State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Carroll D. Besadny
Secretary

December 19, 1988

FILE REF: 4430

Mr. Valdus Adamkus
Regional Administrator
US EPA, Region V
230 S. Dearborn St.
Chicago, IL 60604

Subject: Wausau Municipal Well Field - Interim Superfund Remedy

Dear Mr. Adamkus:

Your staff has requested this letter to document our position on the interim remedy for the Wausau municipal well field. The proposed interim remedy, identified as Alternative Number 3, is discussed fully in the Record of Decision and includes:

- Installation of a groundwater extraction well in the southern end of the contaminant plume;

- Implementation of a treatment system for removal of VOC's;

- Discharge of the treated water to the Wisconsin River; and

- Provisions to modify Alternative 3 to include an additional extraction well, if necessary.

The costs of the selected interim remedy are estimated to be:

- Capital Costs - $422,000

- First year operation and maintenance - $105,000

- Subsequent annual operation and maintenance - $81,000

Based on our review of the Phased Feasibility Study and Alternatives Array, our agency concurs with the selected alternative. We also understand that if the responsible parties do not agree to fund the interim remedy, the State of Wisconsin will contribute ten percent of the remedial action costs. The State's cost share for this project would be $42,200. In addition to cost sharing on the remedy, we acknowledge our responsibility for operation and maintenance. Since this is a water treatment/restoration remedy, the period of cost sharing may be up to ten years. The specific length of time will be negotiated in a State Superfund Contract. Again, this is all contingent upon responsible party action.

Thank you for your support and cooperation in addressing this contaminated municipal water supply. If you have any questions regarding this matter, please contact Mr. Mark Giesfeldt, Chief of the Environmental Response & Repair Section at (608) 267-7562.

Sincerely,

C. D. Besadny
Secretary

cc: L. Wible-AD/5
P. Didier/M. Giesfeldt-SW/3
G. Kulbert/M. Owens-NCD
B. Dobbins-NCD
S. Bangert/C. Diebels-SW/3
Honorable John Robinson, Wausau

RECORD OF DECISION

SELECTED INTERIM REMEDIAL ALTERNATIVE

Site Name and Location

Wausau Groundwater Contamination Site
Wausau, Wisconsin

Statement of Basis and Purpose

This decision document presents the selected interim remedial action for the Wausau Groundwater Contamination Site in Wausau, Wisconsin, developed in accordance with CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan. This decision is based on the administrative record for this site. The attached index identifies the items that comprise the administrative record upon which the selection of the remedial action is based.

The State of Wisconsin has concurred with the selected remedy.

Description of the Selected Remedy

The selected remedy is an operable unit that will address the West Well Field contaminant plume in the City of Wausau's well field. The selected remedy is considered cost-effective and is consistent with the eventual final remedy. The specific components of the selected remedy include:

- Installation of an extraction well located in the southern portion of the contaminant plume;
- Implementation of a treatment system for removal of contaminants;
- Discharge of the treated water to the Wisconsin River; and,
- A provision for implementation of an additional well, as necessary.

Declaration

As required by Section 121(a) of CERCLA as amended by SARA, the selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to

the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. Because treatment of the principal threats of the site was not found to be practicable within the limited scope of this action, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy.

12/23/88
Date

Valdas V. Adamkus
Regional Administrator

SUMMARY OF INTERIM REMEDIAL ALTERNATIVE SELECTION

WAUSAU GROUNDWATER CONTAMINATION SITE
WAUSAU, WISCONSIN

I. SITE LOCATION AND DESCRIPTION

The City of Wausau is located along the Wisconsin River in Marathon County, Wisconsin. The Wausau Groundwater Contamination site encompasses an area in the northern section of the city which includes the City Well Field and five of its production wells. (See Figures 1 and 2).

The City of Wausau provides drinking water for approximately 33,000 people. The City presently operates six groundwater production wells, five of which are located on the north side of the City. A sixth well, Production Well CW8 (CW8), is located adjacent to the Wausau Municipal Airport, on the south side of the City. The water from CW8 has a high concentration of iron and is used only during peak demand periods. Production wells CW6, CW7, and CW9 are located west of the Wisconsin River and are collectively referred to as the West Well Field. The West Well Field (Figure 2) is located in a predominantly residential area, although a few industrial facilities are located in this area. Production wells CW3 and CW4 are located on the east side of the Wisconsin River and are referred to as the East Well Field. The East Well Field is located in a predominantly industrial section of the City.

The six production wells are screened in an aquifer of glacial outwash and alluvial sand and gravel deposits which underlie and are adjacent to the Wisconsin River. This unconfined aquifer supplies nearly all potable, irrigation, and industrial water to residents and industries located in Wausau and the surrounding areas. Within the study area the alluvial aquifer ranges from 0 to 160 feet thick, and has an irregular base and lateral boundaries.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Site History

The City discovered in early 1982 that its production wells CW3, CW4, and CW6 were contaminated by volatile organic compounds (VOCs). Toluene, ethylbenzene, and xylene were also detected at CW4. Trichloroethene (TCE) is the predominant volatile organic compound detected at CW6, although below method detection limit (BMDL) concentrations for tetrachloroethene (PCE) and 1,2-dichloroethene have also been previously reported (Weston, 1984). Since the contamination was first detected in early 1982, TCE concentrations from CW6 have ranged from 70 micrograms per liter (ug/L) to 260 ug/L. The most recent sampling (March 1988)

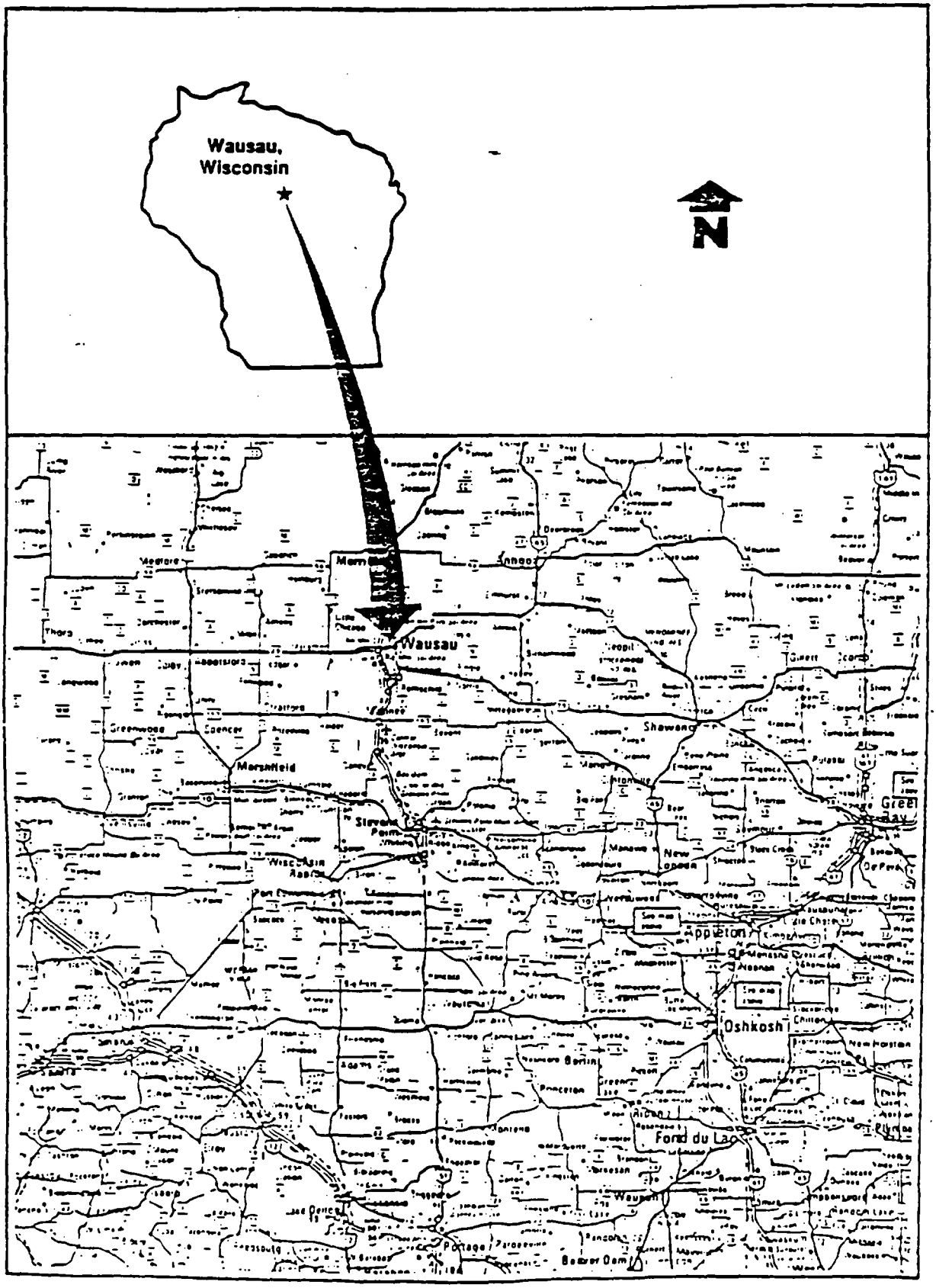
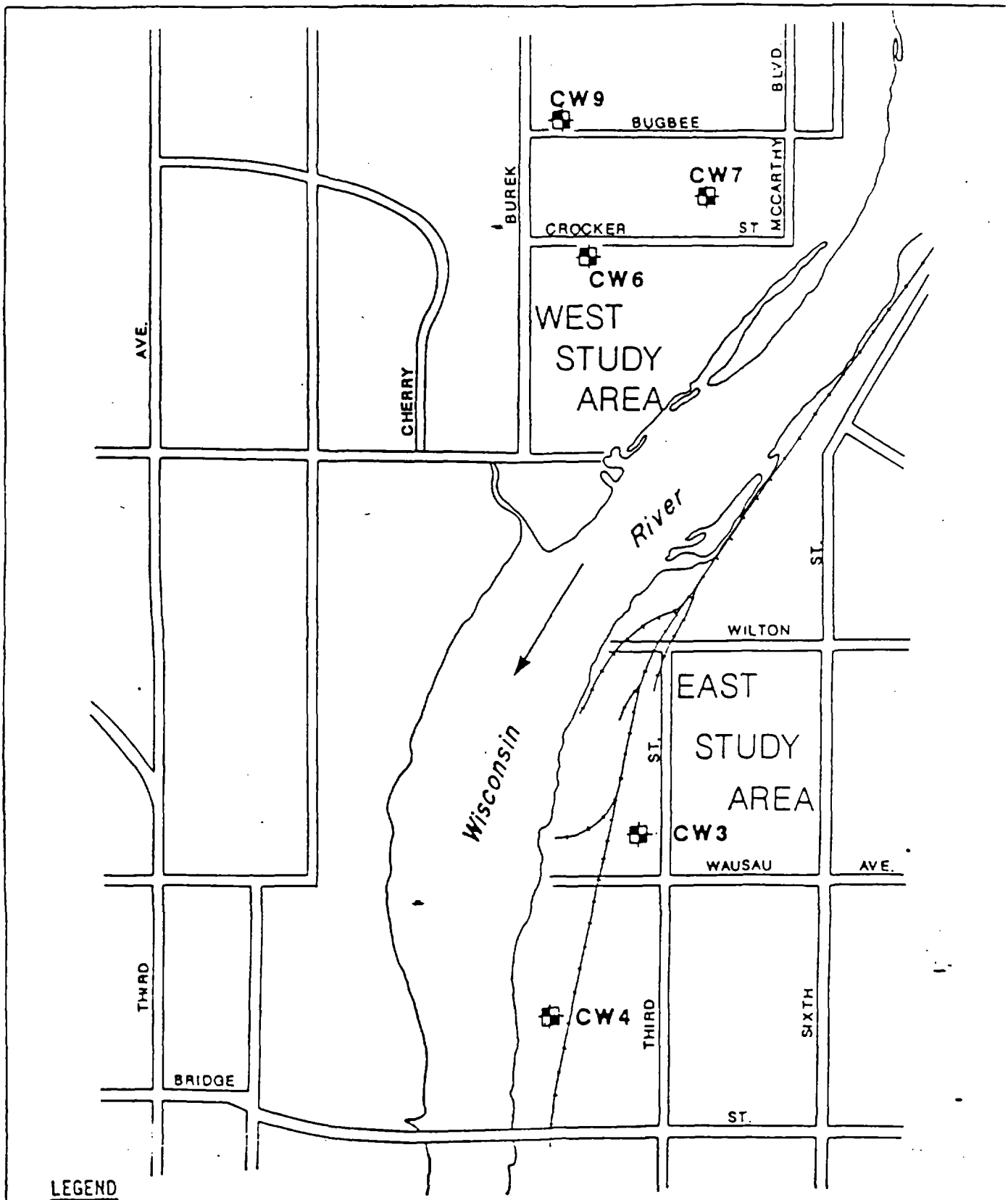


FIGURE 1 REGIONAL LOCATION MAP



NOTE:

BASE MAP DEVELOPED FROM U.S.G.S. 15 MIN. QUADRANGLE MAPS WAUSAU EAST & WAUSAU WEST DATED 1963, PHOTOREVISED 1978.

FIGURE 2

indicates TCE concentrations of approximately 160 ug/L. Sample results from the East Well Field (CW3 and CW4) have indicated considerable PCE, TCE, and DCE impact at both wells. CW4 has generally indicated steadily decreasing concentrations of the three constituents since February 1984. CW3 has indicated decreasing PCE and DCE concentration since the VOCs were discovered in early 1982. However, TCE concentrations at CW3 have remained relatively constant at concentrations ranging between 80 ug/L and 210 ug/L.

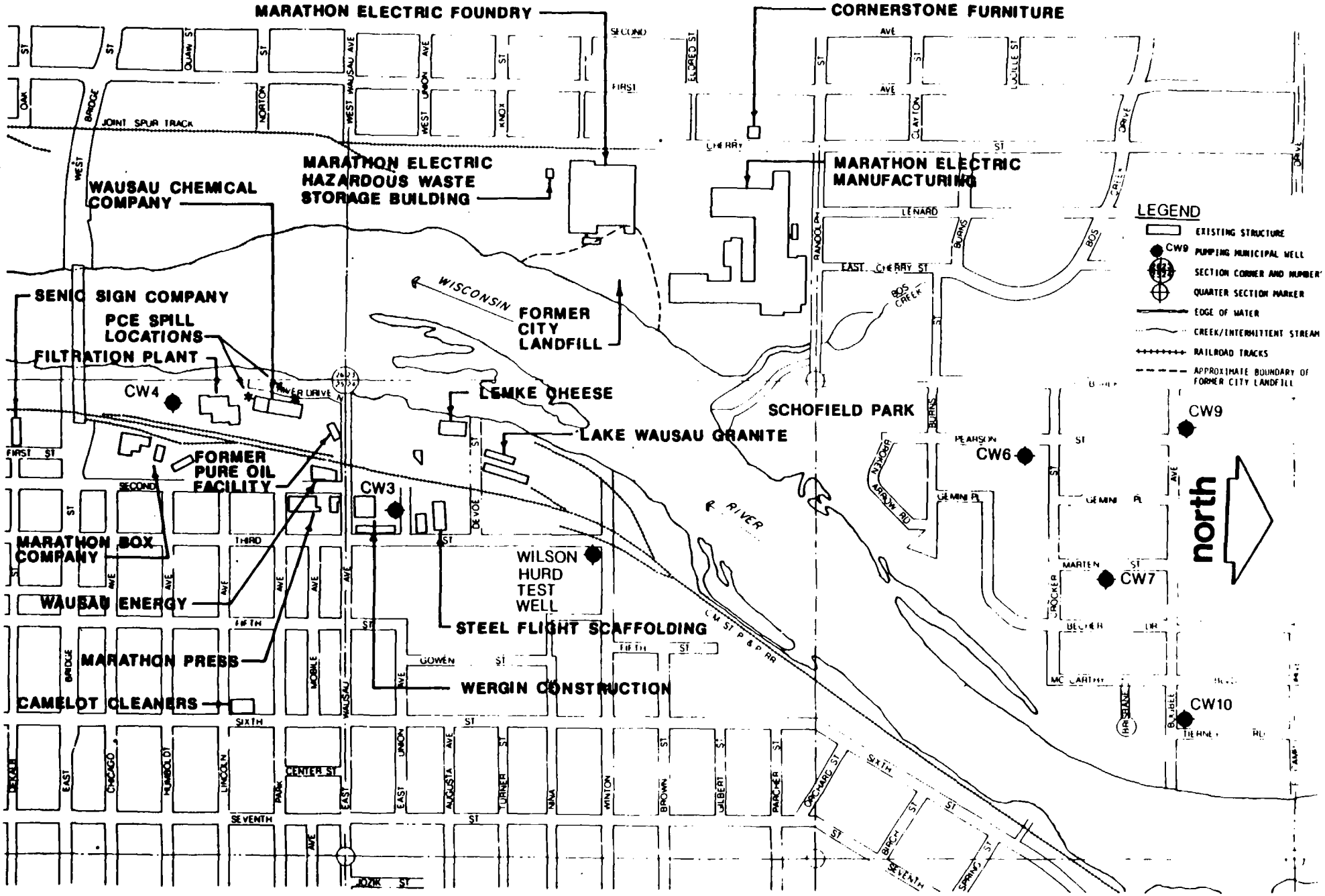
To reduce VOC concentrations, the City originally instituted a program where uncontaminated water from CW9 and CW7 was blended with water from CW3, CW4, and CW6 to dilute the VOC concentrations. However, increasing VOC concentrations in groundwater caused this method to be ineffective, and resulted in then current regulatory limits being exceeded.

In 1983, the United States Environmental Protection Agency (U.S. EPA) awarded the City of Wausau a federal grant to help fund the design and installation of a packed tower VOC stripper in order to provide sufficient water of acceptable quality to City residents. However, because VOC levels in the distribution system continued to increase, U.S. EPA's emergency response team was asked for assistance. As an interim measure in June 1984, the U.S. EPA installed a granular activated carbon (GAC) treatment system on CW6. VOC stripping towers were installed in the Summer and Fall of 1984 at the City water treatment plant to treat water from CW3 and CW4. Subsequently, the GAC system was removed from service in October 1984. In December 1985 the Wausau Groundwater Contamination site was added to the National Priorities List (NPL) for remedial activities under Superfund.

The City has been blending water treated for VOC removal with water from uncontaminated supply sources (CW7 and CW9) to reduce VOC concentrations in the water supply distribution system. Data indicate that prior to installation of treatment units (pre-July 1984), drinking water samples taken from various taps in the City of Wausau consistently contained TCE with concentrations ranging from detectable levels (>1 ug/L) to 80 ug/L. Lower levels of PCE and DCE were identified shortly after discovery of the contamination, probably before blending had reduced the levels of VOCs. Following installation of the packed tower VOC strippers, the water supply distribution system has had relatively low levels of VOC's (generally below detection limits of 0.5 to 1.0 ug/L). These levels are dependent on continued effective operation of the treatment system for CW3 and CW4, the influent VOC concentration for each well, and continued use of the two uncontaminated wells (CW7 and CW9).

B. Previous Studies

Previous investigations have identified several potential point sources of VOC contamination in the vicinity of City production wells. Becher-Hoppe Engineers, Inc. was contracted by the City of Wausau to conduct an investigation of the East Well Field in the vicinity of CW3. The study concentrated on the Wergin Construction Co. property, the former site of



LOCATION OF MUNICIPAL WELLS & INDUSTRIAL SURVEY BUSINESSES

FIGURE

TABLE 1

Existing Reports On Wausau, Wisconsin Water Supply Site

1. Hydrogeological Investigation Of Volatile Organic Contamination In Wausau, Wisconsin Municipal Wells, (for U.S.EPA), Roy F. Weston, Inc., September, 1985.

2. Subsurface Exploration and Testing Program to Evaluate Ground Water Quality at the Wausau Chemical Facilities in Wausau, Wisconsin, (for Wausau Chemical Company), STS Consultants, Ltd., July, 1984.

3. Investigation of An Abandoned City of Wausau Landfill, (for WDNR), CH_2M Hill, February, 1986.

4. Existing Conditions Report and Exploration Program, Wausau East Municipal Well Field, Wausau, Wisconsin, (for WDNR), Twin City Testing Corporation, August, 1986.

5. Groundwater Investigation, (for City of Wausau), Beecher Hoppe Engineers, Inc., 1983.

6. VOC Groundwater Investigation At The Former Wausau Energy Facility In Wausau, Wisconsin, (for Wausau Energy Corporation), Foth & Van Dyke and Associates, Inc., December, 1986.

7. Hydrogeological Investigation of the Alluvial Aquifer Beneath City Well 6, Wausau, Wisconsin, (for City of Wausau and Marathon Electric), RMT, Inc. and Geraghty & Miller, Inc., July, 1987.

a City maintenance garage. Foth & Van Dyke and Associates, Inc. performed a groundwater investigation at the Wausau Energy Company property located just south of the above property, in order to determine the effect of past bulk oil operations at the site. STS Consultants Ltd. performed groundwater investigations at the Wausau Chemical Company, also located in the East Well Field, and instituted a groundwater extraction and treatment system to remediate effects of past VOC releases from their facility operations. Twin City Testing and Engineering Laboratory, Inc. conducted investigations in the East Well Field vicinity on behalf of the Wisconsin Department of Natural Resources (WDNR). Roy F. Weston Inc. conducted an investigation of both the East and West Well Fields as part of the U.S. EPA emergency response action. CH_2M Hill Inc. was contracted by the WDNR to perform a hydrogeologic investigation of the abandoned City of Wausau landfill, located on property presently owned by Marathon Electric Company in the southern part of the West Well Field. RMT Inc. and Geraghty & Miller Inc., representing Marathon Electric Corporation and the City of Wausau, respectively, performed a hydrogeologic investigation to determine the source of TCE in the groundwater in the vicinity of CW6. Geraghty & Miller, Inc. also installed several wells in the East Well Field in order to investigate VOC contamination of CW3. Locations of facilities discussed above are illustrated in Figure 3, and a listing of previous studies is presented in Table 1.

Investigations conducted previously have produced inconclusive results. Potential sources have been identified, but data gaps exist on source concentration, release rates, migration routes, aquifer characteristics, effect of river stage and groundwater pumping on flow direction, and velocity of groundwater and contaminants. The conclusions of most of these studies include a recommendation for further study. At least two studies also expressed the need for a comprehensive investigation to address the entire well field. The remedial investigation, currently in progress, was therefore initiated by U.S. EPA to fill the data gaps and determine a cost-effective solution to the groundwater problem.

C. CERCLA Enforcement

CERCLA enforcement activities began at the site in 1986. U.S. EPA identified five Potentially Responsible Parties (PRPs) as having potential responsibility as waste generators and/or transporters. Notice letters informing PRPs of their potential liabilities and offering them the opportunity to perform the Remedial Investigation/Feasibility Study (RI/FS) were sent via certified mail on January 17, 1986 to the five identified PRPs listed below:

* City of Wausau
* Marathon Electric Company
* Wausau Chemical Company
* Wausau Energy Company
* Amoco Oil Corporation

Several negotiation meetings were held to discuss technical and legal issues of a consent decree for the site. However, due to problems within the PRP group, and failure of the PRPs to agree to key requirements,

negotiations were unsuccessful, and the PRPs declined to participate in the RI/FS. The U.S. EPA then contracted with Warzyn Engineering, Inc. to conduct the RI/FS.

Although the PRPs failed to reach an agreement with U.S. EPA, they have maintained considerable involvement in U.S. EPA's study. Two of the five PRPs conducted an investigation of the West Well Field and all have requested split samples and/or results of data collected. In addition, two of the PRPs, the City of Wausau and Marathon Electric, offered to perform the phased feasibility study (PFS), and have indicated a willingness to perform the operable unit Remedial Design/Remedial Action (RD/RA). Correspondence regarding this matter is included in the administrative record for the site.

In January, 1988, U.S. EPA filed suit against four of the PRPs for recovery of past costs spent on U.S. EPA's emergency response actions. A fifth PRP, Amoco Oil, was not named in the lawsuit based on prosecutorial discretion. Trial proceedings are scheduled to begin in November 1989.

Negotiations with the PRPs are under way for the operable unit RD/RA. Special Notice letters were sent out on October 13, 1988 to the five PRPs listed above. Negotiations are proceeding according to U.S. EPA's general guidance and policies. As discussed above, two of the PRPs have expressed a willingness to perform the RD/RA, and are the only PRPs to continue to attend these negotiations to date.

III. COMMUNITY RELATIONS

A RI/FS "kick-off" public meeting was held in September 1987, to inform the local residents of the Superfund process and the work to be conducted. Issues raised during the meeting, attended mostly by PRP agents and City officials, included the cost of the RI/FS, the estimated time to complete the study, and the number of previous studies performed for the site.

Information repositories have been established at Wausau City Hall, 407 Grant Street, and the Marathon County Public Library, 400 First Street, Wausau, Wisconsin. In accordance with section 113(k)(1) of CERCLA, the administrative record for the site is available to the public at these locations. The draft PFS and the proposed plan were available for public review and comment from October 3, 1988 to October 24, 1988. A public meeting was held on October 17, 1988 to discuss the findings of the Phase I RI and PFS, and to present the proposed plan. Two formal public comments were received during the public meeting and written comments were also received during the public comment period. All comments received during the comment period and U.S. EPA's responses are included in the attached responsiveness summary. The provisions of sections 113(k)(2)(i-v) and 117 of CERCLA relating to community relations have been satisfied.

IV. SCOPE OF OPERABLE UNIT

A contaminant plume, composed mainly of TCE, exists in the West Well Field and is being drawn toward CW6 due to pumpage. The apparent source area is located to the south, on or near current Marathon Electric property.

Until recently, CW6, which the City pumped directly into Bos Creek as waste (subsequently contaminating Bos Creek), served as a blocking well to the rest of the West Well Field. The discharge of CW6 to Bos Creek has resulted in a contaminated groundwater mound between the source area and CW6. The influence of the groundwater mound may not have fully penetrated the glacial outwash aquifer, but Phase I RI data suggest that the mound served effectively to divide the West Well Field contaminant plume into northern and southern portions, indicating that contaminant migration from the source area has been slowed.

In summer 1988 the City of Wausau placed CW6 back in service after completion of a transport pipe to carry contaminated water to the air stripper. Because of this, the pumping rate of CW6 has increased substantially, and the untreated discharge to Bos Creek has been discontinued. These two factors tend to increase the rate of migration from the source area toward CW6. Water from CW6 is treated for VOC removal using the existing air strippers at the water utility. However, if no further action is taken, CW6 will continue to serve as an interceptor well, providing the sole protection for the remaining wells in the West Well Field.

The scope of this operable unit is limited to the contaminant plume impacting the West Well Field and CW6. Ultimately, the solution to protecting the West Well Field will involve additional controls to prevent contaminants from migrating to the north from the source area. Due to the apparently slowed contaminant migration to the north caused by discharge of CW6 to Bos Creek, additional protection of the West Well Field is possible by preventing or limiting the extent of future contaminant movement to the north. Implementation of plume migration controls will effectively limit the time during which CW6 draws in contaminants, thereby also limiting the period during which water consumers are exposed to trace levels of contaminants.

An expedited operable unit remedial action is desirable from a public health standpoint. Taking action now rather than waiting for the final action will shorten the time required to achieve long-term protection of the water supply. This expedited operable unit remedial action is therefore considered to be consistent with achieving a final site remedy.

The PFS evaluated alternatives to address plume migration control in the West Well Field of the site. A discussion of remedial action objectives and goals, as well as a description and evaluation of alternatives developed, is included in Section VII of this document.

V. CURRENT SITE STATUS AND SITE CHARACTERISTICS

A. Current Site Status

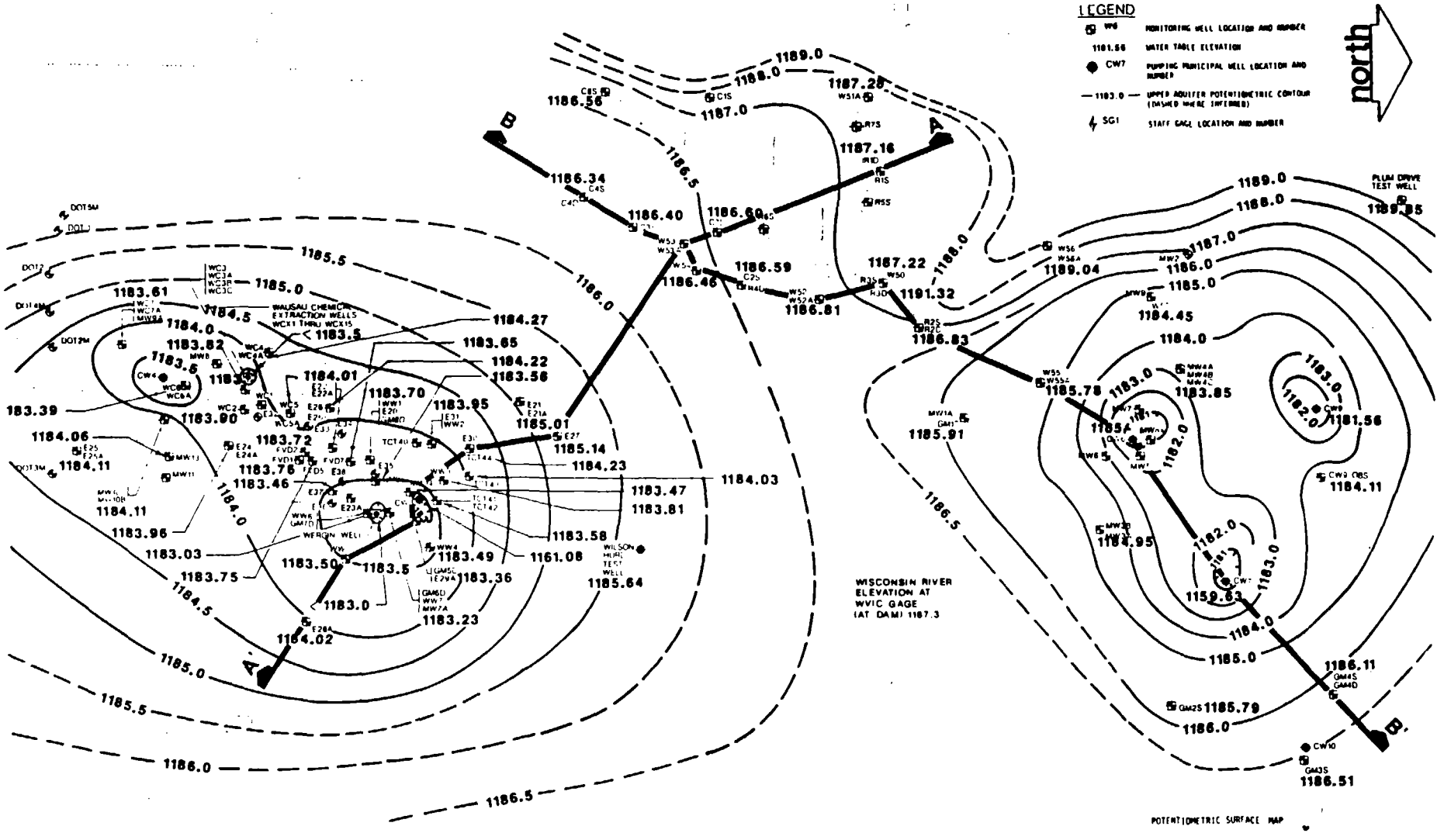
A RI/FS is currently being conducted for U.S. EPA by its contractor, Warzyn Engineering, Inc. The RI entailed two phases or field sampling events. Phase I of the RI field work was conducted from August through January 1988, results of which are summarized in the April 1988 technical memorandum. Phase II of the RI field work was conducted from June to September 1988. Results of this phase of work will be included in the RI report for the site which is currently being prepared. The final FS, which addresses remediation of the entire site, is under development. The PFS prepared for this operable unit remedial action addresses only a limited portion of the site, the West Well Field plume, and is discussed in detail later in this document. The PFS was completed in September 1988.

Currently being developed, the FS will detail the development and evaluation of an array of remedial action alternatives to address the entire Wausau Groundwater Contamination site and sources impacting it.

B. Site Characteristics

1. Hydrogeology

The City production wells are located within glacial outwash and alluvial sediments underlying and adjacent to the Wisconsin River. The aquifer is located within a bedrock valley which is underlain and laterally bounded by relatively impermeable igneous bedrock. Groundwater flow within the unconfined glacial aquifer has been drastically changed by the installation of the production wells. Under non-pumping conditions, groundwater flows toward the Wisconsin River and its tributaries (Bos Creek). Groundwater naturally discharges at the surface water bodies. However, under pumpage conditions, groundwater flows toward the production wells. The natural groundwater flow directions are frequently reversed due to City well pumping which induces recharge of surface water into the aquifer. The horizontal flow in the vicinity of the well field is indicated by the potentiometric contours shown in Figure 4.
The potentiometric surface map also indicates that the cone of depression from the East Well Field appears to affect groundwater flow below and to the west of the Wisconsin River. Monitoring well nests located at Marathon Electric indicate very slight downward gradients adjacent to the Wisconsin River. Below the Wisconsin River, the East Well Field production well pumpage has induced surface water recharge of the aquifer, causing flow downward through the river bed and toward CW3.
Aquifer hydraulic conductivity tests performed during the Phase I RI investigation indicated hydraulic conductivity values ranging from 1.7×10^{-4} cm/sec to 8.1×10^{-2} cm/sec. The overall average hydraulic conductivity of the outwash aquifer is approximately 2.2×10^{-2} cm/sec, based on test data at monitoring wells.



POTENTIOMETRIC SURFACE MAP

FIGURE 4

2. Chemical Characteristics

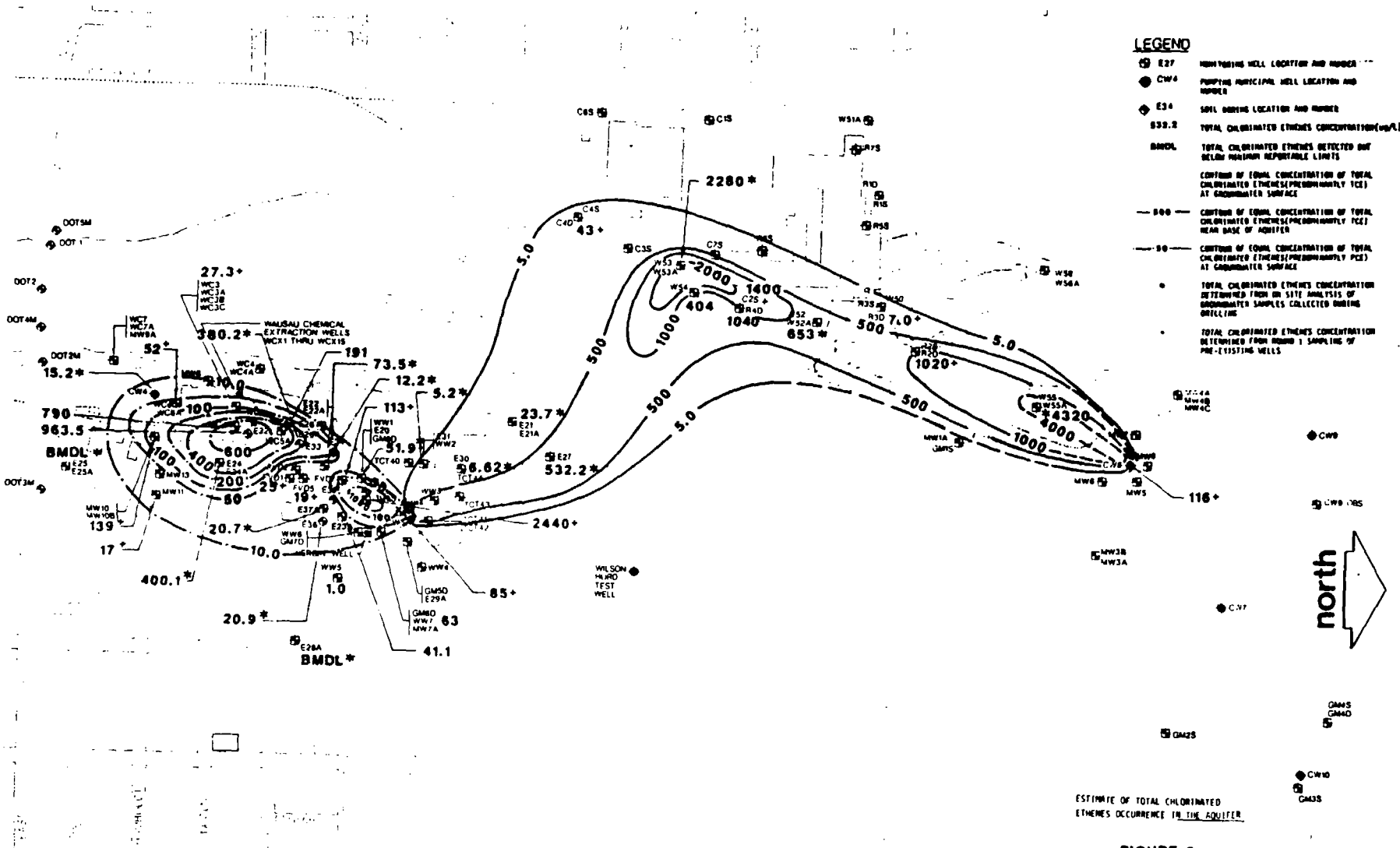
a. Groundwater Quality

Groundwater quality sampling conducted during the Phase I investigation has identified a vertical and lateral distribution of total chlorinated ethenes which suggest that a minimum of three sources are affecting the City well field. The estimated areal distribution of total chlorinated ethenes is shown on Figure 5. The distribution is based on a combination of data obtained from laboratory VOC analyses of Round 1 groundwater samples (October 1987) and field laboratory analyses of groundwater samples collected during drilling (October and November 1987).

West side monitoring wells appear to delineate a deep (greater than 100 foot) north-south trending TCE plume. Based on the vertical distribution of TCE throughout the aquifer in the vicinity of the old City landfill and the presence of TCE in the unsaturated zone in this area, a source appears to be located within the northern portion of the former City (of Wausau) Landfill. The plume appears to have migrated northward, under influence of pumpage from CW6. The highest TCE concentration (4200 ug/L) within this plume was detected approximately 550 feet south of CW6.

TCE was also observed in the shallow aquifer between Bos Creek and CW6. This plume is shown on Figure 5 by the lightly screened contours between Bos Creek and CW6. The shallow aquifer TCE contamination appears to result from the induced infiltration of surface water from Bos Creek, which has been contaminated by the discharge from CW6. The induced surface water recharge of the aquifer is evident from the downward vertical gradients at monitoring well nests in that area. Based on laboratory analyses of samples collected during October 1987, TCE concentrations adjacent to the CW6 discharge were above 100 ug/L. TCE concentrations in the ponded area downstream were approximately 70 ug/L. TCE was not detected in surface water samples collected upstream of the CW6 discharge, nor was it detected at the point of discharge of Bos Creek to the Wisconsin River.

The distribution of TCE in monitoring wells located between the Wisconsin River and CW3 suggest eastward migration of a deep TCE plume below the Wisconsin River from the vicinity of the former City Landfill (refer to Figure 5). TCE appears to be vertically distributed throughout the aquifer in the vicinity of the old City landfill, indicating close proximity to the source area. Slight vertical downward gradients were observed in monitoring wells in the area. The highest concentrations of TCE were detected at a depth of approximately 115 feet. After moving into the deeper portion of the aquifer, a portion of the plume appears to migrate eastward under the influence of pumpage from CW3 (refer to Figure 4). A part of the plume has also been captured by the pumpage from CW6 and appears to migrate northward under the influence of this well. The TCE-contaminated portion of the aquifer appears to be less than 20 feet thick and is laterally restricted to a relatively narrow flow path into the production wells. Since CW6 produces water nearly equally from all



ESTIMATE OF TOTAL CHLORINATED ETHENES OCCURRENCE IN THE AQUIFER

FIGURE 5

sides of the 50 foot screened interval, the resulting dilution factor appears to range from 15 to 25. Thus, concentrations observed at the supply well are likely to be 15 to 25 times less than actual in plume concentration.

b. Source Location

The predominant source of TCE contamination to CW6 and CW3 appears to be the Marathon Electric/Former City Landfill area. Elevated concentrations of TCE were detected in groundwater, soil, and soil gas samples obtained from the northern portion of the landfill. Soil gas concentrations within the landfill range from below minimum detection limits (1.0 ug/L) to approximately 82 ug/L. Soil samples obtained from boring in the vicinity of the landfill contain concentrations of approximately 200 ug/kg. Groundwater samples obtained from the water table in the vicinity of the landfill indicate TCE concentrations ranging from 16 ug/L to approximately 1900 ug/L. Also detected in the vicinity of the landfill were 1,1,1-trichloroethane (TCA), 1,2-dichloroethene (1,2-DCE), chloroform, and carbon tetrachloride at concentrations generally below 100 ug/L. Potential sources within the landfill were investigated in greater detail during the Phase II RI, and will be evaluated during the final FS.

VI. SUMMARY OF SITE RISKS

The risks associated with the West Well Field contaminant plume have been evaluated in the PFS for this operable unit. This effort entailed identification of contaminants, routes of migration of populations exposed to the contaminants associated with the West Well Field. This information was then used to estimate health risks based on exposure levels and toxicologic data of the contaminants. The final FS will contain a comprehensive assessment of risk for the entire site.

The predominant contaminant identified in the groundwater in the West Well Field is TCE. The exposure pathway of concern is the City's water supply. The City water distribution system supplies potable water, derived exclusively from the Wausau groundwater source aquifer, to approximately 33,000 residents. Routes of exposure to residents through contaminated groundwater include ingestion via drinking and cooking, as well as inhalation and dermal exposure while bathing. During the period of 1982 through mid-1984, prior to pumping CW6 directly into Bos Creek and the installation of the VOC strippers, levels of TCE sampled at various drinking water taps throughout the water distribution system ranged from approximately 10 to 100 ug/L. PCE and DCE were periodically detected, but usually below minimum detectable limits. Presently, the City treats water from CW6 prior to distribution using an air stripper. Monitoring in the distribution system indicates undetectable levels of TCE (detection limit 0.5 ug/L).

Because TCE is the predominant contaminant present, it was identified as the indicator contaminant, or contaminant of concern, for the West Well Field. The toxicological effects of TCE, including acute exposure, subchronic exposure, and carcinogenic risk, were evaluated.

Based on undetectable levels of TCE present in the treated water within the City water distribution system, the short-term carcinogenic risks to health associated with TCE contamination would appear to be minimal under current water usage practices. The long-term cancer risk associated with City water use is more difficult to quantify. The U.S. EPA has set a Maximum Contaminant Level (MCL) of 5 ug TCE/L of drinking water. MCLs are enforceable standards promulgated under the Safe Drinking Water Act. Because TCE is carcinogenic and is not considered to be without hazard below a given threshhold, the U.S. EPA has set a non-enforceable Maximum Contaminant Level Goal (MCLG) of zero for TCE in drinking water.

Protection of residents from exposure to TCE is dependent on adequate treatment of the water. The potential for exposure exists in that failure of the treatment system could result in an exposure pathway through the City's drinking water. In addition, if CW6 was turned off, the TCE contaminant plume would migrate north, impacting the remaining clean wells, CW7 and CW9, in the City well field.

Based on the possibility of failure of CW6 and/or the air strippers, a potential future risk of exposure to TCE via drinking water ingestion exists at the site. Therefore, plume migration control to mitigate future risks is considered a prudent response action to address site risks. This action will mitigate potential long-term risks from migration of contaminants in water and will be consistent with the final remedy for the site.

VII. DESCRIPTION OF ALTERNATIVES

A. Response Objectives

The phased feasibility study was initiated to evaluate alternatives for remediation of the West Well Field contaminant plume. Based on the risk assessment, two primary site-specific response objectives were identified; 1) protection from long-term exposure to low levels of TCE from ingestion of drinking water; and, 2) protection from future increased levels of contaminants to the West Well Field.

A variety of technologies to address response objectives were identified for further consideration. From these, four alternatives were developed and subjected to detailed analysis using the nine evaluation criteria developed under the Superfund Amendments and Reauthorization Act (SARA). Table 2 lists the four alternatives.

TABLE 2

REMEDIAL ACTION ALTERNATIVES

Alternative 1	No Action
Alternative 2	Extraction well located north of Bos Creek, with packed tower stripping and discharge to the Wisconsin River.
Alternative 3	Extraction well located south of Bos Creek near the source area, with packed tower stripping and discharge to the Wisconsin River.
Alternative 4	A combination of Alternatives 2 and 3.

B. Treatment

Groundwater treatment was incorporated into each of the alternatives, (except No Action) as a result of technology-based effluent limit requirements. Section 301(b)(2) of the Clean Water Act and federal regulations (40 CFR 122.44(a)) require the consideration and use of the Best Available Technology (BAT) that is economically achievable for treating water prior to discharge. Corresponding State requirements are found in section 147.04, Wisconsin Statutes and Chapters NR 215 and 217, of the Wisconsin Administrative Code.

The maximum observed in-plume contamination concentrations are lower than either acute or available chronic toxicity values for effluent limits for discharge to surface waters. Extraction wells would exert a hydraulic influence radially and throughout the saturated thickness of the aquifer, drawing in both uncontaminated and contaminated groundwater, thereby lowering contaminant concentrations in extracted water (relative to in-plume concentrations) as a result of dilution. Treatment would therefore not be required as a result of water quality-based effluent limits.

The acute and chronic toxicity numbers listed in Table 3 (below) for the three major west side plume contaminants are currently being considered by the Wisconsin DNR in determining effluent limits for discharge to surface waters. The numbers are being used pending promulgation of new Wisconsin Administrative Code chapters regulating the discharge of toxic substances.

TABLE 3

Water Quality Effluent Limits for Surface Water Discharge

Compound	Acute	Chronic	Max. Observed
	ug/L		
trans-1,2-Dichloroethene (DCE)	13,500	Not Avail.	641
Trichloroethene (TCE)	5,200	Not Avail.	3,200
Tetrachloroethene (PCE)	528	84	55

The acute toxicity values are essentially end-of-pipe effluent limits, because these values are not to be exceeded within the mixing zone. The chronic toxicity values are not to be exceeded in the stream after mixing. To calculate allowable effluent limits based on chronic toxicity, a mass balance is performed using upstream, discharge, and downstream flow rates and concentrations.

Groundwater treatment required under the Clean Water Act is determined on a case-by-case basis pursuant to section 402(a)(1), using the guidelines of 40 CFR 125.3. Some flexibility is allowed in determining appropriate treatment technology in a particular application. The final determination regarding specific technologies will be made by WDNR during the design phase. The treatment system choice requires justification based on literature data and/or bench or pilot scale testing that demonstrates effective performance.

The treatment technology used for the purposes of alternative evaluation and development of cost estimates in the PFS is air stripping utilizing a packed tower stripper. Air stripping is effective for the types of contaminants in the groundwater at this site. However, a BAT-equivalent treatment could be provided by a passive VOC stripping system, and its use will be evaluated as BAT by the WDNR during the design phase of the remedy.

C. Alternatives

Alternative 1 - No Action

Under this alternative, no response action would be taken at this time to protect the uncontaminated municipal wells in the West Well Field or to reduce the amount of time that CW6 draws in contaminants.

Production Well CW6 is now on line as a water supply well. The discharge to Bos Creek has been halted. Based on communications with water utility representatives, CW6 will be pumped nearly continuously at a rate of

approximately 1600 gpm during the high-demand summer months and possibly at a lower rate during other times of the year. Contaminants will continue to be drawn to the north under the influence of CW6 pumpage. Water from Production Well CW6 is being treated at the water utility for VOC removal using an existing stripping tower.

Figure 6a shows a simulated piezometric head contour map for the No Action alternative under summertime pumping conditions of 11 cubic feet per second (cfs) total flow. A piezometric surface divide trending northeast to southwest would be created. This divide would extend from the southern portion of Marathon Electric toward Gilbert Park to the northeast. The apparent source area located on Marathon Electric property is located on the divide. The influence of the West Well Field pumping wells extends to the source area. Contaminants would be drawn to the north from the source area into the West Well Field. Under these conditions, CW6 would function as an interceptor well, capturing contaminants drawn toward the West Well Field. Both the deep and shallow contaminant plumes (see Figure 5) are within the zone of influence of CW6. Without any other controls, this situation would continue until the west side contaminant plume has been effectively purged from the aquifer by production well pumping.

Comparison of Figures 7a and 7b shows the effect of taking CW6 off line. Figure 7a reflects the same conditions discussed above. Figure 7b shows simulated piezometric head contours with CW6 off and the total summer production well pumpage of 11 cfs maintained. The piezometric surface divide is shifted slightly to the north, reflecting a relatively greater influence of West Well Field production wells. The source area and west side plumes would be within the zone of influence of CW7 and CW9.

If CW6 ceased pumping, contaminants would be expected to migrate further north under the influence of CW7 and CW9 pumpage. There would be no provision for protecting uncontaminated CW7 and CW9 in the event of a failure that results in substantial down time for CW6.

Applicable or relevant and appropriate requirements (ARARs) for the No Action alternative are summarized in Table 4. The only ARARs identified are federal drinking water standards and Wisconsin Chapter NR 140 standards and requirements. Drinking water MCLs can be met as a result of VOC removal at the water treatment plant.

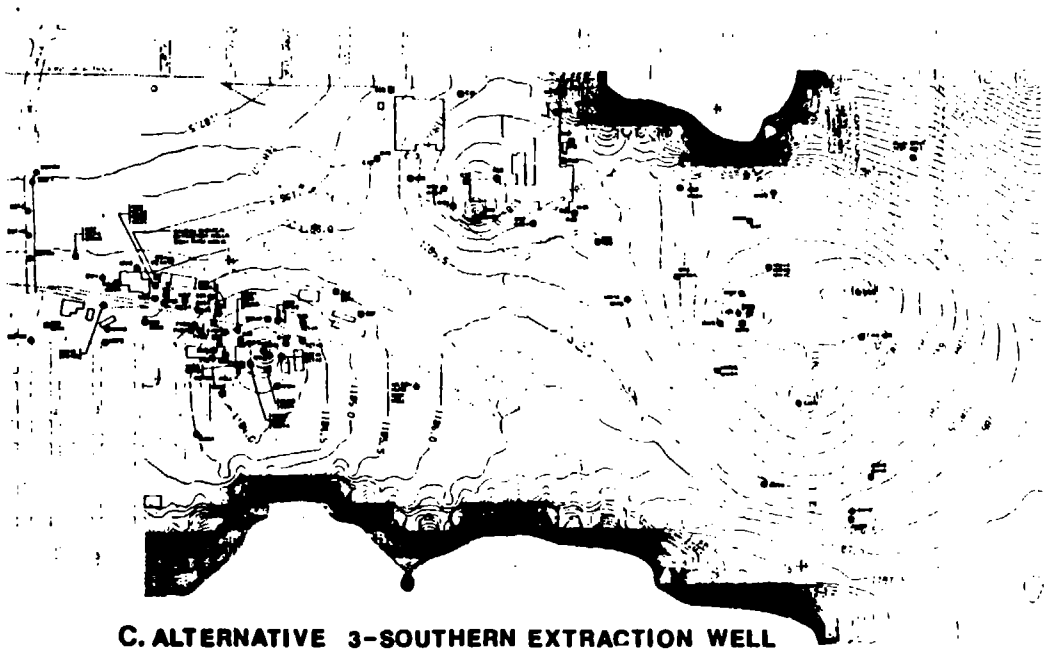
Under the No Action alternative, there would be no time associated with implementation however, the time during which water consumers would be exposed to trace (less than detectable) levels of contaminants in drinking water would be maximized. A single City water supply well (CW6) would be relied on to draw contaminants from the source area and from the aquifer on the west side, preventing further northward contaminant migration to other west well field water supply wells.

There is no cost or operation and maintenance (O&M) associated with the No Action Alternative. Annual costs to operate the present air stripper were not considered as O&M under this alternative.

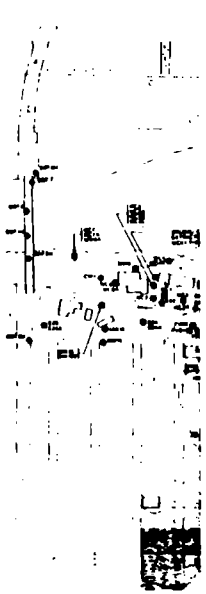
SIMULATED PIEZOMETRIC HEAD MAPS:
ALTERNATIVES 1 THRU 4

A. ALTERNATIVE 1-NO ACTION

B. ALTE

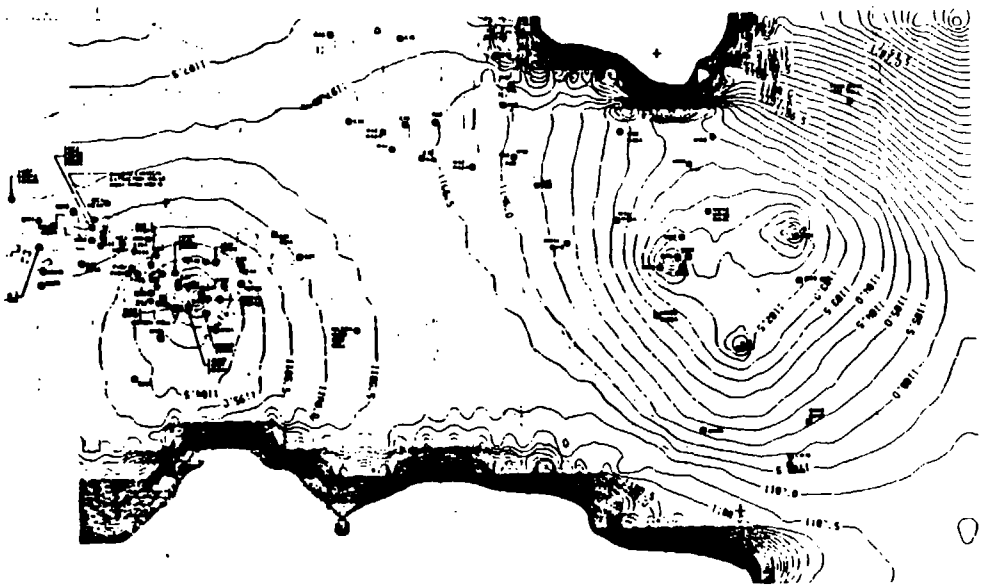


C. ALTERNATIVE 3-SOUTHERN EXTRACTION WELL



D. ALTERNATIVE 4

SIMULATED PIEZOMETRIC HEAD MAPS EFFECT OF PRODUCTION WELL CW6 PUMPING



A. ALTERNATIVE 1-NO ACTION

north

B. ALTERNATIVE 1-NO ACTION (WELL CW6 OFF-LINE)

LEGEND

- MW MONITORING WELL LOCATION AND NUMBER
- CW4 PUMPING MUNICIPAL WELL LOCATION AND NUMBER
- B34 SOIL BORING LOCATION AND NUMBER
- SIMULATED HEAD CONTOUR

FIGURE 7

TABLE 4

ARARS: ALTERNATIVE 1 - NO ACTION
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Regulatory Requirement	Comment
	CHEMICAL-SPECIFIC ARARs
Safe Drinking Water Act; 40 CFR 141; NR 109 WAC	Drinking water MCLs and corresponding State standards for health-related compounds are relevant and appropriate as goals for cleaning up a public water supply source aquifer.
	LOCATION-SPECIFIC ARARs
No location-specific ARARs were identified for the No Action alternative.	
	ACTION-SPECIFIC ARARs
No action-specific ARARs were identified for the No Action alternative.	

Alternative 2 - Extraction Well North of Bos Creek

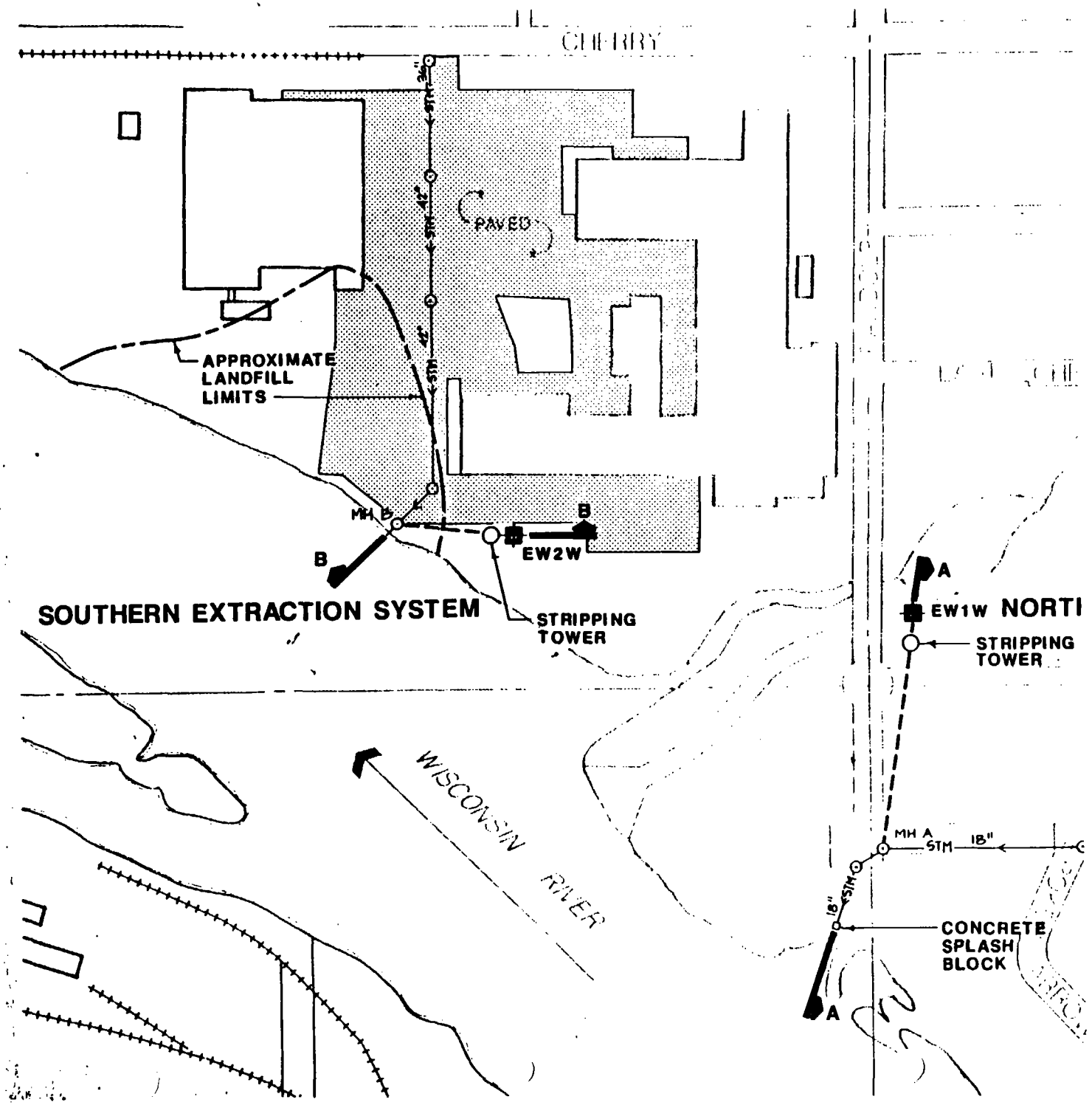
Alternative 2 involves installation of a groundwater extraction well north of Bos Creek and south of CW6. Groundwater would be treated and discharged to the Wisconsin River.

The extraction well would be located in the vicinity of Schofield Park on a City-owned parcel at the northwest corner of the intersection of Randolph and Burek Streets (See Figure 8). This places the well near the apparent center of the contaminant plume which would be the most effective location. The well would serve to remove contaminants from the northern portion of the TCE plume, and would draw in and intercept contaminants from the south. Based on information gathered to date, the plume is estimated to be approximately 500 feet wide and 20 feet thick in that area, and it appears to be within approximately 50 feet of the bedrock base of the aquifer. A deep well would therefore be used.

Groundwater flow model results indicate a groundwater piezometric surface divide would be created between the extraction well and CW6 (see Figure 6b). The divide would be located between Burns and Randolph Streets. Contaminants located north of the divide would migrate toward CW6, and contaminants located south of the divide would migrate to the extraction well. The influence of the extraction well also extends south to include the apparent source area. The extraction well would therefore draw in contaminants from the source area.

A conceptual system layout for the northern extraction, treatment, and discharge system is illustrated on Figure 8. A well and pump house are located on City-owned property near the intersection of Randolph and Burek Street. Section A-A' (Figure 9) shows that a 130 foot well with a 40 foot long, 20 inch diameter screen would be constructed. A small pump house would be constructed at the well head to protect the well head, motor starter and controls, and above ground piping. Above ground piping would incorporate a check valve, flow control valve, sampling tap and totalizer flow. A package tower stripper incorporating an above-ground discharge slump would be located on a concrete pad next to the well house. The tower pad would be surrounded by a chain link fence with a locking gate. For a 1500 gpm design flow and a stripping factor of 0.2, a 7 foot diameter tower with 15 feet of 3.5 inch nominal size polyethylene Pall ring packing would provide an estimated 85% removal of TCE. Treated effluent would flow by gravity to the discharge line and ultimately to an out-fall at the Wisconsin River shoreline. The BAT requirement will be determined by the WDNR during the design phase of the project.

ARARs for Alternative 2 are summarized in Table 5. The action would comply with NR 140 requirements. In general, the highest contaminant concentrations observed in the west side plume are less than effluent limits (5.2 mg/L for TCE) established by the WDNR, so water quality-based requirements can be satisfied. Technology-based effluent limits can be satisfied with the VOC stripping technology.


CHERRY
PAVED
APPROXIMATE LANDFILL LIMITS
MH B
B
B
EW2W
SOUTHERN EXTRACTION SYSTEM
STRIPPING TOWER
A
EW1W NORTI
STRIPPING TOWER
WISCONSIN RIVER
MH A
STM
18"
CONCRETE SPLASH BLOCK
A

NORTHERN EXTRACTION SYSTEM
SECTION A-A

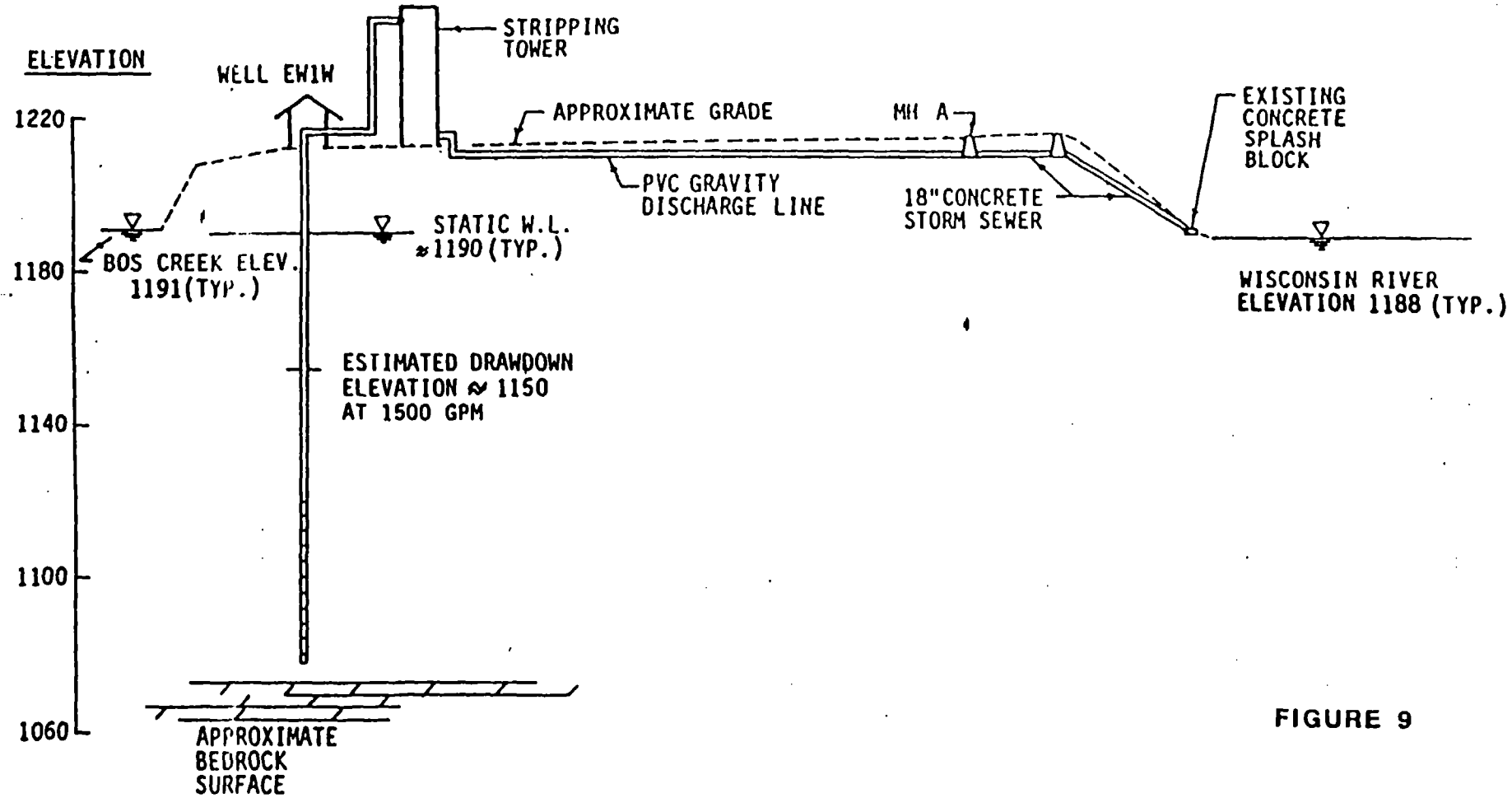


FIGURE 9

CROSS SECTION SCALE:(APPROX.)
VERTICAL: 1" = 40'
HORIZONTAL: 1" = 100'

TABLE 5

ARARS: ACTION ALTERNATIVES 2, 3, AND 4
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Regulatory Requirement	Comment
	CHEMICAL-SPECIFIC ARARs
NR 140 WAC	Groundwater Quality Standards are applicable. RI/FS process is considered to satisfy substantive requirements for investigation, analysis and consideration of appropriate response actions.
Clean Water Act	General requirement for regulating discharges to surface water are applicable. Federal AWQC are ARARS, state numbers are more stringent.
NR 102 WAC NR 104 WAC	Interim numbers used in establishing effluent limits for toxics are to be considered (TBC).
Safe Drinking Water Act; 40 CRF 141; NR 109 WAC	Drinking water MCLs and corresponding State standards are relevant and appropriate as goals for cleaning up a public water supply source aquifer.
	LOCATION-SPECIFIC ARARs
Chapter 30 Statutes; NR 115-117 WAC	May be applied although proposed facilities do not appear to lie within regional floodway or floodway fringe.
	ACTION-SPECIFIC ARARs
CWA Section 301; 40 CFR 122; Chapter 147.04 Statutes	Technology-based effluent limits are applicable.
NR 112 WAC	Applicable to extraction wells.
NR 200 WAC NR 217 WAC	Requirement for application for discharge permit and State review may be applicable. Requirement for permit may be waived under CERCLA on-site action exemption. Monitoring and reporting requirements may be applicable.
NR 219 WAC	Sampling and testing methods would be applicable for monitoring.
ILHR 81-84 WAC ILHR 50-53 WAC IND 1, 6 WAC	Applicable to system piping. Applicable to pump house. Applicable to construction phase for worker safety.

Probable costs of Alternative 2 are summarized in Table 6. Major capital cost items include the extraction well, pump house, stripping tower and foundation, controls and utilities, piping and piping appurtenances. Major operation and maintenance cost item include energy costs, sampling and monitoring, analytical laboratory, routine systems inspection and maintenance, and reporting. Capital costs are estimated to be $432,000. The first-year operation and maintenance costs are estimated to be $105,000, and annual operation and maintenance costs for subsequent years are estimated to be $82,000. The five-year present net worth (10% discount rate) associated with the above costs is $760,000.

Response objectives would begin to be met shortly after the well begins pumping. Contaminants not captured by the system would be drawn to CW6, and contaminated water would be treated at the City water treatment plant to meet drinking water MCLs. A design and construction period of less than six months is considered realistic for this action. Risk to water consumers are minimized by the time it takes for CW6 to draw in contaminants presently situated beyond the northern extent of influence of the extraction well.

Implementation of this alternative is not expected to be a problem. The technology is readily available, conventional, and well demonstrated. Construction is straight forward and no unusual features are anticipated to be required for the system. Coordination between U.S. EPA and the City of Wausau will be required to accomplish implementation of the system.

Alternative 3 - Extraction Well South of Bos Creek

Under Alternative 3, a groundwater extraction well would be constructed south of Bos Creek. Groundwater would be extracted, treated and discharged to the Wisconsin River.

The extraction well would be located near the center of the southern portion of the plume and north of the apparent TCE source area. A location near the southeast corner of the eastern-most Marathon Electric Company building would be suitable, based on available information (See Figure 8). The plume appears to be relatively wide in this area, and contamination has been observed throughout most of the 130 foot saturated thickness of the aquifer (See Figure 5). The concentration of chlorinated ethenes (primarily TCE) ranges from approximately 500 ug/L to 2,000 ug/L in this area, based on Phase I RI results. A deep well would be used to remove contaminants from the southern portion of the plume, and draw some contaminants back to the south, away from CW6.

Groundwater flow modeling was conducted to evaluate the effects of pumping from the southern extraction well. Modeling results indicate that a divide in the groundwater piezometric surface would be created between the extraction well and CW6. Figure 6c shows that a divide trending from west-northwest to east-southeast would be located in the vicinity of Bos Creek and Randolph Street. Contaminants located in

TABLE 6
SUMMARY OF PROBABLE COSTS: ALTERNATIVE 2
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

CAPITAL COSTS

Item	Cost
Extraction Well	$55,000
Well House and Utilities	$14,000
Well House Piping and Appurtenances	$10,000
Discharge System	$19,000
Stripping Tower, Foundation, Appurtenances	$150,000
Capital Facilities Subtotal	$248,000
Engineering Design (25%)	$62,000
Contract Administration (10%)	$25,000
Legal and Administrative (10%)	$25,000
Capital Subtotal	$360,000
Contingencies (20%)	$ 72,000
Capital Total	$432,000

ANNUAL OPERATION AND MAINTENANCE COSTS

	First Year	Subsequent Years
Water Levels	$ 4,500	$ 3,600
Water Quality	$26,000	$ 8,200
Flow Monitoring	$ 2,700	$ 2,700
Energy	$42,000	$42,000
General O&M Labor	$ 6,000	$ 6,000
Reporting	$ 3,000	$ 3,000
Administration	$ 3,000	$ 3,000
O&M Subtotal	$87,200	$68,500
Contingencies (20%)	$17,400	$13,500
O&M Total	$104,600	$82,000

FIVE-YEAR PRESENT WORTH

Present Worth of Capital (10% discount rate)	$430,000
Present Worth of O & M (10% discount rate)	$330,000
Present Worth Total	$760,000

roughly the northern one-half of the west side contaminant plume would migrate toward CW6. Contaminants located south of the contaminant plume would be drawn to the extraction well. Figure 6c shows that a second divide is located beneath the Wisconsin River. Contaminants near the source area would be prevented from migrating away from the source to the east or north. An extraction well at this location accomplishes control of contaminant migration away from the source to both the east and west well fields, while capturing a large portion of the west side contaminant plume.

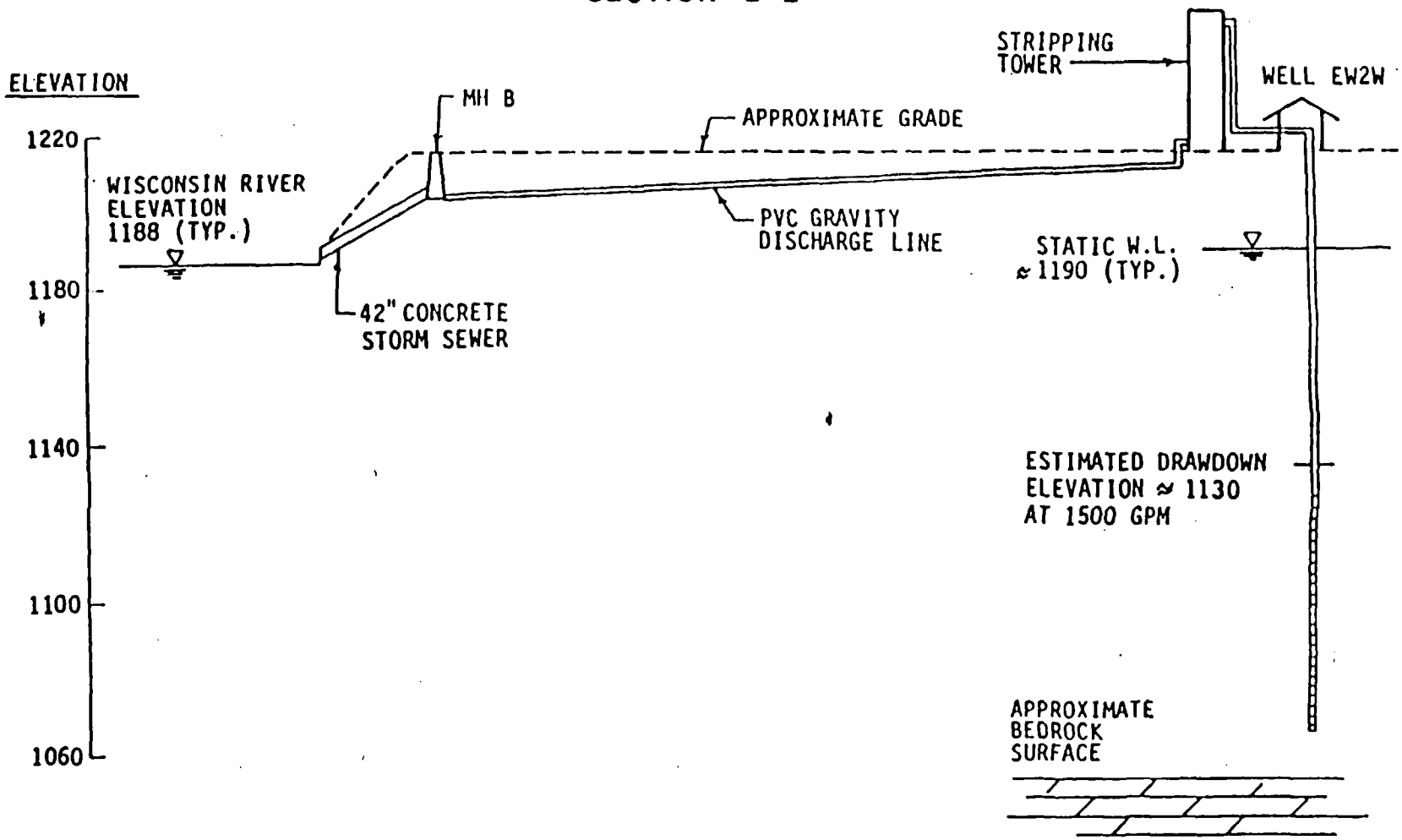
A conceptual system layout for the southern groundwater extraction and discharge system is shown of Figure 8. A well and pump house are located on Marathon Electric property east and slightly north of the southeast corner of the Marathon Electric manufacturing building. Section B-B' (Figure 10) shows that a 150 foot, 16 inch diameter well with a 60 foot screen would be constructed. A small pump house would be constructed at the well head and a stripping tower would be provided. Approximately 220 feet of buried gravity discharge piping would then extend south across Marathon Electric property to an existing storm sewer manhole. A 42-inch storm sewer drops from the manhole to an out fall at the Wisconsin River shoreline.

ARARs for Alternative 3 are summarized in Table 5. The action would comply with NR 140 requirements. State groundwater quality standards apply to the alternative. Drinking water standards (MCLs) for VOCs can be achieved by treatment of water from CW6 at the City water treatment plant. The highest contaminant concentrations observed in the west side contaminant plume are less than effluent limits, so water quality-based effluent limits can be satisfied. Technology-based effluent limits can be satisfied with the VOC stripping technology. The BAT requirement will be determined by the WDNR during the design phase of the project.

Probable costs for Alternative 3 are summarized in Table 7. Major capital cost items include the extraction well, pump house, stripping tower and foundation, controls and utilities, trenching, piping and piping appurtenances. Major operation and maintenance cost items include energy costs, sampling and monitoring, analytical laboratory services, routine systems inspection and maintenance, and reporting. Capital costs are estimated to be $422,000. The first year operation and maintenance costs are estimated to be $105,000 and annual operation and maintenance costs for subsequent years are estimated to be $81,000. The five-year present net worth (10% discount rate) associated with the above costs is $750,000.

Response objectives would begin to be met shortly after extraction well pumping begins. A design and construction period of less than six months is considered realistic for this action. The time until long-term protection is achieved depends on the time required for CW6 to draw in contaminants from the northern half of the west side contaminant plume and from the shallow groundwater plume caused by the discharge of CW6 into Bos Creek.

SOUTHERN EXTRACTION SYSTEM
SECTION B-B



CROSS SECTION SCALE:(APPROX.)
VERTICAL: 1" = 40'
HORIZONTAL: 1" = 40'

FIGURE 10

TABLE 7
SUMMARY OF PROBABLE COSTS: ALTERNATIVE 3
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

CAPITAL COSTS

Item	Cost
Extraction Well	$57,000
Well House and Utilities	$14,000
Well House Piping and Appurtenances	$10,000
Discharge System	$12,000
Stripping Tower, Foundation, Appurtenances	$150,000
Capital Facilities Subtotal	$243,000
Engineering Design (25%)	$61,000
Contract Administration (10%)	$24,000
Legal and Administrative (10%)	$24,000
Capital Subtotal	$352,000
Contingencies (20%)	$ 70,000
Capital Total	$422,000

ANNUAL OPERATION AND MAINTENANCE COSTS

	First Year	Subsequent Years
Water Levels	$ 4,500	$ 3,600
Water Quality	$26,000	$ 8,200
Flow Monitoring	$ 2,700	$ 2,700
Energy	$42,000	$42,000
General O&M Labor	$ 6,000	$ 6,000
Reporting	$ 3,000	$ 2,400
Administration	$ 3,000	$ 2,400
O&M Subtotal	$87,200	$67,300
Contingencies (20%)	$17,400	$13,500
O&M Total	$104,600	$80,800

FIVE-YEAR PRESENT WORTH

Present Worth of Capital (10% discount rate)	$420,000
Present Worth of O & M (10% discount rate)	$330,000
Present Worth Total	$750,000

Implementation of this alternative is not expected to be a problem. The technology is readily available, conventional, and well demonstrated. Construction is straight forward and no unusual features are anticipated to be required for the system. Coordination between U.S. EPA, WDNR, the City of Wausau, and Marathon Electric Company will be required to accomplish implementation of the system.

Alternative 4 - Extraction Wells North and South of Bos Creek

Alternative 4 is essentially a combination of Alternatives 2 and 3. Two extraction wells would be used: one north and one south of Bos Creek. This system would provide plume capture to the north, and source area groundwater removal to the south. Extracted groundwater would be treated at each location and discharged to the Wisconsin River.

Groundwater flow modeling was conducted to evaluate the effects of pumping simultaneously from the northern and southern extraction wells. Well locations are shown on Figure 8. Groundwater flow modeling results indicate two divides in the groundwater piezometric surface would be created in the west side contaminant plume area. One divide would be located between the northern extraction well and CW6, and a second divide would be located between the northern and southern extraction wells. Figure 6d shows the locations of the divides. The northern divide runs approximately east-west and is located between Randolph and Burns streets.

Plume capture would be accomplished such that contaminants in the northern one-third of the plume would be drawn in by CW6. Contaminants in the central portion of the deep west side plume would be captured by the northern extraction well. A portion of the shallow contaminant plume would also be drawn in by this well. Contaminants near the source area and southern portion of the deep west side plume would be captured by the southern extraction well.

As shown on Figure 6d, a large southwest to northeast trending divide in the piezometric surface is located beneath the Wisconsin River. This indicates the extraction system would be effective in controlling the potential migrating of contaminants to the East Well Field.
Comparison of Figures 7c and 7d shows the effect of a shutdown of CW6 for Alternative 4. Figure 7c shows a piezometric surface contour map for the Alternative 4 system with CW3, CW6, CW7, and CW9 pumping at a combined rate of 1437 gpm (11 cfs). Figure 9d shows a corresponding map for Alternative 4 with CW6 off-line and CW3, CW4, CW7, and CW9 pumping at the combined rate of 1437 gpm. With CW6 off-line, the northern extent of influence of the extraction system is shifted a few hundred feet to the north, as indicated by the east-west divide located slightly south of Burns Street. Contaminants located north of this divide would be drawn toward CW7 and CW9.

Conceptual system layouts for the groundwater extraction, treatment, and discharge system are shown on Figure 8. The cross section for the two

TABLE 8
SUMMARY OF PROBABLE COSTS: ALTERNATIVE 4
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

CAPITAL COSTS

Item	Cost
Extraction Wells	$112,000
Well Houses and Utilities	$28,000
Well House Piping and Appurtenances	$20,000
Discharge Systems	$30,000
Stripping Towers, Foundations, Appurtenances	$300,000
Capital Facilities Subtotal	$490,000
Engineering Design (25%)	$123,000
Contract Administration (10%)	$49,000
Legal and Administrative (10%)	$49,000
Capital Subtotal	$711,000
Contingencies (20%)	$142,000
Capital Total	$853,000

ANNUAL OPERATION AND MAINTENANCE COSTS

	First Year	Subsequent Years
Water Levels	$ 4,500	$ 3,600
Water Quality	$ 32,000	$ 10,000
Flow Monitoring	$ 3,500	$ 3,500
Energy	$ 84,000	$ 84,000
General O&M Labor	$ 11,000	$ 11,000
Reporting	$ 3,000	$ 2,400
Administration	$ 3,000	$ 2,400
O&M Subtotal	$141,000	$117,000
Contingencies (20%)	$28,000	$ 23,000
O&M Total	$169,000	$140,000

FIVE-YEAR PRESENT WORTH

Present Worth of Capital (10% discount rate)	$ 850,000
Present Worth of O & M (10% discount rate)	$ 550,000
Present Worth Total	$1,400,000

systems are shown on Figures 9 and 10. The details of each system have been discussed previously.

Response objectives would be met shortly after the wells begin pumping. Contaminants not captured by the system would be drawn into CW6.

A design and construction period of less than six months is considered realistic for this action. The time until risks to water consumers are minimized would be the time required for CW6 to draw in contaminants in the plume beyond the influence of the northern extraction well.

ARARs for Alternative 4 are summarized in Table 5. The action will comply with NR 140 requirements. State groundwater quality standards apply to the alternative. Drinking water standards can be met (MCLs) for VOCs by treatment at the City water treatment plant. The highest contaminant concentrations observed in the west side plume are less than effluent limits, so water quality-based effluent limits can be satisfied. Technology-based effluent limits can be satisfied with the VOC stripping technology. The BAT requirement will be determined by the WDNR during the design phase of the project.

Probable costs for Alternative 4 are summarized in Table 8. Major capital cost items include the extraction wells, pump houses, stripping tower and foundation, control systems and utilities, trenching, and piping. Major O&M items include energy costs, sampling and monitoring, analytical laboratory services, routine systems inspection and maintenance, and reporting. Capital costs are estimated to be $853,000. The first year operation and maintenance costs are estimated to be $169,000, and annual operation and maintenance costs for subsequent years are estimated to be $140,000. The five-year present net worth (10% discount rate) associated with the above costs is $1,400,000.

As with Alternatives 2 and 3, implementation is not expected to be a problem. Technologies are readily available and well demonstrated. Coordination between U.S. EPA, WDNR, the City of Wausau, and Marathon Electric would be required to implement the system.

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In order to determine the most appropriate alternative that is protective of human health and the environment, attains ARARs, is cost-effective, and utilizes permanent solutions and treatment technologies to the maximum extent practicable, alternatives were evaluated against each other. Comparisons were based on the nine evaluation criteria outlined in SARA. A summary of the comparison is provided in Table 9. Following is a discussion of each of the criteria and the alternatives' performance against each of these.

TABLE 9

SUMMARY OF ALTERNATIVES EVALUATION
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Evaluation Factor	Alternative 1 No Action	Alternative 2 Northern Extraction Well	Alternative 3 Southern Extraction Well	Alternative 4 North and South Extraction Well
Short-Term Effectiveness	No additional protection of community and workers is required.	Risk to workers during implementation addressed by standard personal protection. Risks to community considered minimal. Production Well CW6 draws in contaminants from northern one-third of west side plume. VOC removal at water treatment plant provides protection of water consumers.	Risk to workers during implementation addressed by standard personal protection. Risks to community considered minimal. Production Well CW6 draws in contaminants from northern one-half of west side plume. VOC removal at water plant provides protection of water consumers.	Risks to workers during implementation addressed by standard personal protection. Risks to community considered minimal. Production Well CW6 draws in contaminants from northern one-third of west side plume. VOC removal at water plant provides protection of water consumers.
	Production Well CW6 draws in contaminants from west side plume indefinitely.			
	VOC removal at water treatment plant provides protection of water consumers.			
	Period of exposure to trace contaminants in treated water from west side plume is longest.	Period of exposure to trace contaminants in treated water is shortest similar to Alternative 4).	Period of exposure to trace contaminants slightly longer than Alternatives 2 or 4.	Period of exposure to trace/contaminants in treated water is shortest (similar to Alternative 2).
	Requires longest time for purging aquifer due to lack of active remediation.	Requires longest time for purging aquifer among action alternatives.	Requires intermediate time for purging aquifer among action alternatives (substantially less than Alternative 2).	Requires shortest time for purging aquifer among action alternatives.
	Contaminants drawn away from source by production wells.	Contaminants drawn away from source before capture.	Contaminants captured near source area.	Contaminants captured near and away from source area.
	Migration of contaminants to east well field is likely.	Provides protection against eastward contaminant migration.	Provides best protection against eastward contaminant migration.	Provides best protection against eastward contaminant migration.
Long-Term Effectiveness	Could achieve MCLs and State groundwater standards on west side due to long term purging by municipal Production Wells CW6 (west side) and CW3 (east side).	Can achieve MCLs and State groundwater standards on west side due to purging by Production Well CW6 and northern extraction well.	Can achieve MCLs and State groundwater standards on west side due to purging by Production Well CW6 and southern extraction well.	Can achieve MCLs and State groundwater standards on west side due to purging by Production Well CW6 and two extraction wells.

TABLE 9 (Continued)

SUMMARY OF ALTERNATIVES EVALUATION
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Evaluation Factor	Alternative 1 No Action	Alternative 2 Northern Extraction Well	Alternative 3 Southern Extraction Well	Alternative 4 North and South Extraction Well
		High capacity well and discharge system are reliable. Repair or replacement in relatively short time is feasible, should failure occur.	High capacity well and discharge system are reliable. Repair or replacement in relatively short time is feasible, should failure occur.	High capacity well and discharge system are reliable. Repair or replacement in relatively short time is feasible, should failure occur.
		Long term management consists of monitoring water levels, water quality, discharge quantity, and routine maintenance.	Long term management consists of monitoring water levels, water quality, discharge quantity, and routine maintenance.	Long term management consists of monitoring water levels, water quality, discharge quantity, and routine maintenance.
Reduction of Toxicity, Mobility, Volume	None	None	None	None
Implementability	Technical feasibility not relevant, because no additional technologies are used.	Well, treatment and discharge are conventional and readily constructed. Potential future actions are not precluded. System effectiveness and performance are readily monitored.	Well, treatment and discharge are conventional and readily constructed. Potential future actions are not precluded. System effectiveness and performance are readily monitored.	Well, treatment and discharge are conventional and readily constructed. Potential future actions are not precluded. System effectiveness and performance are readily monitored.
	Not administratively feasible because public water supply is threatened with long-term contamination.	Coordination between U.S. EPA and WDNR for plan review and approval. Coordination with local agencies is required. Coordination with PRP group may be required. No apparent administrative difficulties.	Coordination between U.S. EPA and WDNR for plan review and approval. Coordination with local agencies is required. Coordination with PRP group may be required. No apparent administrative difficulties.	Coordination between U.S.EPA and WDNR for plan review and approval. Coordination with local agencies is required. Coordination with PRP group may be required. No apparent administrative difficulties.
	No additional services required.	Required technologies and services are available. Off-site services including POTW and sanitary landfill may be required, and are considered available.	Required technologies and services are available. Off-site services including POTW and sanitary landfill may be required, and are considered available.	Required technologies and services are available. Off-site services including POTW and sanitary landfill may be required, and are considered available.

TABLE 9 (Continued)

SUMMARY OF ALTERNATIVES EVALUATION
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Evaluation Factor	Alternative 1 No Action	Alternative 2 Northern Extraction Well	Alternative 3 Southern Extraction Well	Alternative 4 North and South Extraction Well
Cost	No direct monetary cost	Capital $432,000 1st year O&M $105,000 Subsequent Annual O&M $82,000 5-Year Present Worth $760,000 Discount Rate 10%	Capital $422,000 1st Year O&M $105,000 Subsequent Annual O&M $81,000 5-Year Present Worth $750,000 Discount Rate 10%	Capital $853,000 1st year O&M $169,000 Subsequent Annual O&M $140,000 5-Year Present Worth $1,400,000 Discount Rate 10%
Compliance with ARARs	MCLs achieved for municipal water supply.	MCLs achieved for municipal water supply.	MCLs achieved for municipal water supply.	MCLs achieved for municipal water supply.
		complies with NR 140 requirements for response to groundwater contamination.	complies with NR 140 requirements for response to groundwater contamination.	complies with NR 140 requirements for response to groundwater contamination.
	MCLs and State groundwater standards may be achieved in aquifer in long term.	MCLs and State groundwater standards could be achieved in aquifer in long term.	MCLs and State groundwater standards could be achieved in aquifer in long term.	MCLs and State groundwater standards could be achieved in aquifer in long term.
		Effluent standards can be met for contaminants in discharge.	Effluent standards can be met for contaminants in discharge.	Effluent standards can be met for contaminants in discharge.
		Other identified action-specific ARARs related to design, review and approval, construction and monitoring can be met.	Other identified action-specific ARARs related to design, review and approval, construction and monitoring can be met.	Other identified action-specific ARARs related to design, review and approval, construction and monitoring can be met
Overall Protection of Human Health and Environment	MCLS are met by VOC removal at City water treatment plant.	MCLs are met by VOC removal at City water treatment plant.	MCLs are met by VOC removal at City water treatment plant.	MCLs are met by VOC removal at City water treatment plant.
	Period of exposure to trace residual VOCs (after treatment) is maximized.	Provides greatest reduction in period exposure from west side Production Well CW6.	Provides substantial reduction in period of exposure from west side Production Well CW6.	Provides greatest reduction of period of exposure from west side Production Well CW6.
	Continued migration from source to west side and east side well fields.	Contaminants drawn away from source prior to capture.	Contaminants removed form aquifer near source area.	Contaminants removed from aquifer near source area.

TABLE 9 (Continued)

SUMMARY OF ALTERNATIVES EVALUATION
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Evaluation Factor	Alternative 1 No Action	Alternative 2 Northern Extraction Well	Alternative 3 Southern Extraction Well	Alternative 4 North and South Extraction Well
	No source area control.	Some potential for contaminant migration to east well field.	Best source area control, minimizing migration to east well field.	Best source area control, minimizing migration to east well field.
	Requires most time to purge contaminants from aquifer by sole reliance on City supply wells.	Reduces time required to purge contaminants from aquifer.	Substantially reduces time required to purge contaminants from aquifer.	Requires least time to purge contaminants from aquifer.
	Likely would not comply with ARARs.	Complies with identified ARARs.	Complies with identified ARARs.	Complies with identified ARARs.
State and Community Acceptance	Likely not acceptable to the State. Specific concerns or preferences to be addressed in the Record of Decision.	Specific concerns or preferences to be addressed in the Record of Decision.	Specific concerns or preferences to be addressed in the Record of Decision.	Specific concerns or preferences to be addressed in the Record of Decision.

1. Short-Term Effectiveness

Each of the alternatives (except No Action) is accompanied by similar short-term risk to workers and the community. These potential risks are associated with exposing contaminated materials from subsurface areas. Alternative 2 uses the area most accessible to the community, but access can be controlled. Alternative 3 would be implemented on private property, but plant workers may be nearby. Access to the construction area can be controlled. Alternative 4 involves both areas. In all three cases, site workers can be protected by personal protection equipment. None of the alternatives are considered to present appreciable risks to populations away from the construction areas, and vapor monitoring can be used during construction.

Response objectives can be met by each of the action alternatives, and the desired hydraulic influence by extraction wells is expected to be realized within several weeks of the start of pumping. The effects of the various systems can be summarized as follows.

* Alternative 1 - provides no active remediation of the aquifer. Contaminants would be drawn to CW6 from the source area. Contaminant migration to the east is also anticipated as a result of CW3 pumping.

* Alternative 2 - provides capture of approximately the southern two-thirds of the west side plume. Contaminants in roughly the northern third of the plume would migrate to CW6. Contaminants would be removed from the aquifer as they are drawn away from the source and are intercepted by the northern extraction well. The northern well is expected to have an influence extending east of the source area, beneath the Wisconsin River, thereby reducing the potential for eastward migration of contaminants.

* Alternative 3 - provides capture of approximately the southern half of the plume. Migration of contaminants to CW6 would also occur under the alternative. The southern extraction well is expected to have a pronounced influence extending beneath the Wisconsin River thereby preventing potential eastward migration more effectively than Alternative 2. Contaminants near the source area would be removed before migrating off-site, although the northern extent of influence (for drawing back contaminants) is less than for Alternative 2.

* Alternative 4 - combines Alternatives 2 and 3. The northern extent of plume capture would be similar to that under Alternative 2. Removal of contaminants and control of migration away from the source would be accomplished as under Alternative 3.

Under each of the alternatives, contaminated water in the northern section of the west side plume would migrate to CW6, and contaminated

water would be treated at the City water treatment plant for removal of VOCs.

Because of the difference among the alternatives in the areas of extraction well influence, the major distinctions among the alternatives are: (1) the time required to achieve protection and (2) control/capture of source area groundwater.

2. Long-Term Effectiveness and Permanence

There are differences in the time required to achieve long-term protection of the public water safety, as discussed above. However, each of the alternatives (including No Action) is expected to achieve low contaminant concentrations (i.e., approaching MCLs and State groundwater standards) as a result of aquifer purging. The long-term residual risks are therefore similar for each of the alternatives, but interim (short-term) risks are different, as discussed above.

The reliability of each of the action alternatives is similar. Large portions of the west side contaminant plume would be captured. The No Action alternative is less reliable, because CW6 is used as the sole protection for the west side wells. Contaminants would also migrate to the East Well Field under the No Action alternative.

The technologies used in each of the alternatives are relatively simple and reliable. Each of the alternatives relies on CW6 initially as the last barrier to additional West Well Field contamination. The consequences of failure would be similar for each of the alternatives, i.e., contaminated water would be drawn toward CW6. In the event of remedy failure, risk to water consumers should be no greater than at present, as long as the City keeps CW6 in operation and maintains VOC removal capabilities at the water treatment plant.

3. Reduction in Toxicity, Mobility and Volume

No reduction in toxicity, mobility, or volume of waste or hazardous substances are achieved by any of the four alternatives. Such reduction of toxicity, mobility, or volume is not cost-effective when compared with the effectiveness and relatively lower cost of an extraction well and air stripping system alone, versus a system which utilizes granular activated carbon to control air emissions, considering the relatively low levels of contaminants to be treated.

4. Implementability

The individual technologies used in each of the alternatives are conventional and well demonstrated. No unusual difficulties in construction of wells or treatment and discharge systems are anticipated. Alternatives 3 and 4 may involve trench excavation through rubble in the

former City landfill, but this does not appear to constitute a substantial disadvantage to these alternatives.

The technologies and services used under each of the alternatives are conventional and similar. Required contractor services for extraction well, treatment system and discharge system construction are similar and available. Each alternative requires a clean water supply for well construction, and compliant off-site facilities for disposal of possible drill cuttings and/or trench spoils, and for treatment and disposal of drilling fluids, if required. Services and materials are considered to be available for each alternative.

Coordination between U.S. EPA, WDNR, the City of Wausau, and, under Alternatives 3 and 4, Marathon Electric, would be required for each of the alternatives. Potential future actions would be possible and effectiveness could easily be monitored with each of the alternatives.

5. Cost

Estimated costs for the alternatives are presented in Tables 6 through 8. Major capital cost items for each alternative include extraction well, pump house, stripping tower and foundation, control systems, utilities, trenching, and piping. Major operation and maintenance items include energy costs, sampling and monitoring, analytical laboratory services, routine systems inspection, and maintenance and reporting. Capital, annual operation and maintenance, and five-year present worth costs (10% discount rate) are summarized in Table 9. Variation in costs of major capital and O&M items do not affect the cost comparison, because similar items are included in each alternative.

6. Compliance with ARARs

As shown in Table 5, the same ARARs were identified for each of the action alternatives. State groundwater standards could be met in the long-term. Drinking water MCLs can be met under each alternative due to water treatment by the air strippers prior to distribution.

Technology-based or water quality-based effluent limitations can be met by each of the action alternatives. Other action-specific ARARs can be met by each of the alternatives. CERCLA exempts on-site actions from permit requirements, but State review of plans will be required.

7. Overall Protection of Human Health and the Environment

Short-terms risk associated with the contaminated water supply can be addressed by treatment for VOC removal at the water treatment plant. The alternatives differ in their ability to capture contaminants and in the time required to achieve long-term protection of the water supply and a

resulting risk reduction. Alternative 2 is less effective than Alternative 3 or 4 in controlling source area contaminants, because Alternative 3 and 4 incorporate source area groundwater removal and Alternative 2 draws contaminants away from the source before they are captured. The time required under Alternatives 2 and 3 would be longer than for Alternative 4. The No Action alternative would require the longest time to achieve long-term protection.

Ultimately, the long-term residual risks are expected to be similar for each of the alternatives. None of the action alternatives are anticipated to have substantial adverse effects on public health or the environment as a result of implementation. Effluent standards can be met to protect surface water quality. Each of the alternatives, except for No Action, complies with ARARs.

8. State Acceptance

The State has expressed favor for Alternative 3 with the provision for implementation of an additional well if Alternative 3 does not achieve response objectives for this operable unit. The State and U.S. EPA will work together in determining whether Alternative 3 is achieving the objectives. A discussion on criteria to be used in evaluating the performance of this remedy is included in Section IX of this document.

9. Community Acceptance

The City of Wausau and Marathon Electric, both of whom are PRPs, have expressed a preference for Alternative 3. However, they have also expressed a desire to implement an alternate treatment technology that meets the technology-based requirements of BAT in the Clean Water Act. The community in Wausau has not expressed a preference for any alternative. Specific comments received during the public comment period and at the public meeting for the proposed plan are addressed in the responsiveness summary included with this document.

Summary of Comparison

Under Alternative 1 (no action), contaminants would be purged only through pumping of CW6. Neither control of eastward contaminant migration nor protection from further west side contamination would be achieved. This alternative is not consistent with the objectives for the interim response action at the site and is therefore not considered a viable option for the site.

Although Alternatives 2, 3, and 4 provide similar results when evaluated against the nine criteria, there are some important differences. Alternative 2 provides the least amount of time in which contaminants will continue to reach CW6, but it requires the longest time for aquifer purging. Under Alternative 4, the amount of time contaminants will

migrate to City Well 6 is the same, however, Alternative 4 requires the least amount of purge time. Alternative 3 has an intermediate time associated with both these factors. Alternative 2 provides less protection against eastward migration than Alternatives 3 and 4, and it results in moving contamination from the source area further into the aquifer before capture by the extraction well.

These two factors, in addition to requiring the longest purge time of the three action alternatives, makes Alternative 2 the least attractive. Between Alternatives 3 and 4, the purge time and costs are the major differences. Because CW6 is acting as a contaminant barrier well in the West Well Field, and the water is treated to safe drinking levels, the small difference in purge time between Alternatives 3 and 4 is not considered to cause any additional long-term health risk. Therefore, because Alterative 4 is twice as costly without providing additional protection, Alternative 3 is considered the cost-effective alternative.

IX. SELECTED REMEDY AND STATUTORY DETERMINATIONS

Section 121 of SARA required that all remedies for Superfund sites be protective of human health and the environment, comply with ARARs, be cost-effective, and utilize permanent solutions and alternate treatment technologies to the maximum extent practicable. Alternative 3, with the modification presented below, is believed to provide the best balance of trade-offs among alternatives with respect to the criteria used to evaluate remedies. The modification includes the implementation of an additional extraction well if Alternative 3 is unable to perform as modelled, thereby failing to meet the response objectives for this operable unit, as outlined earlier. Based on the evaluation of the alternatives, U.S. EPA and the State of Wisconsin believe that Alternative 3 (modified) would be protective, attain ARARs, be cost-effective, and would not be inconsistent with the final remedy at the site. The final remedy will attempt to utilize permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

The selected remedy entails:

* Installation of an extraction well located in the southern portion of the contaminant plume;

* Implementation of a treatment system for removal of VOCs;

* Discharge of the treated water to the Wisconsin River; and,

* Provision for implementation of an additional well, as necessary.

Determination of whether the initial well meets the response objectives

for this remedial action will be made following start-up of the system. Criteria used in making this determination include:

* The extent of the cone of depression created by pumping of the extraction well;

* The ability of the extraction well to capture the plume;

* The amount of VOCs removed by the system over time; and,

* The system's ability to protect CW7 and CW9 from contaminants, should CW6 fail.

Evaluation of the system will be based on data collected from existing monitoring wells during start-up and after the system achieves steady state conditions in the aquifer.

As stated above, the remedy is considered the most cost-effective remedial action. It complies with Federal and State ARARs. It is protective of human health and the environment by mitigating contaminant movement towards CW6 and by providing protection against operational failure of CW6 or the air stripper currently treating water from CW6. Requirements of Section 121(b)(1)(A-G) which have been determined to be applicable to this operable unit are discussed below. If a particular section is not addressed, it was determined not to be applicable to this operable unit.

1. Protection of Human Health and the Environment

Based on the risk assessment developed for this operable unit, chronic exposure to low levels of VOCs, and contaminant plume migration to the West Well Field are the identified risks associated with the west side contaminant plume. Implementation of an extraction well in close proximity to the source area, and treatment of extracted groundwater under Alternative 3 provides protection to human health and the environment by reducing chronic exposure to low level VOCs and providing additional protection to the west well field from plume migration. An added benefit of this alternative is the capture of contaminants migrating eastward under the Wisconsin River toward CW3.

Additional protection is also provided if Alternative 3 does not perform as predicted. The provision for implementation of Alternative 4 if necessary provides a backup to the southern extraction well in the event that Alternative 3 does not control plume migration in the northern part of the study area.

Implementation of Alternative 3 will not pose any unacceptable short-term risks or cross-media impacts to the site, the workers, or the community.

2. Attainment of Applicable or Relevant and Appropriate Requirements of Environmental Laws

Alternative 3 will be designed to meet all applicable or relevant and appropriate requirements (ARARs) of Federal and more stringent State environmental laws. Table 5 lists the ARARs that apply to each of the action alternatives and the following discussion provides the details of the ARARs that will be met by Alternative 3.

a. Federal: Clean Water Act (CWA)

Discharge of extracted groundwater is subject to the requirements of the Clean Water Act. Ambient Water Quality Criteria (AWQC) for protection of freshwater aquatic organisms related to discharges to surface bodies is an ARAR. General requirements for discharges to surface waters under the Wisconsin Pollutant Discharge Elimination System (WPDES) discharge regulations are also an ARAR.

Treatment of extracted groundwater prior to discharge is an ARAR. Section 301(b)(2) of the Clean Water Act requires the application of Best Available Technology (BAT) economically achievable to treat pollutants prior to discharge. BAT is determined on a case-by-case basis by the WDNR pursuant to Section 402(a)(1) of the Clean Water Act, using guidelines outlined in 40 CFR 125.3.

b. Federal: Safe Drinking Water Act (SDWA)/State: Chapter NR 109 Wisconsin Administrative Code (WAC)

The SDWA and corresponding State standards specifies maximum contaminant levels (MCLs) for drinking water at public water supplies. Since VOCs, and in particular TCE, are regulated under the SDWA MCLs, requirements for achieving MCLs are relevant and appropriate for this remedial action.

c. State: Chapter NR 140 WAC

Wisconsin groundwater protection Administrative Rule, Chapter NR 140 WAC, regulates public health groundwater quality standards for the State of Wisconsin. The enforceable groundwater quality standard for TCE is 1.8 ug/L. Groundwater quality standards as found in NR 140 WAC are ARARs for this remedial action.

d. State: Chapters NR 102 WAC and NR 104 WAC

Chapters NR 102 and NR 104 of the Wisconsin Administrative Code regulate surface water quality standards and discharges of wastewater to surface water, respectively. Under NR 102 WAC, interim values used for establishing effluent limits for the contaminants of concern are TBC (to

be considered), for this remedial action. NR 104 WAC sets effluent limits and classifies surfaces waters in the State of Wisconsin.

e. State: Chapter NR 112 WAC

Chapter NR 112 WAC addresses well construction and pump installation for extraction wells which withdraw 70 gpm or greater. Requirements under this regulation will be addressed during the design phase of the remedial action. Additional action-specific ARARs pertaining to construction of the remedy will also be addressed during design. These include, but are not limited to, ILHR 81-84 WAC, ILHR 50-53 WAC, and IND 1 and 6 WAC.

f. State: Chapters NR 200, 217, and 219 WAC

These chapters of the Wisconsin Administrative Code cover discharge permit applications, effluent limitations, and monitoring and reporting requirements for discharge activities to surface water bodies in the State. All substantive technical requirements under these regulations will be met for this remedial action.

3. Cost-effectiveness

Alternative 3 affords a high degree of effectiveness by providing protection from chronic low level exposure of TCE for production wells CW3 and CW6, as well as providing protection from plume migration in the West Well Field. Alternative 3 is the least costly alternative that is protective of human health and the environment. Therefore, Alternative 3 is considered to be the most cost-effective alternative that is protective.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

U.S. EPA and WDNR believe the selected remedy is the most appropriate alternative for meeting the response objectives for this operable unit. All of the alternatives evaluated (except No Action) provide adequate protection from chronic exposure to low levels of TCE and protection from plume migration. Alternative 2 does not effectively provide protection from TCE migration to the East Well Field, nor does it provide for capture of contaminants at the source area. Alternatives 3 and 4 are comparable with respect to the nine criteria with the exception of purge time and costs. Because CW6 is acting as a contaminant barrier well for the northern portion of the plume, and the water is treated to safe drinking levels through an existing air stripper, the small difference in purge time between the two does not cause any appreciable additional health risk. Therefore, because Alternative 4 is twice as costly without

providing additional protection, Alternative 3 is the preferred alternative.

Extraction of the contaminated groundwater in the vicinity of the source area will eliminate additional loading of contaminants to the aquifer and will extract contaminants in the groundwater. This action will be consistent with a final remedy to permanently restore the sole-source aquifer. Air stripping of extracted water prior to discharge is an appropriate treatment considering the low levels that are expected to be found and released via the air. The treatment system will be determined by the WDNR during the design phase of the project. Therefore, the selected remedy provides the best balance of trade-offs with respect to the nine criteria and represents the maximum extent to which permanent solutions and treatment are practicable. The final remedy will attempt to utilize permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

5. Preference for Treatment as a Principal Element

The statutory preference for remedies that employ treatment which permanently and significantly reduces toxicity, mobility, or volume of hazardous substances as a principal element is not satisfied. Treatment of extracted groundwater to reduce toxicity, mobility, or volume would seem to be desirable to satisfy the statutory preference. However, treatment of contaminants which permanently and significantly reduces toxicity, mobility, or volume of hazardous substances was not found to be practicable or cost-effective within the limited scope of this operable unit.

RESPONSIVENESS SUMMARY: WAUSAU GROUNDWATER CONTAMINATION SITE
WAUSAU, WISCONSIN

PURPOSE

This responsiveness summary is developed to document community involvement and concerns during the development of the phased feasibility study (PFS) for the Wausau Groundwater Contamination site, Wausau, Wisconsin. Comments received during the public comment period were considered in the selection of the operable unit remedial action for the site. The responsiveness summary serves two purposes: It provides U.S. EPA with information about community preferences and concerns regarding the remedial alternatives, and it shows members of the community how their comments were incorporated into the decision-making process.

This document summaries the oral comments received at the public meeting held October 17, 1988, and the written comments received during the public comment period of October 3 to October 24, 1988.

OVERVIEW

The preferred alternative for the Wausau Groundwater Contamination (Wausau) site was announced to the public just prior to the beginning of the public comment period. The preferred alternative includes:

* Installation of a groundwater extraction well in the vicinity of the source of the West Well Field contaminant plume;

* Treatment of the extracted water; and,

* The discharge of the treated water to the Wisconsin River; and

* A provision for implementation of an additional well, as necessary.

Judging from the comments received during the public comment period, all parties support the extraction of contaminated groundwater from the West Well Field. However, concern has been expressed over the type of treatment system to be used prior to discharge to the Wisconsin River.

SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

The public comment period was held from October 3 to October 24, 1988 to receive comments concerning the draft phased feasibility study (PFS). Because of the similarities, individual comments have been summarized and grouped where appropriate.

A. Comment: The Mayor of Wausau, the Wausau City Council President, and Marathon Electric Corporation have all expressed concern regarding the type of treatment system to be utilized for removal of Volatile Organic Compounds (VOCs) from the extracted groundwater. Each party indicated that they favor the implementation of a passive volatilization system for treating VOCs, rather than a forced-air stripping system, because of cost considerations.

A. Response: As discussed in the PFS and the Record of Decision (ROD) for this operable unit remedial action, the Clean Water Act (CWA) requires treatment of the extracted groundwater for VOC removal prior to discharge*. This requirement is not based on effluent limits, but rather on the availability of treatment technologies to remove contaminants prior to discharge.

The responsibility for regulating discharges under the CWA has been delegated to the State. Therefore, the type of treatment that would satisfy the BAT requirement will be determined by the Wisconsin Department of Natural Resources (WDNR) during the design phase of the project. U.S. EPA conservatively proposed an air stripper for treatment of VOCs in the PFS and ROD only for the purposes of cost-estimation, in order to comply with BAT requirements. However, another type of treatment system may also meet the BAT requirement. The effectiveness of a passive system for treating VOCs will be evaluated by the WDNR during the design phase of the project.

B. Comment: Wausau Chemical Corporation recommended that the proposed remedial action be implemented such that the contaminants found on the east side of the Wisconsin River are not pulled to the west side due to pumping of the proposed extraction well. It further recommended that the remedy must reduce or minimize the existing migration of contamination from the west side sources(s) to the East Well Field.

B. Response: The consideration of this comment is embodied in the selection of Alternative 3, in that this alternative is expected to have a substantial impact on eastward migration of TCE. Pumping of the extraction well, as outlined in the PFS, is not expected to induce East Well Field contaminant migration to the West Well Field. Modelling performed during the phased feasibility study supports this conclusion. Furthermore, water level monitoring will be performed during start-up and subsequent operation of the system to ensure that the desired performance is attained. Any adverse impacts will be corrected as necessary.

*The regulation may be summarized as follows: For any discharge of contaminants to surface water bodies, the Best Available Technology (BAT) for treatment of that contaminant that is readily available and not cost-prohibitive should be applied prior to discharge of that water.

C. Comment: Marathon Electric Corporation requested that the ROD allow U.S. EPA to approve the use of extracted water as a non-contact coolant in Marathon Electric's foundry operations.

C. Response: Since the above use of the water was not considered in the feasibility study, U.S. EPA would not specifically address this request in the ROD. Approval for this type of action would be required from the WDNR through issuance of a discharge permit, and thus the decision will be made during the design phase of the project.

D. Comment: The City of Wausau and Marathon Electric Corporation have pointed out the fact that they offered to implement (a variation of) the preferred alternative over a year ago and are concerned with the apparent lack of action taken so far by U.S. EPA.

D. Response: At the time of the proposal, U.S. EPA felt the action was premature due to identified data gaps regarding contamination plumes and source areas. Specifically, the location of the source(s) for the West Well Field contaminant plume and the occurrence of TCE migration beneath the Wisconsin River had yet not been identified. Furthermore, U.S. EPA was required to evaluate protective, cost-effective remedies prior to undertaking remedial action at Superfund sites. At the time of the proposal, no development or evaluation of alternatives had been completed. The data gaps have now been narrowed, and U.S. EPA feels that it is prudent to go forward with the implementation of Alternative 3 (modified).

ADMINISTRATIVE RECORD INDEX
WAUSAU, WISCONSIN
GROUNDWATER CONTAMINATION SITE

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCUM NUMBE
	1	84/09/24	Record of Communication from Richard O'Hara of the WDNR re: Wausau PA and SI.	Michael Strimbu-USEPA		Communication Record	
	1	84/09/24	Record of Communication to Jim Anklam of the WDNR re: Wausau Preliminary Assessment	Michael Strimbu-USEPA		Communication Record	
	1	84/09/25	Record of Communication from Jim Vennie of the WDNR re: Wausau SI.	Michael Strimbu-USEPA		Communication Record	
	1	84/12/20	Record of Communication of call to Dan Wilson of the WDNR re: Populations served by the municipal water systems.	Michael Strimbu-USEPA		Communication Record	
	1	84/12/27	Record of Communication of call from Dick Boers of Wausau Utilities re: alternate source of drinking water and continuing efforts to locate a new well field.	Michael Strimbu-USEPA		Communication Record	
	2	84/12/27	Record of Communication of call to David Pyles-Weston Spec TAT re: Ground Water Gradients in Wausau.	Michael Strimbu-USEPA		Communication Record	
	1	85/01/07	Record of Communication of call to Kurt Stimpson of Weston Spec re: VOC migration and final report on removal activities.	Michael Strimbu-USEPA		Communication Record	
	1	85/01/07	Record of Communication of call to Jack Saltes of the WDNR re: Wausau water supply - usage and pump rates.	Michael Strimbu-USEPA		Communication Record	

ADMINISTRATIVE RECORD INDEX
WAUSAU, WISCONSIN
GROUNDWATER CONTAMINATION SITE

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCUM NUMBE
	2	86/03/19	Record of Conversation with Mark Thimke-contact person for the PRP's. PRP's decline to participate in the RI/FS and that the PRP's plan to initiate their own investigation. USEPA will initiate the program-funded RI/FS.	Tim Conway-USEPA		Communication Record	
	2	86/06/18	Memo of call from Tom Stolzenberg of RMT, Inc., contractors for Marathon Electric, on use of USEPA well for water measurements and sampling and the USEPA recommendation on that request.	Margaret Guerriero-USEPA		Communication Record	
		88/05/13	Record of verbal comments by Frank Rovers on the RFS.	USEPA		Communication Record	
	1	93/02/05	Transmittal of analytical results of ground water sample data collected during monitoring well installation. Results sent to Dan LaCerta; R.Krueger of Charne, Glassner; Mark Thimke of Foley & Lardner and J.Lonsdorf of Lonsdorf & Andrask.	Margaret Guerriero-USEPA	See title	Correspondence	
	2	85/10/24	Notification of a proposed Superfund project to be funded by the USEPA.	Basil Constantelos-USEPA	D.Hanson-Wis.Dept.ofAdmin	Correspondence	
	3	95/01/05	Response to Information Request.	Russell Susag - 3M	Janet Haff-USEPA	Correspondence	
	7	95/01/10	Request that the recipient of this letter, before the government undertakes necessary action at this site,would voluntarily perform the work required to abate any release or threatened releases of hazardous substances, etc.	Basil Constantelos-USEPA	See service list	Correspondence	

ADMINISTRATIVE RECORD INDEX
WAUSAU, WISCONSIN
GROUNDWATER CONTAMINATION SITE

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCUMENT NUMBER
			into the groundwater.				
	2	86/03/24	Additional Request for Information. Sent to sounsel to Wausau Chemical.	Tim Conway-USEPA	R.Krueger-Charne,Glassner	Correspondence	
	2	86/04/07	Confirmation of recent conversations in which was discussed the status of further negotiations with the PRP's.	Mark Thimke - Foley & Lardner	Tim Conway - USEPA	Correspondence	
	2	86/05/01	Confirmation of results of recent negotiations and discussion of recent correspondence regarding the RI/FS.	Tim Conway - USEPA	Mark Thimke-Foley&Lardner	Correspondence	
	1	87/01/17	Transmittal of the plans for the proposed extraction well and a request for a meeting re: the same well.	Mark Thimke - Foley & Lardner	Tim Conway - USEPA	Correspondence	
	4	87/01/24	Installation of an additional monitoring well for the Wausau Water Supply Investigation and summary of contract lab sample numbers.	Craig Rawlinson-Warzyn Eng.	Margaret Guerriero-USEPA	Correspondence	
	2	87/09/25	The WDNR is concerned that the proposal by Marathon Electric to begin a groundwater extraction system to remove contaminated groundwater north of the plant wil cause problems. These problems incluce changing the configuration of the contaminant plume and interferring with the USEPA's study of the area.	Gary Kulibert-WDNR	Mark Thimke-Foley&Lardner	Correspondence	
	4	87/09/29	Approval of QAPP for the RI/FS.	James Adams - USEPA	Dikinis & Guerriero-USEPA	Correspondence	
	1	87/10/08	Request for a letter confirming that the	Beth Nayloy - Foley & Lardner	Denise Kraft-COE	Correspondence	

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WAUSAU, WISCONSIN
GROUNDWATER CONTAMINATION SITE

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCU NUMB
			proposed placement of rip rap on the bank of the Wisconsin River is covered under a nationwide permit.				
	1	87/10/09	Request for a meeting to discuss the proposed extraction well to be located on the northeast of Marathon Electric's property.	Mark Thimke-Foley & Lardner	Tim Conway-USEPA	Correspondence	
	1	87/10/14	Resolution by the City Council of Wausau accepted 10/13/87 re: placement of a well on city owned property and cover letter transmitting the resolution.	David Koch-City of Wausau	D.Eisenreich-MarathonElec	Correspondence	
	2	87/10/14	Letter acknowledging reciept of the "Plan for Remedial Work" and a letter of 9/30/87 from M.Thimke of Foley & Lardner to G. Kulibert of the WDNR.	Mark Giesfeldt-WDNR	Mark Thimke-Foley&Lardner	Correspondence	
	1	87/10/17	Notice that Maarathon Electric has obtained the approval of the City of Wausau and is proceeding to obtain the approval of the WDNR to install a high capacity well to the northeast of Marathon's property.	Mark Thimke - Foley & Lardner	Tim Conway - USEPA	Correspondence	
	17	87/10/21	Package of correspondence recieved from the city of Wausau and a request that the USEPA bring the senator up to date on the project.	Ian Robert Kasten Jr.	Valdas Adamkus-USEPA	Correspondence	
	9	87/10/30	Authorization to issue a private well permit to	David Koch-Wausau Water & Sewerage	D.Eisenreich-MarathonElec	Correspondence	

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WAUSAU, WISCONSIN
GROUNDWATER CONTAMINATION SITE

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCU NUMBE
			Marathon Electric with noted conditions and requirements. Attached is the permit and application.				
1		87/10/30	Notice of a meeting scheduled for 11/05/87 re: Cong Obey's concerns.	Tim Conway - USEPA	M Thimke-Foley & Lardner	Correspondence	
1		87/11/02	Transmittal letter for materials related to Marathon Electric's application to install a high capacity well.	Dave Eisenreich-Marathon Electric	Bill Dobbins-WDNR	Correspondence	
2		87/11/23	Letter in response to meeting re: groundwater contamination problems, and ongoing USEPA RI/FS and Marathon Electric's proposal for remediation.	Tim Conway - USEPA	Mark Foley-Foley&Lardner	Correspondence	
3		87/11/25	Approval of a high capacity ground water contamination extraction well.	W.Rock - WDNR	D.Eisenreich-MarathonElec	Correspondence	
4		87/12/03	Transmittal of analytical results from initial sampling activities. Letters sent to Lonsdorf of Lonsdorf & Andrask; Dan LaCerte; R.Krueger of Charne, Glassner; and M.Thimke of Foley & Lardner.	Margeret Guerriero-USEPA	See title	Correspondence	
2		87/12/09	Authorization to place riprap for bankx stabilization on the bank of the Wisconsin River.	Ben Wopat-USCOE	Beth Naylor-Foley&Lardner	Correspondence	
2		87/12/08	Explanation of concerns as to the implications of prohibiting PRP's from implementing clean-up activity.	Bruce Cutright-Geraghty & Miller	Fleischer-SenProxmire Off	Correspondence	
3		87/12/29	Explanation of USEPA action	Valdas Adamkus-USEPA	Sen. Robert Kasten Jr.	Correspondence	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCUMENT NUMBER
			in light of concerns expressed by the City of Wausau.				
	1	88/01/13	Belief that installation of an Extraction Well on the west side of the Wisconsin River to remove contaminated ground water would be benificial.	Mark Thimke-Foley & Lardner	Tim Conway - USEPA	Correspondence	
	1	88/01/13	Request for a meeting.	Mark Thimke-Foley & Lardner	Tim Conway - USEPA	Correspondence	
	1	88/01/22	Correction to letter sent 12/29/87.	Basil Constantelos-USEPA	Sen. Robert Kasten Jr.	Correspondence	
	1	88/01/25	Response to request for meeting by counsel for Marathon Electric.	Tim Conway - USEPA	Mark Thimke-Foley-Lardner	Correspondence	
	1	88/02/03	Transmittal of missing four pages of the analytical results package.	Margaret Guerriero-USEPA	R.Krueger-Chanp,Glassner	Correspondence	
	2	88/02/04	Explanation of why the USEPA will not allow installation of a groundwater extraction well to be installed on Marathon Electric's property.	Valdas Adamkus-USEPA	Sen. William Proxmire	Correspondence	
	4	88/02/17	Transmittal of data generated as part of the Phase I RI. Data sent to Krueger, LaCerta, Lonsdorf & Thimke, seperately.	Margaret Guerriero-USEPA	See title	Correspondence	
	3	88/03/01	Supplemental Request for Information Pursuant to Section 104(e) of CERCLA and Section 3007 of RCRA. Sent to counsel for the City of Wausau.	Mary Gade - USEPA	Lonsdorf-Lonsdorf&Andrens	Correspondence	
	3	88/03/01	Supplemental Request for Information Pursuant to Section 104(e) of CERCLA and Section 3007 of RCRA. Sent to counsel for	Mary Gade - USEPA	Mark Thimke-Foley&Lardner	Correspondence	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCU NUMB
			Marathon Electric.				
	4	88/03/08	Affidavit of James P. Lonsdorf in response to the Supplemental Request for Information.	James P. Lonsdorf	Janet Haff - USEPA	Correspondence	
	52	88/03/22	Supplemental Response to Information Request.	David L. Eisenreich-Marathon Elec.	Janet Haff - USEPA	Correspondence	
	2	88/03/30	Notice of intent to delay the issuance of a WPDES permit to discharge contaminated groundwater to the Wisconsin River from a proposed extraction well.	Percy Mather-WDNR	Mark Thimke-Foley&Lardner	Correspondence	
	1	88/04/04	Request for a meeting to discuss the proposed extraction well.	Mark Thimke-Foley & Lardner	Tim Conway-USEPA	Correspondence	
	7	88/04/26	Letter on behalf of the Wausau Energy Corp. discussing the review of the Final Work Plan for the RI/FS.	Doran,Possin-Foth & Van Dyke,Assoc.	Margaret Guerriero-USEPA	Correspondence	
	4	88/04/27	Transmittal of Technical Memorandum for Phase I of the RI. Sent to Thimke, Lonsdorf, LaCerta and Krueger, seperately.	Margaret Guerriero-USEPA	See title	Correspondence	
	25	88/05/02	First set of revisions to the comprehensive ARAR's document provided on 3/5/87.	Mark Giesfeldt-WDNR	"Bill" Constantelos-USEPA	Correspondence	
	1	88/05/05	Transmittal of telecopy numbers and a thank you for the scheduling of a meeting on the extraction well.	Mark Thimke - USEPA	Tim Conway - USEPA	Correspondence	
	4	88/05/06	Transmittals of analytical results of soil samples collected during monitoring well installation. Results sent to Thimke, LaCerta,	Margaret Guerriero-USEPA	See title	Correspondence	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCUMENT NUMBER
			Lonsdorf and Krueger, seperately.				
	2	88/05/11	Work scope, schedule and preliminary report outline for the PFS.	Dennis Iverson-Warzyn	Tim Conway - USEPA	Correspondence	
	1	88/05/02	Notice that Marathon Electric and the City of Wausau agree that the USEPA should proceed with the Phased Feasibility Study.	Mark Thimke-Foley & Lardner	Tim Conway - USEPA	Correspondence	
	1	88/05/06	Transmittal of the analytical results for the second round of the ground water sampling.	Kevin Adler - USEPA	Mark Thimke-Foley&Lardner	Correspondence	
	2	88/05/05	Notice that the PFS is to performed along with a listing of subtasks.	Kevin Adler-USEPA	Dennis Iverson-Warzyn	Correspondence	
	15	88/05/24	Approval of the addendum QAPP for Phase II of the RI/FS.	Andrea Jirka-USEPA	Beverly Kush-USEPA	Correspondence	
	1	88/05/30	Invitation for any further questions of comments on the Phase II RI/FS.	Kevin Adler - USEPA	Michelle Owens - WDNR	Correspondence	
	4	88/05/30	Transmittal of the Phase II Work Plan. Sent to Dave Stewart of DeWitt & Porter; Thimke of Foley & Lardner; Krueger of Charne, Glassner and Lonsdorf of Lonsdorf & Andrask.	Kevin Adler - USEPA	See title	Correspondence	
	2	88/08/03	Response to request for ARAR's.	Michelle DeBrock-Owens--WDNR	Kevin Adler-USEPA	Correspondence	
	7	88/08/12	Comments on the ARAR's - quality based effluent limitations.	Michelle DeBrock-Owens--WDNR	Kevin Adler-USEPA	Correspondence	
	3	88/08/23	Confirmation of willingness to install and operate an extraction well system on the west side of the site.	Maek Thimke - Foley & Lardner	Felipe Gomez - USEPA	Correspondence	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCU NUME
	3	88/08/23	Willingness to install an extraction well system on the west side of the site.	Mark Thimke-Foley & Lardner	Felipe Gomez-USEPA	Correspondence	
	3	88/08/31	Correction to Alternatives Array Document.	Brian Christian - Warzyn Eng.	Kevin Adler - USEPA	Correspondence	
	1	88/09/06	Formal notification of an additional state ARAR for the PFS.	Mark Giesfeldt-WDNR	Margaret Guerriero-USEPA	Correspondence	
	1	88/09/13	Perferred alternative of the State of Wisconsin is a combination of alternatives three and four.	Michelle Owens - WDNR	Margaret Guerriero-USEPA	Correspondence	
	1	88/09/23	Comment on PFS: Report is complete and accurate.	Michelle Owens-WDNR	Margaret Guerriero-USEPA	Correspondence	
	1	88/10/12	Special Notice of Potential Liability.	Mary Gade-USEPA	See service list	Correspondence	
	1	88/10/24	Comments on the Phased Feasibility Study (PFS).	Mark Thimke - Foley & Lardner	Georgette Nelms - USEPA	Correspondence	
	7	88/10/24	Comments on the Public Comment Draft Phased Feasibility Study made by the counsel for Wausau Chemical Corp.	R.Krueger-Charbe,Glassner ,et al.	M.Guerriero&G.Nelms-USEPA	Correspondence	
	4	87/09/00	"Superfund Activities Start In Wausau."	USEPA		Fact Sheet	
	4	87/09/00	"Superfund Activities Start in Wausau"	USEPA		Fact Sheet	
	4	88/10/17	"Wausau Well Field Phased Feasability Study Underway: Public Meeting October 17, 1988, 7:00 p.m., City Hall, Lower Level (Rear Cafeteria), 407 Grand Street, Wausau, Wisconsin.	USEPA		Fact Sheet	
	1	82/05/21	Well Log for Wausau Monitoring Well No. Five.	Soil Exploration Co.		Log	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCU NUMB
	7	87/08/05	Typed notes on meeting regarding City of Wausau Groundwater Contamination Site - August 5, 1987.			Meeting Notes	
	11	83/03/28	VOC Contamination of Wausau's Water Supply.	Kreul & Baltus-WDNR		Memorandum	
	3	93/05/09	Toxicity Rating for Asbestos and Trichloroethylene.	Stephen Caldwell-USEPA	All USEPA Regions	Memorandum	
	15	87/06/10	ACTION MEMORANDUM: Authorization to Proceed with the Remedial Investigation and Feasibility Study at the Wausau Water Supply Site in Wausau,Wisconsin.	Basil Constantelos-USEPA	Valdas Adamkus-USEPA	Memorandum	
	4	87/06/24	ACTION MEMORANDUM: Authorization for Obligating Funds for Multi-Sites for Community Relations.	Basil Constantelos-USEPA	Valdas Adamkus-USEPA	Memorandum	
	2	87/11/24	ACTION MEMORANDUM: Authorization to Obligate Additional Funds for the Remedial Investigation/ Feasibility Study at the Wausau Water Supply Site. Wausau, Wisconsin.	Basil Constantelos-USEPA	Valdas Adamkus-USEPA	Memorandum	
	2	89/09/05	ACTION MEMORANDUM: Authorization for Supplemental Funding for the Phased Feasibility Study at the Wausau Water Supply Site, Wausau, Wisconsin.	Basil Constantelos-USEPA	Valdas Adamkus-USEPA	Memorandum	
	2	85/01/25	"State Will Seek Superfund Aid For Wausau's Wells."	WDNR		News Release	
	1	87/09/09	"EPA To Hold Public Meeting On Wausau Ground-Water Contamination"	USEPA		News Release	

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCU-MENT NUMBER
	2	88/09/27	"EPA, WDNR Reschedule Public Meeting And Comment Period On Wausau Superfund Site"	USEPA		News Release	
	5	88/05/11	Administrative Record Index: Wausau Ground Water Contamination Emergency Removal.	Terry Quirk - OPRA	USEPA	Other	
	1	88/06/29	Administrative Record Index: Wausau Ground Water Emergency Removal - Update.	Terry Quirk - OPRA	USEPA	Other	
	2	89/09/16	Meeting agenda - Wausau Well Field NPL Site Phased Feasability Study along with sign-in list.			Other	
	3	00/00/00	Narrative: Site History and Description.	Jim Anklam - WDNR		Reports/Studies	
	10	00/00/00	Proposed Plan For Remedial Action	USEPA		Reports/Studies	
	19	00/00/00	Documentation Records for Hazard Ranking System.	USEPA		Reports/Studies	
	13	00/00/00	Compilation of Monitoring Well Analytical Results.	Weston*Spec.		Reports/Studies	
	21	84/05/03	Site Assessment and Recommended Immediate Actions For Wausau Municipal Water Supply.	Pyles & Stimpson-Weston*Spec	Richard Bowden-USEPA	Reports/Studies	
	4	84/08/17	Potential Hazardous Waste Site Preliminary Assessment.	Jim Anklam - WDNR	USEPA	Reports/Studies	
	7	84/12/27	Hazard Ranking System Scoring Package.	Michael Steimbu-USEPA	USEPA	Reports/Studies	
	227	85/03/00	Hydrogeological Investigation Of Volotile Organic Contamination In Wausau, Wisconsin, Municipal Wells.	Weston-Spec TAT	USEPA	Reports/Studies	

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TICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCU NUMB
	19	87/07/00	Plan Of Remedial Work Marathon Electric Manufacturing Company Wausau, Wisconsin.	Conestoga-Rovers & Assoc.	Marathon Electric	Reports/Studies	
	33	87/09/04	Final Health And Safety Plan.	Warzyn Engineering	USEPA	Reports/Studies	
	71	87/09/04	Final Work Plan: Remedial Investigation/Feasibility Study	Warzyn Engineering	USEPA	Reports/Studies	
	263	87/09/22	Final Quality Assurance Project Plan (QAPP).	Warzyn Engineering	USEPA	Reports/Studies	
	25	87/11/16	Community Relations Plan	CH2M Hill	USEPA	Reports/Studies	
	29	88/02/04	Scope of Work for Installation of an Interceptor/Extraction Well and Construction of a Water Main Across the Wisconsin River.	Gerachty&Miller and Conestoga-Rover	Marathon Electric	Reports/Studies	
	113	88/04/00	Technical Memorandum- Phase I Remedial Investigation.	Warzyn Engineering	USEPA	Reports/Studies	
	50	88/05/15	Final Phase II Work Plan.	Warzyn Engineering	USEPA	Reports/Studies	
	151	88/06/28	Final Quality Assurance Project Plan Addendum (QAPP).	Warzyn Engineering	USEPA	Reports/Studies	
	74	88/07/00	Request For Applicable or Relevant and Appropriate Requirements (ARARs).	Warzyn Engineering	USEPA	Reports/Studies	
	127	88/08/30	Public Comment Draft Phased Feasibility Study	Warzyn Engineering	USEPA	Reports/Studies	
	49	88/10/17	Transcript of Wausau Wellfield Superfund Site Public Meeting, Wausau City Hall. 10/17/88.	Nina Bostwick-Court Reporter		Transcript	

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WAUSAU, WISCONSIN GROUNDWATER CONTAMINATION SITE
DOCUMENTS MAY BE REVIEWED AT THE USEPA
REGION V OFFICES, CHICAGO, IL.

DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE
87/00/00	Summary of Samples Collected During Existing Well Sampling Wausau NPL RI/FS September29-October 7, 1987.			Sampling/Data
87/00/00	Summary of Soil Samples Collected During Drilling Activities Wausau NPL RI/FS October 14 to November 14, 1987.			Sampling/Data
87/12/10	Summary of data samples collected during new and existing well sampling wausau NPL RI/FS-12/2-10/87.			Sampling/Data
87/12/21	Results of split samples from monitoring well sampling.	Pencak & Cutright-Geraghty & Miller	Margaret Guerriero-USEPA	Sampling/Data
88/01/13	Review and data package: SMO case no. 5270: SMO traffic no. EN 331, 333, 334.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
88/01/23	Review and data package: SMO case no. SAS 3477E: SMO traffic no. E 01-22.	Curtis Ross-USEPA	Warzyn Eng.	Sampling/Data
88/01/25	Review and data package: SMO case no. 8485; SMO traffic no. EN 357-375, 377-391.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
88/02/01	Summary tables for sample descriptions for December, 1987 round of sampling.	Dennis Iverson-Warzyn Engineering	Margaret Guerriero-USEPA	Sampling/Data
88/02/04	Phase I Data: * Monitoring well construction details and water level measurements. * Water sampling results for samples collected during drilling activities. * Soil gas sampling results for	Dennis Iverson - Warzyn Engineering	Margaret Guerriero-USEPA	Sampling/Data

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DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE
	samples collected during the soil gas investigation.			
88/02/05	Reveiw and data package: SMO case no. 8628, SMO traffic no. MEQ 251-259.	Curtis Ross-USEPA	Warzyn Eng.	Sampling/Data
88/02/05	Review and data package: SMO case no. 8709 , SMO traffic no.MEQ 260-274.	Ida Levin-USEPA	Warzyn Eng.	Sampling/Data
88/02/09	Review and data package: SMO case no. 8333; SMO traffic no. EN 342, 348-351.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
88/02/10	Review and data package: SMO case no. SAS34985: E01-103, 107-147, 150-160.	Ida Levin-USEPA	Warzyn Eng.	Sampling/Data
88/02/11	Analytical results for VOC analysis.	Pencax & Cutright-Geraghty & Miller	Lonsdorf-Lonsdorf&Andrask	Sampling/Data
88/02/14	Review and data package: SMO case no. 8637SAS34995: ER472, 474, 475, 484, 485, 494, 496, 499, 201-333, 329-333, 335, 338, 341-344, 346, 347.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
88/02/16	Review and data package: SMO case no. SAS 34775: SMO traffic no. E 01-27, 29, 30.	Curtis Ross-USEPA	Warzyn Eng.	Sampling/Data
88/02/23	Review and data package: SMO case no. 8709, SMO traffic no. ER 333, 470, 471, 473, 475, 477-483, 485-488, 490-494, 497, 499, 500.	Kevin Bolger-USEPA	Warzyn Eng.	Sampling/Data
88/02/24	Review and data set: SMO case no. 8528; SMO traffic no.ER334, 335, 337,339,340,345,346-350.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
88/05/23	Review and data package:	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data

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DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE
	SMO case no. 9952SAS39195; SMO Traffic No. EC075-93.			
89/05/23	Review and data package: SMO case no. 9694. SMO Traffic No. EP879-883.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
89/07/07	Review and data package: SMO case no. 9694; SMO traffic no. ER 457-465, 467-469, ER 324-327, 511-515, 517-519, 500, 594-597, 599.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
89/07/11	Review and data package: SMO case no. 9694, SMO traffic no. MEP 700-709, 710-720.	Curtis Ross-USEPA	Warzyn Eng.	Sampling/Data
89/07/13	Data and data package: SMO case no. 9694, SMO traffic no. MEP 721-729.	Curtis Ross-USEPA	Warzyn Eng.	Sampling/Data
89/07/19	Review and data package: SMO case no. 9694, SMO traffic no. EQ 749, EP 884-890.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
89/07/19	Review and data package: SMO case no. 9559, SMO traffic no. ER 419-431, 399.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
89/08/21	Review and data package: SMO case no. 9559SAS39978, SMO traffic no. ER351-391, 435, 439, EC910-913, 915-916, EP999.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
89/08/04	Review and data package: SMO case no. 9919SAS39195, SMO traffic no. EC011-15.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
89/08/09	Review and data package: SMO case no. 9919; SMO traffic no. MEP 282-287, 299.	Curtis Ross - USEPA	Warzyn Eng.	Sampling/Data

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DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE
88/08/09	Review and data package: SMO case no. 9918SAS3919E; SMO traffic no. EC061-64, 72.	Kevin Bolger-USEPA	Warzyn Eng.	Sampling/Data
88/08/15	Review and data package: SMO Case No. 9918; SMO Traffic No. MEN986-999, MEP911-915, MEO281.	Curtis Ross-USEPA	Warzyn Eng.	Sampling/Data
88/08/18	Review and data package: SMO case no. 9918SAS3919E; SMO tariffic no. EC019.20, 31.41-43.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
88/08/22	Review and data package: SMO Case No. 9918; SMO Traffic No. EC001-03,05,09,10, 17,19,21-27,36-40.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
88/08/31	Review and Data package: SMO case no. 3952; SMO traffic no. MES 2351-359.	Curtis Ross - USEPA	Warzyn Eng.	Sampling Data
88/09/13	Chain-of-Custody Records and validated analytical data for samples collected and groundwater monitoring wells.	Dennis Iverson-Warzyn Engineering	Margaret Guerriero-USEPA	Sampling/Data
88/09/14	Review and data package: SMO Case No. 9950; SMO Traffic No. EC056-57, 66-70, 73.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
88/10/05	Review and data package: SMO Case No. 10099; SMO Traffic No. EC091-097.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
88/10/19	Review and data package: SMO case no. 9919; SMO traffic no. EC0 46,47,51-54, 71.	Patrick Churillo-USEPA	Warzyn Eng.	Sampling/Data
88/10/20	Review and data package: SMO case no. SAS 34775; SMO Traffic No. E01-522.	Curtis Ross-USEPA	Warzyn Eng.	Sampling/Data

WAUSAU, WISCONSIN GROUND WATER CONTAMINATION SITE
GUIDANCE DOCUMENTS FOR THE ADMINISTRATIVE RECORD.
DOCS. NOT COPIED - MAY BE REVIEWED AT THE
USEPA REGION V OFFICES, CHICAGO, ILLINOIS.

TITLE	AUTHOR	DATE
OSWER Dir. 9834.3 Procedures for Identifying Responsible Parties: Uncontrolled Hazardous Waste Superfund	USEPA	82/02/01
OSWER Dir. 9355.0-03 Uncontrolled Hazardous Waste Site Ranking System - A Users Manual	USEPA	82/07/16
OSWER Dir. 9230.0-02 Superfund Community Relations Policy	USEPA	83/05/09
OWER Dir. 9832.1 Cost Recovery Actions Under CERCLA	USEPA	83/09/29
OSWER Dir. 9230.0-03 Community Relations in Superfund: A Handbook, Interim Version.	USEPA	83/09/01
OSWER Dir. 9230.0-05 Community Relations Requirements for Operable Units.	USEPA	83/10/02
OSWER Dir. 9230.0-04 Community Relations Guidance for Evaluating Citizens Concerns at Superfund Sites.	USEPA	83/10/17
OSWER Dir. 9280.0-01 Flood Plain Requirements	USEPA	83/11/14
OSWER Dir. 9835.1 Participation of Potentially Responsible Parties In Development of Remedial Investigation and Feasibility Studies.	USEPA	84/03/20
OSWER Dir. 9340.1-01 Participation of Potentially Responsible Parties in Development of RI's and	USEPA	84/03/20

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TITLE	AUTHOR	DATE
FS's.		
OSWER Dir. 9934.4 Policy for Enforcing Information Requests in Hazardous Waste Cases.	USEPA	84/09/10
OSWER Dir. 9240.0-01 User's Guide to the Contract Laboratory Program.	USEPA	84/10/01
OSWER Dir. 9934.1 Guidance on Issuance of Notice Letters	USEPA	84/10/12
OSWER Dir. 9285.1-01-B Standard Operating Safety Guide Manual	USEPA	84/11/19
OSWER Dir. 9835.0 Interim CERCLA Settlement Policy	USEPA	84/12/05
OSWER Dir. 9285.2-03 FSOP #3 - Air Surveillance	USEPA	85/01/01
OSWER Dir. 9285.2-02 FSOP #7 - Decontamination of Response Personnel	USEPA	85/01/01
OSWER Dir. 9285.2-01 FSOP #4 - Site Entry	USEPA	85/01/01
OSWER Dir. 9340.2-01 Preparation of Decision Documents For Approving Fund-Financed and PRP RA's Under CERCLA.	USEPA	85/02/27
OSWER Dir. 9285.2-05 FSOP #5 - Site Safety Plan.	USEPA	85/04/01
OSWER Dir. 9285.2-04 FSOP #6 - Work Zones.	USEPA	85/04/01
OSWER Dir. 9295.1-01 MOU Between the ATSDR and EPA.	USEPA	85/04/02

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TITLE	AUTHOR	DATE
OSWER Dir. 9835.2 Guidance on Drafting Consent Decrees in Hazardous Waste Cases	USEPA	85/05/01
OSWER Dir. 9355.0-05C Guidance on Feasibility Studies Under CERCLA	USEPA	85/06/01
OSWER Dir. 9355.0-05B Guidance on Remedial Investigations Under CERCLA	USEPA	85/06/01
OSWER Dir. 9280.0-02 Policy on Flood Plains and Wetlands Assessments.	USEPA	85/08/06
OSWER Dir. 9834.0-02 CERCLA Compliance with Other Environmental Statutes.	USEPA	85/10/02
OSWER Dir. 9832.3 Timing of CERCLA Cost Recovery Actions.	USEPA	85/10/07
OSWER Dir. 9834.2 Timely Initiation of Responsible Party Searches, Issuance of Notice Letters, and Releases of Information.	USEPA	85/10/09
OSWER Dir. 9355.1-01 Chart - Federal Lead Remedial Project Management Manual	USEPA	86/01/01
OSWER Dir. 9375.1-01 State Participation in The Superfund Program Manual, Vol. I	USEPA	86/03/01
OSWER Dir. 9375.1-01-03 State Participation in the Superfund Program, Vol. I: Chapter 9, Audits of Response Agreements.	USEPA	86/03/20
OSWER Dir. 9240.0-02	USEPA	86/03/20

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Analytical Support For Superfund		
OSWER Dir. 9355.0-04A Superfund Remedial Design and Remedial Action Guidance	USEPA	86/05/01
OSWER Dir. 9285.4-01 Superfund Public Health Evaluation Manual.	USEPA	86/11/07
Standard RI/FS Tasks Under REM Contracts	OWSER Dir. 9242.3-7	86/11/13
Federal Lead Remedial Project Management Manual.	OWSER Dir. 9355.1-01	86/12/00
Guidance Document for Providing Alternative Water Supplies	OWSER Dir. 9355.1-01	86/12/00
OSWER Dir. 9355.0-19 Interim Guidance on Superfund Selection of Remedy.	USEPA	86/12/24
Interim guidance on State Participation in Pre-Remedial and Remedial Response.	OWSER Dir. 9375.1-09	87/02/00
OWSER Dir. 9835.4 Interim Guidance: Streamline The Settlement Decision Process	USEPA	87/02/12
OWSER Dir. 9235.4-10 Coordinating ATSDR Health Assessment Activities with Superfund Remedial Process	USEPA	87/03/11
Dower Dir. 9355.0-19 Objectives for Remedial Response Activities	USEPA	87/04/01
Final Guidance for the Cooperation of ATSDR Health Assessment Activities w/in the Superfund Remedial Process.	OWSER Dir. 9285.4-02	87/04/22

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TITLE	AUTHOR	DATE
Superfund Selection of Remedy: Background Documentation on Remaining Issues.		87/05/12
Superfund Public Health Evaluation Manual.	OWSER Dir. 9285.4-01	87/07/00
Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements. 52 FR 32496 (8/27/87).	OWSER Dir. 9234.0-05	87/07/09
OSWER Dir. 9235.0-05 Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements.	USEPA	87/07/09
OSWER Dir. 9355.0-21 Additional Interim Guidance for FY'87 Records of Decision.	USEPA	87/07/24
Interim Guidance on PRPs participation in RI/FS.	OWSER Dir. 9835.1a	87/10/02
Interim Final Guidance on Removal Action Levels at Contaminated Drinking Water Sites.	OWSER Dir. 9360.1-10	87/10/05
Interim Guidance on Administrative Records for Decisions on Selection of CERCLA Response Actions.	OWSER Dir. 9833.3	87/11/09
Revised Procedures for Planning and Implementing Off Site Response Actions.	OWSER Dir. 9834.11	87/11/13
FY '88 Region V ROD Process Guidance. Memo from Chief of the Emergency & Remedial Response Branch- Waste Mgmt. Div.	Mary Gade-USEPA	88/01/20
Draft Guidance on Preparing Superfund Decision Documents:	OWSER Dir. 9355.3-02	88/03/00

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The Proposed Plan and ROD.		
Draft Guidance on PRP Participation in the RI/FS.	OWSER Dir. 9835.1A	88/04/00
Record of Decision Questions & Answers - Draft.		88/04/01