Health Assessment for

RIPON CITY LANDFILL
RIPON, FOND DU LAC COUNTY, WISCONSIN
CERCLIS NO. WID980610190
MARCH 30, 1995

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry

THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

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

In accordance with the CERCLA section cited, 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

RIPON CITY LANDFILL

RIPON, FOND DU LAC COUNTY, WISCONSIN

CERCLIS NO. WID980610190

Prepared by
Wisconsin Department of Health and Social Services
Division of Health
Under a Cooperative Agreement with
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.

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

FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, is an agency of the U.S. Public Health Service. It was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. (The legal definition of a health assessment is included on the inside front cover.) If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements.

E---sure: As the first step in the evaluation, ATSDR scientists r ew environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists then evaluate whether or not there will be any harmful effects from these exposures. The report focuses on public health, or the health impact on the community as a whole, rather than on individual risks. Again, ATSDR generally makes use of existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further research studies are needed.

Conclusions: The report presents conclusions about the level of h---th threat, if any, posed by a site and recommends ways to s or reduce exposure in its public health action plan. ATSDR is primarily an advisory agency, so usually these reports identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions

of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Interactive Process: The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state and federal agencies, the companies responsible for cleaning up the site, and the community. It then shares its conclusions with them. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When informed of ATSDR's conclusions and recommendations, sometimes the agencies will begin to act on them before the final release of the report.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E-56), Atlanta, GA 30333.

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SUMMARY

The Ripon FF/NN Superfund Site is an abandoned landfill that operated from 1967 to 1983. The landfill accepted municipal, commercial, and industrial wastes during its operation. The site is northwest of the City of Ripon in the northwest corner of Fond du Lac County, Wisconsin. Volatile organic compounds (VOCs) have migrated from the landfill to the groundwater near the site. Leachate from the landfill has seeped to the surface and into a depression adjacent to the site.

A private water supply approximately 500 feet south of the site became contaminated with VOCs. Vinyl chloride levels in the water supply wells at this residence posed a public health hazard to the residents. Such an exposure can cause an increased cancer risk. Both water supply wells on this property have been abandoned and the home is no longer occupied. There are no other known exposures to contamination from this site. Other private wells in the area have been tested and are not impacted by the site. A public health hazard could exist in the future if contaminated groundwater migrated to other private wells and were present at levels of health concern. Future exposures to the leachate seeps on-site pose an indeterminant public health hazard.

A monitoring plan should be developed that will provide the nearby well users warning of exposure to contamination above levels that could cause health effects. Leachate in the landfill should be controlled to prevent the potential for exposure to seeps and additional contribution of groundwater contamination. Site access should be limited to prevent contact with the leachate. The WDOH will continue to review remedial actions at this site to ensure the protection of public health. WDOH will also continue to address community health concerns as they arise.

BACKGROUND

SITE DESCRIPTION AND HISTORY

The Ripon FF/NN Landfill is located approximately 1 mile northwest of the City of Ripon. Ripon is in the northwest corner of Fond du Lac County, Wisconsin. Figure 1 shows the general location of the City of Ripon in Wisconsin, and Figure 2 shows the location of the site.

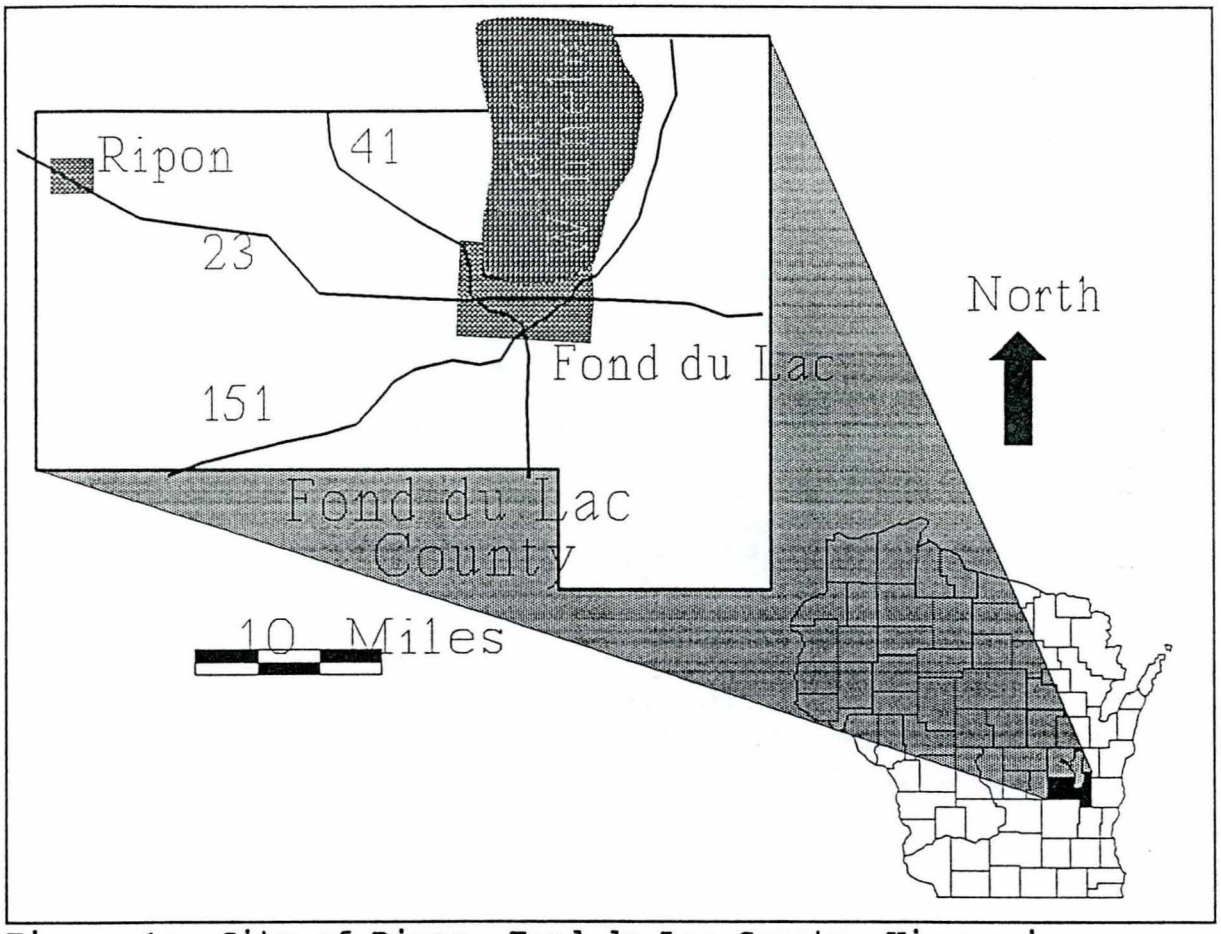

Figure 1: City of Ripon, Fond du Lac County, Wisconsin

Prior to use as a landfill, the property was a ~~wetland~~ quarry. The landfill operated from 1967 to 1983, accepting a combination of municipal, commercial and industrial wastes. The site also accepted wastewater treatment sludge during its operation. The property was leased from the property owner in 1967, by the Speed Queen Company for industrial waste disposal from its Ripon facility. In 1968, the City of Ripon leased the property for use as a landfill and received a landfill license from the Wisconsin Department of Natural Resources (WDNR) in 1969. The City and Town of Ripon jointly operated the site from 1970 to 1983[2]. The site was listed on the Superfund National Priorities List in the Summer of 1993. The remedial

investigation had begun shortly before that time and is expected to be completed in the Fall of 1994.

The landfill itself occupies 7.3 acres of a 9-acre parcel. The waste thickness ranges from 30 feet at the western edge to 10 feet at the eastern edge. The waste volume has been estimated at 180,000 cubic yards. In 1985 the site was capped with clay, and a passive gas venting system was installed. At that time a leachate interceptor trench was also constructed along the eastern side of the site. Hay has been grown on the cap since 1985. The site is currently well vegetated. The clay cap ranges in thickness from one to four feet, with three to six inches of topsoil[3].

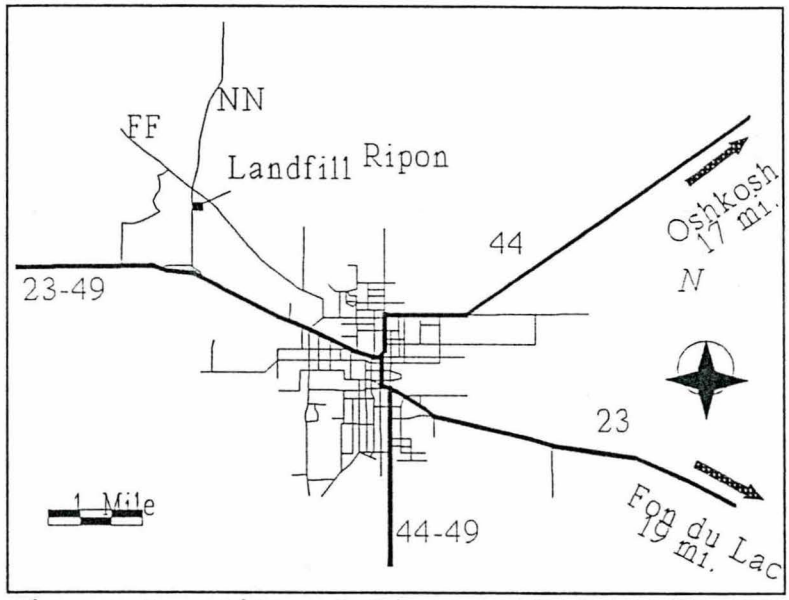

Figure 2: City of Ripon and Landfill Location

Large wetlands exist directly northeast of the site across County Highway FF and directly southwest of the site across County Highway NN(Figure 3).

The geology of the area consists of about 170 feet of glacial deposits made up primarily of sand and gravel with minimal silt and clay. Sandstone bedrock lies beneath this unconsolidated layer. The water table is about 20 feet below the base of the landfill. After the heavy rainfall in the summer of 1993, the water table was still more than 10 feet below the bottom of the landfill. Groundwater flow at the water table is to the southwest beneath the site. Groundwater flow within the deeper sandstone is to the west[4].

DEMOGRAPHICS, LAND USE, AND NATURAL RESOURCE USE

Land use in the area consists of a mixture of rural residential, agricultural, and a quarry operation. The quarry operation is across County Highway NN to the west of the site. There are twenty-four residences within a half mile of the site. Most are along County Highways FF and NN to the north. Figure 3 shows the approximate locations of those homes. The population of the City of Ripon is approximately 7,500 people. The city includes a mix of industrial, commercial and residential land uses. There is also a small college in the town.

There is a residence directly south of the site that had been occupied until 1991. This home is no longer occupied, and the private well serving it has been abandoned to prevent further use.

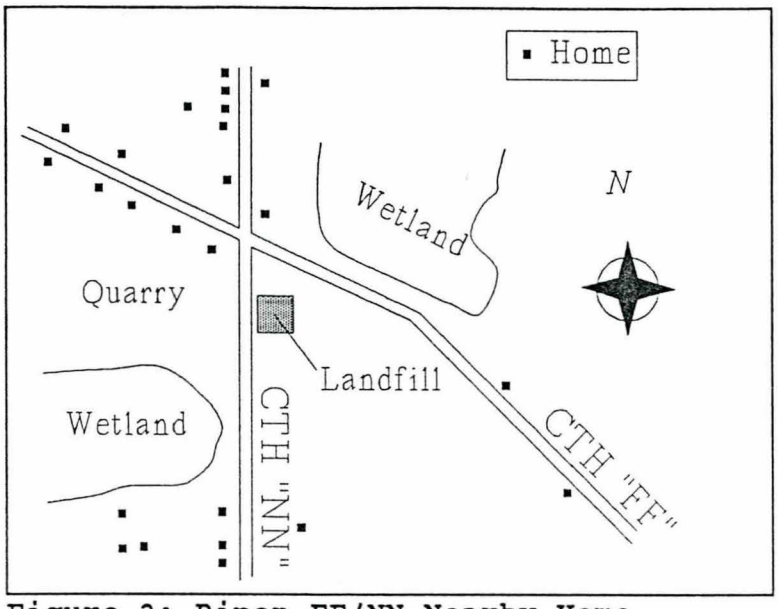

Figure 3: Ripon FF/NN Nearby Home Locations (This Figure is not To Scale)

SITE VISIT

On April 21, 1992 Chuck Warzecha of the WDOH went to the site with the Wisconsin Department of Natural Resources (WDNR) project manager. The cap was well vegetated without noticeable erosion. Since closure hay has been grown on the cap. There is potential for ponding of water to the east of the cap, in fact, standing water was noted at the time of the site visit. The base of the cap to the east has had some erosion related to leachate seeps from the landfill. The slope of the landfill cap appears to be sufficient to prevent ponding on the landfill itself. The site is not fenced and there are no signs warning people to stay off the site.

The site is on the edge of a ridge that drops off rapidly to the northeast and to the west and southwest. A wetland and shooting range are northeast of the site across County Highway FF. A very large rock quarry operates west of the site across County Highway NN. South of the quarry is a large, open-water wetland. At the time of the visit, this wetland was filled with a variety of ducks and geese. It appeared that the wetland received water indirectly from the quarry.

On April 20, 1993 Chuck Warzecha and Mary Young of WDOH participated in a public meeting with two WDNR representatives. The meeting was held to discuss the upcoming investigation of the site. The site had not yet been listed as a ***Superfund*** site, however, the Superfund process was also discussed. During a visit to the site prior to the meeting no changes were noted from the previous year[5].

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 disease near a site.

COMMUNITY HEALTH CONCERNS

This section addresses the community health concerns identified earlier in the document. community health concerns were solicited at a public meeting held in April of 1993 in the City of Ripon. Chuck Warzecha and Mary Young also interviewed the residents living near the site in the summer of 1993. In general the residents were well informed about the site and were not concerned that the site could affect their health.

1. A common concern expressed was that the groundwater contamination from the site not be allowed to enter private wells in the area.

2. Residents questioned what was coming out of the pipes sticking up out of the site. They wanted to know if there was a health hazard posed by those pipes.

3. Several residents to the south of the site have been experiencing a problem with their private well water quality. The water is very turbid and has a strong "swampy" odor. The residents question whether or not there could be a relationship between this problem and the site.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

This section describes contamination and other hazards associated with the Ripon FF/NN Landfill Superfund site. Contaminants of concern are selected for further analysis in following sections.

Contaminants of concern are those contaminants migrating from the landfill that have the potential to affect human health. Isolating these contaminants from the long list of those that may be found at a site allows the assessor to focus on fewer, more important, contaminants. Sample results from the remedial investigation are used to evaluate all environmental pathways with potential human exposure routes. Human exposure routes are points where contaminants may enter the body and include: inhalation, ingestion, and dermal absorption. The environmental pathways evaluated include: groundwater, surface water, surface soils, and air.

"Comparison values" are used to help select potential contaminants of concern from the results of samples taken at the site. A comparison value is a contaminant concentration level below which human exposure is likely to be without harmful health effects. Comparison values are derived from toxicity data and exposure dose assumptions for specific media (e.g. soils, drinking water, etc.). Sample results summary tables in this section include comparison values for the respective contaminants detected in each media evaluated. Concentrations at or above these levels do not necessarily represent a health threat. All other areas are considered to be "off-site". On-site contamination has been detected in groundwater and leachate seeps coming from the landfill. Off-site contamination has been detected in groundwater.

ON-SITE CONTAMINATION

The landfill contains an estimated 6 to 11 million gallons of leachate[6]. Samples were taken of the landfill leachate to determine which contaminants could possibly be migrating from the landfill. The contaminants detected are shown in Table 1. Of the parameters detected the VOCs are the most mobile in the groundwater, followed by the metals and the semivolatile organic compounds (SVOCs).

Table 1[7]
Contaminants Detected in Landfill Leachate

VOCs	SVOCs	Metals
Vinyl chloride	Phenol	Arsenic
Chloroethane	2-Methyl phenol	Barium
Cis 1,2 dichloroethylene	4-Methyl phenol	Cadmium
Trichloroethylene	2,4 Dimethyl phenol	Chromium
Benzene	Naphthalene	Iron
Toluene	4-Choro 3-methyl phenol	Lead
Chlorobenzene	2-Methylnaphthalene	Manganese
Ethyl benzene	Dimethylphthalate	Selenium
Xylenes (total)	Diethylphthalate	Silver
1,4 Dichlorobenzene	Pentachlorophenol	Zinc
	Butylbenzylphthalate	

As part of on-going investigations at the site, nineteen monitoring wells were installed during the summer and fall of 1993. Groundwater contamination has been detected in monitoring wells adjacent to the site and to the south and west of the site. The monitoring wells to the north and the east have not shown contamination. VOC contaminants detected in groundwater monitoring wells are shown in Table 2 at their highest detected levels. VOC concentrations meeting or exceeding their comparison values are shown in bold type. These compounds are contaminants of concern for on-site groundwater. 1,4 Dichlorobenzene is considered to be a possible carcinogen. For this reason it is selected as a contaminant of concern even though its concentration is below the comparison value. Two metals also detected at concentrations exceeding their comparison values are also contaminants of concern. Those metals are shown at their highest concentrations in Table 2.

Table 2[8]
Contaminants in On-Site Groundwater
(Contaminants of Concern in Bold)

VOC	Maximum Detected Concentration (ppb)	Comparison Value (ppb)
Benzene	**2.0**	**1.0[c]**
Chlorobenzene	2.0	200[r]
1,4 Dichlorobenzene	**2.0**	**75[l]**
Cis 1,2 dichloroethylene	**410**	**70[l]**
Tetrachloroethylene	**0.7**	**0.7[c]**
Trichloroethylene	2.0	3.0[c]
Vinyl chloride	**75**	**0.2[c]**
Metals		
Arsenic	**21.6**	**0.02[c]**
Manganese	**2150**	**50[r]**

c - CREG, Cancer Risk Evaluation Guide for $1x10^{-6}$ excess cancer risk
r - RMEG, Evaluation guide derived from EPA's Reference Dose
l - LTHA, Lifetime Health Advisory for Drinking Water
e - EMEG, Environmental Media Evaluation Guide

Leachate seeps at the eastern side of the landfill represent additional on-site contamination. The seeps were sampled in October, 1991. The results are summarized in Table 3. Drinking water comparison values are also included in the table. The use of the drinking water comparison values for this purpose is extremely conservative. These values assume that people would be drinking two liters of leachate from the seeps each day over the course of a lifetime. None of the contaminants were detected at concentrations exceeding the comparison values where available. Only the two trimethyl benzenes are selected as contaminants of concern because no comparison values are available for them.

Table 3
On-Site Leachate Sample Results

Contaminant	Detected Concentration (ppb)	Comparison Value (ppb)
VOC		
Chlorobenzene	5.0	200[r]
Ethyl benzene	66	700[l]
Naphthalene	**30**	**20[l]**
1,2,4 Trimethyl benzene	**15**	**NA**
1,3,5 Trimethyl benzene	**5.0**	**NA**
Xylenes (total)	63	2000[e]
SVOCs		
Di-n-Butylphthalate	15	1000[r]
Metals		
Barium	233	700[r]
Lead	2.0	15[m]
Manganese	**250**	**50[r]**

r - RMEG, Evaluation guide derived from EPA's Reference Dose
l - LTHA, Lifetime Health Advisory for Drinking Water
e - EMEG, Environmental Media Evaluation Guide
m - MCL, EPA Maximum Contaminant Level

OFF-SITE CONTAMINATION

In November 1984 water samples from a private well approximately 500 feet south of the landfill contained vinyl chloride. A sample taken from that same well earlier that year did not contain contamination. In June of 1989, that private well was replaced with a deeper well. The new well was also found to contain vinyl chloride, trichloroethylene, and 1,2 dichloroethylene. Table 4 shows the contaminants detected at this home at their highest concentrations. Because vinyl chloride exceeds its comparison value it is shown in bold type and is retained as a contaminant of concern for off-site groundwater. Table 5 is a summary of off-site monitoring well sample results from the remedial investigation. Again only vinyl chloride is considered a contaminant of concern for off-site groundwater. During the remedial investigation in 1993, 23 private wells were sampled within a half mile of the site. None of the samples from these wells detected contaminants related to the site.

Table 4[9],[10]
Residential Well Contamination

VOC	Maximum Detected Concentration (ppb)	Comparison Value (ppb)
1,2 Dichloroethylene	18	70[l]
Trichloroethylene	1.8	3.0[c]
Vinyl chloride	**47**	**0.2[e]**

c - CREG, Cancer Risk Evaluation Guide for $1x10^{-6}$ excess cancer risk
l - LTHA, Lifetime Health Advisory for Drinking Water
e - EMEG, Environmental Media Evaluation Guide

Table 5[11]
Off-Site Monitoring Well Sample Results

VOC	Maximum Detected Concentration (ppb)	Comparison Value (ppb)
1,2 Dichloroethylene	4.0	70[l]
Toluene	11	1000[l]
Trichloroethylene	2.0	3.0[c]
Vinyl chloride	**6.0**	**0.2[e]**

c - CREG, Cancer Risk Evaluation Guide for $1x10^{-6}$ excess cancer risk
l - LTHA, Lifetime Health Advisory for Drinking Water
e - EMEG, Environmental Media Evaluation Guide

The WDOH conducted indoor air sampling at the home with the contaminated private well in September of 1989. There were four samples taken. One sample was taken in the basement while clothes were being washed. One was taken in a doorway between the living room and kitchen. Two were taken in the first floor bathroom, one of which was taken while the shower was running. Table 6 shows the results of those samples analyzed for vinyl chloride.

Table 6[12]
Results of Indoor Air Samples

Sample Location	Vinyl Chloride Concentration (ppm)
Kitchen	Not Detected
Basement	0.01
Bathroom	0.03
Bathroom w/Shower	0.06

The home is no longer occupied and both private wells on the property have been abandoned.

In June 1986, subsurface samples from beneath the wetlands northeast and southwest of the site detected VOCs. These samples were taken from excavations dug two to three feet below ground surface in the wetlands. Samples taken in the wetlands during the remedial investigation did not contain contamination, indicating that contamination is not discharging into the wetlands in measurable amounts.

QUALITY ASSURANCE AND QUALITY CONTROL

In preparing this assessment, the WDOH relies on the information provided in the referenced documents and assumes that quality assurance and quality control measures were followed concerning chain-of-custody, laboratory procedures, and data reporting. The validity of the analyses and conclusions drawn for this assessment is determined by the reliability of the referenced information.

TRI SEARCH

The Toxic Chemical Release Inventory (TRI) was searched for chemical releases from the Ripon FF/NN Landfill site and other facilities in the same zip code area. The landfill site was not listed in the TRI. No other releases were reported in the vicinity of the site.

PHYSICAL AND OTHER HAZARDS

There is no site access restriction to prevent people from walking across the site. There are no physical hazards related to fire and explosion from the site, as it is not producing sufficient quantities of methane gas. Site slope and miscellaneous debris may present a slip/trip/fall type hazard.

PATHWAYS ANALYSES

This section describes exposure scenarios for known (completed) exposures and for exposures that may have occurred or could occur in the future (potential). These exposures are considered along with the toxicological information for the respective contaminants of concern to determine likely health effects from the exposures.

COMPLETED EXPOSURE PATHWAYS

There has been one documented completed exposure to contaminants from the Ripon FF/NN Landfill. VOC contamination in groundwater migrated south to a private residential water supply approximately 500 feet from the site. The water supply was tested in 1984 and found to be contaminated with vinyl chloride. The residents were advised by the WDNR and WDOH that the water should not be used for any purpose. They were also advised of the health risks associated with using the water. In 1990 the WDNR abandoned the existing water supply well to prevent further use of the water supply. The residents using contaminated groundwater from that well ingested contaminants when drinking water, and inhaled contamination released from the water during domestic uses (cooking, showering, etc.). The water supply may have been contaminated a few years after waste disposal began. Because vinyl chloride is the only contaminant of concern for this pathway. A conservative estimate of exposure would assume the exposure began in 1984 when the contamination reached the residential well and ended when the well was abandoned in 1990 (six years). It is also assumed that the vinyl chloride concentration in that well was at its highest detected level (47 μg/L) for that seven year period. These assumptions lead to an exposure of approximately 4.7 μg/Kg/Day for a 10 Kg child drinking one liter of water each day, and 1.3 μg/Kg/Day for a 70 Kg adult drinking two liters of water each day.

No other completed exposure pathways exist at the site.

POTENTIAL EXPOSURE PATHWAYS

Residents living near the site rely on groundwater for their drinking water and other domestic uses. There is currently no exposure to contaminants from the site. There is a very low potential that contamination from the site could migrate to additional private wells. The nearest down gradient private wells are approximately 2000 feet from the site. The wetland to the southwest of the site lies between the site and those private wells, making it more unlikely for them to be at risk of contamination from the site. If a private well were to become contaminated the residents using the contaminated groundwater from that well could ingest contaminants when drinking water; inhale contamination released from the water during domestic uses (cooking, showering, etc.); and absorb contaminants through their skin while bathing and washing in contaminated water.

Vinyl chloride is the only groundwater contaminant of concern at this site that could migrate from the site at levels of health concern. For this reason no other groundwater contaminants

of concern identified in Table 2 are considered for potential exposure pathways.

Another potential exposure could be caused by the existence of leachate seeps on the eastern slope of the landfill cap. Contamination has been documented through sampling in that area. Exposures to this leachate could result from direct skin contact with the leachate while walking across this portion of the site. Unsupervised children playing on-site could also ingest the leachate or leachate contaminated soils from this area. Interviews with nearby residents indicated that parents do not allow their children to enter the site. A general discussion of health effects related to exposure to these seeps is included in the next section.

PUBLIC HEALTH IMPLICATIONS

This section provides a discussion of possible health effects that could be related to completed or potential exposures to contaminants identified in the Environmental Contamination Section.

TOXICOLOGICAL EVALUATION

Residential Well

Vinyl Chloride

The completed exposure to vinyl chloride described in the previous section poses an increased cancer risk to the residents who used the water for drinking and other domestic uses. Sampling confirmed that there was exposure through ingestion as well as through inhalation during other potable uses. Vinyl chloride is a very potent human carcinogen. Low levels of exposure over an extended period of time is expected to significantly increase a person's risk of getting cancer. Studies with laboratory animals also suggest that long term exposures to high levels of vinyl chloride may cause changes in the liver[13].

Leachate Seeps

Trimethyl Benzenes

There is little toxicological information available for the trimethyl benzenes detected. However, the information available indicates that exposures to the concentrations in the leachate seeps is not expected to cause adverse health effects[14].

Naphthalenes

No adverse health effects are associated with exposure to naphthalene at the concentrations found in the leachate. Such an exposure would have to include ingestion of nearly two liters of the landfill leachate each day over the course of a lifetime before being considered a health concern.

Manganese

No adverse health effects are associated with exposure to manganese at the concentrations found in the leachate. Such an exposure would have to include ingestion of nearly one half a liter of the landfill leachate each day over the course of a lifetime before being considered a health concern.

Other Possible Contaminants

The leachate in the landfill contained several organic compounds and metals that are considered to be carcinogens. Most of these contaminants have not been detected during leachate sampling. However, there is a potential that they may also migrate from the landfill in the seeps. The concentrations of these compounds is not high enough in most cases to cause acute health effects. Some acute effects that could be caused by prolonged contact or

long term inhalation of chemicals from the leachate are: skin irritation from the organic solvents in the leachate and possibly the chromium at higher concentrations; respiratory irritation from inhalation of the VOCs and SVOCs[15,16,17,18,19]. Such exposures have not existed in the past at the site and do not currently exist, as has been mentioned earlier in this document.

HEALTH OUTCOME DATA EVALUATION

"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 disease near a site.

No community health concerns related to the site have been reported. No health outcome data review is warranted as a result of this evaluation. There is an indication of exposure to vinyl chloride that could pose an increased cancer risk. However, the exposure occurred at only one residence. A health outcome data review would not be appropriate for this site. Should additional information of human exposures be found, a review of health outcome data will be reconsidered.

COMMUNITY HEALTH CONCERNS EVALUATION

This section addresses the community health concerns identified earlier in the document. community health concerns were solicited at a public meeting held in April of 1993 in the City of Ripon. Chuck Warzecha and Mary Young also interviewed the residents living near the site in the summer of 1993. In general the residents were well informed about the site and were not concerned that the site could affect their health.

1. A common concern expressed was that the groundwater contamination from the site not be allowed to enter private wells in the area.

   WDOH is recommending to the WDNR that a monitoring plan be established that would warn of the migration of groundwater contamination that could threaten private wells. Current information about the site indicates that existing private wells are not likely to be threatened by groundwater contamination from the site.

2. Residents questioned what was coming out of the pipes sticking up out of the site. They wanted to know if there was a health hazard posed by those pipes.

   The pipes are passive gas vents that allow landfill gasses to leave the landfill as they are generated. These vents have been monitored and indicate that the landfill is not producing much landfill gas. These vents are not expected to pose a health hazard to nearby residents.

3. Several residents to the south of the site have been experiencing a problem with their private well water quality. The water is very turbid and has a strong "swampy" odor. The residents question whether or not there could be a relationship between this problem and the site.

   In response to the concerns raised by these residents, the WDNR sampled some of the wells with water quality problems. The sample results indicate that each well has an iron bacteria problem. The iron bacteria problem has no relationship to the landfill site. The WDNR is working with the private well owners to identify a solution for the iron bacteria problem.

CONCLUSIONS

The Ripon FF/NN landfill has caused environmental contamination both on and off-site. Volatile organic compounds (VOCs) have migrated from the landfill to the groundwater near the site. Leachate from the landfill has seeped into a depression adjacent to the landfill.

A private water supply approximately 500 feet south of the site was contaminated with VOCs. Vinyl chloride levels in the water supply wells at this residence posed a public health hazard to the residents. Such an exposure can cause an increased cancer risk and possible liver damage. Both water supply wells on this property have been abandoned and the home is no longer occupied.

There are currently no exposures to contamination from this site. Existing private wells in the area have been tested and are not impacted by the site. Though the potential is quite low, a public health hazard could exist in the future if contaminated groundwater migrated to other private wells at levels of health concern. Future exposures to the leachate seeps on-site pose an indeterminant public health hazard.

RECOMMENDATIONS

Based on the conclusions developed in this report the WDOH and ATSDR make the following recommendations:

1. *A monitoring plan should be developed that will provide the nearby well users warning of exposure to contamination above levels that could cause health effects.*

2. Leachate in the landfill should be controlled to prevent the potential for exposure to seeps and additional contribution of groundwater contamination.

3. Site access should be limited to prevent contact with leachate seeps that exist at this time.

NEED FOR FOLLOW-UP HEALTH ACTIVITIES

The WDOH and the ATSDR Health Activities Recommendation Panel evaluated the data on this site to determine what needs exist for additional research and/or local education about health related concerns. Such activities could include conducting further studies on cases of disease in the area or providing information about exposure to toxic chemicals.

The WDOH will provide community education about this site as part of its ongoing efforts at Wisconsin's Superfund sites. The Health Activities Recommendation Panel determined that follow-up health studies are not appropriate for the single residence exposed to vinyl chloride in the past. If the remedial investigation of this site shows that exposure to toxic substances is more widespread than previous sampling found, the Wisconsin Division of Health and ATSDR will reconsider the need for other activities.

If future WDOH evaluations indicate that additional completed exposure pathways exist or that the community has expressed specific health concerns, then WDOH will consider reviewing health outcome databases.

PUBLIC HEALTH ACTION PLAN

The WDOH, in cooperation with ATSDR, will conduct the following activities to respond to the recommendations of this assessment:

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

2. Review and comment on public health aspects of the remedial design for the site.

3. Provide site information and offer health information to primary care physicians and public health professionals in the geographic region of the site.

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

5. Work with the WDNR to ensure that a groundwater monitoring plan is developed is protective of the private well owners in the area.

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CERTIFICATION

The Ripon FF/NN Landfill Public Health Assessment was prepared by the Wisconsin Division of Health 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.

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

for Robert C. Williams, P.E., DEE
Director, DHAC, ATSDR

RESPONSE TO PUBLIC COMMENTS

The following comments were received durring the public comment period for the public health assessment. After each comment is an explanation of how it has been addressed in bold type.

1. Neighborhood private wells should be tested twice yearly during the rainy season (April and October) for VOCs.

   WDOH will discuss this recommendation with the WDNR. A groundwater monitoring plan will be developed by the responsible party group and must be approved by the DNR and DOH. If this monitoring plan doesn't include appropriate sampling frequency of private wells to be protective of public health, DOH will recommend the appropriate changes.

2 General comment expressed by more than one commentor: The City of Ripon should run a public water main to the neighborhood.

   The water quality problem in local private wells is not related to this or other landfill sites.

3. Replace the testing well owned by the power company that was removed.

   Additional monitoring wells have been added that now sufficiently monitors this area.

APPENDIX

RMEG - Reference Media Evaluation Guide derived from EPA Reference dose concentration. This concentration was calculated from an exposure dose below which no adverse health effects are expected. This value is lower for children than for adults and can be considered protective for both.

LTHA - EPA's drinking water Lifetime Health Advisory.

EMEG - Environmental Media Evaluation Guide. This concentration has been developed as a threshold level below which no adverse systemic health effects are expected. This value is lower for children than for adults and can be considered protective for both.

MRL - ATSDR Minimal Risk Level.

Rfd - Reference dose. This concentration was calculated from an exposure dose below which no adverse health effects are expected. This value is lower for children than for adults and can be considered protective for both.

CREG - Cancer Risk Evaluation Guide. Exposure to this level over a lifetime may increase a persons risk of developing cancer by a factor of 1 in 1,000,000.

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