INTERIM

ADAMS PLATING
LANSING, INGHAM COUNTY, MICHIGAN
CERCLIS NO. MID006522791
APRIL 27, 1992

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry
Section 104 (i) (7) (A) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risks assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, ATSDR has conducted this preliminary health assessment on the data in the site summary form. Additional health assessments may be conducted for this site as more information becomes available to ATSDR.

The conclusion and recommendations presented in this Health Assessment are the result of site specific analyses and are not to be cited or quoted for other evaluations or Health Assessments.

Use of trade names is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health and Human Services.
INTERIM PRELIMINARY PUBLIC HEALTH ASSESSMENT

ADAMS PLATING

LANSING, INGHAM COUNTY, MICHIGAN

CERCLIS NO. MID006522791

Prepared by

Michigan Department of Public Health (MDPH)

Under cooperative agreement with the

Agency for Toxic Substances and Disease Registry (ATSDR)
Section 104 (i)(6)(F) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term "health assessment" shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risk assessment, risk evaluations, and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, ATSDR prepared this Interim Health Assessment using available data and information. ATSDR will re-evaluate this site and prepare an updated health assessment as warranted by the availability of additional data and information and as resources permit.
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SUMMARY

Adams Plating, an active electroplating operation, is in a primarily residential neighborhood in the city of Lansing. Direct discharge of plating wastewater into a storm drain, and condensate dripping from vent fans onto surface soil contributed to the contamination of subsurface soil and groundwater. Sampling of both media has also revealed contaminants consistent with those used in the dry cleaning business that was formerly on the site. The contamination was discovered in 1981 when construction activities that resulted in broken sewer pipes caused the flooding of an adjacent residence's basement with water containing 150 parts per million of total chromium. Water pumped from the basement into the yard contributed further to soil contamination. An underground drainage system has been installed to intercept the flow of contaminated groundwater between the facility and the adjacent residence.

A Remedial Investigation/Feasibility Study (RI/FS) was begun in 1988; Phase I field work started in 1989, and Phase II fieldwork will begin early in 1992. Preliminary results indicate that further sampling is necessary to characterize the extent of contamination on and off of the site. Because of the need for additional monitoring data to characterize the site fully and to determine the site's effects on human health, this site is classified an indeterminate public health hazard.

Based on the data and information reviewed, this site is not being considered for follow-up health activities at this time. However, if data become available suggesting that human exposure to significant levels of hazardous substances is currently occurring or has occurred in the past, ATSDR will reevaluate this site for any indicated follow-up.
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BACKGROUND

A. Site Description and History

The Adams Plating site was placed on the U.S. Environmental Protection Agency (U.S. EPA) National Priorities List (NPL) in June 1988.

Adams Plating is on the west side of the city of Lansing at 521 North Rosemary Street (Figure 1). The site is approximately one acre in area. Since 1964 the facility has been used primarily for metal electroplating on a small, individual customer order basis. Before Adams Plating began operations at the site, the building was occupied by a dry cleaning establishment. From about 1964 to 1971, wastewater generated from the plating operation process was discharged directly into a storm drain. A collection and pretreatment system for chromium-containing condensate has reportedly been in operation on site since 1981, before which time the condensate dripped from the plating facility blowers onto the ground.

In response to a telephone call in January 1981, officials from the Ingham County Health Department investigated a reported contamination event at a residence at 560 North Grace, Lansing. The residence is southwest of Adams Plating, bordering on the plating operation property. Wastewater with a total chromium content of 150 parts per million (ppm) was found entering the basement of the residence from a sewer pipe whose underground connections had been broken by construction activities nearby. Remediation was attempted by cementing the residence's drain shut, however, wastewater continued to enter the home through cracks in the concrete basement floor. At one time, wastewater entered the basement at the rate of 500 gallons per day. The residents initially discharged that wastewater into their flower and vegetable gardens. Subsequent soil testing in that area revealed elevated levels of chromium.

Soil borings throughout the site indicated that a sand layer was saturated with chromium-contaminated wastewater. Water samples from those borings contained as much as 160 ppm total chromium. In addition, dichloroethane and trichloroethane were detected in soil samples and in seepage water samples taken from the basement of the house. The Michigan Department of Natural Resources (MDNR) has attributed those organic chemicals to the previous dry cleaning operation on the Adams Plating site.

In October 1988, an underground drainage system was installed between the facility and the residence at 560 North Grace to intercept the flow of wastewater. The captured water and wastewater from the plating business are pretreated at Adams Plating before discharge into the Lansing municipal sewer. There are no active residential wells in the area.

In 1988, the EPA started work on a Remedial Investigation/Feasibility Study (RI/FS) for the site. A workplan for the RI/FS was produced early in 1989. The Phase I final RI report
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was released in spring 1990. A Phase II Remedial Investigation is scheduled for early 1992.

B. Site Visit

Staff members from the Michigan Department of Public Health conducted site visits in August 1988, January 1989, and May 1991. On December 9, 1991, MDPH representative Brendan Boyle visited the site and the surrounding neighborhood. Observations from that visit were used to update site status portions of this assessment.

C. Demographics, Land Use, and Natural Resource Use

According to the 1980 census, 20,000 persons live within a one-mile radius of the site; 67,400 within two miles, and 107,900 within three miles. There is a junior high school less than half a mile south of the site. Two high schools, a junior high school, more than a dozen elementary schools, and a hospital are all within 2 miles of the plating facility. The nearest private home is within 25 feet of Adams Plating. The Grand River bends in a wide arc in the city of Lansing thus bringing the river to a point about one mile north of the site, and to another point about one mile south of the site.

D. Health Outcome Data

MDPH reviewed data for lung cancer from the Michigan Cancer Registry because of the association of that health outcome with human exposure to hexavalent chromium via inhalation. The cancer incidence data were reviewed for the years 1985-1986 because that was the total data base available at the time of inquiry in 1989. Zip code 48917 was evaluated since it is the smallest geographic area that includes the site, and for which statistics are available. Data from the zip code were also evaluated for total cancer (all cancer types) for the same 1985-86 period.

COMMUNITY HEALTH CONCERNS

At a Citizens Information Committee meeting in May 1989, a group of neighborhood residents told the Ingham County Health Department (ICHD) their concerns about diagnosed cases of cancer in the neighborhood of the Adams Plating Site. The ICHD asked the MDPH to review the disease incidence to determine if it indicated a possible cancer increase for that geographic area.
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ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

To identify facilities that could possibly contribute to contamination on or adjacent to the Adams Plating site, staff members from the Michigan Department of Public Health searched the 1987, 1988, and 1989 Toxic Chemical Release Inventory (TRI). TRI is developed by EPA from chemical release information provided by certain industries. TRI data did not indicate the release in the site's zip code area of any chemicals expected to effect contaminant levels on site and in off-site areas adjacent to the site.

In March 1981, water collected from soil borings on both the Adams Plating property and the affected residence was found to contain up to 280 ppm of 1,1,1-trichloroethane and 800 ppm of total chromium. After they found solvents floating on the water in the borings, researchers samples were analyzed for both metals and volatile organic chemicals. Additional testing is needed to characterize the precise areas of soil contamination and the extent of the shallow contaminated aquifer.

Surface soil collected in March 1981 from the area where the liquid pumped from the basement had been discharged contained up to 54.4 ppm of total chromium. The tilled garden soil, through which the basement seepage flowed, contained 42.9 ppm chromium in March 1981, but in July 1981 only 0.28 ppm of chromium was detected.

In October 1988, water seeping into the basement contained 6.8 ppm of hexavalent chromium. Water from the recovery system contained 2.9 ppm hexavalent chromium (3.3 ppm total chromium). In February 1989, water from the recovery system contained 10 ppm of total chromium, including 0.19 ppm of hexavalent chromium.

The surface soil around the residence contained up to 131 ppm of total chromium, which is within the typical range for chromium content of soils.¹ 1,1,1-Trichloroethane was detected at 0.009 ppm.

The first analyses for chromium on site did not distinguish between the metal's two common oxidation states, trivalent and hexavalent, and measured the total chromium content. Hexavalent chromium will quickly reduce to trivalent chromium under most environmental conditions.

Sampling in 1981 of a water table 80 feet below the surface of the ground showed no evidence of contamination. Four municipal supply wells within 1 mile of the site were sampled and tested in November 1990 by MDPH, and did not detect chromium at any level.

PATHWAYS ANALYSES

A. ENVIRONMENTAL PATHWAYS (FATE AND TRANSPORT)

Contaminants may migrate from the site by several environmental pathways. Contaminants bound to surface soil may be carried by surface water runoff or they may be transported by wind erosion.

Contaminants in the soil may leach into ground water beneath the site. If contaminants should migrate to the lower aquifer, 80 feet below the ground surface, they would pose a threat of contamination to downgradient municipal wells approximately 1,200 feet northwest of the site. However, as mentioned earlier, no contaminants from Adams Plating are known to have reached the lower aquifer.

Testing to date indicates that contaminants have neither reached the deeper underlying aquifer nor migrated beyond residential properties adjacent to Adams Plating, but instead remain in a perched water table in the sand lens. A hydrogeological study has shown that the shallow contaminated aquifer is underlain by clay and shale. The shallow aquifer appears to extend only a short distance from the plating facility, abruptly ending near two adjacent residences.

B. HUMAN EXPOSURE PATHWAYS

During early remediation attempts, the basement seepage from North Grace Street was pumped into the side yard of that residence, and the potential for dermal exposure to contaminants in the soil became a concern. Subsequent soil testing has revealed that the levels of the chemicals of concern found there are now consistent with regional background ranges.

The potential for exposure through ingestion of contaminated produce has been evaluated. Analysis of soil, vegetables, and strawberries by staff from Michigan State University and the State Department of Agriculture have determined that the garden area is safe for gardening. Chromium does not usually accumulate in plants, and the levels of chromium in garden soil no longer exceed regional background concentrations. Therefore human exposure to site-related contaminants through eating contaminated garden produce is unlikely.

Inhalation of volatilized hydrocarbons from the basement seepage may have been a human exposure pathway. However, air samples taken in 1985 from the basement and kitchen showed no chromium or volatile hydrocarbons.

Access to Adams Plating property used to be inadequately restricted. That has been remedied with the addition of a new section of fence, and by the elimination of other openings. The gates are now locked at night and there are "No Trespassing" signs on the
Adams Plating gate. Therefore, it is unlikely that any human beings will be exposed to contaminated soil on site.

PUBLIC HEALTH IMPLICATIONS

A. Toxological Implications

Hexavalent chromium is generally more toxic than trivalent chromium. Long-term exposure of workers to levels of airborne chromium higher than those in the natural environment has been associated with lung cancer. Lung cancer may occur long after exposure to chromium has ended. Although it is not clear which form of chromium is responsible for this effect, only compounds of hexavalent chromium have been found to cause cancer in animal studies. Based on evidence in human beings and in animals, compounds of hexavalent chromium should be regarded as probable cancer-causing substances in human beings exposed by inhalation. Long-term studies in which animals were exposed via food and/or water to low levels of chromium compounds (particularly trivalent chromium compounds) have not shown harmful health effects.²

B. Health Outcome Data Evaluation

Based on the review of available data, MDPH concluded that the zip code area including Adams Plating did not experience an excessive number of cancers for either sex during the period 1985-1986, compared to the expected cancer incidence for the state of Michigan as a whole. That was true for lung cancer, as well as for all cancer types combined (see Table 1). However, this analysis does not rule out the possibility that a subpopulation in a smaller area near a particular site may have experienced an excessive number of cancer cases. This uncertainty results from the dilution effect caused by inclusion of data from a much larger geographic area (zip code) than is represented by the possibly exposed population.³

Other community health concerns have been addressed by the ICHD whose representatives have been closely involved with the community since the discovery of the contamination, and who have on several occasions consulted with neighborhood residents and taken water from basement sump pits and air samples in their homes. ICHD has worked with EPA, MDNR, and MDPH in community involvement activities.

This Preliminary Health Assessment was released for public comment from April 5 to

² ATSDR, Toxicological Profile for Chromium, p. 3.

³ Dolanski, D., MDPH, letter to M.L. Hultin, Ingham County Health Department, June 21, 1990.
May 6, 1991. No health-related concerns or comments were received during the public comment process.

Table 1. Observed and Expected Numbers of Cancer Cases and Incidence Ratios, by sex, in ZIP code 48917, 1985-6

<table>
<thead>
<tr>
<th>Site</th>
<th>Sex</th>
<th>Observed # of cases</th>
<th>Expected # of cases*</th>
<th>Incidence Ratio (P/E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>Male</td>
<td>12</td>
<td>20</td>
<td>0.60</td>
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<tr>
<td></td>
<td>Female</td>
<td>5</td>
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</tr>
<tr>
<td></td>
<td>Total</td>
<td>190</td>
<td>190</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* - Expected number of cases is based on ZIP code population estimates and 1985 and 1986 Michigan annual average age and sex-specific incidence rates.

** - Approaching statistical significance. (P > .05)
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CONCLUSIONS AND RECOMMENDATIONS

Based upon information reviewed, and because of the lack of adequate monitoring data, ATSDR has concluded that the site is an indeterminate public health concern. As noted in the Environmental Contamination and Other Hazards and Pathways Analyses sections above, human exposure to 1,1,1-trichloroethane and chromium may have occurred via dermal contact and/or inhalation exposure pathways. As stated earlier, data evaluated for the zip code area in which the site is located did not detect more cancer incidence than expected. The reliability of the evaluation is limited by the small number of individuals possibly exposed in the past, and the dilution effect of the data set. In order to allow further assessment of the site, the following actions are recommended:

1. Perform additional hydrogeological investigation to characterize further the extent of contaminant migration that has occurred or is occurring. Particularly important is the need to confirm the direction of groundwater flow and to investigate the possibility that underground drains may provide an additional environmental pathway for contaminant migration;

2. Determine the effectiveness of the existing groundwater recovery system.

3. The Adams Plating site has been evaluated by the ATSDR Health Activities Recommendation Panel for appropriate follow-up activities. Based on the data and information reviewed, this site is not being considered for follow-up health activities at this time. However, if data become available suggesting that human exposure to significant levels of hazardous substances is currently occurring or has occurred in the past, ATSDR will reevaluate this site for any indicated follow-up.

4. If future ATSDR evaluations indicate that a substantive completed exposure pathway exists or that the community has expressed specific health concerns, then health outcome data should be evaluated in future assessments for this site.
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CERTIFICATION

This Interim Preliminary Public Health Assessment was prepared by the Michigan Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved methodology and procedures existing at the time the public health assessment was initiated.

[Signature]
Technical Project Officer, SPS, RPB, DHAC

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

[Signature]
Division Director, DHAC, ATSDR
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Sources

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MDNR Site Inspection, October, 1986

HRS, May, 1987

U.S. EPA RI/FS Scoping Meeting Packet, November, 1988

RI/FS Draft Workplan, January, 1989

MDNR files
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RESPONSIVENESS STATEMENT

A Public Review Draft of the Adams Plating Preliminary Health Assessment was released for public comment for a 30-day period from April 5 to May 6, 1991. The MDNR site manager responded to the draft with brief comments that reflected an update on site investigation activities. The draft has been revised to reflect those comments. Otherwise, no comments were received on the draft during the Public Comment Period.