

# Public Health Assessment for

WAUSAU GROUNDWATER CONTAMINATION  
WAUSAU, MARATHON COUNTY, WISCONSIN  
CERCLIS NO. WID980993521  
JULY 1, 1992

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





## Health Assessments

### Statement of Purpose

The federal "Superfund" law requires the U.S. Agency for Toxic Substances and Disease Registry (ATSDR) to prepare a health assessment for all toxic waste sites that the U.S. Environmental Protection Agency (EPA) proposes for placement on the Superfund list (called the National Priorities List)\*. The Wisconsin Division of Health works with the ATSDR to prepare health assessments. The purposes of health assessments are:

1. to evaluate whether contaminants at the site pose a current or future threat to public health;
2. to recommend any steps needed to protect the public from exposure to toxic substances; and
3. to recommend long-term health studies, when appropriate.

For each site assessment health professionals look at the types of contamination present, including each substance's toxicity; ability to move through soil, air or water; persistence in the environment; and ability to accumulate in the food chain. They look at such ways that people could come in contact with the contaminants as ingestion, skin contact, or breathing. Investigators make conclusions about the types of illness that could result from exposure to the chemicals present. Finally, they recommend actions to protect public health now and in the future.

The EPA and the Wisconsin Department of Natural Resources provide much of the sampling data used for the assessment. This health assessment incorporates information from the remedial investigation that the EPA oversaw at this site.

\* Officially, this section of the "Superfund" law is 42 U.S.C. §9604 (i).

PUBLIC HEALTH ASSESSMENT

WAUSAU GROUNDWATER CONTAMINATION

WAUSAU, MARATHON COUNTY, WISCONSIN

CERCLIS NO. WID980993521

Prepared by

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

## SUMMARY

The Wausau Groundwater Contamination Superfund Site comprises part of the well field serving the City of Wausau in north-central Wisconsin, Marathon County (see figure 1). Contamination of city ground water was discovered in 1982. Between March 1982 and May 1984 contaminated ground water was blended with uncontaminated water for distribution. Samples of tap water at various public buildings, during the time of blending, showed total chlorinated ethylenes from 10 to over 100 µg/L.

Sources of contamination include two sites on the west side of the Wisconsin River - an abandoned landfill and a shallow plume at Bos Creek, and two sites on the east side - Wausau Chemical Corporation (Wausau Chemical) and Wausau Energy Corporation (Wausau Energy) (see figure 2). Chemicals of concern in the ground water include trichloroethylene (TCE), tetrachloroethylene (PCE) and cis-1,2-dichloroethylene (DCE).

The 33,000 residents of Wausau use municipal water. Parts of the city aquifer are contaminated, but city water treatment processes currently provide drinking water in which concentrations of TCE, PCE, and DCE are well below Federal Maximum Contaminant Levels. Minimizing the levels of VOCs in the water supply depends on the continued efficient operation of the equipment at the water treatment plant, the volume of contaminated water used, the level of pollution in the water as it comes into the plant, and the ability to blend treated water with uncontaminated water.

Other ways residents could possibly be exposed to contamination from the site include breathing air near volatile organic compound (VOC) stripper towers at the water treatment plant, touching the water or sediments of Bos Creek, or touching contaminated soil at the Wausau Chemical property. These sources of contamination are not expected to cause health effects.

Dermal  
absorption  
Ingestion

The threat of future exposure to pollution in the water, air, and soil will be mitigated by clean-up activities described in the U.S. Environmental Protection Agency's Record of Decision dated September 1989. The city currently treats contaminated ground water using a VOC stripper tower and mixes the treated water with uncontaminated water before distributing it to the public. The city is using one tower with one contaminated well at a time. In that way, there is always reserve capacity in case of equipment malfunction. A new uncontaminated well, CW10, was placed in service in 1989 adding to the city's capacity to provide uncontaminated municipal water. VOCs are released into the air via the VOC stripper towers, but the emissions are currently within legally acceptable limits (see figure 3 for tower location). An extraction well on the west side of the river is currently pumping up ground water in the most contaminated portion of the aquifer, aerating it over stones, and releasing it into the Wisconsin River. In the future, VOCs will be removed from soil by a soil/gas extraction system in areas

where chemical concentrations are highest. Chemicals removed from soil will prevent further, ground-water contamination in those areas. Air quality will be protected during the soil/gas extraction operation by filtering the air through charcoal.

The U.S. Environmental Protection Agency (U.S.EPA) proposed the Wausau Groundwater Contamination Site for inclusion on the National Priority List in December 1985 (1, p.2). The Wisconsin Division of Health in cooperation with the Agency for Toxic Substances and Disease Registry published a preliminary health assessment on this site in June 1989. This site poses no apparent public health hazard. While people possibly have been exposed to contamination from the site, the levels of exposure are not expected to cause health effects. The current condition of the municipal water supply is not expected to cause public health concern as long as the water treatment system functions efficiently. Further health studies are not necessary now. However, follow-up surveillance of chemical-specific disease should be conducted in the future to compare results with a 1990 Division of Health study.

## BACKGROUND

### Site Description and History

Part of the north well field serving the City of Wausau is contaminated. The well field provides up to 10 million gallons of water per day to the residents of Wausau (2, p.1). There are six municipal wells in the vicinity of the site (see figure 2). Three wells (CW3, CW4, CW6) show contamination and three do not (CW7, CW9, CW10). Wells 3 and 4 are across the river from an abandoned landfill and CW6 is the closest well north of the landfill. CW 7,9 and 10 are farther north on the west side of the river.

Wausau's well field is located in the Wisconsin River Valley. The aquifer that serves the city is the only source of ground water available to the city. Because there is no confining layer above the aquifer, ground water is susceptible to contamination (3, p.13). Water resides in soil, rock, and sand deposited by glaciers (4, p.2-3). The natural flow of ground water is toward the river, but city well pumping also influences the direction of flow. Bos Creek, a small tributary that flows into the Wisconsin river during wetter seasons, is considered part of the Superfund study area (see figure 2).

The city discovered contamination in wells CW3, CW4 and CW6 in 1982. At that time the problem was addressed by blending contaminated water with uncontaminated water to dilute the contamination. Tap water samples showed that blending was not sufficient to solve the problem. In 1984, the U.S. EPA provided emergency funding for installation of a granular charcoal filter on CW6 so that the well could continue to be used safely. Later that year, two VOC stripper towers were constructed at the water treatment plant. Water from CW3 and CW4 was passed through the VOC stripper towers, mixed with uncontaminated water, and distributed to city residents. When the strippers were in place, CW6 was disconnected from the charcoal filter and the municipal water system. The well continued to be discharged into Bos Creek. This discharge created a barrier so that contaminated ground water would not reach CW7 and CW9 to the north.

In 1988, a separate water line from CW6 to the stripper was completed so that the well could be placed back in service. In 1989, another uncontaminated well was added to the municipal system, CW10 (5, p.2-3). Since December 1989, the city is using one contaminated well and one VOC stripper tower at a time. Treated water is blended with uncontaminated water before it enters the distribution system. CW4 is only being used when water demand exceeds the capacity of other wells (2, p.1). Three sources of contamination have been identified for the site; an abandoned landfill, spills at Wausau Chemical, and discharge to Bos Creek. (Wausau Energy spills of petroleum compounds are

not being addressed by Superfund remedial actions.) The 4.5 acre abandoned city landfill on the west side of the river and a shallow plume of contaminated ground water below Bos Creek are contributing to the TCE contamination in CW6 water. Contaminants from the landfill are also moving southeastward, under the river and have affected CW3. The landfill operated from 1948 to 1955, accepting city refuse and industrial wastes (5, p.3-5). It is now buried under a parking lot at Marathon Electric (3, p.10).

*mostly, but not all*  
A shallow area of contamination from chemical spills at Wausau Chemical has affected the quality of water in CW3 and CW4. Wausau Chemical, a chemical distributor, reported spills of PCE in 1983 (5, p.8-3). The company removed 1,000 cubic yards of contaminated soil in 1984 (5, p.8-4). Wausau Chemical installed and has been operating several extraction wells that pump contaminated water below their property into a stripper for VOC removal and from there the water is discharged into a storm sewer. The Department of Natural Resources (DNR) monitors and regulates the extraction/treatment process.

In 1989, the U.S. EPA selected a plan to clean up soils and ground water associated with the site. On the west side of the river, it called for an extraction well placed on the Marathon Electric property to pump contaminated water out of the ground at the landfill source. Water would be aerated as it flows over rocks so that VOCs evaporate from the water before being discharged into the Wisconsin River (1, p.22). VOCs will be extracted from chemically contaminated soil at Wausau Chemical to reduce the chance that chemicals may leach into the ground water. Gases that are extracted from soil will be filtered through a carbon adsorption filter to protect air quality (3, p. 31).

#### Site Visit

On June 24, 1988, representatives from the Wisconsin Division of Health (DOH) and the Wisconsin Department of Natural Resources (DNR) conducted a site visit. At two different locations, pipes were discharging contaminated water into city storm sewers at street level. CW6 discharged into a storm sewer that apparently flowed into Bos Creek on the west side of the Wisconsin River. On the east side of the river, extraction wells at Wausau Chemical pumped ground water to an air stripper that discharged into a storm sewer. Wausau Chemical, adjacent to the water treatment plant and city production wells, was handling large numbers of chemical barrels. There were several monitoring wells between the chemical company and the municipal water treatment plant (6, p.1).

On August 22, 1989, other representatives of the DOH visited the site. Water was no longer being discharged into Bos Creek from CW6. The representatives saw discharge water from Wausau



Chemical pouring into a storm sewer on the northwest corner of the company property. A person could reach through the grates and touch the discharge water; however, there was no evidence to suggest that children play around the discharge pipe. The representatives saw no people around Wausau Chemical or the water treatment plant other than employees. There were no warning signs on either side of the river to discourage public access at Bos Creek, Wausau Chemical, or the water treatment plant (7, p.1).

### **Demographics, Land Use, and Natural Resource Use**

This site, a contaminated ground-water aquifer, is in the center of a developed residential/industrial neighborhood in the City of Wausau. The areas of greatest ground-water contamination are below properties used by industry. Neighborhoods of single-family homes surround those industries. Space restrictions will keep the residential area from expanding in the direction of the Superfund site.

Bos Creek, the tributary where CW6 discharged for over three years, may be an attractive place for children to play. However, dense plant growth on the banks may discourage its use. The Wisconsin River is used for recreational purposes that include fishing, boating, swimming, and water skiing.

### **Health Outcome Data**

Death certificates listing the cause of death, and census information provided data on bladder cancer, liver cancer and leukemia for a surveillance study of Wausau conducted by the DOH. The Cancer Reporting System, a relatively new reporting system, may also be helpful in future surveillance activities. This system provides information about newly diagnosed cases of cancer and is accessed by zip code. Data is available for the years 1980 through 1989.

### **COMMUNITY HEALTH CONCERNS**

At a U.S. EPA public meeting on August 22, 1989, local residents voiced health concerns. One person asked about the time it might take for health effects to appear in people living in neighborhoods east of the strippers, assuming they breathe contaminated air. Another person asked whether one molecule of a carcinogen is capable of causing cancer or if a minimum dose is required (8, p.1).



**ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS**

**On-Site Contamination**

The term "on-site" refers to the affected aquifer, the land where contamination occurred, and the waterways where contaminated water was discharged. Over fifty chemicals have been found in various water samples collected on the site. The chemicals of concern include three VOCs: TCE, PCE and DCE (5, p.3-10). The highest concentration of TCE in ground water occurs near the old landfill. TCE is spreading toward CW6 and under the river to CW3 on the east side. Discharge water from CW6 into Bos Creek created another shallow plume below the creek. In 1988, TCE was found in Bos Creek water samples near the point of discharge and downstream (5, p.3-2). A plume of PCE and DCE exists in the east well field and affects CW3 and CW4.

**Table 1: Contaminants by Medium at the Wausau Groundwater Contamination Site 1982 - 1988**

	<u>Minimum Level</u>	<u>Maximum Level</u>	
<u>Ground water (<math>\mu\text{g/L}</math>)*</u>			
CW3			
DCE	ND	250	
TCE	20	210	
PCE	ND	100	
CW4			
DCE	ND	500	
TCE	ND	320	
PCE	ND	150	
CW6			
DCE	ND	140	
TCE	ND	260	
PCE	ND	NQ	
	<u>Minimum Level</u>	<u>Maximum Level</u>	<u>Number of Detections/ Number of Samples</u>
<b>Aquifer overall</b>			
DCE	1	1,300	48/134
TCE	1	4,200	68/134
PCE	1	2,440	53/134

Source: Remedial Investigation, 1989, tables 11, 12 and 13.

Table 1 (continued)

	Minimum Level	Maximum Level	Number of Detections/ Number of Samples
<u>Surface Water (<math>\mu\text{g/L}</math>)</u>			
Bos Creek			
DCE	1	1	2/12
TCE	1	110	10/12
PCE	1	3	2/12
Wisconsin River			
DCE	ND	1	1/4
TCE	ND	ND	0/4
PCE	ND	6	1/4
<u>Sediments (<math>\mu\text{g/kg}</math>)**</u>			
Boss Creek			
DCE	6	200	3/11
TCE	6	17	5/11
PCE	ND	ND	0/11
Wisconsin River			
DCE	<0.3	ND	10/10
TCE	<0.2	<0.3	10/10 (4, table 19)
PCE	<0.2	<1.0	10/10 (9, app.E)
<u>Surface Soils (<math>\mu\text{g/kg}</math>)</u>			
DCE	ND	ND	0/8
TCE	ND	ND	0/8
PCE	ND	3	1/8 (4, table 19)
<u>Subsurface Soils (<math>\mu\text{g/kg}</math>)</u>			
DCE	ND	170	3/27
TCE	ND	11,000	8/27
PCE	ND	3,500	8/27 (4, app M)

\*  $\mu\text{g/L}$  = micrograms per liter (parts per billion)

\*\*  $\mu\text{g/kg}$  = micrograms per kilogram (parts per billion)

ND = not detectable

NQ = detected but too low to quantify

Levels of all VOCs in CW3 have decreased from the highest values reported. Since 1984 DCE values have ranged from ND - 20  $\mu\text{g/L}$ ; TCE values have ranged from 53 - 210  $\mu\text{g/L}$ ; and PCE values, ranging from ND - 18  $\mu\text{g/L}$ , are going down (4, table 13). In CW4 levels of DCE, TCE, and PCE are going down. The most recent values are 4  $\mu\text{g/L}$ , ND, and 14  $\mu\text{g/L}$  respectively. In CW6 levels of TCE have been fluctuating between 120 and 220  $\mu\text{g/L}$  since September of 1984 .

Levels of contamination have decreased in Bos Creek surface water since CW6 is no longer being discharged into that waterway (10, p.46) (4, app.L). Sediment contamination will continue to decrease as the chemicals dissipate from the creek bed area.

The Wisconsin River appears to be minimally affected by contamination at the site. Only one surface water sample showed PCE at 6  $\mu\text{g/L}$  and DCE at approximately 1  $\mu\text{g/L}$ ; other samples showed none of the chemicals of concern. Sediment sampling from the river showed no detection of VOCs. There are no recent data on surface water or sediment sampling for the Wisconsin River (4, app.L). Surface water and sediments may be affected by the discharge from the extraction well at Marathon Electric. Discharge of contaminated water directly from the extraction well meets the DNR effluent quality criteria. Aeration of the ground water will reduce the contaminant levels even further.

Levels of DCE and TCE are not detectable in surface soils. Subsurface soils have indicated the presence of all three chemicals of concern. The highest values for VOCs are concentrated at the old landfill and the industrial area adjacent to the municipal water treatment plant.

Soil on the Wausau Chemical property is contaminated. Samples of subsurface soil that were suspected of being contaminated showed PCE levels between 64 and 3500 mg/kg. TCE levels ranged from 223 to 627 mg/kg (4, app.M). Generally soil gases on the site, within three feet of the surface contain levels of total chlorinated ethylenes that range from 5 to 80  $\mu\text{g/L}$ . One location between the municipal water treatment plant and Wausau Chemical showed a value of 4,080  $\mu\text{g/L}$  PCE (10, app.D).

#### Off-Site Contamination

VOCs move away from the air strippers with air currents. The U.S. EPA estimated, by modeling, the worst-case potential contamination of residential air downwind of the strippers at the municipal water treatment plant and Wausau Chemical, and the results are described in the "Environmental Pathways" portion of this assessment. There are no data to confirm the conclusions of the air modeling performed by the U.S. EPA. Some evaporation of VOCs is occurring above contaminated soils where natural or

asphalt cover is not present. When clean-up of VOCs from soils occurs, VOCs could be released into the air.

A review of the Toxic Chemical Release Inventory revealed no additional industrial releases of TCE, PCE, or DCE for the City of Wausau. Wausau Chemical was listed for point source release of tetrachloroethylene from 1 to 499 pounds. That release would be representative of the ground water extraction/VOC stripper tower system (18).

Between March 1982 and June 1984, tap water samples from 18 locations in the municipal water distribution system showed levels of TCE from less than 10 µg/L to 80 µg/L. DCE ranged from non-detectable levels to 30 µg/L except for one sampling occasion when samples from two locations contained 60 and 70 µg/L. These findings prompted the closure of CW4. Levels of PCE ranged from non-detectable to 20 µg/L (17, table 4).

Table 2: Contaminants in Tap Water Samples from the Wausau Municipal Water System (March 1982 - May 1984)

	<u>Minimum Level</u>	<u>Maximum Level</u>	<u>Number of Detects/ Number of Samples</u>
<u>Ground water (µg/L)</u>			
DCE	ND	70.0	17/43
TCE	<10.0	80.0	43/43
PCE	ND	20.0	24/43

ND = not detected

Recent samples (August through October 1989) of tap water show the levels of all three contaminants of concern in residential water are below the level of detection, with one exception where TCE measured 0.2 µg/L. The city is testing water for distribution each month. The water utility is required by the Department of Natural Resources to test quarterly (every three months). The city water department will continue to test water monthly until it is satisfied the problem has been solved (16, p.1).

### Quality Assurance and Quality Control

In preparing this health assessment, the Wisconsin Division of Health relies on the information provided in the referenced documents and assumes that adequate quality assurance and quality control measures were followed concerning chain-of-custody, laboratory procedures, and data reporting. The validity of the analysis and conclusions drawn for this assessment is determined



by the availability and reliability of the referenced information. The remedial investigation of this site followed a Quality Assurance Project Plan that was approved by the U.S. EPA.

### Physical and Other Hazards

Physical hazards common to industrial areas such as railroad tracks, occasional uneven pavement, industrial equipment, and debris were present. No other physical hazards were observed.

## PATHWAYS ANALYSES

### Environmental Pathways

Ground water: Chemicals can move away from sources in several ways; the primary movement occurs in ground water. The site is situated in Pleistocene glacial outwash deposits overlying Precambrian igneous and metamorphic rock. All of the municipal wells in Wausau draw from the outwash deposits. Municipal wells are pulling contaminated ground water toward the wells and away from the natural path of flow - toward the Wisconsin River. A plume of contamination currently extends from the old landfill north to CW6, and from the old landfill east to CW3. The depth of this plume varies from 115 feet near the landfill to 20 feet near the municipal wells. A shallow plume of contaminated ground water extended along Bos Creek from the point where CW6 discharged into the creek to the mouth of the Wisconsin River. On the east side of the river, a shallow PCE plume extended between CW3 and CW4. A private well, used only for cooling purposes, is located within the area of the PCE plume on the Wergin Construction property (11, p.1).

Air: Clean-up action of the VOC stripper towers at the water treatment plant and Wausau Chemical release VOCs into the air. The U.S. EPA estimated rates of chemical emissions into the air based on ground-water contamination levels going into the VOC strippers, water contamination levels out of the stripper and gallons per minute flowing through the system. The highest concentration of emission from the three strippers occurs 100 meters east of the towers and equals 1.3 microgram per cubic meter of PCE and 0.37 microgram per cubic meter TCE. The Wausau chemical stripper accounts for almost all of PCE in the air and approximately forty percent of TCE estimated to be present (14, 3). There have been no air sampling or monitoring in the neighborhoods east of the VOC stripper towers to substantiate the modeling. When clean-up of VOCs from soils occurs, VOCs could be released into the air. Charcoal adsorption filters will be added to the soil/gas removal system. VOCs in contaminated municipal water will volatilize when used for showering, cooking, or drying.

Surface Water and Sediments: Surface water and sediments of Bos Creek contained TCE in 1988. Since contaminated water from CW6 is no longer discharged into Bos Creek, levels of TCE in sediments should decrease over time. Surface water and sediments in the Wisconsin River may be affected by the extraction process. Levels of contamination in discharged ground water to surface water are regulated by the DNR and are within allowable limits.

Food Chain: The contaminants of concern are not expected to bioconcentrate significantly in plants and animals. These compounds however, can contaminate the food chain and have been detected in national food surveys of plants, animals, and milk.

### Human Exposure Pathways

Ingestion: The most significant way people can contact contamination at the site is by drinking contaminated tap water. Recent sampling shows that the residents of Wausau are not being exposed to significant contamination in their drinking water (2, P.1). The continued quality of consumable water in the City of Wausau is dependent on the proper function of water treatment equipment. Water quality is also dependant upon the concentration of contamination in the water and the quantity of contaminated water being used.

The Wergin Construction Company uses a private well for non-consumption purposes. A search of well construction records revealed no private residential wells in the area. The city requires residents to use municipal water for domestic purposes (3, p.13). The city uses one stripper at a time when city water requirements are normal. Water could, therefore, be diverted to the other stripper if a malfunction occurs (2, p.1). Tap water is regularly tested at monthly intervals (16, p.1).

In regard to the food chain, human exposure to DCE, TCE, PCE, from ingestion of plants and animals is not believed to represent a significant human exposure pathway. When exposed to air, these chemicals evaporate easily. There are no dairy, beef, poultry, or large agricultural operations that have used the contaminated water.

Persons who may have had a food chain exposure to DCE, TCE, PCE in the past would have been exposed, most likely, through ingestion of fish from the contaminated river water or consumption of backyard agricultural products watered with contaminated ground water.

Inhalation: Employees of Wausau Chemical or the city water utility could be exposed to VOCs in the air from strippers on the property and at the water treatment plant next door. Soils

carrying contamination could be touched or inhaled. During the clean-up process, VOCs extracted from soil could enter the air and increase levels of contamination if the carbon adsorption system failed. People living east of the air strippers could be exposed to low levels of contamination given off by strippers. A dose was calculated based on a 70 kilogram adult breathing 20 cubic meters of air per day over a 70 year period. The maximum estimated level of PCE in air is 1.3 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ); TCE is  $.3723 \mu\text{g}/\text{m}^3$  (14, p.1). If municipal water becomes is contaminated, residents could be exposed to VOCs in air during washing, cooking, or showering processes.

Dermal Contact: People may contact small amounts of contamination by touching water and sediment of Bos Creek. Children playing in Bos Creek could be exposed to low levels of TCE via skin contact. TCE can be absorbed into the body through the skin (12, p.2). The extraction well will contribute VOCs to the surface water and sediments of the Wisconsin River that could be contacted through dermal exposure.

## PUBLIC HEALTH IMPLICATIONS

### Toxicological Evaluation

DCE in ground water exceeded the Wisconsin Ground Water Enforcement Standards, but there is no indication of public exposure that would result in adverse health effects. Because long-term exposure to either TCE or PCE causes cancer in laboratory animals, the U.S. EPA classifies both chemicals as "probable human carcinogens" (12/13, p.4/6).

Consumption of tap water containing 10 to 80  $\mu\text{g}/\text{L}$  would not be expected to result in signs of acute exposure. Long-term exposure to TCE and PCE could increase one's risk of acquiring cancer (12, p.4). The DOH estimated upper-level excess lifetime cancer risks for past exposure (ingestion and inhalation) to PCE and TCE in the Wausau drinking water supply. The risk was estimated for maximally exposed residents who lived in Wausau for thirty years while tap water could have been contaminated. Tap sample results collected between March 1982 and June 1984 were assumed to be representative of contamination throughout the 30-year period. The most frequently sampled tap was at the city hall, which is located south of the water treatment in the downtown area. The tap was considered representative of tap water in the area because the amounts of VOCs in the water were similar to those in tap water from other parts of the city. An exposure time of 30 years was used for the calculations because the landfill operated between 1948 and 1955 and well CW6 was taken off line in 1984.

An average exposure based on the data was figure for TCE and PCE. The combined exposures are expected to result in increase cancers of one in 100,000 population. The DOH has concluded there is no apparent increased risk of cancer in the community from exposure to chemicals in drinking water associated with the Superfund site.

← These two sentences seem to contradict or another, if one doesn't realize that this is comparing cancer risk for these chemicals to the "normal" cancer risk in the community. Same comment here.

Since Bos Creek is a shallow, intermittent stream, any exposure would likely be of short duration. Any resultant increase in cancer risk would be negligible. Levels of TCE and PCE at this site are far below those shown to cause any other adverse health effects. The levels of contamination entering the Wisconsin River from the extraction well are not expected to result in significant exposures.

Levels of contamination in air from strippers at the water treatment plant and Wausau Chemical are not expected to cause ill health effects in people living east of the strippers (3, p.15). Risk calculations are based on a 70 kilogram adult breathing 20 cubic meters of air per day over a 70 year period. The maximum estimated level of PCE and TCE in air are substantially below levels reported to cause health problems other than cancer (14, p.1). The upper level cancer risk estimate for maximally exposed residents would be  $1.7 \times 10^{-6}$  (14, table 3). This exposure would pose no apparent increased risk of cancer. In other words it is unlikely that this level of increased risk could be measured. Plans to extract VOCs from the soil include methods to collect gases on charcoal particles. Charcoal collection of VOCs will reduce the hazard of inhalation exposure as gases are extracted from contaminated soil.

#### Health Outcome Data Evaluation

The Wisconsin Division of Health, as part of its environmental surveillance activities, undertook a study to see if Wausau citizens had significant increases in cancers that may be associated with exposure to solvents. The study was conducted using existing disease and demographic data. The division looked at liver cancer, bladder cancer, and leukemia deaths. No significant increase in death rates for these cancers was found (15, p.120).

#### Community Health Concerns Evaluation

One citizen voiced interest during a public meeting August 22, 1989 about the mechanism by which a chemical causes cancer. The person was told that there are uncertainties about these mechanisms. Our opinion is that any exposure to a cancer-causing substance increases one's risk of contracting the disease to some



extent. The level of risk depends on the extent of exposure and the potency of the substance.

Another citizen was concerned about how long it would take before people living in the path of air contamination coming from the air strippers experienced health effects. That person was told that given the estimated levels of exposure and the duration of projected clean-up at the sites, no apparent increase in health effects is expected.

### CONCLUSIONS

The Division of Health considers this site to be of no apparent health hazard as long as the City of Wausau maintains continued efficient operation of the water treatment system. Citizens could be exposed to TCE, PCE or DCE if water quality is not properly maintained. Past exposures to solvents in the municipal drinking water supply are expected to result in no apparent increased risk of cancer.

Surface water and sediments in Bos Creek may be a potential source for low level skin exposure to TCE. Ingestion of contamination from this source is not likely, and the levels of contamination absorbed through skin are not expected to result in adverse health effects.

Soils at Wausau Chemical and Wausau Energy may contribute to low levels of exposure to employees or others who frequent these areas. Exposure could occur through dermal contact or inhalation of evaporating VOCs. The adverse health effects associated with these exposures would be negligible.

Contaminated air around VOC stripper towers could result in low level inhalation exposure to people who are in the immediate vicinity. Exposure to all of the PCE and most of the TCE in air can be eliminated by discontinuing the use of the existing air strippers at Wausau Chemical.

### RECOMMENDATIONS

#### Cease/Reduce Exposure Recommendations

1. Municipal water quality should continue to be routinely monitored according to Department of Natural Resources regulations.
2. Children and others should be discouraged from touching the sediment and water of Bos Creek until environmental quality tests show levels below those of health concern. Additional sampling should be conducted at Bos Creek to demonstrate

Are there warning signs in that area or other areas (point #3)

- reduced levels of solvents in surface water and sediments.
3. People should be discouraged from touching areas of contaminated soil at Wausau Chemical.
  4. The City of Wausau should maintain emissions from the air-stripper towers at or below the limits enforced by the Wisconsin Department of Natural Resources.
  5. Air quality in the breathing zone of the residential neighborhood east of the air strippers should be tested to confirm model estimates.
  6. VOCs extracted from soil must be collected to reduce the potential for exposure to contamination through air.

### Health Activities Recommendations

The Division of Health and ATSDR's Health Activities Recommendation Panel reviewed the data on this site to determine the need for more action on health-related concerns. The Panel offers the following recommendations:

1. Follow-up surveillance of cases of chemical-specific disease in the area should be conducted for comparison to the 1990 Division of Health investigation to confirm the DOH's estimates of no apparent increase in cancer risk. Death certificates and the cancer reporting system may provide the necessary data for such surveillance.
2. Professional education activities should be offered to physicians practicing in the Wausau area relating to TCE, PCE, and DCE exposures.
3. Community health education activities should continue as part of the DOH's on-going activities at Superfund sites.
4. If further testing of tap water, outside air, or nearby surface water shows contamination at levels of health concern, the Division of Health and ATSDR will reconsider the need for other health activities.

*What about "signing" warnings in areas of potential exposure.*

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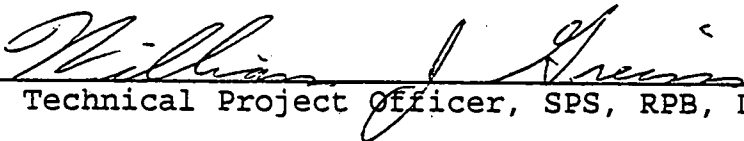
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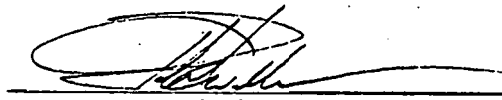
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CERTIFICATION

This 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 health assessment was initiated.

  
Technical Project Officer, SPS, RPB, DHAC

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

  
Division Director, DHAC, ATSDR



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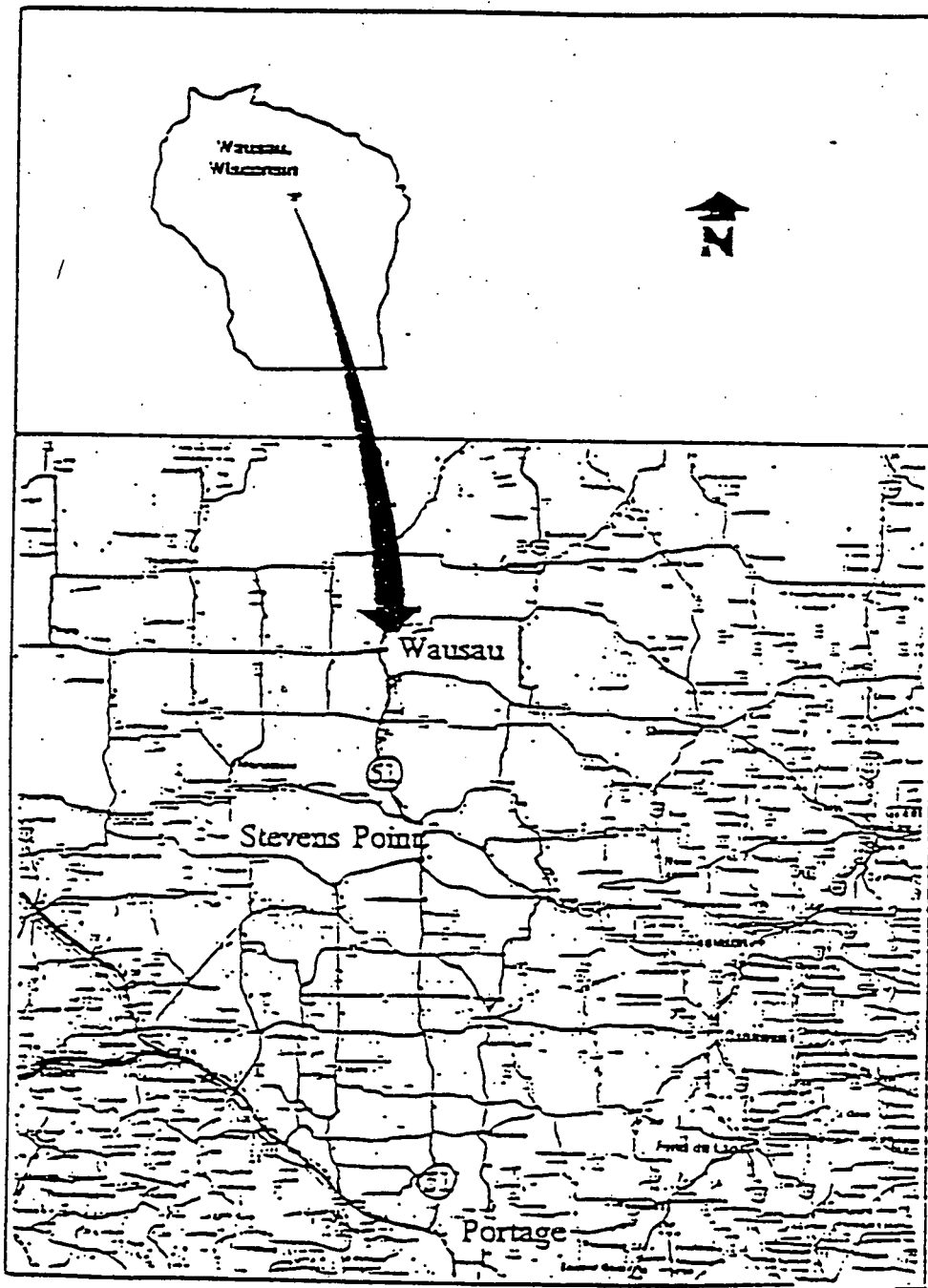
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## Figures

1. Wausau Area Map
2. Wausau Groundwater Contamination Site
3. VOC Stripper Tower Location

Figure 1

WAUSAU AREA MAP

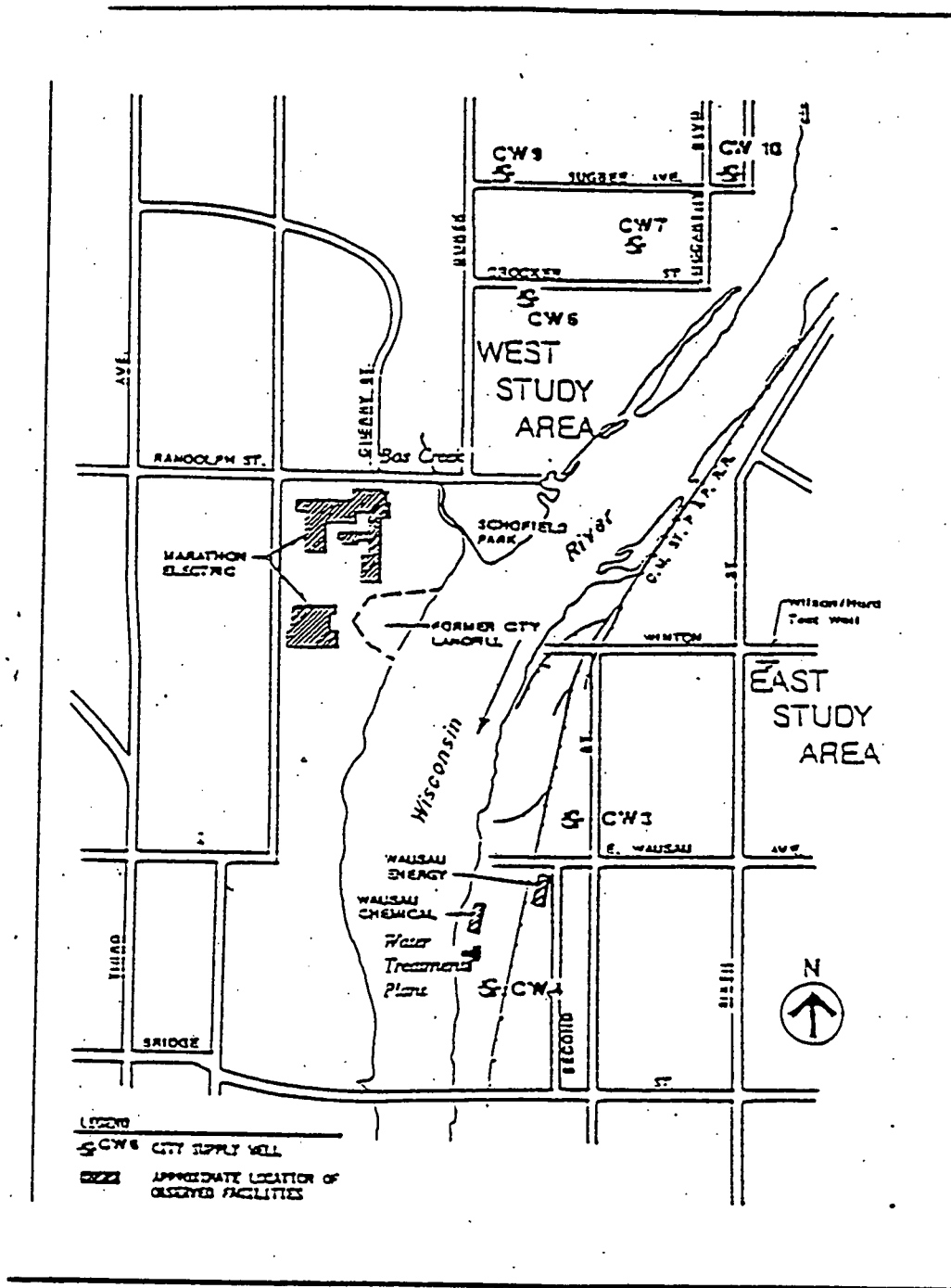


Source: U.S. EPA, Region V, Spill Response Section: Soil Testing Services, Inc., Report, June 30, 1984.



Figure 2

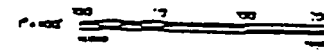
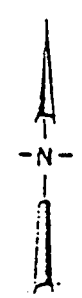
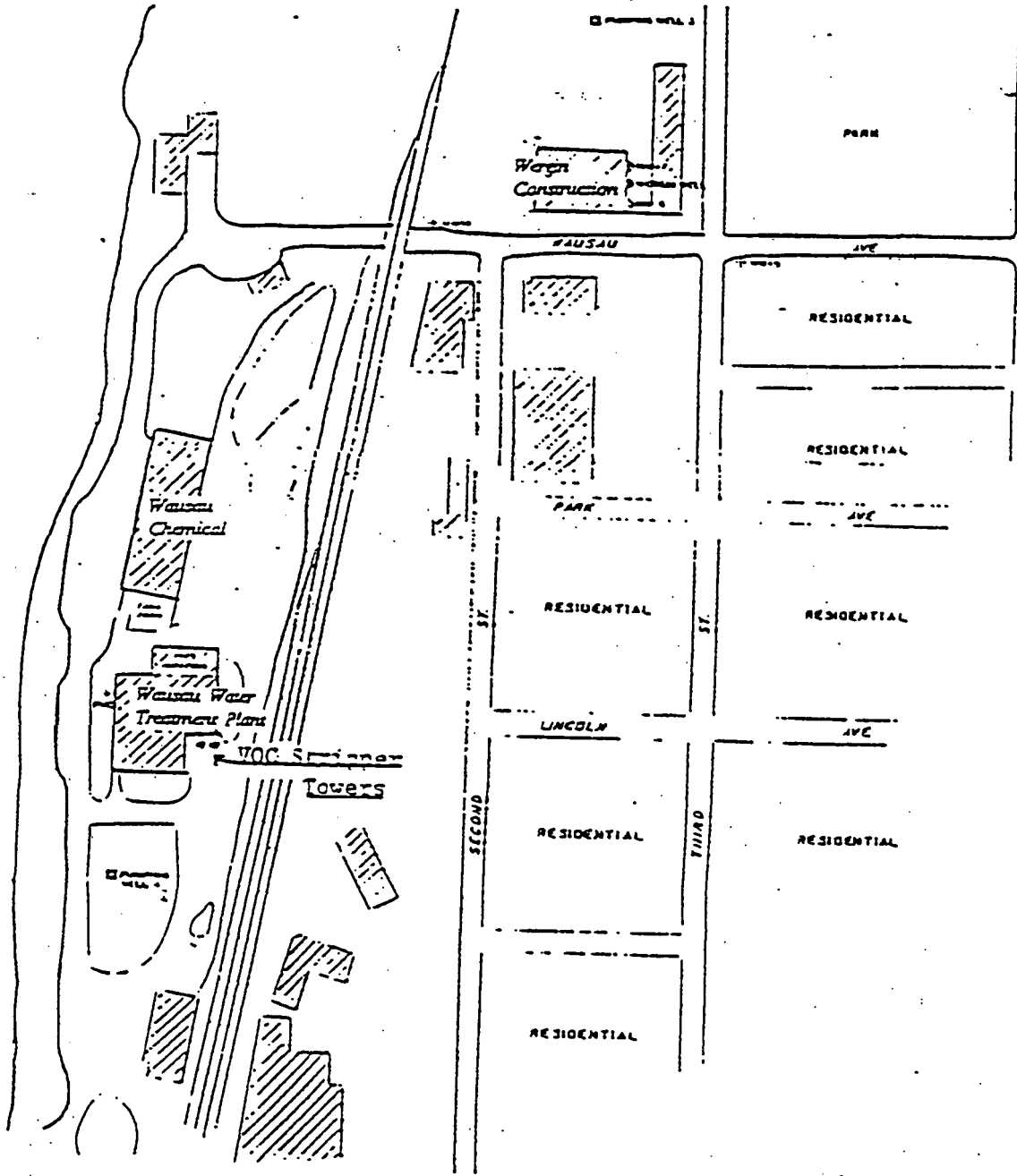
Wausau Groundwater Contamination Site



Source: U.S. EPA, Region V, Site Fact Sheet  
August 1989.

Figure 3: VOC Stripper Tower Location

WISCONSIN RIVER



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PAUSAU CHEMICAL CORPORATION

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SOIL, AIR AND MONITORING LOCATION