

Health Consultation

MOUNT VERNON RESIDENTIAL INDOOR AIR IMPACTS

MOUNT VERNON, DANE COUNTY, WISCONSIN

APRIL 11, 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

Health Consultation: A Note of Explanation

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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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Prepared by:

Wisconsin Department of Health and Family Services
Bureau of Environmental Health
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
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Summary

In May 2004, a resident of the Village of Mount Vernon contacted the Wisconsin Department of Health and Family Services (DHFS) for assistance with an apparent chemical vapor intrusion problem. DHFS was also contacted for assistance by the Department of Natural Resources (DNR) which had also been working on the problem. Petroleum product and vapors that entered the home at this Village of Mount Vernon residence posed a *public health hazard* from both fire and explosion and short-term exposure health effects. It is not likely that past exposures would result in long term health effects. The current potential for contaminants to impact this home poses an *indeterminate public health hazard*.

Background

On May 23, 2004, a resident in the Village of Mount Vernon, Dane County, Wisconsin, experienced flooding problems in her home. The water entering the basement also brought petroleum contamination into the basement from an unknown source, and the petroleum floating on the water in the basement caught fire. The sole resident of the home contacted the Mount Horeb Volunteer Fire Department who responded to the home and extinguished a small fire that remained when they arrived (MHVFD, 2004). The fire department contacted the DNR who also responded. The DNR put the resident in touch with a company that specializes in emergency chemical spill cleanup work. On June 4, 2004, shortly after returning to the home after the indoor cleanup work was completed, the resident contacted DHFS with concerns about well water quality. The original source of the petroleum contamination in groundwater has not yet been found. This public health consultation documents observations and recommendations provided by DHFS to the homeowner and DNR related to the incident.

Drinking Water

The resident had been in touch with DNR staff about well water quality concerns, and the DNR was attempting to find funding to sample the well, but had not yet been successful. After talking with the resident about the problem, DHFS contacted the DNR Spills Coordinator and Drinking Water Specialist. Because there was a clear exposure related to contaminated groundwater, and at the recommendation of the DNR staff involved, DHFS paid the cost of sampling the well for chemical solvents associated with petroleum and bacteria. No chemical solvents or bacterial contamination were found in the well sample collected on May 28, 2004 (WSLH, 2004). Because health concerns were initially related to odors, the resident was advised to not drink the water if petroleum odors are noticed in the future and to also contact either DNR or DHFS.

Indoor Air

On June 17, 2004, the resident contacted DHFS to report that petroleum odors were again noticeable in the home, apparently coming up from the basement. The resident had mentioned having this problem many years ago (mid 90s), and recently learned that the local fire department had responded to a similar problem at the home 20 years or more ago. After discussing the general layout of the basement, DHFS recommended placing a fan in the basement window to draw air out of the basement and prevent impacted air from moving into the upstairs living area. DHFS then arranged to meet the resident at the

home after work on June 22nd. At that time DHFS staff observed that the ventilation fan was effectively preventing air exchange between the basement and upstairs as no petroleum odor was present upstairs. DHFS screened indoor air with a photo-ionization detector (PID) meter capable of measuring volatile organic compounds (VOCs) at very low levels (RaeSystems, 2003). There were no measurable petroleum solvents or VOCs, in the air of the upstairs living area based on the hand held PID meter DHFS brought to the home. DHFS experience with this PID meter indicates that there is often at least a low amount (10 to 80 parts per billion or ppb) of VOC in indoor air of homes from perfumes, air fresheners, or other household chemicals.

Upon going into the basement there were no elevated VOC measurements in the indoor air of the room next to the stairway until a basement fan was turned off. The resident had placed a fan in the basement window as DHFS had suggested, but she had also placed another fan in a basement doorway to help move the air from the room with the stairway, to the basement room with the fan in the window. Shortly after the fan between the basement rooms was turned off, the VOC measurements rose to and stayed at about 10 ppb in that room. DHFS used the PID meter to screen air around the pressure tank and other plumbing features, but there were no noticeable VOC sources in that room.

The next basement room towards the back of the house (South) is a step lower than the first room. In that room the VOC readings rose to about 200 to 300 ppb, and the petroleum odors became noticeable. VOC readings reached as high as 600 to 700 ppb for short periods. Using the PID meter, DHFS checked around that room and found that VOC vapors were entering the basement through cracks in the floor of that room. The VOC measurements were just over 3,000 ppb in the air just above the cracks in the cement floor. The VOCs in air within and above the sump crock were not elevated above that of the rest of the room. There were no remarkable VOC levels in the small utility room off to the side of the second room. The fan in the window of the basement was left on during the visit. There were no outdoor sources of VOCs at the time of the visit.

The ventilation fans that the resident had set up were effectively preventing vapors in the basement from migrating upstairs and entering the living area of the home. With fans operating, the air in the home does not pose an inhalation exposure hazard to the resident. The fan used in the basement window is a standard house fan that the resident had placed over the window opening from the outside. Because this type of fan is not designed for outdoor use this method of ventilation would not be effective during wet weather and may become an electrical safety hazard.

The fire department disconnected the LP gas and electricity to the home during their response on May 23, 2004. The water heater and the furnace were not in use during the June DHFS site visit because for 12 days, they had been sitting in 20 inches of water with petroleum product floating on top. There was a fire hazard in the home when the gasoline product was carried by water, entered through the cracks in the basement floor and caught fire. The gasoline vapors observed during the site visit seeping through floor cracks were less likely to result in a fire hazard than the liquid product, as in May 2004. The level of gasoline vapor that it would take to cause a fire would be roughly

14,000,000 ppb, or more than 4,000 times higher than the highest level of vapor entering the basement during the DHFS visit (NIOSH, 1997). Accumulation of these vapors to such a level in the indoor air of the home would likely constitute a long-term chemical inhalation exposure hazard to residents.

Health Implications

No air samples were collected for laboratory analysis from the indoor air in the home. For cases involving petroleum contamination (gasoline or fuel oil), DHFS has a policy of not recommending indoor air testing if characteristic petroleum odors are noted and their presence is not in dispute (DHFS, 2003). This policy is the result of many years of experience with petroleum releases that demonstrates that analytical sampling results are not needed in order to recognize that an inhalation health hazard is present, and to identify actions necessary to reduce exposure. Sample collection and analysis will, however, add unnecessary delay to the decision making and response process. Because indoor air quality varies dramatically from hour to hour and day to day, a sample of the indoor air would not necessarily represent the air the resident is exposed to over the long-term of living in the home.

Based on the nature of petroleum contaminants, and particularly their low odor threshold, if odors cannot be smelled in the basement, DHFS would not expect an unhealthy chemical exposure in the upstairs living area of the home (DHFS, 2003). When petroleum odors are noticeable but faint, breathing the vapors for many years could pose a health hazard. When odors are strong, the resident may also experience symptoms such as headache or nausea from short-term exposures. These short-term symptoms should go away after moving to fresh clean air, and no long-term or recurring health effects would be expected from those short-term exposures. Based on what the Mount Vernon resident told DHFS about the frequency of the odors and how strong they became in May 2004, the air quality in the home may have posed a short-term or acute health hazard during the infrequent period when odors were the strongest. These specific conditions posed a *public health hazard* from both fire and explosion and short-term exposure effects. Because the occurrence of odors have been very infrequent in the past, it appears unlikely that past exposures would contribute to long-term health effects. Long-term inhalation exposures in the past posed *no apparent public health hazard*. However, because in May and June, 2004 the odors have been stronger and more persistent than in the past, and conditions can change and may increase the frequency and strength of the odors, DHFS cannot not rule out the potential for a long term health hazard in the future at the home without some type of corrective action being taken. As a result, there is a potential that in the future contaminants may reappear again in this home, but the uncertainty of what the future indoor air levels may be is an *indeterminate public health hazard*.

The source of the petroleum contamination outside the home has not yet been identified. There currently is not a responsible party who would be required to investigate and correct the contamination problem. Until an off-site responsible party could be identified, it has been the residents' responsibility to pay for the work needed on their property and in their home. These costs have already been high and the insurance company carrying the homeowner's policy has indicated that these costs are not covered.

In the event that a responsible party is found, the resident may be able to recover costs from them so DHFS urged the homeowner to keep good records of these costs. DHFS provided the homeowner with information from the USDA Rural Development Office in Dodgeville about a Rural Development Home Repair Loan. A loan for this work is not ideal, but if the resident is eligible it may provide an option to consider in order to make it through the current situation. After Dane County was declared eligible for federal disaster assistance, DHFS suggested that the resident contact the FEMA Disaster Assistance Hotline at 1-800-621-3362 to find out if they may be eligible for assistance. The resident was encouraged to consider and evaluate all available options to find what works best for them.

The resident indicated that they had been under a considerable amount of stress as this would be a very difficult problem for anyone to deal with. They requested that DHFS condemn the home because of this problem. It is not the role of the Department of Health and Family Services to condemn housing, but rather to identify health hazards and make recommendations to reduce risks from chemical exposures. DHFS suggested that the resident contact the local building inspector for the area about whether the house should be condemned. Because this is a chemical contamination problem and not a structural defect of the building, the inspector may need assistance. If necessary, DHFS has offered to provide input on characterizing the health hazard. DHFS contacted the Environmental Health Program of the Dane County Human Services Department and obtained its assistance as well.

Child Health Considerations

Due to their breathing rates and lower body weight, children are generally more highly exposed to air pollutants than the adult population (EPA, 2002). Childhood exposures to the contaminants of concern for indoor air at this site would result in similar levels of increased health risk as discussed in the previous section. However, children are less able to indicate when they are uncomfortable from or experiencing symptoms from chemical exposures. There currently are no children living in this home.

Conclusions

- ◆ Petroleum product and vapors that entered the home at this Village of Mount Vernon residence posed a *public health hazard* from both fire and explosion and short-term exposure effects.
- ◆ Based on DHFS's experience in dealing with petroleum vapors in indoor air of homes, and the rare presence of odors noticed by the resident of the Mount Vernon home, past exposures in this home are not likely to cause long-term health effects.
- ◆ The current potential for contaminants to impact the Mount Vernon home poses an *indeterminate public health hazard*. The factors that lead to impacts in the spring of 2004 may return and again lead to problems in the future. However, the likelihood cannot be predicted based on gaps in our current knowledge of the source, degree, and extent of contamination.

Recommendations

- ◆ DHFS recommends that the resident at the Mount Vernon property relocate temporarily until the immediate concerns about fire and explosion and short term health effects has been mitigated. Since making this recommendation, the resident has relocated to another location.
- ◆ Because the homeowner has limited financial resources, DHFS recommends that DNR prioritize this site for investigation into the source of contamination. The DNR has now requested and received funding to conduct a state lead investigation into the source of contamination.

Public Health Action Plan

- ◆ DHFS will continue to address resident health questions and concerns about past exposures.
- ◆ DHFS will continue to provide technical assistance to DNR, the resident, and other parties as they attempt to prevent future indoor air impacts at this home.

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CERTIFICATION

This health consultation, **Mount Vernon Residential Indoor Air Impacts**, 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). The health consultation is in accordance with ATSDR-approved methodology and procedures existing when the health consultation was begun. Editorial review was completed by the Cooperative Agreement partner.

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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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