



Agency for Toxic Substances
and Disease Registry
Atlanta GA 30333

July 22, 1998

Linda Howard
Waste Management Division
United States Environmental
Protection Agency
77 W. Jackson Blvd. (SR-6J)
Chicago, Illinois 60604

Dear Linda:

Here is a copy of the Site Review and Update (SRU) for the following site:

Better Brite Plating Chrome and Zinc Shops

The primary purpose of this document is to perform a review of current site conditions and recommend further actions for ATSDR to take at the site. If an extensive evaluation is necessary due to new information the SRU will recommend that a health consultation or a public health assessment be performed. A written response is necessary only if significant errors are noted which could change the conclusions and recommendations made in the document.

If you have any questions regarding this document, please contact me at 886-0840.

Sincerely,
Louise A. Fabinski

Louise Fabinski
Senior Regional Representative

Site Review and Update

BETTER BRITE PLATING CHROME AND ZINC SHOPS

DEPERE, BROWN COUNTY, WISCONSIN

CERCLIS NO. WTT560010118

JUNE 29, 1998

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

Site Review and Update: A Note of Explanation

The purpose of the Site Review and Update is to discuss the current status of a hazardous waste site and to identify future ATSDR activities planned for the site. The SRU is generally reserved to update activities for those sites for which public health assessments have been previously prepared (it is not intended to be an addendum to a public health assessment). The SRU, in conjunction with the ATSDR Site Ranking Scheme, will be used to determine relative priorities for future ATSDR public health actions.

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SITE REVIEW AND UPDATE

BETTER BRITE PLATING CHROME AND ZINC SHOPS

DEPERE, BROWN COUNTY, WISCONSIN

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Prepared by:

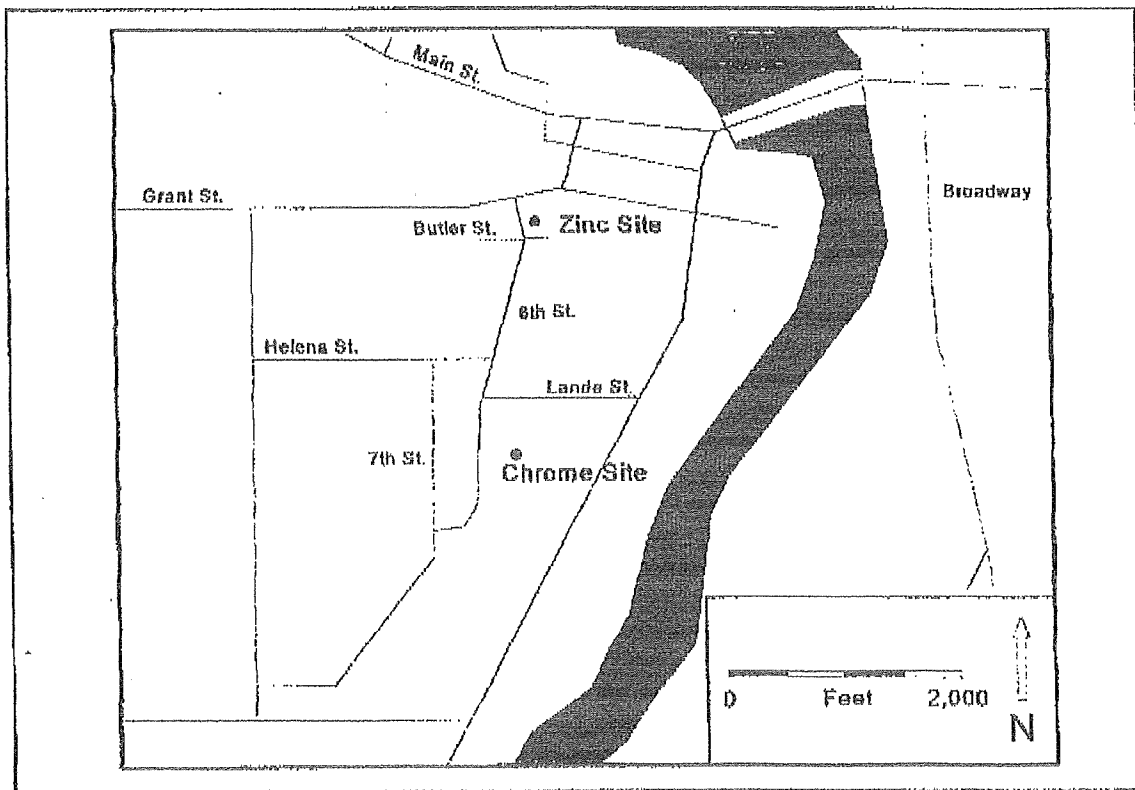
Wisconsin Division of Health, Madison, Wisconsin
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

SUMMARY OF BACKGROUND AND HISTORY

This document summarizes past and current public health hazards posed by the Chrome and Zinc Shops in De Pere, Wisconsin. For a discussion of the toxicology of chemicals of concern, please refer to the Preliminary Public Health Assessment written by the Wisconsin Division of Health (DOH) in 1991. (See references)

The two properties, Better Brite Chrome and Better Brite Zinc Shops are located about 2,000 feet apart in a mixed industrial and residential neighborhood in the De Pere, which is in Brown County, Wisconsin. Chromium, cadmium, zinc, cyanide, and chlorinated organic solvents were used in metal plating operations at the shops from 1963 through 1989. Waste disposal practices at the two businesses caused contamination of soil, air, surface water, and groundwater.

Figure 1: Site location of Better Brite Chrome and Zinc Shops (De Pere, Wisconsin).



De Pere residents in the vicinity of these two plating shops complained for years about the way the businesses operated. During their operation, neighbors reported that the company poured liquid wastes on the ground, disposed of wastes in the storm sewer, and vented fumes out of windows. (3)

Over the years, a number of agencies have responded to complaints. Early in the 1970s, the plating companies were inspected by the Occupational Safety and Health Agency. Later in 1979, DOH evaluated health concerns when a resident complained of contaminants and wanted an opinion about the safety of eating garden vegetables that may have absorbed contaminants from runoff surface water. A DOH representative visited the site and recommended that people not eat vegetables that were grown in contaminated water. A year later, the state lab sampled garden vegetables and found levels of chromium similar to those found in grocery store vegetables.

While still in operation, the Wisconsin Department of Natural Resources (DNR) investigated the businesses and ordered a number of cleanup actions. In the late 1980s, DOH records indicate that DNR installed monitoring wells. In the same period, the U.S. Environmental Protection Agency (EPA) constructed a pre-treatment system to remove high levels of chromium from water before allowing discharge to the sanitary sewer.

EPA proposed the Chrome and Zinc Shops for joint inclusion, as one site, on the National Priorities List in October 1989 and added the site to the list in August 1990.(1) In February 1990, United States Senator Herbert Kohl of Wisconsin petitioned the Agency for Toxic Substances and Disease Registry (ATSDR) to conduct a health assessment of the site. (2) In response to his request, DOH, under a cooperative agreement with ATSDR, conducted a health assessment of the site. Since first requested, DOH staff have consulted on many occasions with environmental agencies and community members to make sure that public health concerns are considered during the investigation and cleanup of the site.

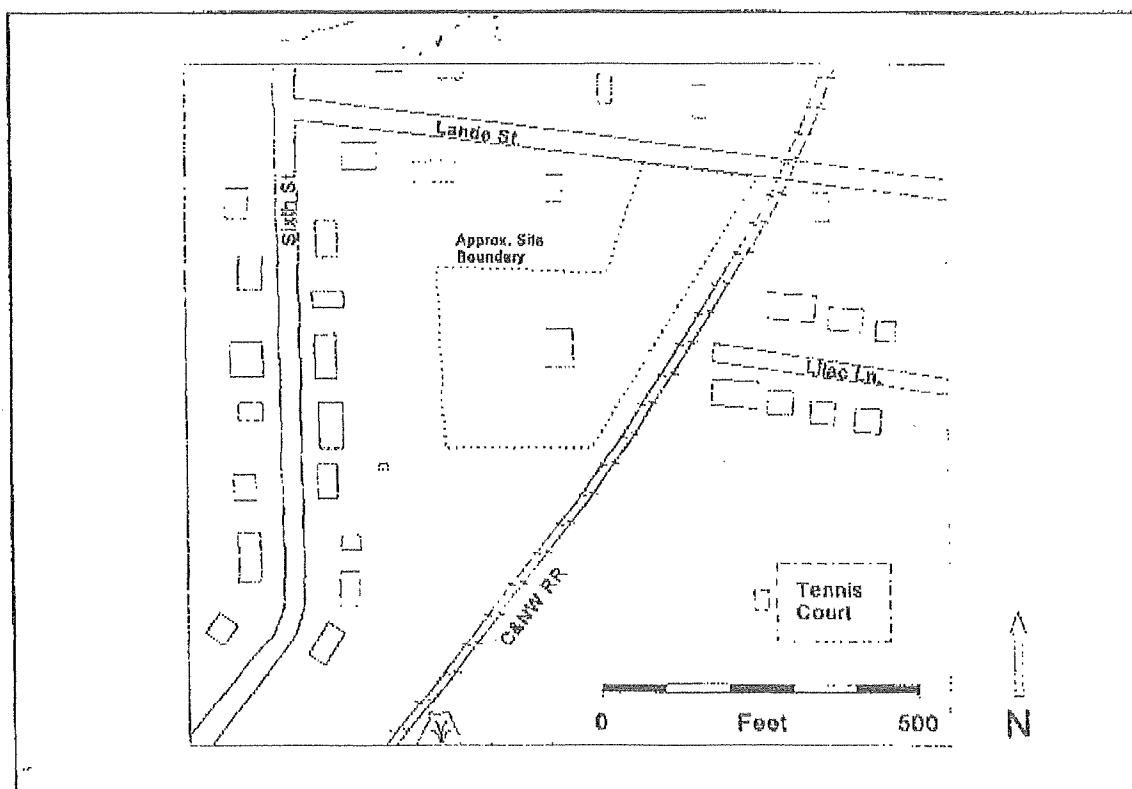
A number of formal actions have occurred in response to ATSDR recommendations, environmental agency requests, and citizen concerns. DOH released a preliminary health assessment as a comment draft to the public in 1991. In 1992, DOH arranged skin allergy testing for residents who believed they developed rashes when they contacted hexavalent chromium in surface water. In 1996, DOH prepared a health consultation to address basement seepage in a home near the Zinc Shop.

In order to accurately assess public health risks, DOH solicited data from EPA and DNR. On at least six occasions DOH visited the site looking for evidence of exposure pathways. Throughout the health assessment process, DOH involved citizens by asking for public health concerns at public meetings and soliciting their concerns in published site information. Four site-specific information brochures were developed, and staff participated in public meetings in 1990, 1991, 1993, and 1996. DOH responded to community information needs by making presentations at public meetings and providing written information in handouts. In 1995, the

Better Brite site was the focus of two environmental health lectures to community nursing students. The programs were designed to demonstrate the various skills necessary for addressing environmental health issues in communities.

The Chrome Shop at 519 Lande Street, posed a public health hazard to people who trespassed on the property or lived down gradient from the property. As contaminated soil washed off of the property, it posed a hazard to people whose yards were downgradient. Shallow, contaminated groundwater also discharged as surface water in yards, sumps, and seepage through foundation walls. As a result of run-off conditions, neighbors continually worried about contact with contaminated water, contact with contaminated soil, and possible exposure from eating garden vegetables.

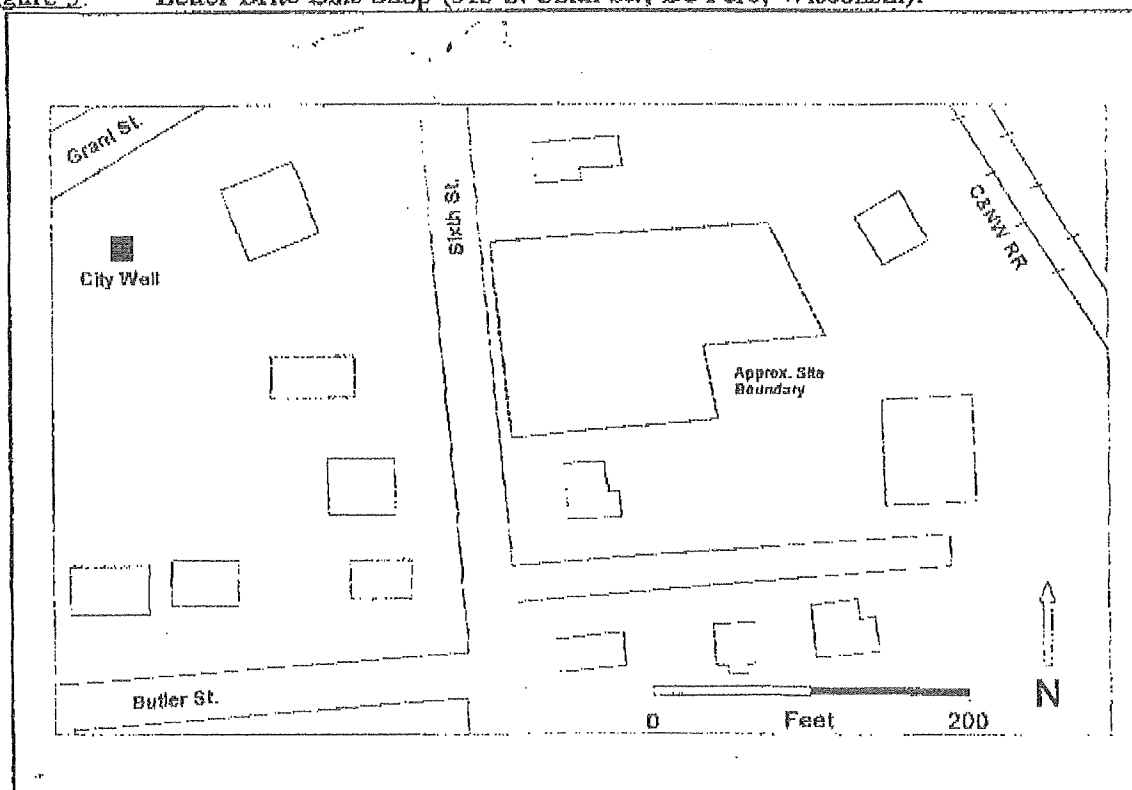
Figure 2: Better Brite Chrome Shop (519 Lande St., De Pere, Wisconsin).



The contaminants of concern in surface soil at the Chrome Shop included chromium that ranged from 3.2 to 2,250 parts per million (ppm), cadmium that ranged from 0.4 to 116 ppm, and lead that ranged from 5.8 to 7,900 ppm. The chemicals of concern in groundwater included total chromium from 0.1 to 429,000 parts per billion (ppb) and hexavalent chromium from 0.06 to 280,000 ppb. (Sources: 5, p.8, Table 4.3; 28, p.4; 31; 32).

The Zinc Shop, at 315 South Sixth Street, posed a public health hazard to people who lived next to the site or to people who trespassed on the property. While the building remained, it posed an exposure threat from contact with contaminated building materials. Surface soils and groundwater contained significant amounts of waste plating chemicals. Contaminants of concern in surface soil included barium that ranged from 26.9 to 2,970 ppm, cadmium from 1.4 to 43 ppm, chromium from 40 to 2,910 ppm, and lead from 33 to 1,540 ppm. Contaminants of concern in shallow groundwater included chromium that ranged from 100 to 310,000 ppb, cyanide from 59.4 to 228 ppb, 1,1-Dichloroethylene from 6.5 to 36 ppb, tetrachloroethylene from 0 to 2.1 ppb, and 1,1,1-trichloroethane from 8.6 to 690 ppb. (Source: 5, Table 4.3)

Figure 3: Better Brite Zinc Shop (315 S. Sixth St., De Pere, Wisconsin).



Workers and people living near the Zinc Shop may have contacted contaminants in exposed building materials. The contaminants included cyanide at 960 ppm and chromium at 6,692 ppm. Contaminants in shallow groundwater posed a long-term future threat to the municipal water supply. Groundwater in this vicinity moves through clay soil very slowly toward the west. A De Pere municipal well, about 250 feet west of the Zinc Shop, extends to a depth of 765 feet below the surface and pumps water from the sandstone aquifer. The city well is cased to a depth of 180 feet below the surface. (4)

The 1991 preliminary health assessment identified public health hazards at each property from exposure to chromium in surface soil, groundwater, and surface water. A long-term threat was associated with the eventual contamination of the municipal well down-gradient and west of the Zinc Shop. Residents were advised to avoid yellow-tinged puddles, and the environmental agencies were advised to more comprehensively sample surface soil. DOH recommended that the municipal well be regularly monitored and that a more thorough search be done to assure that residents are not using private wells for drinking water.

The 1996 health consultation on seepage in basements concluded that hexavalent chromium seepage into the basement of a home south of the Zinc Shop could pose a public health hazard. To reduce the hazard, residents were advised to avoid activities that stir up dust in their basement. Environmental agencies were advised to take actions that reduce the flow of groundwater into the basement of the home. This basement may be more accurately called a crawlspace because of its low ceiling and access from an outdoor hatch. However, the space is used as a basement, containing a workbench and laundry equipment.

In response to the public health threats posed by the shops, EPA and DNR took a number of actions. The agencies assured the removal of buildings (the Zinc Shop after it burned), removal of chemical containers, removal of heavily contaminated surface soils, and construction of groundwater collection systems at both sites. A system for treating contaminated water was constructed at the Chrome Shop. The system also treats water collected at the Zinc Shop, which is pumped from the collection system and hauled to the Chrome Shop. DNR will continue to collect and treat contaminated groundwater from the Zinc Shop to reduce migration of contaminants away from the property. On at least two occasions, DOH, with representatives from the environmental agency, visited neighbors south of the Zinc Shop property. During the visits, they sampled crystals on basement walls and water in sumps for levels of contamination that may pose a public health risk.

CURRENT CONDITIONS OF SITE

In August 1996, DOH visited both properties with representatives from DNR. Except for monitoring wells, the Zinc Shop property appeared as a well-maintained vacant lot. While on-site, DOH visited a home south of and a business east of the property for the purpose of collecting crystal samples from basement walls. In the home, DOH staff saw evidence (toys and equipment) that children regularly play in the basement. At the business, there was very little evidence of activity in the basement. There were no noticeable changes to the Chrome Shop property since DOH's site visit in 1994.

At the Chrome Shop contaminated sub-surface soil continues to provide a source of contamination for groundwater. Shallow groundwater moves toward the west except in the vicinity of the Chrome Shop sump and drain system where the most contaminated groundwater

is collected and treated before being released to the sanitary sewer. Table 1 lists the contaminants of concern, their highest concentration, the Wisconsin Groundwater Standard, and a comparison value by which DOH selects contaminants of concern.

Table 1: Contaminants in Groundwater at the Chrome Shop reported in 1996 that Exceed Comparison Values (Water Collected by the Sump System)			
Contaminant found at levels over comparison values	Highest Value ppb	Wisconsin Enforcement Standard	Comparison Value
Antimony	1370	6	4 ¹
Arsenic	902	50	.02 ⁽²⁾
Beryllium	9	4	.008 ⁽²⁾
Cadmium	17		7 ⁽³⁾
Chromium Total	694,000	100	10,000 ⁽⁴⁾
Chromium Hexavalent	620,000		50 ⁽⁴⁾
Manganese	197	50	
Nickel	110	100	100 ⁽⁴⁾
Silver	66	50	50 ⁽⁴⁾
Thallium	111	2	.4 ⁽⁴⁾
1,1,1 Trichloroethane	1100	200	200 ⁽²⁾
Trichloroethylene	59	5	3 ⁽²⁾
Tetrachloroethylene	59	5	0.7 ⁽²⁾

¹ Reference Dose Media Evaluation Guide for a child

All concentrations in parts per billion (ppb)

² Cancer Risk Evaluation Guide of 1×10^{-6} excess cancer risk

³ Environmental Media Evaluation Guide (ATSDR)

Source: 5

⁴ Lifetime Health Advisory for Drinking Water (EPA)

Outside of the area where groundwater is captured by the sump, the highest values for Manganese range from 50.0 ppb to 545.0 ppb. Nickel was found in one well at 173 ppb, and Antimony was found at 69.3 ppb. (5)

In 1998, DNR plans to move the groundwater treatment facility to the Zinc Shop property. They will also supervise the consolidation of soil at the Chrome Shop. By adding a stabilizer (like concrete), DNR will keep chromium from leaching into groundwater. After treating soil and removing the groundwater treatment building, the property will be available for re-development.

At the Zinc Shop, contaminated groundwater is moving toward a leachate collection system where it is pumped and treated before being released to the sanitary sewer. Ultimately, water from the shallow aquifer recharges the aquifer (located 180 feet below the ground surface). The deeper aquifer provides drinking water for De Pere and other municipalities in the area. The potential for contaminating this aquifer is a concern. At this writing, the groundwater collection system is preventing the movement of contaminated groundwater, and the municipal well is unaffected by site contaminants in shallow groundwater.

Contaminant found at levels over comparison values	Highest Value ppb	Wisconsin Enforcement Standard	Comparison Value
Antimony	3,190	6	0.4 ⁽¹⁾
Beryllium	5.4	4	0.0082 ⁽²⁾
Chromium total	277,000	100	10,000 ⁽³⁾
Chromium hexavalent	144,900		50 ⁽³⁾
Thallium	60	2	0.4 ⁽³⁾
Cyanide	939	200	200 ⁽³⁾
Lead	18	15	n/a
Manganese	1,250	50	n/a
1,2 Dichloroethane	6	5	0.4 ⁽³⁾

¹ Reference Dose Media Evaluation Guide for a child

² Cancer Risk Evaluation Guide of 1×10^{-6} excess cancer risk

³ Lifetime Health Advisory for drinking water (EPA)

n/a not available

All values in parts per billion

Source: 5

Just outside of the capture zone, monitoring well #6 contains antimony at 217 ppb, chromium at 42,000 ppb, and thallium at 12 ppb. Further away from the capture zone, manganese ranges from 84 to 387 ppb, chromium was found in one well at 697 ppb, and antimony ranged from

64 to 110 ppb between well #4 (south of the sump) and the sump in the nearest residence south of the site. Well #4 contains chromium at 42,000 ppb.

The basement in the home south of the Zinc Shop shows a light buildup of crystals. The sump in the floor of the basement occasionally contains water. Results from the 1996 sampling of crystals on basement walls showed low levels of contamination. Three samples of crystals were taken from the walls of the residence. The sample contained a range of hexavalent chromium from 1.7 - 3.07 ppm (parts per million). Compared to 1990 sample results, the levels were substantially lower. Previous results ranged from 390 to 650 ppm. (7). DNR plans, in summer 1998, to install a new sump and coat the walls of the basement of the residence. By taking these remedial actions, they hope to further reduce the flow of contaminated groundwater into the residence.

Samples from the business east of the site contained no chromium at levels above detection (1.36 ppm). Sump water at the business contained 140 ppb chromium.

CURRENT ISSUES

On-site contamination from the chrome and zinc plating operations at this site includes contaminated groundwater and sub-surface soil. The chromate used at the shops (a hexavalent form of chromium) is very water soluble. Hexavalent chromium (chromate) tends to remain in solution with water and migrate with water rather than bind to soil particles. It is a strong oxidizer. When the chromate comes into contact with organic matter or some other reducing agent, it oxidizes the organic matter, and then the chromate converts to a more stable -- and less toxic -- form: trivalent chromium. Hexavalent chromium does not accumulate in plants. When hexavalent chromium is reduced to the trivalent form, it will form complexes and bind more readily to soil. Trivalent chromium is typically much less soluble and adheres to soil particles (8).

Groundwater in the clay aquifer also contains VOCs. When water contaminated with VOCs seeps out from the soil, the VOCs rapidly dissipate into the air.

Recent sampling indicates that surface soils at both properties no longer contain chromium at hazardous levels. The most contaminated soil is removed. Remaining chromate-contaminated soil is binding to the soil, depending on the availability of reducing agents in the soil.

Concentrations of hexavalent chromium in crystals on wall surfaces in the residence have decreased substantially over time. The comparison value for a pica child (child who deliberately eats soil or other unusual materials) is 10 ppm and for a child who indirectly eats soil on dirty hands and toys is 300 ppm. All levels were well below 10 ppm. DOH contacted the family to let them know the levels of chromium in crystals did not pose an immediate health hazard, but the residents were told they should continue to avoid contact with crystals.

DOH notified the business that the crystal on their walls contained no hazardous materials. Chromium concentrations in sump water in the basement of the building exceeded the long-term advisory for children, 100 ppb. However, there was no evidence that anyone is likely to drink water from the sump.

People who live near the sites continue to be concerned about effects of contamination on their health and the value of their property. For nearly twenty years neighbors of the plating shops have complained about chemical spills and worked to clean up the contamination. The site is a source of anxiety and stress. Although all significant exposure routes were eliminated or greatly reduced, residents continue to express concerns about long-term health that may be affected by past exposures. They are concerned about who will take financial responsibility for their medical expenses in case of chronic illness, and are frustrated by their reduced property value. Chrome Shop neighbors are concerned about possible exposure by inhalation of air-borne contaminated dust particles during an upcoming remedial action. The same residents are frustrated that their use of cigarettes might be blamed for future health conditions that could actually have been caused by exposure to chemicals from the Chrome Shop.

CONCLUSIONS

Environmental and health agencies have been involved for many years at the Better Brite site. The history of the site includes actions to reduce exposure to chemicals in air, surface soil, surface water, groundwater and building materials. At this writing all of the immediate health hazards are addressed, and actions to address future health hazards are being planned. People who live next to the site use the municipal water supply and are not currently at risk of drinking water that is affected by contaminated water coming from the site.

1. A municipal well is located 250 feet down-gradient from the Zinc Shop. Water from that well is currently safe. Because of its proximity and the high level of contaminants in shallow groundwater around the Zinc Property, the site poses a possible future hazard. Although the sandstone aquifer used for public water is clean, chromium and chlorinated solvents in shallow groundwater could eventually reach the municipal well if the source of contamination is not controlled. Current actions to collect and treat contaminated groundwater will continue to contain the movement of contaminants and reduce contamination levels as long as the system is maintained.
2. Contaminants in subsurface soil continue to migrate into groundwater below the Chrome Shop property. Therefore, groundwater poses a possible future health risk to people who may contact water as it comes to the surface, accumulates in sumps of nearby basements, or crystalizes on basement walls near the site. DOH believes the DNR's proposed actions to bind up chromium in soil will eliminate the source of contamination to groundwater.

3. Although the concentrations of contaminants have been greatly reduced, affected groundwater continues to enter the walls and sump of the residence south of the Zinc Shop. The chromium crystals on walls and concentrations in surface water currently pose a very low risk to public health. DOH believes remedial action to reduce the flow of groundwater into the walls of the basement will eliminate future possible health threats from the accumulation of contaminated crystals on the walls and water in the sump.
4. For nearly twenty years, neighbors of the plating shops have complained about chemical spills and worked to clean up the contamination. The site clearly is a source of anxiety and stress for some people who lived near the shops. Such stress may affect the health of those people.
5. Under normal circumstances inhalation of contaminated air is not likely. However, during the proposed solidification of contaminated soil, dust could enter the air.
6. A reduction in exposures is dependent on the maintenance of caps, continued pumping of groundwater, and soil solidification.
7. The continued success of the remedial actions depends, in part, on maintenance of caps and continued use of municipal wells for a drinking water. Therefore, DOH supports DNR's efforts to initiate deed restrictions that prohibit disturbance of surface soil and prohibits installation of private wells.
8. Community members are concerned about long-term health effects from previous exposures.

RECOMMENDATIONS

The environmental agencies and DOH should continue to respond to public health threats and public health concerns as conditions or actions occur at the site or as community concerns dictate.

1. The City or DNR should see that groundwater between the Zinc Shop and the closest municipal well continues to be monitored for site-related contamination. If further sampling shows that contamination has migrated beyond the effective range of the Zinc Shop groundwater collection system, additional measures to protect the municipal water supply may be considered.

2. DNR should implement its plan to solidify soil at the Chrome Shop and, therefore, remove the source of contamination to groundwater. During the solidification, the contractor should control dust.
3. DNR should implement its plan to seal the basement of the residence south of the Zinc Shop from the flow of contaminated groundwater and install a new sump.
4. DOH should continue to provide public health education as new information related to public health issues becomes available;
5. DOH should continue to solicit health concerns of nearby residents through agency contacts with the De Pere Public Health Department; and
6. DOH should continue to advise and consult with DNR and EPA on public health concerns that may arise as new information about the site becomes available or as site conditions change.
7. Once remedial efforts are complete, DOH should review the data to determine if further public health action is indicated.

DOCUMENTS REVIEWED

1. Comprehensive Environmental Response, Compensation, and Liability Act as amended. 42 U.S. Code §§9601-9675.
2. Kohl, Herbert. 1990. Petition to the U. S. Agency for Toxic Substances and Disease Registry for a health assessment of the Better Brite Plating Company, De Pere, Wisconsin. U. S. Senate. Washington, D.C. 23 February.
3. Roper, William L. 1990. Correspondence responding to U. S. Senator Herbert Kohl's petition for health assessment of the Better Brite Plating Company, De Pere, Wisconsin. Agency for Toxic Substances and Disease Registry. Atlanta, Georgia. 28 June.
4. Stoll, Rick C. 1988. Correspondence to Bob Barnum regarding potential impacts of Better Brite Chrome and Zinc Shops on the bedrock aquifer. Wisconsin Department of Natural Resources, Lake Michigan District, Green Bay, Wisconsin. 2 December.
5. Hydro-Search Inc. 1996. Focused Feasibility Study Ground-Water Operable Unit Better Brite Plating, Inc. De Pere, Wisconsin. Brookfield, Wisconsin. March.
6. Wisconsin Department of Natural Resources. 1996. Fact sheet: Proposed Plan Better Brite Chrome and Zinc. Madison, Wisconsin.
7. Bro, Kenneth and Louise Fabinski. 1996. Consultation to the Wisconsin Department of Natural Resources regarding health hazards posed by hexavalent chromium in basements of buildings south and east of the Better Brite Zinc Shop. Wisconsin Division of Health and the federal Agency for Toxic Substances and Disease Registry. Madison, Wisconsin. August.
8. Weissbach, Annette E. 1988. Draft screening site inspection -- follow up report: Better Brite Chrome Shop. Wisconsin Department of Natural Resources, Lake Michigan District, Green Bay, Wisconsin. 20 December.
9. Bro, Kenneth and Louise Fabinski. 1997. Preliminary Public Health Assessment for Better Brite Chrome and Zinc Shops. Wisconsin Division of Health and the Federal Agency for Toxic Substances and Disease Registry. Madison, Wisconsin.

PREPARERS OF REPORT

Wisconsin Division of Health

Mary Young, MS.Ed.

Public Health Educator

Section of Environmental Epidemiology and Prevention

ATSDR Senior Regional Representative

Louise Fabinski


Regional Services

Region V

Office of the Assistant Administrator

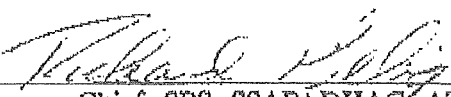
CERTIFICATION

The Better Brite Chrome and Zinc Shops Superfund Site Review and Update 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 approved methodology and procedures existing at the time the site review and update was begun.



Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this site review and update and concurs with the findings.



Chief, SPS, SSAB, DHAC, ATSDR