placed in serum bottles with groundwater, and the following treatments will be performed:

- Soil and groundwater only (biotic control)
- Soil, groundwater, and emulsified vegetable oil (EVO)
- Soil, groundwater, and sodium azide (abiotic control)

After 0, 3, 6, and 12 months, duplicate microcosms for each treatment would be sacrificed and the soil and groundwater samples would be analyzed for PCP. Depending on the results, additional testing may be conducted at extended durations.

3.2.4 Data Assessment

Following completion of microcosm study, the data will be compiled and evaluated. An assessment would be made of the potential for natural attenuation with estimated degradation rates of PCP at the Site, which can be used to project groundwater cleanup times.

3.3 Proposed Bio-Trap Study

MNA is a remedial approach that relies on natural subsurface mechanisms that are classified as either destructive or nondestructive. In certain circumstances, MNA can be sufficiently protective of human health and the environment. Biodegradation is the most important in situ destructive mechanism, while non-destructive mechanisms include sorption, dispersion, dilution, and volatilization. However, MNA has its inherent limitations and can be slow, making the time frame for completion relatively long. To support successful implementation of MNA, a bio-trap study is proposed as a line of evidence to demonstrate that the degradation of the site hydrocarbons is occurring at rates sufficient to be protective of human health and the environment. The objectives of this proposed laboratory study are to gather the data necessary to:

- Determine whether bacteria capable of degrading PCP are present at the Site
- Demonstrate in-situ biodegradation of PCP using a bio-trap

3.3.1 Bio-Trap Testing

Bio-traps baited with 13C labelled PCP would be obtained from Microbial Insights. They would be installed in wells MW20 and MW29 located within the source area and wells MW9 and EW11 (upper screened casing) located downgradient of the source area. The bio-traps would be left in place for 90 days. After 90 days the bio-traps would be retrieved and submitted to Microbial Insights located in Knoxville, Tennessee. The samples would be analyzed for the following:

- ^{13}C Pentachlorophenol concentration
- Phospholipid Fatty Acids (PLFA)
- Stable Isotope Probing
- Dissolved ^{13}C Inorganic Carbon

The proposed BioTrap study schedule is provided in Table 3.1.

3.3.2 Data Assessment

Following completion of the bio-trap study, the data will be compiled and evaluated. An assessment would be made of the potential for natural attenuation of PCP at the Site.

3.4 Proposed Monitoring Plan

3.4.1 Baseline Monitoring and Sampling

Following shutdown of the remediation system in November/December 2015 and after allowing the subsurface conditions to stabilize, groundwater monitoring and sampling will be conducted in April 2016 at all groundwater monitoring and extraction wells to determine baseline conditions at the Site. The proposed baseline monitoring and sampling schedule is provided in Table 3.1. The proposed baseline groundwater monitoring and sampling plan is summarized in Table 3.2.

Groundwater and LNAPL levels would be measured to assess groundwater flow direction, hydraulic gradient, and LNAPL thickness and extent. Groundwater elevation contours would be inferred from the measurement data and submitted in a subsequent report to the USEPA.

Groundwater sampling would be conducted during one baseline event to confirm that the dissolved plume size and extent and concentration distribution at the Site. Groundwater samples would be collected using low flow purge and sample protocol, in general accordance with the FSP. As part of the well stabilization process, the groundwater would be measured in the field for the following parameters: pH, temperature, specific conductance, dissolved oxygen (DO), oxidation-reduction potential (ORP), iron, and sulfide. Groundwater samples would not be collected from well casings containing LNAPL.

The groundwater samples would be submitted for laboratory analysis, in general accordance with the QAPP, of the following parameters: PCP, naphthalene, BTEX, natural attenuation parameters, and select dissolved metals. The natural attenuation parameters would include alkalinity, chloride, hardness, nitrate, sulfate, total organic carbon, and methane. The select dissolved metals would include arsenic, copper, iron, manganese, and zinc. The metals samples would be filtered in the field through a 0.45 micron filter.

Purge/decontamination water would be discharged to the ground surface within the CAMU limits, and the quantity will be documented. Any LNAPL recovered during the monitoring and sampling would be stored in a drum at the Site and subsequently profiled and disposed at an authorized offsite facility.

3.4.2 Pilot Study Groundwater/LNAPL Level Monitoring

During the pilot study, groundwater and LNAPL levels would be measured in all monitoring wells and all extraction wells at the Site on a quarterly basis through 2019 to assess:

- Groundwater flow direction
- Hydraulic gradient
- LNAPL thickness, extent, and trends to confirm that LNAPL migration does not occur (e.g., the appearance of LNAPL in a well that never previously contained LNAPL)

Groundwater elevation contours would be inferred from the measurement data and submitted in reports to the USEPA. The proposed groundwater and LNAPL monitoring schedule is provided in Table 3.1. The proposed groundwater and LNAPL level sampling plan is summarized in Table 3.2.

3.4.3 Pilot Study Groundwater Sampling

During the pilot study, groundwater sampling would be conducted on a quarterly basis for at least the first four consecutive quarters. If the quarterly sampling results are favorable and the dissolved plume is not increasing in size or concentration, the sampling frequency would be proposed for reduction to a semiannual basis. Groundwater sampling would be conducted through 2019. The proposed groundwater sampling schedule is provided in Table 3.1. The purpose of the groundwater sampling is to confirm that there is a statistically significant stable or decreasing trend in dissolved plume size and concentrations. The groundwater sample analytical data would be evaluated using methods and tools in general accordance with the Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance (EPA 530/R-09-007, March 2009).

Groundwater samples would be collected from the following wells:

- Unconfined (upper) aquifer – monitoring wells MW1, MW6S, MW10S, MW13, MW16, MW20, MW21, MW22, MW29, MW30, and MW31 and the extraction well EW11 casing screened in the unconfined (upper) aquifer
- Semiconfined (lower) aquifer – monitoring wells MW3, MW10, MW12, MW17, and MW28 and the extraction well EW11 casing screened in the semiconfined (lower) aquifer

This network of monitoring wells includes sample collection both in the source area and surrounding the source area. The proposed groundwater sampling plan is summarized in Table 3.2. The proposed unconfined (upper) aquifer wells and semiconfined (lower) aquifer wells to be sampled are shown on Figures 2.1 and 2.2, respectively.

Groundwater samples would be collected using low flow purge and sample protocol, in general accordance with the FSP. As part of the well stabilization process, the groundwater would be measured in the field for the following parameters: pH, temperature, specific conductance, dissolved oxygen (DO), oxidation-reduction potential (ORP), iron, and sulfide. Groundwater samples would not be collected from well casings containing LNAPL.

The groundwater samples would be submitted for laboratory analysis, in general accordance with the QAPP, of the following parameters: PCP, naphthalene, BTEX, natural attenuation parameters, and select dissolved metals. The natural attenuation parameters would include alkalinity, chloride, hardness, nitrate, sulfate, total organic carbon, and methane. The results of the natural attenuation parameters would be evaluated to confirm the groundwater reduction-oxidation conditions at the Site and if the groundwater conditions are favorable for biodegradation. The select dissolved metals would include arsenic, copper, iron, manganese, and zinc. The metals samples would be filtered in the field through a 0.45 micron filter.

Purge/decontamination water would be discharged to the ground surface within the CAMU limits at the Site, and the quantity will be documented. Any LNAPL recovered during the monitoring and sampling would be stored in a drum at the Site and subsequently profiled and disposed at an authorized offsite facility.

3.4.4 Residential Well Sampling

Water samples would be collected from six residential wells located near the Site and the onsite water supply well (DW01) on a semiannual basis through 2019. The proposed residential well sampling schedule is provided in Table 3.1. The six residential wells include:

- 8713 Daniels 70 (RW1)
- 8627 Daniels 70 (RW2)
- 8454 Daniels 70 (RW3)
- 8526 Daniels 70 (RW4)
- 8783 Daniels 70 (RW5)
- 8542 West Doctor Lake Road (RW6)

The onsite water supply well serves the remediation equipment building. The water is used for sanitary facilities in the building and maintaining the remediation equipment but is not ingested by workers. The residential well and onsite water supply well locations are shown on Figure 1.3. The samples would be analyzed for PCP, BTEX, and naphthalene.

3.5 Reporting

Quarterly reports would be submitted to document the results of the monitoring work. The reports would include figures showing:

- Groundwater elevations and contours
- LNAPL thicknesses and LNAPL body limits
- Groundwater sample analytical results and dissolved plume limits (PCP)
- Residential well sample analytical results

The reports would also include tables summarizing the following data:

- Current and historical groundwater and LNAPL level elevations
- Current groundwater purging and sampling data
- Current and historical groundwater sample analytical data (PCP, BTEX, naphthalene, dissolved metals, and natural attenuation parameters) with comparison to the WAC ch. NR 140 Enforcement Standards (ESs) and Preventative Action Limits (PALs)
- Current and historical residential well sample analytical data (PCP, BTEX, and naphthalene)

The reports would be submitted based on the following schedule and as provided in Table 3.1:

- April 30 – covering work and results during January through March
- July 30 – covering work and results during April through June
- October 30 – covering work and results during July through September
- January 30 – covering work and results during October through December

4. Pilot Study Contingency Plan

This section provides a contingency plan for potential future action should monitoring results not be favorable during the temporary remediation system shutdown pilot study. The proposed monitoring plan (refer to Section 3.) is designed to determine whether MNA is a feasible alternate remedy for the Site and to monitor changes in the Site conditions that could potentially increase the risk of

exposure to receptors. The primary contingency plan decision point during the pilot study would be if dissolved PCP, naphthalene, and/or BTEX are detected at concentrations exceeding the respective Wisconsin Enforcement Standards (refer to Table 2.1) in wells MW1, MW3, MW13, MW21, and MW22 located between the source area and potential receptors. Other criteria will be considered as part of the data evaluation including changes in LNAPL presence, LNAPL thickness, and aerobic/anaerobic conditions.

Following each monitoring period, a report will be prepared and submitted to USEPA. A statement would be included in each report certifying that the current actions at the Site remain protective of human health and the environment based on an evaluation of the current data.

If Site conditions and data indicate that the current remedy is not protective of human health and the environment or that there is an increased risk to potential offsite receptors, a proposed plan would be developed and submitted to USEPA with the associated monitoring report. The plan could include additional monitoring, implementation of additional institutional controls, restart of the groundwater extraction/treatment and/or biovent systems, LNAPL recovery, or a combination of corrective actions.

Effective institutional controls have been implemented for the Site property. The WDNR remedial action approval letter with continuing obligations (WDNR; July 6, 2015; WDNR BRRTS Activity #02-07-000532, FID #: 807050310) meets the intent of the institutional controls required by the ROD (USEPA, November 1998). The Long-Term Response Action Operation and Maintenance Plan (O&M Plan) (GHD; July 22, 2015) with Addendum No. 1 (GHD; November 9, 2015) effectively serves as an Institutional Control Implementation and Assurance Plan (ICIAP).

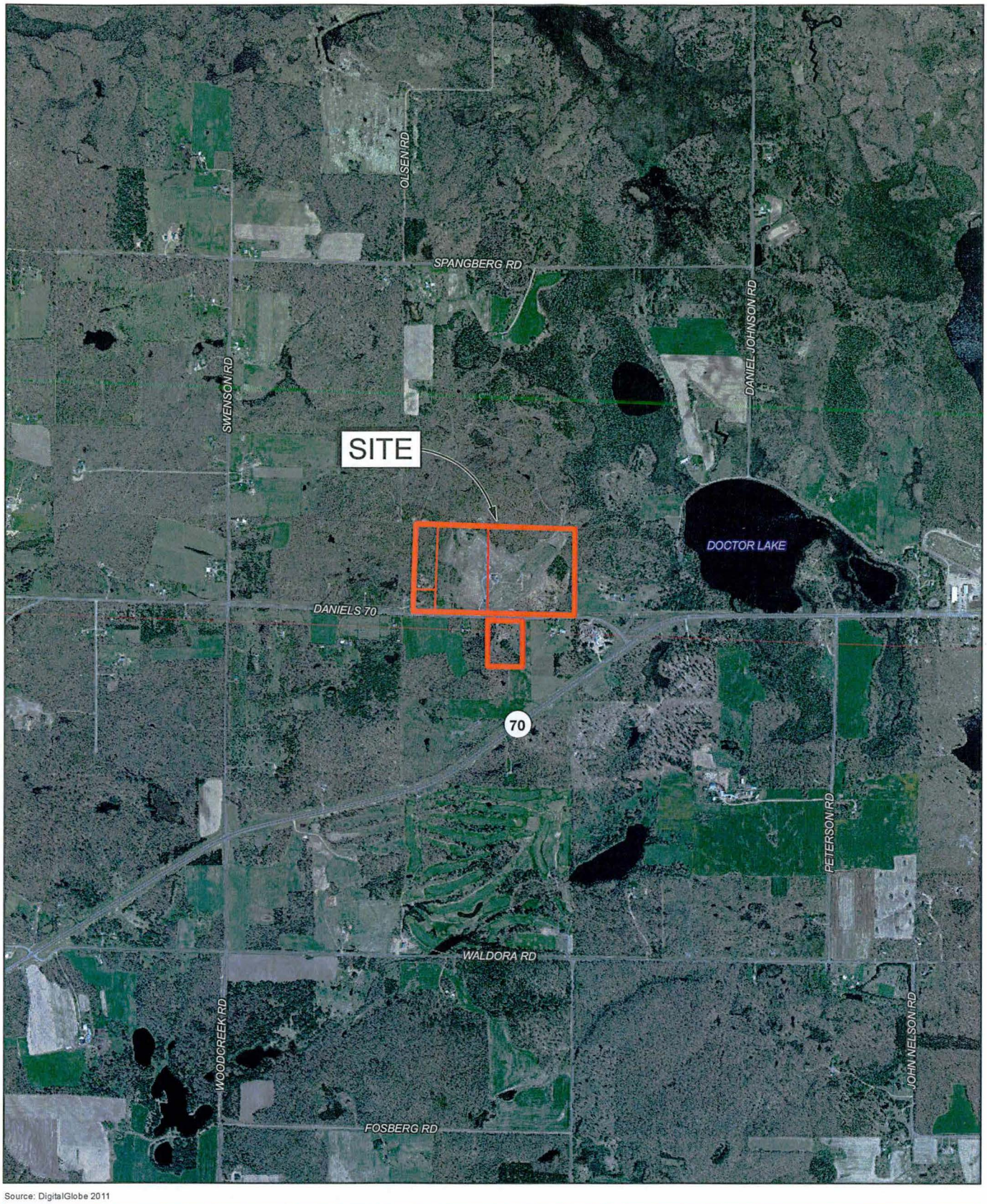
The intent of the temporary system shutdown and pilot study is to monitor how the Site reacts without active remedial actions and develop lines of evidence to support MNA as a future Site remedy. Implementing an active remedial action prior to completing the full pilot study and associated monitoring should only be conducted when there is convincing evidence that monitored natural attenuation is not a feasible alternative for this Site and that the current actions are no longer protective.

5. References

The following key Site documents were referenced in preparation of this report:

- Record of Decision (USEPA, November 1998)
- Remedial Action Report (CH2M HILL, September 2000)
- Long-Term Remedial Action Report (CH2M HILL, November 2014)
- LNAPL Mobility and Recoverability Report (CH2M HILL, October 2014)
- Semiannual Report – September through December 2014 (CRA, February 2015)
- Semiannual Report – January through June 2015 (GHD, September 2015)
- Alternate Remedy Recommendation (GHD, July 2015)
- Long-Term Response Action Operation and Maintenance Plan (GHD, July 2015)

- Long-Term Response Action Operation and Maintenance Plan Addendum No. 1 (GHD, November 2015)



Source: DigitalGlobe 2011

0 1,000 2,000 ft

N

GHD

PENTA WOOD PRODUCTS
SUPERFUND SITE
SIREN, WISCONSIN

086165-02-20
Oct 9, 2015

SITE LOCATION

FIGURE 1.1

GIS File: I:\GIS\Projects\6-chars\08----\0861--\086165\086165-REPORTS\086165-02(008)\086165-02(008)GIS-SP001.mxd

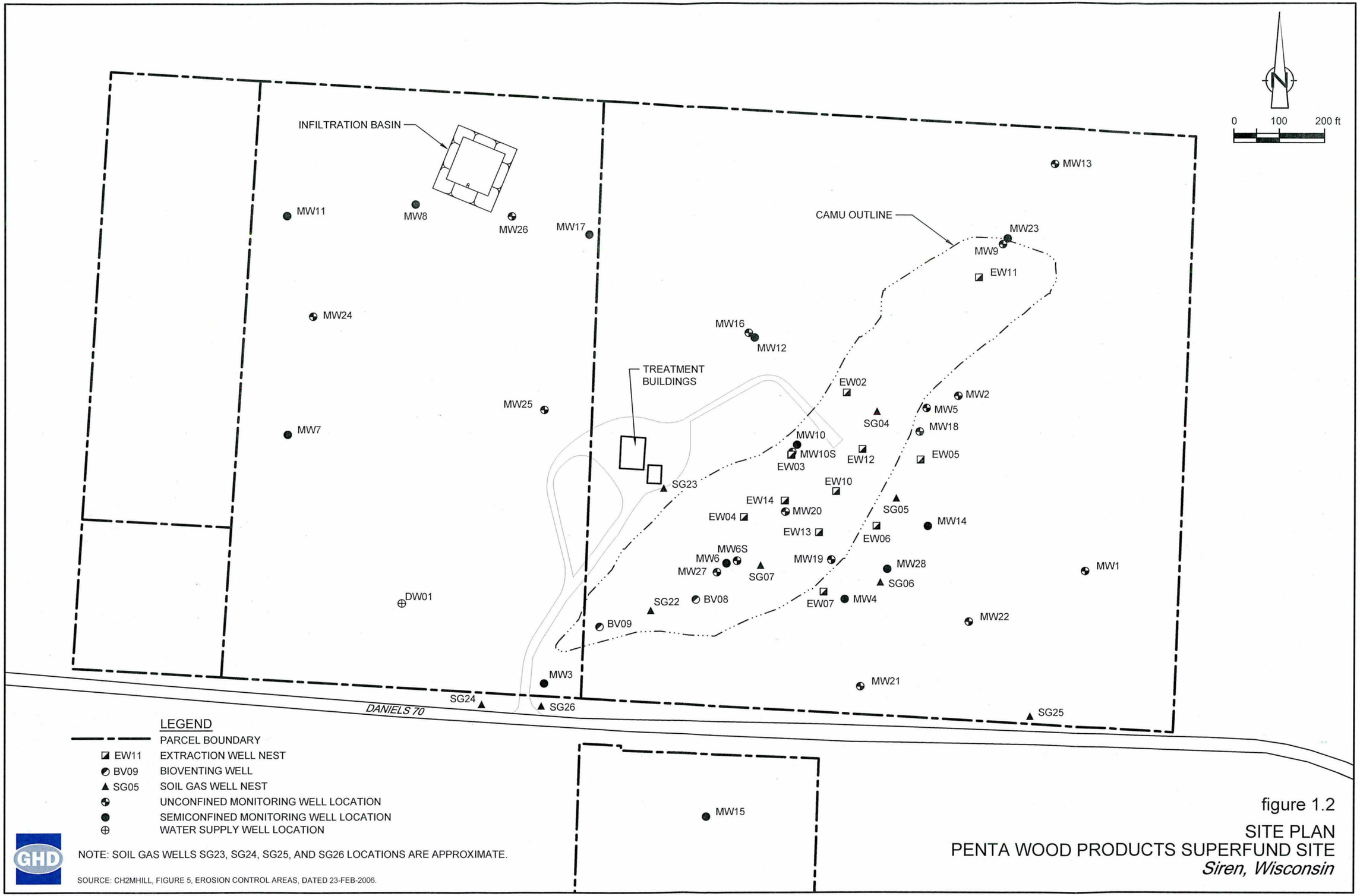
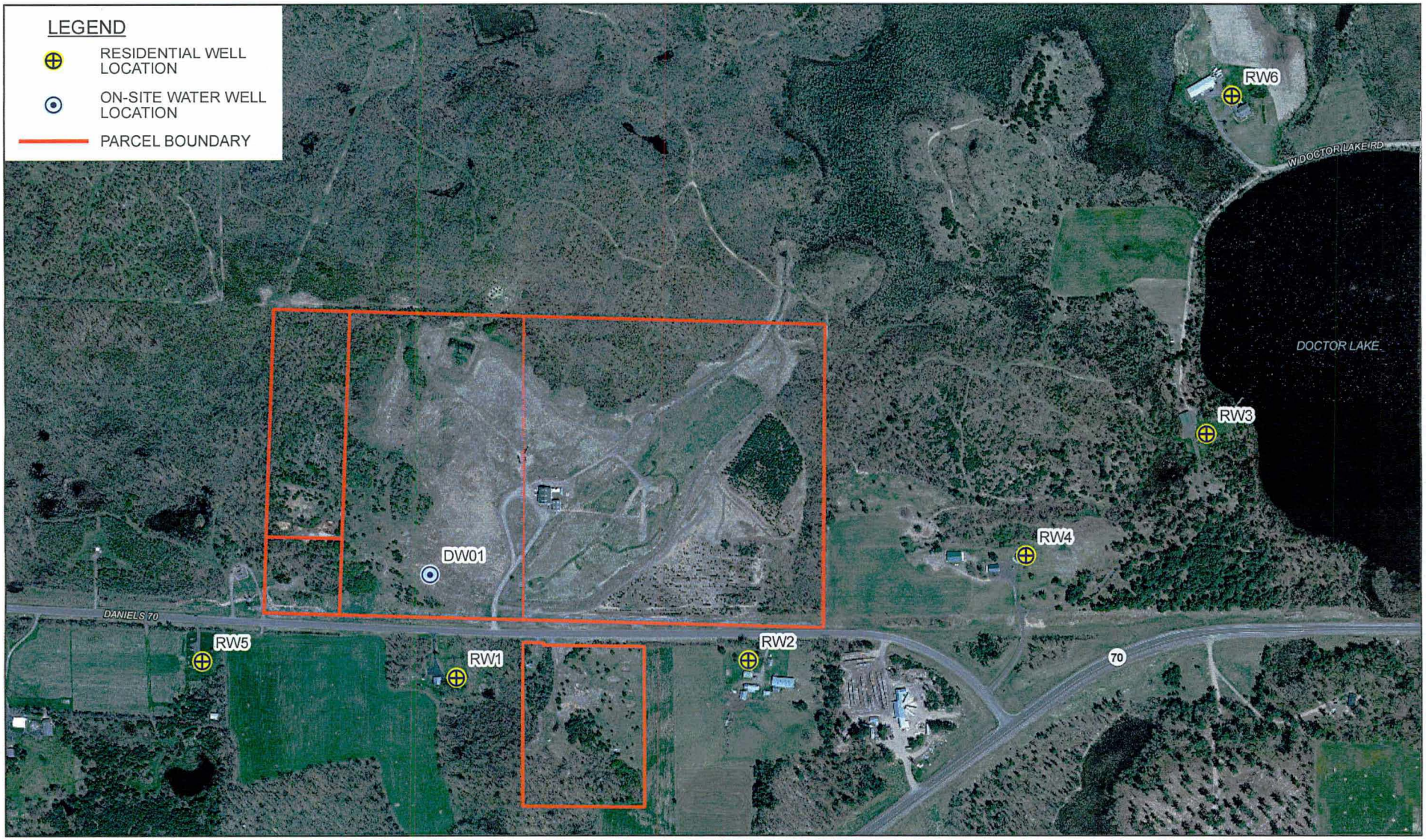


figure 1.2

SITE PLAN
PENTA WOOD PRODUCTS SUPERFUND SITE
Siren, Wisconsin

86165-02(008)GN-WA001 OCT 13, 2015



0 200 400 600 ft

PENTA WOOD PRODUCTS SUPERFUND SITE
SIREN, WISCONSIN
REMEDIATION SYSTEM SHUTDOWN PILOT STUDY WORK PLAN

086165-02-20
Oct 16, 2015

RESIDENTIAL WELL LOCATIONS

FIGURE 1.3

GIS File: I:\GIS\Projects\6-chars\08----\0861--\086165\086165-REPORTS\086165-02(008)\086165-02(008)GIS-SP002.mxd

Source: DigitalGlobe 2011

0 200 400 ft

N

LEGEND

- EXTRACTION WELL NEST
- BIOVENTING WELL
- SOIL GAS WELL NEST
- UNCONFINED MONITORING WELL LOCATION
- PROPOSED UNCONFINED MONITORING WELL LOCATION
- SEMICONFINED MONITORING WELL LOCATION
- PROPOSED SOIL BORING LOCATION
- WATER SUPPLY WELL LOCATION
- RESIDENTIAL WELL LOCATION
- PCP CONCENTRATION CONTOUR (µg/L)
- APPROXIMATE LNAPL LIMIT
- PROPOSED GROUNDWATER MONITORING WELL SAMPLE LOCATION

GHD

PENTA WOOD PRODUCTS SUPERFUND SITE
SIREN, WISCONSIN
REMEDIATION SYSTEM SHUTDOWN PILOT STUDY WORK PLAN

086165-02-20
Oct 23, 2015

UNCONFINED (UPPER) AQUIFER MONITORING PLAN

FIGURE 2.1

GIS File: I:\GIS\Projects\6-chars\08----\0861--\086165\086165-REPORTS\086165-02(008)\086165-02(008)GIS-SP003.mxd

Source: DigitalGlobe 2011

0 200 400 ft

N

LEGEND

- EXTRACTION WELL NEST
- BIOVENTING WELL
- SOIL GAS WELL NEST
- UNCONFINED MONITORING WELL LOCATION
- PROPOSED UNCONFINED MONITORING WELL LOCATION
- SEMICONFINED MONITORING WELL LOCATION
- WATER SUPPLY WELL LOCATION
- RESIDENTIAL WELL LOCATION
- PCP CONCENTRATION CONTOUR (µg/L)
- PROPOSED GROUNDWATER MONITORING WELL SAMPLE LOCATION

GHD

PENTA WOOD PRODUCTS SUPERFUND SITE
SIREN, WISCONSIN
REMEDIATION SYSTEM SHUTDOWN PILOT STUDY WORK PLAN

086165-02-20
Oct 23, 2015

SEMICONFINED (LOWER) AQUIFER MONITORING PLAN

FIGURE 2.2

GIS File: I:\GIS\Projects\6-chars\08----\0861--\086165\086165-REPORTS\086165-02(008)\086165-02(008)GIS-SP004.mxd

A
SOUTHWEST

A'
NORTHEAST

APPROXIMATE CAMU LIMITS

MW3 LY-01 MW6S MW20 LY-02 EW14 EW03 MW10S MW10 IT-01 MW18 MW5 MW29 (PROPOSED) MW2 MW30, MW31 (PROPOSED) SB1 (PROPOSED) EW11 MW9 MW23 MW13

US GT LS LS/G

ELEVATION (feet AMSL)

1130 1120 1110 1100 1090 1080 1070 1060 1050 1040 1030 1020 1010 1000 990 980 970 960 950 940 930 920 910 900 890 880 870 860 850 840 830 820 810 800 790 780 770

0 200 400 600 800 1000 1200 1400 1600 1800

DISTANCE (feet)

SCALE: HORZ. 1" = 200'
VERT. 1" = 30'

LEGEND

SB1 MW2 — WELL DESIGNATION
GROUND SURFACE
WELL INSTALLATION
STRATIGRAPHIC BOUNDARY
SCREENED INTERVAL
BOTTOM OF BORING
APPROXIMATE WATER TABLE

UPPER SAND (*US*)
WELL GRADED SAND UNIT

GLACIAL TILL (*GT*)
SILTY SAND TO SANDY SILT WITH GRAVEL

LOWER SAND (*LS*)
WELL GRADED SAND UNIT

LOWER SAND WITH GRAVEL (*LS/G*)
WELL GRADED SAND WITH GRAVEL

APPROXIMATE LNAPL LIMIT

APPROXIMATE DISSOLVED PENTACHLOROPHENOL LIMIT (1,000 µg/L)

figure 2.3

GENERAL CROSS-SECTION
PENTA WOOD PRODUCTS SUPERFUND SITE
Siren, Wisconsin

86165-02(008)GN-WA002 OCT 23, 2015

Table 2.1

Compounds of Concern and Cleanup Goals
Penta Wood Products Superfund Site
Siren, Wisconsin

Compound of Concern	Wisconsin Enforcement Standard [1] (ug/L)	Wisconsin Preventive Action Limit [1] (ug/L)
Pentachlorophenol	1.0	0.1
Naphthalene	40	8
Benzene	5	0.5
Toluene	343	68.6
Ethylbenzene	700	140
Xylenes	620	124
Chloride [2]	250000	125000
Arsenic	50	5
Copper	1300	130
Iron [2]	300	150
Manganese [2]	50	25
Zinc [2]	5000	2500

Note:

[1] Cleanup goals adapted from Table 2 of the ROD (USEPA, 1998)

[2] Criteria is for public welfare concerns (taste or odor aesthetics)

Transmittal

Date: January 26, 2016 Reference No.: 086165 (8)

To: Mr. Phil Richard
Wisconsin Department of Natural Resources
875 S. 4th Avenue
Park Falls, Wisconsin 54552

Subject: Revision to Report

No. of Copies	Description/Title	Drawing No./ Document Ref.	Issue
1	Copy of Revised Table 2.1 Remediation System Shutdown Pilot Study Work Plan Penta Wood Products Superfund Site Siren, Wisconsin		

Issued for: ☒ For your use ☐ As requested ☐ Construction ☐ Quotation
☐ Your approval/comments ☐ Returned to you ☐ For re-submission

Sent by: ☐ Overnight courier ☐ Same day courier ☐ Mailed under separate cover ☒ Mail enclosed

Remarks:

Please replace the revised Table 2.1 (attached) into the referenced work plan.

Copy to: Linda Martin, USEPA

Completed by: Tim Ree [Please Print] Signed: Tim Ree

Filing: Correspondence File

GHD Services Inc.
1801 Old Highway 8 Northwest Suite 114 St. Paul Minnesota 55112 USA
T 651 639 0913 **F** 651 639 0923 **W** www.ghd.com

Table 2.1

Compounds of Concern and Cleanup Goals
Penta Wood Products Superfund Site
Siren, Wisconsin

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Zinc [2]	5000	2500

Note:

[1] Cleanup goals adapted from Table 2 of the ROD (USEPA, 1998)

[2] Criteria is for public welfare concerns (taste or odor aesthetics)

Table 3.1

Proposed Pilot Study Schedule
Penta Wood Products Superfund Site
Siren, Wisconsin

Task	2015		2016												2017												2018												2019												2020
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
USEPA approval of Remediation System Shutdown Pilot Study Work Plan																																																	
Temporary remediation system shutdown																																																	
Drilling and well installation (MW29, MW30, and MW31)																																																	
Microcosm study soil sample collection (SB1 and MW29)																																																	
Microcosm study groundwater sample collection (SB1)																																																	
Microcosm soil laboratory testing (SB1 and MW29)																																																	
Microcosm groundwater laboratory testing (SB1)																																																	
Microcosm study groundwater sample collection (MW29)																																																	
Microcosm groundwater laboratory testing (MW29)																																																	
Bio-trap sample collection (MW9, MW20, MW29, and EW11)																																																	
Bio-trap laboratory testing (MW9, MW20, MW29, and EW11)																																																	
Baseline groundwater monitoring and sampling																																																	
Pilot study quarterly groundwater monitoring and sampling																																																	
Pilot study semiannual groundwater monitoring and sampling																																																	
Semiannual residential well sampling																																																	
Reporting																																																	
Soil cuttings profiling and disposal																																																	
Remediation system waste profiling and disposal																																																	

Proposed Monitoring and Sampling Plan
Penta Wood Products Superfund Site
Siren, Wisconsin

Well ID	TOC Elevation (ft MSL)	Top of Screen Elevation [1] (ft MSL)	Bottom of Screen Elevation [1] (ft MSL)	Groundwater Elevation March 2015 (ft MSL)	Baseline		Pilot Study	
					Groundwater/ LNAPL Level Monitoring	Groundwater Sampling [2, 3]	Groundwater/ LNAPL Level Monitoring	Groundwater Sampling [2, 3]
Unconfined (Upper) Aquifer								
MW1	1072.32	978.93	973.93	985.61	X	X	X	X
MW2	1064.85	984.05	979.05	985.26	X	X	X	
MW5	1071.73	958.72	953.72	985.13	X	X	X	
MW6S	1108.63	999.72	979.72	986.59	X	X	X	X
MW9	1020.71	973.69	963.69	988.78	X	X	X	
MW10S	1090.43	995.49	975.49	985.55	X	X	X	X
MW13	1006.10	986.15	977.15	985.28	X	X	X	X
MW16	1081.92	991.97	976.97	985.79	X	X	X	X
MW18	1072.44	978.74	958.74	985.39	X	X	X	
MW19	1088.17	993.30	973.30	984.63	X	X	X	
MW20	1097.76	988.29	978.29	985.51	X	X	X	X
MW21	1095.70	991.13	981.13	985.44	X	X	X	X
MW22	1084.70	990.84	980.84	985.56	X	X	X	X
MW24	1084.10	985.42	975.42	985.97	X	X	X	
MW25	1095.24	987.34	977.34	985.75	X	X	X	
MW26	1087.07	959.07	944.07	985.22	X	X	X	
MW27	1111.00	996.00	976.00	985.69	X	X	X	
MW29	NA	995.00	970.00	NA	X	X	X	X
MW30	NA	995.00	970.00	NA	X	X	X	X
MW31	NA	995.00	970.00	NA	X	X	X	X
EW02	NA	12.00	115.00	NA	X	X		
EW03	NA	12.00	123.00	NA	X	X		
EW04	NA	13.00	135.00	NA	X	X		
EW05	NA	12.00	111.00	NA	X	X		
EW06	NA	12.00	116.00	NA	X	X		
EW07	NA	12.00	120.00	NA	X	X		
EW10	NA	12.00	123.00	NA	X	X		
EW11	NA	20.00	80.00	NA	X	X	X	X
EW12	NA	95.00	125.00	NA	X	X		
EW13	NA	95.00	125.00	NA	X	X		
EW14	NA	98.00	128.00	NA	X	X		

Proposed Monitoring and Sampling Plan
Penta Wood Products Superfund Site
Siren, Wisconsin

Well ID	TOC Elevation (ft MSL)	Top of Screen Elevation [1] (ft MSL)	Bottom of Screen Elevation [1] (ft MSL)	Groundwater Elevation March 2015 (ft MSL)	Baseline		Pilot Study	
					Groundwater/ LNAPL Level Monitoring	Groundwater Sampling [2, 3]	Groundwater/ LNAPL Level Monitoring	Groundwater Sampling [2, 3]
Semiconfined (Lower) Aquifer								
MW3	1129.50	950.87	945.87	985.32	X	X	X	X
MW4	1087.81	906.28	901.28	984.81	X	X	X	
MW6	1095.13	950.54	945.54	970.66	X	X	X	
MW7	1096.39	931.07	926.07	985.42	X	X	X	
MW8	1091.28	934.28	929.28	985.46	X	X	X	
MW10	1089.74	956.49	951.49	984.89	X	X	X	X
MW11	1085.58	943.51	928.51	985.00	X	X	X	
MW12	1081.99	959.24	945.24	984.95	X	X	X	X
MW14	1078.50	917.27	902.27	984.54	X	X	X	
MW15	1127.22	971.09	956.09	985.50	X	X	X	
MW17	1084.50	957.43	947.43	985.20	X	X	X	X
MW23	1017.57	900.45	890.45	984.95	X	X	X	
MW28	1083.10	968.10	948.10	984.85	X	X	X	X
EW02	NA	125.00	145.00	NA	X	X		
EW03	NA	133.00	153.00	NA	X	X		
EW04	NA	145.00	165.00	NA	X	X		
EW05	NA	121.00	141.00	NA	X	X		
EW06	NA	126.00	146.00	NA	X	X		
EW07	NA	130.00	150.00	NA	X	X		
EW10	NA	133.00	153.00	NA	X	X		
EW11	NA	90.00	110.00	NA	X	X	X	X
EW12	NA	130.00	150.00	NA	X	X		
EW13	NA	135.00	155.00	NA	X	X		
EW14	NA	133.00	153.00	NA	X	X		

Note:

1. Well screen information for all extraction wells is reported as depth (ft) below ground surface rather than as elevation (ft MSL).

2. Groundwater sample laboratory analyses include the following parameters: Pentachlorphenol (PCP); naphthalene; benzene, toluene, ethylbenzene, and xylenes (BTEX); natural attenuation parameters (alkalinity, chloride, hardness, nitrate, sulfate, total organic carbon, and methane); and select dissolved metals (arsenic, copper, iron, manganese, and zinc). Field parameter measurements include the following parameters: pH, temperature, specific conductance, dissolved oxygen (DO), oxidation-reduction potential (ORP), iron, and sulfide.

3. Groundwater samples will not be collected if LNAPL is present in the well casing.

Appendix A
Historical Pentachlorophenol Concentration and LNAPL Thickness Data

Historical Pentachlorophenol Concentrations
Penta Wood Products Superfund Site
Siren, Wisconsin

MW1		MW2		MW3		MW4		MW5		MW6S	
10/9/1997	2	10/9/1997	< 1	10/8/1997	< 1	10/9/1997	< 1	10/10/1997	31000	10/9/1997	< 1
4/24/2001	< 0.1	4/5/2000	< 0.5	4/4/2000	< 0.6	4/4/2000	< 0.5	4/7/2000	20600	4/26/2001	2.5
9/11/2001	0.5	6/18/2001	< 0.1	4/25/2001	< 0.11			4/26/2001	20600	9/12/2001	1.1
8/6/2002	0.067	9/12/2001	0.51	9/13/2001	J 0.092			9/13/2001	6300	8/7/2002	88
4/29/2003	< 0.1	8/6/2002	0.12	8/7/2002	0.11			8/7/2002	510	9/25/2003	0.33
9/24/2003	0.13	9/24/2003	0.28	9/23/2003	0.31			9/25/2003	1100	9/27/2006	0.21
5/4/2004	1.06	9/21/2004	1.26	9/21/2004	0.367			9/22/2004	214	9/20/2007	0.14
9/21/2004	0.442	9/28/2005	2.2	9/28/2005	0.20			9/28/2005	1100	10/23/2008	2.65
5/10/2005	0.12	9/26/2006	2.3	10/21/2008	< 0.10			9/26/2006	460	10/7/2010	< 0.1
9/29/2005	0.12	9/19/2007	3.7	10/7/2009	< 0.1			9/20/2007	31	10/19/2011	0.10
5/31/2006	J 0.049	10/21/2008	1.60	10/5/2010	< 0.1			10/22/2008	206	10/17/2012	0.10
5/8/2007	0.11	10/6/2009	2.21	10/18/2011	0.58			10/7/2009	33.3	10/9/2013	0.52
9/18/2007	< 0.093	10/6/2010	< 0.1	10/16/2012	0.46			10/6/2010	39.8	9/24/2014	0.27
10/21/2008	0.42	10/19/2011	0.097	10/8/2013	0.38			10/19/2011	0.97		
		10/16/2012	0.33	9/25/2014	0.35			10/17/2012	0.59		
		10/9/2013	0.94					10/10/2013	0.60		
		9/24/2014	0.32					9/24/2014	12.00		

Historical Pentachlorophenol Concentrations
Penta Wood Products Superfund Site
Siren, Wisconsin

MW7		MW8		MW9		MW10		MW10S		MW11	
10/14/1997	< 1	10/14/1997	< 1	10/8/1997	< 1	10/15/1997	8200	10/15/1997	30000	10/15/1997	< 1
4/4/2000	< 0.5	4/5/2000	< 0.5	4/5/2000	0.6	4/6/2000	12900	4/7/2000	J 56100	4/4/2000	< 0.6
4/25/2001	< 0.1	4/25/2001	0.2	4/23/2001	0.12	4/26/2001	22800	12/5/2000	3810	4/24/2001	< 0.11
9/11/2001	J 0.13	9/11/2001	J 0.062	9/12/2001	0.76	9/12/2001	21000	4/25/2001	49000	9/10/2001	J 0.091
8/7/2002	J 0.03	8/8/2002	< 0.04	8/6/2002	0.54	8/7/2002	22000	9/12/2001	82000	8/6/2002	< 0.04
9/24/2003	J 0.044	9/25/2003	< 0.11	9/25/2003	2.3	10/1/2003	9000	8/7/2002	390	9/23/2003	< 0.11
9/22/2004	9.18	9/23/2004	1.94	9/22/2004	2.92	9/23/2004	38000	9/25/2003	2200	9/21/2004	J 0.0656
9/27/2005	< 0.12	9/28/2005	< 0.12	10/18/2005	0.57	9/27/2006	23000	9/22/2004	9490	9/29/2005	< 740
9/26/2006	J 0.087	9/20/2007	< 0.093	9/21/2007	0.37	9/21/2007	1700	9/29/2005	< 0.11	9/27/2006	< 0.11
9/20/2007	< 0.093	10/22/2008	< 0.1	10/22/2008	< 0.1	10/23/2008	1720	9/26/2006	2700	9/20/2007	< 0.093
10/22/2008	< 0.1			5/18/2010	J 0.073	10/7/2009	220	9/21/2007	24	10/22/2008	0.27
10/7/2009	0.403			10/6/2010	< 0.1	10/7/2010	92.4				
10/6/2010	< 0.1			10/19/2011	0.098	10/20/2011	21				
10/19/2011	< 0.098			10/16/2012	0.39	10/17/2012	14				
10/17/2012	< 0.096			10/9/2013	0.41	10/10/2013	17				
10/9/2013	< 0.094			9/24/2014	1.6	9/25/2014	37				
9/23/2014	J 0.034										

Historical Pentachlorophenol Concentrations
Penta Wood Products Superfund Site
Siren, Wisconsin

MW12		MW13		MW14		MW15		MW16		MW17	
10/15/1997	13000	10/8/1997	J 0.7	10/9/1997	< 1	10/16/1997	< 1	10/14/1997	< 1	10/15/1997	< 1
4/6/2000	15000	4/5/2000	0.8	4/6/2000	< 0.5	4/4/2000	< 0.5	4/6/2000	< 0.5	10/28/1997	5
4/26/2001	1500	4/23/2001	0.18	6/19/2001	0.96	4/25/2001	< 0.11	4/23/2001	< 0.11	4/6/2000	< 0.5
9/13/2001	18000	6/19/2001	< 0.11			9/12/2001	J 0.077	9/10/2001	0.17	4/26/2001	0.72
5/14/2002	4300	9/10/2001	0.69			8/6/2002	< 0.04	8/6/2002	J 0.035	9/11/2001	< 0.059
8/8/2002	6400	8/5/2002	0.64			9/23/2003	< 0.1	9/23/2003	J 0.089	8/8/2002	J 0.032
4/29/2003	3000	9/23/2003	2.9			9/21/2004	0.279	9/21/2004	J 0.0962	9/25/2003	0.46
9/23/2003	10000	9/21/2004	4.67			9/29/2005	< 0.11	9/29/2005	< 0.11	9/22/2004	2.82
5/4/2004	11200	9/27/2005	0.85			9/27/2006	< 0.11	9/27/2006	< 0.046	9/27/2005	J 0.054
9/22/2004	9060	9/18/2007	0.53			9/19/2007	< 0.10	9/18/2007	0.20	9/26/2006	< 0.11
5/10/2005	8300	10/21/2008	0.31			5/20/2008	0.18	10/22/2008	J 0.08	9/19/2007	< 0.099
9/27/2005	8500	10/7/2009	0.16			10/21/2008	< 0.10	10/6/2009	< 0.1	10/22/2008	0.1
6/7/2006	6100					6/2/2009	< 0.1	10/5/2010	< 0.1	10/6/2009	< 0.1
9/26/2006	3100					10/7/2009	< 0.1	10/19/2011	J 0.095	10/5/2010	< 0.1
5/9/2007	3000					5/18/2010	< 0.1	10/16/2012	J 0.099	10/18/2011	< 0.095
9/19/2007	1100					10/7/2010	2.32	10/8/2013	J 0.029	10/16/2012	< 0.095
5/20/2008	2200					6/28/2011	< 0.1	9/23/2014	J 0.036	10/8/2013	< 0.095
10/21/2008	1670					10/18/2011	< 0.10			9/24/2014	< 0.097
6/2/2009	521					5/22/2012	J 0.024				
10/6/2009	295					10/16/2012	< 0.094				
5/19/2010	81.9					5/21/2013	J 0.025				
10/5/2010	43.7					10/8/2013	< 0.095				
6/29/2011	37					5/13/2014	< 0.095				
10/18/2011	37					9/23/2014	J 0.054				
5/22/2012	21					4/20/2015	< 0.094				
10/16/2012	26										
5/22/2013	24										
10/8/2013	28										
5/14/2014	19										
9/23/2014	24										
4/20/2015	16										

Historical Pentachlorophenol Concentrations
Penta Wood Products Superfund Site
Siren, Wisconsin

MW18		MW19		MW20		MW21		MW22		MW23	
10/10/1997	27000	10/16/1997	19000	10/15/1997	29000	2/9/1998	< 1	2/9/1998	< 1	2/26/1998	< 1
6/19/2001	27400	4/7/2000	11800	4/26/2001	36600	8/6/2002	J 0.035	8/6/2002	0.078	9/11/2001	0.49
		4/26/2001	25600	9/12/2001	83000	4/29/2003	0.15	9/24/2003	0.34		
		9/12/2001	400000	8/7/2002	30000	9/24/2003	J 0.063	9/21/2004	0.220		
		5/13/2002	14000	9/25/2003	13000	5/4/2004	0.135	9/28/2005	0.16		
		8/8/2002	11000	9/22/2004	133000	9/21/2004	0.474	9/18/2007	0.13		
		4/29/2003	4900	10/25/2005	63000	5/10/2005	0.33	5/20/2008	0.77		
		9/25/2003	15000	9/27/2006	44000	9/27/2005	J 0.046	10/21/2008	J 0.09		
		5/4/2004	70000	9/21/2007	9500	6/1/2006	J 0.023	6/2/2009	< 0.1		
		9/22/2004	111000	10/23/2008	41000	5/8/2007	< 0.098	10/6/2009	< 0.1		
		5/10/2005	45000			9/18/2007	0.13	5/18/2010	< 0.1		
		9/29/2005	13000			10/21/2008	< 0.10	10/6/2010	0.13		
		6/7/2006	17000					6/29/2011	< 0.1		
		9/27/2006	8200					10/18/2011	0.098		
		5/9/2007	11000					5/22/2012	J 0.084		
		9/21/2007	3500					10/16/2012	0.096		
		5/20/2008	23000					5/22/2013	0.11		
		10/24/2008	27900					10/8/2013	0.14		
		6/2/2009	18600					5/14/2014	J 0.093		
		10/7/2009	31800					9/24/2014	0.27		
		5/20/2010	26000					4/21/2015	J 0.072		
		10/7/2010	4470								
		6/29/2011	8880								
		10/20/2011	13000								
		5/22/2012	5300								
		10/17/2012	8100								
		5/22/2013	5800								
		10/10/2013	7900								
		5/14/2014	18000								

Historical Pentachlorophenol Concentrations
Penta Wood Products Superfund Site
Siren, Wisconsin

MW24		MW25		MW26		MW27		MW28		DW1	
2/8/1998	< 4	2/9/1998	1	4/24/2001	< 0.1	10/20/2011	0.17	10/20/2011	690	9/24/2003	J 0.05
4/24/2001	0.11			6/18/2001	1			10/17/2012	0.095	5/4/2004	0.102
				9/10/2001	J 0.16			10/9/2013	J 0.049	9/28/2004	1.08
				5/14/2002	0.1			9/25/2014	0.099	11/1/2004	< 0.0962
				8/5/2002	J 0.035					5/11/2005	J 0.033
				4/29/2003	< 0.11					9/27/2005	J 0.040
				9/23/2003	< 0.11					5/31/2006	J 0.039
				5/4/2004	0.242					9/26/2006	< 0.11
				9/23/2004	5.97					5/10/2007	J 0.074
				5/10/2005	< 0.11					9/19/2007	< 0.093
				9/27/2005	J 0.027					5/20/2008	< 0.094
				6/7/2006	< 0.11					10/23/2008	< 0.1
				9/26/2006	< 0.11					6/3/2009	< 0.1
				5/8/2007	< 0.095					10/8/2009	< 0.1
				9/19/2007	< 0.095					5/19/2010	< 0.1
				5/20/2008	< 0.096					10/7/2010	< 0.1
				10/22/2008	< 0.1					6/30/2011	< 0.1
				6/2/2009	< 0.1					10/18/2011	J 0.032
				10/6/2009	< 0.1					5/23/2012	J 0.028
				5/19/2010	0.13					10/18/2012	J 0.032
				10/5/2010	< 0.1					5/21/2013	J 0.029
				6/29/2011	< 0.1					10/8/2013	J 0.027
				10/19/2011	< 0.099					5/13/2014	J 0.057
				5/22/2012	< 0.10					9/25/2014	J 0.54
				10/16/2012	< 0.095					4/21/2015	J 0.023
				5/22/2013	< 0.094						
				10/8/2013	< 0.095						
				5/14/2014	< 0.095						
				9/24/2014	< 0.095						
				4/21/2015	< 0.094						
				4/21/2015	< 0.094						

Historical Pentachlorophenol Concentrations
Penta Wood Products Superfund Site
Siren, Wisconsin

RW1		RW2		RW3		RW4		RW5		RW6	
4/23/2001	< 0.1	4/24/2001	< 0.1	9/11/2001	J 0.1	4/23/2001	< 0.1	5/4/2004	< 0.0935	9/25/2014	< 0.095
9/11/2001	J 0.071	9/11/2001	9.5	9/28/2001	< 0.1	9/11/2001	J 0.073	9/22/2004	0.293	4/21/2015	< 0.095
9/28/2001	< 0.1	9/28/2001	< 0.1	5/14/2002	J 0.094	9/28/2001	< 0.1	11/1/2004	< 0.0962		
5/14/2002	0.23	5/14/2002	0.1	8/6/2002	< 0.04	5/14/2002	0.13	5/10/2005	< 0.11		
8/6/2002	0.04	8/6/2002	< 0.04	4/29/2003	< 0.11	8/6/2002	< 0.04	9/27/2005	< 0.11		
4/29/2003	J 0.1	4/29/2003	< 0.11	9/23/2003	< 0.11	4/29/2003	< 0.11	5/31/2006	< 0.11		
9/23/2003	0.28	9/24/2003	< 0.11	5/4/2004	< 0.0952	9/23/2003	< 0.11	9/25/2006	< 0.11		
11/20/2003	0.24	5/4/2004	J 0.0252	9/22/2004	2.18	5/4/2004	< 0.100	5/9/2007	< 0.092		
5/4/2004	0.140	9/22/2004	0.398	11/1/2004	< 0.0962	9/22/2004	0.266	9/18/2007	< 0.093		
9/22/2004	1.51	11/1/2004	< 0.0962	5/10/2005	< 0.11	10/1/2004	< 0.0962	5/20/2008	< 0.095		
11/1/2004	< 0.0952	5/10/2005	< 0.11	9/27/2005	< 0.11	5/10/2005	< 0.11	12/10/2008	< 0.1		
5/10/2005	J 0.068	9/27/2005	< 0.11	5/31/2006	< 0.11	9/27/2005	< 0.11	6/2/2009	< 0.1		
7/7/2005	J 0.043	5/31/2006	< 0.11	9/25/2006	< 0.11	5/31/2006	< 0.11	10/7/2009	< 0.1		
9/27/2005	J 0.050	9/25/2006	< 0.11	5/9/2007	< 0.092	9/25/2006	< 0.11	5/19/2010	< 0.1		
5/31/2006	J 0.055	5/9/2007	< 0.092	9/18/2007	< 0.093	5/9/2007	< 0.093	10/5/2010	< 0.1		
9/25/2006	< 0.11	9/18/2007	< 0.093	5/20/2008	< 0.097	9/18/2007	< 0.093	6/30/2011	< 0.1		
5/9/2007	J 0.048	5/20/2008	< 0.095	12/10/2008	< 0.1	5/20/2008	< 0.093	10/20/2011	< 0.095		
9/18/2007	0.27	12/10/2008	< 0.1	6/2/2009	< 0.1	12/10/2008	< 0.1	5/23/2012	< 0.095		
5/20/2008	J 0.066	6/2/2009	< 0.1	10/7/2009	< 0.1	6/2/2009	< 0.1	10/17/2012	J 0.030		
12/11/2008	< 0.1	10/7/2009	< 0.1	5/19/2010	< 0.1	10/7/2009	0.15	12/4/2012	< 0.095		
6/2/2009	< 0.1	5/19/2010	< 0.1	10/5/2010	< 0.1	10/20/2009	< 0.1	5/21/2013	< 0.095		
10/7/2009	< 0.1	10/5/2010	< 0.1	6/30/2011	< 0.1	5/19/2010	< 0.1	10/8/2013	< 0.098		
5/19/2010	< 0.1	6/30/2011	< 0.1	10/20/2011	< 0.095	10/5/2010	< 0.1	5/13/2014	< 0.095		
10/5/2010	< 0.1	10/20/2011	< 0.095	5/23/2012	< 0.097	6/30/2011	< 0.1	9/25/2014	< 0.096		
6/30/2011	< 0.1	5/23/2012	< 0.097	10/17/2012	J 0.015	10/20/2011	< 0.095	4/21/2015	< 0.095		
10/20/2011	J 0.040	10/17/2012	< 0.094	12/3/2012	< 0.095	5/23/2012	< 0.094				
12/16/2011	< 0.096	12/3/2012	< 0.095	5/21/2013	J 0.053	10/17/2012	J 0.071				
5/23/2012	J 0.019	5/21/2013	< 0.097	10/8/2013	< 0.096	12/3/2012	< 0.095				
7/11/2012	J 0.035	10/8/2013	< 0.094	5/13/2014	< 0.095	5/21/2013	< 0.094				
10/17/2012	J 0.045	5/13/2014	< 0.095	9/25/2014	< 0.095	10/8/2013	< 0.095				
12/3/2012	< 0.095	9/25/2014	< 0.096	9/25/2014	< 0.095	5/13/2014	J 0.023				
5/21/2013	J 0.031	4/21/2015	< 0.095	4/21/2015	< 0.097	9/25/2014	< 0.096				
10/8/2013	< 0.097					4/21/2015	< 0.094				
5/13/2014	J 0.051										
9/25/2014	J 0.043										
4/21/2015	< 0.095										

Appendix A.2

Historical LNAPL Thickness - Monitoring Wells
Penta Wood Products Superfund Site
Siren, Wisconsin

	Monitoring Well LNAPL Thickness (feet)			
Date	MW10S	MW18	MW19	MW20
Sep-01	0.01	0.27	0.51	0.11
May-02	0.00	0.29	0.23	0.00
Aug-02	0.00	0.33	0.22	0.00
May-03	0.00	0.00	0.00	0.00
Sep-03	0.00	0.32	0.24	0.04
May-04	0.00	0.45	0.36	0.35
Sep-04	0.21	0.54	0.67	0.52
May-05	0.29	0.48	0.63	0.36
Sep-05	0.87	0.06	0.83	1.15
May-06	0.00	0.00	0.29	0.00
Sep-06	0.00	0.05	0.80	0.69
Apr-07	0.58	0.04	0.74	1.22
May-07	0.58	0.03	0.54	1.20
Sep-07	0.04	0.16	1.07	0.00
May-08	0.40	1.19	0.90	1.71
Oct-08	0.14	0.04	0.00	0.00
Jun-09	0.54	1.58	1.60	1.45
Oct-09	0.63	1.92	1.46	1.02
May-10	0.51	2.01	1.10	0.85
Oct-10	0.00	0.57	0.59	0.00
Jun-11	0.00	0.42	0.79	0.00
Oct-11	0.00	0.53	1.07	0.00
May-12	0.69	0.79	0.80	2.17
Aug-12	0.04	0.43	0.89	0.30
Oct-12	0.00	0.45	0.91	0.88
Dec-12	0.02	0.44	1.06	0.95
May-13	0.17	0.53	0.94	1.08
Oct-13	0.00	0.70	1.25	0.81
May-14	0.00	0.79	0.22	0.22
Sep-14	0.00	0.56	0.30	0.00
2/13/15	0.00	0.56	0.24	0.00
2/20/15	0.00	0.53	0.23	0.00
3/24/15	0.00	0.34	0.52	0.00
4/16/15	0.00	0.58	NM	0.00
5/14/15	0.00	0.57	NM	0.00

Notes:

NM - Not Measured