Health Consultation

OUTOKUMPU/FORMER UPTOWN BRASS
REDEVELOPMENT PROJECT
(a/k/a KENOSHA CITY – FORMER OUTOKUMPU SITE)

KENOSHA, KENOSHA COUNTY, WISCONSIN

EPA FACILITY ID: WID006101695

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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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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
Agency for Toxic Substances and Disease Registry

Summary
The Wisconsin Department of Health and Family Services (DHFS) was asked by an environmental consultant and the Wisconsin Department of Natural Resources (DNR) to review a remediation and redevelopment plan for a former brass manufacturing plant in the City of Kenosha. DHFS had provided guidance related to redevelopment and questions about chemical vapor intrusion earlier in the planning process. After review of the "Remedial Action Plan, West Side of Former Outokumpu Copper, Kenosha Facility" DHFS concluded that the proposed remedial actions and their relationship to the redevelopment plan removes the potential for chemical vapor intrusion into on-site buildings. This remediation and redevelopment proposal is protective of public health. If implemented, the site will pose "no public health hazard."

Background
The Former Outokumpu Copper facility in the City of Kenosha operated from 1886 until 1999 as a brass manufacturing facility under various ownership. The property, which is located just over a half mile west of Lake Michigan, is bounded by residential, commercial, and institutional land uses.

The facility's manufacturing structures and wastewater treatment plant were removed in 2002 and 2003. Previous investigation identified chemical-contaminated soils on the property. During the demolition of buildings on the property, the most highly contaminated soils were removed. Additional sampling was then conducted to fully characterize the degree and extent of residual chemical contamination in soil and groundwater on the property (TRC, 2004). Following the soil removal actions and building demolition, the contaminants of concern on the property are primarily chlorinated volatile organic compounds (VOCs), metals, and polycyclic aromatic hydrocarbons (PAHs).

The property is currently undergoing redevelopment planning. The proposed redevelopment includes a mixture of commercial and multifamily residential properties. The plan is focussed on the western half of the former Outokumpu property. The commercial usage will include a grocery and up to six additional retail buildings. The residential usage, as proposed, will include senior housing and town homes. Each of the residential units will be located either above a retail business or a below-grade parking garage.

In June of 2004, DHFS assistance was requested by contractors working on both the remedial action and redevelopment plans for the project. DHFS was asked for general guidance on how these plans should be developed in order to ensure that all human health concerns about the potential for vapor intrusion would be addressed. At that time, DHFS suggested four general methods for addressing the vapor intrusion potential. Based on the site setting and preliminary development proposal, DHFS recommended that a combination of the methods be used consistent with the DHFS guidance on vapor intrusion (DHFS, 2003).

Although DHFS will not be evaluating the pathway of direct contact with soil, the measures within the remediation proposal for the site will also address potential surface soil exposure from heavy metals and polycyclic aromatic hydrocarbons. The property owners are proposing to comply with guidance developed by the DNR to prevent direct contact with contaminated soils.

DHFS Preliminary Recommendations

During a June, 2004 meeting DHFS made four general recommendations for Brownfield redevelopment when vapor intrusion is a consideration. Individually, or in combination, they can be used to ensure that chemical vapor impacts are prevented.

1) Source Remediation/Removal - The first and most straightforward recommendation involves cleanup or removal of the contaminant source. Complete cleanup is not always practical, or necessary. However, the greater the level of cleanup, the easier the rest of this task becomes.
2) Building Location/Orientation - Locate buildings such that they are on the cleanest part of the property. This is an important option when the size of the property is large and the remaining soil and/or groundwater impacts are not widespread.
3) Barriers to Migration - Create barriers to subsurface vapor migration by sealing subsurface migration pathways along utility lines, providing preferential flow routes away from buildings, or a combination of the two. The creation of annular space seals along utility lines is a common technique. Subsurface venting of areas with remaining impacted soils reduces the likelihood that vapors will move laterally away from the source areas.
4) Incorporating Migration with Building Design - Lastly, with new construction we have the opportunity to design building features that prevent chemical vapors from entering buildings. Radon resistant new construction methods are practical, and have also been proven to be effective at preventing soil vapor entry.

Remedial Action Plan

On August 30th, 2004, DHFS received the "Remedial Action Plan - West Side of Former Outokumpu Copper Kenosha Facility." DHFS staff reviewed this plan with emphasis on how it addresses vapor intrusion prevention. The following is a discussion of how the proposal addresses each of the four recommendation categories provided by DHFS in previous meetings for this project.

1. Source Remediation/Removal

Past excavation of soil and underground storage tanks have removed the most highly contaminated soils. More soil will be removed from the two remaining source areas of the property (North Degreaser Area and South Degreaser Area). Outside of these two areas, there does not appear to be any additional concentrated areas of VOCs in soils on the property.

Groundwater impacts remain on the property, and may represent a contaminant source for vapor intrusion in the future. Table 1 contains the highest concentration of each of the primary contaminants of concern found in groundwater between the two source areas. A screening value derived from EPA's draft guidance for investigating vapor intrusion (USEPA, 2002a -Table 2c) is also included for reference.

For each of the five chemicals of concern in groundwater listed in Table 1, there was at least one location on the property that exceeded the EPA Table 2c screening value from the draft EPA guidance. The contaminant plumes in groundwater are isolated and concentrations for all compounds drop to very low levels and no detections within a short distance of the highest concentrations. The models and underlying assumptions used to derive the screening values in the EPA guidance are intended for application at sites where the contaminant concentrations are representative of levels beneath most or all of the building footprint. In this case concentrations would be very low or below detect for much of the surface area at each building. This distribution of contaminant concentrations indicates that vapor intrusion would be much less likely than a model or generic screening value would predict. However, with small areas and with these high concentrations in groundwater remaining on the property, it would be difficult to demonstrate that vapor intrusion was impossible without buildings in place to conduct confirmation sampling.

Table 1
Summary Groundwater Results
Outokumpu/Former Uptown Brass Property (6/15/2004)

VOC	High Concentration (μg/L)	Comparison Value*(μg/L)	Predicted Air Concentration** (ppbv)
1,1-Dichloroethane	40,800	2,200	10,737
cis-1,2-Dichloroethylene	15,000	210	629
1,1,1-Trichloroethane	628,000	3,100	81,032
Trichloroethylene	1,520	5.0	118
Vinyl chloride	6,470	2.0	2,847

μg/L – micrograms per liter
ppbv – parts per billion per volume of air
*US EPA Table 2c value for groundwater to indoor air (USEPA, 2002)
** These predicted indoor air concentrations are based on worst case assumptions that in fact do not exist on this property.

Site specific data needed to refine the predicted values could potentially reduce these levels dramatically, but is not available. Because these data are unlikely (based on test model runs) to completely eliminate the potential for vapor intrusion, and because the property owners are willing to implement preventive actions, additional data is not being requested prior to initiating this project. Based solely on source removal actions and remaining contaminant concentrations in groundwater, the potential for vapor intrusion is believed to be much lower than the estimates in Table 1, but can not be ruled out. During the geotechnical investigation of the property the property developer will be installing approximately 65 soil borings within the proposed footprints of the building. Each of the borings will be screened with an flame ionization detector to make sure that our current understanding is correct, and that unknown soil VOC source areas are not present below the proposed buildings.

2. Building Location/Orientation
The planned building locations are such that only two of the buildings are near the source areas and their locations minimize to the extent possible the amount of residual soil contamination that will remain beneath the buildings. This was done while still maximizing the use of the available property. The building locations and additional soil removal actions are coordinated such that any excavation for the building footings that cuts into impacted soils near the source areas will be characterized and removed for disposal.

3. Barriers to Migration
If the development had continued with no additional work to address vapor migration, it is possible that vapor intrusion would no longer be an issue. This possibility would be difficult to confirm without first developing the buildings and conducting monitoring. In the absence of such monitoring data, the proposal incorporates additional precautionary steps to further reduce concerns for this exposure pathway.

Beneath each building, a 10 mil high density polyethylene vapor barrier will be placed over a layer of sand. All penetrations through this vapor barrier will be booted and sealed. All subsurface utility lines will have bentonite plugs to prevent the utility corridors from becoming preferential vapor migration pathways to the buildings (BT2, 2004).

4. Incorporating Mitigation with Building Design
On their own, the previous three measures should be enough to prevent vapor intrusion on the property. A remaining concern would involve a defect or break in the vapor barrier that could allow the chemical vapors contained below to migrate into the building foundations. The building design itself addresses this concern by blocking and redirecting soil gas migration to the atmosphere so that any remaining vapors would vent slowly to the atmosphere rather than into buildings. Each building will have either an active or a passive system to ventilate and depressurize soil gasses beneath the foundation (similar to a radon mitigation system). Buildings constructed as slab-on-grade with parking garages beneath them will have passive foundation ventilation systems only, because they will each have active ventilation of the air in the garage to address building code requirements (Comm, 2003). Buildings with below-grade parking will have active sub-slab depressurization systems and also meet building code requirements for garage ventilation. In addition to the foundation ventilation within the construction of the buildings, the proposal also includes design of building heating, ventilating, and cooling system design to maintain a positive pressure in the buildings themselves.

A common question about the use of sub-slab depressurization systems within a remediation and redevelopment proposal involves the need for long term monitoring and maintenance of the system by the property owner or responsible party for the cleanup. In this case, the steps taken to prevent vapor intrusion are sufficiently protective prior to adding a blower fan. For this reason, there are no long-term monitoring or maintenance requirements for the active sub-slab depressurization systems related to the residual chemical contamination on the property. DHFS supports this plan as described because

of the significant improvement to overall air quality that it provides and the reduction of indoor air radon levels that could be realized.

Public Health Implications

The primary contaminants of concern related to chemical vapor intrusion on this property are chlorinated VOCs, including 1,1-dichloroethane, cis-1,2-dichloroethylene, 1,1,1-trichloroethylene, trichloroethylene, and vinyl chloride. The predicted indoor air concentrations under worst case conditions without removal actions and other remedial measures incorporated into this proposal would be considerably higher than the chronic toxicity comparison values for each chemical. However, because the samples used in the evaluation represent an extreme overstatement of the source mass of contaminants available for vapor migration to each building, far lower indoor air impacts would be more realistic. For this reason, health effects from short-term exposures would be unlikely. Assuming a potential indoor air concentration of trichloroethylene of 10 ppbv and vinyl chloride of 10 ppbv, exposures over many years could result in a low increased risk of developing some forms of cancer from TCE and vinyl chloride exposures and damage to the liver and kidneys from the group of contaminants. Although the predicted level of risk from these exposures is in each case low, there is sufficient health benefit from avoiding such exposures to warrant taking the measures identified in the proposal (ATSDR, 1990,1996,1995,1997a,1997b).

Child Health Considerations

DHFS expects that children will someday live in the residential portions of this property, and frequent all parts of the property. The primary question that DHFS was asked to address with this consultation involved the potential for indoor air impacts from chemical vapor intrusion. Physiologically, children are more highly exposed to air pollutants than the adult population. Younger children also tend to spend a greater amount of time in the home than do adults who may leave for a significant part of each day to work. 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 (USEPA, 2002b). Each of these concerns, combined with concerns about increased exposure periods, are effectively addressed by the measures taken in this proposal.

Though not an issue of this consultation, DHFS also notes that the measures within the proposal to address surface soil impacts by a number of heavy metals and polycyclic aromatic hydrocarbons also provides sufficient protection for public health. The property owners are proposing to comply with guidance developed by the DNR to prevent direct contact with contaminated soils. DHFS concurs with the application of this guidance based on the conditions at this site. The purpose of the guidance includes the expectation that children tend to have a disproportionately higher level of exposure to contaminants in soils.

Conclusions

- The proposed workplan for redevelopment of the former Outokumpu property, if fully implemented, is expected to fully address any potential future concerns about chemical vapor intrusion to indoor air, and will result in “no public health hazard.”

Recommendations for Improving Indoor Air Quality

- DHFS recommends that a certified radon mitigation contractor be consulted or contracted with for the design and construction of building vapor mitigation features.

Public Health Action Plan

- The findings of this consultation will be provided to, and discussed with city officials and the Kenosha County Health Department by DHFS.
- DHFS will be available to address community questions and concerns about this plan as they are raised. This may be necessary because the history of this property as an industrial facility will be known to the public as well as future residents of this property. It will be important that information be made available explaining the former landuse, cleanup actions taken, and additional work that has and will be done in order to ensure the health and safety of the public.
- DHFS will assist the city and their developer with review of indoor air data following the post construction indoor air monitoring.

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Certification

This Outakumpu/Former Uptown Brass Health Consultation was prepared by the Wisconsin Department of Health and Family Services under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodologies and procedures existing at the time the Health Consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.

Technical Project Officer, CAT, SPAB, DHAC

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

Team Lead, CAT, SPAB, DHAC, ATSDR