Health Consultation

BARABOO MANUFACTURED GAS PLANT

125 VINE STREET

BARABOO, SAUK COUNTY, WISCONSIN

Prepared by the
Wisconsin Department of Health Services

NOVEMBER 16, 2010

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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 or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Summary

Introduction The City of Baraboo (City) plans to redevelop the former Baraboo manufactured gas plant (MGP) site that is located along the Baraboo River and within the Ringling Riverfront Redevelopment Area. The City has received several state and federal Brownfield grants, some of which are being used for cleanup of this site. Several environmental investigations found substantial contamination of on-site soils and groundwater, primarily in the northwestern portion of the site. The Wisconsin Department of Health Services (DHS) has supported a cleanup action at the former Baraboo MGP site that will decrease contaminant levels and enable the lessening or removal of property use restrictions. As one step in this process, during June 2010 a cleanup action removed an estimated 1,200 cubic yards of contaminated soils and MGP wastes.

DHS has made three conclusions about the former Baraboo MGP site.

Conclusion 1 In the past, people were not likely to have direct contact and be harmed by contaminated soils at the former Baraboo MGP.

Basis for Decision Prior to the June 2010 cleanup, contaminated sub-surface soils were 3 to 5 feet below the surface, providing a protective cover of clean soils. Furthermore, the recent excavation removed this contamination.

Conclusion 2 In the past or present, vapor intrusion from contaminated soils at the Baraboo MGP site is not likely to reach indoor air and harm people in nearby buildings.

Basis for Decision The lighter fractions of MGP-related contamination do not easily migrate through sub-surface soils and are not likely to reach nearby buildings.

Conclusion 3 The June 2010 clean-up of contaminated soils at the Baraboo MGP site were not likely to have released levels of volatile chemicals to outdoor air that could harm neighboring workers, residents, or children.

Basis for Decision During the cleanup, slight coal tar odors were reported around the site perimeter, but monitoring did not find elevated and unsafe levels of MGP-related volatiles. No odor or ambient air health concerns or complaints were raised by the community during the cleanup.

Next Steps DHS will continue to work with the City of Baraboo and the Sauk County Health Department to address public health questions and concerns related to the former Baraboo MGP site.

Background

In Baraboo, two manufactured gas plant (MGP) facilities previously operated at adjoining parcels, and were recently owned by the Alliant Energy Corporation (Alliant Energy). These properties are located at 125 Vine Street, in Baraboo, Sauk County, Wisconsin, and are bordered on the north side by the Baraboo River. The first MGP facility, on the east side of Vine Street, operated from the late 1880s till 1911, and originally used coal as a feedstock. The second MGP facility was located on a 1-acre parcel on the west side of Vine Street and operated from 1911 to 1964. Between 1911 and 1947, this facility used a "water-gas" or "carburetted water gas" process for the manufacturing of gas. Between 1947 and 1964, the property was also the site of a distribution facility for butane and propane gases (Hydro-Search 1991a).

During the late 1800s and early 1900, over 70 Wisconsin towns and cities obtained manufactured gas (primarily hydrogen, methane, and ethane) from MGP facilities for heating and lighting. To manufacture the gas, coal or petroleum feed stocks were heated to high temperatures in the absence of oxygen. Manufactured raw gas was then cleaned, stored in tanks, and distributed throughout a community via a local gas line network. These MGP properties were frequently situated along rivers and lakes because a large volume of water was typically needed for daily operations. MGP production declined in the United States with the expansion of electrical plants and natural gas pipelines across the country. While MGPs were abandoned or redeveloped for other purposes, high concentrations of heavy and light fractions of coal tar wastes from gas production often remain and can continue posing environmental and public health concerns (Hatheway 2009).

The lighter range of contamination commonly found at former MGP sites includes aromatic volatile organic compounds (VOCs), such as benzene, ethylbenzene, toluene, and isomers of xylene (BETX). The heavier fractions of coal tar wastes include a wide range of multiple-ringed or polycyclic aromatic hydrocarbons (PAHs). MGP-related PAHs include naphthalene, pyrene, and seven other PAHs that are classified by U.S. EPA as "suspected human carcinogens": benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. Other environmental contaminants common at former MGP sites also include various phenols and stable iron cyanide complexes, such as ferric ferrocyanides (DHS 2004).

In June 2010, the City of Baraboo hired contractors to remove approximately 1,200 tons of contaminated soils and waste from the former Baraboo MGP site. The ultimate intent of the cleanup was to achieve soil cleanup standards that would enable the property to be redeveloped for acceptable mixed-used purposes, such as residential, commercial, and park or recreational green space.

Site Contamination

Several environmental investigations of the former Baraboo MGP site found substantial levels of contamination in on-site soils and groundwater, primarily in the northwestern portion of the site. Sampling showed sub-surface soils had elevated levels of BTEX, PAH, and phenols. The highest levels of BETX (benzene at 25 mg/kg, or milligrams per kilogram) and PAHs

(benzo(a)pyrene at 190 mg/kg) were found at depths of 3 to 5 feet, where human contact with contaminants was unlikely. Slightly elevated levels of arsenic, lead, and total ferric ferrocyanides were also detected in on-site sub-surface soils, but the highest measured levels were well below concentrations that might pose a direct-contact health concern. Surface soils were minimally impacted, and when contaminants were detected, concentrations were very low.

Groundwater contamination was localized, with the highest contaminant levels near the north western quadrant of the site. Where contamination was found, benzene and naphthalene groundwater concentrations were as high as 18,000 µg/L (micrograms per liter). In general, groundwater in Baraboo discharges towards the Baraboo River, but on the former MGP site, natural attenuation and other factors appear to have prevented contaminated groundwater from migrating laterally away from the site and into the river. The City of Baraboo obtains municipal drinking water from groundwater. While local groundwater at the MGP site was impacted by coal tar contamination, the closest municipal well is approximately 4,000 feet upgradient of the MGP site and has not been affected by site conditions (Hydro-Search 1991a).

In 1998, high levels of PAHs and non-aqueous phase liquid (NAPL) coal tar product were also found in river sediments behind a low-head dam that was immediately adjacent to the MGP site. When this dam was dismantled in 2000, related actions included the removal of these coal-tar impacted sediments, with over 4,400 cubic yards of sediments excavated and mixed with fly ash to stabilize it for transport and disposal in a landfill (Hydro-Search 1991b, Ayers 2009). After removal of the dam and contaminated sediments, a sheet-pile wall was left in place along the riverbank to prevent residual contaminants in upland soil from migrating into the Baraboo River.

In November, 2002, Alliant Energy requested the Department of Natural Resources (DNR) to determine declare that no further investigative or remediation actions were required at the former Baraboo MGP site. DNR granted closure with the stipulation that a deed restriction be signed and recorded to address the issue of remaining soil contamination associated with the site. The purpose of the restriction was to maintain a surface barrier over the remaining soil contamination, in an effort to prevent it from impacting human health and the environment. Very high levels of PAH and BETX contamination remained in the west sector of the property. The deed restriction was needed to ensure maintenance of the gravel barrier (DNR 2002).

In June 2010, contractors for the City of Baraboo conducted a cleanup action to remove approximately 1,200 tons of contaminated soils and MGP waste from the former Baraboo MGP site. Following that action a clean cap was placed over the excavated area.

Discussion

Contaminated Soils

Contaminated soils at the former Baraboo MGP did not pose a human health concern in the past for people who went on the site. While BETX and PAH contamination was elevated at discrete locations in on-site soils, the affected soils were in deeper, sub-surface soils that were covered by clean surface material. Additionally, it is unlikely that the public or any workers at this property

would have unknowingly dug or excavated to this depth and had contact with these impacted soils. Contaminated sub-surface soils were removed during the excavation of June 2010. DHS supports cleanup actions at the Baraboo MGP site that would both decrease contaminant levels and allow for the removal of some, or all, property use restrictions.

Vapor Intrusion

It is not uncommon for MGP sites to have soil, groundwater and other environmental media containing NAPL or high concentrations of PAHs and aromatic VOCs. The volatile and toxic components of MGP-related contaminants typically include BETX compounds and naphthalene. Consequently, questions are frequently raised at MGP sites about the potential for lateral migration and intrusion of these volatiles into indoor air of nearby buildings. DHS has investigated and reviewed vapor intrusion data from various sites, including those heavily contaminated by BETX and other aromatic VOCs associated with MGP sites. Given the typical physical characteristics of MGP sites and the chemical properties of naphthalene and BETX compounds, DHS has found that these aromatic VOCs have a limited potential for lateral migration and vapor migration into buildings located on or adjacent to MGP sites, except when building foundations are located directly on top of waste, allowing for direct contact with NAPL (ATSDR 2003).

In many circumstances, site-specific soil gas, sub-slab vapor, and indoor air data have demonstrated that aromatic VOCs are not detected even short distances from high concentrations of NAPLs of MGP-related contamination. When vapor intrusion has been found inside buildings located directly on MGP sites the occurrence was under circumstances where the foundation of buildings have direct contact with highly contaminated groundwater or soils, or where MGP-related contaminant vapors have access to preferential pathways, such as very porous utility trenches or drainage tile systems. Given the conditions at the former Baraboo MGP site and the distance to the nearest buildings, DHS concludes that vapor intrusion to indoor air is not likely to have resulted in a current or past completed exposure pathway to the indoor air off adjacent buildings.

Air Management During June 2010 Cleanup Actions

During the remediation of MGP sites, air management is important to prevent the release of volatiles and dust into ambient air and to avoid potentially unsafe exposures by the public. Environmental remedial actions at other MGP sites have generated airborne releases that have reached nearby properties and resulted in odor and health complaints. DHS has regularly recommended that MGP sites undergoing cleanup include a comprehensive air management plan and actions to protect both occupational and public inhalation exposures (DHS 2004). The former Baraboo MGP site is very close to homes and other businesses, and during the 2000 sediment removal, DNR and contractors implemented a comprehensive air management plan to monitor and control airborne releases and protect public health.

Prior to the June 2010 removal of 1,200 tons of MGP-contaminated soils and waste, DHS input was requested by contractors for developing an air management plan. The final air management plan (MSA 2010a) was modeled after DHS guidance (DHS 2004) and included: site-specific

and community air monitoring, action levels for total VOCs and particulates; contingencies for conducting compound-specific air sampling should total VOCs exceed action levels; a protocol for responding to odor complaints at neighboring properties; and a plan whereby citizens can call a 24-hour number with questions and concerns about airborne releases or odors. The air management plan also included education and outreach to ensure that neighbors, including the nearby day care center, were aware of the planned cleanup and the potential for odors and ambient air releases.

Between June 15 and June 22, 2010, an excavation of contaminated soils and MGP waste was conducted at the site. During the excavation, air monitoring by the contractor detected no significant off-site levels of aromatic VOCs. On occasion a slight coal tar odor was noted at the east side gate and along the edge of the west fence. No odor or outdoor air complaints or concerns associated with the site were raised by the community during the excavation (MSA 2010b). Consequently, any air releases during June 2010 cleanup of the MGP site were not at levels that would have been considered harmful to the public.

Child Health Considerations

In communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than adults from certain kinds of exposures to hazardous substances. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than are adults; this means they breathe dust, soil, and vapors that are close to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus adults need as much information as possible to make informed decisions regarding their children's health.

There have been no reports or indication that children have visited the former MGP site and had potential contact with sub-surface soils within the fenced area, and, as a result, children were apparently not exposed to contaminated soils. Additionally, nearby children, including those at the adjacent day care center, were not apparently exposed to any elevated VOCs potentially released into ambient air during the cleanup actions of June 2010.

Conclusions

- In the past, contaminated soils at the former Baraboo MGP were 3 to 5 feet beneath the ground, where people were not likely to have direct contact and be harmed. Since then a June 2010 excavation removed contaminated soils.

- In the past or present, vapor intrusion from contaminated soils at the Baraboo MGP site is not likely to reach indoor air and harm people in nearby buildings.

- The June 2010 clean-up of contaminated soils at the Baraboo MGP site were not likely to have released levels of volatile chemicals to outdoor air that could harm neighboring workers, residents, or children.

Recommendations

At this time, DHS has no public health recommendations for the former Baraboo MGP site.

Public Health Action Plan

DHS will continue to work with the City of Baraboo and Sauk County Health Department to address public health questions and concerns related to the former Baraboo MGP site.

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CERTIFICATION

This Health Consultation for the **Baraboo Manufactured Gas Plant** was prepared by the Wisconsin Department of Health Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved methodology and procedures existing at the time this Health Consultation was begun. Editorial review was completed by the Cooperative Agreement partner.

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

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