BORDEN PACKAGING AND INDUSTRIAL PRODUCTS KENT, WASHINGTON

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WASHINGTON STATE
DEPARTMENT OF HEALTH
OFFICE OF TOXIC SUBSTANCES
HAZARDOUS WASTE SECTION

Site Description

This 12-acre facility makes formaldehyde and phenolic resins for use by the wood products industry. The Borden site is in an urban area northwest of the City of Kent's downtown core. Existing uses on the site are mainly industrial. Surrounding uses include commercial to the south, recreational immediately to the north (playfield) and northwest (Kent Commons), and residential only a tenth of a mile away from the site.

Environmental Contamination (see Table)

The highest concentrations of contamination reported in groundwater on the Borden site have been 25,000 parts per million (ppm) methanol, 660 ppm ammonia, 2800 parts per billion (ppb) phenol, 1800 ppb formaldehyde, and 80 ppb di(ethylhexyl)phthalate. Formaldehyde was also detected in soil at 63 ppm.

Data Gaps

The State Department of Ecology (DOE) reported one incident of formaldehyde in the air last summer. Neither the State Department of Labor and Industries nor the Puget Sound Air Pollution Control Authority matched DOE's finding.

In preparing this health investigation, Washington Department of Health (WDOH) relies on the information provided in the referenced documents. We assume that adequate quality assurance and quality control measures were followed regarding chain of custody, laboratory procedures, and data reporting. The analyses, conclusions, and recommendations in this health investigation are valid only if the referenced documents are complete and reliable.

Physical and Other Hazards

Not observed on site at time of visit.

Exposure Pathways

WDOH considers environmental and human factors to decide whether people are exposed to contaminants linked to this site. In our study of pathways, we look at five elements: a source of contamination, transport through an environmental medium, a point of exposure, a route of exposure, and an exposed population.

Exposure pathways are defined as either completed or potential. Completed pathways need to have all five elements and show that exposure has occurred in the past, is occurring in the present, or will occur in the future. Potential pathways have one or more elements missing but could exist, and describe an exposure that could have happened before, could be occurring now, or could happen in the future. We can rule out a pathway if one or more elements are missing and never will be present.

Completed Exposure Pathway: None identified.

Potential Exposure Pathway: Workers at the site could have been exposed to contaminated soil or groundwater in the past. If remediation occurs on site in the future, workers may be exposed to contaminants by skin contact, ingestion and inhalation; whereas residents, nearby employees or customers may be exposed by inhaling dust. No drinking water well has been identified within a mile downgradient from the site. Yet a future pathway could exist if a drinking water well was built closer to the site.

Community Health Concerns

No known health concerns have been received by this office from the community specifically about the Borden site at this time.

Potential Public Health Problem

Any worker or person near the site should be concerned about their health whenever formaldehyde is released into the air.

Ammonia exceeds the child's intermediate EMEG 220 times; (formaldehyde exceeds the LTHA); and methanol exceeds the child RMEG by 5000 times (see Table 1).

Ammonia and methanol levels in groundwater exceed the health guidelines for drinking water set forth by the federal government's Agency for Toxic Substances and Disease Registry (see Table 2). Any person, especially a child, who drinks Borden's groundwater (at levels listed in the next tables) for many years could suffer serious health effects, such as eyesight and respiratory problems. For instance, 2.5% methanol in the drinking water could cause optic nerve neuropathy, dyspnea, nausea and vomiting in an adult after 30 years use (see Table 2).

Table 1:

Borden P & IP Site - Kent, Washington			
Contaminant[1]	Sample Point[2]	Maximum GW Concentration (ppb or ug/l)[3]	U.S. ATSDR Screening Value (ppb)[4]
Ammonia	SB2	660000	ciEMEG = 3000
DEHP	BC-MW1	80	(Unlisted)
Formaldehyde*	SB1	1800	LTHA = 1000
Methanol	SB1	25000000	RMEG = 5000
Phenol	SB1	2800	LTHA = 4000

Footnotes:

1. DEHP = di(ethylhexyl)pthalate.

2. The BC-MW1 refers to 1987 data and the SB sample points refer to 1991 data.

3. The maximum on-site groundwater concentration is expressed in parts per billion or micrograms per liter of water sampled.

4. These are the latest screening values set forth for drinking water by the Agency for Toxic Substances and Disease Registry (ATSDR) in Atlanta, Georgia:

   - **EMEG = Environmental Media Evaluation Guide** is the highest priority comparison value, and is derived from ATSDR's MRL value. The ciEMEG assume body weight of 10 kg for a child. Drinking water EMEGs assume a child intake of one liter per day. Intermediate EMEGs suggest harmful effects, except cancer, for an exposure period between two weeks and one year.
   - **LTHA = Lifetime Health Advisory** (Environmental Protection Agency or EPA) is a contaminant level that would not be expected to produce a noncancer effect throughout seventy years of drinking this contaminated water source.
   - **RMEG = Reference Dose-based Media Evaluation Guide** (ATSDR) is a screening value derived from an EPA value, intake rate and body weight. It assumes an exposure period of one year. A **cRMEG** is calculated for a child.

* In 1987, highest results for formaldehyde were 5.7 mg/l (5700 ppb) and 210 mg/l formalin (reference: Elaine Atkinson, State Dept of Ecology, on 30 SEP 1992).

Table 2:

Chemical	Estimated dose[1] in mg/kg/d	Health guideline[2] in mg/kg/d
Ammonia[3]	baby = 66 adult = 19	iMRL = 0.3
DEHP	adult = 0.0009	not listed
Formaldehyde	child = 0.024 adult = 0.065	RfD = 0.2
Methanol[4]	child = 109 adult = 286	RfD = 0.5
Phenol	baby = 0.3 adult = 0.03	acuteMRL = 0.6 RfD = 0.6

Footnotes:

1. Oral dose estimated from the following assumptions:
   for baby: age one, drinks one liter/day for 2 weeks, weighs ten kilograms
   for child: age 1-5, drinks one liter/day for five years, weighs 16 kilograms
   for adult: drinks two liters per day for 30 years, weighs 70 kilograms

2. Health guidelines:
   acuteMRL = acute minimal risk level (ATSDR): this is for an exposure period of less than two weeks.
   iMRL = intermediate minimal risk level (ATSDR): this is for an exposure duration from two weeks to one year.
   RfD = chronic reference dose (EPA): this is for a lifetime exposure of seventy years.

3. Lowest adverse effect level in the ATSDR Toxicological Profile is 79 mg/kg/d.

4. Lowest dose found in the current RTECS (Registry for Toxic Effects of Chemical Substances) database for a human is 143 mg/kg, which resulted in optic nerve neuropathy.

All values are represented in miligrams of chemical per kilogram body weight per day.

Conclusions

Groundwater beneath the Borden site is contaminated with potentially harmful levels of ammonia, di(ethylhexyl)pthalate and methanol. There is, however, no evidence of an immediate health threat to the public at this time. And there is not enough evidence to show that these contaminants will pollute drinking water sources in the near future. Therefore, more information needs to be collected and studied before making a final conclusion about health risk.

Public Health Recommendations

1. Plans toward eventual remediation of the site should continue.

2. Periodically monitor the air around the site for formaldehyde.

3. Survey wells in the community and monitor the nearest drinking water wells for ammonia, di(ethylhexyl)pthalate, formaldehyde, methanol and phenol.

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References

ATSDR (Agency for Toxic Substances and Disease Registry) Toxicological Profile for DEHP, 1991.

HSDB (Hazardous Substance Database) for formaldehyde, methanol, and phenol, 1992.

EMCON Northwest Inc. April, 1992. Summary Report, Hydrogeologic Investigations, Borden Packaging & Industrial Products Facility, Kent, Washington, Volume 1.

Washington State Department of Ecology. 1992. Site Hazard Assessment for Borden, and WARM Summary Score Sheets.