

# Health Consultation

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MARINETTE SEWAGE TREATMENT PLANT  
MARINETTE, MARINETTE COUNTY, WISCONSIN  
EPA FACILITY ID: WID980703359

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
Agency for Toxic Substances and Disease Registry  
Division of Health Assessment and Consultation  
Atlanta, Georgia 30333

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In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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# **HEALTH CONSULTATION**

## **Marinette Manufactured Gas Plant Brownfield Remediation**

**Marinette, Marinette County, Wisconsin  
EPA ID# WID980703359**

Prepared by

Wisconsin Department of Health and Family Services  
Under Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry

## Summary

The Wisconsin Department of Health and Family Services (DHFS) was asked by the Wisconsin Department of Natural Resources (WDNR) to assess the public health implications of dredging coal-tar contaminated sediments from the Menominee River in Marinette, Wisconsin. The coal tar is waste from a manufactured gas plant (MGP) that was formerly located on nearby property now occupied by the Marinette Wastewater Treatment Plant (MWTP). Tar-contaminated dredge spoils will be staged on city park property adjoining a boat landing at the dredge area. Currently, contact with tar-contaminated sediments in the boat landing area poses a *health hazard*. The potential release of semi-volatile and volatile organic compounds to air from staged dredge spoils represents an *indeterminate health hazard*. The concentration of tar-related contaminants in the sediment suggests that the release of volatile organic compounds from staged dredge spoils will not be an important problem at this site, but that semi-volatile organic compounds in sediment could affect the air quality for nearby workers and residents. Therefore, air management techniques for coal tar wastes should be employed to prevent air quality problems. If the dredge spoils are well managed, neighboring workers and residents should not be affected. Still, neighbors should receive advance notice of the project and information of possible health effects. The *Remedial Design* (NRT 2004) proposed for the project includes an air management plan, as well as containment measures to prevent dispersal and runoff from the dredge spoils. Pending completion of the sediment remediation, a sign should be placed in the park advising the public to avoid contact with river sediments. To protect public health, the completeness of the sediment remediation should be verified with follow-up testing of sediment.

## Background and statement of issues

The former Marinette MGP, which operated from about 1920 to 1960, was located at Ely and Ludington Streets in Marinette. The Wisconsin Public Service Corporation (WPSC, an energy utility company) is assessing contaminants associated with the former MGP for later remediation. Currently, the Marinette Wastewater Treatment Plant (MWTP) occupies the property. The area surrounding the MWTP and former MGP is mixed light industrial and residential. Shipping-related activities are concentrated along this area of the Menominee River waterfront. Although the area is mostly industrial, several neighbors may be affected by the remediation work. The closest residence is a senior residential facility at the corner of Ludington and Mann, which is 250 yards from the proposed dredge spoils staging area and approximately 100 yards from a former log run that was reportedly later filled with MGP waste (Figure 1). Adjacent to the Boom Island dredging area are a park, marina, and a ship yard. Remediation of the property is expected to proceed in several phases. Dredging of coal-tar contaminated sediments is planned following renovation of the Boom Island boat landing in Marinette, Wisconsin. Planning for later remediation of adjacent upland areas affected by MGP wastes is under way.

This report is limited to the planned dredging of MGP wastes from Menominee River sediment. A future report will consider public health aspects of upland areas of MGP waste removal. Several routes are possible for exposing the public to contaminated sediments:

- Coal tars, indicated by tar odors in surficial sediments, are present near shore in the cove area (Figure 1). The cove and boat landing area are used for recreational fishing. Presently, any

wading in this area would result in direct contact with coal tars.

- Users of the boat landing and surrounding river areas have potential for direct contact with tar-contaminated sediments clinging to boats, anchors, or mooring ropes.
- A potential exists for release of volatile, semi-volatile, and particulate hydrocarbons to air during dredging, staging, and transport of contaminated sediments.

## **Discussion**

*Public health issues associated with the Marinette MGP.* As with most former MGPs, the major public health concern during the Marinette MGP cleanup is the release of volatile, semi-volatile, and particulate compounds to air. In general, risk to the public varies with the concentration of contaminants, removal and mitigation techniques used, and the proximity of people to the site. During the sediment dredging phase of the Marinette MGP remediation, the public's exposure to hydrocarbons released to air is expected to be limited due to the low concentration of volatile organic chemicals (benzene, toluene, ethylbenzene, and xylenes) in the sediment (Table 1), and the relative remoteness of the site. The senior residential facility, located 250 yards away, and other nearby homes may be sufficiently distant, given the nature of the sediments. Still, we don't know how the dredge spoils, which contain higher concentrations of semivolatile chemicals (naphthalene, anthracene, fluoranthene, fluorene, and pyrene; Table 1), will affect the atmosphere once staged. Furthermore, the senior residents should be considered a sensitive population. Therefore, air emissions from the staging and transport of dredge spoils should be monitored and managed with regard to these citizens.

Exposures to visitors and workers in neighboring businesses must also be considered. If releases of volatile hydrocarbons from dredge spoils occur, visitors to the marina are likely to have brief or intermittent exposures, depending upon the length of their visit. Workers at the ship yard, the marina, and other workers would be more likely to have full-day exposures. At other MGP remediation projects in Wisconsin, airborne releases from the excavation and staging of MGP wastes have, on several occasions, caused irritation and work stoppages at neighboring businesses. To avoid problems, neighboring businesses should receive information about site activities prior to and during the project. Plans to communicate with neighboring residents, businesses, and health agencies should be a part of the site work plan.

During any project involving the transportation of excavated materials, traffic along truck routes is an inconvenience and a safety issue in affected neighborhoods. Truck routes should be planned to avoid routes near schools and areas that have high pedestrian traffic, and neighborhoods should be informed so that they can plan accordingly. Routine containment and decontamination procedures should be followed, as detailed in the site *Remedial Design* (NRT 2004), to avoid dispersing dredge spoils along the truck route.

During site visits by DHFS, tar odors were evident in sediments found in shallow water in the cove area around Boom Island Landing. Children and families frequently use the park, cove, sea wall, and boat landing for recreational boating and fishing. Based on site conditions, wading here is possible though probably infrequent. Wading in the river around the cove would bring waders into contact with sediments. At former MGP sites in Wisconsin, DHFS has consistently recommended against contact with tar-contaminated soils and sediments. Contact with coal tar-associated hydrocarbon is a health hazard, based because of the irritating effects of a major

component of coal tar, polycyclic aromatic hydrocarbons (PAHs), on skin following photoactivation of PAHs in sunlight (ATSDR 1995, 2000, 2002). There is no exposure pathway at this site through affected groundwater. Because of the metabolism of PAHs in fish, no significant accumulation PAHs occurs in fish muscle (Nakata et al. 2003, Hellou et al. 1999). Because the date of sediment remediation has not yet been determined, a sign warning against contact with sediments is recommended. River sediments should be assessed following completion of the dredging to verify that sediments are safe for the general public.

*Toxicological effects of chronic exposure to coal tar.* The environmental assessment (NRT 1996) indicates that PAHs are the compounds of concern in Menominee River sediments near Boom Island Landing (Table 1). Humans are able to metabolize PAHs, although some PAH structures are carcinogenic with chronic exposure. Under occupational conditions, chronic exposure to coal tars, by dermal contact or inhalation, produces lesions to skin and mucous membranes that begin with burning and itching and progress to open sores and benign growths such as hardened skin patches and “tar warts.” Several types of PAH may become carcinogenic after being structurally transformed to reactive epoxides. This oxidative transformation occurs following exposure to ultraviolet light (this can occur on the skin) or is catalyzed by oxidizing enzymes within living cells. The PAHs with the greatest potential to be activated to reactive structures are dibenz[a,h]anthracene, benzo[a]pyrene, benz[a]anthracene, benzo[b]fluoranthene, and benzo[k]fluoranthene (ATSDR 1995). Each of these materials was detected in sediments near the Boom Island Landing. During the remediation of PAH-contaminated sites, including former MGPs, site management that includes dust suppression, containment, and air monitoring must be sufficient to prevent unsafe concentrations of PAH dispersal and deposition. Air monitoring and management of the excavation, as detailed in the *Remedial Design* (NRT 2004) is indicated to avoid exposing the public to coal tar-contaminated sediments.

### **Child Health Considerations**

Long-term exposure to PAHs is a risk to child health. Direct contact with coal-tar-contaminated sediments, followed by oxidation of PAHs in sunlight, can be irritating to skin. Repeated exposure can be more damaging to skin. Increased truck traffic, described above, is a child safety issue that should be considered when planning truck routes.

### **Conclusions**

- Currently, contact with tar-contaminated sediments in the boat landing area poses a human health hazard.
- The potential release of semi-volatile and volatile organic compounds to air from staged dredge spoils represents an indeterminate health hazard to workers or visitors of adjacent ship building, marina, and waste water treatment facilities.
- Dredge spoils removed from the Menominee River near Boom Island Landing are predicted to require management to prevent hydrocarbon release to air.
- It is unclear whether the senior residential facility and adjacent residences, located approximately 250 yards from the dredge spoils staging area, are sufficiently distant from the work site if releases of volatile and semivolatile hydrocarbons are not adequately controlled during excavation and staging of dredge spoils. Therefore, the staging of dredge spoils at Boom Island Landing is an indeterminate health hazard to these residents.

## **Recommendations**

- Dredge spoils removed from the Menominee River near Boom Island Landing should be monitored and managed, as described in the *Remedial Design*, to minimize hydrocarbon release to air.
- DHFS guidelines for air management at MGP sites should be followed. These guidelines have been provided to WPSC.
- Nearby businesses and residents should be informed of the project, including possible health effects, truck traffic routes, and contact information for project managers and health and environmental agencies.
- The senior residential facility, which houses a relatively sensitive and immobile population, should be monitored closely to avoid exposure to residents. Air monitoring at the site should be designed to be specifically protective of these residents.
- Prior to remediation, the landing should be posted with signs advising against direct contact with sediments.
- Follow-up sediment sampling around the boat landing and cove should be conducted after completing the dredging and boat ramp projects.

## **Public Health Action Plan**

- DHFS will assist, as needed, with activities to discuss the dredging project with area residents.
- WDHFS will review the confirmatory post-remediation sampling.

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**Table 1. Concentration of hydrocarbons in Menominee River sediments near Boom Island Landing, Marinette, Wisconsin<sup>1</sup>.**

	EPA cancer class	Mean mg/kg ± standard error n=19	Maximum reported, mg/kg (sample site) <sup>2</sup>
Anthracene	D	7.0±5.4	106 (SD306)
Benzo(a)anthracene	B2	8.9±5.7	110 (SD306)
Benzo(b)fluoranthene	B2	0.9±0.4	5 (SD306)
Benzo(k)fluoranthene	B2	1.0±0.5	7.3 (SD303)
Benzo(a)pyrene	B2	6.1±4.8	95 (SD306)
Benzo(g,h,i)perylene	D	2.0±1.0	19 (SD302)
Chrysene	B2	1.8±0.9	15 (SD303)
Dibenz(a,h)anthracene	B2	0.4±0.3	4.4 (SD306)
Fluoranthene	D	23.5±17.5	343 (SD306)
Fluorene	D	1.8±0.9	12 (SD302)
Indeno(1,2,3cd)pyrene	B2	1.2±0.5	6.8 (SD303)
Naphthalene	C	3.8±2.5	46 (SD302)
Phenanthrene	D	23.9±19.0	372 (SD306)
Pyrene	D	11.4±8.7	171 (SD306)
Benzene	A	0.01±0.01	0.12 (SD302)
Ethylbenzene	D	0.01±0.01	0.15 (SD306)
Toluene	D	0.05±0.05	0.91 (SD302)
Xylenes	na	0.05±0.04	0.77 (SD302)
Total Hydrocarbon		93.8	na
Total PAH		93.7	na

<sup>1</sup>Results reported by Natural Resources Technology. 1996. Sediment Report, Former Manufactured Gas Plant Site, Marinette, Wisconsin.

<sup>2</sup>Sample site designator reported in Natural Resources Technology 1996.

na: not applicable

mg/kg: milligram per kilogram

EPA: U. S. Environmental Protection Agency

EPA cancer classes: A: known human carcinogen

B2: probable human carcinogen (inadequate human, sufficient animal studies)

C: possible human carcinogen

D: Not classifiable as to human carcinogenicity

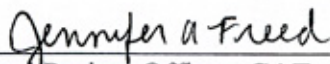
PAH: polycyclic aromatic hydrocarbons

**Figure 1. Location of Marinette former manufactured gas plant and surrounding area.**



## Certification

This Health Consultation for the former Marinette Manufactured Gas Plant Facility was prepared by the Wisconsin Department of Health and Family Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved methodology and procedure existing at the time the Health Consultation was begun.

  
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The Division of Health Assessment and Consultation, ATSDR, has reviewed this Public Health Consultation and concurs with the findings.

  
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Team Lead, CAT, SPAB, DHAC

*for R. R.*