U.S. Environmental Protection Agency

Proposed Plan

WPSC Marinette Former Manufactured Gas Plant Site

Marinette, Wisconsin

EPA ANNOUNCES PROPOSED PLAN **August 20, 2012**

This Proposed Plan to conduct a Non-Time Critical Removal Action (NTCRA) identifies the U.S. Environmental Protection Agency's (EPA or the "Agency") preferred alternative to clean up polycyclic aromatic hydrocarbon (PAH)-contaminated sediment at the Wisconsin Public Service Corporation (WPSC) Marinette Former Manufactured Gas Plant (Marinette MGP) Superfund Alternative site in Marinette, Wisconsin. The Proposed Plan describes other NTCRA alternatives that were evaluated for use at this site and provides the Agency's rationale for the preferred alternative.

Based upon the results of the comparative analysis of alternatives, EPA's recommended sediment removal action alternative is RAA-01B: Dredging and disposal (of PAH deposits (called "NAPL" or non-aqueous phase liquid) and adjacent and near-shore PAH-contaminated sediment (Areas 1 and 2). This alternative is more effective compared to the NAPL-only removal alternative (RAA-01A) and is most administratively feasible compared to the dredging and capping alternative (RAA-02) that EPA evaluated for the site. Further, alternative RAA-01B will remove more residual PAH contamination at a lower cost than the dredging and capping alternative.

This Proposed Plan is issued by EPA, the lead oversight agency for the Marinette MGP site. The Wisconsin Department of Natural Resources (WDNR) is the support oversight agency. EPA, in consultation with WDNR, will select a NTCRA alternative for the site after reviewing and considering all information submitted during a 30-day public comment period. EPA may modify the preferred alternative or select another response action presented in this Proposed Plan based on new information or public comment. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, 42 U.S.C Section 9617, commonly known as Superfund, and Section 300.430 (f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan summarizes information from the July 30, 2012 Engineering Evaluation/Cost Analysis (EE/CA) Report and other documents that comprise the Administrative Record for the Marinette MGP site.

EPA encourages the public to review the Administrative Record to gain a more comprehensive understanding of the cleanup and investigative activities that have been conducted at the site. The Administrative Record can be accessed at www.epa.gov/arweb, or at the following locations:

Stephenson Public Library 1700 Hall Avenue Marinette, WI 54143	EPA Region 5 Records Center 77 West Jackson Boulevard Chicago, IL 60604 (By appointment only, Monday-Friday 8 a.m. to 4 p.m.)

To ensure the community's concerns are being addressed, the public comment period will open on August 29, 2012 and close on September 28, 2012. During this time, the public is encouraged to submit comments on the Proposed Plan to EPA. The public may also request that EPA hold a public meeting in Marinette to discuss the Proposed Plan. All requests must be submitted to either Susan Pastor or Margaret Gielniewski by September 7, 2012.

After the close of the public comment period, EPA will announce its selection of the NTCRA at the site in a document called the Action Memorandum (Action Memo). Public comments will be considered and incorporated into the Action Memo as part of the Responsiveness Summary. Comments should be submitted in writing or e-mailed to:

Margaret Gielniewski (SR-6J) Removal Project Manager U.S. EPA Region 5 77 West Jackson Blvd Chicago, IL 60604 gielniewski.margaret@epa.gov	or	Susan Pastor (SR-5J) Community Involvement Coordinator U.S. EPA Region 5 77 West Jackson Blvd Chicago, IL 60604 pastor.susan@epa.gov

SITE BACKGROUND

Site Location and Description

The four-acre WPSC Marinette MGP site is located approximately 700 feet south of the Menominee River at 1603 Ely Street in Marinette, Marinette County, Wisconsin (Figures 1 and 2). The property was the location of a former WPSC manufactured gas plant (MGP) facility and is currently owned by the city of Marinette, which built its waste water treatment plant (WWTP) on it. The site is surrounded by commercial and industrial-use properties. The WWTP property is bounded on the north by Mann Street and railroad tracks, on the southwest by Ludington Street, and Ely Street on the southeast. Boom Landing Park, a boat launch facility owned and operated by the city is located between the WWTP and the river.

Although groundwater, soil and sediment at the site are contaminated with PAHs and benzene (a volatile organic compound, or VOC), the focus of this proposed plan is only on cleaning up PAH-contaminated sediment in the Menominee River (the "River Portion" of the site). PAH and benzene contamination in groundwater and soil will be assessed during the Remedial Investigation (RI) that began in November 2011 and is planned for completion in April 2013. EPA and WDNR will evaluate the soil and groundwater data to determine if any cleanup actions will be necessary, and, if so, the information will be used to conduct a Feasibility Study (FS) that will evaluate potential cleanup alternatives for the soil and groundwater.

Site History

Manufactured gas plants are facilities that used coal, oil, and other feedstock materials to produce gas for cooking, lighting, and heating. WPSC operated the Marinette MGP from 1910 to 1960, using the carbureted water/gas method to produce gas primarily from oil. The plant ceased production in 1960. The former MGP process structures were located on the west side of the MGP facility, while the east side was used as storage and disposal of MGP- process wastes and other materials. A slough was formerly located along the south property boundary, and served as a storm water outfall to the Menominee River. In 1945, the slough between the site and the Menominee River was filled in with tarry material. Since 1960, the slough gradually filled with silt; however, the slough was excavated as part of the city's WWTP expansion project in 1989.

WPSC has been a subsidiary of Integrys Energy Group (Integrys) since 2007.

History of Previous Environmental Investigations and Removal Actions

Integrys submitted a *Completion Report* (NRT, May 2009) to EPA that contains a full bibliography of the reports and summaries issued for the WPSC Marinette MGP Site. Site investigation and historical soil excavation activities associated with WWTP construction were previously undertaken since the late-1980s through the present. Investigations have focused on determining the presence of former MGP structures, identifying source areas, and conducting an initial groundwater assessment. Investigations included soil borings, test pits, surface soil samples, sediment samples, and groundwater sampling from monitoring wells and piezometers. Integrys filed annual site groundwater quality reports prior to the submittal of the Remedial Investigation (RI) Site Specific Work Plan (*SSWP*) in 2009, but discontinued the annual report submittals after 2009 because the data will now be in the RI Report.

SITE CHARACTERISTICS

Source, Nature, and Extent of Contamination

This section presents a summary of the documents discussing the previous investigations performed between 1995 and 2003. In addition, this section presents a summary of the nature and extent of contamination in the River Portion of the Site based on the data collected between November 2011 and May 2012 in accordance with the *SSWP*.

Previous Investigations

As summarized in the *Completion Report* and *SSWP*, multiple sediment investigations were conducted in the Menominee River from 1996-2003. Detailed information of the sediment investigation activities and results are discussed in the *Completion Report* and other reports that EPA has placed into the administrative record for the Marinette MGP Site.

Integrys conducted additional sediment investigations from November 2011 through May 2012 to further define the extent of MGP residuals and evaluate potential health risks associated with the River Portion of the Site. These investigations included the following:

Bathymetric Survey

A combined hydrographic and side scan sonar (bathymetric) survey was conducted on November 15, 2011. The bathymetric survey extended a distance of approximately 1,900 linear feet in the Menominee River near the location of the former MGP. The western-most survey boundary was approximately 500 feet upstream of the western edge of Strawberry Island, just downstream of the HWY 41 Bridge. The eastern-most survey boundary was approximately 500 feet downstream of the eastern edge of Strawberry Island. The northern-most survey boundary was the approximate center of the river, except for the area west of Strawberry Island where the bathymetry extended across river to the Michigan shoreline. Based on a river width of approximately 1,100 feet, the survey area totaled about 31 acres. The bathymetric survey results are provided on the basemap of Figures 3 through 6 and have been used to evaluate potential sediment dredging volumes.

Sediment Poling

Sediment poling was performed at each sediment sampling location (shown on Figures 3 through 6) to measure the river water depth (2-10 feet) and the relative thickness of soft sediment (0-12 feet). The sediment poling results were compared to the results of the bathymetric survey and used to assist with identifying sediment sampling locations. Sediment poling results were also used to develop human health and ecological exposure assumptions (e.g., how deep could a person sink while wading in the river).

River Sediment Sampling

Soft or loose non-native river sediment samples and native material (native material refers to all materials below the soft sediments) samples were collected to achieve the following:

- Evaluate "ambient" sediment conditions and potential off-site sources of contaminants;
- Evaluate the vertical and horizontal contaminant distribution within river sediments through chemical analysis of sediment samples;
- Evaluate the presence and characteristics of MGP residuals, found typically as NAPL visually observed in any sample interval;
- Evaluate appropriate removal and remedial action option/alternatives (e.g., geotechnical and waste disposal characterization) to support removal and remedial actions; and,
- Support a human health and ecological risk assessment for the RI.

EPA notes that the timing of this most recent sediment sampling event caused the new analytical data to not be available for evaluation in the EE/CA; however, it will be presented and evaluated in the RI Report. Due to the accelerated NTCRA schedule and the length of time needed to validate sample analysis data, only previously-existing sediment sampling data could be evaluated in the EE/CA. Data will be available for use in the design of the NTCRA.

Principal Threat Waste and Cleanup Levels

Residual MGP contaminants, in the form of a NAPL consisting of PAHs, constitute a principal threat waste at the site and will be addressed during the NTCRA. NAPLs were observed in the area immediately adjacent to the mouth of the former slough as shown by the sediment cores

highlighted on Figure 3. The approximate extent of the NAPL is approximately 31,600 square feet. NAPL was observed in sediment cores ranging from the mudline surface (at T05HH3, just west of the boat ramp) to the top of bedrock (approximately 6 to 10 feet below mudline just west of the former slough), as shown on the cross sections (Figures 5 and 6). A consolidated silt layer was typically observed in cores east of the boat ramp between the shore and the navigational channel limits. However, this layer was absent in cores west of the boat ramp, in the cove near the outfall of the former slough, and NAPL was observed to the top of the bedrock.

Under this NTCRA, contaminated river sediment will be addressed to reach a cleanup level of 22.8 mg/kg [equivalent to 22.8 parts per million (ppm)] total PAHs. This PAH cleanup level was developed by National Oceanic and Atmospheric Administration (NOAA) researchers (McDonald, 2000) and is known as the "probable effects concentration" (PEC) and it is the same cleanup level proposed for sediment cleanup at the Stevens Point MGP Site in Stevens Point, Wisconsin (Record of Decision pending September 2012). PEC means the PAHs are likely causing toxic effects to benthic organisms in contaminated sediment.

SCOPE AND ROLE OF RESPONSE ACTION

The purpose of this NTCRA is to address potential impacts to benthic organisms and recreational human exposure pathways associated with the River Portion of the Site. The scope of the proposed action is removal of NAPL and PAH concentrations above 22.8 mg/kg in Menominee River sediment. The specific objectives that define the scope of the removal action were developed to achieve the overall objective of the protection of human health and the environment.

This objective addresses human health and ecological risks, as well the reduction of mobility, and quantity of residuals remaining after treatment and/or removal.

Data regarding upland soil and groundwater is currently being collected by Integrys and will be reviewed by EPA and WDNR in the RI document. Further site cleanup actions, if any, will be set forth in a Record of Decision (ROD) that EPA plans to issue by April 2014.

SUMMARY OF SITE RISKS

As part of the RI Report, a baseline risk assessment will be performed to develop a site-specific, risk based sediment level incorporating results of toxicity testing, bulk chemistry concentrations, and other factors. For purposes of the EE/CA, the discussion of analytical results focuses on total PAH results compared to the PEC (22.8 mg/kg total PAHs), which was selected as a screening level because the baseline risk assessment has not yet been finalized. Table 1, below, summarizes sediment samples that reported a total PAH concentration above the 22.8 mg/kg PEC. Sample locations are found in Figure xx.

Table 1. Totals PAHs Exceeding Screening Level

Location (Depth)	Total PAHs (mg/kg)	Location (Depth)	Total PAHs (mg/kg)
T01A (2.5-3.5)	49.8	T05HH1 (0-0.5)	743.4

T01A (3.5-4.5)	82.3	T05HH1 (0.5-1.3)	3,201.80
T01A1 (0.5-1.5)	127.6	T05HH3 (0-0.5)	188.3
T02A4 (0-0.5)	26.2	T05N (0-0.5)	24.8
T03A3 (3.5-4.5)	26.2	T05N (0.5-1.5)	61.2
T03A3 (4.5-4.9)	3,708.80	T05N (1.5-2.5)	913.8
T03E (0-0.7)	2,668.00	T05N2 (0.5-1.5)	25.6

Streamlined Risk Evaluation

This section provides a streamlined risk evaluation to help identify current or potential exposures to contaminated sediment located near Boom Landing. Based on the Conceptual Site Model presented in the *SSWP*, there are potentially complete pathways for recreational users and benthic invertebrates. These receptors and the pathways will be further evaluated in the baseline risk assessment to be included in the RI Report.

Recreational User Scenario

Under current land use conditions, recreational use by visitors to the area would be primarily focused in the area of the boat landing and the Menominee River. There are obvious entry points into the river adjacent to the boat launch docks. There is no beach and the river in the vicinity of the site is primarily access for fishing by boat. The likelihood of wading and contacting sediment is limited directly to the boat launch area because the depth of water and current. The water depth along the shoreline of the river adjacent to the River Portion of the Site is generally greater than 5 feet except at the boat launch, which would preclude wading into the river other than at the launch. The water depth drops quickly from the riverbank to depths greater than 5 feet deep within 50 feet from shore. An exception to this is a relatively small area adjacent to the boat landing, where water depth ranges from 2 to 4 feet deep within approximately 5-10 feet from the shoreline. Water depths vary greatly in this area with drop offs as deep as 10 feet, making wading treacherous. Outside this zone water depths drop quickly to greater than 5 feet in depth.

MGP residuals have been observed in the near-shore sediment in the vicinity of the former slough located adjacent to the boat landing. The potential for human exposure to these materials is expected to be minimal. Near the boat landing, the primary recreational water activities anticipated to occur are launching of fishing and other recreational watercraft at the boat landing, and limited fishing from a boat or shore. The boat landing is well maintained with concrete ramps extending into the water, and a concrete lining extends up the banks of the river on both the upstream and downstream edges of the boat landing area. The boat landing has two well maintained docks to moor boats. Recreational boaters are not anticipated to be exposed to the sediments in the vicinity of the former slough while launching their boats. Poling measurements collected in November 2011 indicate the concrete boat ramp extends into the river beyond the shallow water depth of 3.5 feet. Sediments encountered at the end of the boat ramp were in approximately 5-feet of water. As such, recreational users of the boat launch are not expected to encounter sediments while launching, retrieving, or cleaning boats.

Anglers have been observed fishing in the area where PAH-contaminated sediments have been documented the river. Exposure assumptions regarding fishing include:

- Anglers will frequent the area for a few days a week when the river is not iced over, thus, contact with contaminated sediment is possible, but not all year round;
- The amount of time that people spend fishing in the contaminated sediment area is limited by the small size of the affected area as well as that most people who launch a boat to fish from do not fish in this area, but rather pass through on their way downstream to fish in Lake Michigan. Also, for safety sake and as a courtesy to others loading or unloading their water craft, most anglers do not fish in the area of the boat launch;
- Even if people were to fish from the shore near the boat landing, the potential for exposure to contaminated sediment is minimized because the water is generally over 5 feet near the shore; and
- PAHs do not bioaccumulate in fish and therefore are not available for human consumption because most fish species have enzymatic systems that metabolize and detoxify PAHs (Hahn et al. 1994).

Benthic Invertebrates

Benthic invertebrates form the base of many food chains and spend most or all of their life-cycle burrowed or feeding just at the interface between surface water and sediment. Under the *SSWP*, Integrys took samples of benthos in the Menominee River to qualitatively determine the relative abundance of benthic invertebrates that may be present in river sediment. Based on these samples, a variety of benthic invertebrates was found to exist in the area. Because PAH levels exceed the PEC in some areas of sediment, it is probable that there are toxic effects to benthic invertebrates associated with exposure to PAH-contaminated sediment. A more complete evaluation of risks to benthic invertebrates will be conducted and summarized in the RI report.

No Applicable or Relevant and Appropriate Requirements (ARARs) specific to sediment exist in Wisconsin. As discussed above, a site-specific, risk-based cleanup level will be developed as part of the baseline risk assessment included in the RI Report. The goal of the NTCRA is to address the NAPL and total PAH concentrations that exceed the PEC (22.8 mg/kg). When the baseline risk assessment is complete under the RI, EPA anticipates that the site specific, risk-based cleanup level for PAHs in river sediment will be higher than the PEC, making this removal action compatible with any future remedial actions at the site.

Summary

Under current conditions and potential future uses, there are potential human health risks from exposure to PAH-contaminated sediment by recreational users and it is likely that exposure to river sediment containing PAHs above the PEC is causing toxic effects to benthic organisms. It is EPA's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures evaluated in the Proposed Plan, is necessary to protect human health and the environment from releases of contaminants at the site.

REMOVAL ACTION OBJECTIVES

Based on the results of the EE/CA and after consultation with WDNR, EPA proposes the action described in the following sections.

Identification of Removal Action Objectives

The purpose of this NTCRA is to address potential health impacts to humans and benthic organisms due to exposure to PAH-contaminated Menominee River sediment. The scope of the removal action is to address NAPL and the areas of PAH concentrations in sediment above the PEC (22.8 ppm) (Figure 4).

Statutory Limits on Removal Actions

The $2 million and 12-month statutory limits do not apply to this removal action because it is not Fund financed.

Applicable Relevant and Appropriate Requirements (ARARs)

Removal actions conducted under CERCLA are required to meet ARARs "to the extent practicable, considering the exigencies of the situation" [Section 104(a) (2)]. ARARs are defined as:

Any cleanup standards, standard of control, environmental protection requirements, criterion, or limitation under any federal or state environmental law that specifically addresses a hazardous substance, pollutant, contaminant, remedial action, or location.

Promulgated state standards that are more stringent than federal standards may be an ARAR. In addition to ARARs, EPA may identify other relevant information, criteria, or guidance to be considered (TBC). TBCs may not be legally binding or enforceable, but may be useful in developing remedial alternatives. Both ARARs and TBCs may be chemical-specific, location-specific, or action specific. Chemical-specific ARARs are generally health or risk based standards that define concentration limits for environmental media or discharges.

Location-specific ARARs are based on the site's characteristics or location including natural site features such as wetlands, floodplains, and endangered or threatened species and habitats. Location-specific ARARs may also apply to man-made features such as cultural resource areas. Action-specific ARARs are technology-based or activity-based limits that guide how the remedial action will be implemented or how remedial waste may be handled.

SUMMARY OF REMOVAL ALTERNATIVES

IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

The streamlined approach used in this NTCRA Proposed Plan eliminated the technology identification and screening steps EPA generally uses under the RI process by assuming that there are limited technologies available to address contaminated river sediment.

General Response Options and Removal Action Alternatives

The focused approach used in this Proposed Plan identifies three possible general response options for river sediment, namely:

- Dredging and Disposal Only
- Dredging/Disposal and Capping
- Capping Only

Based upon removal action objectives and site conditions identified above, these general response options were further refined into the following specific removal action alternatives (RAAs):

- RAA-01: Dredging and Disposal
  o RAA-01A: NAPL (portion of Area 1)
  o RAA-01B: NAPL and Adjacent and Near-Shore PAHs (Areas 1 and 2)
- RAA-02: Dredging/Disposal and Capping
- RAA-03: Capping.

These alternatives are described in further detail below and were evaluated for short- and long-term aspects of the following criteria:

■ Effectiveness: the level of protection of public health and the environment achieved by the alternative expressed in the terms of:

- Short-term effectiveness, considering:
  - Protection of the community
  - Protection of site workers
  - Environmental impacts
  - Time required to achieve removal action objectives
- Long-term effectiveness and permanence, considering:
  - Magnitude of risk posed by waste and/or residuals remaining following completion of the removal action
  - Adequacy and reliability of removal alternative
  - Compliance with ARARs
  - Reduction of toxicity, mobility, or volume through treatment

■ Implementability: the feasibility of the alternative expressed in the terms of:

- Technical feasibility, considering:
  - Construction and operation requirements
  - Technology maturity and reliability
  - Suitability to site environmental conditions
  - Contribution to long-term remedial performance
  - Ability to measure and monitor effectiveness
- Administrative feasibility, considering:
  - Permits and waivers required
  - Easements or access agreements required
  - State Agency acceptance
  - Community acceptance

- Availability of services and materials needed, considering:
    - Personnel and technology
    - Off-site treatment, storage, and disposal
    - Other support services and materials

■ Cost: expressed in the terms of:
- Direct capital costs
- Indirect capital costs
- Present worth of annual operation and maintenance and/or post-removal site control costs

These evaluations were conducted to be consistent with the Multi-Site FS Work Plan Revision 1 (March 26, 2010), and then used to screen the alternatives for the comparative analysis.

Dredging and Disposal RAAs

Under RAAs-01A and B, PAH-contaminated sediment would be dredged and disposed of at a permitted, off-site facility. Because a lot of snags occur in the area, the sediment would be mechanically excavated in the wet. A temporary sheet pile, cofferdam, or other containment system, will be employed to partially dewater the excavation area before dredging.

Dredging in the dry is not preferable because it would significantly complicate the design and construction of a temporary sheet pile cofferdam for dewatering due to the relatively shallow bedrock depth beneath the Menominee River and resulting low sheet pile embedment depths. Temporary bypass of the city's WWTP and storm sewer outfalls present in the area of NAPL-containing sediments would also be necessary to facilitate dry removal, whereas bypass might not be necessary for wet removal. Wet dredging has been successfully accomplished at other sites where river sediments were impacted by PAHs, including NAPL. The temporary containment system would be designed to effectively contain suspended sediment and NAPL in the work area so that downstream impacts from these dredging residuals would be minimized or avoided altogether. Silt curtains would be employed for this purpose in any areas dredged outside of the temporary containment system.

For cost estimating purposes a sheet pile cofferdam system was assumed as the containment system.

Dredging would be followed by placement of a minimum 6-inch sand layer to manage dredge residuals in the water column. Dredged sediment would be stabilized on site with amendments, if required, and loaded for off-site disposal. Contact water generated during dredging/dewatering activities would be treated and monitored on site in accordance with substantive WPDES requirements, and then discharged to the Menominee River.

RAA-01A: NAPL

RAA-01A would address only the NAPL-containing sediments located near and just upstream of the Boom Landing boat launch with a projected dredge volume of approximately 4,870 cubic yards.

Estimated costs for this RAA include post-removal monitoring until a final remedy and Record of Decision are established since PAHs above the PEC (22.8 mg/kg) in Areas 1 and 2 would not be addressed.

RAA-01B: NAPL and Adjacent and Near-Shore PAHs (Areas 1 and 2)
RAA-01B would address the NAPL-containing sediments and the adjacent sediments containing PAHs (all of Area 1), as well as upstream near-shore sediments containing PAHs at greater than 22.8 mg/kg located near Nest Egg Marine (Area 2). The projected dredge volume is approximately 6,945 cubic yards. Estimated costs for this RAA do not include post-removal monitoring since it is anticipated that PAHs that may be addressed in a final remedy would instead be addressed by this alternative.

Dredging and Disposal Effectiveness

The dredging and disposal RAAs could potentially subject the community and site workers to short-term exposure to PAH-contaminated sediment, particularly through airborne dust and vapors. Dredging in the wet will minimize these potential exposures.

The dredging and disposal RAAs potentially could cause adverse environmental impacts downstream of the dredging by suspending NAPL and sediment in the water column. Specific measures to mitigate these potential impacts, including the use of a temporary sheet pile cofferdam or other containment system in the area where dredging of NAPL-containing sediments will occur (Area 1), the use of silt curtains where dredging of sediments containing only PAHs will occur (Area 2), and turbidity monitoring throughout the entire removal action area, would be incorporated.

The time required for the dredging and disposal RAAs to achieve the removal action objective is considered to be relatively short (within 2-4 months). Placement of the sand layer to address residuals following dredging would expedite the time required to achieve the removal action objectives.

The dredging and disposal RAAs would achieve long-term effectiveness and permanence by removing the NAPL-containing sediments. RAA-01B is more effective at achieving the removal action objective as a result of additional mass removal. As with any environmental dredging project, it may not be practicable to achieve complete removal of these sediments due to the potential suspension of residual contaminants in the water column during dredging. Placement of the sand layer following dredging will accelerate natural deposition of the dredge residuals and mitigate any potential downstream impacts following removal of the temporary containment system.

The dredging and disposal RAAs would reduce the toxicity and mobility of the NAPL/PAH contamination in the sediments through required stabilization treatment before off-site disposal. There would be mass removal of contaminants from the river that would be securely contained at the off-site disposal facility. Water collected from sediment dewatering would also be treated, which reduces the toxicity and volume of hazardous substances in the treated water.

Dredging and Disposal Implementability

The dredging and disposal RAAs are technically and administratively implementable. Dredging and disposal are common remedial technologies for contaminated sediments, and have been previously approved by the WDNR for other projects addressing sediments contaminated with MGP residuals. Although CERCLA projects are exempted from state and local permitting requirements, these alternatives would still need to meet the substantive requirements of the associated permitting programs.

Disposal facilities, materials, and contractors required to implement the dredging and disposal RAAs are available. These RAAs would require adequate area, equipment, and materials to dewater sediment at the site, in preparation for transportation to the landfill. This is assumed to include a portable water treatment system, a stabilization pad, stabilization materials (e.g., cement kiln dust), and mixing equipment. Since WPSC does not own any land in the area targeted for the removal action, access agreements would be required for an upland area to support the removal action.

Dredging of the Menominee River is assumed to be moderately difficult due to the wood debris observed in the sediment. Placement of the sand layer can be implemented but would be difficult for the near-shore sediments containing PAHs (i.e., outside of the temporary containment system) due to the small area and swift current. Placement of the sand layer inside of the temporary containment system is achievable since effects of the river current would be mitigated.

Dredging and Disposal Costs

The estimated net present worth cost of RAA-01A is approximately $5,993,000. Capital costs are estimated at approximately $5,732,000. Annual costs for monitoring are estimated at approximately $13,000.

The estimated capital cost of RAA-01B is approximately $6,493,000.

As described above, annual costs are assumed for RAA-01A only. Table 6 in the EE/CA provides a summary of the overall costs to implement. Appendix C of the EE/CA provides the unit cost and additional assumptions.

Dredging and Capping RAA

The dredging and capping RAA consists of dredging all of the NAPL-containing sediments with PAH contamination above the PEC (22.8 mg/kg) found in the top 2.5 feet near the boat launch (all of Area 1) and top 2.5 feet in upstream near-shore sediments located near Nest Egg Marine (Area 2). Dredging would be followed by placement of a minimum 6-inch sand layer to manage dredge residuals in the water column. In areas where PAHs above the PEC remain below the dredge line, a 2.5-ft thick sand and gravel cap (additional 12 inches of sand and 12 inches of gravel) would be placed. If selected, the cap thickness and material specifications will be refined

as part of the final design. The projected dredge volume is approximately 6,620 cubic yards and cap area is 6,600 square feet, covering approximately 325 cubic yards of sediment.

Dredging would be accomplished in a manner similar to that described in Section 3.2 (Dredging and Disposal RAAs), including the use of a temporary sheet pile cofferdam or other containment system surrounding the NAPL-containing PAH-contaminated sediments, and silt curtains in areas outside of the temporary containment system. Dredged sediment would be stabilized on site with amendments, if required, and loaded for off-site disposal at an appropriately-licensed and permitted disposal facility. Contact water generated during dredging/dewatering activities would be treated and monitored on site in accordance with substantive WPDES requirements and then discharged to the Menominee River.

Estimated costs for this RAA include post-removal monitoring of the engineered cap.

Dredging and Capping Effectiveness

The dredging and capping RAA could potentially subject the community and site workers to short-term exposure to the contaminated sediments, particularly through airborne dust and vapors. Dredging in the wet will minimize these potential exposures.

The dredging and capping RAA could potentially also have adverse environmental impacts downstream of the removal action through suspension of NAPL and sediment containing PAHs in the water column. Specific measures to mitigate these potential impacts, including the use of a temporary sheet pile cofferdam or other containment system in the area where dredging of NAPL-containing sediments will occur (Area 1), the use of silt curtains where dredging of sediments containing only PAHs will occur (Area 2), and turbidity monitoring throughout the entire removal action area, would be incorporated into this RAA.

The time required for the dredging and capping RAA to achieve the removal action objective is considered to be relatively short (within 2-6 months). Placement of the sand layer to address residuals following dredging would expedite the time required to achieve the removal action objectives.

The dredging and capping RAA would achieve long-term effectiveness and permanence by removing the NAPL-contaminated sediments and the majority of sediments containing PAHs above the PEC. Sediments left in place containing PAHs above the PEC would be capped to minimize future exposure and to create a new sediment surface for the benthic community.

This alternative would reduce the mobility of PAH contaminants through stabilization treatment of dredged sediments required before off-site disposal. There would be mass removal of contaminants from the river that would be securely contained at the off-site disposal facility. Water collected from sediment de-watering would also be treated.

Dredging and Capping Implementability

The dredging and capping RAA is technically and administratively implementable. Dredging and capping are common cleanup technologies for contaminated sediments, and have been

previously approved by the WDNR for other projects addressing sediments contaminated with MGP residuals. Although CERCLA projects are exempted from state and local permitting requirements, these alternatives would still need to meet the substantive requirements of the associated permitting programs.

Disposal facilities, cap materials, and contractors required to implement the dredging and capping RAA are available. These RAAs would require adequate area, equipment, and materials to dewater sediment at the site, in preparation for transportation to the landfill. This is assumed to include a portable water treatment system, a stabilization pad, stabilization materials (e.g., cement kiln dust), and mixing equipment. Additional land area may be required to allow for staging / stockpiling of the cover materials before placement. Since WPSC does not own any land in the area targeted for the removal action, access agreements would be required for an upland area to support the removal action.

Dredging of the Menominee River is assumed to be moderately difficult due to the wood debris observed in the sediment. Placement of the sand layer and cap can be implemented but would be difficult for the near-shore sediments (i.e., outside of the temporary containment system) due to the small area and swift current. Placement of the sand layer and cap inside of the temporary containment system is achievable since any affects of the river current would be mitigated. Additional sediment stability evaluation would be required to design the cap.

Dredging and Capping Costs

The estimated net present worth cost of the dredging and capping alternative is approximately $7,984,000. Capital costs are estimated at approximately $6,448,000. Annual costs for cap monitoring and maintenance are estimated at approximately $80,000.

Table 6 of the EE/CA provides a summary of the overall costs to implement. Appendix C of the EE/CA provides unit cost and additional assumptions.

Capping Alternative RAA3

The capping alternative consists of placement of an engineered cap over the NAPL-containing sediments and sediments containing PAHs above the PEC (22.8 mg/kg) (Areas 1 and 2). The design of the cap would likely consist of sand and gravel (minimum 6 inches of sand and 6 inches of gravel). Also, a reactive core mat (RCM) layer would be necessary to mitigate leaching from the NAPL-containing sediments.

There would be two separate caps, approximately 54,500 square feet, or 1.25 acres in total, including for the NAPL-containing and near-shore areas. The caps would be placed in the wet, without segregation and dewatering of the cap areas, and a temporary sheet pile cofferdam or other containment system would not be necessary.

The necessity of institutional controls for this RAA would be evaluated during the RI process and selected, as necessary, in the ROD.

Capping Effectiveness

The capping RAA would avoid potential community and site worker exposure to the contaminated sediments since they would be capped in place and not handled as part of the removal action. For the same reason, the potential for adverse environmental impacts downstream of the removal action would also be lower. Potential impacts from suspended clean sediment (associated with the cap materials) in the water column are still a possibility, but could be easily mitigated by using silt curtains during placement of the cap.

The time required for the capping RAA to achieve the removal action objective is relatively short (within 3-6 months).

A significant factor in evaluating the effectiveness of a capping-only alternative is the ability to demonstrate long term protectiveness, considering NAPL would be left in place at relatively shallow depths. The RCM component of the cap would be the primary mechanism to address residual NAPL and its effectiveness is uncertain. Pilot- or bench-scale evaluation may be needed.

If no dredging is conducted prior to placement of the caps, there would be an increase in river bed elevation that would need to be evaluated for scour potential.

The capping RAA would achieve ARARs by minimizing exposure to NAPL- and PAH-containing sediments in Areas 1 and 2.

The RCM may provide for some treatment of hazardous substances that would reduce the mobility of contaminated sediment, but long-term effectiveness of the cap would require monitoring and maintenance in Areas 1 and 2.

Capping Implementability

Capping could be technically feasible but would require the following evaluations to support its selection:

- Significance of flood storage and navigation impact due to an increase in the river bed elevations;
- Sediment stability evaluations considering the swift current known to occur at the site. Sufficiency of cap stability is an important evaluation since this alternative relies upon the cap for long term performance and protection to meet the removal action objectives; and,
- Possible bench- or pilot-scale testing to support the RCM design.

Capping Cost

Due to the technical evaluation requirements that affect implementability and effectiveness, the capping RAA was screened out for further analysis, and a corresponding cost estimate was not prepared.

COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

This section provides a comparative analysis of the removal action alternatives RAA-01A, RAA-01B, and RAA-02 with regard to effectiveness, implementability, and cost relative to each other. The purpose of this comparative analysis is to identify the basic advantages and disadvantages of the alternatives relative to one another.

Effectiveness

Short Term Effectiveness

EPA assumed that the greater amount of planned volume of material to be dredged from the river, the greater the potential for short-term risk is from exposure to suspended sediment. Alternative RAA-01B has the greatest potential for short-term risk in this regard, and Alternative RAA-02 has the least potential for short-term risk. However, the differences in these potential short-term risks are insignificant. Also, all the removal alternatives would require approximately the same amount of time to achieve the removal action objectives.

Compliance with ARARs

All of the alternatives evaluated will comply with ARARs to the extent practicable.

Long-Term Effectiveness and Permanence

The larger the volume of contaminated material taken off-site for disposal, the greater the long-term effectiveness of the various removal alternatives, thus, Alternative RAA-01B is the most long-term effective alternative; and Alternative RAA-02 is the least. The long-term effectiveness of capping associated with the removal alternatives can be assured by a well-designed and monitored cap to keep these sediments below anticipated potential scour depth and not accessible to the benthic community. None of the alternatives proposed permanently destroy or degrade the PAHs in the sediment

Reduction of Toxicity, Mobility, or Volume through Treatment

There is some stabilization treatment anticipated for Alternatives RAA-01A and RAA-01B for the dredged sediments and water associated with the dredged sediments; with more treatment anticipated in Alternative RAA-01B than for RAA-01A. There is no treatment planned for Alternative RAA-02.

Implementability

All of the alternatives evaluated are implementable. Each alternative can be performed at the site. There are no barriers or obstacles that would make any of the alternatives impossible to complete.

Technical Feasibility

All of the alternatives evaluated are technically feasible. Alternative RAA-02 may be more challenging to implement than Alternatives RAA-01 A and B due to difficulties in placing a cap in relatively small areas with a swift river current. The alternatives that minimize dredge volumes (RAA-01A, RAA-02) may be easier to implement than Alternative RAA-01B due to the reduced volumes/areas required by dredging. These differences are considered to be insignificant.

Administrative Feasibility

Alternatives RAA01B and RAA-02 will be more challenging to implement from an administrative standpoint than RAA-01A due to the long-term monitoring that will be required for the cap. Maintaining the cap would be difficult due to volume of users of the river in this area.

Availability of Services and Materials Required

The availability of services and materials required to implement all remaining alternatives are considered to be relatively equal. More land area may be required for an upland support for the Alternatives RAA-02 to allow for staging and stockpiling of the cap materials before placement.

Cost

Table 6 of the EE/CA summarizes the capital and long-term costs associated with the alternatives evaluated. The long-term costs of Alternative RAA-02 result in the total present worth costs of this alternative to exceed that of Alternatives RAA-01A and B.

EPA'S PREFERRED ALTERNATIVE

Based upon the results of the comparative analysis presented in the EE/CA, the recommended sediment removal action alternative is RAA-01B: Dredging and Disposal of NAPL and Adjacent and Near-Shore PAHs (Areas 1 and 2). This alternative is more effective compared to the NAPL only removal alternative evaluated (RAA-01A), and most administratively feasible compared to the dredging and capping alternative (RAA-02). Further, RAA-01B accomplishes greater removal of residual PAH contamination at lower cost than the dredging and capping alternative. The alternatives evaluated were roughly equal for other aspects of effectiveness and implementability considered.

The Superfund NCP requires that whenever a planning period of at least six months exists before on-site removal activities are initiated, the lead agency shall conduct an engineering evaluation/ cost analysis (EE/CA) of the removal alternatives for the site. The July 30, 2012, EE/CA is available for review by the public in the site information repository. The EE/CA evaluates Alternatives RAA-01A, RAA-01B and RAA-02 with respect to effectiveness, implementability, and cost. EPA's Preferred Alternative RAA-01B is the best balance of these three evaluation criteria.

The Preferred Alternative is effective. With respect to Long-term Effectiveness and Permanence, the Preferred Alternative will permanently remove sediment contamination above the PEC (22.8 mg/kg PAHs) from the site.

The Preferred Alternative will be effective in the short-term. It presents no short-term human health risks and achieves protection from contaminated sediment within a few months. Dredging the river sediment will disrupt or eliminate the existing benthic community and temporarily increase the suspended solids in the water column in the short-term. However, benthos will recolonize the clean fill or cover placed on these areas resulting in an overall healthier benthic community.

The action in the Preferred Alternative is implementable. The Preferred Alternative is cost-effective.

The costs of dredging all affected sediments are proportional to the resulting benefit. The Preferred Alternative does not require long-term maintenance and the monitoring costs that are associated with the other alternatives.