PROPOSED PLAN FOR REMEDIAL ACTION

Wausau Ground Water Contamination Site
Wausau, Wisconsin

PURPOSE

This proposed plan has been prepared as a supplement to the August 1989 public comment draft final Feasibility Study (FS) for the Wausau Groundwater Contamination Site. It is made available with the FS and other documents in the administrative record for public review and comment.

Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), requires U.S. EPA to issue a "Proposed Plan" and make such plan available to the public for comment. This document satisfies that requirement in that it:

* Describes the remedial alternatives analyzed for the project;

* Identifies the preliminary decision on a preferred alternative, explaining the rationale for the preference; and

* Solicits community involvement in the selection of a remedy for the site.

SITE DESCRIPTION

The City of Wausau is located in Marathon County, along the Wisconsin River, in the north-central region of Wisconsin. The City provides drinking water for approximately 33,000 people. In the summer of 1982, the City first detected Volatile Organic Chemicals (VOCs) in three of the six municipal supply wells (CW6, CW3, CW4). Levels in the wells exceeded U.S. EPA advisory levels for safe drinking water. Contaminants found include tetrachloroethylene (PCE), trichloroethylene (TCE), trans-1,2-dichloroethylene (DCE), and toluene.

After discovering the problem the City began blending clean water with contaminated water to dilute VOC concentrations while meeting demand. At the same time, the City, with support of the Wisconsin Department of Natural Resources (WDNR), made several attempts to mitigate the problem and locate the contaminant source. Monitoring wells were installed in the Wausau area and unsuccessful attempts were made to aerate the water by modifying the water treatment process. The City also applied for, and was granted, a U.S. EPA cooperative agreement through the Agency's Drinking Water Research Division. The agreement provided for the design and construction of a stripping tower to effectively aerate the water.

However, VOC concentrations in the supply wells were steadily increasing

and by early 1984, "water at the tap" exceeded recommended levels. The increased concentrations made it impossible to supply clean water and still meet demand. In the spring of 1984, the City of Wausau and WDNR asked U.S. EPA for emergency assistance. The U.S. EPA Emergency Response Group took action to install temporary activated carbon filters on one of the supply wells, which then provided clean water until the air stripper was completed. The City purchased a second air stripper which was also installed at the water treatment plant, insuring the capability to supply clean water to the residents. Two of the city's supply wells, CW3 and CW4, were hooked up to the stripper for treatment prior to distribution. The third contaminated supply well, CW6, was removed from service and pumped to waste into Bos Creek to prevent CW7 and CW9 from becoming contaminated.

Since that time, the city has completed a pipeline to add water from CW6 to the air strippers for treatment. In addition, an extraction system and air stripper was installed at the Wausau Chemical facility (one of the source areas) by the property owner to address past spills.

In December 1988, U.S. EPA signed a Record of Decision (ROD) that addressed remediation of a contaminant plume originating from the former City landfill/Marathon Electric property. The City and Marathon Electric agreed to implement the remedy which entails installation of an extraction and treatment system at the facility.

SUMMARY OF SITE CHARACTERISTICS

Several studies have been completed in the study area by various parties, including the remedial investigation/feasibility study (RI/FS) completed by U.S. EPA. The scope of the RI included characterizing the groundwater contamination previously identified on both sides of the River, and locating and defining the source areas of the contamination for the site (see Figures 1 & 2). The RI data collected indicates the following findings:

* VOC contamination is present in the northern section of the former City landfill, located at the southern part of the west study area and in unsaturated soils adjacent to the fill;

* Non-volatile organic compounds and heavy metals were also detected at elevated concentrations in samples from the former City landfill;

* Groundwater in the West Study Area (on the west side of the Wisconsin River) is contaminated with two VOC plumes. One is a deep VOC plume located at the base of the aquifer. This plume originates at the former City landfill on the Marathon Electric facility and has been drawn north toward CW6. The second plume is shallow and contains low concentration VOCs originating from Bos Creek. This plume is believed to be a result of discharging CW6 to the Creek in an effort to protect the remaining supply wells in the West Well Field from becoming contaminated;

* Groundwater in the East Well Field (on the east side of the River) is also contaminated with VOCs. Two major plumes have been identified. A deep plume originating from the west side landfill has been located migrating under the Wisconsin River to CW3. The second plume is shallow and widely dispersed. This plume originates from the Wausau Chemical property, located just south of CW3, and has migrated to the east and northeast toward CW3;

* The unsaturated (subsurface) soils at Wausau Chemical contain widely distributed VOCs. Two source areas identified include the north loading dock and the former tank storage area; and

* The unsaturated soils at Wausau Energy, also located to the south of CW3 contain numerous apparently petroleum derived compounds. A former source area appears to be located at the southern end of the site where fuel storage tanks were located. Groundwater beneath the facility is contaminated with these compounds however, it does not appear that they have migrated to any off-site location at this time.

The Risk Assessment, included in the RI report, identified PCE, TCE, and DCE as the primary contaminants of concern at the site. Other compounds found in the landfill were not considered to be of primary concern because they are not a threat for direct contact (found at depth in fill) and have not been detected in groundwater away from the fill area.

The routes of exposure identified were consumption of groundwater and inhalation of contaminants in air. This is due to the impacts seen at the municipal wells, from emissions from the existing air strippers in the study area, the likelihood of future exposure by contaminants found, and the health risks associated with the contaminants. Based on the findings of the RI and the results of the risk assessment, a feasibility study to develop alternatives remediation of the site was developed. The scope of the final remedy and the alternatives evaluated are discussed in the following sections.

SCOPE OF THE REMEDY

A previous operable unit action at the site addresses the contaminant plume originating from the former landfill/Marathon Electric source area which affects CW6. The approved remedy entails installation of an extraction and treatment system to remove VOCs from groundwater. The system will be located just north of the former landfill on the Marathon Electric property.

During development of the final FS, it was determined that the deep plume migrating under the River and affecting CW3 would best be addressed by purging groundwater at the same location as the Phase I remedy extraction system. Therefore, it was determined that an increase in the minimum pumping rates called for in the Phase I extraction system and

modifications to the Phase I monitoring plan would provide the most effective remediation for this contaminant plume. It was also assumed that the City would continue to use CW3 as a supply well and thus continue to remove contaminants from the most eastern portion of the plume.

The recommended alternative for the final phase of the Wausau project will address the remaining concerns at the site. Remaining concerns include the source areas and the shallow east side groundwater contaminant plume originating from the Wausau Chemical source area. The identified source areas include; former City landfill/Marathon Electric property, Wausau Chemical property, and Wausau Energy property. The final remedy for the site is intended to address the entire site. This include alterations to the previous operable unit action to include increased pumpage rates for the extraction system and additional monitoring to ensure the system is addressing both of the deep plumes.

ALTERNATIVES ANALYZED

Alternative 1: No Action

Estimated Construction Cost:	$0
Estimated Annual O&M Costs:	$0
Estimated Present Worth:	$0
Estimated Implementation Time frame:	None

Under this alternative, no additional response action would be taken at the site to address groundwater contamination in the east well field or the source areas. The extraction well planned for the west side will be installed and water from CW6 and CW3 will continue to be treated by the air strippers prior to distribution. Contamination from groundwater and soils would remain in place and would eventually be purged from the aquifer through pumping of the City's supply wells.

Alternative 2: Groundwater Extraction and Treatment

Estimated Construction Cost:	$480,000
Estimated Annual O&M Costs:	$122,000
Estimated Present Worth:	$1,330,000
Estimated Implementation Time frame:	Less than 6 months

Under this alternative, extraction wells would be placed on the Wausau Chemical property to extract the groundwater plume emanating from that facility. Pumping at approximately 500 gpm, the extraction wells would draw out contaminated water which would be treated by air stripping with carbon absorption of off-gases and then discharged directly into the Wisconsin River.

Alternative 3: In-Situ Bioreclamation With Partial Treatment and Discharge

Estimated Construction Cost:	$990,000
Estimated Annual O&M Costs:	$161,800
Estimated Present Worth:	$1,710,000
Estimated Implementation Time frame:	2 years to start RA

Under Alterative 3 an arc of extraction wells would be placed along the northern boundary of the Wausau Chemical property. The wells would draw out contaminated water from the shallow groundwater away from the source area. The extracted water would then be split with half being treated using an air stripping system and discharged directly into the Wisconsin River while the remaining water would be enhanced with nutrients and recharged back to the groundwater in the vicinity of the source area. This provides a means for maintaining hydraulic control of the system, by recharging less than what is extracted.

In-situ bioreclamation is a method for remediating groundwater contaminated with various organic compounds. It involves the addition of nutrients and oxygen to stimulate the growth of naturally occurring bacteria. These bacteria are of the type responsible for the breakdown of organic materials in nature.

Alternative 4: In-Situ Bioreclamation

Estimated Construction Cost:	$710,000
Estimated Annual O&M Costs:	$112,000
Estimated Present Worth:	$1,380,000
Estimated Implementation Time frame:	2 years to start RA

Alternative 4 is similar to Alternative 3 in that it involves the use of in-situ bioreclamation. Extraction wells would be placed in an arc on the northern boundary of the site for extracting water. However, all of the water would be enhanced with nutrients and oxygen and recharged back to the groundwater for in-situ bioreclamation. The difference between this alternative and Alternative 3 is no above ground treatment. No means for maintaining hydraulic control is included here, but this alternatives allows for breakdown of contaminants using only in-situ bioreclamation as the only treatment method. (See discussion of bioreclamation above for an explanation of the process).

Alternative 5: Active Source Control - Soil Vapor Extraction

Estimated Construction Cost:	$256,000
Estimated Annual O&M Costs:	$482,000
Estimated Present Worth:	$738,000
Estimated Implementation Time frame:	Less than 6 months

Under this alternative, VOCs would be removed from soils at source areas.

Soil vapor extraction would be used to remove VOCs using a vacuum extraction process which removes contaminants from the unsaturated zone before they reach groundwater. Contaminants vacuumed from the soils, in the vapor phase, would be treated with carbon prior to release to the air.

Soil vapor extraction systems would be installed at the former City landfill/Marathon Electric, Wausau Chemical, and Wausau Energy source areas. The systems include extraction wells in the unsaturated zone soils, a vacuum extraction unit to draw out contaminants from soils in the vapor phase, and carbon units to treat off gases prior to release to the atmosphere.

This alternative also includes pumping of CW3 and CW6 as the means of remediating groundwater contamination at the site.

THE PREFERRED ALTERNATIVE

Based upon the evaluation of the nine criteria, the preferred alternative is Alternative 5. Alternative 5 includes the installation of soil vapor extraction systems at the identified source areas, and the treatment of off gases generated by the extraction systems. The alternative also addresses groundwater by calling for specified pumping rates of the City's supply wells in order to expedite removal of the groundwater contaminant plumes affecting these wells.

Based on new information or public comments, U.S. EPA, in consultation with the State of Wisconsin, may modify the preferred alternative or select another of the response actions presented in this plan. The public therefore, is encouraged to review and comment on all of the alternatives identified in this Proposed Plan. The FS report should be consulted for more information on these alternatives.

ALTERNATIVE EVALUATION MATRIX

The following nine criteria were used to select a preferred alternative for the Wausau site:

1. Overall Protection of Human Health and the Environment addresses whether or not a remedy provides adequate protection and describes how risks are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements (ARARs) of other environmental statutes and/or provide grounds for invoking a waiver.

3. Short-term Effectiveness involves the period of time needed to achieve protection and any adverse impact on human health and the

environment that may be posed during the construction and implementation period until cleanup goals are achieved.

4. Long-term Effectiveness and Permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

5. Reduction of Toxicity, Mobility, or Volume is the anticipated performance of the treatment technologies a remedy may employ.

6. Implementability is the technical and administrative feasibility of a remedy, including the availability of goods and services needed to implement the chosen solution.

7. Cost includes capital and operation and maintenance costs.

8. State Acceptance indicates whether, based on its review of the PFS and Proposed Plan, the State of Wisconsin concurs, opposes, or has no comment on the preferred alternative.

9. Community Acceptance will be assessed in the Record of Decision following a review of the public comments received on the PFS report and the Proposed Plan.

Each alternative was evaluated against these nine criteria. A summary of the alternative evaluation matrix is presented in Table 1. A discussion of how the preferred alternative compares to the other alternatives is presented under the following section.

COMPARISON OF ALTERNATIVES

1. Overall Protection of Human Health and the Environment:
Each of the alternatives (except No Action) will achieve reduction of risks from contaminants and pathways of concern identified for the site. However, the alternatives differ in the time needed to purge the aquifer of contaminants. Alternative 1 requires the longest time to achieve clean-up. Alternative 2 requires the next longest period. Alternatives 3 and 4 require similar periods for remediation of the east side contaminant plume which is expected to be shorter than pump and treat under Alternative 2. However, as with Alternatives 2 and 3, it does not provide any reduction in time for purging of the deep plume migrating under the River to CW3. This results in a significantly long time period for contaminants to remain in the aquifer. Alternative 5 achieves source reduction which results in a substantial reduction in time for remediation of contamination in the groundwater. Added controls on pumping of City supply wells further reduces the time for remediation under this alternative.

2. Compliance with ARARs: All applicable or relevant and appropriate requirements under Federal and State environmental regulations are met

by Alternatives 2, 3, 4 and 5. Alternative 1 would not comply with Wisconsin NR 140 requirements for response when groundwater quality standards are exceeded.

Superfund monies may not be able to be used at the Wausau Energy source area if it is determined that contaminants from this source are strictly derived from a petroleum source. However, the Wisconsin Hazardous Substances Spill Law does include a provision to address such spills and would pursued.

3. Short-Term Effectiveness: The short-term risks associated with implementation are not expected to be a problem for any of the alternatives. All of the alternatives (including the Phase I Remedy) will result in contaminated material being brought to the surface, however no appreciable risks to residents are expected, and workers can use conventional personnel protective gear.

Short-term risks associated with operation of the alternatives vary. Carbon treatment of off-gases generated by stripping of VOCs is planned for Alternatives 2,5, and the pump and treat portion of Alternative 3. Alternative 4 and the bioreclamation portion of alternative 3 do have potential risks associated with the additives necessary for contaminant breakdown and the transformation products from the process. Risks from these alternatives would result if the contaminants were not broken down completely before reaching CW3, or if additives from the process were to reach CW3.

The alternatives differ in the time needed to purge the aquifer of contaminants. Alternative 1 requires the longest time to achieve aquifer purging because contaminants would be allowed to continue to flush to the groundwater from soils and then be purged through pumping of the City's supply wells. Alternative 2 requires the next longest period. This is because pumping of extraction wells at Wausau Chemical in conjunction with CW3 would create a groundwater divide that would actually cause contaminants to be held up longer in the aquifer. In addition, this alternative would not reduce the time frame during which contaminants would continue to impact CW6 on the west side of the River. Alternatives 3 and 4 require similar periods for remediation of the east side contaminant plume which is expected to be shorter than pump and treat under Alternative 2. However, as with Alternative 2, these alternatives do not provide any reduction in time for purging of the deep TCE plume migrating under the River to CW3. Alternative 5 results in a substantial reduction in time for remediation of contamination in the aquifer because it addresses the source areas on both sides of the River. Added controls on pumping rates of City supply wells further reduces the time for remediation under this alternative.

4. Long-term Effectiveness: The alternatives differ in the time required to achieve various objectives, but in the long-term, each of the alternatives is expected to achieve compliance with MCLs and State groundwater standards (NR 140) in the aquifer. Table 1 lists the time period requirement for each of the alternatives.

5. Reduction of Toxicity, Mobility or Volume: Alternative 1 does not achieve reduction in toxicity, mobility, or volume. Alternatives 3 and 4 provide toxicity reduction as a result of contaminant degradation. Volume and toxicity reductions are provided by Alternatives 2, 3 and 5 as a result of contaminant adsorption on carbon and subsequent destruction during thermal regeneration of the carbon.

6. Implementability: Technologies used for Alternatives 2 and 5, and part of 3, are conventional and well demonstrated. Bioreclamation as proposed for Alternative 4 and part of Alternative 3 is not conventional or well demonstrated for the types of chemicals found at the site. In addition, U.S. EPA's Office of Research and Development (ORD) has reviewed the potential for In-situ Bioreclamation and has expressed concern over the uncertainties regarding whether this technology would work for the contaminants found at the site. Implementation would require fairly extensive laboratory and field test prior to start-up.

Administratively, Alternative 5 would require the lowest amount of coordination. Alternatives 2, and the above ground portion of 3 require additional coordination because of treatment and discharge system. Alternative 4 and the in-situ portion of 3 would be administratively difficult because the technology is relatively unknown, and requires reinjection of water back into the ground.

There are no difficulties anticipated in obtaining materials for any of the alternatives. Materials are available and considered conventional and readily available.

7. Cost: Comparison of present worth costs for the alternatives indicates that Alternative 5 is the least costly at $738,000. This is due to the shorter operation time of the source control action and the reduced O&M costs associated with the City air strippers due to the reduced time required for their use. Alternative 2 has the next lowest present worth cost at $1,330,000. Alternative 4 is somewhat higher at $1,380,000 and the present worth cost for Alternative 3 is highest at $1,710,000 due to the combination of systems used. Alternative 1 has no associated costs.

8. State Acceptance: The State had expressed interest in a bioreclamation alternative if one showed promise for the site. However, because of the need for extensive laboratory and field pilot studies, the State has agreed that a bioreclamation alternative should not be pursued for the site. The State supports Alternative 5 due to its ability to reduce aquifer purge times at a low cost.

9. Community Acceptance: The community has not at this time expressed a preference for any alternative. Evaluation of this criterion will be revisited once the public comment period has ended. A discussion of this will be included in the Record of Decision (ROD) for this action.

SUMMARY OF COMPARISON

Under Alternative 1 (no action), contaminants would be purged only through pumping of the supply wells and the west side extraction well. Nothing would be done to reduce contaminant loading to the aquifer from source areas nor to expedite removal of contaminants in the East Well Field. Given the nature and location of the site, this alternative is not consistent with the objectives for remedial action at the site and is therefore not considered a viable option for the site. In addition, Wisconsin groundwater standards under NR 140 would not be met under this alternative. NR 140 has been determined to be an ARAR for the site.

Although all of the other alternatives will achieve aquifer purging in the long-term, there are significant differences in the time to purge the groundwater. Alternatives 2, 3, and 4 are groundwater remediation alternatives that do not address remediation of source areas. In addition, they do not provide any reduction in the time to remediate the deep plume originating from the landfill. This results in a significant time period to achieve the clean up objectives. In addition, the actual time frame for clean up under the bioremediation alternatives cannot be determined, so an estimate is based on groundwater flow. Alternative 5, source control, requires the shortest time period for remediation of the site because it eliminates the continued addition of contaminants to the groundwater and provides for the removal of remaining contaminants in groundwater through pumping of CW3. Alternative 5 also provides for a reduction in time to clean up the deep west side plume by removing the source and specifying pumping rates for the City's supply wells CW3 and CW6.

All of the alternatives (other than No Action) provide a reduction in toxicity of contaminants. Alternatives 2, 5 and the pump and treat portion of 3 provide a reduction in volume as well. Alternatives 2 and 5 use proven technologies that can easily be implemented and have a low potential for failure, and the proposed actions will have no problem complying with Federal and State ARARs. Alternatives 3 and 4 use a technology that has not been shown to work on the contaminants present at the site. In addition, some of the required additives needed to enhance biodegradation, could exceed the State's NR 140 groundwater standards for those substances.

Costs and implementation times for alternatives vary as well. Alternative 5, source control, is the least costly and requires the shortest time period to implement and complete the remedial action. Alternative 2 has the next lowest cost and requires a similar implementation period. Alternatives 3 and 4 have the highest costs associated with them due to the bioreclamation technology proposed. These alternatives also require the longest implementation time. A period of 2 years to begin the process will be required due to the need for extensive testing prior to start up.

SUMMARIZING THE STATUTORY FINDINGS

At this time, Alternative 5, is believed to provide the best balance of trade-offs among alternatives with respect to the criteria used to evaluate remedies. Based on the information available at this time, EPA and the State of Wisconsin believe the preferred alterative will be protective, will attain ARARs, will be cost-effective, and will utilize permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

COMMUNITY INVOLVEMENT

The proposed plan for the Wausau site is meant to provide interested parties with a summary of remedial alternatives analyzed in the feasibility study (FS) and the rationale for selecting the preferred remedial action for the site. The Agency requests that the public provide comments on all of the alternatives discussed in the proposed plan and the FS, not just on the preferred alterative. The public should utilize the FS and other pertinent documents in the administrative record, as they provide a more detailed description of the alternatives contemplated for the Wausau site.

All documents developed and released to the public are available for public inspection and copying at the following locations:

Wausau City Hall
407 Grant Street
Wausau, WI 54401-4783

Marathon County Public Library
400 First Street
Wausau, WI 54401

The public comment period will run from August 14 to September 12, 1989. Written comments will be accepted during this time, and will be addressed in the Responsiveness Summary of the ROD document. All comments should be directed to:

Susan Pastor
Community Relations Coordinator
Office of Public Affairs
(312) 353-1325

Margaret Guerriero
Remedial Project Manager
(312) 886-0399

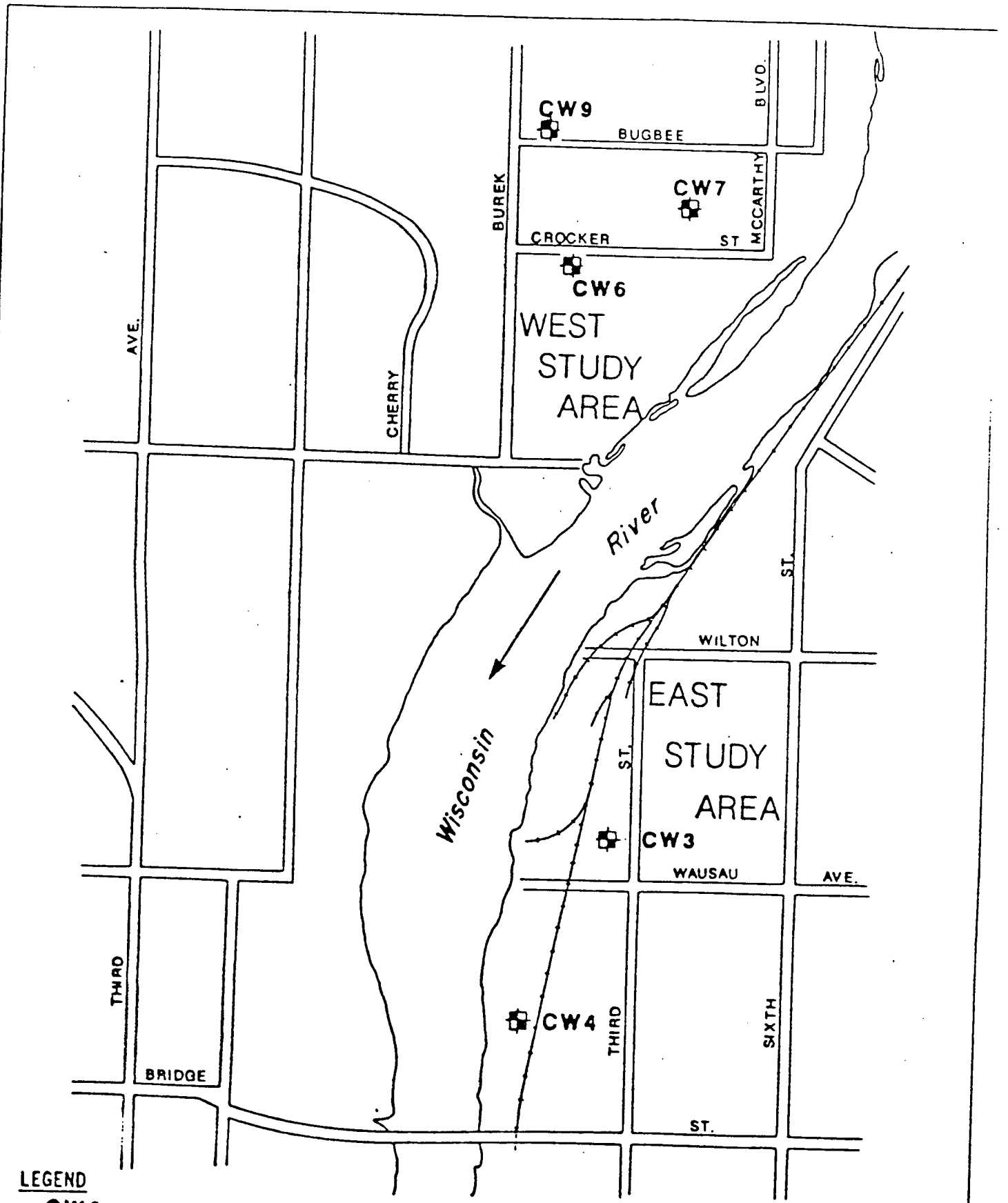
AT

U.S. EPA, Region V
230 South Dearborn
Chicago, Illinois 60604

Toll Free Number: 1 (800) 621-8431

EPA will hold a public meeting on August 22, 1989 to discuss the proposed remedial action for the Wausau site. Oral comments can be

entered into the record during the public meeting. A transcript of the meeting will be made and entered into the files at the administrative record repositories listed above. Selection of an remedial action to be implemented at the Wausau Well Field will not be made until after the public comment period has concluded.



NOTE:

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

FIGURE 1

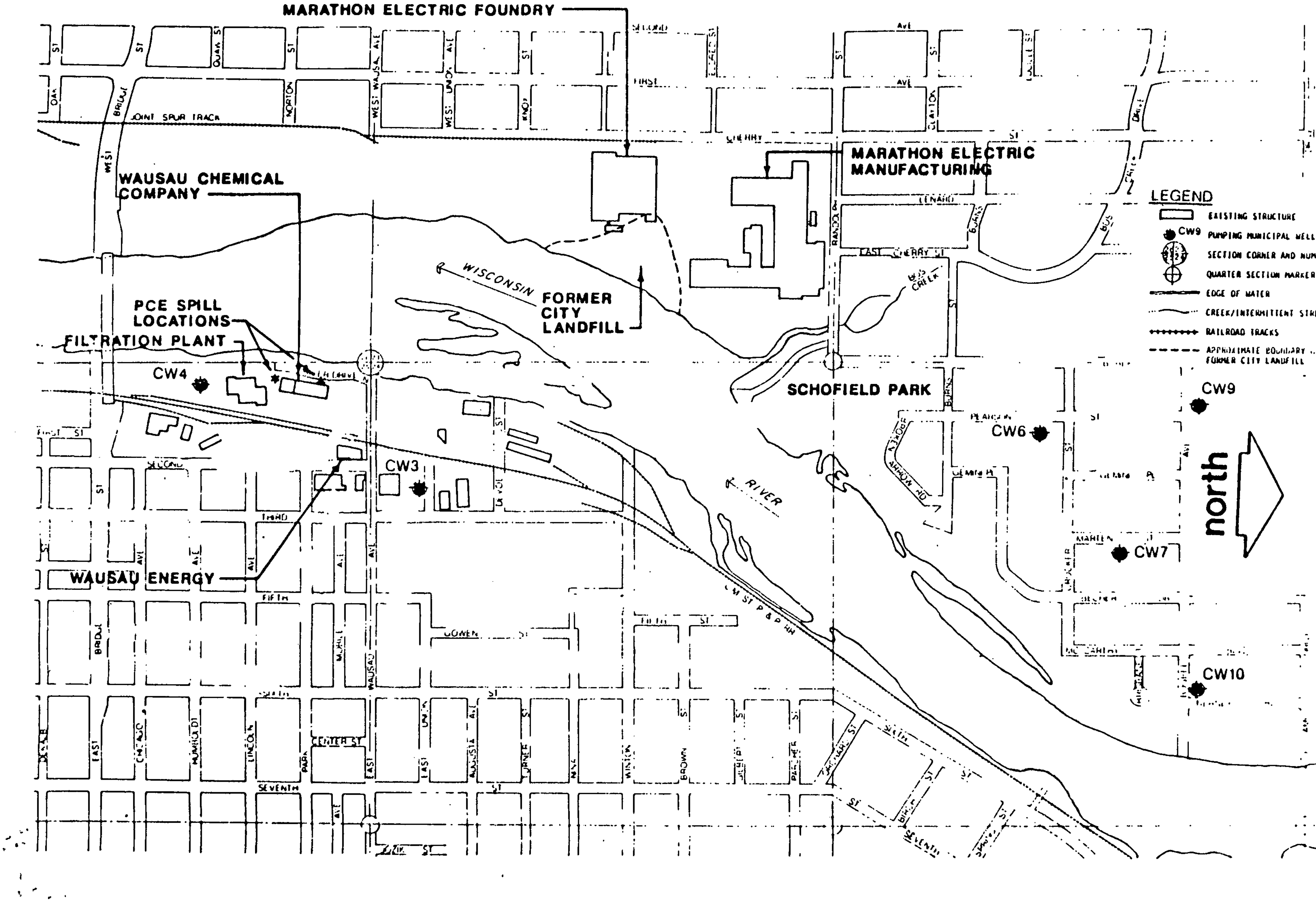

MARATHON ELECTRIC FOUNDRY
MARATHON ELECTRIC MANUFACTURING
WAUSAU CHEMICAL COMPANY
PCE SPILL LOCATIONS
FILTRATION PLANT
FORMER CITY LANDFILL
WISCONSIN
RIVER
SCHOFIELD PARK
WAUSAU ENERGY
CW4
CW3
CW6
CW7
CW9
CW10
LEGEND
EXISTING STRUCTURE
PUMPING MUNICIPAL WELL
SECTION CORNER AND NUMBER
QUARTER SECTION MARKER
EDGE OF WATER
CREEK/INTERMITTENT STREAM
RAILROAD TRACKS
APPROXIMATE BOUNDARY OF FORMER CITY LANDFILL
north
JOINT SPUR TRACK
CHERRY
FIRST
SECOND
THIRD
FIFTH
SEVENTH
CENTER ST
GOWEN ST

FIGURE 2

TABLE 1

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

Evaluation Factor	Alternative 1 No Action	Alternative 2 Groundwater Extraction and Treatment	Alternative 3 Groundwater Extraction and Treatment with In-Situ Bioreclamation	Alternative 4 In-Situ Bioreclamation	Alternative 5 Active Source Control(1)
Short-Term Effectiveness	No additional protection of community and workers is required.	Risks to workers during implementation addressed by standard controls and personal protection equipment. Community risks considered to be minimal.	Risks to workers during implementation addressed by standard controls and personal protection equipment. Community risks considered to be minimal.	Risks to workers during implementation addressed by standard controls and personal protection equipment. Community risks considered to be minimal.	Risks to workers during implementation addressed by standard controls and personal protection equipment. Community risks considered to be minimal.
	No additional risks beyond baseline conditions.	Stripping tower off gas controls are provided to control potential additional exposure risks.	Stripping tower off-gas controls are provided to control potential additional exposure risks. Possible migration of contaminants from recharge area is controlled by extraction rate greater than recharge rate.	Possible migration of contaminants from recharge area is anticipated. Quantity can be limited by controlling the bioreclamation system recirculation rate.	Vapor extraction system off-gas controls are provided to control potential additional exposure risks.
	Approximately 20 years of purging northern portion of west side plume by Well CW6.	Approximately 20 years of purging northern portion of west side plume by well CW6.	Approximately 20 years of purging northern portion of west side plume by well CW6.	Approximately 20 years of purging northern portion of west side plume by well CW6.	Approximately 20 years of purging northern portion of west side plume by well CW6.
		Achieves protection through contaminant removal and above-ground treatment.	Achieves protection through combination of contaminant removal, above ground treatment, and in-situ groundwater treatment.	Achieves protection through in-situ groundwater treatment.	Achieves protection primarilby preventing additional contaminant loading to the aquifer as a result of soil vapor extraction.
Long-Term Effectiveness	Can achieve MCLs and contaminant levels approaching state groundwater standards in aquifer.	Can achieve MCLs and contaminant levels approaching state groundwater standards in aquifer.	Can achieve MCLs and contaminant levels approaching state groundwater standards in aquifer.	Can achieve MCLs and contaminant levels approaching state groundwater standards in aquifer.	Can achieve MCLs and contaminant levels approaching state groundwatestandards in aquifer.
		Groundwater extraction and treatment technologies are reliable. Repair or replacement in relatively short time is feasible, in the event of failure.	Groundwater extraction, and treatment technologies are reliable. Infiltration technology is reliable but potentially subject to fooling. Limitations can be managed with sound operation and maintenance strategies. bioreclamation aspect is reliable if desired bacterial populations can be maintained. In worst case failure mode, system can operate as conventional pump and treat system.	Groundwater extraction technology is reliable. Infiltration technology is reliable but potentially subject to fooling. Limitations can be managed with sound operation and maintenance strategies. Bioreclamation is reliable if desired bacterial populations can be maintained.	Vapor extraction technology is reliable. Repair or replacement in relatively short time is feasible in the event of failure.

TABLE 1
(Continued)

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

Evaluation Factor	Alternative 1 No Action	Alternative 2 Groundwater Extraction and Treatment	Alternative 3 Groundwater Extraction and Treatment with In-Situ Bioreclamation	Alternative 4 In-Situ Bioreclamation	Alternative 5 Active Source Control(1)
	Long-term management consists of monitoring water quality and aquifer purging effectiveness by existing wells.	Long-term management consists of monitoring water levels, water quality, discharge quality and routine system maintenance.	Long-term management consists of monitoring water levels, water quality, discharge quality and routine system maintenance.	Long-term management consists of monitoring water levels, water quality, recharge water quality and routine system maintenance.	Vapor extraction has a short operation period. Long-term management consists of monitoring as in Alternative 1.
Reduction of Toxicity, Mobility, Volume	None	Volume and toxicity reduction through carbon adsorption and thermal regeneration.	Toxicity reduction through contaminant degradation. Volume and toxicity reduction through carbon adsorption and thermal regeneration.	Toxicity reduction through contaminant degradation.	Volume and toxicity reduction through carbon adsorption and thermal regeneration.
Implementability	Technical feasibility considerations are not applicable.	Groundwater extraction, treatment and discharge technologies are conventional. System effectiveness and performance are readily monitored.	Groundwater extraction treatment discharge and infiltration technologies are all conventional Hydraulic control of the area appears feasible. Bioreclamation appears feasible. Full site-specific assessment will require testing. System effectiveness and performance are readily monitored.	Groundwater extraction and technologies are conventional. Complete recapture and recharged water is not feasible. Bioreclamation appears feasible. Full site-specific assessment will require testing. System effectiveness and performance are readily monitored.	Vapor extraction technology is conventional. System effectiveness and performance are readily monitored.
	May not be administratively feasible due to lack of additional responses.	Coordination between U.S. EPA and WDNR for plan review and approval. Coordination with local agencies may be required. Coordination with PRP representatives will be required. No apparent administrative difficulties.	Coordination between U.S. EPA and WDNR for plan review and approval. Coordination with local agencies will be required. Coordination with PRP representatives will be required. No apparent administrative difficulties.	Coordination between U.S. EPA and WDNR for plan review and approval. Coordination with local agencies will be required. coordination with PRP representatives will be required. No apparent administrative difficulties.	Coordination between U.S. EPA and WDNR for plan review and approval. Coordination with local agencies may be required. Coordination with PRP representatives will 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 to be available.	Required technologies and services are available. Off-site services including POTW and sanitary landfill may be required, and are considered to be available.	Required technologies and services are available. Off-site services including POTW and sanitary landfill may be required, and are considered to be available.	Required technologies and services are available. Off-site services including POTW and sanitary landfill may be required, and are considered to be available.
Cost	No direct monetary cost	Capital: $480,000 Annual O&M: $122,000 Present Worth: $1,330,000 Discount Period: 12 years Discount Rate: 10%	Capital: $990,000 Annual O&M: $161,000 Present Worth: $1,710,000 Discount Period: 6 years Discount Rate: 10%	Capital: $710,000 Annual O&M: $112,000 Present Worth: $1,380,000 Discount Period: 9 years Discount Rate: 10%	Capital: $256,000 O&M: $482,000 Present Worth: $738,000 Discount Period: 14 years Discount Rate: 10%

TABLE 1
(Continued)

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

Evaluation Factor	Alternative 1 No Action	Alternative 2 Groundwater Extraction and Treatment	Alternative 3 Groundwater Extraction and Treatment with In-Situ Bioreclamation	Alternative 4 In-Situ Bioreclamation	Alternative 5 Active Source Control(1)
Compliance with ARARs	MCLs achieved for municipal water study.	MCLs achieved for municipal water study.	MCLs achieved for municipal water study.	MCLs achieved for municipal water study.	MCLs achieved for municipal water study.
	Likely would not comply with NR 140 requirement for response due to lack of source area control and no additional groundwater remediation.	Would likely comply with NR 140 requirement for response as a groundwater control measure.	Would likely comply with NR 140 requirement for response as a groundwater control measure.	Would likely comply with NR 140 requirement for response as a groundwater control measure.	Would likely comply with NR 140 requirement for response as a source control measure.
	MCLs and State groundwater standards could be achieved in the aquifer in the long term.	MCLs and State groundwater standards could be achieved in the aquifer in the long term.	MCLs and State groundwater standards could be achieved in the aquifer in the long term.	MCLs and State groundwater standards could be achieved in the aquifer in the long term.	MCLs and State groundwater standards could be achieved in the aquifer in the long term.
	Compliance with VOC emissions limits can be achieved.	Compliance with VOC emissions limits can be achieved.	Compliance with VOC emissions limits can be achieved.	Compliance with VOC emissions limits can be achieved.	Compliance with VOC emissions limits can be achieved.
		Effluent standards can be met for surface water discharge.	Effluent standards can be met for surface water discharge.		
		Compliance with action-specific ARARs related to design, approval, construction and monitoring can be met.	Compliance with action-specific ARARs related to design, approval, construction and monitoring can be met.	Compliance with action-specific ARARs related to design, approval, construction and monitoring can be met.	Compliance with action-specific ARARs related to design, approval, construction and monitoring can be met.
Overall Protection of Human Health and the 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.	MCLs are met by VOC removal at City water treatment plant.
	No additional source or groundwater controls.	Groundwater controls only.	Groundwater controls only.	Groundwater controls only.	Source controls only.
	Approximately ten years to meet TCE MCL at well CW6.	Approximately ten years to meet TCE MCL at well CW6.	Approximately ten years to meet TCE MCL at well CW6.	Approximately ten years to meet TCE MCL at well CW6.	Approximately ten years to meet TCE MCL at well CW6.

TABLE 1
(Continued)

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

Evaluation Factor	Alternative 1 No Action	Alternative 2 Groundwater Extraction and Treatment	Alternative 3 Groundwater Extraction and Treatment with In-Situ Bioreclamation	Alternative 4 In-Situ Bioreclamation	Alternative 5 Active Source Control(1)
	Approximately 20 years until contaminants are no longer drawn in by well CW6.	Approximately 20 years until contaminants are no longer drawn in by well CW6.	Approximately 20 years until contaminants are no longer drawn in by well CW6.	Approximately 20 years until contaminants are no longer drawn in by well CW6.	Approximately 14 years untilcontaminants are no longer drawn in by well CW6
	Approximately 9.7 years to meet TCE MCL at Production Well CW6.	Approximately 9.7 years to meet TCE MCL at Production Well C6.	Approximately 9.7 years to meet TCE MCL at Production Well CW6.	Approximately 9.7 years to meet TCE MCL at Production Well CW6.	Approximately 4.5 years to meet TCE MCL at Production Well CW6.
	Approximately 6 years to meet TCE MCL at well CW3 (landfill source).	Approximately 6 years to meet TCE MCL at well CW3 (landfill source).	Approximately 6 years to meet TCE MCL at well CW3 (landfill source).	Approximately 6 years to meet TCE MCL at well CW3 (landfill source).	Approximately 4 years to meeTCE MCL at well CW3 (landfilsource).
	Approximately 6.3 years to meet PCE MCL at well CW3 (Wausau Chemical Source).	Approximately 5 years to meet PCE MCL at well CW3 (Wausau Chemical Source).	Approximately 2.5 years to meet PCE MCL at well CW3 (Wausau Chemical Source).	Approximately 2.5 years to meet PCE MCL at well CW3 (Wausau Chemical Source).	Approximately 3.3 years to meet PCE MCL at well CW3 (Wausau Chemical Source).
	Approximately 13 years until contaminants from landfill source are no longer drawn in by well CW3.	Approximately 13 years until contaminants from landfill source are no longer drawn in by well CW3.	Approximately 13 years until contaminants from landfill source are no longer drawn in by well CW3.	Approximately 13 years until contaminants from landfill source are no longer drawn in by well CW3.	Approximately 6 years until contaminants from landfill source are no longer drawn in by well CW3.
	Approximately 15 years until contaminants from Wausau Chemical are no longer drawn in by well CW3.	Approximately 12 until contaminants from Wausau Chemical are no longer drawn in by well CW3.	Aquifer purging time could not be estimated for this alternative with the existing contaminant transport model.	Aquifer purging time could not be estimated for the alternative with the exjsting contaminant transport model.	Approximately 5 years until contaminants from Wausau Chemical are no longer draw in by well CW3.
	Would not comply with all identified ARARs.	Would comply with all identified ARARs.	Would comply with all identified ARARs.	Would comply with all identified ARARs.	Would comply with all identified ARARs.
State and Community Acceptance	Specific comments to be addressed in the Record of Decision.	Specific comments to be addressed in the Record of Decision.	Specific comments to be addressed in the Record of Decision.	Specific comments to be addressed in the Record of Decision.	Specific comments to be addressed in the Record of Decision.

(1) Remediation times shown for Alternative 5 are based on computer simulations of source control used in conjunction with increased pumping rates at Production Wells CW3 and CW6, and at the Phase 1 remedy extraction well.

RLM/sss
[sss-400-18]
13076.32