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Department of Health and Social Services

DIVISION OF HEALTH

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MADISON WI 53701-0309

March 16, 1994

Jane Lemcke
Department of Natural Resources
GEF 2, SW/3
101 S. Webster
Madison, WI 53702

Dear Ms. Lemcke:

Here is a copy of the public health assessment for the Oconomowoc Electroplating Company, Incorporated, Superfund Site. Back in June 1993 we distributed a public comment draft of this assessment. We did receive a couple of comments and responses are included in the final edition. A copy of the assessment will be mailed to the Associated Bank of Ashippun and to Delores Burrow, Ashippun Town Clerk, today. I have also sent a copy of the assessment to Tom Eggert and Cara Norland-Shultz. If you have questions about the assessment or its distribution please call me (608) 267-6844.

Sincerely,

Mary Young
Public Health Educator
Section of Environmental Epidemiology
and Prevention

Public Health Assessment for

OCONOMOWOC ELECTROPLATING COMPANY INC.

ASHIPPUN, DODGE COUNTY, WISCONSIN

CERCLIS NO. WID006100275

FEBRUARY 14, 1994

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

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, risks assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, this Health Assessment has been conducted using available data. Additional Health Assessments may be conducted for this site as more information becomes available.

The conclusions 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.

PUBLIC HEALTH ASSESSMENT

OCONOMOWOC ELECTROPLATING COMPANY INC.

ASHIPPUN, DODGE COUNTY, WISCONSIN

CERCLIS NO. WID006100275

Prepared by

Wisconsin Department of Health and Social Services
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6), and in accordance with our implementing regulations 42 C.F.R. Part 90). In preparing this document ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30 day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment 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.

Agency for Toxic Substances and Disease Registry.....*William L. Roper, M.D., M.P.H. Administrator*
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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

Additional copies of this report are available from:
National Technical Information Service, Springfield, VA
(703) 487-4650

ATSDR and its Public Health Assessment

ATSDR is the Agency for Toxic Substances and Disease Registry, a federal public health agency. ATSDR is part of the Public Health Service in the U.S. Department of Health and Human Services. ATSDR is not a regulatory agency. Created by Superfund legislation in 1980, ATSDR's mission is to prevent or mitigate adverse human health effects and diminished quality of life resulting from exposure to hazardous substances in the environment.

The Superfund legislation directs ATSDR to undertake actions related to public health. One of these actions is to prepare public health assessments for all sites on or proposed for the Environmental Protection Agency's National Priorities List, including sites owned or operated by the federal government.

During ATSDR assessment process the author reviews available information on

- the levels (or concentrations) of the contaminants,
- how people are or might be exposed to the contaminants, and
- how exposure to the contaminants might affect people's health

to decide whether working or living nearby might affect peoples' health, and whether there are physical dangers to people, such as abandoned mine shafts, unsafe buildings, or other hazards.

Four types of information are used in an ATSDR assessment.

1) environmental data; information on the contaminants and how people could come in contact with them

2) demographic data; information on the ethnicity, socioeconomic status, age, and gender of people living around the site,

3) community health concerns; reports from the public about how the site affects their health or quality of life

4) health data; information on community-wide rates of illness, disease, and death compared with national and state rates

The sources of this information include the Environmental Protection Agency (EPA) and other federal agencies, state, and local environmental and health agencies, other institutions, organizations, or individuals, and people living around and working at the site and their representatives.

ATSDR health assessors visit the site to see what it is like, how it is used, whether people can walk onto the site, and who lives around the site. Throughout the assessment process, ATSDR health assessors meet with people working at and living around the site to discuss with them their health concerns or symptoms.

A team of ATSDR staff recommend actions based on the information available that will protect the health of the people living around the site. When actions are recommended, ATSDR works with other federal and state agencies to carry out those actions.

A public health action plan is part of the assessment. This plan describes the actions ATSDR and others will take at and around the site to prevent or stop exposure to site contaminants that could harm peoples' health. ATSDR may recommend public health actions that include these:

- restricting access to the site,
- monitoring,
- surveillance, registries, or health studies,
- environmental health education, and
- applied substance-specific research.

ATSDR shares its initial release of the assessment with EPA, other federal departments and agencies, and the state health department to ensure that it is clear, complete, and accurate. After addressing the comments on that release, ATSDR releases the assessment to the general public. ATSDR notifies the public through the media that the assessment is available at nearby libraries, the city hall, or another convenient place. Based on comments from the public, ATSDR may revise the assessment. ATSDR then releases the final assessment. That release includes in an appendix ATSDR's written response to the public's comments.

If conditions change at the site, or if new information or data become available after the assessment is completed, ATSDR will review the new information and determine what, if any, other public health action is needed.

For more information about ATSDR's assessment process and related programs please write to:

Director
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry
1600 Clifton Road (E-32)
Atlanta, Georgia 30333

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SUMMARY

The Oconomowoc Electroplating Company, Inc., Superfund site (OEC) is located in the Town of Ashippun, approximately 35 miles northwest of Milwaukee in Dodge County, Wisconsin. OEC occupies 10.5 acres of land at 2572 Oak Street and has been involved with electroplating operations from 1957 until it ceased operations in February 1991. A residential area and several small businesses are located about 1 to 2 blocks from the site; a small creek and associated wetlands are about 500 feet south of the facility. Prior to 1973, untreated wastewaters from OEC were discharged into the wetland area.

Groundwater at the site is contaminated with volatile organic compounds (VOCs) such as trichloroethylene and the inorganic compound cyanide. Recent sampling of residential wells has shown the presence of cyanide at low levels. Soil at the site is contaminated with VOCs and metals, such as cadmium, chromium and lead. The Davy Creek wetlands area is contaminated with cyanide and a variety of metals. Residents in the vicinity of OEC are concerned about exposure to contaminants discharged from the site and recreational use of areas near the site. Children living in the area utilize two parks near the site.

Exposure pathways of potential concern include ingestion of contaminated groundwater and surface soils/sediment and inhalation of contaminated dust. Dermal absorption of contaminated sediment/soil is also a potential exposure pathway for persons entering the wetland area. Ingestion and dermal absorption of contaminated lagoon liquid and sludge are also potential exposure pathways.

The OEC Superfund site poses a public health hazard primarily from ingestion of possible future increased levels of site contamination in residential groundwater. There is evidence that people are being exposed to contaminants from this site, however, at levels that are not likely to cause adverse health effects. Presently, the only on-site contaminant in a completed exposure pathway is cyanide, which has been detected in residential well water. Steps should be taken to prevent the further migration of this and other contaminants from the OEC site. Residential wells should continue to be monitored for cyanide, and other inorganic and organic compounds. The source of lead in private residences should also be investigated. The contaminated wetlands should be properly secured and posted and area residents informed of the hazards associated with entering this area.

The ATSDR Health Activities Recommendation Panel and the Wisconsin Division of Health (WDOH) evaluated the data on this site to determine the need for additional health actions. The Panel and WDOH determined that some people living nearby have evidently been exposed to low levels of contamination in groundwater that originates from the site. Despite this, the levels of contamination are too low to detect any increased incidence of illness or disease among the exposed individuals. Therefore, no more studies of the site's impact on public health are needed at this time. The WDOH will continue to provide health education to the community and local health care professionals and solicit health concerns of Dodge County residents through agency contacts with the Dodge County Nurses, which is the local health agency for the town of Ashippun. Additionally, WDOH will review and comment on the public health aspects of draft work plans of sampling to be done for the site and advise and consult with the WDNR and the EPA on public health concerns that may arise as new information about the site becomes available.

BACKGROUND

A. Site Description and History

The Oconomowoc Electroplating Company, Inc. (OEC) began operations in 1957. The site encompasses an abandoned electroplating facility located at 2572 West Oak Street in the Town of Ashippun, Dodge County, Wisconsin, and the adjacent wetlands area to the southwest. The cities of Oconomowoc and Watertown are approximately 8 miles south and 10 miles west of the site, respectively. Milwaukee lies approximately 35 miles to the southeast. The site occupies approximately 10.5 acres, which includes 5 acres of the OEC facility. A small creek, Davy Creek is located approximately 500 feet south of the site. Davy Creek, which flows through the wetlands, is a tributary to the Rock River (see map: Appendix A). The OEC site is bordered on the north by Eva and Oak Streets and on the south by Elm Street and property occupied by the Ashippun Town Garage (see map: Appendix A). Residents in these areas rely on groundwater for their source of drinking water.

The site consisted of a multi-sectional main building with the office and process lines; a wastewater treatment building and two lagoons formerly used for wastewater treatment; a parking area; storage tank and container deposit areas; a fill area, and a lowlands area (see map: appendix A).

Since 1957, OEC has performed electroplating processes that use nickel, chrome, zinc, copper, brass, cadmium, and tin. Contaminants in the effluent originate from sources that include spent process solutions, the drag-out of various processing baths into subsequent rinses, accidental spills, plating tanks filter systems, leaks, and sludge from the bottom of plating baths. Three categories comprise the wastewaters from the site: 1) cyanide-bearing; 2) chromium-bearing; 3) and acid-alkaline. In addition, volatile organic compounds (VOCs) are used in degreasing operations. OEC ceased tin plating operations in 1981 and chromium, copper and nickel plating operations in 1982. Plating of cadmium stopped in October 1984; cyanide-plating processes ceased in February 1985.

Prior to 1973, OEC discharged wastewater directly into the wetlands located south of the plant. In 1972, OEC constructed two unlined settling lagoons to supplement its wastewater treatment system. Each lagoon is 60 feet long by 40 feet wide with a sidewall depth of 5 feet. Both lagoons have accumulated large volumes of plating sludges. Several times between 1973 and 1978 untreated sludges from the lagoons have overflowed and settled in the wetlands between the OEC site and Davy Creek. In 1980, approximately one million pounds of electroplating sludges were removed, leaving the lagoons approximately one-third full of sludge. In 1981, the Wisconsin Department of Natural Resources (WDNR) filed suit against OEC for alleged violations of their hazardous waste discharge permit.

In 1983, in order to alleviate local flooding problems, the Dodge County Drainage Board proposed to dredge and rechannel a 5,000 foot stretch of Davy Creek near OEC. The United States Environmental Protection Agency (EPA) and Army Corp of Engineers disapproved the

proposal because they believed it would increase the migration of contaminants from the wetlands, downstream to the Rock River. In 1984, the EPA placed the OEC site on the National Priorities List.

On-site spills and leaks of hazardous chemicals occurred several times during 1986. These, and other spills and leaks, have contributed to on-site soil and groundwater contamination. In 1986 and 1987, a contractor for the EPA sampled sediment in the wetlands. The analytical results indicated that heavy metals and cyanide contaminate approximately 75,000 square feet of the wetlands adjacent to OEC.

In 1987, the EPA Environmental Response Team conducted a toxicity investigation in the wetlands south of the OEC site to determine if the contaminated sediments are toxic to aquatic organisms. The analytical results indicated severe metal and cyanide contamination of the sediments in the wetlands. As a result, the sediments from several locations were considered highly toxic. Toxicity data collected on fathead minnows and algae showed conclusively that the contamination in the wetlands was toxic.

During that same year, the Agency for Toxic Substances and Disease Registry (ATSDR) was asked to provide consultation on the immediate threat to public health caused by the contamination of sediments in the wetlands. As a result of that consultation signs and fencing was installed to restrict easy access to the wetlands. A health assessment was conducted by the Wisconsin Division of Health (DOH) and that report was published in 1988.

The Remedial Investigation (RI) was completed in December 1989. In September 1990, the EPA signed a Record of Decision (ROD), which outlines the remedial actions to be taken at OEC, was signed. The ROD addresses four Operable Units at the site: clean up of the wastewater treatment lagoons; clean up of on-site contaminated soil and debris; extraction of the groundwater contaminant plume; excavation of contaminated wetland and Davy Creek sediment.

On February 1, 1991, OEC ceased operations and was officially abandoned on April 26, 1991. The site was then referred to the EPA Emergency and Enforcement Response Branch for a possible removal action. The site assessment (completed on April 25, 1991) confirmed the presence of acidic, caustic, and cyanide contaminated materials. The Emergency Response contractor was mobilized to the site on April 27, 1991. The contractor inventoried and moved drums, vats, and other containers from outside the facility to the inside; previously spilled liquids were cleaned up; vats were covered to minimize fumes; deteriorating containers were replaced with new containers; and entry points onto the site were secured with locks and a snow fence was installed around the property. Removal actions will be completed in three phases. Phase 1 will include the testing of all materials; Phase 2 will include the transportation and disposal of all waste and high pressure washing of the building(s). The third phase will involve the removal of the building. After this is accomplished, a study will be undertaken to determine the extent of soil contamination on the OEC premises.

B. Site Visits

1988

Representatives of the Wisconsin Division of Health (WDOH), the WDNR, and four members of the Ashippun Town Board conducted a site visit on June 28, 1988. They observed effluent water discharging directly into the wetland through a pipe coming from the OEC plant. The fence built to prevent access to the wetland area discourages access to the wetland site but did not prevent it. The wetland was dry because of existing drought conditions. There were footpaths and all-terrain vehicle trails into the area beyond the wetland fence. The majority of the area was covered with grass, but some dust was observed in the air, possibly a result of the prolonged drought. Several areas of dead or stressed vegetation were observed in the wetland area.

Three adults and several children were playing in the ballpark within 150 feet of the OEC facility. Children were riding bicycles on the road between the wetland and the OEC facility. Also noted were 13 small garden plots at private homes within two blocks of the OEC facility. Other gardens were observed within a few blocks of the wetland.

A large, elevated storage tank was noticed on the parking lot of OEC; it was not possible to determine if it contained any liquid. According to EPA documents, the storage tank is no longer used.

1990

Staff from the WDOH visited the site on March 28, 1990. The OEC plant was accessible even though parts of the site were fenced. The lagoons were fenced but some areas of the fence do not reach the ground. Children could crawl under the fence in these spots. The fill area (east of the plant) which also has contaminated soil is not fenced.

1991

On October 8, 1991, representatives of the WDOH visited the OEC site. The waste water lagoons were double fenced on all sides. Standing water was observed in the lagoons. Access to parking lots and the outside of the OEC building are not restricted.

There is a stretch of fence, approximately 300 feet long,that separates Elm Street from the wetlands and Davy Creek. Each end of the fence is shifted 90 degrees, and extends out into the wetlands area (about 100 feet). The fenced areas were posted with warning signs. There did not appear to be any evidence of trespassing into the wetlands area. Standing water was also observed in the wetlands. It is reported that the wetlands area and Davy Creek provide prime habitat for deer and water fowl.

The nearest homes are approximately one block to the west of the site. The majority of homes appear to be located approximately three blocks to the east of the site.

1992

On June 24, 1992, representatives from the WDOH, WDNR, Army Corp of Engineers, the EPA project officer, and the EPA contractor conducted a visit to the OEC site. The purpose of the meeting was to discuss wetlands clean-up including how and when that might be accomplished. The EPA collected samples from Davy Creek to further characterize the extent of wetland contamination.

A tour was taken of the OEC site to observe the clean-up undertaken by the EPA Emergency and Enforcement Response Branch. The EPA had removed the buildings and containerized chemicals within. The OEC property was securely fenced and warning signs were placed around the property. The lagoon was inside the fence and contained standing water that the EPA project manager described as groundwater.

There was discussion about abandonment procedures for two wells on the OEC property. Reportedly, these will be pulled and grouted to prevent the chance of contamination. The two waste-water lagoons may also be covered to prevent animals and humans from falling in.

The wetland is open on three sites to trespassers. However, contaminated sediments lie below several inches to several feet of spongy root mass. Above the root mass are several feet of wetland plants including cattails and reed canary grass. It is difficult to walk through the wetlands. Trails that were observed are indications of animal traffic, but not human trespass.

1993

On November 30, 1993, WDOH and WDNR representatives visited the OEC site in conjunction with a public meeting. The site was toured to review where the proposed wetlands dredging will take place.

The site where the OEC buildings were removed was also visited. A large pile of excavated soil was noted on the site. The majority of tarps that had covered the pile had blown off exposing the soil to wind and rain. The lagoons had standing water. In some areas there are large gaps between the ground and bottom of the security fence. Children and animals could enter the site in those areas.

C. Demographics, Land Use, and Natural Resources Use

The OEC site is in an area of light industry and residential properties. The region surrounding the site consists of a mix of dairy farms, woodlands, cropland, and a small

residential/commercial zone. No schools, hospitals, or nursing homes containing larger groups of sensitive populations, were observed within a three block radius of the site.

The community consists primarily of farmers and middle income, white families whose jobs are out of town. There are an estimated 570 residents within one mile of the site. Several of the homes near the site are occupied by families with small children. Residential areas of approximately 20 homes are west (200 ft) and northwest of the site (200 ft) beyond Eva Street, and southeast of the site (1400 ft) beyond the town garage facilities. The nearest house to OEC is 100 to 150 feet west. Most of the homes in the vicinity of the site appear to be over 10 years old. There are two parks and a sportsmen's club within 200 yards of the site.

The two parks have facilities for baseball, skeet shooting, and picnicking. One of the parks, with playground equipment, is adjacent to the Town Garage between Oak Street and Elm Street. The other park is beyond the residential block to the northwest. The two parks and club are reported to be heavily used by local townspeople. There is no current indication that area residents use the wetland for recreational purposes. The creek is generally very shallow and is unsuitable for fishing or swimming.

To the northeast of the site are a series of six or seven small businesses, including a farm pesticide distributor, Thermogas distributor, and an auto body repair shop. Behind these businesses is a railroad corridor, a state highway and farm lands. Immediately to the southeast is the Town of Ashippun garage. Southwest of the OEC plant is the contaminated wetland and Davy Creek. In all directions from the site are rolling hills and farmland with wooded areas.

D. Health Outcome Data

"Health outcome data" is a phrase referring to records of death and disease. When there is evidence that people near a site have been exposed to contaminants at levels that could lead to an increase in rates of death or disease, a review of health outcome data may be appropriate. A review also may be appropriate if there are reports of unusual clusters of diseases near a site. There is no evidence of significant public exposure to chemicals from the OEC that would be likely to result in health effects. The WDOH is not aware of any reports of clusters of chronic disease near this site.

COMMUNITY HEALTH CONCERNS

WDOH determined community health concerns by attending public meetings regarding the OEC Superfund Site. Representatives from WDOH attended public meetings on July 5, 1988, March 28, 1990, and October 8, 1991. Persons in attendance were asked about their health related questions regarding the OEC site. During the public meetings area residents asked what the health risk is for someone entering the contaminated part of the Davy Creek wetlands.

In general, residents are concerned about the length of time it is taking to develop and carry out a remediation plan for the contaminated area of the Davy Creek wetlands. For the past ten years, residents have been attempting to get a dredging permit from the Army Corp of Engineers to reopen a section of Davy Creek. They are concerned about the continuing encroachment of the wetlands on their property and the periodic flooding of their basements. However, because of the potential release of toxic chemicals from contaminated wetland sediment during dredging, the permit has not been approved.

The "Full" Health assessment for the Oconomowoc Electroplating Company, Inc., Superfund site was available for public comment from June 18, 1993 to July 19, 1993.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

This section discusses the chemicals that are present on the OEC manufacturing property "on-site" and off the OEC property "off-site" at levels of health concern. A chemical is considered to be of health concern if concentrations are above a level that might affect human health, and if people are likely to contact those chemicals now or in the future. In many cases, levels of health concern are not published standards. Health assessors use comparison values to decide whether chemicals are of health concern at a site (see Appendix B for descriptions of various comparison values). For cancer-causing chemicals, carcinogens, health concern exists when a lifetime exposure to the most contaminated material at the site might result in at least one additional cancer for every one million people exposed.

A. On-site Contamination

Soil

Results of the soil gas survey in 1988 indicated isolated contamination in the OEC lagoon area and in the former storage area. The major organic contaminant found in the soils is trichloroethylene. The lowlands area south of the fill area showed the most elevated concentrations of trichloroethylene and other volatile organic compounds in the soil. It is likely that the volatile organic compounds detected in the soil are the result of degreasing operations and laboratory practices at OEC (Page 4-4, R.I.).

From December 5-8, 1988, soil samples were collected from three depth intervals between ground surface and the water table (approx. 5 feet). Samples were also collected below the water table (greater than 5 feet). 36 soil samples were collected from a depth of 0 to 1 foot at 34 locations; 17 soil samples were collected at the 2 to 3 foot depth interval; 8 soil samples were collected at the 4 to 5 foot depth interval; 4 soil samples were collected, one each, at 5.5 to 7 feet, 6 to 8 feet and 8-10 feet.

In the 0 to 1 foot range the volatile organic compound (VOC) trichloroethylene was detected in 5 samples at concentrations ranging from 2-160 ug/kg. The highest concentrations were

reported in the northern corner of the lowland area, south of the fill area on the eastern edge of the main production area building, and in the far southern corner of the lowland area in the drainage pathway. These results are consistent with the soil gas survey discussed previously (See Appendix A for locator map).

Several inorganic chemicals were found to be contaminating soils at 0-1 foot intervals. Of these, only cadmium occurred at levels of potential health concern. Table 1 lists the soil contaminants considered to be the contaminants of concern.

There were no soil contaminants of concern at the 3'- 4' and 4'- 5' depth intervals or at a depth interval greater than 5'.

Table 1: On-Site Soil Sampling
Chemicals of Concern
Oconomowoc Electroplating Company

Contaminant	Range of Levels Detected		Background	Comparison Value
	Minimum Detected (mg/kg)	Maximum Detected (mg/kg)		
Cadmium	1.6	6,100	<1.0	10 [1]
Trichloroethylene	0.002	0.160	-	5,000 [2]

1 Environmental Media Evaluation Guides
2 Based on an intermediate Minimal Risk Levels

Source: Remedial Investigation Report Table 4-7.t

Groundwater

A total of 12 monitoring wells, 8 shallow (approx. 15') and 4 deep (approx. 50'), were drilled between November 5-23, 1988. Three of the twelve monitoring wells are located off-site and will be discussed in that section. The locations of the monitoring wells are shown in Appendix A.

Groundwater samples were collected in two separate rounds of sampling conducted the weeks of December 13-20, 1988, and February 27 to March 3, 1989. All 12 monitoring wells were sampled during the first round, and 11 monitoring wells during the second round (MW - 04D was not resampled due to mechanical problems). Two of the 12 monitoring wells are located off-site in the upgradient direction and one is off-site in the downgradient direction. The remaining 9 wells are on-site. Most of the groundwater that was contaminated with volatile organic compounds was restricted to two on-site shallow monitoring wells and the one off-site shallow monitoring well located in the downgradient direction.

The following organic contaminants were detected during both rounds of sampling: 1,1-dichloroethylene, trichloroethylene, trans-1,2-dichloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane and methylene chloride. Vinyl chloride was detected on one occasion in one of 26 monitoring well water samples. Because of the very low detection frequency in only one medium on one occasion, it is not considered a contaminant of concern. Methylene chloride was detected in 2 of 26 samples at a maximum concentration of 15 μg/L. Since methylene chloride was also identified as a chemical of concern in lagoon liquid it is considered a chemical of concern in groundwater. Table 2 lists the on-site groundwater organic contaminants of concern.

Table 2: On-site Monitoring Well Sampling
Volatile Organic Compounds
Chemicals of Concern

Contaminant	Frequency of Occurrence	Range of Levels Detected		Comparison Value (μg/L)
		Minimum Level (μg/L)	Maximum Level (μg/L)	
1,1-Dichloroethylene	5/20	18	170	0.058 [1]
trans 1,2-Dichloroethylene	6/20	7	810	100.0 [2]
1,2-Dichloroethane	1/20	21	34	0.38 [1]
Methylene Chloride	2/20	14	15	4.7 [1]
1,1,1-Trichloroethane	6/20	58	810	200.0 [2]
Trichloroethylene	6/20	20	2,100	5.0 [4]

Source: Remedial Investigation Report Table 4-11.
1 Cancer Risk Evaluation Guide
2 Drinking Water Lifetime Health Advisory
3 Derived from the Reference Dose
4 Wisconsin Groundwater Enforcement Standard

The following inorganic contaminants were detected in the monitoring well groundwater samples: Cadmium, nickel and cyanide. Due to conflicting language in the Remedial Investigation (Pages 4-9 and 4-10) it is not clear if all the samples were unfiltered.

The cadmium, nickel and cyanide were detected in a shallow monitoring well MW-02S, located downgradient, in the drainage ditch southwest of the wastewater treatment lagoons. Table 3 lists the on-site inorganic contaminants of concern.

Table 3: On-site Monitoring Well Sampling
Inorganic Chemicals of Concern

Contaminant	Frequency of Occurrence	Range of Levels Detected		Comparison Value (µg/L)
		Minimum Level (µg/L)	Maximum Level (µg/L)	
Cadmium	3/26	5	12	2.0 [1]
Cyanide	8/26	11	510	200.0 [2]

1 Environmental Media Evaluation Guides for children.
2 Derived from the oral Reference Dose for children.

Source: Remedial Investigation Report Table 4-12.

Lagoon Contamination

On May 23, 1989, sludge and liquid samples were collected from the two wastewater treatment lagoons (known as East and West). A total of 9 sludge samples were collected from 8 locations. Samples were collected approximately 4 feet from the edge of the lagoons representing the upper 6 inches of sludge. In addition, one composite sludge sample was collected at random locations within the two lagoons.

Lagoon sludge

The following organic compounds were detected in the sludge samples: methylene chloride, acetone, 1,1-dichloroethane, 1,1,1-trichloroethane, tetrachloroethylene, toluene, ethylbenzene, and xylene. None of these organic compounds were considered to be chemicals of concern in the lagoon because concentrations were below comparison values. Several inorganic contaminants were found as contaminants in the lagoon sludge. Table 4 lists the inorganic sludge contaminants considered to be of potential concern.

Table 4: On-site Lagoon Sludge Sampling
Inorganic Chemicals of Concern

Contaminant	Frequency of Occurrence	Range of Levels Detected		Comparison Value (µg/L)
		Minimum Level (mg/kg)	Maximum Level (mg/kg)	
Cadmium	8/8	14	3,360	10 [1]
Chromium	7/8	1,531	18,700	250 [2]
Lead	8/8	71	2,370	NA [3]

1 Environmental Media Evaluation Guide.
2 Derived from Reference Dose.
3 Not Available
Source: Remedial Investigation Report Table 4-18.

Lagoon Liquid

Three liquid samples were collected from two locations in the wastewater treatment lagoons. Samples were collected approximately 4 feet from the edge of the lagoon at a depth of 1 to 2 feet. Table 5 lists the organic contaminants of concern.

There were no inorganic chemicals of concern at detectable levels in the lagoon liquid samples.

Table 5: On-site Lagoon Liquid Sampling
Organic Chemicals of Concern

Contaminant	Range of Levels Detected		Comparison Value (μg/L)
	Minimum Level (mg/kg)	Maximum Level (mg/kg)	
Methylene Chloride	2,900	6,600	4.7 [1]

1 Cancer Risk Evaluation Guideline
Source: Remedial Investigation Report Table 4-18.

B. Off-Site Contamination

Groundwater

Groundwater samples were collected during the weeks of December 13-20, 1988 and February 27 through March 3, 1989, from 12 residential wells and three off-site monitoring wells. This coincides with the two rounds of sampling completed at the nine on-site monitoring wells. Ten of the residential wells are located west of the site. One well is located within OEC property, and another is the Town Garage well east of the site. Refer to Appendix A for the location of wells tested.

No organic contaminants of concern were identified in the 1988/89 sampling rounds of residential wells. However, sampling completed by the WDNR in 1986 revealed trichloroethylene (2.2 and 2.3 μg/L) in a residential well and 1,2-dichloroethane (2.0 and 1.5 μg/L) in the town garage well. The contaminated residential well was located across Eva Street, northwest of OEC. Both samples were below the Wisconsin Groundwater Enforcement Standard (WGES) for trichloroethylene and 1,2-dichloroethane (5.0 μg/L); however, the level of 1,2-dichloroethane exceeded the current CREG comparison value (0.38 μg/L). Subsequent samples have not identified the presence of trichloroethylene or 1,2-dichloroethane.

Several inorganic contaminants were identified in residential groundwater samples at concentrations above background. Background was established by sampling an off-site residential well located in an upgradient direction. Those chemicals were also compared to health values and those of concern are listed in Table 6.

In April 1992, water sampling of residential wells was completed by an EPA contractor. Cyanide, a contaminant of concern in on-site monitoring wells was identified in residential well water samples. The levels detected were below the WGES for cyanide (200 μg/L) and the WGES Preventive Action Limit (40μg/L). No organic contaminants were identified in the monitoring wells located northeast of the site. However, since cyanide was detected at high levels in on-site monitoring wells it is also included in Table 6 as a chemical of concern in residential wells.

Two of the three off-site monitoring wells are located in the upgradient direction east and northeast of the site and provide background water quality data. The remaining off-site monitoring well is located downgradient, southwest of the site. This shallow well, extending into the unconsolidated deposits, was placed near a residential well identified as having VOC contamination in 1986.

The following VOCs were identified in the downgradient monitoring well southwest of the OEC site: 1,1-dichloroethylene, 1,1-dichloroethane, trans-1,2-dichloroethylene, 1,1,1-trichloroethane, and trichloroethylene. Table 7 lists the organic contaminants of concern. No organic contaminants were identified in the monitoring wells located northeast of the site. There were no inorganic chemicals of concern identified in the monitoring wells.

Table 6: Off-site Residential Well Sampling
Inorganic Chemicals of Concern

Contaminant	Frequency of Occurrence	Range of Levels Detected		Comparison Value (μg/L)
		Minimum Level (mg/kg)	Maximum Level (mg/kg)	
Lead	3/31	8	21	5 [1]
Cyanide	4/17	10	20	200 [2]

1 Wisconsin Groundwater Preventive Action Limit
2 Derived from Reference Dose for Children.
Source: Remedial Investigation Report Table 4-15.

Air

In October 1988, ambient air monitoring was done to determine safety precautions necessary for personnel conducting the sampling activities. The results of air monitoring performed with an organic vapor analyzer during the site sampling activities indicated that airborne

volatile compounds were not detectable at levels greater than 0.1 ppm above background concentrations anywhere on the OEC site.

Davy Creek wetlands

Over the past decade, several rounds of sampling/investigations of the Davy Creek wetlands have been completed by various agencies and contractors. The following is a chronological listing of those efforts.

1. The WDNR investigated the Davy Creek wetlands in 1979. At that time 4 stream sediment samples and 3 representative soil samples of the top five inches of wetlands soils were collected. The results showed an electroplating sludge layer ranging from 0.2 to 3.2 feet thick downstream of the facilities outfall. No sludge was present upstream from OEC's discharge point. Sludge was also observed outside the stream-bed, in the wooded area below Fireman's Park, apparently having settled out during periods of high water. Table 8 indicates the chemicals of concern.

2. The WDNR collected samples from the wetlands area soils and sediment of Davy Creek in June 1983. The results indicated elevated concentrations of cadmium, chromium, nickel and zinc. A Resource Conservation and Recovery Act Facility Assessment was prepared by the WDNR in October, 1986. Testing was performed on one soil and one sediment sample. Table 9 list the chemicals of concern.

Table 7: Off-site Monitoring Well Sampling Results
1988-1989
Volatile Organic Chemicals of Concern

Contaminant	Frequency of Occurrence	Range of Levels Detected		Comparison Value (µg/L)
		Minimum Level (mg/kg)	Maximum Level (mg/kg)	
1,1-Dichloroethylene	3/3	6	12	0.058 [1]
Total 1,2-Dichloroethylene	3/3	54	58	200 [3]
1,1,1-Trichloroethylene	3/3	12	22	200 [4]
Trichloroethylene	3/3	64	130	5 [2]

1 Cancer Risk Evaluation Guide
2 Wisconsin Groundwater Enforcement Standard
3 Derived from Reference Dose for Child.
4 Maximum Contaminant Level
Source: Remedial Investigation Report Tables G-6 & G-7.

3. In July of 1986, the Technical Assistance Team (TAT) conducted a limited sampling survey of sediments in the wetlands. Three samples were collected in the wetlands and four from Davy Creek. Of the samples collected in Davy Creek, one was upstream and three downstream from the OEC's outfall. Analysis of these samples indicated elevated concentrations of metals and total cyanide in the area between OEC's discharge point and the adjacent stretch of Davy Creek. Elevated levels of cadmium, chromium, copper, lead, nickel, zinc, and cyanide were detected. The chemicals of concern are listed in Table 10.

Table 8: Davy Creek Off-site Wetlands Sediment Sampling
Inorganic Chemicals of Concern
1979 WDNR

Contaminants	1979 WDNR Samples (mg/kg)	Comparison Values (mg/kg)
Cadmium	4,400	10 [1]
Chromium	19,000	250 [2]
Nickel	15,000	1,000 [2]
Copper	14,000	NA [3]

1 Environmental Media Evaluation Guide.
2 Derived from Reference Dose, Nickel Salts RfD-C (child dose).
3 Not Available
Source: Remedial Investigation Report, page 1-17

4. Based on the results of the 1986 sampling project, the TAT conducted an extensive sampling program of the wetlands in March and April of 1987 to determine the extent-of-contamination of the wetland area adjacent to OEC. The sampling project encompassed approximately 300 acres of wetlands, south of OEC, along Davy Creek. A total of 184 sediment samples were collected from sixty locations in the wetlands at depths ranging from 0 to 5 feet. The wetlands area being investigated was divided into three areas: the grid area, the Davy Creek up-stream area, and the Davy Creek down-stream area. Refer to Appendix A to review the three wetland areas investigated.

Table 9: Davy Creek Off-site Wetlands Sediment Sampling
Inorganic Chemicals of Concern
1983 WDNR

Contaminants	WDNR Soil Sample (mg/kg)	WDNR Sediment Sample (mg/kg)
Cadmium	9.4	2.6

Source: Remedial Investigation Report, page 1-7

Sampling in the grid area consisted of 94 sediment samples taken from 30 locations in a 250,000 square foot area south of the OEC facility. The Davy Creek upstream area occupied the east side of the grid along Davy Creek. The upstream sampling was used to establish background concentrations of inorganic chemicals. Forty-five sediment samples from 14 locations were collected along this 3/4 mile stretch of Davy Creek. The Davy Creek downstream area was defined as the area between the grid and the confluence point of Davy Creek with the Rock River (the Rock River is located approximately 5,500 feet downstream of the OEC site). Forty-five sediment samples were collected from 16 locations west (down-stream) of the grid area.

Table 11 indicates the inorganic chemicals in the downstream area wetland sediment contaminants of concern (samples were taken at 0-1 foot and 1-2 feet depth intervals). There were no organic chemicals of concern.

The wetlands grid area, consisting of the area adjacent to and south of the OEC site, was sampled at depths of 0 to 1 foot, 1 to 2 feet and 2 to 3 feet. Sampling indicated that contamination by inorganic chemicals may extend to depths greater than 3 feet. Table 12 lists the inorganic chemicals of concern.

Table 10: Off-site Davy Creek Wetlands Sediment Sampling
Inorganic Chemicals of Concern
1986 TAT

Contaminants	Concentration Detected (mg/kg)	Comparison Value (mg/kg)
Cadmium	1,690	10 [1]
Chromium	38,700	250 [2]
Copper	6,560	NA [3]
Lead	382	NA [3]
Nickel	33,100	1,000 [2]
Zinc	73,600	NA [3]
Cyanide	1,820	1,000 [2]

1 Environmental Media Evaluation Guide
2 Derived from the Reference Dose, Nickel Salts RfD-C (child dose)
3 Not Available

Analytical results also indicated the presence of three volatile organic compounds in the sediment. The highest concentrations were 4000 μg/kg acetone, 250 μg/kg methylene chloride, and 1100 μg/kg toluene. The organic chemicals were determined not to be of concern.

Table 11: Off-site Davy Creek Wetlands Downstream Sediment Sampling
Inorganic Chemicals of Concern
1987 TAT

Contaminant	Contaminant Level and Depth of Sample (mg/kg)		Background[a] Level (mg/kg)	Comparison Value (μg/L)
	0-1 ft (mg/kg)	1-2 ft (mg/kg)		
Cadmium	383	272	<2.7	10 [1]
Chromium	545	1,370	14	250 [2]
Copper	2,760	714	18	NA [3]
Lead	284	29	10	NA [3]

a Samples used to determine background levels were taken approximately 3,700 feet from the OEC site.
1 Environmental Media Evaluation Guide.
2 Derived from Reference Dose.
3 Not Available
Source: Remedial Investigation Report Table 1-1 and 1-2.

5. In December of 1987, the Environmental Response Team (ERP) collected ten sediment samples from the wetlands south of the OEC site. The objective was to determine if the contaminated sediments are toxic to aquatic organisms. Table 13 lists inorganic chemicals of concern.

   The results of the extraction procedure toxicity testing indicated that six of the ten sediments examined were acutely toxic to fathead minnows. In addition one sediment sample was chronically toxic to algae.

Davy Creek Surface Water

Ten surface water samples were collected to determine if contaminants were migrating via surface water. Samples were collected from downstream, upstream, sewage treatment plant outfall, OEC discharge, within the grid area, and by the Lincoln Road bridge. All samples were collected prior to sediment sampling activities to minimize the amount of suspended sediments in the water. All samples were filtered before being analyzed for inorganic parameters.

With the exception of zinc, surface water samples in the wetland did not appear to contain dissolved contaminants associated with OEC. Zinc concentrations ranged from 11 to 478 μg/L, the latter concentration being from a sample collected at the OEC discharge point. While there were no dissolved chemicals of potential public health concern identified in the

surface water samples, there were no analyses of hazardous chemicals in the particulate matter carried in the surface water.

Table 12: Off-site Davy Creek Wetlands Grid Area Sediment Sampling
Chemicals of Concern
1987 TAT

Contaminant	Concentration (mg/kg)	Background[a] Level (mg/kg)	Comparison Value (µg/L)
Cadmium	3,600	12.7	10 [1]
Chromium	8,840	14.0	250 [2]
Copper	3,550	18.0	NA [3]
Cyanide	2,690	<0.2	1,000 [2]
Lead	153	9.6	NA [3]
Nickel	16,500	12.0	1,000 [2]
Zinc	10,800	47.0	NA [3]

a Samples taken approximately 3,700 feet upstream from the OEC site were used to determine background levels.
1 Environmental Media Evaluation Guide.
2 Derived from Reference Dose.
3 Not Available
Source: Extent-of Contamination Study, 1987, Weston, Appendix A.

Table 13: Off-site Davy Creek Wetlands Sediment
Inorganic Chemicals of Concern
1987 ERP Sampling

Contaminant	Concentration (mg/kg)	Background[a] Level (mg/kg)	Comparison Value (µg/L)
Arsenic	54	<6.8	15 [1]
Cadmium	4,700	<12.7	10 [1]
Chromium	15,000	14.0	250 [1]
Copper	5,500	18.0	NA [3]
Cyanide	2,800	<0.2	1,000 [1]
Lead	910	9.6	NA [3]
Nickel	18,000	12.0	1,000 [2]
Zinc	59,000	47.0	NA [3]

a April 13, 1988, Environmental Response Team Report.
1 Derived from Reference Dose.
2 EPA Maximum Contaminant Level Goal, Nickel Salts RfD-C (child dose).
3 No guidelines available
Source: Remedial Investigation Report, pages 1-8 and 1-9.

C. Quality Assurance and Quality Control

The soil, groundwater and lagoon samples collected for the remedial investigation were analyzed by the EPA's Contract Laboratory Program (CLP). The resulting analytical laboratory database was validated by the EPA Central Region Laboratory staff, and has been reviewed by the contractor, EBASCO Services Incorporated. The analytical data were considered conformational level, that is, the highest level of data quality. These analyses required full CLP analytical and validation procedures.

D. Toxic Chemical Release Inventory

A search of EPA's Toxic Chemical Release Inventory (TRI) was conducted of Town of Ashippun zip codes for any previously reported toxic chemicals. Certain manufacturers are required to report to the EPA releases or transferrances of specific hazardous chemicals. This reported information is entered into the automated TRI system. Results of a computer search disclosed no reports of hazardous substance releases or transferrances for these zip codes.

E. Physical and Other Hazards

Many of the physical hazards at this site were removed during the 1991 emergency removal completed by the EPA. Buildings, chemical barrels and vats, and contaminated soil were removed at this time. However, the sludge lagoons and large piles of contaminated dirt still present a hazard to persons trespassing on the site. The wetlands do not pose any unique physical hazards except for those inherent in wetlands.

PATHWAYS ANALYSIS

People may be exposed to the chemicals of concern in a number of ways. The pathways analysis looks at five elements - the source of the chemicals, where they are found (soil, water, air), the ways the chemicals may move from the site, ways by which people could be exposed to the chemicals (touch, ingestion, inhalation), and the groups of people that might be exposed.

Pathways are referred to as completed, potential, or eliminated. A completed pathway is one where there is a clear indication that people were exposed to chemicals from the site and when there is sufficient information to evaluate that exposure. All five of the elements must exist for a completed pathway to exist. This includes exposures that occurred in the past and exposures that are currently happening.

A potential pathway exists when there is insufficient information to link a chemical to a known level of exposure among an identified population. A potential pathway may refer to a past, present, or future exposure. An exposure pathway can be eliminated if one of the five elements is missing and will never be present.

A. Completed Exposure Pathways

Exposure to contaminants through ingestion, inhalation, and dermal absorption has occurred and may still be occurring as a result of contaminated groundwater moving downgradient and away from the OEC site into residential wells.

The OEC site is located on a thick unconsolidated glacial drift deposit. Boring logs describe the deposits as light brown, silty sands to coarser, fine grained, poorly graded gray sands, with some clay. No gravel was found. The thickness of the glacial deposits range from 30 to 60 feet depending on the extent of weathering of the bedrock surface.

The glacial deposits are underlain by bedrock consisting of Ordovician-age dolomite. The dolomite constitutes the upper portion of the Maquoketa Shale. The dolomite varies from approximately 30 feet thick beneath the eastern part of the site to zero feet west of the site. Several residential wells near the site are completed in dolomite. The Maquoketa Shale is underlain by dolomite of the Galena Platteville aquifer. Several residential wells in the Ashippun area appear to be withdrawing water from dolomite below the shale.

The water table lies within the unconsolidated glacial deposits. It is shallow, less than 10 feet below ground surface, approaching the land surface in the wetland area south of the OEC site. The local groundwater flow in this unconsolidated drift is in the west-southwest direction toward Davy Creek.

The recharge to the upper dolomite is downward leakage through the overlying unconsolidated deposits. As a result of the apparent hydraulic connection between the unconsolidated deposits and upper dolomite, it is assumed that the groundwater flow is similar in both. Accordingly, contaminants identified in the on-site monitoring wells will be transferred between the unconsolidated upper deposits and upper dolomite presenting a potential future pathway to private wells drawing groundwater from this zone.

Exposure to cyanide is occurring through the ingestion of cyanide contaminated groundwater from residential wells, screened in the unconsolidated aquifer, west of the OEC site. Cyanide has been identified as a contaminant of concern in on-site groundwater and has now been detected in four off-site residential wells. The movement of groundwater from the OEC site is to the west-southwest towards several residential wells. Levels of cyanide up to on-site concentrations could possibly enter nearby residential wells in the future.

Exposure to lead (20.5 μg/L) occurred through the ingestion of contaminated groundwater at a residence west of the OEC site. Lead has been identified as an on-site contaminant of concern in lagoon sludge. It was not considered a contaminant of concern in on-site groundwater. The levels detected in the residential well samples in 1988 and 1989 were below the current WGES (50 μg/L) but exceeded the Preventive Action Limit of 5 μg/L. Subsequent sampling of residential wells has not detected lead as a contaminant of concern. However, further

investigation of lead as a contaminant of concern in groundwater should be undertaken to rule out other potential sources such as lead solder and plumbing fixtures.

Previous sampling results indicate a completed exposure pathway for trichloroethylene and 1,2-dichloroethane. Exposure to trichloroethylene occurred through the ingestion of contaminated residential well water confirmed in sampling April 1986. The affected residence is located west of the OEC site. The levels of trichloroethylene detected (2.2 and 2.3 μg/L) were below the WGES (5.0 μg/L) (ref. 8). Subsequent testing has not detected trichloroethylene in residential water supplies. Exposure to 1,2-dichloroethane occurred through the ingestion of contaminated groundwater from the well located in the Ashippun town garage, confirmed in sampling April 1986. The levels of 1,2-dichloroethane detected (2.0 and 1.5 μg/L) were above the CREG value of 0.058 μg/l and were a health hazard (ref 7). Subsequent testing, in 1988 and 1989, did not show 1,2-dichloroethane in the garage well water.

Chromium is often associated with plating processing and was one of many types of plating that occurred at this site. So far, the concentrations of chromium in drinking water are below comparison values that trigger health concern.

B. Potential Exposure Pathways

Groundwater

Exposures that result in adverse health effects may result from contact with contaminants through ingestion, inhalation, and dermal absorption as increase concentrations of contaminated groundwater moving downgradient and away from the OEC site. The detection of cyanide in private water supplies west of the OEC site suggest that there is the potential for other on-site groundwater contaminants to impact off-site groundwater quality of residential well water in the future.

Soil

Soil contaminated with VOCs and metals may pose a potential exposure risk through ingestion, dermal contact and inhalation. The greatest risk would be to children entering the site. In particular, the on-site former location of the main building. Soils in this area are heavily contaminated by improperly disposed of laboratory and processing waste from OEC. The EPA commenced an Emergency Removal action in April of 1991 which resulted in the removal of the most contaminated soil from these areas. The property was also secured with a locked fence. If the fence is not maintained until all remedial actions are completed, access to the site and human exposures to chemicals could result.

A future potential pathway of concern is the disturbance and wind dispersion of contaminated soil during site clean-up. This could present an inhalation and ingestion exposure risk to persons living near or using the parks adjacent to the site. This type of scenario could also

occur under extremely dry conditions, i.e., a drought. There is no ambient air monitoring data available for determining the exposure risk from contaminated, air-borne dust.

Lagoon Liquid/Sludge

The waste-water lagoons at the OEC Superfund site present a potential exposure pathway to persons trespassing on the site through skin contact and inhalation of volatilizing vapors. The lagoon liquid is contaminated with methylene chloride. The lagoon sludge is contaminated with high levels of heavy metals. However, as a result of the emergency removal undertaken by the EPA's Emergency and Enforcement Response Branch this type of exposure scenario is unlikely to occur in the future. Security was improved by the installation of additional fencing at several key points around the site. If the fence is not maintained throughout the remedial action, human exposures to chemicals on-site remain a potential pathway.

Davy Creek Wetland

It is estimated that there are 6,000 cubic yards of contaminated sediment involving approximately 75,000 square feet of the Davy Creek wetlands. The bulk of the hazardous waste is located adjacent to the OEC's discharge ditch in what is called the "grid area." This area is considered a "sink" for OEC contaminants (see map: appendix A). The contaminants of concern are metals and cyanide that were discharged into the wetland area as electroplating waste. In some locations the depth of contamination is greater than 3 feet. Under typical wetland conditions it is unlikely that there is exposure risk to the public because trespassers would not likely venture through the mucky wetlands and reach the contamination. Contaminated sediments are buried below several inches to several feet of wetland plant root material. However, under extremely dry conditions, i.e., drought, this area is accessible and presents a very small potential risk of dermal and inhalation exposure from contaminated dust and/or sediment. During a 1988 site visit, which took place during a prolonged drought, all terrain vehicle tracks and footpaths were noted in the wetland area. It would also seem likely that children from the area would be candidates to explore the wetlands given the appropriate conditions such as a dry period which would make access easier.

PUBLIC HEALTH IMPLICATIONS

A. Toxicological Evaluation

There is evidence that people have been, are presently, and will continue to be exposed to contaminants at this site. The major public health concern is the continuing migration and ultimate consumption of contaminated groundwater from the site if these levels reach nearby residential wells. Cyanide has been detected in several wells west of the OEC site. The relevant health effects for each chemical of concern in groundwater are described below.

Ingestion of and dermal contact with contaminated soil are also potential exposure pathways. High levels of the metal cadmium have been identified in soil sampling conducted at the OEC site. The VOC trichloroethylene has also been identified in on-site soil samples. The relevant health effects for each chemical of concern in soil will be discussed below.

Lagoon liquid and sludge on the OEC site are also contaminated. The liquid contains high levels of the VOC, methylene chloride. The sludge contains elevated levels of the metals cadmium, chromium, and lead. The health effects of these chemicals will be discussed below.

The Davy Creek wetlands are contaminated with metals and cyanide. Arsenic, cadmium, chromium, copper, lead, nickel, and zinc have been identified in wetland sediment samples. Discussion of the health effects associated with potential exposure to these chemicals is provided below.

Contaminants of Concern

This section discusses the health effects that might result from exposure to the concentration of chemicals associated with this hazardous site. The assessment uses existing toxicological data to estimate non-cancer health effects and to estimate increased cancer risks when appropriate. (See Appendix B for a description of individual sources)

For each possible drinking water exposure a dose was figured for a 10 kilogram child, representing the most sensitive population. A lifetime adult exposure was also calculated for each possible exposure. Soil contamination exposure was based on a 30 kilogram child, entering the wetlands two times a month, seven months per year, over a 5 year period of exposure. Short-term and lifetime health concerns were considered in the evaluation.

Chemical are arranged alphabetically under the broader headings of "Inorganic Contaminants" and "Organic Contaminants" for easy reference.

Inorganic Contaminants

ARSENIC

Arsenic has been detected in wetland sediment at a level of 54 mg/kg. Exposure through ingestion is a potential health concern. An estimated exposed dose for a 30 kg child entering the wetlands two times a month for seven months over 5 years is 0.0000068 mg/kg/day.

There are several epidemiological studies that suggest the ingestion of arsenic increases the risk of developing skin cancer. The U.S. EPA classifies arsenic as a class A carcinogen, and it is recognized as a known carcinogen by the National Toxicology Program. The most common characteristic of long term exposure to arsenic is a pattern of skin changes. This includes darkening of the skin and the appearance of small "warts". While the skin changes are not considered a health concern in their own right, a small number of the warts may

develop into skin cancer. There is some question about whether the level of carcinogenicity from arsenic exposure presented in epidemiological studies is valid for lower dose exposures that may result from the ingestion of arsenic. It is unlikely that exposure to the levels of arsenic detected in wetland sediment would result in an increased risk of cancer. There is some evidence that exposure to arsenic at levels typical of most people's diets (between 10 and 50 ug per day) may be essential or beneficial to health. However, this positive effect has not been rigorously established. There is no comparison value available to predict the increased risk of cancer from contact with wetland soils. A lifetime exposure to sediments that are generally buried under root material is very unlikely. (ref 17)

CADMIUM

Cadmium has been identified as a contaminant of concern in on-site groundwater, soil, and lagoon sludge. It has also been found at high levels in the Davy Creek wetlands. Exposure through ingestion is a public health concern. An estimated exposed dose in on-site groundwater is 0.017 mg/kg/day for a 10 kg child drinking one liter of water a day. The on-site soil exposed dose would be 0.00077 mg/kg/day. The lagoon sludge exposed dose is 0.00043 mg/kg/day. The Davy Creek wetlands exposed dose to sediment is 0.0006 mg/kg/day.

Occupationally exposed workers breathing cadmium for periods of years may have an increased risk of developing lung cancer. Studies of humans and animals that eat or drink cadmium have not found increases in cancer. No apparent increase in cancer would be expected from exposure to cadmium in on-site groundwater, wetland sediment or on-site soil. Ingesting low levels of cadmium over a long period of time leads to a build-up of cadmium in the kidneys. This cadmium build-up causes kidney damage, and also causes bones to become fragile and break easily. Animals eating or drinking cadmium sometimes get high blood pressure, iron poor blood, liver disease, and nerve or brain damage. It is not known if humans eating or drinking cadmium get any of these diseases. These non-cancer health effects would not be expected from exposure to wetland sediment or on-site soil. However, the MRL for chronic exposure to cadmium is exceeded and human health effects could occur if private drinking water supplies become contaminated with cadmium at the level reported on-site. (ref 18)

CHROMIUM

Chromium has been identified as a contaminant of concern in on-site lagoon sludge and the Davy Creek wetlands. Exposure through ingestion and dermal contact are public health concerns. An estimated exposed dose in lagoon sludge is 0.0024 mg/kg/day. The wetland sediment exposed dose is 0.0049 mg/kg/day.

Long term exposure to high levels of hexavalent chromium in the air has been associated with increased lung cancer in occupationally exposed workers. The levels of chromium found in the wetlands and lagoon sludge are unlikely to pose a cancer risk. Ingestion of

small amounts of chromium will not hurt you; however, intentional or accidental swallowing have caused stomach upsets and ulcers, kidney and liver damage and even death. Some people are dermally sensitive to chromium. Allergic reactions consisting of severe redness and swelling of the skin have been noted. Levels as low as 0.08 mg have caused skin inflammation in humans (ref 19, p.50). It is possible that dermal exposure to wetland sediment or on-site lagoon sludge could result in irritation to the skin, in particular, for persons already sensitized to chromium.

COPPER

Copper is considered a contaminant of concern in Davy Creek wetland sediment. Ingestion of copper is a public health concern for children. However, an estimated exposed dose to copper of 0.0018 mg/kg/day is below the Lowest Observable Adverse Health Effect Level (LOAEL) and would probably not result in health effects.

Very young children are sensitive to copper, and long term exposure to copper in food or water may cause liver damage and death. One study revealed that two infant siblings exposed to water containing 2.2 -3.4 mg/L copper had evidence of liver damage. Children under one year represent a high risk group because homeostatic mechanisms for clearing copper from the body and preventing its entry via the intestine have not yet developed. Studies have not shown copper to be a carcinogen. It is unlikely that the levels of copper detected in the wetlands would have any non-cancer health effects. The lifetime dose of copper from contact with wetlands soil is estimated at 0.00126 mg/kg/day.

CYANIDE

Cyanide is a contaminant of concern in on-site groundwater, off-site residential wells, and Davy Creek wetland sediment. Ingestion is the exposure pathway of concern. An estimated exposed dose to cyanide in on-site groundwater is 0.051 mg/kg/day. The dose from off-site residential water is 0.002 mg/kg/day. The dose from wetland sediment is 0.00035 mg/kg/day.

In high concentrations cyanide is very harmful to the human body. Much of the health information available on cyanide deals with exposure to high levels, frequently as a result of intentional ingestion. At lower levels, in occupationally exposed workers, thyroid gland effects have been noted. Studies completed on cyanide have not shown it to be a cancer causing agent. The levels of cyanide detected in on-site monitoring wells and in wetland sediment exceed RfDs. There is, however, no likely human exposures to either contaminated medium. Levels of cyanide in private residential wells do not exceed health outcome comparison values and are not be expected to pose adverse health effects in humans at the present concentrations (ref 20).

LEAD

Lead is considered a contaminant of concern in on-site lagoon sludge, residential well water, and Davy Creek wetlands sediment. Ingestion of lead is considered an exposure pathway of public health concern. An estimated exposed dose to lead in the lagoon sludge is 0.0003 mg/kg/day. The exposed dose from residential well water is 0.002 mg/kg/day. The dose from wetland sediment is 0.00012 mg/kg/day.

Exposure to lead is dangerous for young children (1-7) because they ingest more dirt, through the typical hand to mouth behavior associated with this age group. Lead exposure has been related to decreased IQ in children. Unborn children can also be exposed to lead through their mothers. This may cause premature births, smaller babies, and decreased mental ability in the infant. Lead has been shown to cause cancer in laboratory animals. As a result, it is classified as a "probable human carcinogen" by the EPA. The cancer risk cannot be estimated because no cancer potency factor is available for lead. There may be a slight risk of impeded intelligence development in a young child ingesting contaminated wetlands sediment and consuming contaminated residential well water with elevated levels of lead. It is unlikely that the lagoon sludge would be ingested by a young child (ref 25).

NICKEL

Nickel is considered a contaminant of concern in Davy Creek wetland sediment. Ingestion and dermal contact are exposure pathways of public health concern. An estimated exposed dose to wetland sediment is 0.00042 mg/kg/day. There are no health guideline values for judging the likelihood of adverse health effects from this exposure.

The inhalation of nickel dust has been shown to cause lung cancer in occupationally exposed refinery workers. Oral exposure to nickel in animals has resulted in death, respiratory, gastrointestinal, hematological, hepatic, renal effects, neurological, immunological, and reproductive effects. The most prevalent adverse effect related to nickel is allergic contact dermatitis in occupationally exposed individuals. There is no increased cancer risk posed by wetland contaminated sediment. With the exception of possible allergic skin reaction on the part of sensitive individuals, health effects from nickel contaminated sediment would not be expected (ref 27).

Organic Contaminants

1,1-DICHLOROETHYLENE

1,1-Dichloroethylene is a contaminant of concern in on-site and off-site groundwater monitoring wells. Ingestion and inhalation are potential pathways of concern. An estimated exposed dose to 1,1-dichloroethylene in on-site groundwater is 0.017 mg/kg/day. In off-site groundwater the exposed dose is 0.0012 mg/kg/day.

Although there is limited data available on human exposure to 1,1-dichloroethylene, one study of laboratory animals shows an association between inhalation exposure and increased incidence of cancer of the kidney (ref 22). Most studies of 1,1-dichloroethylene's potential to cause cancer in laboratory animals did not find such association. However, it is prudent to consider the possibility that 1,1-dichloroethylene is carcinogenic. The U.S. EPA considers this contaminant a "Class C carcinogen". This classification indicates that there is limited evidence of carcinogenicity in animals and inadequate or no evidence of carcinogenicity in humans. A moderate increase in cancer could be expected if private water supplies become contaminated at a level consistent with those found on-site. Levels in on-site groundwater exceed RfDs. Future potential exposure from ingesting or inhaling this chemical would be damage to the liver.

TRANS-1,2-DICHLOROETHYLENE

Trans-1,2-Dichloroethylene is a contaminant of concern in on-site groundwater. Ingestion is a potential pathway of concern. An estimated exposed dose to trans-1,2-dichloroethylene in groundwater is 0.081 mg/kg/day.

The human health effects of long-term, low-dose exposure to trans-1,2-dichloroethylene are not known. The potential for this or cis-1,2-dichloroethylene (another isomer) to cause cancer in humans or laboratory animals has not been studied. A decrease in hematocrit and hemoglobin levels was observed in male rats exposed for 90 days at nearly 400 times the maximum level found in groundwater at the OEC site. The level of trans-1,2-dichloroethylene exceeds the RfD and future potential exposure could result in health effects (ref 24).

1,2-DICHLOROETHANE

1,2-Dichloroethane is a contaminant of concern in on-site groundwater. Ingestion is a potential pathway of concern. An estimated exposed dose to 1,2-dichloroethane is 0.0034 mg/kg/day for children and 0.00097 mg/kg/day for adults exposed for a lifetime. 1,2-dichloroethane had been detected in the town of Ashippun garage during sampling completed in 1986. Subsequent samples have not detected this or other volatile organic compound contamination.

Ingesting, inhaling, and dermally absorbing 1,2-dichloroethane may cause cancer in humans because oral and dermal exposures in laboratory animals caused several different types of cancer in such organs as the forestomach, circulatory system, mammary glands, liver, lungs, and endometrial tissue. Little information is available on the development of cancer in people who were exposed to the chemical. The U.S. EPA classifies this contaminant as a B2 carcinogen, meaning there is sufficient evidence of carcinogenicity in animals and inadequate or no evidence of carcinogenicity in humans. A lifetime exposure to levels detected at the private water supply may cause a low increased risk of cancer from this potential future exposure to contaminated groundwater at this landfill site. Levels of

1,2-dichloroethane exceed no health guideline values and non-cancer health effects would not be expected (ref 21).

METHYLENE CHLORIDE

Methylene Chloride is a contaminant of concern in on-site lagoon liquid. The potential pathways of concern would be ingestion, inhalation and dermal absorption. An estimated exposed dose through ingestion of lagoon liquid is 0.66 mg/kg/day,

Methylene chloride is not known to cause cancer in people, but it has been shown to cause cancer in laboratory animals. Studies of laboratory animals ingesting methylene chloride have shown increases in liver and mammary cancers. Studies showed that laboratory rats breathing methylene chloride developed cancer of the liver and lung. The EPA classifies methylene chloride as a "probable human carcinogen". Ingesting low levels of methylene chloride has not been shown to cause cancer in people. It is unlikely that there would be future potential exposure to methylene chloride contamination unless an individual accidently fell into either of the lagoons. Such an accident might result in consumption of 0.5 Liters of contaminated water. If the individual is a child, a likely exposure might be 0.330 mg/kg exposure. Such an exposure does not exceed health guideline values for acute exposure (ref 26).

1,1,1-TRICHLOROETHANE

1,1,1-Trichloroethane is a contaminant of concern in on-site groundwater. The potential pathways of concern would be ingestion, inhalation and dermal absorption. An estimated exposed dose through ingestion is 0.081 mg/kg/day.

Studies in laboratory animals have not shown 1,1,1-trichloroethane in air or water to cause cancer. There are no studies in humans that can tell us whether adverse health effects will occur if you were to eat food or drink water with 1,1,1-trichloroethane. Cancer and non-cancer health effects would not be expected from potential future exposure to contaminated groundwater at the levels detected (ref 29).

TRICHLOROETHYLENE

Trichloroethylene is a contaminant of concern in on and off-site groundwater monitoring wells, and on-site soil. The pathways of concern would be ingestion, inhalation, and dermal exposure. An estimated exposed dose to the ingestion of on-site groundwater is 0.21 mg/kg/day for a child dose and 0.06 mg/kg/day for an adult lifetime dose. The exposed dose to off-site groundwater is 0.013 mg/kg/day for a child dose and 0.004 mg/kg/day for an adult lifetime dose. The exposed dose from soil is 0.00002 mg/kg/day for a child dose and 0.0000014 mg/kg/day for an adult lifetime dose. Low levels of trichloroethylene have been ingested by people living in a residence adjacent

to and west of the OEC site. Subsequent sampling of residential wells has not detected trichloroethylene or other volatile organic compounds.

Ingesting or inhaling trichloroethylene may cause cancer in humans because such exposures to laboratory animals cause cancer of the liver and kidney. Past limited data linked exposure to trichloroethylene with cancer in humans. Currently the compound is considered unclassifiable for carcinogenicity. Adverse health effects might be expected from future exposure to trichloroethylene contaminated groundwater if levels in residential wells reach those found on the site that exceed MRLs. Previously reported levels in private water supplies did not exceed MRLs. No increased risk of cancer would be expected from future potential exposure to contaminated groundwater (ref 28).

B. Health Outcome Data Evaluation

A review of health outcome data is appropriate when there is evidence of people who have been exposed to contaminants at levels which could lead to a increase in rates of death or illness. In Wisconsin "Health Outcome Data" refers to records of death and/or disease that include vital statistics (birth and death records), a cancer reporting system, and hospital discharge records. A review of health outcome data might also be appropriate if there are reports of unusual clusters or higher-than-expected levels of specific diseases near a site. Based on existing data from the RI and current research on diseases caused by contaminants which were found at the OEC site, the levels of exposure to contaminants are too low to initiate any studies of death and illness. In the event additional OEC Superfund site data becomes available which shows local residents exposed to a much higher level of contaminants, such a study may be desirable.

C. Community Health Concerns Evaluation

Each of the concerns raised by the community regarding the OEC Superfund site are addressed below.

What is the health risk for someone entering the Davy Creek wetlands, i.e., where the OEC contamination is located?

Metals and cyanide present the greatest health risk to persons entering the wetlands area. It is unlikely that exposure to any single contaminant would result in adverse health effects for the exposed individual. However, the "additive effect" or multiple effect of several chemicals on an individual entering this area and ingesting contaminated sediment is not known. Dermal absorption would not be a major health concern except for individuals already sensitized to the metals chromium and nickel. This type of exposure would most likely result in redness or swelling of the area of skin coming in contact with the contaminated sediment. The physical characteristics of Davy Creek make it unsuitable for fishing and therefore, eating fish from that source is not considered a health concern.

CONCLUSIONS

1. The OEC Superfund site poses a public health hazard primarily from ingestion of possible future increased levels of site contamination in residential groundwater. Site chemicals are present in residential groundwater at low levels that are not expected to cause adverse health effects. The migration of higher levels of VOC-contaminated groundwater into residential wells west and northwest of the OEC site may occur in the future. Five of the VOCs detected in groundwater monitoring wells exceed the WGES. Several of these are carcinogens. Two of the VOCs, 1,2-dichloroethylene and trichloroethylene were detected in the off-site monitoring well located approximately sixty feet east of a residential well. These chemicals are also identified as on-site groundwater contaminants. There would be low increase in the cancer risk for persons consuming the VOC contaminated water.

2. The inorganic compounds cadmium and cyanide have been identified as on-site contaminants. Until 1992, these contaminants had not been detected in residential wells. However, sampling completed in April 1992 detected cyanide in residential wells at levels below (20 μg/L was the highest) the WGES of 200 μg/L. Cyanide at this level is not known to cause adverse health effects. The residential wells with cyanide are located west of the OEC site. Groundwater flows west-southwest from the site and may carry much higher levels of cyanide representative of on-site contamination levels, 510 μg/L.

3. On-site soil contains high levels of cadmium and trichloroethylene. The highest levels are reported to be southeast of the main building in the lowland area. Persons trespassing on the site or workers remediating the site would be at risk of dermal, inhalation and ingestion exposure. Trespassers are currently restricted from the site by a fenced and locked perimeter.

4. Lagoon sludge contains high levels of cadmium, chromium and lead. The lagoon liquid contains high levels of methylene chloride. These environmental media could pose an inhalation and dermal exposure risk to persons trespassing on the site or workers remediating the site.

5. Residential wells located west of the OEC had high levels of the metals lead and zinc. Zinc is not viewed as a contaminant of concern at the levels identified. However, lead (20.5 μg/L) exceeds the EPA's Action Level of 15 μg/L. It is possible that the lead may not be from the OEC site but may be leaching from pipes or solder in the home. It presents an exposure concern for infants and young children.

6. The Davy Creek Wetland contains an estimated 6,000 cubic yards of contaminated sediment. Arsenic, cadmium, chromium, copper, lead, nickel, and cyanide are the contaminants of concern. Outdoor enthusiasts, children, and workers entering this area would be at slight risk of dermal and ingestion exposure since the sediments are generally covered by several inches to several feet of plant root material. During periods of drought, inhalation of contaminated dust would also be an exposure concern. In particular, exposure to chromium,

lead and nickel would present an increased health risk to individuals. Chromium and nickel would most likely cause allergic type responses (skin redness, swelling) in sensitive individuals. Lead exposure to young children could increase the risk of developmental disorders such as decreased intelligence quotient (IQ) and reduced growth. Citizens expressed concern about the risks associated with exposure to chemicals in the wetlands.

RECOMMENDATIONS

1. Continue to regularly sample residential wells to provide early warning of the possible migration of hazardous levels of site contaminants and reduce the possibility of ingestion exposures. Further, as soon as possible, steps should be taken to prevent the further migration of contaminants from the OEC site.

2. Continue to monitor for contaminants in the on and off-site monitoring wells.

3. Continue monitoring residential wells in the path of the contaminated groundwater plume. In particular, homes to the west and southwest of the site. Several of these homes are adjacent to monitoring wells with contaminated groundwater. Water should be checked for VOCs, metals, and cyanide.

4. Include the well located in the Ashippun town garage in the ongoing groundwater monitoring program. The chemical 1,2-dichloroethane had been detected during water testing completed in 1986.

5. Continue to insure that access to the site is restricted. Some areas of the site have soils contaminated with high levels of trichloroethylene and cadmium.

6. Implement, during the remediation of on-site soils, appropriate dust control measures to prevent wind dispersion of contaminated soil to nearby residences.

7. Further evaluate residential wells identified as having levels of lead $\geq$ 15 μg/L to determine the source.

8. Ensure that the contaminated wetland area is properly posted and secured. Residents should be informed of the potential exposure risk posed by the contaminated wetland sediments. In particular, when this area is more likely to be accessed, such as during dry periods or the winter.

9. Test and then properly abandon the on-site well to eliminate possible downward migration of chemical contaminants.

A. Health Activities Recommendation Panel Statement

The ATSDR Health Activities Recommendation Panel (see Appendix B) and the Wisconsin Division of Health evaluated the data on this site to determine what needs exist for additional research and/or local education about health related concerns. Examples of such activities could include further studies on cases of disease in the vicinity of the site or providing residents with additional information about the health effects of exposures to specific toxic chemicals coming from the site.

Some people living nearby have evidently been exposed to low levels of contamination in groundwater that originates from the site. Despite this, the levels of contamination are too low to detect any increased incidence of illness or disease among the exposed individuals. Therefore, no more studies of the site's impact on public health are needed at this time. The Division of Health will continue to provide health education to the community and local health care professionals.

The Division of Health and ATSDR will evaluate the need for more health activities if new information about the site becomes available.

B. Public Health Actions

ATSDR and WDOH evaluated the OEC Site for appropriate health follow-up activities. Based on the recommendations made in the health assessment, the following public health actions have been or will be undertaken.

1. Provide continuing public health education as new information related to public health issues becomes available;

2. Continue to solicit health concerns of Dodge County residents through agency contacts with the Dodge County Nurses, which is the local health agency for the town of Ashippun.

3. Review and comment on the public health aspects of draft work plans of sampling to be done for the site.

4. Advise and consult with the WDNR and the EPA on public health concerns that may arise as new information about the site becomes available.

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CERTIFICATION

This Oconomowoc Electroplating Company, Inc. Public Health Assessment was prepared by the Wisconsin Department of Health and Social 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 public health assessment was begun.

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The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health assessment, and concurs with its findings.

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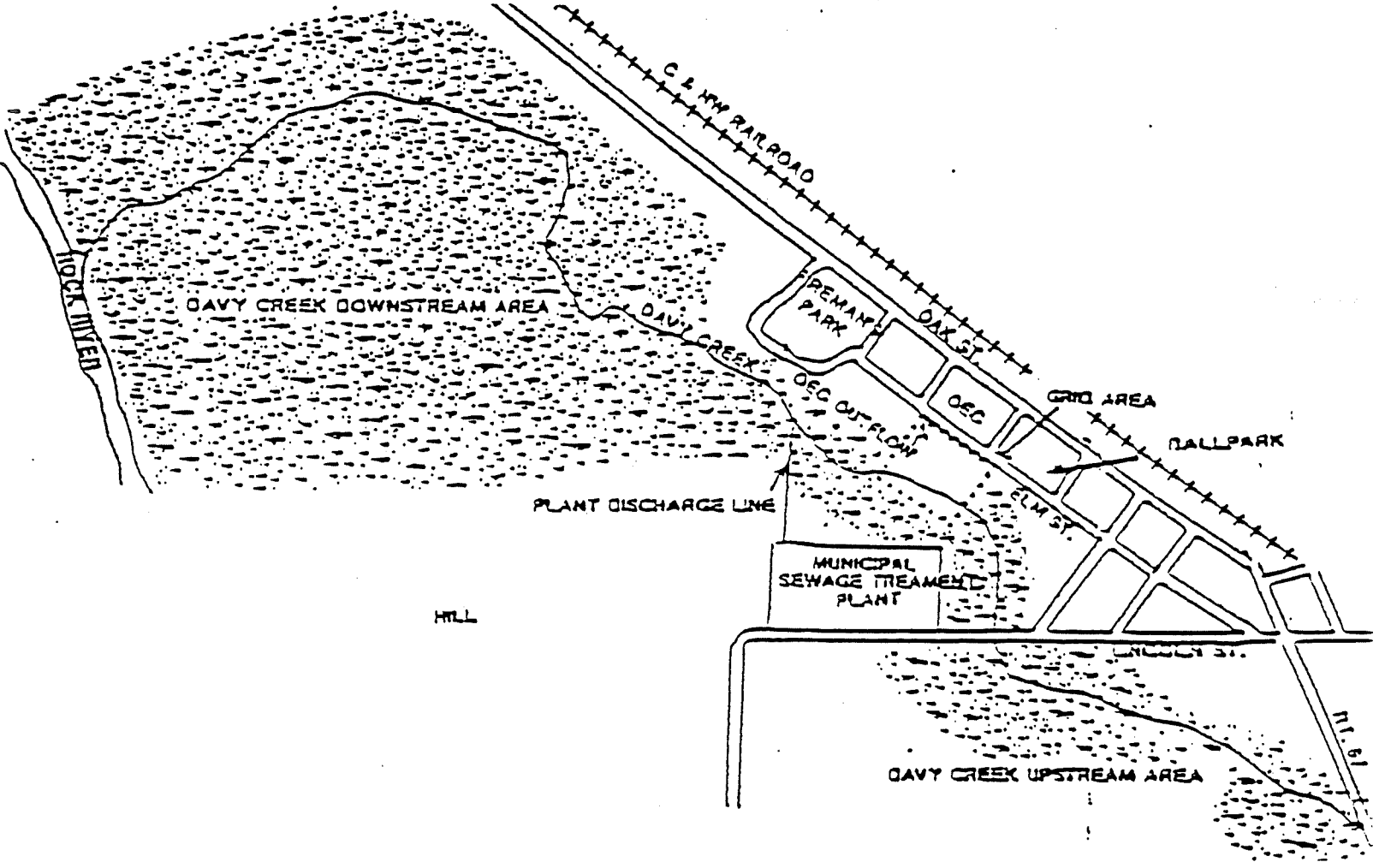
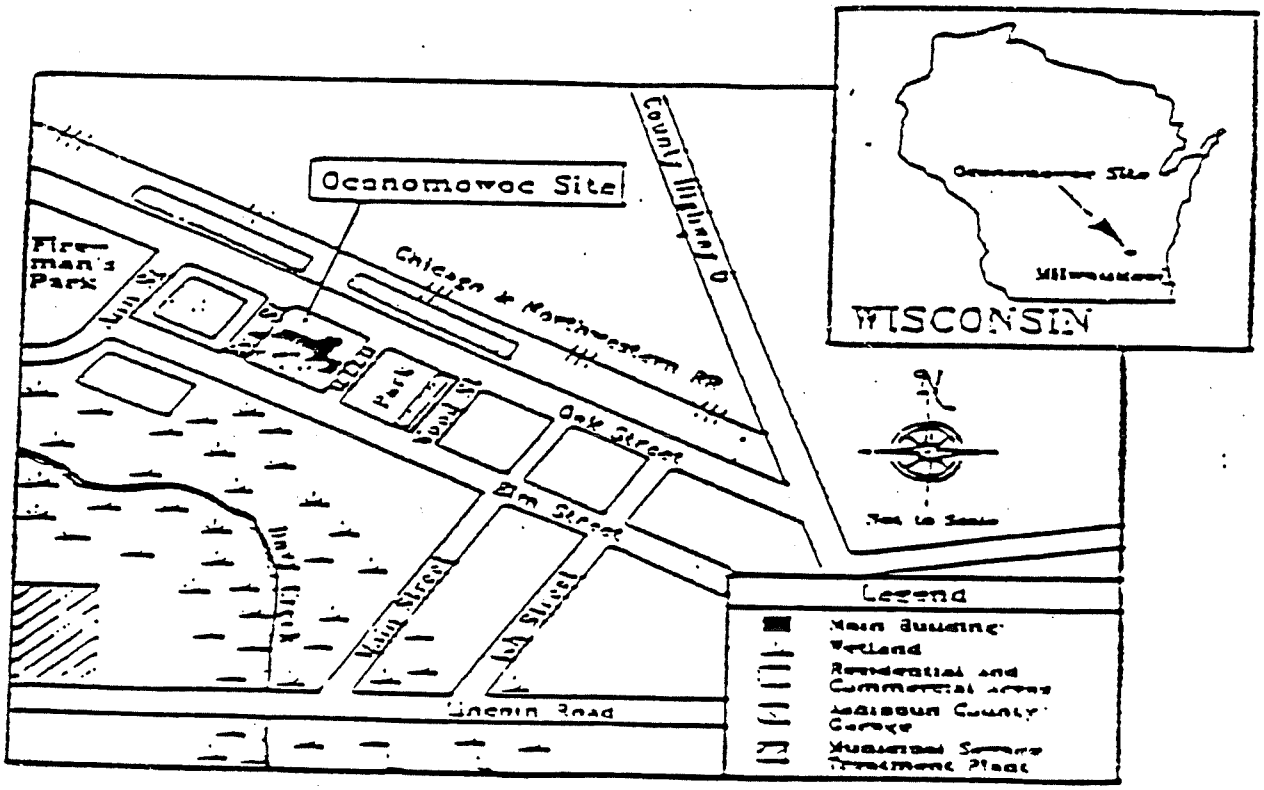
APPENDIX A: FIGURES

MAP 1 - Davy Creek



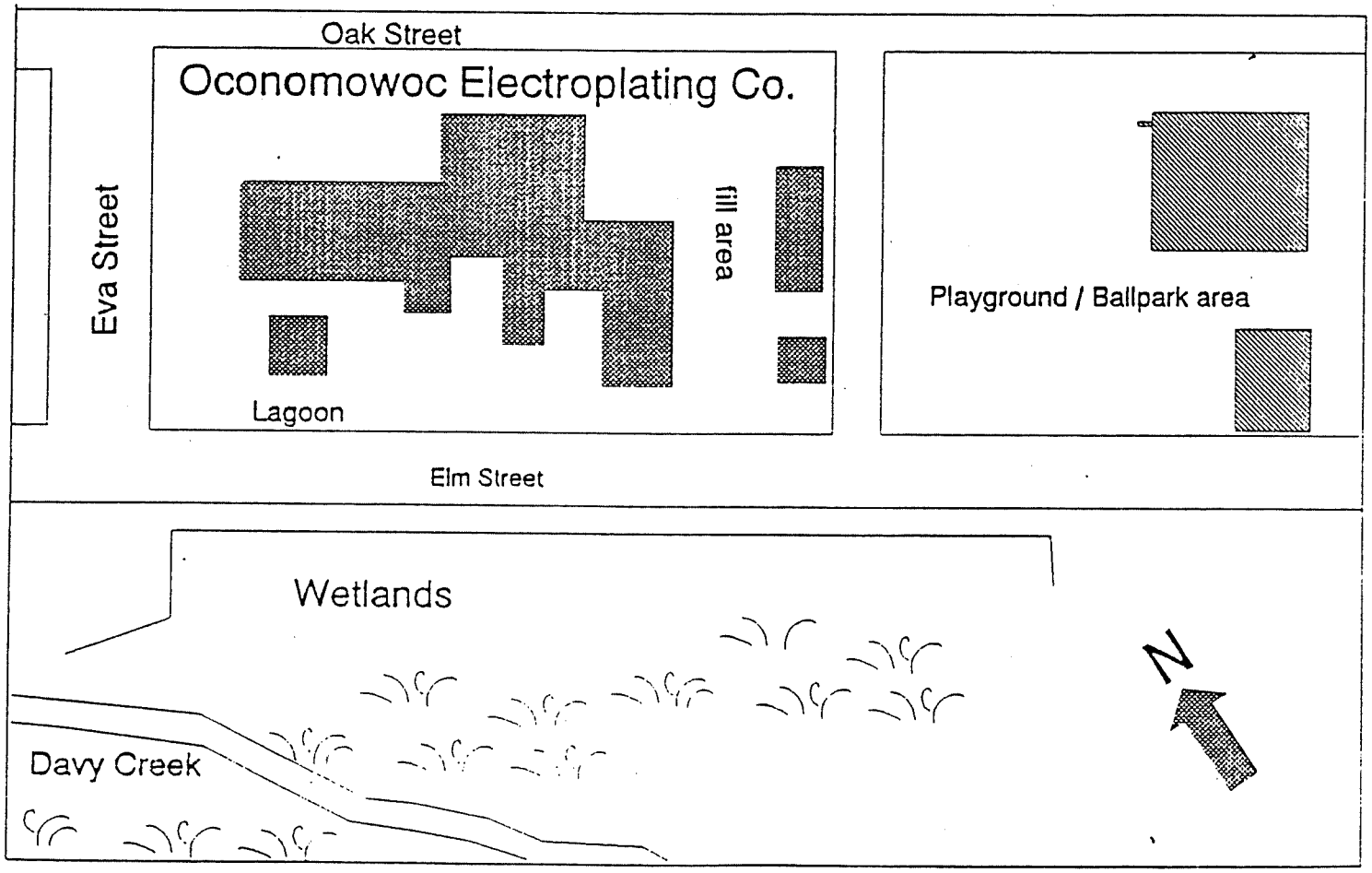
APPENDIX A: FIGURES (continued)

MAP 2 - The Oconomowoc Site (OEC)



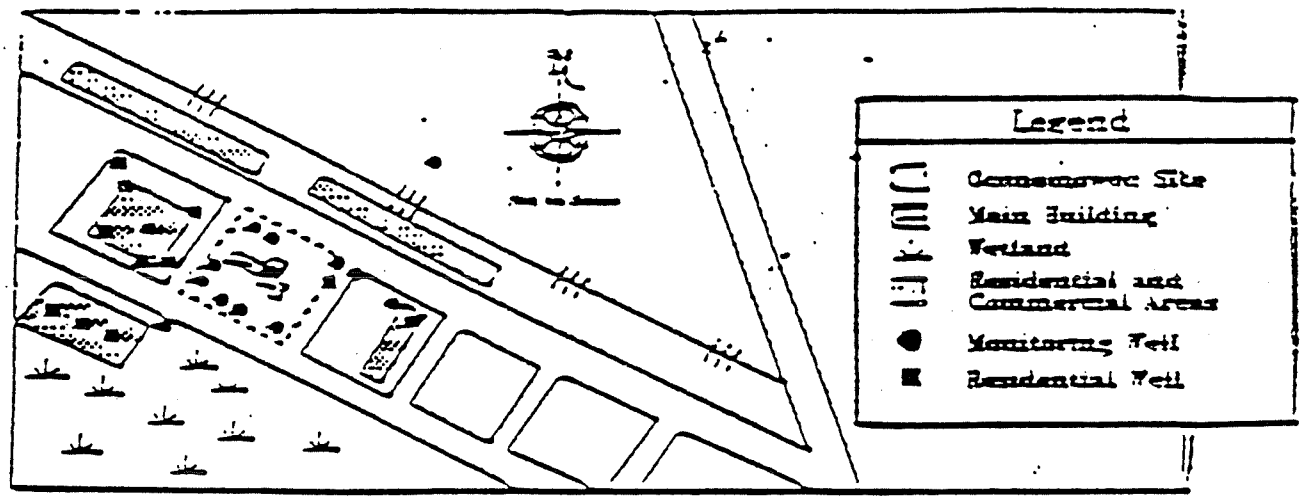
APPENDIX A: FIGURES (continued

MAP 3 - Site Fencing Diagram



APPENDIX A: FIGURES (continued)

MAP 4 - Groundwater Monitoring Wells



Groundwater Monitoring Wells

APPENDIX B: DEFINITIONS

Cancer Slope Factor: The upper limit on the lifetime probability (at or less than 1 in 1,000,000) that a cancer causing chemical will cause cancer at a dose of 1.10 mg/kg/day.

Environmental Media Evaluation Guidelines (EMEGs): ATSDR developed guidelines for water, soil, and air; usually expressed as a range of values that allows the assessor to select the value that corresponds to the most sensitive segment of the population that could be exposed. EMEGs are based on MRLs and do not refer to cancer health effects. The EMEG values should not be used as a predictor of adverse health effects or for setting cleanup levels.

Groundwater Enforcement Standards (and Preventive Action Standards): Health-based groundwater goals set by the Wisconsin DNR that when exceeded prompt regulatory action.

Health Activities Recommendation Panel (HARP):
A review panel consisting of representatives from each division of ATSDR and the participating state health department. HARP recommends, following review and discussion of the health assessment, appropriate follow-up health actions designed to mitigate or prevent adverse health effects related to exposures to hazardous substances.

Lifetime Health Advisory (LTHA): A level of a chemical that can be consumed in drinking water for a lifetime and not cause illness. Cancer is not considered in the evaluation of these health effects.

Maximum Contamination Level (MCL): Drinking water health goals set by the U.S. EPA, using LTHAs, at which "no known or anticipated adverse effect on the health of persons occur and which allows an adequate margin of safety".

Minimal Risk Factors (MRL): Values based on health effects to the most sensitive person that include developmental effects and reproductive effects but do <u>not</u> include cancer.

Reference Dose (RfD): An estimate of a daily exposure level to a substance for the human population that is likely to be without an apparent risk of causing damaging health effects during a lifetime of exposure.

APPENDIX C: RESPONSE TO PUBLIC COMMENTS

1. Comment postmarked July 19, 1993. What is the level of contamination in public and private sources?

   The listing of contaminants and the levels in environmental media such as water can be found in the section of the Health Assessment entitled " Environmental Contamination and Other Hazards".

2. Comment postmarked July 19, 1993. Will the community be made aware of contamination found in private residential wells? In a timely manner? In what fashion?

   The Department of Natural Resources informs residents if contaminants are found in private water supplies. Typically, a letter is sent listing the contaminants detected, the contaminant concentration, and whether a state groundwater standard was exceeded. The letter is sent shortly after test results are received and reviewed by the DNR. A discussion of contaminants can also be found in the Health Assessment in the section entitled "Pathways Analysis".

3. Comment postmarked July 19, 1993. How will the contaminated lands be safely used for after the clean-up process?

   When the remediation activities have been completed the site should not present a hazard to human health. This includes the area once occupied by the OEC buildings as well as the wetlands area. Deed restrictions may determine future land use of the property.

4. Comment postmarked July 19, 1993. If the lands continue to be off-limits to human contact, who will be liable?

   Liability would need to be determined through appropriate judicial channels.

5. Comment postmarked July 19, 1993. Would allergies or high blood pressure be aggravated by the dust form the contaminated area?

   Allergies can be aggravated by many air-borne substances including particles found in dust. Under extreme conditions, such as visible clouds of dust, dust could potentially cause stress and increase blood pressure. In particular this would be true for a person with a pre-existing hypertension condition. It would seem unlikely that this type of a situation would present itself at the OEC site.

6. Comment postmarked July 19, 1993. The lagoons are accessible to pets and children by the large opening under the fence. This been noted by you but not addressed as a real concern. Why not?

Accessibility concerns at the site have been presented to the EPA. Presently, the EPA does not have funds to complete remedial activities at the OEC site. The Division of Health will continue to request that site security, including gaps in fencing, be reviewed and if necessary acted upon.

7. Comment postmarked July 19, 1993. What concerns will we have as a community when the wetland is cleaned up during the actual removal process and with what is left behind in the soil?

   The clean-up activities planned for the site will be completed using "state of the art" remedial procedures to control contaminants during the removal process. The project will be carefully monitored by the DNR and EPA to ensure that workers, residents, and area wildlife are not threatened by the clean-up process. The DNR and EPA have established acceptable levels for chemicals after the clean-up process. These levels should not have an adverse effect on human health.

8. Comment postmarked July 19, 1993. Health concerns have been played down so much that skeptics think that it is a waste of money to spend millions to clean it up. There seems to be a need to clarify more information to the public.

   The Division of Health considers the OEC site to be of moderate health concern because of contaminated soils that could be contacted in the wetland and the off-site migration of contaminated groundwater. The area where the OEC building stood was a significant health hazard but the majority of that was addressed by the EPA Emergency Removal which took place in 1991. The Division of Health has kept the public informed of health concerns since our first involvement at the site in 1988. The Division has been represented at 4 public meetings regarding the OEC site. Site information and chemical fact sheets regarding contaminants at the site have been distributed. At the most recent meeting, on November 30, 1993, Division of Health staff presented information on health concerns at the OEC site. During these meetings the DNR and EPA have also distributed information regarding the OEC site. Copies of information regarding the site, including the OEC Health Assessment are available to the public at the designated, local repository.