Record of Decision Summary

N.W. Mauthe Site

City of Appleton, Outagamie County,
Wisconsin

March, 1994

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: March 22, 1994

FILE REF: FID #4509707
Outagamie Co.
ER/SFND

TO: George Meyer - LC/5

FROM: Gary Edelstein - SW/3 GE

SUBJECT: N.W. Mauthe Record of Decision

The attached ROD is being routed now for your approval. U.S. EPA desires to have the document approved by Secretary Meyer and the Regional Administrator by March 31. This would meet their internal deadline to complete it by the end of this federal fiscal quarter. U.S. EPA desires to have the ROD approved by you before the Regional Administrator signs. I understand it will be signed by Mr. Adamkus or his designate immediately after you approve it.

At the briefing Terry Koehn, Paul Didier and I gave to you on March 10, you asked that we follow through on 2 action items intended to help address concerns raised by adjacent property owners who wish to be bought out. First, you would like us and U.S. EPA (who will be implementing the remedial action - we are giving the project lead back to them) to meet with the City of Appleton to discuss project implementation issues, the property values of the adjacent properties, zoning and any measures the City could take to assist the adjacent property owners. U.S. EPA has agreed to attend this meeting and it is now being scheduled. Second, you would like us to send out a written notice of the ROD to the legislative representatives for the area and the City representatives. A press release will be sent to the local media, the legislative representatives and the City.

Secretary Meyer's signature block is marked by the yellow tab. Please return the document to me when done. Should you have any questions, do not hesitate to contact me or Jane Lemcke. Thank you.

Attach.

cc: Doug Rossberg - LMD
Terry Koehn - NWD

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

N.W. Mauthe Site
725 South Outagamie Street
Appleton, Wisconsin

Statement of Basis and Purpose

This decision document presents the selected remedial action for the N.W. Mauthe Site located in Appleton, Wisconsin. The remedial action was selected in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this site.

The State of Wisconsin and the U.S. Environmental Protection Agency (U.S. EPA) concur with the selected remedy.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Selected Remedy

This response action addresses remediation of soil and groundwater contaminated primarily with chromium from prior electroplating operations at the N.W. Mauthe Site. The principal threats posed by conditions at the site include ingestion, dermal contact and inhalation of impacted soils, surface water and groundwater.

The selected remedy for the N.W. Mauthe Site entails:

- Demolition and removal of the buildings on the N.W. Mauthe property, with proper management and disposal of the building debris;
- Removal and proper disposal of the containerized waste currently stored on-site;
- Excavation of soils with a total chromium concentration greater than 500 mg/kg, removing approximately 80% of the chromium contaminant mass, including the removal of those soils from beneath the railroad tracks if it is determined during RD that it is feasible to do so in a way that allows the railroad reasonable and normal use of the tracks;
- Off-Site treatment (reduction and solidification) of the excavated soils which are determined to be hazardous and subsequent off-site disposal;
- Backfilling the excavation with clean soils, and converting the excavated area into a groundwater

collection sump if it is determined during RD that the addition of such a sump would significantly hasten achievement of remedial goals for soil and groundwater, including containment and/or control of contamination in groundwater and ultimate compliance with groundwater ARARs;

- Capping the site with two feet of clay soil and topsoil, with the establishment of a vegetative cover;

- Installation of groundwater collection trenches and construction and operation of a groundwater treatment (chemical reduction and precipitation with possible VOC and cyanide removal, if is determined to be necessary) facility with discharge to the sanitary sewer, to contain and/or control groundwater contamination with ultimate compliance with groundwater ARARs;

- Improvement or installation of foundation drain systems and cleaning, painting or sealing of basement walls and floors, as needed, for homes or businesses in the area of the site, to prevent seepage of contaminated water into the buildings;

- Institutional controls, such as deed restrictions or easements and site access controls that are intended to prevent access, excavation, disturbance of the newly constructed cap, future soil excavation in the railroad corridor for areas in the corridor where contaminated soils will remain and installation of drinking water wells;

- Monitoring of the effectiveness of the groundwater treatment system and groundwater quality; and

- Operation and maintenance of all systems.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally 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, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on-site above health based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Michelle D. Jordan for Valdas V. Adamkus
Regional Administrator, U.S. EPA Region 5

3-31-94
Date

George E. Meyer
George E. Meyer
Secretary, Wisconsin DNR

3.24.95 94
Date

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Appleton, Wisconsin

I. SITE DESCRIPTION, HISTORY AND BACKGROUND

The N.W. Mauthe site is a former electroplating facility located at 725 South Outagamie Street in Appleton, Wisconsin as depicted in **Figure 1**. Located in a neighborhood of mixed commercial, light industrial, and residential properties, the 2-acre site is roughly triangular in shape and is bordered by Melvin Street on the north, a parking lot owned by Miller Electric and Manufacturing Company on the west, and the Wisconsin Central Transportation Corporation (previously the Fox River Valley Railroad Corporation) railroad right-of-way on the southeast. Private residences are located immediately southeast of the railroad tracks and on the north side of Melvin Street.

Norbert W. Mauthe founded the Wisconsin Chromium Corporation (WC) in 1946. Until 1960 WC operated from a facility at 1522 West Melvin Street, at which time WC moved to 725 South Outagamie Street. WC leased the property at 725 South Outagamie Street until 1966, when Norbert Mauthe purchased the property. From that time on, WC leased the property from Norbert Mauthe. Hard chromium plating took place in the on-site building referred to as the Chrome Building from 1960 to 1976. In 1976, WC sold most of its chrome plating assets, and chromium plating operations ceased at the site. Norbert Mauthe then formed a new company known as the N.W. Mauthe Company.

Under the name of N.W. Mauthe Company, electroplating of zinc, cadmium, copper, and possibly silver was conducted in the on-site building referred to as the Zinc Building, from 1978 until 1987. After operations ceased in August 1987, all usable plating equipment and solutions were removed. The property is presently owned by Carol Mauthe, Mr. Mauthe's widow.

Hard chromium plating is a process by which chromium is plated directly onto a base metal. Much of WC's chromium plating was conducted on roller drums for the paper industry. The source of the chromium was concentrated chromic acid. During the electroplating operation the rollers were first rinsed with a chlorinated solvent to remove surface oils. They were then partially submerged in the chromic acid bath while current was passed through the roller drum.

Hydrogen gas and chromic acid mists generated from the chromium plating process were blown outside of the building by a ventilating fan, while splashes, drips, and spills from the plating and degreasing activities were directed to a shallow floor trench and channeled into the sanitary sewer system. The plating bath solutions reacted with components of concrete which produced cracks and pits within trenches and the floor itself. This allowed infiltration of chromium and solvent solutions into the soil and groundwater below the building.

In March 1982, ponded yellow-green water in the railroad ditches adjacent to the N.W. Mauthe property was reported to the Wisconsin Department of Natural Resources (WDNR). There was also a report of yellow-green water being pumped from a nearby basement foundation drain sump. In April and May 1982 over 30,000 gallons of water were pumped from the puddles and transported to a municipally-owned wastewater treatment plant (POTW), where it was discharged into the municipal system.

In May 1982, the WDNR installed a shallow drain system to collect groundwater and contaminated surface water. Collected water was again transferred to the POTW. Approximately 1.3 million gallons of contaminated water were removed. The system has been inactive since late 1984.

In November 1982, the WDNR contracted for the drilling and sampling of soil borings, and installation of 16 monitoring wells. Significant concentrations of chromium were detected in soil and water at the site, with the apparent source centered under the southeast portion of the Chrome Building.

From 1982 to 1985, the WDNR attempted to gain site remediation from Mauthe. In 1985, Mauthe was ordered to develop a cleanup plan by the Outagamie County Circuit Court, and he subsequently hired a consulting firm. In 1986, the consultant proposed site cleanup plans, which were subsequently rejected by the WDNR. In 1986 Mauthe's insurance carrier rejected claims for incurred costs and remedial efforts by Mauthe ceased.

In October 1984, contractors for the WDNR regraded the site and applied an asphalt cover to channel surface runoff into a new storm sewer inlet and limit infiltration of surface water into the ground. The coat of liquid asphalt rapidly deteriorated.

A federal Superfund Field Investigation Team (FIT) a contractor for the U.S. Environmental Protection Agency (U.S. EPA), conducted a site inspection in October 1984. The site Hazard Ranking Score (HRS) was not high enough for inclusion on the National Priorities List (NPL). Therefore, in June 1988, at the request of the WDNR, the U.S. EPA formally proposed that the site be placed on the NPL as Wisconsin's number 1 priority site. The N.W. Mauthe site was added to the NPL in March 1989. In September 1988, the WDNR signed a Cooperative Agreement with the U.S. EPA to conduct a fund financed, state-lead Remedial Investigation/Feasibility Study (RI/FS).

In May 1987, a contractor of AT&T installed a fiber optics cable along the railroad right-of-way adjacent to the site utilizing a train-mounted plow. In August 1987, a contractor of U.S. Sprint also installed a fiber optics cable in a trench between the railroad tracks. The City of Appleton Health Department and the WDNR were notified that several workers developed skin irritation and rashes, apparently caused by contact with the water and soil in the U.S. Sprint trench. The WDNR requested that U.S. Sprint restore the site to its prior condition and take measures to ensure that the trenches would not serve as conduits for transport of contaminated groundwater.

In November 1987, U.S. Sprint and AT&T cooperatively installed a joint conduit system for

the fiber optics cables outside of the contaminated area. The cables originally installed along the railroad right-of-way were abandoned and antiseep plugs were installed along the original routes.

In May 1990, a Preliminary Health Assessment was prepared by the Wisconsin Division of Health (WDOH) for the U.S. Agency for Toxic Substances and Disease Registry (ATSDR). The assessment concluded that the site posed a public health concern because human exposure to hexavalent chromium, cadmium and other contaminants may occur through contact with or ingestion of contaminated soil, water, or inhalation of dust. The report recommended avoiding contact with the site and suspected contaminated soil, water, and also with precipitates noted on neighboring basement walls.

Warzyn Engineering, under contract to the WDNR, compiled a Site Evaluation Report (SER) for the N.W. Mauthe site summarizing existing information. In October 1990 they also submitted a RI/FS Work Plan, however, the WDNR did not authorize Warzyn to perform the RI/FS and opened it up for bid.

Also, in 1991, the U.S. EPA Emergency Response Program installed a fence around the N.W. Mauthe site, and excavated some of the highly contaminated soils and placed them into containers. The soils were excavated from along the southeast side of the Chrome Building and from a tank pit inside the building. U.S. EPA also steam cleaned the walls, floors and ceilings of the office areas and the floors and uninsulated portions of the Zinc and Chromium Buildings. Miscellaneous debris was decontaminated and disposed of or placed in containers. The containers are located in the on-site buildings. Decontamination water was pretreated and discharged to the municipal POTW.

WDNR installed a groundwater diversion system in the basement of the 1414 West Second Street residence in 1991 to divert contaminated groundwater flow around the home. The system, called the Electro-Pulse Shield, uses electrical current to alter the direction of groundwater flow. The Electro-Pulse Shield appears to have reduced seepage into the basement.

Under contract to the WDNR, CH2M Hill conducted a RI/FS at the N.W. Mauthe site beginning in November 1991. The RI/FS included the installation of monitoring wells; surface and subsurface soil sampling; test pit excavation; groundwater, residential sump pump, and sewer water sampling; hydraulic conductivity testing; surface water sampling; and videotaping of the sanitary and storm sewer lines. A final RI Report, dated February 4, 1993, was approved by the U.S. EPA and the WDNR by letters dated August 20, 1993 and September 28, 1993, respectively. A final FS Report, dated May 1993, was approved by the U.S. EPA and the WDNR by letters dated September 24, 1993 and October 20, 1993, respectively.

II. COMMUNITY PARTICIPATION

A fact sheet summarizing site background and history was distributed to the public in October 1989. A second fact sheet outlining the RI sampling program was distributed in June 1991. A RI initiation meeting was also held at that time at the Appleton Police Department at 222 S. Walnut Street. In January 1993 a letter was distributed to persons on the site mailing list to provide an update on the status of the site and its investigation. The RI and the FS Reports were both made available to the public in October 1993 through placement in the Administrative Record. The Proposed Plan was distributed to members of the current mailing list and made available to the general public in October 1993. Notice of availability of the Proposed Plan was included in an advertisement in the Appleton Post Crescent on October 13, 1993. Press releases were also sent to local media to announce the availability of the Proposed Plan on October 5, 1993.

A public comment period was provided from October 15, 1993 through November 15, 1993. A public meeting was held on October 27, 1993, where comments were accepted verbally and in writing. The public meeting was held at the Appleton Police Department to discuss the alternatives evaluated in the FS and describe the remedial alternatives presented in the Proposed Plan. All comments which were received by the WDNR prior to the end of the public comment period, including those expressed verbally at the public meeting, were considered in making the final decision and are addressed in the Responsiveness Summary.

All of the documents discussed above, are available in the Administrative Record maintained at the Appleton Public Library at 225 N. Oneida Street, the WDNR's central office at 101 S. Webster Street (Bureau of Solid and Hazardous Waste, GEF 2, 3rd Floor), Madison, Wisconsin and at the WDNR Lake Michigan District Office in Green Bay, Wisconsin. A copy of the Administrative Record is also available at the U.S. EPA offices at 77 West Jackson Boulevard (7th Floor Records Center), Chicago, Illinois.

III. SCOPE AND ROLE OF RESPONSE ACTION

Contaminated soils and surface water at the site pose a threat to human health and the environment because of the risks from possible ingestion or dermal contact. Contaminated groundwater at the site poses a potential future threat to human health and the environment because of the risks from possible ingestion of or dermal contact with the groundwater should a well be installed at the site or should the contaminated groundwater reach the bedrock aquifer, which is used as a regional drinking water source.

The selected remedial action, described below as Alternative 4, Hot Spot Removal, addresses the principal threats posed by site conditions by eliminating the potential for direct contact with contaminants of concern, containing and/or controlling the groundwater contamination at the site and reducing the levels of contamination in the groundwater.

IV. SUMMARY OF SITE CHARACTERISTICS

A. Overview

The following is a summary of the RI results. The RI determined the nature and extent of contamination at the site.

The City of Appleton lies within the drainage basin of the Fox River, which flows to the northeast and discharges to Green Bay. The Fox River is located about a 1/2 mile to the southeast of the site. Surface water from the site either flows to the storm sewer system along Melvin Street or the railroad tracks which ultimately channels water to the Fox River.

Topography in the area of the site is generally flat with the investigated area roughly at an elevation of 805 feet above mean sea level (msl). The majority of the site itself is currently covered by the two on-site buildings or gravel parking areas. Soil is exposed at the surface primarily in the southwest corner of the site and along Melvin Street.

There are a variety of fine-grained soils beneath the site that are approximately 70 feet thick, which have been divided into upper and lower till units. These soils are underlain by dolomitic bedrock. The bedrock aquifer is used as a drinking water supply for a limited number of private wells within three miles of the site, however, the area surrounding the site is supplied by a municipal water system. The City of Appleton obtains its water supply from Lake Winnebago and does not depend on wells. Vertical fractures and thin sand and silt lenses were observed in the clay in soil borings completed during the RI. These fractures and lenses are thought to provide the primary flow paths for groundwater movement from the site. The fractures primarily occur in the top 15 feet of the soil column. Groundwater flow in the upper till unit is to the southeast with groundwater flow rates estimated to range between 0.01 foot to 112 feet per year.

Soil and groundwater sampling results from the RI indicate that the greatest concentrations of contaminants are under the southeast corner of the Chromium Building, along the floor trenches and sanitary sewer lateral that drained its process area, and beneath a trough in the Zinc Building. The chemicals detected above background levels or the State of Wisconsin's Preventative Action Limits (PALs) for groundwater include chromium (hexavalent and total), zinc, cadmium, cyanide, copper, lead, trichloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene, and toluene. Benzene and xylenes were detected in samples collected near a fuel oil distributor and do not appear to be attributable to the N.W. Mauthe site, which is not known to have had underground or above ground fuel storage tanks.

The chlorinated hydrocarbons and hexavalent chromium in the N.W. Mauthe site soils are relatively mobile and available to leach into the groundwater. Due to the site's low permeability soils and relatively slow groundwater flow, contaminant movement in groundwater is thought to be mainly through sand and silt lenses and fractures in the clay. Both soil and groundwater contamination appear to be dispersed preferentially along the

railroad ballast and sanitary sewer lateral trenches extending from the Chromium Building.

B. Surface Soil

Twelve surface soil samples were collected and analyzed for total chromium, cadmium, zinc and cyanide. **Figure 2** shows the surface soil sampling locations and the concentrations of contaminants detected.

Chromium levels above background were detected in most of the surface soil samples collected. Cyanide was not detected above background levels (2 mg/kg) in any off-site soil sample. Off-site surface soil samples contained chromium, cadmium, and zinc at concentrations above background levels.

C. Subsurface Soils

Subsurface soil contamination was detected to a maximum depth of 25 feet, and found to extend over the entire N.W. Mauthe property, northeast and southwest along the railroad and southward to the residence at 1414 West Second St. Inorganic subsurface soil contamination is much more extensive than VOC contamination.

Figure 3 depicts the horizontal extent of total chromium contamination in the subsurface soils at the site. Concentrations of cadmium, chromium, zinc, and cyanide detected at each sample location are also shown in the figure. Sample locations outside of the background (32 mg/kg) total chromium concentration contour did not contain other metals over background levels. Therefore, the areas contaminated with cyanide and other metals generally coincide with the areas with the highest levels of chromium-contaminated soils.

Figure 4 depicts the horizontal extent of VOC contamination in subsurface soils. VOC compounds have been grouped into three categories; benzene, toluene, ethylbenzene and xylenes (BTEX); chlorinated hydrocarbons; and, 2-butanone. **Figure 4** also indicates the interval at which the maximum amount of contamination was detected in that boring. The presence of chlorinated hydrocarbons may be attributed to the degreasing solvents used at the site, whereas BTEX contamination is typically associated with fuels, such as gasoline, fuel oil or diesel fuel. The source of the 2-butanone is unknown, although it may also be related to fuel spills or may represent a laboratory contaminant. 2-Butanone was detected in samples collected from several locations.

The VOC subsurface soil contamination appears to be centered around the Chromium Building and around the Zinc Building. The major compounds detected were 1,1,1-trichloroethane and trichloroethene. The VOC-contaminated area is enclosed within the chromium-contaminated area and the areas with the highest levels of VOC- contaminated soils generally coincide with the areas with the highest levels of chromium-contaminated soils.

D. Groundwater

Groundwater elevations and samples were taken from 34 monitoring wells. Shallow wells were installed to depths of 15 feet or less, while deep wells were installed to a maximum depth of 72 feet.

Contours from water level measurements in wells show a general southeastern groundwater flow direction as shown on **Figure 5.** Downward vertical hydraulic gradients are indicated, suggesting the potential for groundwater to flow from the upper saturated soils to the lower soils towards the underlying bedrock.

Groundwater sampling of monitoring wells was performed at two separate times during the RI (Rounds 1 and 2). Water samples from six residential foundation drain sumps were also collected. Samples were analyzed for VOCs, metals (including total and hexavalent chromium) and cyanide. Results from both rounds indicate that total chromium groundwater contamination in excess of Maximum Contaminant Levels (MCLs) set by U.S. EPA under the Safe Drinking Water Act and Wisconsin PALs and Enforcement Standards (ESs) extends over much of the area bordered by Melvin, Outagamie, and Second Streets as indicated on **Figure 6**.

Hexavalent chromium-contaminated groundwater extends over much of the same area. It appears that most of the chromium in the groundwater exists in the hexavalent form. All of the wells contained detectable levels of total chromium except W5C & W1B. Levels of cyanide in excess of both Federal and State criteria and standards were detected in two shallow wells (MW26R and MW34). A comparison of 1983, 1986, and 1992 groundwater total chromium data shows that the horizontal extent of contamination did not change greatly, but indicates that the chromium contamination is moving downward.

Figure 7 depicts VOC concentrations in groundwater, again categorizing the compounds into chlorinated hydrocarbons, BTEX, and 2-butanone. Trichloroethene and 1,1,1-trichloroethane were the main compounds detected, as well as 1,1-dichloroethane, 1,1-dichloroethene, and 1,2-dichloroethene. The VOC-contaminated groundwater appears to be located mostly on the north side of the railroad tracks. The majority of the VOCs were detected in the shallow wells. BTEX contamination was primarily detected near the oil distributor facility east of Outagamie Street. The extent of VOC-contaminated groundwater appears smaller than the extent of chromium contamination and is contained within the chromium-contaminated area. **Table 1** presents the maximum concentrations of the contaminants of concern observed in the various media.

E. Surface Water

Four surface water samples were collected from puddles in back of the Chromium Building and in the ditch along the railroad tracks. Water samples were also collected from the shallow groundwater collection system crocks that were installed in 1982. The source of the

water in the crocks is likely to be a combination of groundwater seepage and surface water.

Every surface water sample contained elevated levels of chromium. Three of the sample locations contained VOCs above detection limits. The main VOCs detected were 1,1,1-trichloroethane and trichloroethene.

F. Sewer Lines

A potential means of contaminant transport is through or along sanitary or storm sewer lines, or along utility trenches. For this reason a test pit was excavated near the corner of Melvin Street and Outagamie Street and several soil borings were drilled near sewer lines on Second Street and at the Outagamie Street/Second Street intersection. Storm and sanitary sewers were also sampled to investigate the possibility of contamination entering the system and being transported away from the site.

Two soil samples collected from the test pit did not show inorganic contamination above background levels. Chlorinated hydrocarbons were detected in the test pit; however, they appear to be from another source as chromium was not detected.

Soil borings drilled along storm and sanitary sewers along Outagamie and Second Streets showed neither elevated chromium levels nor chlorinated hydrocarbons above detection limits.

A total of four storm and sanitary sewer grab samples were collected from manholes along Second Street, Outagamie Street and Melvin Street as indicated on **Figures 5 and 6**. High concentrations of chromium and low levels of VOCs were detected in a manhole along Melvin Street (SG1). It appears that the pooled water at the bottom of the manhole, from which the sample was obtained, is groundwater infiltration. No hexavalent chromium and only low levels of total chromium were detected in the other samples.

A dye study showed the sanitary laterals from the N.W. Mauthe site to the sewer system to be clogged or collapsed. The Melvin Street sanitary line contains low spots and shifting in the joints based on a video survey. Water was noted to collect in the low spots with some infiltration observed. The storm sewer was found to be in better condition, (e.g., fewer low spots, less shifting and probably less infiltration).

The condition of the sewer lines along Melvin Street coupled with the presence of contaminants in the sewer grab samples suggest that the sewers in this area are acting as conduits for the transport of contaminated groundwater.

V. SUMMARY OF SITE RISKS

A. Overview

The RI included an evaluation of risks at the site to human health and the environment if no remedial actions were taken. This process is called a Baseline Risk Assessment (Risk Assessment). The Risk Assessment involves assessing the toxicity, or degree of hazard, posed by substances related to the site, and describing the routes by which these substances could come into contact with humans and the environment. Separate calculations are made for those substances that can cause cancer (carcinogenic) and for those that can cause other, non-carcinogenic health effects. The results are also used to identify the nature and extent of remediation required.

Cancer Potency factors (CPFs) have been developed by U.S. EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes under estimation of the actual cancer risk highly unlikely. CPFs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by U.S. EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic effects. RfDs, which are expressed in units of mg/kg-day are estimates of the lifetime daily exposure levels for humans, including sensitive individuals, below which no adverse non-carcinogenic effects will be suffered. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD by dividing the estimated dose by the Reference Dose to obtain the Hazard Index (HI). RfDs are derived from human epidemiological studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects upon humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse non-carcinogenic effects to occur.

The National Oil and Hazardous Substance Contingency Plan (NCP) established acceptable levels of carcinogenic risk for Superfund sites ranging from 1 in 10,000 to 1 in 1 million ($1x10^{-4}$ and $1x10^{-6}$) excess cancer cases and a HI of 1 or below for noncarcinogenic effects. The NCP requires that the Risk Assessment consider exposure scenarios both for current land use and for a conservative reasonable future use.

B. Media and Contaminants of Concern

The media and contaminants of concern at the N.W. Mauthe site are listed in **Table 1** and are discussed above. **Table 1** presents the maximum concentration detected for those parameters, by individual media, which were determined to be of potential concern in the Risk Assessment. In general, they are associated with the plating industry, and include organic solvents, metals and cyanide.

C. Exposure Scenarios and Methodology

The noncarcinogenic risk and excess lifetime cancer risk for each exposure scenario associated with both current and potential future land use are discussed below and are summarized in **Tables 2 & 3**.

1. Current Land Use - The current land use scenarios involve a trespasser exposed to surface and subsurface soils on-site, and residents exposed to surface soil off-site.

The results of the risk characterization for current land use show that noncarcinogenic risks exceed a Hazard Index (HI) level of 1 for several of the exposure scenarios while excess lifetime cancer risks slightly exceed a risk level of 1×10^{-6}. The main contributors to risk are surface soils containing hexavalent chromium and cadmium. The reasonable maximum exposure assumptions for direct contact with soil for the trespassing toddler, and adult exceed the target HI level of 1 for current land use. The average assumptions and average concentration combination are below the U.S. EPA's acceptable risk level for both excess lifetime cancer risk and noncarcinogenic risk.

As part of the Risk Assessment, HI levels were calculated for the contaminants of concern in soils at the N.W. Mauthe site. A hexavalent chromium concentration in soil, representing a HI level of 1 for dermal contact was determined to be 570 mg/kg. A hexavalent chromium concentration in soil, representing an HI level of 1 for ingestion was determined to be 780 mg/kg. HI levels were also calculated for groundwater. The concentration of chromium in water which represents an HI level of 1 for occupational dermal exposure is 5000 ug/l. While levels of chromium above 5000 μg/l were detected in basement sumps, those sumps were not expected to be a probable pathway of concern for direct contact.

2. Future Land Use - The main difference between current land use and future land use is the potential for residents to move on-site and have contaminated groundwater as their source of water for household use. The high concentration of chromium in groundwater causes the noncarcinogenic risk from residential use from ingestion and showering to significantly exceed the acceptable noncarcinogenic risk level (HI level of 1). The excess lifetime cancer risk is slightly greater than the U.S. EPA's acceptable risk level of 1×10^{-4}, mainly due to the presence of 1,1-dichloroethene and trichloroethene.

Inhalation of contaminants from soil particulates or from volatiles during showering does not appear to be a significant pathway. Ingestion of and dermal contact with cadmium or chromium in soil or groundwater are the main contributors to potential future risk at the site.

The direct contact scenarios with either surface or subsurface soil show that the hazard index is greater than the U.S. EPA's acceptable risk level for a child. Cadmium and chromium are again the chief contributors to the risk. Inhalation of contaminants from soil particulates does not appear to be a significant pathway.

3. Uncertainty of Risk Assessment

There are other scenarios that could contribute to the risk that have not been specifically quantified. The consumption of garden vegetables grown in soil containing chromium and cadmium could add to the daily intake of these contaminants. Likewise, contaminated groundwater entering the basements of homes could add to the daily intake through ingestion or dermal contact with residues or through inhalation. Short-term exposures, such as dermal contact with surface water from puddles or contaminated soil could also add to the total intake of contaminants.

Conservative exposure assumptions are used to produce reasonable maximum intakes and risk for the scenarios that have been quantified. Therefore, the contribution to risk from the scenarios noted above should be accounted for by the conservative risk calculations.

Actual or threatened releases of hazardous substances from this site, if not addressed by the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

VI. REMEDIAL ACTION OBJECTIVES

A. Direct Contact Objectives

There are several remedial objectives that are of a short term nature. These are primarily measures to reduce the potential for direct contact with contaminated media such as contaminated soil, surface water and groundwater at the site. Specific remedial action objectives are to prevent direct contact or ingestion of ponded water, groundwater or soils or debris with contaminants producing a total excess cancer risk greater that 1×10^{-6}, or a HI level that exceeds 1 and to prevent the discharge of water that exceeds state or federal surface water criteria to local storm sewers which would ultimately discharge to the Fox River.

B. Groundwater Objectives

The NCP at Section 300.430(a)(1)(iii)(F), provides that under CERCLA, U.S. EPA will return usable groundwaters to their beneficial uses wherever practicable, within a timeframe

that is reasonable, given the particular circumstances of the site. When restoration of groundwater to its beneficial uses is not practicable, U.S. EPA expects to prevent further migration of the contaminant plume, prevent exposure to the contaminated groundwater, and to evaluate further risk reduction.

The initial groundwater objective is to protect the underlying bedrock aquifer and contain and/or control the further migration of contaminants. The long term remedial objective for the N.W. Mauthe site is to reduce the contaminant concentration in groundwater to meet state and/or federal groundwater quality standards, whichever are more stringent.

In addition to federal standards, or Maximum Contaminant Levels (MCLs), the State of Wisconsin has established groundwater quality standards in NR 140, Wisconsin Administrative Code (Wis. Adm. Code). Wisconsin's groundwater code, which is an applicable requirement for remediation of the site, is more stringent than federal standards. NR 140, Wis. Adm. Code, requires remediation of groundwater to meet numeric health based standards.

Public health-related groundwater quality standards have been established for several of the compounds found at the site. Many inorganic chemicals are naturally occurring in groundwater with natural concentrations of chromium in the range of 1.0 to 5.0 μg/L or parts per billion (ppb). The NR 140 Wis. Adm. Code's Enforcement Standard (ES) for total chromium is 50 μg/L and the Preventive Action Limit (PAL) is 5 μg/L. The federal MCL is 100 μg/L. **Table 4** presents the state and federal standards for compounds that have been detected at the N.W. Mauthe site.

In light of the site hydrogeologic conditions, achievement of NR 140 Wis. Adm. Code standards and MCLs may take a very extended period of time using currently existing technology. As a result, five (5) year reviews conducted pursuant to Sections 300.430 (f)(4)(ii) and 300.430 (f)(5)(iii)(C) of the NCP will assess whether newly developed technologies exist to achieve NR 140 Wis. Adm. Code standards in a significantly shorter timeframe. Should a review determine that it is not possible at that time to achieve the groundwater standards or to achieve further reductions, then one of the following options may be exercised:

- Continue with the action without modifications and wait until the next review to reassess the situation;

- Consider establishing an Alternative Concentration Limit under the substantive requirements of NR 140.28 Wis. Adm. Code, which can be no higher than the ES;

- Consider a technical impracticability waiver under Section 121(d) of CERCLA, which may be used to set an alternative groundwater goal higher than the ES or establish other approaches to groundwater containment or remediation that are protective of human health and the environment.

In no event, however, will groundwater containment and control activities be discontinued until groundwater is cleaned to the standards designed to eliminate unacceptable health risks based on dermal contact with the groundwater or ponded surface water.

Contaminated groundwater can appear at the surface and express itself as contaminated ponded surface water. Therefore, contaminated groundwater must be controlled and remediated to meet standards designed to eliminate unacceptable health risks based on dermal contact. Remediation of contaminated groundwater to these levels is also needed to remove hazards associated with digging in soils saturated with contaminated groundwater.

VII. DESCRIPTION OF ALTERNATIVES

Six remedial action alternatives were carried through a detailed analysis in the Feasibility Study (FS) prepared for the site. Detailed descriptions of each of the six remedial alternatives are presented in the FS. Brief descriptions of the six alternatives are presented on the next several pages. A summary of the components and costs associated with the six alternatives is presented in **Table 5.**

A. Alternative 1 - No Action

The no action alternative was developed as required by the NCP to serve as a basis for comparison. Under the no action alternative, no remedial activities would occur that would reduce the volume, toxicity, or mobility of the hazardous substances at the site. The only future activities would include institutional controls, such as access and deed restrictions, and monitoring.

Access to the site would be restricted by fences. Land use restrictions for the N.W. Mauthe property would include prohibition of subsurface work. Land use along and under the railroad tracks would be restricted to its current use. Restrictions could be implemented on the residential properties immediately to the south of the railroad tracks to require health and safety programs for subsurface activities and to prohibit groundwater use. The use of private water wells within the limits of the City of Appleton is regulated by a Well Abandonment and Cross Contamination Ordinance that is administered by the municipality through NR 811, Wis. Adm. Code. Under this ordinance a permit must be obtained prior to well installation. Arrangements will be made with the City to discourage well installation in the area of the site through enforcement of this ordinance. In the future it might be necessary to extend the deed restrictions to areas further downgradient of the estimated extent of groundwater contamination if groundwater monitoring shows the contamination has migrated further. Other deed restrictions would be implemented that would prohibit future property development. It will be necessary to negotiate with property owners to obtain their signature on any property deed restriction that would affect their property.

Concerns exist regarding the effectiveness of certain institutional controls. It may be difficult for the U.S. EPA or WDNR to obtain property owners' signatures on deed restrictions and to enforce their terms. However, deed restrictions may be supplemented by the City of Appleton's enforcement of local ordinances, zoning regulations and building permits to regulate property use in the area. The City will be asked to further restrict property use in the area through these mechanisms.

Selected groundwater monitoring wells would continue to be sampled to assess whether the nature and extent of contamination is changing and provide early warning if substantial changes occur.

Duration: 3 to 5 months for Construction
Groundwater Restoration* - Over 4,300 Years to Hazard Index <1 - Over 16,000 Years to PALs
Capital Cost: $150,000, Annual O&M: $17,000, Total Present Worth: $430,000
* Natural attenuation will eventually result in reductions in the concentrations of contaminants observed.

B. Alternative 2 - Direct Contact Control

Alternative 2 would consist of demolition of existing on-site buildings, removal, treatment, and disposal of the building material and debris and stored containers of soil. It would also include construction of a soil cover and the use of institutional controls discussed in Alternative 1. Additionally, the basement floors and walls of the homes and businesses within the area of contaminated groundwater would be cleaned and painted or sealed to reduce the potential for infiltration of contaminated water; and to remove the potential for direct contact with contaminants in the basements.

Before soil cover installation, containers of soil currently located on-site would be removed, treated, and disposed of. The site buildings would be decontaminated, demolished and transported off-site for treatment and disposal.

The soil cover would extend over the area within the N.W. Mauthe property boundaries and south along the railroad tracks. The extent of the soil cover is shown on **Figure 8**. This area was selected because it covers the soil with chromium concentrations resulting in a HI level exceeding 1. The cover would be constructed to satisfy substantive NR 506.08(3), Wis. Adm. Code, solid waste landfill cap standards, and would consist of at least two (2) feet of imported clay soil with topsoil over it. The topsoil would be seeded and a vegetated cover established and maintained.

Surface water runoff controls would be constructed at the cover's perimeter. The runoff controls would divert surface water to the storm sewer.

Operation and maintenance for this alternative would include inspection and maintenance of the cover and the site in general. The hazardous substances would be left in place under the

soil cover and as such, the soil cover and institutional controls would need to be maintained indefinitely.

Duration: 3 to 5 Months for Construction
Groundwater Restoration* - Over 4,300 Years to Hazard Index <1 - Over 16,000 Years to PALs
Capital Cost: $940,000
Annual Operation and Maintenance Cost: $34,000
Total Present Worth: $1,600,000
*Natural attenuation will eventually result in reductions in the concentrations of contaminants observed.

C. Alternative 3 - Groundwater Collection

Alternative 3 would include the construction of a groundwater collection and treatment system, removal of site buildings and debris, construction of a soil cover, and implementation of institutional controls. The soil cover would be the same as that described for Alternative 2, as would the building and debris removal and institutional controls. Alternative 3 would also include cleaning and painting or sealing the basements of homes or businesses as described in Alternative 2.

A groundwater collection system would be installed as shown in **Figure 8**. This figure shows a conceptual layout for collection trenches; the final layout would be established during the Remedial Design (RD) phase of the project. A trench would be constructed parallel to the railroad tracks to prevent further migration of hazardous substances from the N.W. Mauthe property. A second trench would be located to the west of the N.W. Mauthe property, extending from the railroad tracks to Melvin Street. A third trench would be constructed along Outagamie and Second Streets to collect contaminated groundwater that had already migrated away from the property.

The placement of the trenches would be done in a manner to avoid damaging homes or utilities, unless absolutely necessary. The majority of the collection trenches would be approximately 16 feet deep. The trench parallel to the railroad tracks and the trench west of the site would be excavated to a depth of approximately 25 feet to address deeper on-site contamination.

Perforated polyvinyl chloride (PVC) drain pipe would be installed in the bottom of the trenches, with the excavation backfilled with gravel and imported soil near the surface. A geotextile layer would be placed between the gravel and the soil to avoid migration of fine material into the gravel. Construction near the railroad tracks would require safeguards and coordination with the railroad to avoid significant interruptions of rail service and to avoid hazards to site workers. New or improved foundation drain systems around the existing homes and businesses in the area of groundwater contamination would be installed and tied into the collection trench system.

Collected groundwater would be treated in an on-property treatment system, to meet local pretreatment discharge limits before release to the City of Appleton sanitary sewer system.

Table 6 lists the POTW discharge limits. If this discharge option was not available, a discharge to the Fox River through a storm sewer could be implemented, but would require additional treatment. The need for VOC or cyanide treatment, in addition to treatment for chromium, would be evaluated during RD considering both discharge and air emission limits (Tables 6 and 7). Sludge from the treatment process would be dewatered in a filter press and would require treatment to meet applicable requirements prior to disposal.

As with Alternative 2, hazardous substances would remain in place if Alternative 3 was implemented. Maintenance and monitoring would continue indefinitely. Operation and maintenance would be required for the groundwater collection and treatment system, the cover, monitoring, and institutional controls. The other elements of Alternative 3 would also require maintenance and monitoring as discussed in Alternative 2.

Duration: 5 to 10 Months for Construction
Groundwater Cleanup - Over 280 Years to Hazard Index <1 - Over 1,050 Years to PALs
Capital Cost: $4,600,000
Annual Operation and Maintenance Cost: $210,000
Total Present Worth: $8,100,000

D. Alternative 4 - Hot Spot Soil Removal

Alternative 4 would include the construction of a groundwater collection and treatment system, removal of site buildings and debris, construction of a soil cover, basement cleaning/painting and implementation of institutional controls. These remedial elements are described above in the summaries of Alternatives 1 through 3. Alternative 4 would also include removal of chromium, VOC and cyanide contaminated soil containing a large percentage of the contaminant mass.

In addition to meeting the remedial action objectives, Alternative 4 accomplishes the CERCLA objective of reducing the toxicity, mobility, or volume of hazardous substances. Soil containing more than 500 mg/kg of total chromium would be removed, treated, and disposed of off-property. This removal would result in approximately an 80 percent reduction of the chromium contaminant mass and a large percentage of the cyanide and VOC contaminant mass.

The soil that would be addressed in a hot spot removal is shown in **Figure 8**, as are the other components of Alternative 4. It is estimated that a total of 6200 cubic yards of soil would be removed. The hot spot removal excavation may be converted into an additional collection sump. The feasibility of this conversion will be determined during the design phase. Additionally, removal of soils from beneath the railroad tracks will be considered if it is determined during the design phase that it is feasible to do so in a way that allows the railroad reasonable and normal use of the tracks.

The maintenance and monitoring requirements for Alternative 4 would be similar to those discussed for Alternative 3. In general, the duration of maintenance and monitoring would

be indefinite. Because this soil removal would remove an estimated 80 percent of the chromium contaminant mass, the time required to meet groundwater remedial objectives may be reduced, compared to Alternative 3. However, a long period of time would still be required.

Duration: 5 to 10 Months for Construction
Groundwater Cleanup - Over 270 Years to Hazard Index <1 - Over 1,012 Years to PALs
Capital Cost: $6,640,000
Annual Operation and Maintenance Cost: $220,000
Total Present Worth: $10,090,000

E. Alternative 5 - In Situ Soil Remediation

Alternative 5 would include removal of site buildings and debris, construction of a groundwater collection and treatment system, construction of a soil cover, basement cleaning/painting and implementation of institutional controls. These remedial elements are described above in the summaries for Alternatives 1 through 3. Additionally, this alternative includes in situ (in-place) treatment of contaminated soil. It is similar to Alternative 3 with the addition of the in situ treatment of soil.

In addition to meeting the remedial action objectives, in situ, deep soil mixing would result in a reduction of the toxicity and mobility of the hazardous substances in soil. It does not reduce the volume of contaminated soil at the site because the contaminant mass is left in place. The deep soil mixing would stabilize the soil mass to reduce the mobility of contaminants.

Under Alternative 5, soil with total chromium concentrations exceeding the background concentration would be treated using deep soil mixing technologies. Reducing agents and stabilization chemicals would be added to the soil to reduce hexavalent chromium to trivalent chromium and stabilize the soil mass. The deep soil mixing would be performed using a large crane with augers that bore into the soil, mixing it and introducing various chemicals.

The estimated limits of soil contamination extends under some of the residences, however, soil mixing would end at least 20 feet from the buildings. At least two feet of clean fill would be placed over the stabilized mass to maintain the existing surface elevation near the residences.

In the soil around and below the railroad tracks, alternative soil mixing techniques would be required to treat contaminated soil with minimal interruption of rail service.

Following the deep soil mixing, the soil cover and groundwater collection and treatment system would be constructed. Institutional controls would be implemented, as in Alternatives 1 through 4.

The maintenance and monitoring requirements for Alternative 5 are similar to those presented in Alternative 3. Contaminant movement out of the solidified soil would be greatly

reduced, but not eliminated entirely. Because some contamination would continue to leach out, the achievement of groundwater remedial objectives would take a very long time. The estimated time to meet groundwater goals is increased due to the increased retardation of contaminants in the solidified mass and decreased groundwater flow through the mass.

Duration: 7 to 10 Months for Construction
Groundwater Cleanup - Over 28,000 Years to Hazard Index <1 - Over 105,000 Years to PALs
Capital Cost: $11,000,000
Annual Operation and Maintenance Cost: $210,000
Total Present Worth: $15,000,000

F. Alternative 6 - Ex Situ Soil Remediation

Alternative 6 includes all of the same remedial elements in Alternative 5 except the cap, however, soil containing chromium in excess of the background concentration would be excavated and taken off-property for treatment and disposal instead of being stabilized in situ. This alternative would achieve the same remedial action objectives as in Alternative 5 with the addition of fully remediating soils to background concentrations.

Under Alternative 6, soil containing total chromium in excess of the background concentration would be excavated and transported off-property for treatment and disposal. It is estimated that a total of 32,000 cubic yards of soil would be removed. Excavation would occur on both sides of the railroad tracks, with the deepest excavation occurring on the property.

The soil under the railroad tracks and the associated contaminant mass would be removed under this alternative. Potential conflicts with the railroad may exist if the tracks were to be put out of service for an extended period of time.

The excavated areas for this alternative would be backfilled with clean fill, with topsoil placed over it. The surface would also be revegetated. A soil cover would not be required because the soil containing significant concentrations of hazardous substances would have been replaced.

The only institutional controls that would be implemented under this alternative would be groundwater use restrictions and potentially some land use restrictions.

This alternative has the lowest degree of maintenance and monitoring of the alternatives, excluding Alternative 1. Following completion of the soil removal, only the groundwater collection and treatment system would be operational. There would not be a soil cover to maintain. Because most of the contaminant mass will be removed in this alternative, it is feasible that the groundwater remedial action objectives may be achieved within a shorter time frame as compared to the other alternatives.

Duration: 9 to 24 Months for Construction
Groundwater Cleanup - Over 200 Years to Hazard Index <1

- Over 675 Years to PALs
Capital Cost: $12,000,000
Annual Operation and Maintenance Cost: $190,000
Total Present Worth: $15,000,000

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

A. Introduction

To determine the most appropriate remedial alternative for the N.W. Mauthe site, the alternatives were evaluated against each other. Nine Criteria have been established by the U.S. EPA that balance health, technical and cost considerations to determine the most appropriate alternative. Comparisons were based on these nine evaluation criteria, which are outlined below.

1. **Overall Protection of Human Health and the Environment** addresses whether a remedy protects human health and the environment and whether risks are properly eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether a remedy meets all state and federal environmental laws and requirements that apply to site conditions and cleanup options.

3. **Long-term Effectiveness and Permanence** refers to the ability of a remedy to reliably protect human health and the environment over time once cleanup goals have been met.

4. **Reduction of Toxicity, Mobility, or Volume through Treatment** are three principal measures of overall performance of an alternative. The 1986 Superfund Amendments and Reauthorization Act (SARA) emphasizes that whenever possible, a remedy should be selected that will permanently reduce the level of toxicity of the contaminants at the site, the spread of contaminants away from the site, and the volume, or amount, of contaminants at the site.

5. **Short Term Effectiveness** refers to the likelihood of any adverse impacts to human health or the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

6. **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the remedy.

7. **Cost** includes capital, annual operation and maintenance (O&M) and total (net) present worth costs of implementing a remedy.

8. **Agency Acceptance** indicates whether, based on its review of the data, the State of

Wisconsin (Department of Natural Resources) and the U.S. EPA concur with the alternative proposed as the preferred response technology for the site.

9. **Community Acceptance** indicates whether the public concurs with, opposes, or has no comments on the remedy presented in the Proposed Plan. Comments are addressed in the Responsiveness Summary.

B. Threshold Criteria

The two most important criteria are statutory requirements that must be satisfied by any alternative in order for it to be eligible for selection. Alternatives that do not meet the Threshold Criteria will not be considered in evaluation of the remaining seven criteria. These two criteria are discussed below.

1. Overall Protection of Human Health and the Environment

With the exception of Alternatives 1 and 2, and assuming all deed, use and access restrictions are adequately enforced, all remaining alternatives will be protective of human health and the environment.

Alternative 1 is not considered protective of human health or the environment. Off-site contaminated surface soils remain a threat through dermal absorption or ingestion. Contaminated surface water runoff could discharge into the Fox River. As Alternative 1 does not meet the requirements of the Threshold Criteria it will not be discussed further.

Alternative 2 would remove the threats related to surface soil through use of a soil cover. Hazardous substances in groundwater would be allowed to migrate from the site. This migration would be monitored. This alternative is not considered protective because it does not remediate contaminated groundwater to remove health risks based on the dermal contact with contaminated groundwater nor prevent the potential for contact with any surface expression of contaminated groundwater. As Alternative 2 does not meet the requirements of the Threshold Criteria it will not be discussed further.

Alternative 3 would also use a soil cover to remove the threats related to surface soil and surface water runoff. It would additionally contain and/or control and over time reduce groundwater contamination. Alternatives 4 through 6 provide active treatment, on- or off-site, of contaminated site soils. These alternatives would also contain and/or control groundwater contamination. They are additionally expected to produce reductions in groundwater contamination more quickly than would Alternative 3. To ensure protectiveness, excavated soils for which listed hazardous waste requirements are relevant and appropriate for on-site activities will also satisfy such requirements for off-site activities, including treatment and disposal. Because Alternative 6 removes the most contaminated soil that acts as a continued source of groundwater contamination, it is the alternative that is expected to obtain the most rapid reduction in groundwater contaminant levels, followed by

Alternative 5 and then Alternative 4.

The groundwater collection alternatives would initially contain and/or control contaminated groundwater through extraction and through influencing hydraulic gradients to inhibit flow of contamination away from the site. Long term operation of the containment system should also lead to ultimate achievement of the groundwater cleanup ARARs in NR 140 Wis. Adm. Code. In light of the site hydrogeologic conditions, achievement of NR 140 Wis. Adm. Code standards and MCLs may take a very extended period of time using currently existing technology. As a result, five (5) year reviews conducted pursuant to Sections 300.430 (f)(4)(ii) and 300.430 (f)(5)(iii)(C) of the NCP will assess whether newly developed technologies exist to achieve NR 140 Wis. Adm. Code standards in a significantly shorter timeframe. Should a review determine that it is not possible at that time to achieve the groundwater standards or to achieve further reductions, then one of the following options may be exercised:

- Continue with the action without modifications and wait until the next review to reassess the situation.

- Consider establishing an Alternative Concentration Limit under the substantive requirements of NR 140.28 Wis. Adm. Code, which can be no higher than the ES;

- Consider a technical impractibility waiver under Section 121(d) of CERCLA, which may be used to set an alternative groundwater goal higher than the ES or establish other approaches to groundwater containment or remediation that are protective of human health and the environment.

In no event, however, will groundwater containment and control activities be discontinued until groundwater is cleaned to the standards designed to eliminate unacceptable health risks based on dermal contact with the groundwater or ponded surface water.

Alternative 4 reduces the soil chromium mass by approximately 80 percent. Soil containing greater than 500 mg/kg of total chromium would be excavated, treated and disposed of. The majority of the soil VOC and cyanide mass would also be removed. Under Alternative 6, soil containing total chromium above the background concentration would be excavated, treated and disposed of. Alternative 3 relies entirely on the leaching and collection of all the contaminants through implementation of a groundwater collection system to remediate the soils. Alternative 4 would rely on the groundwater collection system to remediate the contaminant mass remaining after excavation through leaching. Alternative 5 would fix most of the contaminants in place and would rely on the groundwater collection system to continue to collect the leachable contamination.

Alternatives 1 through 6 would require land and groundwater use restrictions with indefinite time frames because hazardous substances would be left in place. The only institutional controls that would expected to be implemented under Alternative 6 would be groundwater

use restrictions. However, some land use restrictions may be necessary under that alternative (e.g., to avoid direct contact with contaminated groundwater).

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Alternatives 3 through 6 would be in compliance with NR 140 Wis Adm. Code through the active collection and treatment of contaminated groundwater. NR 140 Wis. Adm. Code requires that a remedial action be taken to restore contaminated groundwater within a reasonable period of time (NR 140.26 (2) Wis. Adm. Code) when an ES is exceeded. Additionally, under Chapter 160, Wisconsin Statutes (Wis. Stats.) and NR 140, Wis. Adm. Code, PALs are the cleanup goals to which groundwater is to be restored if technically and economically feasible. Alternatives 3 through 6 would confine the groundwater contamination within a one-block area, and are expected to reduce the contaminant concentrations. Alternatives 3 through 5 may achieve groundwater standards, but are expected to take a long time to do so. Alternative 6 may eventually achieve groundwater standards in a shorter period of time when compared to the other alternatives.

The groundwater collection alternatives would initially contain and/or control contaminated groundwater through extraction and through influencing hydraulic gradients to inhibit flow of contamination away from the site. Long term operation of the containment system should also lead to ultimate achievement of the groundwater cleanup ARARs in NR 140 Wis. Adm. Code. In light of the site hydrogeologic conditions, achievement of NR 140 Wis. Adm. Code standards and MCLs may take a very extended period of time using currently existing technology. As a result, five (5) year reviews conducted pursuant to Sections 300.430 (f)(4)(ii) and 300.430 (f)(5)(iii)(C) of the NCP will assess whether newly developed technologies exist to achieve NR 140 Wis. Adm. Code standards in a significantly shorter timeframe. Should a review determine that it is not possible at that time to achieve the groundwater standards or to achieve further reductions, then one of the options discussed in Section VI(B) of this document may be exercised. A decision to establish an alternative cleanup standard or invoke a technical impracticability waiver may require an amendment to this ROD.

Under Alternatives 3 through 6 the requirements of the Resource Conservation and Recovery Act (RCRA) are applicable to all wastes (i.e. building debris), treatment residuals, and excavated soils that constitute characteristic wastes under NR 605.08 Wis. Adm. Code and 40 CFR Part 261 Subpart C. In light of the nature of cyanide contamination in soil, and the high likelihood that the contamination came from plating wastes, RCRA requirements for listed plating wastes F007 and F008, including the requirements of 40 CFR Part 268, are generally relevant and appropriate for cyanide-contaminated material at the site which exceeds the Part 268 treatment standards. For Alternatives 3 through 6, consistency with those requirements and overall protectiveness of human health require treatment of wastes containing significant amounts of cyanide that are removed from the site to the standards required for F007 and F008 waste in 40 CFR §§ 268.41 and 268.43 (or alternatively to standards set under a treatability variance pursuant to 40 CFR § 268.44) prior to disposal.

Similarly, under Alternatives 4 and 6 this treated cyanide-contaminated material would be disposed of in a RCRA Subtitle C landfill. An estimated ten (10) cubic yards of soil in both Alternatives 4 and 6 would require separate management because of cyanide concentrations which are expected to exceed LDR treatment standards and require compliance with LDR treatment and disposal requirements.

Alternatives 3 through 5 will leave varying amounts of contaminated soils on site. RCRA Subtitle C requirements for a multilayer cap are relevant, but not appropriate, for the soil cover to be placed over those soils. Under Alternative 5 the soil will have been treated in place to immobilize the contaminants. Even under Alternative 3, where all of the contaminated soils will remain in place without treatment, at this site infiltration of precipitation and snowmelt into the native, low permeability, clay soils is not expected to have a significant impact on the movement of contaminants from those soils. The soil cover in Alternatives 3 through 6, which will meet the substantive requirements for a solid waste landfill cap under NR 506.08(3) Wis. Adm. Code, meets all relevant and appropriate landfill capping requirements and will prevent direct contact with the remaining contaminated soil.

Substantive RCRA general operating requirements are also relevant and appropriate for on-site handling, transportation, and treatment of contaminated materials.

Alternative 3 would not be in compliance with the requirements of the State Hazardous Substance Discharge Statute, s.144.76, Stats., and rules recently promulgated pursuant to that statute, ch.NR 700 series, Wis.Adm.Code. These new rules are expected to be effective on May 1, 1994. The statute and rule require that contaminated soil be restored to pre-spill conditions to the extent practicable. Because promulgated soil standards, adopted pursuant to s.144.76, Stats., are not yet in effect, guidance on the restoration of spill sites to background concentrations or to "no detect", where practicable would not be an ARAR, but, should considered in the evaluation of alternatives 3 through 6. Alternatives 4 through 6 would meet the requirements of s.144.76, Stats., because they would restore the soils at the site to the extent practicable. Alternative 3 would not.

Collected groundwater under Alternatives 3 through 6 will be treated to meet state and local pretreatment standards prior to discharge to the Appleton POTW. **Table 6** presents the current and proposed discharge limits of the City of Appleton's Municipal Sewer Code. A discharge permit or approval from the City of Appleton will be obtained prior to discharge. Should the POTW discharge option be unavailable, due to POTW capacity limitations or other unforeseen circumstances, then the discharge will be treated to meet state wastewater discharge standards for a discharge to the Fox River. Treated water would be directed to the storm sewer at the site. The groundwater treatment system would be designed to meet Best Available Technology (BAT) requirements.

Injection of chemical agents through an auger mixing system under Alternative 5 is considered underground injection through a well under the state well rule, NR 112 Wis. Adm. Code. While underground injection is normally prohibited under that code, a variance

may be granted. The injection process would be required to meet any substantive technical standards generally applied under that rule in order to obtain a variance.

Based on the VOC concentrations in the collected groundwater (influent) and the effluent discharge requirements, it may be necessary to air strip collected groundwater under Alternatives 3 through 6 to remove VOCs prior to discharge. Should that become necessary, the emissions from the air stripper would comply with the state hazardous air emissions rule, NR 445 Wis. Adm. Code. Limits associated with the hazardous air emissions rule would also apply to emissions caused by disturbance of contaminated soils at the site. The need for VOC (as well as cyanide) removal will be determined during the RD. **Table 7** presents the emission limits from a point source treatment unit for contaminants of concern at the site that are regulated for air emissions.

Therefore, Alternatives 3 through 6 will comply with ARARs or will proceed after satisfying the substantive requirements for appropriate variances.

C. Primary Balancing Criteria

Five primary balancing criteria are used to identify major trade-offs between the remedial alternatives which satisfy the two threshold criteria. These trade-offs are ultimately balanced to identify the preferred alternative and to select the final remedy.

1. Long Term Effectiveness and Permanence

The baseline risk assessment conducted during the RI indicated that significant risks exist under current land use caused by surface soils containing chromium and cadmium, and even greater risks exist under future land use caused by use of chromium-containing groundwater, and future land development uncovering subsurface soils. Alternatives 3 through 5 use institutional controls and a soil cover to serve as a barrier to mitigate the risk presented by contacting or ingesting contaminated surface soils, and prevents surface water from contacting contaminants.

Alternatives 3 through 6 collect and treat groundwater exceeding NR 140 Wis. Adm. Code standards. Groundwater would be intercepted by trenches, minimizing further migration of hazardous substances in groundwater. If discharge to the Appleton POTW is not allowed, for whatever reason, discharge of treated groundwater to the Fox River will meet Wisconsin discharge standards, therefore, environmental impacts are not expected.

Groundwater use restrictions are expected to be readily enforceable, as a public water supply is available, and its use for drinking water is required by the City of Appleton. Monitoring and fence maintenance for all the alternatives are considered reliable if properly managed. The reliability of the soil cover will depend on regular maintenance in addition to establishing vegetation. The reliability of in situ soil remediation to reduce the hexavalent chromium and stabilize soil contaminants would need to be tested.

Concerns exist regarding the effectiveness of certain institutional controls. It may be difficult for the U.S. EPA or WDNR to obtain property owners' signatures on deed restrictions or easements, and to enforce their terms. However, deed restrictions may be supplemented by the City of Appleton's enforcement of local ordinances, zoning regulations and building permits to regulate property use in the area. The City will be asked to further restrict property use in the area through these mechanisms.

Alternatives 4 and 5 reduce the potential for introducing new contamination into groundwater by removing the most highly contaminated soils or treating them in place, respectively. Alternative 6 provides even stronger assurances that continuing sources of contamination are removed from the site through the removal and off-site treatment of soils above background chromium concentrations.

Under Alternative 3 no soil contamination will be removed from the site. Approximately 20 percent of the soil contaminant mass will be left in place under Alternative 4. However, the soil chromium concentrations remaining under Alternative 4 would be less than that concentration representing a HI of 1. Alternative 5 would not remove any contaminant mass from the soil, but would stabilize it in place. All soils exhibiting a chromium concentration above the calculated background level would be removed under Alternative 6.

In light of the site hydrogeologic conditions, achievement of the NR 140, Wis. Adm. Code groundwater standards may take an extended period of time using currently existing technology. As a result, five (5) year reviews conducted pursuant to Sections 300.430 (f)(4)(ii) and 300.430 (f)(5)(iii)(C) of the NCP will assess whether newly developed technologies exist to achieve those standards in a significantly shorter timeframe. Data developed over time may indicate that it is not possible at that time to achieve NR 140 Wis. Adm. Code standards or even to achieve further reductions. At that point, the lead agency, in consultation with the support agency, may develop alternative cleanup goals, as discussed in Section VI(B) of this document, or determine that further operation of the system is not required.

2. Reduction in Toxicity, Mobility, and Volume Through Treatment

Alternatives 3 through 6 include demolition of the site buildings and removal of stored soils, building material and debris for off-site treatment and disposal.

Alternatives 3 through 6 additionally include groundwater containment or control and reduction of contaminant concentrations through collection and treatment. The maximum estimated flow of groundwater into the collection system is five (5) gallons per minute (gpm). The effect of the extraction system on groundwater serves to reduce the mobility of contamination in groundwater. The groundwater treatment system would be designed to meet Best Available Technology (BAT) requirements. Metals would be removed using chemical reduction and precipitation and activated carbon adsorption would be used to remove VOCs (or treatment for cyanide if needed) to meet discharge or emission standards.

Residual sludge will require off-property treatment and disposal. Alternative 5 is expected to collect a smaller amount of contaminated groundwater because of soil solidification. The contaminant concentrations in the collected groundwater would be expected to decrease over time under Alternatives 4 through 6 because the alternatives include reductions in the volume and mass or mobility of hazardous substances.

Alternatives 4 and 6 involve removing soil from the site for treatment to achieve appropriate standards for disposal in a landfill. This treatment will reduce toxicity and mobility of the materials. Approximately 6200 cubic yards of contaminated soil would be excavated and treated under Alternative 4. This represents an estimated 80 percent reduction of the chromium contaminant mass and a large percentage of the VOC and cyanide contaminant mass. Alternative 6 includes removal of approximately 32,000 cubic yards of soil for treatment and disposal. An estimated ten (10) cubic yards of soil in both Alternatives 4 and 6 would require separate management because of cyanide concentrations which are expected to exceed LDR treatment standards and require compliance with LDR treatment and disposal requirements. These soils would likely be taken to an out-of-state facility for cyanide destruction and disposal.

Chromium would be reduced to the trivalent state under Alternative 5, with its reduced toxicity and mobility. This Alternative's reduction of hexavalent chromium in the soil, followed by stabilization inhibits the chemicals from mobilizing into the groundwater.

3. Short Term Effectiveness

Remedial actions may potentially affect the community and safety of on-site workers in three ways: increased truck traffic and heavy machinery noise and accident potential; short-term dust and VOC emissions; and possible temporary disruption of railroad service. Truck traffic and the use of heavy machinery generally causes nuisances from noise and dust and increases the risks of accidents. The amount of truck traffic needed to import soil for the soil cover or to export excavated contaminated soil and building debris will vary among the alternatives. During construction of the soil cover under Alternatives 3 through 5, there will be heavy truck traffic associated with bringing soil to the site for approximately 4 months. Soil removal (Alternatives 4 and 6) will involve heavy truck traffic for transporting soil to a facility for treatment and bringing soil to the site for backfill for up to a year. Safety measures for traffic control, such as increased signage, will be taken to mitigate these risks.

Building demolition is part of Alternatives 3 through 6 along with the removal and disposal of contaminated soils stored on-site. Excavation of contaminated soil is included in Alternatives 4 and 6, and excavation to install groundwater collection drains is included in Alternatives 3 through 6. Dust containing hazardous substances and VOC emissions may be released during excavation and demolition activities. Wetting solutions or foams would be used to control emissions if monitoring indicated the need. Emissions would be expected to be low during soil mixing, under Alternative 5, because the process is typically performed by injecting liquid solutions and, if needed, using a shroud over the mixing auger. The

effectiveness of, and emissions from, deep soil mixing would require evaluation through treatability studies before full scale use. Air emissions would be monitored under all of the alternatives.

Alternatives 3 through 6 involve varying degrees of activity near the active railroad tracks. All activities performed near the tracks would require additional safety considerations, and communication with railroad personnel to avoid injury and work disruptions. Alternative 5 may include conducting deep soil mixing under the tracks with temporary disruption of rail service possible. Alternative 6, and possibly Alternative 4, would require the temporary closure of the tracks to facilitate excavation under them. The decision on whether to remove the soil from beneath the tracks, for Alternative 4, will be made during RD.

The time required for design, procurement, and construction of Alternatives 3 through 6 is estimated to range from two (2) to five (5) years. The time until remedial construction is complete will be controlled by the technologies selected. Alternatives 3 could probably be constructed within a single construction season. The groundwater collection trench could be installed concurrently with the soil cover, with an expected duration of four (4) months. The duration of soil removal alternatives would be controlled by the volume of soil involved and the ability to treat the material. The duration of soil excavation and treatment for Alternative 4 would be approximately four (4) months and between six (6) and 18 months for removing soil to background concentrations in Alternative 6. The deep soil mixing of Alternative 5 is estimated to require approximately four (4) months. The construction of the groundwater treatment system in Alternatives 3 through 6 would take an estimated three (3) to six (6) months.

Some elements of the alternatives could be implemented in a short time frame. Demolition of the buildings and removal of the containers of soil could occur concurrently with design of other elements of the selected alternative.

Soil erosion and siltation during earthwork activities in Alternatives 3 through 6 could be a problem, but use of silt curtains with regular inspection would mitigate potential impacts.

Alternatives 4 and 6 would create the greatest short-term risks to public health and the environment during excavation, but air monitoring and construction controls would be performed to minimize those risks. Those short term risks would be greatest for Alternative 6, which requires roughly 10 times as much soil excavation as Alternative 4.

4. Implementability

Technical difficulties may be encountered during construction activities along or under the railroad, and during excavation and installation of the groundwater collection trenches along local streets. The groundwater collection trench under Alternatives 3 through 6 would be constructed in locations containing buried utilities, which would either have to be relocated or excavation would have to proceed slowly to avoid disrupting service as much as possible.

Remediation in or near the railroad right-of-way must consider rail traffic requirements. Obtaining access from the railroad may be difficult and time consuming for Alternative 6 and possibly Alternative 4, if it is decided to remove the contaminated soils from beneath the tracks.

Access agreements from some of the adjacent property owners and the City of Appleton would have to be obtained to construct the collection trenches under Alternatives 3 through 6. Such agreements from some of the adjacent property owners would also need to be in place to perform the in situ soil treatment under Alternative 5 and the soil removal under Alternatives 4 and 6. If access agreements cannot be obtained, it would be necessary to pursue enforcement action to compel access under U.S. EPA's statutory authorities.

The technical feasibility of the deep soil mixing technology in Alternative 5 is unproven for a full scale chromium reduction and stabilization project. However, it has been used to stabilize other metals and some organic chemicals. The chemistry for reducing hexavalent chromium is well established and the technology is expected to work effectively.

The ex situ treatment of chromium contaminated soil is a proven technology and reportedly has been successfully applied.

Approval from the City of Appleton and compliance with the local and state pretreatment standards will be necessary to discharge treated groundwater to the sanitary sewer. If the sanitary sewer option is unavailable, then the substantive requirements of a Wisconsin Pollution Discharge Elimination System (WPDES) permit must be met if treated groundwater is to be discharged to the Fox River.

If necessary, a treatability variance for soils containing F007 and F008 listed wastes would be requested under several of the alternatives where cyanide is detected above LDRs. The substantive requirements normally imposed under a variance from the WDNR prohibition on injection of chemicals into the ground would be met for Alternative 5. Any required local approvals to perform construction in the city streets and to demolish buildings would be obtained, if necessary.

For those soils transported off-site for treatment and disposal there remains some uncertainty regarding the availability of facilities. There are facilities that are currently in compliance with state and federal environmental laws and capable of handling the waste generated from the site. However, it is not possible at this time to state that there will be appropriate facilities available that are in compliance and with the necessary capacity to handle the volume of waste generated at the time the selected remedial action is implemented.

Concerns remain regarding the effectiveness of certain institutional controls. It may be difficult for the U.S. EPA or WDNR to obtain property owners' signatures on deed restrictions or easements and to enforce their terms. However, deed restrictions may be supplemented by the City of Appleton's enforcement of local ordinances, zoning regulations

and building permits to regulate property use in the area. The City will be asked to further restrict property use in the area through these mechanisms.

5. Cost

A summary of costs is presented in **Table 5**. Refer to the FS Report for detailed information on the cost estimates. The cost estimates were prepared to aid in the evaluation of the alternatives. The costs were developed at an order-of-magnitude level, with an expected accuracy of +50 to -30 percent. The cost estimates consist of total capital costs, replacement costs, operation and maintenance costs and total present worth (5% discount rate over a 30 year period). Final project costs will depend on actual labor and material costs, actual site conditions, weather conditions and the firm selected to perform the work. The remedial cost estimates will be revised during RD.

D. Modifying Criteria

1. Agency Acceptance

The State of Wisconsin and the U.S. EPA are in agreement with the selected remedy. This decision document has been issued jointly by both agencies.

2. Community Acceptance

Several comments were given at the public meeting presenting the Proposed Plan and several were also received in writing. The WDNR has reviewed and responded to all comments submitted on the Proposed Plan in the attached Responsiveness Summary.

In general, the primary objection raised in the comments was the lack of a program in the remedy to purchase, or otherwise obtain with compensation, adjacent homes and businesses by the government so the owners of these properties could recover the property values lost by the presence of the contamination. It is U.S. EPA's policy not to buy properties where it is doing cleanup. There are several reasons behind this policy. The main reason behind this policy is that U.S. EPA has limited funds to accomplish the task of cleaning up all of the country's worst hazardous waste sites. As a result, U.S. EPA has a responsibility to see that its limited resources go toward actual cleanup.

In addition, the site neighbors will benefit from having contamination removed from under their properties and the action minimizes the potential for additional migration of contamination from the Mauthe property onto their properties. This should increase the value of those properties. It is U.S. EPA's policy that it will not try to charge neighboring residential landowners for any of the cleanup costs unless those landowners were the cause of the pollution. U.S. EPA also has the ability to give protection from potential Superfund liability to persons who might want to buy these properties under U.S. EPA's Prospective Purchaser Policy.

State of Wisconsin environmental laws basically state that the owner of a property with contamination on that property is responsible for cleanup of the contamination. However, in a situation where the source of contamination is known to be from a separate property, such as the N.W. Mauthe site, it is the state's position to try and obtain remediation from the responsible party, rather than the owner of a adjacent property. Additionally, it is not the State of Wisconsin's policy to pursue cleanup from a purchaser of an adjacent property.

While U.S. EPA cannot purchase these properties, U.S. EPA will, in cooperation with the WDNR, design the remedy to make sure that the inconvenience and intrusion on neighboring properties is kept to a minimum. The cleanup will also be designed to ensure that any unacceptable environmental hazards are removed from the neighborhood so it can be returned to normal as much as possible.

Also, one commenter stated a preference for implementation of Alternative 6, as a 100 percent cleanup of soil contamination was desired.

IX. Summary

Based on a comparison of the nine criteria, Alternatives 1 and 2 do not provide protection from all of the potential risks at the site, nor do they comply with ARARs. They therefore do not meet the threshold test for selection of a remedial alternative at the site. Alternatives 3 through 6 would all be protective and would attain ARARs. Meeting groundwater quality standards would take a very long time for each of these alternatives.

Alternatives 3 through 6 all use treatment to reduce the toxicity, mobility or volume of the contaminant mass to varying degrees. Alternative 5, does not however, reduce the volume as it solidifies the contaminant mass in place. Alternative 3 removes contaminant mass only through the collection and treatment of impacted groundwater. Sole reliance on groundwater collection to remove contaminant mass, would be a very lengthy process without significant short term benefits. As compared to Alternative 3, Alternative 4 removes the majority of the contaminant mass, as well as satisfying the statutory preference for treatment and adding an additional level of permanence.

Implementation of Alternatives 3, 4 or 6 is not expected to pose any technical problems since the proposed actions utilize proven technologies and have been used at other sites with similar problems. Alternative 5 utilizes technology that has not been proven to be effective, as it has not had full scale application at sites with hexavalent chromium as the main contaminant of concern.

Alternatives 5 and 6 would be significantly more costly than Alternative 4, however, they would not be significantly more protective. The increased cost of Alternative 6 would address approximately 20% more of the contaminant mass than Alternative 4, with much greater capital cost. The additional soil removed by Alternative 6 would be at chromium

concentrations less than those identified in the Risk Assessment as producing a HI level of 1 for dermal exposure (570 mg/kg) or ingestion (780 mg/kg). Neither Alternatives 5 nor 6 eliminate the need for groundwater containment and/or control, with associated collection and treatment or the related costs.

X. The Selected Remedy

Based on the evaluation of the alternatives, the State of Wisconsin and the U.S. EPA believe the selected remedy, Alternative 4, (Hot Spot Removal) will be protective of human health and the environment, comply with ARARs, (unless it is shown through a future review of the site conditions that an exemption or waiver is required), be cost effective and will utilize permanent solutions to the maximum extent practicable.

The selected remedy for the N.W. Mauthe site includes:

- Demolition and removal of the buildings on the N.W. Mauthe property, with proper management and disposal of the building debris;

- Removal and proper disposal of the containerized waste currently stored on-site;

- Excavation of soils with a total chromium concentration greater than 500 mg/kg, removing approximately 80% of the chromium contaminant mass, including the removal of those soils from beneath the railroad tracks if it is determined during RD that it is feasible to do so in a way that allows the railroad reasonable and normal use of the tracks;

- Off-Site treatment (reduction and solidification) of the excavated soils which are determined to be hazardous and subsequent off-site disposal;

- Backfilling the excavation with clean soils, and converting the excavated area into a groundwater collection sump if it is determined during RD that the addition of such a sump would significantly hasten achievement of remedial goals for soil and groundwater, including containment and/or control of contamination in groundwater and ultimate compliance with groundwater ARARs:

- Capping the site with two feet of clay soil and topsoil, with the establishment of a vegetative cover;

- Installation of groundwater collection trenches and construction and operation of a groundwater treatment (chemical reduction and precipitation with possible VOC and cyanide removal, if is determined to be necessary) facility with discharge to the sanitary sewer, to contain and/or control groundwater contamination with ultimate compliance with groundwater ARARs;

- Improvement or installation of foundation drain systems and cleaning, painting or sealing

of basement walls and floors, as needed, for homes or businesses in the area of the site, to prevent seepage of contaminated water into the buildings;

- Institutional controls, such as deed restrictions or easements and site access controls that are intended to prevent access, excavation, disturbance of the newly constructed cap, future soil excavation in the railroad corridor for areas in the corridor where contaminated soils will remain and installation of drinking water wells;

- Monitoring of the effectiveness of the groundwater treatment system and groundwater quality; and

- Operation and maintenance of all systems.

If properly implemented and enforced, site controls will assure minimal non-authorized access to the contaminated areas and deed restrictions will assure that the land impacted by contamination from the N.W. Mauthe site is not used for purposes that are incompatible with the remedial action or could result in human exposure to the remaining contaminants. These controls and restrictions will also assure that drinking water wells are not installed at or near the N.W. Mauthe site. The excavation and removal of contaminated soils, in addition to the capping will prevent direct contact hazards as well as reduce the infiltration of surface water and subsequent leachate production. The removal of highly contaminated soils will also reduce the amount of time required for groundwater cleanup. Installation of the groundwater collection and treatment system will effectively contain and/or control the migration of the contaminants in the groundwater as well as eventually improve groundwater quality.

Concerns remain regarding the effectiveness of certain institutional controls. It may be difficult for the U.S. EPA or WDNR to obtain property owners signatures on deed restrictions and to enforce the terms of the deed restrictions though court orders. However, deed restrictions may be supplemented by the City of Appleton's enforcement of local ordinances, zoning regulations and building permits to regulate property use in the area. The City will be asked to further restrict property use in the area through these mechanisms.

The remedial action objectives and cleanup goals for the site are presented in Section VI of this ROD. The remedial action objectives include:

- Prevent migration of contaminants in groundwater and in the long term, to remediate the groundwater to protect human health and the environment and to meet state and federal standards;
- Prevent human exposure to contaminated soils, groundwater or surface water that pose unacceptable risks.

The WDNR and the U.S. EPA believe the selected remedy will achieve the remedial action objectives for the site. **Table 5** provides a cost summary for the selected remedy.

XI. Statutory Determinations

A. Protection of Human Health and the Environment

The selected remedy provides adequate protection of human health and the environment. Excavation of highly contaminated soils along with capping removes the risk of direct contact with more contaminated soils and surface water. The capping additionally minimizes the potential for surface water to come into contact with highly contaminated soils. Capping will also remove the potential for the generation of airborne dusts generated from contaminated soils.

Short term risks associated with the excavation of trenches or removal of contaminated soils will be minimized through good construction practices.

Groundwater collection and treatment will contain and/or control the migration of contaminants and eventually reduce contaminant concentrations in soil and groundwater. As groundwater moves through impacted soil, contaminants in that soil will eventually go into solution and be transported by the groundwater to the collection system where it will be collected and treated. However, an extended period of time will be necessary to reduce contaminant concentrations below the levels identified as representing a direct contact hazard or to meet groundwater standards. Chromium concentrations determined in the Baseline Risk Assessment as representing a HI level equal to 1 are noted in section V.C.1 of this document.

B. Attainment of ARARs

The selected remedy will meet all ARARs under federal and more stringent state environmental laws or obtain appropriate waivers. The primary ARARs that will be achieved by the selected alternative are described below. The U.S. EPA OSWER Directive No. 9234.1-01, defines three types of ARARs - Action specific, Chemical specific and Location specific.

1. Action Specific

Action-specific ARARs are substantive requirements that define acceptable treatment and disposal standards for hazardous substances. These requirements are triggered by the selected remedial activities to accomplish a remedy. The action-specific requirements do not in themselves determine the remedial alternative; they indicate how or to what level treatment or cleanup will be achieved. Important action-specific ARAR considerations for the selected alternative are discussed below.

Resource Conservation and Recovery Act, as amended [42 U.S.C. § 6901 et seq.]; Wisconsin Environmental Protection Law, Hazardous Waste Management Act [Wis. Stat §144.60-74]

Most RCRA requirements are administered under the State of Wisconsin's implementing regulations. U.S. EPA does not have sufficient evidence to demonstrate conclusively that listed RCRA wastes were disposed of at the site. RCRA requirements for listed wastes are therefore not applicable to the site, except to the extent that new hazardous wastes (such as treatment residuals) are generated during the course of the remedy.

The remedy will comply with the following applicable requirements:

Wis. Adm. Code NR 605; 40 CFR 261 - Identification of Hazardous Wastes. Provides requirements for determining when a waste is hazardous. The substantive requirements of these regulations will apply to Toxicity Characteristic Leaching Procedure (TCLP) testing of treatment residuals and waste excavated at the site which may be disposed of off-site.

Wis. Adm. Code NR 615; 40 CFR 262 - Standards Applicable to Generators of Hazardous Waste. Provides requirements for the shipment of wastes to treatment, storage or disposal facilities. These requirements may apply to on-site activity relating to off-site shipment of treatment residuals and other wastes.

Wis. Adm. Code NR 620; Department of Transportation Hazardous Materials Transportation Act (49 U.S.C. S 1801]; 40 CFR 263 - Standards Applicable to Transporters of Hazardous Waste. Requires record keeping, reporting and manifesting of waste shipments. These requirements may apply to off-site shipment of treatment residuals and other wastes.

Wis. Adm. Code NR 675; 40 CFR 268 - Land Disposal Restrictions. (LDRs)

The contaminated soil and likely some of the building debris at the N.W. Mauthe site contains hazardous substances in sufficient concentration to be classified as hazardous waste based on the RCRA characteristic of toxicity, determined through TCLP testing. Contaminated soil and debris that is removed from the ground and placed outside the area of contamination (e.g., taken off-site for disposal) is subject to RCRA LDRs if it is classified as a hazardous waste. The restricted wastes must meet treatment standards before land disposal. For most characteristic wastes with concentration-based treatment levels, the LDR treatment standards are set at the characteristic level that defines the waste as hazardous. Characteristic hazardous waste that has been treated to meet the treatment standards is no longer considered hazardous after the characteristic is eliminated, and can be disposed of in a Subtitle D solid waste landfill.

Several other RCRA regulations, although not applicable, address problems or circumstances very similar to those encountered at this site and are therefore relevant and appropriate.

Wis. Adm. Code NR 605.09; 40 CFR 261.31 - Listed Hazardous Waste.
Based on site process activities, hazardous waste records and concentrations of constituents detected at the N.W. Mauthe site, the U.S. EPA and WDNR have determined that the treatment standards for RCRA F007 and F008 listed hazardous wastes are relevant and appropriate for soil and debris containing cyanide in concentrations greater than LDR treatment standards and managed in a manner that constitutes land disposal (placement). F007 and F008 listed hazardous wastes are spent cyanide plating bath solutions from electroplating operations, and plating bath residues from the bottom of plating baths from electroplating operations where cyanide was used in the process, respectively. Under the LDR regulations, soil and debris from the site containing cyanide at levels that exceed treatment standards are subject to LDR treatment standards for cyanide, cadmium, chromium (total), lead, nickel and silver, and require disposal in a Subtitle C facility.

LDR treatment standards for F007 and F008 listed wastes (40 CFR 268.41 and 268.43; NR 675.21 and 675.23 Wis. Adm. Code) are presented in **Table 8** as well as the maximum concentrations detected on site. The cyanide treatment standard is a constituent concentration in waste (CCW) standard, while the metals are regulated by a constituent concentration in waste extract (CCWE) standard (based on TCLP).

LDR treatment standards are based on treating the less complex matrices of industrial wastes. For this reason a treatability variance is available to comply with LDRs when managing restricted soils. This variance does not remove the requirement to treat the soil, but provides alternative treatment levels, based on the data from actual treatment of soil (Superfund LDR Guide No. 6A, 1990). A variance will only be sought should it be determined that the regular LDR treatment standards are not attainable utilizing available technologies.

Wis. Adm. Code NR 630.10-17; 40 CFR 264, Subpart B - General Facility Requirements. Establishes substantive requirements for security, inspection, personnel training, and materials handling which are relevant and appropriate to on-site activities involving excavation and handling of hazardous soils and materials.

Wis. Adm. Code NR 630.21-22; 40 CFR 264, Subpart D - Contingency Plan and Emergency Procedures. Establishes substantive requirements for emergency planning which are relevant and appropriate for on-site activities involving excavation and handling of hazardous substances.

Wis. Adm. Code NR 675; 40 CFR 268 - Land Disposal Restrictions. Requires that hazardous wastes cannot be land disposed unless they satisfy specified treatment standards and imposes record keeping requirements on such wastes. These requirements are ARARs for on-site activities relating to off-site disposal of any treatment residues or other hazardous wastes.

Wis. Adm. Code NR 506.08 - Landfill Closure Requirements. Establishes substantive requirements for design, operation and maintenance of landfill caps which are relevant and appropriate to installation and upgrading of the caps at the site. The cap design and construction will comply with these requirements, which provide substantive standards for cap design, implementation and documentation.

Clean Water Act of 1977, an amended [33 U.S.C. § 1317] 40 CFR 403 - Pretreatment Standards. Require that waste waters to be discharged into a POTW satisfy both general and specific requirements to protect against damage to POTWS. Any waste to be discharged to a POTW must, if necessary, be treated to satisfy these applicable standards prior to discharge. These pretreatment requirements are administered under NR 211 and NR 108 Wis. Adm. Code. The substantive requirements of these regulations will apply to groundwater, transported through the sanitary sewer to the POTW.

In the event that the POTW is not available for discharge of treated groundwater, the collected groundwater would be discharged to the Fox River. Direct discharges would require establishment of WPDES permit requirements. The discharge limits will control the design of the water treatment system. At a minimum, NR 220 Wis. Adm. Code requires best available control technology for treatment before discharge. Chemical-specific ARARs for treatment are discussed below.

Air Emission Treatment Requirements
Groundwater treatment may include removal of VOCs before discharge. The need for treatment of air emissions would be evaluated based on requirements of NR 445 Wis. Adm. Code and risk to public health. If emissions are predicted to exceed the emissions standards, then air emission treatment would be included in the remedial alternative. The need for VOC treatment will be evaluated during RD. Emission limits are presented in **Table 7**.

2. Chemical Specific

Chemical-specific ARARs are laws and requirements that regulate the release to the environment of materials having certain chemical or physical characteristics or materials containing specified chemical compounds. These requirements generally set health- or risk-based concentration limits or discharge limitations for specific hazardous substances.

They may also determine the extent of soil, sediment, and groundwater remediation and residual levels of contaminants allowable after treatment.

Wis. Adm. Code NR 140 - Groundwater Quality Standards. NR 140 Wis. Adm. Code establishes chemical-specific standards for groundwater, including Preventive Action Limits (PALs), Enforcement Standards (ESs), and (Wisconsin) Alternative Concentration Limits (WACLs). **Table 4** presents the ESs and PALs of contaminants of potential concern at the N.W. Mauthe site. Exceedance of the PAL does not necessarily require remedial action, but rather it serves to establish the level of groundwater contamination at which the WDNR is

required to commence efforts to control the contamination. Therefore, the applicable groundwater remedial action goals at this site are the PALs. Exceedance of an ES requires that remedial action be taken to restore the contaminated groundwater within a reasonable period of time. Under NR 140.28 Wis. Adm. Code, exemptions from the requirement to achieve PALs may be granted if it is determined that it is not technically or economically feasible to achieve PALs, but the exemption levels may be no higher than the ESs. These requirements must be met at all wells (points) where groundwater is monitored.

Safe Drinking Water Act [40 U.S.C. § 300 et seq.]

40 CFR 141, Wis. Adm. Code NR 109 - Maximum Contaminant Levels

MCLs are chemical-specific standards and criteria that are often ARARs for groundwater remediation. **Table 4** presents MCLs in drinking water for selected parameters. The MCLs are generally not as stringent as the ESs and PALs established under NR 140 Wis. Adm. Code.

The goal of the selected alternative is to contain and/or control and ultimately reduce the contaminant concentrations in groundwater to the standards set under NR 140 Wis. Adm. Code and the SDWA. This will be accomplished through the removal of the majority of the source contamination and the construction and operation of groundwater collection trenches.

The groundwater collection alternatives would initially contain and/or control contaminated groundwater through extraction and through influencing hydraulic gradients to inhibit flow of contamination away from the site. Long term operation of the containment system should also lead to ultimate achievement of the groundwater cleanup ARARs in NR 140 Wis. Adm. Code. In light of the site hydrogeologic conditions, achievement of NR 140 Wis. Adm. Code standards and MCLs may take a very extended period of time using currently existing technology. As a result, five (5) year reviews conducted pursuant to Sections 300.430 (f)(4)(ii) and 300.430 (f)(5)(iii)(C) of the NCP will assess whether newly developed technologies exist to achieve NR 140 Wis. Adm. Code standards in a significantly shorter timeframe. Should a review determine that it is not possible at that time to achieve the groundwater standards or to achieve further reductions, then one of the following options may be exercised:

- Continue with the action without modifications and wait until the next review to reassess the situation.

- Consider establishing an Alternative Concentration Limit under the substantive provisions of NR 140.28 Wis. Adm. Code, which can be no higher than the ES.

- Consider a technical impracticability waiver under Section 121(d) of CERCLA which may be used to and set an alternative groundwater goal higher than the ES or establish other approaches to groundwater containment or remediation that are protective of human health

and the environment.

In no event, however, will groundwater remediation activities be discontinued until groundwater is cleaned to the standards designed to eliminate unacceptable health risks based on dermal contact with the groundwater or ponded surface water.

Wisconsin Environmental Protection Law, Subchapter II-Water and Sewage [Wis. Stat. § 144.02-27]
Clean Water Act of 1977, as amended [33 U.S.C. § 1314(a)(1)]
Surface Water Quality Standards
Chemical-specific ARARs for the protection of human health and aquatic life from exposure to contaminants in the Fox River are important at the N.W. Mauthe site because the river may receive the natural groundwater discharge from the site or the discharge of treated groundwater. Potential ARARs for protection of human health are Wisconsin's Water Quality Standards (NR 105 Wis. Adm. Code) and the Clean Water Act Federal Water Quality Criteria (40 CFR 131). Wisconsin surface water quality criteria depend on the water use designation of the river. The section of the Fox River nearest the site is thought to be classified as Public Water Supply, Warm Water Sport Fish Community (NR 104 Wis. Adm. Code).

Discharges to Surface Water
If discharges of treated groundwater to the Fox River are necessary, these discharges are regulated by NR 220 Wis. Adm. Code. The regulations require the WDNR to establish effluent limits for uncategorized point sources and to base those limits on best available technology economically achievable. Groundwater would be treated to meet the substantive requirements of obtaining a WPDES permit.

Clean Air Act [42 U.S.C. § 7401 et seq.]; Wisconsin Environmental Protection Law, Subchapter III-Air Pollution [Wis. Stat. 144.30-144.426]

40 CFR 50; Wis. Adm. Code NR 404, 415-449 - Emission Standards. Establishes standards for emission of pollutants into the ambient air and procedures for measuring specific air pollutants. Groundwater treatment, handling of contaminated soils during excavation, and cap construction could cause air emissions of VOCs, particulates, fugitive dust or other contaminants which could adversely effect human health and the environment. The design of the remedy will reduce such emissions to acceptable levels or provide for treatment to satisfy these standards.

3. Location Specific

Location-specific ARARs are substantive requirements that relate to the geographical or physical position of the site, rather than to the nature of the contaminants or the proposed site remedial actions. They may limit the type of remedial actions that can be implemented or may impose constraints on the remedial action. Flood plain restrictions and protection of

endangered species are examples of location-specific ARARs.

No location-specific ARARs are thought to pertain to the N.W. Mauthe site.

C. Cost Effectiveness

The selected remedy provides overall cost effectiveness as compared to the other alternatives evaluated. **Table 5** presents the costs associated with implementation of Alternative 4 in relation with the other alternatives. The table additionally provides a summary of the actions associated with the alternatives.

Alternative 4 represents an increase in cost as compared to Alternative 3. This increase removes approximately 80% of the chromium contaminant mass, providing the potential for a shorter time to reach groundwater cleanup goals as well as providing rapid removal of direct contact hazards.

Alternative 4 removes a large proportion of the contaminant mass from the site rather than solidifying it in place as in Alternative 5 for significantly less cost.

The cost of implementing Alternative 4 is also significantly less than Alternative 6 (approximately a 46% increase in Capital Cost). The increased cost associated with Alternative 6 represents removing contaminated soil to background levels. The additional soil proposed for removal under Alternative 6 would be at concentrations identified as less than those representing a HI level of 1 (570 mg/kg hexavalent chromium in soils).

D. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy for the N.W. Mauthe site, Alternative 4, meets the statutory requirement to utilize to the maximum extent practicable permanent solutions and treatment technologies. This finding was made through evaluation of the protective and ARAR compliant alternatives (Threshold Criteria) and through the comparison of the advantages and disadvantages among the alternatives with respect to the Balancing Criteria. Alternative 4 provides the best balance of tradeoffs among the alternatives with respect to the evaluation criteria.

The selected alternative treats contaminants in groundwater using reduction and precipitation as a treatment for metals found in collected groundwater. If necessary, it will also include treatment for VOCs and/or cyanide. No other alternative provides for more treatment of groundwater.

The selected alternative addresses those soils impacted with chromium concentrations exceeding the HI level of 1 for dermal contact through permanent treatment technologies. The increased volume of soil to be excavated and treated under Alternative 6 significantly

increases the cost for little improvement in protectiveness.

Although Alternative 5 includes a potentially innovative treatment method, through in situ reduction and solidification, this alternative does not remove any contaminant mass from the site other than through groundwater collection and treatment. The technology to be employed in Alternative 5 has not been used at full scale for the treatment of hexavalent chromium.

E. Preference for Treatment as a Principal Element

Through excavation and treatment of contaminated soils with chromium concentrations above 500 mg/kg and treating contaminated groundwater, the selected remedy satisfies the statutory preference for remedies that employ treatment of the principal threat to permanently and significantly reduce toxicity, mobility or volume of hazardous substances.

The selected remedy removes the primary source material and the potential for that material to continue to impact groundwater. Capping will further reduce the potential for infiltration of water and subsequent generation of contaminated groundwater.

Responsiveness Summary
N.W. Mauthe Site
City of Appleton, Outagamie County,
Wisconsin

March, 1994

This responsiveness summary has been prepared to meet the requirements of sections 113(k)(2)(iv) and 117(b) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), which requires a response "...to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on a Proposed Plan for remedial action. The Responsiveness Summary addresses concerns expressed by the public, potentially responsible parties (PRPs), and governmental bodies, in comments received regarding the Proposed Plan for the remedial action at the N.W. Mauthe Site.

Public Comment Period

A public comment period was held from October 15, 1993 through November 15, 1993, to allow interested parties to comment on the Proposed Plan, in accordance with section 117 of CERCLA. On October 27, 1993, a public meeting was held at the Police Station in Appleton, Wisconsin, at which the Wisconsin Department of Natural Resources (WDNR) and the U.S. Environmental Protection Agency (U.S. EPA) presented the Proposed Plan, answered questions and accepted comments from the public. Comments received during this period are included in this Responsiveness Summary.

The Remedial Investigation (RI) Report, Feasibility Study (FS) and the Proposed Plan for the N.W. Mauthe Site were released for public review in October, 1993. The Administrative Record was made available to the public in October, prior to the comment period, at the Appleton Public Library, the WDNR district office in Green Bay, Wisconsin, the WDNR's central office in Madison, Wisconsin and at U.S. EPA's Region 5 office in Chicago, Illinois.

Community Interest

Overall public interest in the N.W. Mauthe site has not been particularly high. However, those residents and business persons owning property immediately adjacent to the N.W. Mauthe site have shown a significant interest. Their interest in the site began years before it became a Superfund site. For the past several years the primary concern of most of these residents is their desire to have the government purchase or otherwise obtain their properties to provide them with an opportunity to move from the area of the site. Public comments are addressed in the following section.

Summary of Comments Received and Agency Responses

The following comments were received by the WDNR as written comments during the public comment period. The written comments reflect the issues that were noted verbally at the October 27, 1993 public meeting.

1. Comment:
Alternative 6 is the proper solution. Anything short of complete contaminated soil removal, to background concentration levels, would be a great disservice.

Agency Response: Alternative 6 includes excavation of soil to the calculated background level. This entails the removal of approximately 32,000 cubic yards of soil. Alternative 4 removes approximately 80% of the contaminant mass with the excavation of a much smaller amount of soil (approximately 6,200 cubic yards). All soil with chromium concentrations above 500 mg/kg would be removed under alternative 4. The additional soil removed under Alternative 6, approximately 25,800 cubic yards, would address only 20% of the contaminate mass in soil exceeding the calculated background value. The Baseline Risk Assessment, developed as part of the Remedial Investigation, determined that the chromium concentration of concern in soils, for direct contact, is 570 mg/kg. This concentration represents a Hazard Index level of 1. Removal of soils to background concentrations would mean that a significant amount of additional soils that do not represent a direct contact risk would have to be excavated to obtain the additional 20% of the contaminant mass. The cost of the removal is directly related to the volume of soil removed. Thus, the capital cost associated with Alternative 6 is approximately 5 times greater than Alternative 4, with little increase in protectiveness.

Alternative 4 includes groundwater collection provisions that are expected to contain and control the remaining soil and groundwater contamination in the areas that are not excavated. This means that the remaining 20% of contaminant mass is not left unaddressed.

Given the above considerations, and considering that Alternative 6 would have additional short term secondary impacts, such as dust, noise and truck traffic as compared to alternative 4, the agencies have determined that alternative 6 would not be cost effective nor would it provide the best balance of the nine selection criteria.

2. Comment:
Alternative 6 would shorten the length of groundwater clean up by many years as compared to Alternative 4.

Agency Response: Alternative 6 would shorten the time to reach groundwater clean up goals when compared to Alternative 4 according to the time estimates prepared as part of the Remedial Investigation. However, removing the soils to background levels would not significantly shorten the amount of time necessary (calculated minimums) to reach

concentration levels associated with direct contact with groundwater (5000 μg/l) while increasing the cost by 46%. The time estimate to reach this goal for Alternative 6 is about 200 years and approximately 270 years for Alternative 4. In addition, the extent of excavation should have little or no impact on the ability of the groundwater collection system to contain and control the contamination.

3. Comment:
The Agencies should file suit against the Mauthe's insurance company to recover the cost of clean up and annual O&M.

Agency Response: The Agencies are in the process of evaluating the possibility of cost recovery. If a party is determined to be responsible, the Agencies will attempt to recover their expenses.

4. Comment:
Clean the site up 100% (e.g., implement Alternative 6), including the temporary shut down of rail service and the removal of contaminated soil beneath the railroad right-of-way.

Agency Response: The comment on selecting Alternative 6 is addressed above. The need for removal of soil from beneath the railroad tracks will be evaluated during the Remedial Design phase of the project, and therefore, remains an option for the final remedy. However, only a limited percentage of the overall contaminant mass is thought to be present beneath the railroad tracks. Removal of this material, with temporary shut down of the railroad, would not alter the need for the installation of a groundwater collection trench near the tracks. For this reason, a significant cost savings would not be realized by removing contaminated soil from beneath the railroad tracks nor would the amount of time to clean up be significantly reduced. Even if the soil under the tracks is not removed, the proposed collection trench positioned along the tracks will intercept contaminated groundwater moving beneath the tracks and would eventually capture the contamination that is leaching from the soil under the tracks.

5. Comment:
We can't sell our homes and businesses because no one will buy and no one will give loans for repair, or to a new buyer for purchase.

Agency Response: The agencies recognize that lenders may choose not to provide loans on property having existing contamination from off-property sources due to concerns over potential purchaser or lender liability. However, considering the source of the contamination, it is not expected that a purchaser of property or a lender who foreclosed on property in the area would be held responsible for costs associated with clean up related to the N.W. Mauthe site, on any purchased property. U.S. EPA's Prospective Purchaser Policy provides that a purchaser of property in a situation such as at the N.W. Mauthe site can be provided protection from potential Superfund liability. The state Hazardous Substance Spill Statute generally provides that a property owner may be held

responsible for clean up of contamination on their property. However, in a situation like the N.W. Mauthe site, where the source of the contamination is known to be from off-site, it is not the WDNR's policy to pursue innocent property owners or lenders who did not cause the contamination, but simply had it migrate on to their land.

There are no state or federal restrictions to the sale of the homes or businesses in the vicinity of the N.W. Mauthe Site, other than the requirement to disclose knowledge regarding defects in the property as required by ch. 709, Wis. Stats.

6. Comment:
I'm concerned about the long term property values and potential livability for future residents in the immediate area of the N.W. Mauthe site.

Agency Response: It is not the within the ability of the Superfund or state environmental response programs to include measures within a remedial action for the purpose of improving property values in the vicinity of a contaminated site. The purpose of these programs is to clean up environmental contamination and remove health risks associated with that contamination. The proposed remedial actions will remove all direct contact hazards associated with the N.W. Mauthe site and will take appropriate actions toward soil and groundwater clean up, so that residents can safely continue to reside in the vicinity of the site.

7. Comment:
Contamination of soil has a very detrimental influence on property and the safety of residents in the area.

Agency Response: Upon completion of the remedial action at the site, health risks associated with the site will be removed. Surface and subsurface soils exceeding levels representing a direct contact hazard will have been removed, except perhaps those soils beneath the railroad tracks. Soils beneath the tracks would, however, remain beneath railroad ballast and would not be readily available to direct contact. Current physical hazards associated with the site itself would also be removed through demolition and removal of the buildings. Steps will be taken to prohibit the installation of drinking water wells in this area thereby removing the potential for ingestion of the contaminated water. Capping coupled with groundwater collection will also remove the potential for contact with contaminated surface water (puddles).

8. Comment:
I would recommend the on-site buildings be demolished including the houses on 2nd Street and that a zero property value level be maintained for those homes.

Agency Response: The on-site buildings are to be demolished as one of the actions associated with the selected alternative. It is our intention to remove these buildings as soon as possible, probably during the Remedial Design (RD) phase of the process rather

than waiting until the full implementation of the Remedial Action (RA). Removal of the on-site buildings is required for the implementation of the excavation of the soils representing the contaminant source. This is not the case for the homes near the site. Their removal is not required to implement the selected alternative. Additionally, a significant health risk has not been identified for the nearby homes to require their removal. Improvement or installation (as appropriate) of foundation drain systems around the homes, coupled with sealing or painting of the basements is anticipated to minimize the potential for seepage into the basements. Neither of the agencies are able to require that a property be assessed at a certain value or determine the associated amount of property taxes.

9. Comment:
Removal of homes and businesses adjacent to the N.W. Mauthe Site could save thousands of dollars in the actual physical remedial work, as well as in the long term liabilities.

Agency Response: U.S. EPA guidelines do not allow the purchase of homes or businesses unless there is a significant health threat associated with continued occupancy of the home or if the home is located in such a manner that it prohibits the implementation of the selected clean up action. Neither of these situations have been identified. Direct construction costs could potentially be reduced if the adjacent homes and businesses were removed, as there would not be a need for careful excavation near the buildings or replacement of utilities. However, this would probably be offset by the costs of purchasing the homes and subsequent demolition. Additionally, location of the collection trench along Second Street was not selected to avoid homes and businesses. It is located in a manner to collect groundwater from the leading edge of groundwater contamination and to prevent further migration of that contamination. Its location would not change if the homes and businesses were removed.

10. Comment:
The property owners have sat back and patiently waited for this site to be cleaned up for over 10 years. Now they are told clean up could possibly start in two years or so depending on funding availability.

Agency Response: The agencies understand the adjacent property owner's frustration with the length of time the Superfund and prior state actions have taken to address the site. It is our intent to complete the design and construction process as quickly as possible. For example, it is our intent to begin on-property building demolition and stored waste removal before the design process is complete. We hope to begin that work this summer. Superfund financed action is dependent on the availability of federal and state funds.

11. Comment:
By purchasing the adjacent land parcels there would be no delays or problems in getting easements for the proposed clean up. When the clean up is completed the parcels could then be converted to an alternative use with less complication.

Agency Response: The reasons why the homes and businesses adjacent to the N.W. Mauthe site are not being purchased are discussed in responses to previous comments. Should significant difficulties occur in obtaining access for the implementation of the selected remedial action, U.S. EPA has the authority to seek a court order granting access.

12. Comment:
The property owners are getting mixed signals from the Agencies. On one hand they are told that their basements are safe to use but then any new construction will not be allowed to have basements after clean up is done.

Agency Response: Significant health threats associated with the levels of contaminants detected in the basements of the homes adjacent to the N.W. Mauthe site have not been identified. Improvements to the foundation drains around the homes in the area coupled with painting and/or sealing of the basement walls and floors should remove the potential for continued seepage of contaminated groundwater into the basements, removing any long term risks related to the site. Future use of the adjacent properties would be restricted to prevent risks associated with excavation of contaminated soils or soils saturated with contaminated groundwater without proper precautions and to prevent the disturbance of the in-ground portions of the remedial action (trenchs, pipes, etc.).

The statement about new construction without basements was made at the October 27, 1993 public meeting in reference to restrictions on the Mauthe property itself. The statement was a reply to a question about possible future uses of the Mauthe property. A possible use would have to be one that would not disturb the in-ground portions of the remedial action, and a developer might want to avoid the precautions and costs associated with excavating contaminated soils. One such use would be a building without a basement. However, buildings with basements are not precluded provided that the proper precautions are taken.

13. Comment:
We question whether the plan adequately addresses the contamination of the properties adjacent to the site. We are not convinced that the proposed remediation will be either cost effective or successful in dealing with the problems of these locations. We have no indication from the property owners that the proposed action is acceptable to them. We are particularly concerned about the long-term monitoring and future corrective actions that may be necessary to effectively manage the contamination at these properties.

Agency Response: The agency believes the proposed remedial action will adequately address the contamination and be protective of human health and that future additional corrective or remedial actions are unlikely. The actions in the proposed remedy that address the adjacent properties, such as the collection trenches and foundation drains are, if properly constructed and maintained, expected to be reliable over a long period of time. The agency recognizes that the action will require long-term operation, maintenance and

monitoring and intends to provide for those activities.

14. Comment:
The zone of contamination extends into the street right-of-ways for Melvin, Outagamie, and Second Streets. What actions will be taken to insure the City's ability to maintain public utilities and infrastructure contained within the right-of-way?

Agency Response: The proposed remedial action is expected to minimize the spread of additional contamination towards the public right-of-ways and, over time, remediate the contamination found there. Specifics related to protection, maintenance and/or replacement of utilities located in City right-of-ways during construction of the remedial action will be resolved during the Remedial Design phase of the clean up process. The Superfund investigation results may be of value to the City to determine if precautions are necessary during future utility work. For example, it should be noted that other than along a portion of Melvin Street and near the corner of Melvin and Outagamie Streets levels of contamination that have been identified in both groundwater or soils are not at levels that are expected to represent a direct contact hazard. We do not believe the level of contamination found in the public right-of-ways would restrict the City's ability to perform normal utility work, provided proper precautions are taken. It may however, be useful for the City to perform additional sampling along the streets in question in conjunction with any future subsurface work to ensure the safety of their workers.

15. Comment:
Our understanding is that the site will be closed to public access for the foreseeable future. We have concerns about this occurring and about long-term upkeep of the property. We would prefer a solution that resulted in usable space, even if that were restricted to surface activities.

Agency Response: Specific land use decisions for the Mauthe property should be made during the Remedial Design phase of the clean up process with the input of the City of Appleton and the local residents. The agency intends to initiate this decision process during the design, however, we stand ready to begin sooner should the City wish to initiate the discussions. A portion of the site would obviously be used for construction of a groundwater treatment facility and associated work area. The Mauthe property may prove to be suitable for certain industrial or commercial uses or for parking or as green space.

Table 1 - Contaminants of Potential Concern
N.W. Mauthe Site

Inorganic Contaminants	Groundwater[1] Max. Conc. Detected (ug/L)	Soil[2] Max. Conc. Detected (mg/kg)	Surface Water[3] Max.Conc. Detected (ug/L)
Aluminum	---[4]	---	122J[5]
Arsenic	---	---	5.6
Barium	---	---	75.5J
Cadmium	---	3,660	9.3
Chromium (total)	860,000	15,000	57,000
Hexavalent Chromium[6]	1,700,000	NA	75,500
Copper	128	1,310	30.2
Cyanide	13,100	2,960	16.5J
Lead	---	---	3.5
Mercury	1.5J	0.95	---
Manganese	880	---	182
Nickel	---	---	19.7J
Silver	---	29	---
Zinc	468	14,900	391
Organic Contaminants	**(ug/L)**	**(ug/kg)**	**(ug/L)**
2-Butanone	57	81J	---
Carbon Disulfide	480	47	---
Chloroform	4J	55	---
1,1-Dichloroethane	120	120	16J
1,1-Dichloroethene	190	5J	20
1,2-Dichloroethene	1,800	32	23
Toluene	740	85	---
1,1,1-Trichloroethane	2,100	1,500	220
1,1,2-Trichloroethane	7J	13	---
Trichloroethene	1,800	3,400	280
Benzene	1,200	---	---
Xylene	360	---	---

[1] Includes Monitoring Well, Sump & Grab Samples
[2] Includes Surface & Subsurface Samples
[3] Includes Puddle & Crock Samples
[4] --- Indicates Parameter Not of Potential Concern For Specific Media
[5] J Qualifier Indicates an Estimated Value
[6] Analyses for hexavalent chromium (water) performed using colorometric method

Table 2 - Summary of Risk Characterization Results
N.W. Mauthe Site

Current Land Use		Hazard Index		Excess Lifetime Cancer Risk	
Scenario/Location	Exposure Pathway	Average	Reasonable Maximum	Average	Reasonable Maximum
Trespasser/ Onsite-Surface Soil	Ingestion	<1	2		
	Dermal	<1	18		
	Inhalation	<1	<1	$<10^{-6}$	$<10^{-6}$
	Total	<1	20	$<10^{-6}$	$<10^{-6}$
Onsite-Subsurface Soil	Ingestion	<1	<1	$<10^{-6}$	$<10^{-6}$
	Dermal	<1	5	$<10^{-6}$	$<10^{-6}$
	Total	<1	5	$<10^{-6}$	$<10^{-6}$
Residential/Offsite-Surface Soil--Toddler	Ingestion	<1	3		
	Dermal	<1	15		
	Inhalation	<1	1	$<10^{-6}$	2×10^{-6}
	Total	<1	19	$<10^{-6}$	2×10^{-6}
Residential/Offsite-Surface Soil--Adult	Ingestion	<1	<1		
	Dermal	<1	4		
	Inhalation	<1	<1	$<10^{-6}$	2×10^{-6}
	Total	<1	4	$<10^{-6}$	2×10^{-6}

See RI Report for specific risk characterization results (Appendices I)

Table 3 - Summary of Risk Characterization Results
N.W. Mauthe Site

Future Land Use		Hazard Index		Excess Lifetime Cancer Risk	
Scenario/Location	Exposure Pathway	Average	Reasonable Maximum	Average	Reasonable Maximum
Onsite-Surface Soil--Child	Ingestion	2	13		
	Dermal	<1	61		
	Inhalation	<1	<1	$<10^{-6}$	$<10^{-6}$
	Total	2	74	$<10^{-6}$	$<10^{-6}$
Onsite-Surface Soil--Adult	Ingestion	<1	1		
	Dermal	<1	14		
	Inhalation	<1	<1	$<10^{-6}$	$<10^{-6}$
	Total	<1	15	$<10^{-6}$	$<10^{-6}$
Onsite-Groundwater--Child	Ingestion	1,200	31,000	2×10^{-4}	3×10^{-4}
	Dermal	30	800	3×10^{-6}	4×10^{-6}
	Inhalation	<1	<1	2×10^{-5}	2×10^{-5}
	Total	1,230	32,000	6×10^{-4}	1×10^{-3}
Onsite-Groundwater--Adult	Ingestion	360	9,500	2×10^{-4}	3×10^{-4}
	Dermal	16	400	7×10^{-6}	9×10^{-6}
	Inhalation	<1	<1	1×10^{-5}	2×10^{-4}
	Total	380	10,000	6×10^{-4}	9×10^{-4}
Onsite-Subsurface Soil--Child	Ingestion	1	4	$<10^{-6}$	$<10^{-6}$
	Dermal	<1	16	$<10^{-6}$	$<10^{-6}$
	Total	1	20	$<10^{-6}$	$<10^{-6}$
Onsite-Subsurface Soil--Adult	Ingestion	<1	<1	$<10^{-6}$	$<10^{-6}$
	Dermal	<1	4	$<10^{-6}$	$<10^{-6}$
	Total	<1	4	$<10^{-6}$	$<10^{-6}$

See RI Report for specific risk characterization results (Appendices H)

Table 4 - Groundwater Quality Standards
N.W. Mauthe Site

Contaminants	State Enforcement Standard[1] (ug/l)	State Preventive Action Limit[1] (ug/l)	U.S. EPA Maximum Contaminant Level[2] (ug/l)[3]
Cadmium	10	1	5
Chromium	50	5	100
Cyanide	200	40	200
Copper	1000	500	---
Mercury	2	0.2	2
Manganese	50	25	---
Zinc	5,000	2,500	5,000[4]
Chloroform	6	0.6	100
1,1-Dichloroethane	850	85	---
1,1-Dichloroethene	7	0.024	7
1,2-Dichloroethene (cis/trans)	100/100	10/20	70/100
Toluene	343	68.6	1,000
1,1,1-Trichloroethane	200	40	200
1,1,2-Trichloroethane	0.6	0.06	5
Trichloroethene	5	0.18	5
Benzene	5	0.067	5
Xylene (Total)	620	124	10,000

[1] Wis. Adm. Code NR 140.10, Register. Jan. 1992. No. 433.
[2] 40 CFR 141.61 & 141.62, as of Sept. 1992.
[3] All Concentrations Expressed in micrograms/Liter (ug/L = ppb)
[4] Secondary MCL

Table 5 - Remedial Action Alternatives Components and Costs
N.W. Mauthe Site

Alternative Description		Capital Cost	Annual O&M	Total Present Worth[1]
Alternative 1 No Action	•No Action •Institutional Controls	$150,000	$17,000	$430,000
Alternative 2 Direct Contact Control	•Institutional Controls •Building Demolition •Soil Cover	$940,000	$34,000	$1,600,000
Alternative 3 Groundwater Collection	•Institutional Controls •Soil Cover •Groundwater Collection & Treatment	$4,600,000	$210,000	$8,100,000
Alternative 4 Hot Spot Soil Removal	•Institutional Controls •Soil Cover •Groundwater Collection & Treatment •Limited Soil Removal •Ex Situ Soil Treatment	$6,640,000	$220,000	$10,090,000
Alternative 5 In Situ Soil Remediation	•Institutional Controls •Soil Cover •Groundwater Collection & Treatment •In Situ Soil Treatment & Solidification	$11,000,000	$210,000	$15,000,000
Alternative 6 Ex Situ Soil Remediation	•Institutional Controls •Groundwater Collection & Treatment •Extensive Soil Removal •Ex Situ Soil Treatment	$12,000,000	$190,000	$15,000,000

[1] Present Worth Estimate Calculated at 5% over 30 Years

Table 6 - City of Appleton POTW Discharge Limits [1]
N.W. Mauthe Site

Constituent	Current Limits (ug/L)	Proposed New Limits [2] (ug/L) [3]
Aluminum	200,000	70,000
Cadmium	1,300	400
Chromium (total)	7,000	7,000
Hexavalent Chromium	--	4,500
Copper	5,000	3,500
Lead	2,000	2,000
Mercury	--	2
Nickel	2,000	2,000
Zinc	10,000	8,500
Cyanide	1,000	300

[1] POTW - Publically Owned Treatment Works
City of Appleton Municipal Sewer Code
[2] Modified standards are proposed
[3] ug/L = micrograms per liter = ppb

Table 7 - Hazardous Air Contaminant Emission Limits
N.W. Mauthe Site

Organic Contaminants of Concern	Table No. in NR 445[1]	Emission Rate Limit < 25 feet [2] (pounds/hour)	Emission Rate Limit > or = 25 feet (pounds/hour)	Emission Rate Limit (pounds/year)
Carbon Disulfide	Table 1	2.4984	10.4488	--
Chloroform	Table 3	--	--	250.0
1,1-Dichloroethane	Table 1	67.4568	283.296	--
1,2-Dichloroethene	Table 1	65.7912	276.312	--
Toluene	Table 1	31.2312	131.16	--
1,1,2-Trichloroethane	Table 1	3.7488	15.744	--
Trichloroethene	Table 1	22.4856	94.416	--

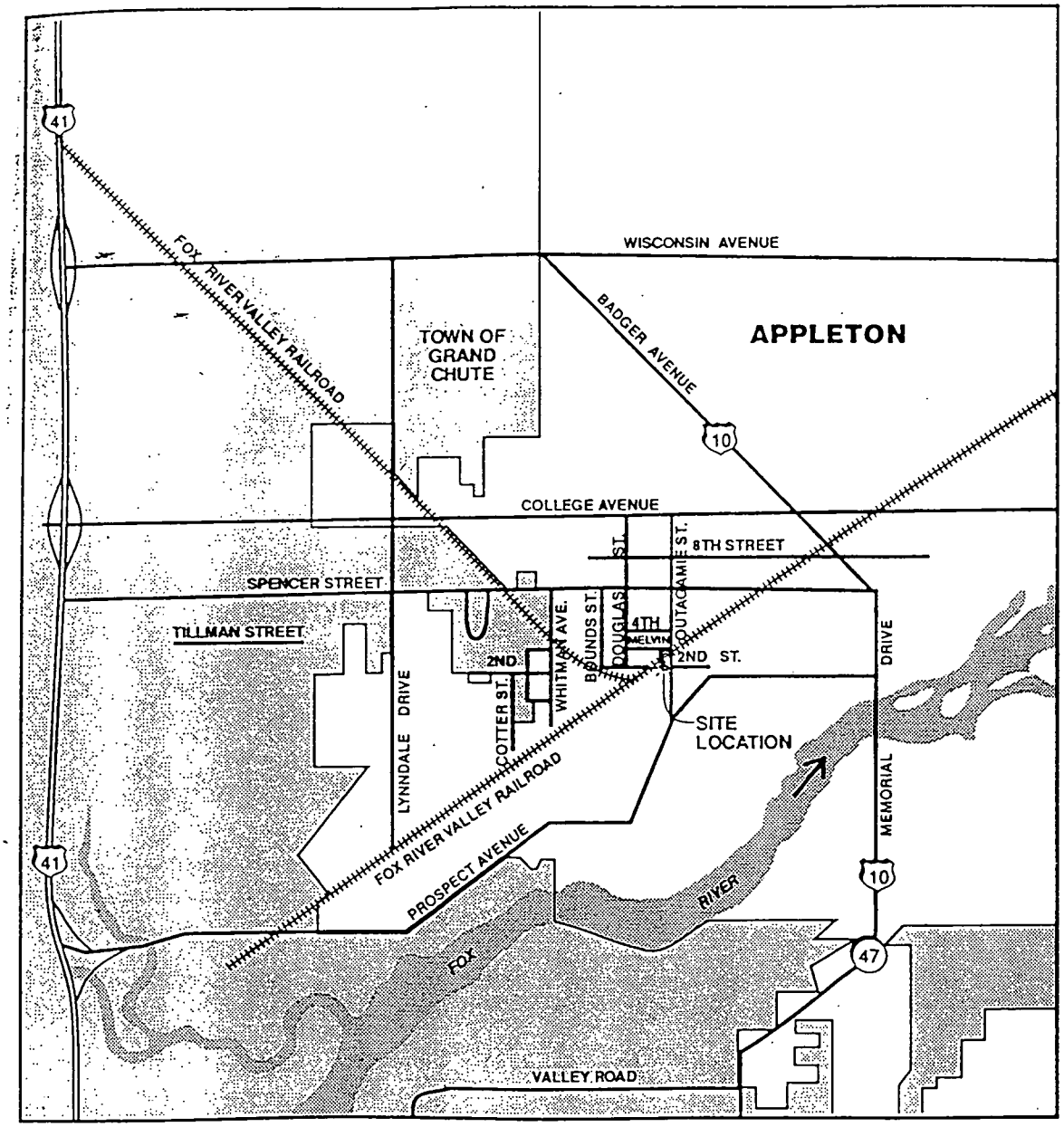
[1] Wis. Adm. Code NR 445
[2] Stack Height

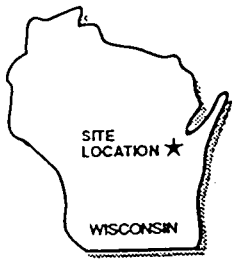
Table 8 - LDR Treatment Standards (F007-F008)
N.W. Mauthe Site

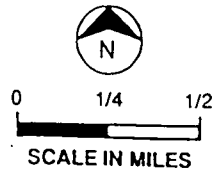
Constituent	Treatment Standard	Maximum Concentration Detected in Soils (mg/kg)	Max/20[1] (mg/L)
Cyanide (total)	590 mg/kg	2,960	NA
Cadmium	0.066 mg/L	3,660	183
Chromium (total)	5.2 mg/L	15,000	750
Lead	0.51 mg/L	1,960	98.5
Nickel	0.32 mg/L	36	1.8
Silver	0.072 mg/L	29.3	1.5

[1] Max/20 - Maximum Detected Concentration/20 column shows the maximum TCLP concentration that a constituent could achieve if 100 percent of the constituent was leached during the TCLP analysis (the TCLP procedure involves a 1 to 20 dilution)

Figure 1
Site Location Map
N.W. Mauthe Site





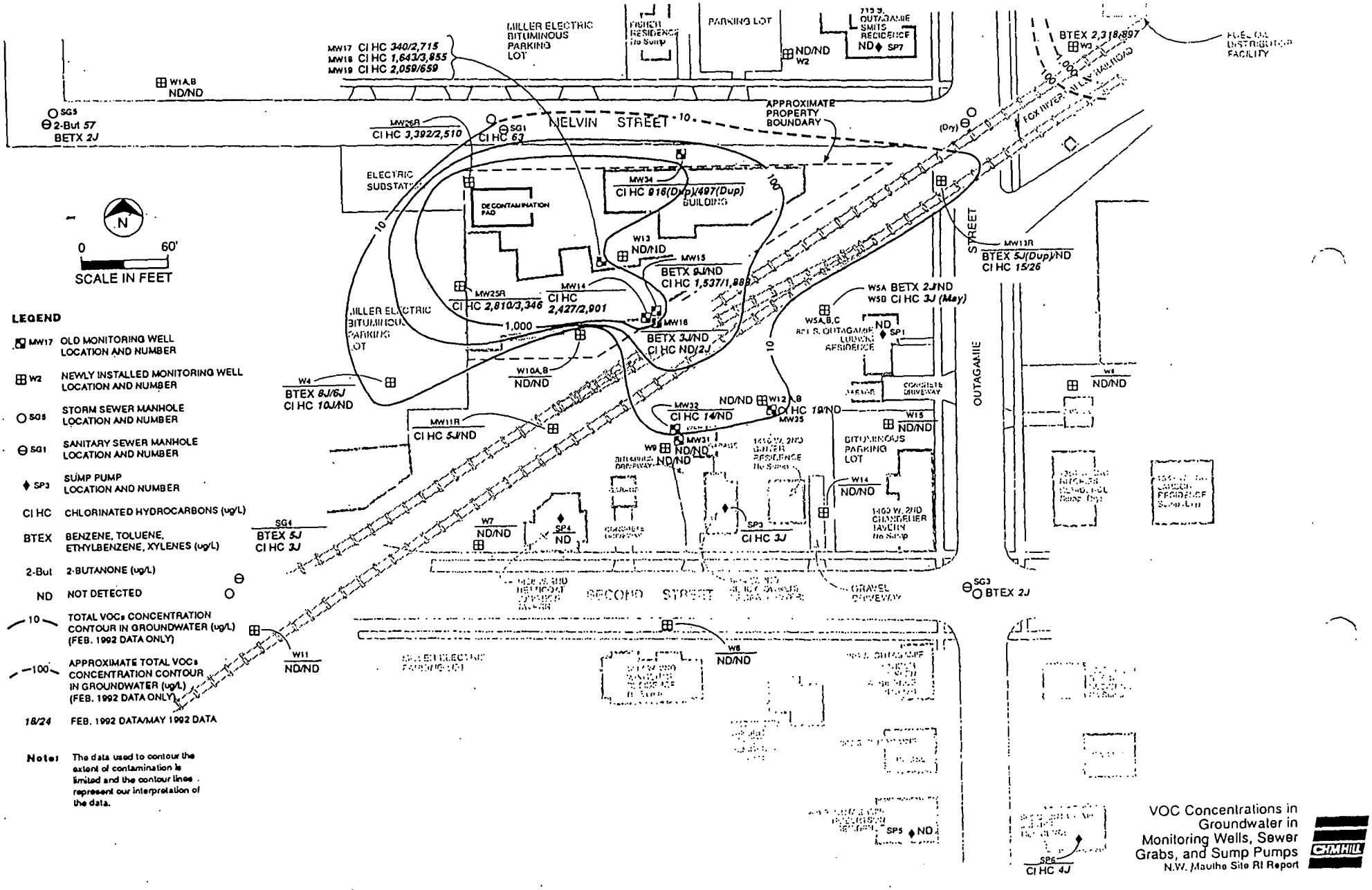


Map Source: R.R. Donnelley & Sons Co. Cartographic Services

Site Location Map
N.W. Mauthe Site RI Report

CRMHILL

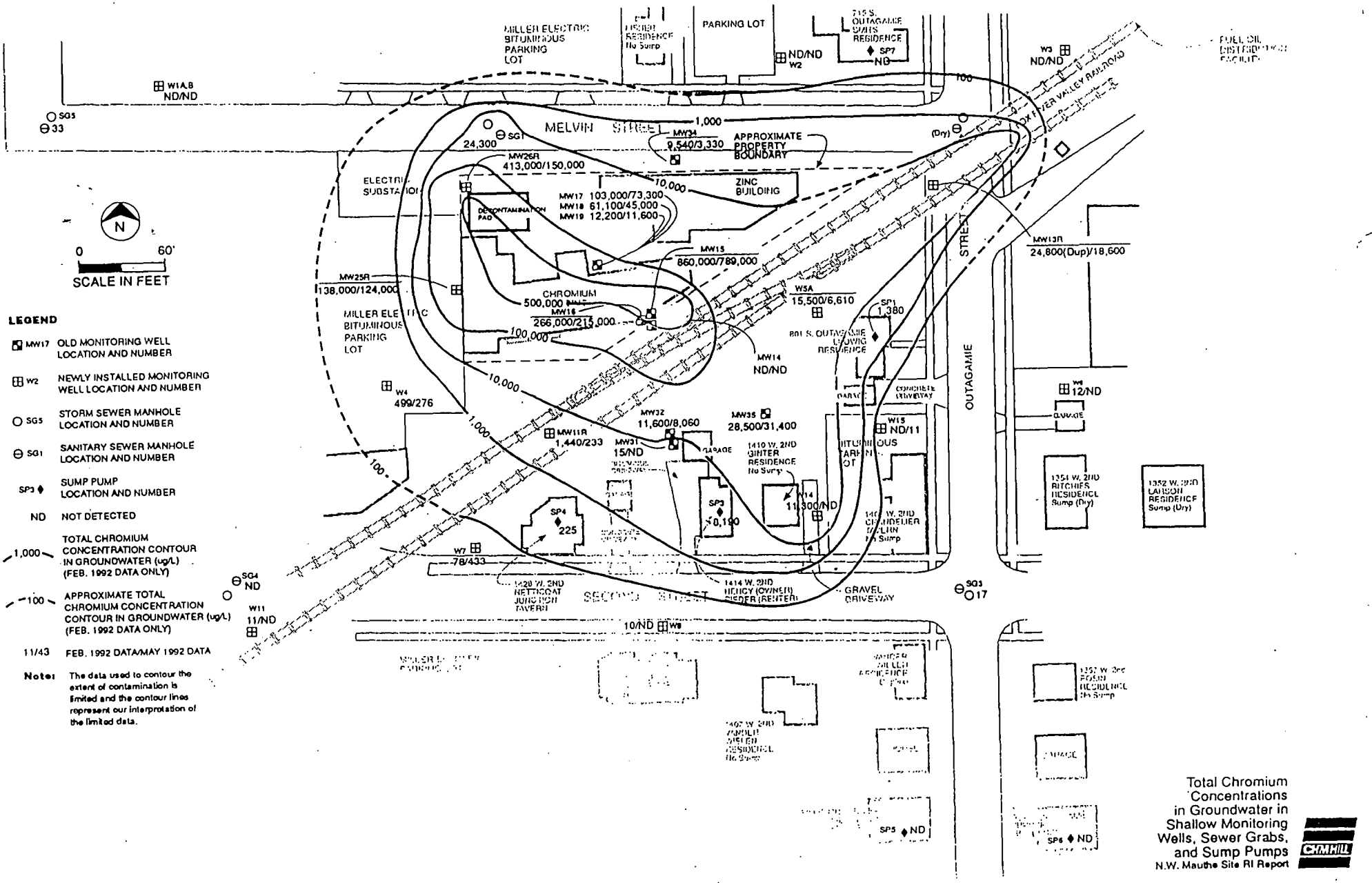
Figure 7
Volatile Organic Compounds in Groundwater
N.W. Mauthe Site



VOC Concentrations in Groundwater in Monitoring Wells, Sewer Grabs, and Sump Pumps
N.W. Mauthe Site RI Report

CH2M HILL

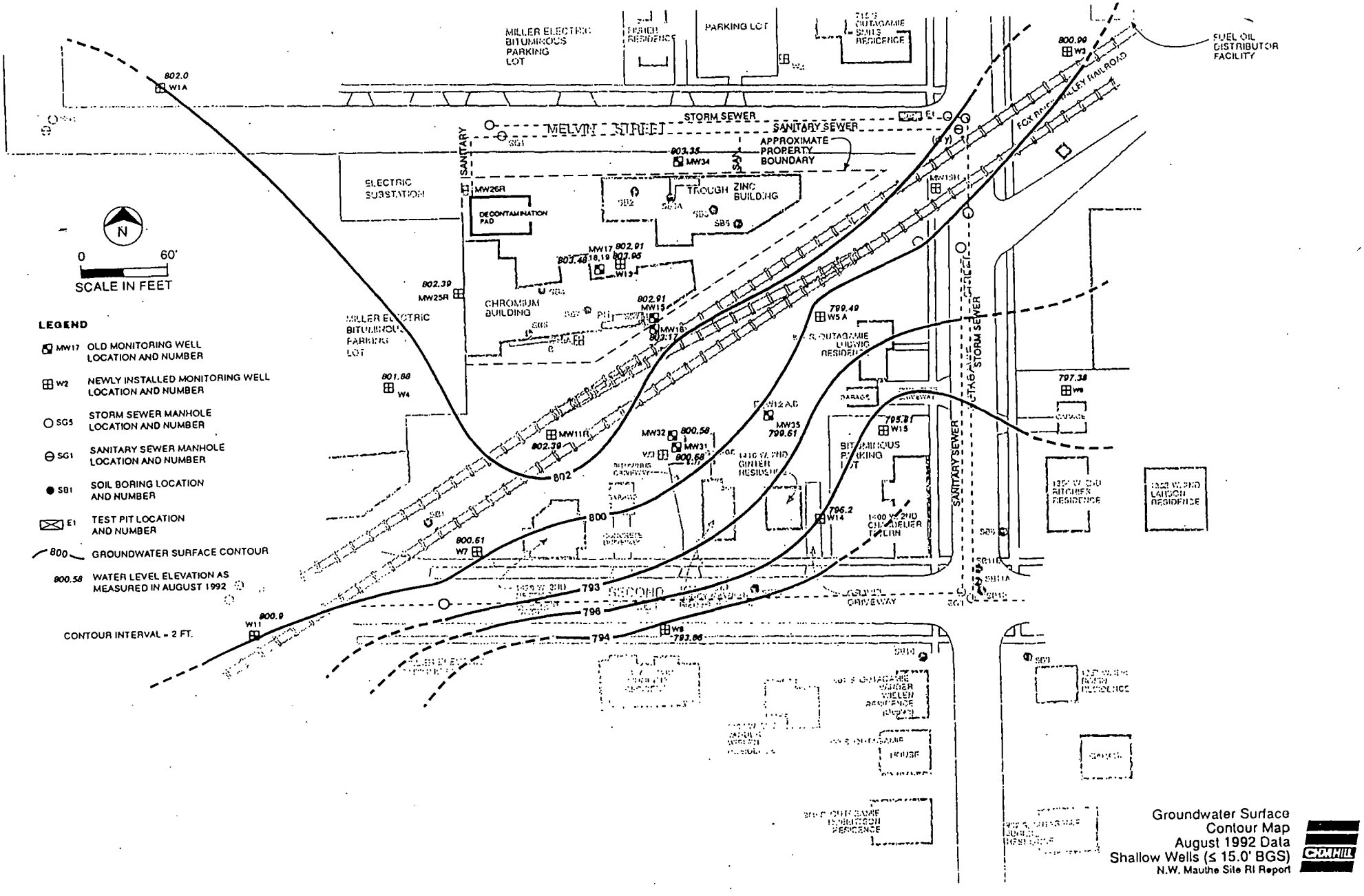
Figure 6
Chromium in Groundwater
N.W. Mauthe Site



Total Chromium Concentrations in Groundwater in Shallow Monitoring Wells, Sewer Grabs, and Sump Pumps
N.W. Mauthe Site RI Report

CH2MHILL

Figure 5
Groundwater Flow
N.W. Mauthe Site



Groundwater Surface
Contour Map
August 1992 Data
Shallow Wells (≤ 15.0' BGS)
N.W. Mauthe Site RI Report

CDM HILL

Figure 4
Volatile Organic Compounds in Subsurface Soils
N.W. Mauthe Site

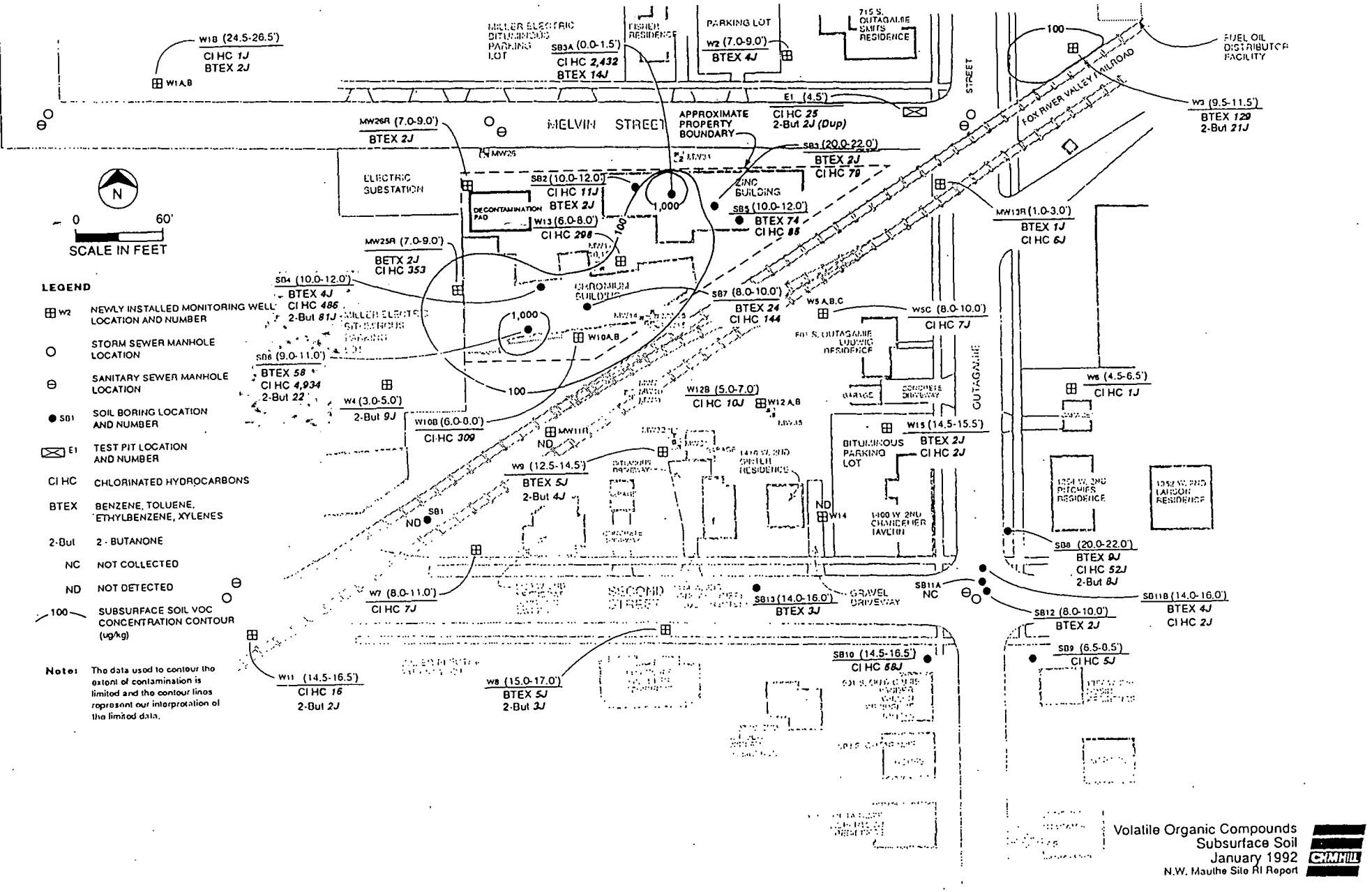
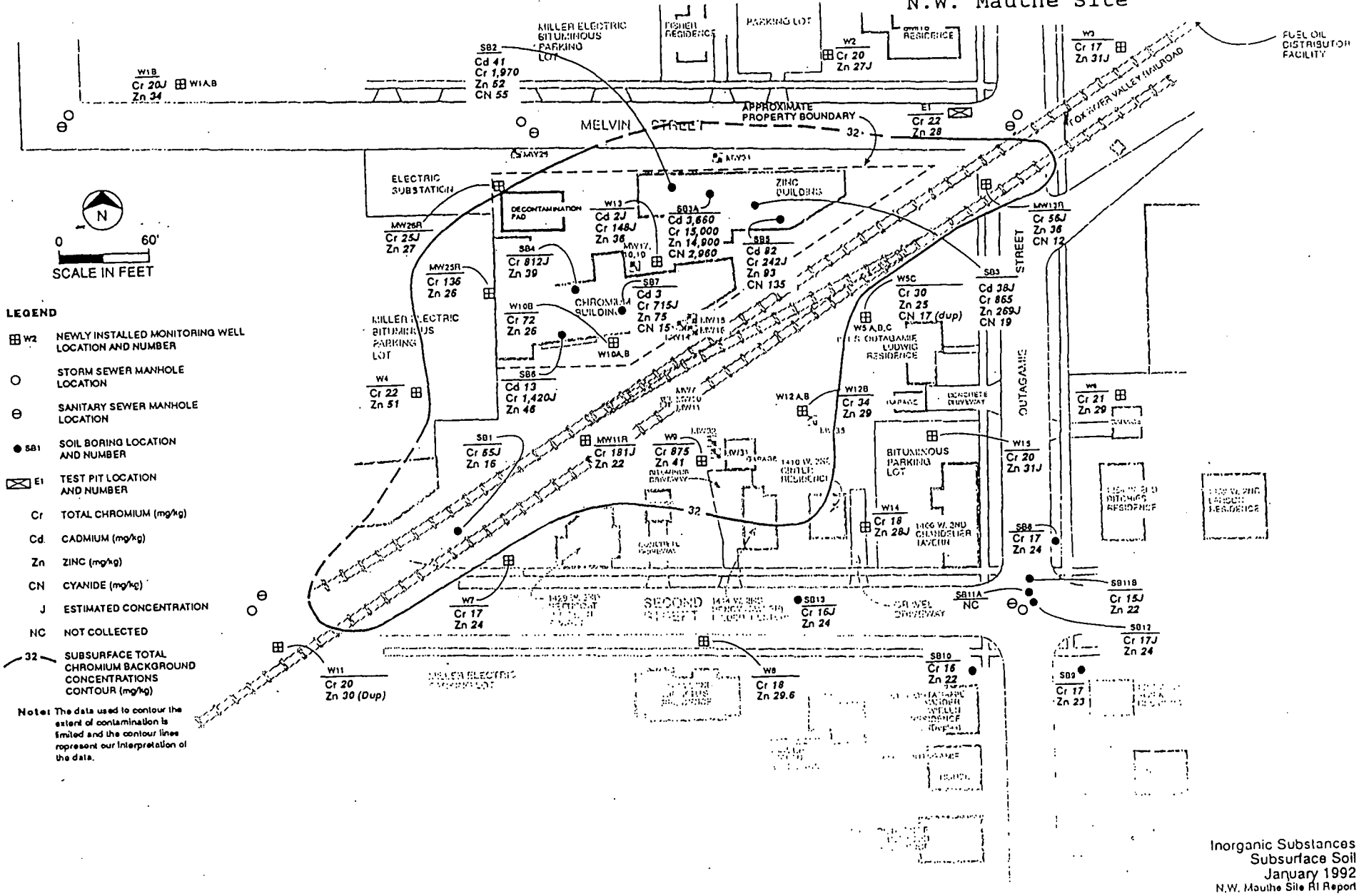


Figure 3
Chromium in Subsurface Soils
N.W. Mauthe Site



Inorganic Substances
Subsurface Soil
January 1992
N.W. Mauthe Site RI Report

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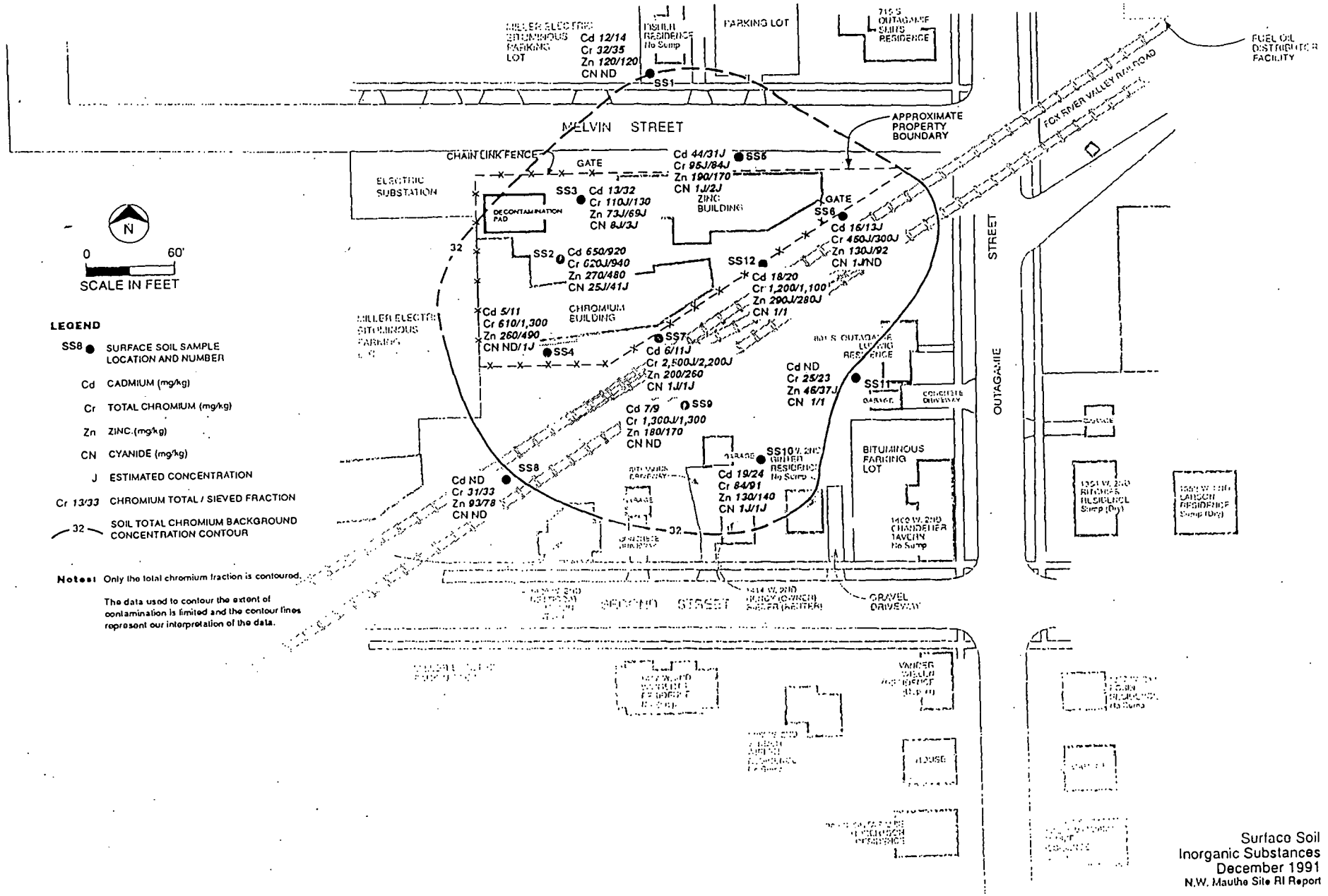
Figure 2
Surface Soil Sampling
N.W. Mauthe Site



Surface Soil
Inorganic Substances
December 1991
N.W. Mauthe Site RI Report

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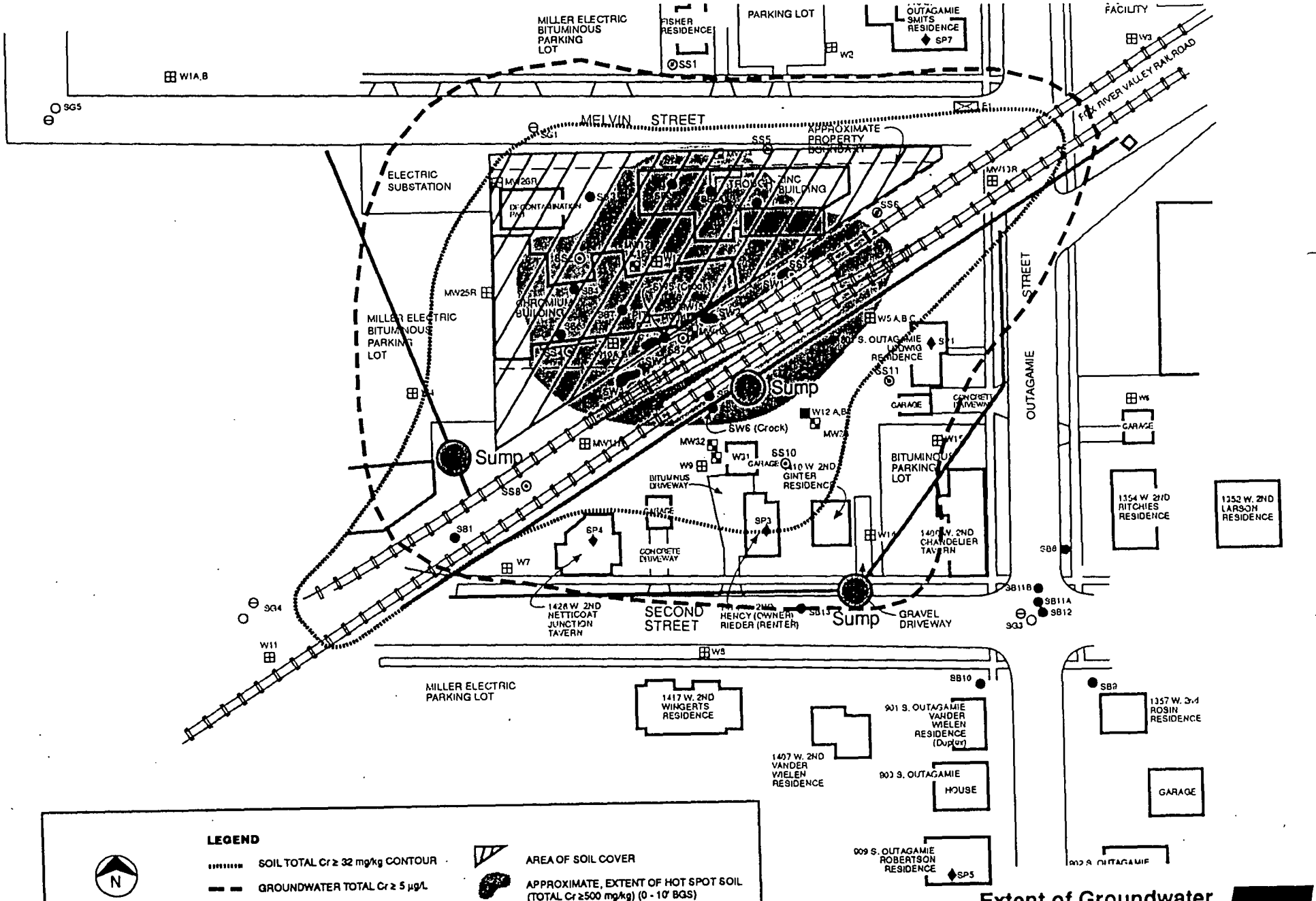
Figure 8
Alternative 4 (Hot Spot Removal) - Selected Alternative
N.W. Mauthe Site



Extent of Groundwater Contamination and Hot Spot Soil Removal (Alternative 4)
N.W. Mauthe Site Proposed Plan

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GLO32860.FF.NN Figure 4-7 7-9-93 CS/ml