Health Consultation

NEENAH MGP RESIDENTIAL INDOOR AIR

NEENAH, WINNEBAGO COUNTY, WISCONSIN

FEBRUARY 23, 2005

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

Neenah Former Manufactured Gas Plant
Residential Indoor Air Investigation

Neenah, Winnebago County, Wisconsin

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) investigated the potential for vapor intrusion into an apartment building next to a former manufactured gas plant (MGP) in Neenah, Wisconsin. In 2001, DHFS reviewed data on contaminated subsurface soils and groundwater and found that the soils and groundwater did not pose a health hazard to apartment residents, but DHFS also concluded that vapors have the potential to enter the apartment basement (DHFS 2001). Indoor air sampling of the apartment building in 2004 found very low levels of contaminants that pose *no apparent health hazard* to apartment residents.

Background

In June 2001, the Wisconsin Department of Natural Resources requested assistance from DHFS to determine if contaminants at a former MGP are a health hazard for the residents of Island Manor Apartments. The apartments, a 20-unit residential complex, are located at 400 Hewitt Street in the city of Neenah, Winnebago County, Wisconsin.

Immediately east of the Island Manor Apartments is a vacant lot that was the site of an MGP facility that operated from 1879 until 1902. Later, the site was used for a business called Buyer's Guide. MGPs operated in Wisconsin from the late 1800s to the mid-20th century. These facilities produced fuel gas composed of methane, hydrogen, carbon monoxide, nitrogen, and other gases that were produced by heating coal, steam, and coke or steam and oil. The gas produced was then pressurized and distributed throughout communities by a gas pipe network similar to the current method of distributing natural gas. By the early 1900s, at least 70 MGP facilities were still operating in Wisconsin. Today, some of these former MGP sites contain original buildings; some sites have been converted to other uses but still have subsurface MGP wastes. Coal tars, light oils, and inorganic wastes are often found in soil, sediment, and groundwater near former MGP sites and can be both an environmental and public health concern. Some of the chemicals commonly found at MGP sites include benzene, toluene, naphthalene, and xylenes.

In August 2001, DHFS visited the Island Manor Apartments and the former MGP property and evaluated the site conditions and the environmental sampling data from the two properties (DHFS 2001). DHFS concluded that the site was not a health hazard because people did not have contact with contaminated subsurface soils and groundwater. Drinking water for the city of Neenah is from the municipal water supply, which is not affected by contaminants at the MGP site and is safe to drink. DHFS staff noted that standing water in a basement sump crock of the Island Manor Apartments had a slight odor of coal tar. DHFS sampled water from two basement sump crocks and found very low levels of MGP-related contaminants, including benzene and naphthalene. The levels of contaminants found in sump water were less than Wisconsin's Public Health Drinking Water Quality Enforcement Standards (WAC NR140) and would not pose a health concern even if people were regularly drinking this sump water.

Subsurface soils and groundwater near the Island Manor Apartment building still have very high levels of benzene and naphthalene. DHFS concluded in 2001 that vapors had the potential to enter the indoor air of the basement by soil vapor migration and intrusion or from contaminated groundwater flowing into sump crocks (DHFS 2001). At that time, DHFS recommended collecting air samples from the basement to ensure that the indoor air was safe for apartment residents, including those who regularly use the basement laundry facility and storage lockers. No living quarters or office spaces are in the basement. At the time of the 2001 visit, the owner of Island Manor Apartments declined permission for DHFS to collect indoor air samples from the apartments. The apartments were sold in 2003, and in August 2004, the new owner authorized DHFS to collect indoor air samples.

Methods

On August 30, 2004, DHFS collected four air samples at the Island Manor Apartments using 6-liter Summa® stainless steel canisters. Each Summa canister was prepared by creating a 30 mmHg vacuum and was outfitted with a flow restrictor valve that enabled complete filling during a 90-minute period. Summa canisters were placed at three indoor locations: 1) the basement slab near the north sump crock; 2) the basement slab near the south sump crock; and 3) the main floor foyer area. A fourth Summa canister was placed outdoors on the lawn in front of the entrance of the Island Manor Apartments to provide a background ambient air sample. The samples were analyzed for volatile organic compounds (VOCs) using the EPA Method TO-14a by the Wisconsin State Laboratory of Hygiene in Madison, Wisconsin.

Discussion

The results of indoor air sampling at the Island Manor Apartments (Table 1) found slightly elevated levels of certain VOCs, but none of the levels indicate a health concern and pose *no apparent health hazard* to apartment residents. Benzene was found in all four air samples slightly above its health-based comparison value, with the highest levels found in the two basement indoor air samples. The benzene detected in the basement air may result from vapors originating from the MGP site, although the levels of benzene in these two samples are not unusual for a residential setting. Sampling of indoor air in private urban homes by Sexton (2004) found mean benzene levels of 1.8 ppbv.

There is currently no active ventilation system at the Island Manor Apartment building, which limits the amount of air exchanged between the basement and the rest the building. This limited air exchange is reflected by the difference in the measurement of benzene concentrations between the upstairs common area and the basement. Because people do not live or work daily in the basement, their inhalation exposure duration to basement indoor air is limited to the short periods when they are using the laundry facility or storage lockers. Even if people lived in the basement and were exposed on a daily basis to the highest level of benzene observed at the

Island Manor Apartments, the amount and duration of benzene inhaled would not be a health concern.

If benzene vapors were being regularly released into the basement from either vapor intrusion or contaminated water in the crock sumps, the benzene concentrations in the basement could possibly build up and be much higher than the amounts that were detected. The benzene at the levels detected in the indoor air of the basement, however, is similar to levels that DHFS has observed in unaffected homes. Benzene in the indoor air of homes is commonly from products purchased and used by homeowners, including solvents, cleaning solutions, and cigarette smoke. Benzene can enter a residence from an attached garage or can be brought in from outdoor air. DHFS staff inspected a portion of the basement where the building owners stored cleaning products, cleaning equipment, and other items such as gasoline-operated yard machinery. These products may also be sources of benzene in the basement indoor air.

Table 1: Indoor Air Concentrations
Volatile Organic Compounds (VOCs)
Island Manor Apartments, Neenah, Wisconsin
August 2004
All Concentrations in Parts Per Billion by Volume (PPBV)

	Indoor Air				
Chemical	Basement South Sump (IMA-01)	Basement North Sump (IMA-02)	Upstairs Foyer (IMA-04)	Outdoor Air (IMA-03)	Comparison Value
Benzene	1.2*	1.7*	0.14*	0.15*	0.1[a]
Ethylbenzene	1.3	1.4	0.06	0.08	n/a
Isopropyl benzene	nd	nd	nd	0.06	n/a
n-Octane	1.0	1.0	nd	nd	n/a
Styrene	1.5	1.4	nd	0.19	60.0[b]
Toluene	12.0	13.0	0.34	0.25	80.0[b]
Xylenes (total)	5.9	6.0	0.26	0.3	n/a

* - Exceeds Comparison Value
a - Cancer Risk Evaluation Guide for 1 in 1,000,000 excess lifetime cancer risk
b - ATSDR Chronic Environmental Media Guideline
nd - Chemical not detected
n/a - Comparison value not available.

Given the presence of naphthalene at the former MGP property, DHFS staff were also interested in the levels of naphthalene in indoor air. Using the TO-14a method, the Wisconsin State Laboratory of Hygiene was unable to quantify naphthalene in the samples, but laboratory technicians reported that gas chromatography did not indicate the presence of naphthalene in any of the four samples.

The presence of very low levels of benzene and naphthalene in sump water demonstrated that a pathway probably exists for vapor intrusion into the indoor air of the Island Manor Apartment building. Within short distances from the apartment building are very high concentrations of MGP- and petroleum-related contaminants in groundwater and subsurface soils. Fluctuations of groundwater levels due to flooding or unusual weather events can raise the water table and may increase the movement of nearby contaminants into the apartment building. In early 2001, one month prior to the first DHFS visit to the Island Manor Apartments, the nearby Fox River was at an unusually high level and caused a substantial rise in the local water table. This resulted in flooding of the basement to a depth of 6 inches, which caused water damage to walls and items stored there. During their first visit, DHFS asked the property owner about conditions in the flooded basement. Although many items were water damaged and wall board needed replacement, the property owner reported that he had not observed any oily sheens nor had he noticed any petroleum or coal tar-like odors. Since 2001, the basement has not been flooded. DHFS suggested to the property owner that he periodically check the basement and sumps for petroleum and coal tar odors, particularly if flooding occurs. If such odors are noticed, the property owner should contact DHFS.

Child Health Considerations

DHFS recognizes that children are especially sensitive to some contaminants. For that reason, DHFS includes children when evaluating exposures to contaminants and considers children as one of the most sensitive populations evaluated in this health consultation. Children who live in the Island Manor Apartments have not been exposed to contaminants at levels that would be expected to cause or increase the risk of adverse health effects.

Conclusion

Results of air sampling at the Island Manor Apartments showed very low levels of VOCs in indoor air. The concentrations of these compounds in indoor air pose *no apparent health hazard* to apartment residents.

Recommendation

No further action is needed by DHFS for this site.

Public Health Action Plan

DHFS will continue to work with the City of Neenah Health Department and Wisconsin Department of Natural Resources to address human health issues of the former MGP property. When requested, DHFS will provide technical assistance to the owner of the Island Manor Apartments property regarding nearby contamination.

References

1. Wisconsin Department of Health and Family Services. Letter to J Ziemba from H Nehls-Lowe and J Hayes. Madison, WI: DHFS. November 20, 2001.

2. Wisconsin Administrative Code (WAC). Groundwater Quality. Chapter NR 140.10 WAC. April 2001.

3. Sexton K, Adgate JL, Ramachandran G, Pratt GC Mongin SJ, Stock TH Morandi MT. 2004. Comparison of personal, indoor, and outdoor exposures to hazardous air pollutants in three urban communities. *Env Sci Technol* 38:423-430.

Consultation Preparers

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CERTIFICATION

This health consultation, on the Neenah Former Manufactured Gas Plant - Residential Indoor Air Investigation, 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 health consultation and concurs with the findings.

Lora C. Mayes

for RE Team Lead, CAT, SPAB, DHAC, ATSDR