Five Year Review

Pursuant to CERCLA

Third Five-Year Review Report
for
Better Brite Plating Co. Zinc and Chrome Shops Superfund Site
De Pere,
Brown County, Wisconsin

Prepared By:

Wisconsin Department of Natural Resources
Northeast Region
Green Bay, Wisconsin

and

U.S. Environmental Protection Agency
Region 5
Chicago, Illinois

Approved By:

Donald J. Bruce

for Richard C. Karl
Director
Superfund Division

11/20/09

Date

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List of Acronyms

bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
ESs	enforcement standards from Wisconsin Administrative Code, Chapter NR 140
FIE	Foth Infrastructure and Environment, LLC
FS	Focused Feasibility Study Groundwater Operable Unit, Hydro-Search, Inc., March 13, 1996
ICs	Institutional Controls
mg/kg	milligrams/kilogram (parts-per-million in soil)
O&M	operation and maintenance
PALs	preventive action limit from Wisconsin Administrative Code, Chapter NR 140
RI	Remedial Investigation Better Brite Plating, Inc., Hydro-Search, Inc., September 18, 1995
ROD	Record of Decision
SLs	EPA Region 3 screening levels
ug/l	micrograms/liter (parts-per-billion in water)
UU/UE	unlimited use / unlimited exposure
VOCs	volatile organic compounds
WDNR	Wisconsin Department of Natural Resources

EXECUTIVE SUMMARY

The Better Brite Plating Co. Zinc and Chrome Shops Superfund site consists of two separate properties in De Pere, Wisconsin (City of De Pere or City). These two properties were included on the National Priorities List as one site due to similarities in contaminants, site history and ownership. The primary contaminant of concern at each site is chromium, especially the hexavalent form of chromium.

The most immediate public health risks were addressed from 1980 - 1995 through Wisconsin Department of Natural Resources (WDNR) enforcement actions, and United States Environmental Protection Agency (EPA) removal actions, including removal of all containerized wastes, removal of contaminated debris and soils, fencing and placing of soil cover over the remaining contaminated soil, and installation and operation of a groundwater removal and treatment system.

The Record of Decision (ROD) for the final remedial action was signed on September 24, 1996. In general, this ROD provides for replacement of the groundwater removal and treatment system at the Chrome Shop with soil and groundwater treatment by stabilization of the hexavalent chromium, continuation of groundwater removal and treatment at the Zinc Shop, and actions to isolate recharge of contaminated groundwater to basement sumps in two nearby residences. The construction required in the ROD was conducted in 1999, and EPA signed a Preliminary Closeout Report in February 2000. WDNR has operated, maintained, and monitored the site, under a cooperative agreement with EPA. Groundwater monitoring events during the last five years took place in May 2005, November 2005, October 2006, August 2007 and July 2009.

The remedy currently protects human health and the environment because the removal and remedial actions addressed risks from soils and from groundwater recharge into building sumps, the soil cover is being maintained, groundwater monitoring is ongoing, the aquifer affected is low in permeability, and there are no longer any groundwater users in the vicinity of the site. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:

- at the Zinc Shop: 1) implement measures to maximize the groundwater removal rate; 2) install additional water level monitoring points; 3) perform a capture zone evaluation correlating capture zone to removal rates; 4) submit accurate monitoring reports containing adequate information to interpret groundwater data; and, 5) add more off-site, downgradient monitoring well locations, if needed;
- at the Chrome Shop, further evaluate the effectiveness of the soil stabilization and the potential for off-site migration of chromium contaminated groundwater;
- evaluate whether it is possible to collect groundwater samples using a low-flow sampling procedure and the advisability of field filtration;
- add measurement of field parameters to future sampling events, and add analysis of cyanide and some metals to future comprehensive sampling events; and
- evaluate whether restrictive covenants are necessary on properties not owned by the City and, if so, pursue restrictive covenants on these properties.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name ***(from WasteLAN)*****:** Better Brite Plating Co. Chrome and Zinc Shops

EPA ID ***(from WasteLAN)*****:** WIT560010118

Region: 5	**State:** WI	**City/County:** De Pere/Brown

SITE STATUS

NPL status: **X** Final ☐ Deleted ☐ Other (specify)

Remediation status (choose all that apply): ☐ Under Construction **X** Operating ☐ Complete

Multiple OUs?* **X** YES ☐ NO	**Construction completion date:** _2_ / _8_ / _2000__

Has site been put into reuse? ☐ YES **X** NO

REVIEW STATUS

Lead agency: ☐ EPA **X** State ☐ Tribe ☐ Other Federal Agency _____

Author name: Keld Lauridsen, WDNR, and Richard Boice, EPA

Author title: Project Managers	**Author affiliation:** WDNR / EPA

Review period:** __06 / _17 / 2009_ to date of signature

Date(s) of site inspection: ___ / ___ / _____ every couple months

Type of review:

X Post-SARA ☐ Pre-SARA ☐ NPL-Removal only
☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead
☐ Regional Discretion

Review number: ☐ 1 (first) ☐ 2 (second) **X** 3 (third) ☐ Other (specify) _____

Triggering action:

☐ Actual RA Onsite Construction at OU #____ ☐Actual RA Start at OU#____
☐ Construction Completion **X** Previous Five-Year Review Report
☐ Other (specify)

Triggering action date ***(from WasteLAN)*****:** _11 / _23 / _2004____

Due date ***(five years after triggering action date)*****:** _11 / _23 / _2009_

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

1. Zinc Shop operational and capture zone problems.
2. At the Chrome Shop, concern about effectiveness of stabilization treatment and off-site migration of the chromium contaminated groundwater.
3. Concern about representativeness of groundwater samples.
4. Lack of monitoring for cyanide, some metals, and field parameters.
5. Contamination extends beyond properties covered by the restrictive covenant.

Recommendations and Follow-up Actions:

1. At the Zinc Shop: 1) implement measures to maximize the groundwater removal rate; 2) install additional water level monitoring points; 3) perform a capture zone evaluation correlating capture zone to removal rates; 4) submit accurate monitoring reports containing adequate information to interpret groundwater data; and, 5) add more off-site, downgradient monitoring well locations, if needed.
2. At the Chrome Shop, further evaluate the effectiveness of the soil stabilization and the potential for off-site migration of chromium contaminated groundwater.
3. Evaluate whether it is possible to collect groundwater samples using a low-flow sampling procedure and the advisability of field filtration.
4. Add measurement of field parameters to future sampling events, and add analysis of cyanide and some metals to future comprehensive sampling events.
5. Evaluate whether restrictive covenants are necessary on affected properties not owned by the City and if so pursue restrictive covenants on these properties.

Protectiveness Statement(s):

The remedy currently protects human health and the environment because the removal and remedial actions addressed risks from soils and from groundwater recharge of building sumps, the soil cover is being maintained, groundwater monitoring is ongoing, the aquifer affected is low in permeability, and there are no longer any groundwater users in the vicinity of the site. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: - at the Zinc Shop: 1) implement measures to maximize the groundwater removal rate; 2) install additional water level monitoring points; 3) perform a capture zone evaluation correlating capture zone to removal rates; 4) submit accurate monitoring reports containing adequate information to interpret groundwater data; and, 5) add more off-site, downgradient monitoring well locations, if needed; - at the Chrome Shop, further evaluate the effectiveness of the soil stabilization and the potential for off-site migration of chromium contaminated groundwater; - evaluate whether it is possible to collect groundwater samples using a low-flow sampling procedure and the advisability of field filtration; - add measurement of field parameters to future sampling events, and add analysis of cyanide and some metals to future comprehensive sampling events; and
- evaluate whether restrictive covenants are necessary on properties not owned by the City and, if so, pursue restrictive covenants on these properties.

Other Comments:

Date of last Regional review of Human Exposure Indicator (from WasteLAN): __11/16/2009 ____
Human Exposure Survey Status (from WasteLAN): current human exposure controlled
Date of last Regional review of Groundwater Migration Indicator (from WasteLAN): _11/16/2009___
Groundwater Migration Survey Status (from WasteLAN): contaminated groundwater migration under control_
Ready for Reuse Determination Status (from WasteLAN): unused_____

I. INTRODUCTION

Section 121 (C) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by SARA and Section 300.430 (f) (4) (ii) of the National Contingency Plan (NCP), require that periodic (no less often than five years) reviews are to be conducted for sites where hazardous substances, pollutants or contaminants remain at the site at levels that do not allow for unlimited use and unrestricted exposure following the completion of all remedial actions for the site. The purpose of this five-year review is to evaluate whether the remedial actions implemented continue to be protective of human health and the environment. This review focuses on the protectiveness of the Better Brite Plating Co. Zinc and Chrome Shops Superfund Site, De Pere, Wisconsin. This review will be placed in the Site files and at the local repository for the Better Brite Superfund Site at the Brown County Public Library, De Pere Branch, De Pere, Wisconsin.

Region 5 of the United States Environmental Protection Agency (EPA) and the Wisconsin Department of Natural Resources (WDNR) conducted the third five-year review of the remedy implemented at the Better Brite Site in De Pere, Wisconsin. This review was performed by Keld Lauridsen, State Project Manager and Community Involvement Coordinator of WDNR, and Richard Boice, Remedial Project Manager of EPA, during October and November 2009. This documents the results of the review.

This is the third five-year review for the Better Brite Site. The triggering action for this statutory review is the signature date of the second five-year review report. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

II. SITE CHRONOLOGY

Table 1: Chronology of Site Events

Approx. 1967 – 1989	Chrome / zinc plating operations at the Zinc Shop
Mid 1970s – 1985	Chrome plating operations at the Chrome Shop
1979 – ~1990	WDNR investigations and litigation.
1980	Better Brite initiated groundwater removal at the Chrome Shop
October 1986 – October 1993	EPA fund lead removal actions
October 26, 1989	Proposed for the National Priorities List
September 1990	EPA initiated groundwater removal at the Zinc Shop
August 30, 1990	Finalized on National Priorities List
June 28, 1991	EPA issued an interim action Record of Decision (ROD)

September 1995	WDNR lead Remedial Investigation/Feasibility Study (RI/FS) for the Better Brite site was completed
September 24, 1996	WDNR and EPA issued final ROD
August – December 1999	WDNR contractor implemented final ROD remedy, including in-situ stabilization at Chrome Shop and relocation of the treatment equipment to the Zinc Shop. In November, EPA issued the First Five-Year Review Report. In December, the Zinc Shop groundwater removal restarted.
November 1999	EPA issued First Five-Year Review report
February 8, 2000	EPA issued Preliminary Closeout Report
November 23, 2004	EPA issued Second Five-Year Review report

III. BACKGROUND

Physical Characteristics

This National Priorities List site consists of two separate properties where Better Brite formerly operated a metal plating business. The properties are known as the Chrome Shop and Zinc Shop. The Better Brite Chrome and Zinc Shops are located at 519 Lande Street and 315 South Sixth Street, respectively, in the City of De Pere, Brown County, Wisconsin. The sites are approximately 2,000 feet apart in Sections 21 and 28 De Pere Township (see Figures 2-1, 2-7, and 7-3 and from the Remedial Action Documentation Report Better Brite Plating, HSI Geotrans, December 21, 1999).

The Chrome Shop property comprises 3.7 acres and the Zinc Shop property comprises 0.61 acres. The topography of the area is generally flat, and both site properties are approximately ¼ mile west of the Fox River.

Three water bearing units are present below the site, including from shallow to deep: an approximately 30-foot thick unconsolidated glacial lacustrine and till deposits layer; dolomite; and, sandstones starting about 170 feet below ground surface (bgs). The glacial deposits are primarily silty clay to lean clay with isolated lenses and seams of silt, silty sand, sandy clay and clayey sand. The glacial deposits are of low yield and not utilized for water supply. The dolomite bedrock is about 150 feet thick and is generally not used for water supply in this area, although water bearing dolomite was encountered in the top 15 feet of dolomite in borings near the Zinc Shop, and some private wells were formerly screened in the dolomite. The sandstone aquifer is highly productive and is the primary source of water in this area.

Land and Resource Use

Land use in the vicinity of the site is mixed residential/commercial and is expected to remain the same in the foreseeable future. According to the Final Design Report (HSI Geotrans,

December 3, 1998), an estimated 46,000 people obtained drinking water from municipal wells within three miles of Better Brite. The City of De Pere had six municipal wells, all screened in the deep sandstone aquifer, but the City now utilizes Lake Michigan water. One municipal well was located 250 feet northwest of the Zinc Shop, but is now abandoned. A 1991 door-to-door survey located five unused and two used private wells near the site, but these wells are now abandoned according to the City of De Pere. The private wells drew water from the dolomite or the sandstone formations.

History of Contamination

The Better Brite facilities primarily engaged in plating of 15 to 20-foot rollers for paper mills in the area. Better Brite began operations at the Zinc Shop in the late 1960s. By 1978 chrome plating operations had begun at the Chrome Shop site, and operations at the Zinc Shop had been converted to zinc plating only. Vertical in-ground dip tanks were used for chromium plating operations. Known chemical usage included muriatic acid, sodium hypochlorite, degreasers containing VOCs, chromic acid, and sodium cyanide solution.

Operational practices were poor. In 1979, numerous complaints of spills and dumping from neighbors and employees prompted the initial investigations of the site by WDNR. During the 1980s, limited site investigation and remedial efforts were conducted. In 1985, Better Brite filed for bankruptcy protection, and operations were discontinued at the Chrome Shop, but operations continued until 1989 at the Zinc Shop. Investigations found that the vertical tanks at the Chrome Shop had been leaking, and it was estimated that between 20,000 and 60,000 gallons of chrome plating solution leaked from the tanks during the time the plant was in operation. In early investigations, high concentrations of chromium, zinc, cadmium, and cyanide were detected in wastes, surface water and soil samples.

Initial Responses

Chrome Shop

From 1979-1990, there were ongoing investigations and litigation by WDNR that resulted in limited measures to remove and/or contain the contamination. In 1979–1980, EPA prepared a response plan, which Better Brite implemented, including a groundwater collection trench, surface water controls, groundwater monitoring wells, and limited soil removal. Groundwater from the collection trench was discharged to a City of De Pere sanitary sewer. Following the 1985 bankruptcy, the site owner with WDNR oversight removed the Chrome Shop building, filled a holding pond, and capped the building area with a clay cap. In April 1986, EPA removed four subsurface plating tanks from the Chrome Shop. In September 1986, EPA prepared a Site Assessment and Emergency Action Plan, which concluded that the Chrome Shop posed an immediate threat to human health. From September 1986 to April 1987, EPA performed a removal action, which included removal of all containerized hazardous materials, removal of wastes from the plating pits, and removal of visibly contaminated soil. In total, EPA removed 83 tons of contaminated soil, 9,270 gallons of chromic acid, 3,600 gallons of base/neutral liquids, 550 gallons of cyanide solution, 150 pounds of cyanide sludge, and 500 gallons of flammable liquids.

In 1986, Better Brite discontinued pumping from the collection trench. As a result, by 1988, chromium contaminated surface water collected in neighbors' yards. In response to this, as an interim measure, in March 1988 EPA initiated pumping from the collection trench and discharging to a sanitary sewer. In 1990, EPA constructed and initiated operation of a 2,000 gallon per day system to treat groundwater prior to discharge to a sanitary sewer and initiated pumping from a recovery well in addition to the collection trench. In 1993, EPA replaced the recovery well and groundwater collection trench with an engineered groundwater collection sump.

In 1993, EPA excavated and removed approximately 10,000 tons of contaminated soil, concrete, and debris. Contaminated surface soils were excavated from much of the Chrome Shop property, and some from adjacent properties (see Figure 2-13 from the RI). A smaller area was excavated to a depth of 20 feet bgs. Sampling indicated that soils outside of and below the excavated area were uncontaminated. The excavated area was filled with clean soil.

Zinc Shop

In October 1989, EPA performed a site assessment at the Zinc Shop. The assessment confirmed the WDNR report of contamination and illegally stored hazardous substances. Based on the results of the site assessment, EPA conducted a removal action consisting of sampling and sorting hazardous materials, securing and heating the building, removal of wastes, decontaminating the building, and compiling the analytical results of previous investigations.

In 1990, EPA constructed a groundwater recovery sump along the east side of the building. Contaminated groundwater from the sump was trucked to the Chrome Shop for pretreatment. Approximately 350 cubic yards of chromium contaminated soil was excavated and disposed of during the installation of the sump. In 1991, EPA conducted additional decontamination of the building and investigation beneath the concrete slab foundation. In 1993, following further excavation, the sump was replaced with a larger sump. Until the fall of 1999, contaminated groundwater was regularly extracted from the sump and trucked to the Chrome Shop for treatment.

In September 1992, the Zinc Shop burned down. From November 1992 to January 1993, EPA removed the building, the slab foundation, and two 15-foot long vertical in-ground dip tanks. Contaminated soil was excavated from the area of the former foundation to 20 feet bgs, and soils below the excavation were sampled and found to be uncontaminated. Approximately 6,032 tons of chromium contaminated soil, concrete, and building debris was removed from the site and disposed.

Through August 1999, approximately 2,330,000 gallons of chromium-contaminated water had been removed from the Zinc Shop and Chrome Shop groundwater collection systems.

Basis for Taking Action

The RI and earlier investigations focused on volatile organic compounds (VOCs), cyanide, and metals, especially chromium and hexavalent chromium. From the RI, EPA and WDNR concluded that contaminants relating to the plating operation, including metal plating solutions and solvents, were released primarily from leaking underground plating tanks, drum and roll-off box storage areas, and surface spills, and resulted in impacts to soil, groundwater, and possibly air and surface water. Although the removal actions resulted in a substantial reduction in contamination, significant groundwater contamination remained. Between 1994 and 1998, total chromium from the Chrome Shop treatment system influent decreased from approximately 500,000 micrograms/liter (ug/l) to 150,000 ug/l. Between 1993 and 1999, the total chromium from the Zinc Shop sump decreased from 600,000 ug/l to 65,000 ug/l.

The RI included an assessment of risks to human health and the environment from all potential exposure pathways, including those related to contaminated groundwater, air, surface water, soil, basement sump water, and precipitates in basements. The primary pathways of concern were determined to be from groundwater to residential drinking water users, and groundwater to basement sumps to residential direct contact and inhalation. In the RI, it was determined that the air, surface water and soil exposure pathways were minor and/or had been eliminated by the removal actions.

Relative to the soil pathway, in 1991, the Wisconsin Department of Public Health determined that off-site soil contamination did not pose a risk to the residents adjacent to the site. In the RI, on-site soil concentrations were compared to the following criteria: for total chromium 135 milligrams/kilogram (mg/kg) (developed by Wisconsin Department of Public Health); State of Wisconsin NR 720 standards; and EPA Region 3 screening levels (see attached Tables 6-1. 8-1, 8-2 and 8-3 from the RI). The RI documented that most surface and subsurface soil with inorganic contamination exceeding background or criteria had already been excavated. Some soil exceeding background or criteria remained, but the public health risks were not significant because of the limited area of contamination, limited number of contaminants, limited migration potential, and limited exposure potential because the site is well vegetated, and infrequently used.

The 1996 ROD Summary included an assessment of the remaining risks from groundwater contamination. EPA and WDNR concluded that in Wisconsin Administrative Code NR140 Enforcement Standards (ESs) and Preventive Action Limits (PALs) provided sufficient protection of public health for residential groundwater usage, and, therefore, only a qualitative risk assessment was performed by comparing groundwater detections to the ESs and PALs. It was determined that chromium was the primary contaminant of concern in groundwater at both the Zinc Shop and the Chrome Shop. A large percentage of the chromium was present in the form of hexavalent chromium, which is the most mobile and most toxic form of chromium. To evaluate the risks from contaminated groundwater entry into sumps in the basements of nearby households, the Wisconsin Department of Public Health performed an evaluation, in which they concluded that chromium contaminated dust and water seepage within the basements of homes posed a public health hazard.

At the Chrome Shop, the highest chromium concentrations were from the sump and trench. The western extent of the chromium contamination reached into yards of adjacent residences (see Figure 7-3). Manganese exceeded the ES but was believed to be from background. Other metals and cyanide exceeded ESs only in one sampling event (antimony, arsenic, beryllium, cadmium, cyanide, iron, lead, nickel, silver, and thallium). 1,1,1-trichloroethane, trichloroethylene, and tetrachloroethylene were detected exceeding ESs in the vicinity of the sump. The 1996 ROD concluded that all of the groundwater contamination was being contained by the groundwater collection system except the off-site groundwater contamination, located west of the collection trench.

At the Zinc Shop, nickel and cyanide were also identified as primary contaminants of concern. The contaminant plume extended across the Zinc Shop property, and partially encompassed adjacent properties to the south, southeast, and east. Manganese exceeded the ES but was believed to be from background contamination. Antimony, beryllium, iron, lead, selenium, and thallium exceeded the ES in one sampling event. Benzene exceeded the ES in one monitoring well, but was believed to be from some other source. There were trace detections of other VOCs. In the 1996 ROD, EPA concluded that all of the contaminated groundwater was being contained by the groundwater collection sump.

In the 1996 ROD, EPA concluded that the downward hydraulic gradient between the glacial groundwater and bedrock groundwater indicates potential for contamination of the dolomite and sandstone aquifers, which are used as water supplies by some private residences and by the city, if the contamination is not controlled. There was no current risk, because the investigation indicated that contamination had not reached the bedrock, and sampling confirmed that the nearest residential and city water supply wells were not affected by the Better Brite contamination. Groundwater contamination was limited to the upper portion (top 25 feet) of the glacial deposits and was being captured by the groundwater removal systems. The estimated horizontal groundwater velocities were low. Vertical groundwater velocities could not be estimated because water level measurements were not at equilibrium, but are apparently very low.

The RI noted that because of the low hydraulic conductivities and the limited time interval between purging and water level measurements (there were three water level measurement surveys, which occurred from 1 to 4 weeks after purging), there may not have been enough time for the water levels to come to equilibrium. As a result, the magnitude of the vertical gradients was not believed to be accurate, but EPA and WDNR were still confident that the vertical gradient was downward. The impact on the horizontal gradients in the glacial groundwater was not discussed in the RI.

In the 1996 ROD, EPA and WDNR also concluded that exposure to contaminated groundwater could occur through basement sumps located at two adjacent residences, and that additional basement sumps could be impacted in the future if groundwater contaminant migration is not controlled.

Sampling for semivolatile organic compounds, pesticides, and polychlorinated biphenyls was limited. Some Zinc Shop soil sampling by WDNR in 1988 included semivolatile organic

compounds, pesticides and polychlorinated biphenyls. Total DDT was detected in one sample at 865 mg/kg, and some semivolatile organic compounds were detected. In the Preliminary Health Assessment, the Wisconsin Department of Public Health noted that a high concentration of DDT was detected, but that there was no follow up sampling for DDT. It was conjectured that the source of the DDT detections could be from a nearby facility or from pesticide usage at the Zinc Shop.

IV. REMEDIAL ACTIONS

REMEDY SELECTION

On June 28, 1991, EPA issued an interim ROD (operable unit #1) providing for: modification of and continued O&M of the existing groundwater removal and pretreatment system; control of surface water by ground contouring and berming along with collection and treatment by pretreatment system as needed; and additional fencing and other actions to prevent direct contact risks.

On September 24, 1996 the WDNR and EPA issued a ROD for the final remedial action at the site. The remedial action objectives listed in the ROD included: protection of the underlying bedrock aquifers and/or control of further migration of contaminants in the short term; and, in the long term, to meet state and/or federal groundwater quality standards, whichever is more stringent. The most stringent groundwater quality standards were identified as the PALs and ESs. The objective of the basement/foundation remedial actions was to prevent human contact with the soil dust and groundwater at the residences near the Zinc Shop. Although the ROD did not directly address direct contact risks, the RI considered the following additional, more generic remedial objectives: prevent ingestion/inhalation/direct contact with ground water and soil which would pose an unacceptable risk to human health or the environment; and, prevent migration of contaminants that would result in surface water or sediment contamination which would pose an unacceptable risk to human health or the environment. The previously implemented removal actions included source removal actions and measures to prevent human contact with the contaminated soils and groundwater.

The major components of the remedy, as identified in the ROD, include:

- relocation of the pretreatment plant, which is currently located at the Chrome Shop, to the Zinc Shop;
- continued removal, treatment and discharge to the sanitary sewer of groundwater from the existing groundwater collection sump at the Zinc Shop;
- in-situ stabilization and/or solidification of chromium contaminated soil and groundwater at the Chrome Shop;
- implementation of proper institutional controls (ICs) and site access restrictions;
- sealing the interior access points of the existing foundation drains;
- waterproofing existing exterior foundation walls;
- construction of new exterior building foundation drains with collected water treated at the Zinc Shop pretreatment facility;
- necessary predesign investigations of the structural integrity of the existing buildings near the zinc shop to determine if the above actions are feasible (if it is found that

the buildings do not have the structural integrity to construct the actions, the actions will be modified to remove as much risk as possible without endangering building structural integrity); and

- removal and proper treatment/disposal of any contaminated soil near off-site buildings that pose health risks or could cause additional groundwater contamination near the Zinc Shop after a predesign investigation.

The objective of the in-situ stabilization at the Chrome Shop was to achieve PALs. If the PALs are not achieved, but the ESs are, then an exemption pursuant to WAC NR 140.28 would be necessary, but no change to the ROD would be required. If the ESs are not achieved, then other alternatives would be evaluated.

Access restrictions were assumed to include: fences around both sites to limit access to monitoring wells, sumps, equipment, clay cap, and warning signs. Deed restrictions were to be "placed on the Zinc Shop and Chrome Shop properties to prevent activities which could affect or disturb the effectiveness of the remedy, including future subsurface excavation, and water well installation."

In the ROD, EPA and WDNR recognized that it may take many years to achieve the PALs in Zinc Shop groundwater. Therefore, the ROD included a note that five-year reviews will include an assessment of whether newly developed technologies are capable of achieving the PALs sooner. If not, then one of the following options should be implemented: continue the action without modification until the next review; consider establishing Alternative Concentration Limits under substantive requirements of Wisconsin Administrative Code NR 140.28, which can be no higher than ESs; or process a technical impracticability waiver pursuant to Section 121(d) of the CERCLA.

Hazardous waste identification, storage, shipment, disposal, and transportation must comply with Wisconsin Administrative Code NR 605, NR 615, NR 620, and NR 675. Contaminated soil and groundwater that do not meet the legal definition of a hazardous waste must be managed in accordance with Wisconsin Administrative Code NR 500. The discharge of the pretreated groundwater must comply with Wisconsin Administrative Code 108 and 211.

REMEDY IMPLEMENTATION

The remedial design, construction and operation and maintenance (O&M) for the final ROD have been conducted by WDNR under a cooperative agreement with EPA. Sampling, treatability, design, and oversight of construction were performed by HSI Geotrans under a contract with WDNR. WDNR selected RMT, Inc. to perform the construction. The sampling, treatability, and design work for the remedial actions are summarized in the Final Design Report.

Construction activities began at the Better Brite Site on August 23, 1999. The area with groundwater impacted by hexavalent chromium at the Chrome Shop was stabilized by mixing a chemical reductant into the soil to a depth of 20 feet bgs (see attached Figure 3.1 from Remedial Action Documentation Report). There were some adjustments to the soil treatment zone during

the operation based on field conditions and observations. Approximately 15,000 cubic yards of soil were treated. The mixing procedure differed from that anticipated in the ROD. The mixing was performed primarily using a backhoe supplemented with a rototiller type attachment instead of a crane mounted vertical mixer. The chemical was mixed with soil in two foot lifts using the rototiller attachment, the treated soil was field tested, and then excavated and stock piled after field tests indicated that treatment was sufficient. Thirty-seven confirmation samples were collected from the stock-piled treated soils and sent to a laboratory for testing for chromium using the Synthetic Precipitation Leaching Procedure. Some soil had to be further treated based on field or laboratory test results. After final treatment, all of the chromium leaching results were less than the PAL (10 ug/l).

The treated soils were deposited and compacted back into the excavation. The appearance of the Chrome Shop property was restored and the treated soil was protected from erosion and human contact by backfilling and grading in order to improve drainage, along with placement of top soil, seeding and mulching. Approximately 1,080 cubic yards of topsoil were spread on the Chrome Shop to provide a four-inch cover over the stabilized soil and staging areas. The fence around the Chrome Shop was not replaced, and currently there is no fence at the Chrome Shop. Each monitoring well is protected by a locked steel casing.

Waste materials generated during the soil treatment included concrete debris, two partially intact underground storage tanks, debris from abandonment of wells and the French drain. These wastes were disposed off-site as non-hazardous special wastes. Soil stabilization at the Chrome Shop was completed on October 29, 1999.

Relocation and restart of the groundwater recovery and treatment system at the Zinc Shop was completed by the end of 1999. This included piping groundwater pumped from new exterior foundation drains for two nearby residences to the treatment system. Disturbed areas were restored and covered with 4 inches of top soil or 4 inches of crushed aggregate and asphalt paving. Approximately 2,100 square feet were paved, and 45 cubic yards of top soil were spread. A fence was installed around the Zinc Shop sump, and treatment facilities are enclosed within a locked building, but no fence was installed around the Zinc Shop property. Each monitoring well is protected by a locked steel casing. The removal of hexavalent chromium-contaminated groundwater and subsequent pretreatment prior to discharge to the sanitary sewer is ongoing at the Zinc Shop.

The basement foundation sump was sealed at one residence near the Zinc Shop and had already been sealed by the owner of the other residence of concern. The sump discharges were piped to the sewer. Maintenance of the in-home drain cover, seal and plumbing is the responsibility of the owners. Waterproofing of existing exterior foundation walls was not performed at either residence for the following reasons: at one residence because the building walls extend beyond the foundation walls; and at the other because of concern about potential for collapse of the foundation. Exterior foundation drains were constructed for the two residences with the groundwater discharge piped to the Zinc Shop treatment system (see Figure 4-1 of the Remedial Action Documentation Report). Surface soil sampling at the two residences detected only lead at greater than the non-industrial Wisconsin standard (50 mg/kg), but results were less than the industrial standard for lead. No further soil excavation was performed, but the top two feet of

the excavations for the exterior foundation drains were disposed of in the subsurface at the Chrome shop, and the top two feet of the excavations were filled with clean soil. The excavation areas were restored with vegetation or asphalt paving as appropriate.

SYSTEM O&M

EPA has been funding WDNR to perform O&M of the remedial actions under a cooperative agreement. Starting on July 18, 2011, EPA funding will be discontinued, and WDNR will become fully financially responsible for O&M.

HSI Geotrans, a WDNR contractor, prepared a Quality Assurance Project Plan for Groundwater Monitoring, September 28, 1998 and the Remedial Action Documentation Report. Together these documents provide a plan for long-term monitoring, sampling, analysis, validation, health and safety, maintaining the grounds, and the content of monitoring reports. The proposed laboratory analytical parameters were limited to total chromium, hexavalent chromium, and VOCs. The Quality Assurance Project Plan included an explanation for why cyanide and other metals should be screened out based on 1994 and 1995 data, plus 1998 data for the most highly contaminated groundwater. Procedures for field filtration were included. Groundwater is being sampled using bailers.

Until March 31, 2009, the City of De Pere was responsible for O&M of the Zinc Shop groundwater removal system under an agreement with WDNR. O&M was performed by City of De Pere wastewater treatment staff. Since April 1, 2009, Foth Infrastructure and Environment, LLC (FIE) has been responsible for O&M under a contract with WDNR. No plan has been provided to EPA for O&M by either the City of De Pere or FIE. The City of De Pere staff kept records of the amount of groundwater removed from the sump, but no one evaluated whether removal rates had increased or decreased, nor what representative removal rate should be utilized for evaluating the extent of groundwater capture. City staff only removed water when the sump filled up. In a technical memorandum attached to the Focused FS, Hydro-Search advised that if the water level in the sump could be kept low, the rate of groundwater removal and groundwater capture zone may be increased. According to WDNR, groundwater removal may be automated and record keeping may be improved under FIE.

The annual O&M costs have ranged from approximately $21,500 to $23,000 per year. This breaks down to (approximately): $12,000 charged by the City of De Pere to operate the treatment system; $3000 for sludge disposal; $5000 for groundwater monitoring; and up to $3000 for WDNR salary. According to the WDNR, the operating budget utilizing FIE is expected to be in line with previous budgets.

In 2007, the Zinc Shop pretreatment system generated four 55 gallon barrels of waste chromium sludge, and, in 2008, three barrels. The chromium sludge from the Zinc Shop treatment system has been picked up by Veolia Environmental Services and transported to their facility at Menominee Falls, Wisconsin, where the sludge is stabilized prior to disposal in a non-hazardous waste landfill. The WDNR site manager receives and reviews the hazardous waste manifests and annual certificate for this disposal.

The WDNR site manager has reviewed the data on the discharge from the Zinc Shop pretreatment to the sanitary sewer to assure that the discharge is in compliance with pretreatment requirements.

INSTITUTIONAL CONTROLS

Attached Figure 2-7 from the RI shows the area that may not support unlimited use and/ unlimited exposure (UU/UE) at the Zinc Shop because of high hexavalent chromium in the groundwater. Attached Figure 7-3 shows the area that may not support UU/UE at the Chrome Shop because of the soil treatment. The following table summarizes the status of ICs for the different areas and owners of the site properties.

Table 2: IC Summary

Media & Areas that Do Not Support UU/UE Based on Current Conditions.	**IC Objective**	**Status of ICs**
Chrome Shop area of soil treatment, which is owned by City of De Pere	Restrict use of groundwater, excavation of soils, disturbance of cap	In place: City ownership; WDNR O&M, public information, and well drilling restrictions; EPA public information and oversight under CERCLA; City groundwater usage restrictions. Being finalized: restrictive covenant between WDNR and City.
Chrome Shop area of soil treatment outside of City ownership	Restrict use of groundwater, excavation of soils, disturbance of cap	In place: WDNR O&M, public information, and well drilling restrictions; EPA public information and oversight under CERCLA; City groundwater usage restrictions. Not initiated: restrictive covenants.
Zinc Shop area of groundwater contamination, which is owned by the City	Restrict usage of groundwater	In place: City groundwater usage restrictions; WDNR O&M, public information, and well drilling restrictions; EPA public information and oversight under CERCLA. Being finalized: restrictive covenant between WDNR and City.
Zinc Shop area of groundwater contamination outside of City ownership	Restrict usage of groundwater	In place: City groundwater usage restrictions; WDNR O&M, and public information, and well drilling restrictions; EPA information and oversight under CERCLA. Not initiated: restrictive covenants.

The City of De Pere assumed ownership of the Better Brite properties in 2001, and, until April 1, 2009, performed O&M under an agreement with WDNR. Since April 1, 2009, WDNR has been conducting O&M of the site through a contractor. WDNR staff inspect the site periodically. The City's ownership, along with oversight by WDNR and (to a lesser extent) EPA, provides significant assurance that the remedial actions will be property maintained, and

that the contaminated areas will not be improperly developed in the future. At this time, the City has no plans to sell the Better Brite properties. Part of the Zinc Shop that is paved with asphalt is being leased by the City for parking. The City has no other plans for utilizing the Better Brite properties. Information on hazardous waste sites, including Better Brite, is available to the public on both EPA and WDNR web sites. Presently there are no deed notices or controls on the affected properties, but a restrictive covenant between the City and WDNR is now being finalized. EPA has been involved in preparation of this restrictive covenant to assure that it will satisfy EPA requirements.

The City of De Pere strictly regulates all well construction, usage, and abandonment within the city limits. Chapter 26 of the municipal code of De Pere includes the following requirements: if the building is adjacent to an installed water line, the owner is required to connect to the City water line; cross connections between City and private water supplies are prohibited; a permit is required for any well constructed, installed or maintained (the permit can be revoked if the well water is found to be contaminated); and, unused wells must be abandoned in accordance with WAC NR#112. A copy of Chapter 26 of the City of De Pere municipal code was attached to the Second Five-Year Review Report (November 23, 2004). In addition, Wisconsin Administrative Code 812 prohibits installation of new wells within 1,200 feet of a hazardous waste treatment facility.

As can be seen from Figures 7-3, 2-7 and 4-1 from the Remedial Action Documentation Report, the area of soil treatment at the Chrome Shop, the area of groundwater contamination at the Zinc Shop, and the exterior footing drains at the Zinc Shop are beyond the properties owned by the City of De Pere. There has been no plan to pursue restrictive covenants on affected properties that are not owned by the City. These factors create concern for the area where soil was treated at the Chrome Shop, because even though the dermal contact risks from the contaminated soils is low, the ROD provided that the stabilized soil should not be disturbed. Relative to the area of groundwater contamination at the Zinc Shop, the City and WDNR regulations should be effective in preventing risks from residential groundwater usage. However, based on past risk assessments, it appears possible that future development of properties adjacent to the Zinc Shop could result in a heath risk from entry of contaminated groundwater into sumps.

V. PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

The following table summarizes the progress made in addressing the recommendations from the 2004 five-year review:

Table 3: Actions Taken Since the Last Five-Year Review

Issues	Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
There was no notice to future owners of properties overlying contaminated soil or groundwater	Prepare IC plan, Place restrictive covenant on affected properties	WDNR	5/23/2005	Negotiating restrictive covenants with the City of De Pere	Being finalized for City property. No progress for other properties.

Groundwater standards not achieved	Continue groundwater monitoring and pump-and-treat	WDNR	5/23/2005	Monitoring and pump-and-treat has continued	Ongoing

The City of De Pere, as the current property owner of the Zinc and Chrome Shop properties, has been working with WDNR staff and EPA legal staff to prepare a restrictive covenant for their portions of the Better Brite properties. The City, WDNR, and EPA have agreed upon language, and the document is now in final preparation. After signature, the restrictive covenant will be filed at the Brown County Register of Deeds Office. There has been no effort to impose a restrictive covenant on properties outside of the City-owned property even though the soil stabilization occurred outside of the City-owned property at the Chrome Shop, and chromium contaminated groundwater extends beyond the City-owned property at the Zinc Shop.

WDNR has been in regular contact with the City regarding O&M of the Zinc Shop pump-and-treat system. The City has passed an ordinance strictly regulating usage of groundwater wells within the City. As a result of the City ordinance and other factors, there are no longer private wells near the site. The City's drinking water wells are no longer in operation, as the City has converted to usage of Lake Michigan water.

VI. FIVE YEAR REVIEW PROCESS

Administrative Components

The Better Brite five-year review team was led by Keld Lauridsen of the WDNR (currently assigned as both the State Project Manager and the Community Involvement Coordinator), and Richard Boice, the EPA Remedial Project Manager. Tom Turner, EPA Associate Regional Counsel, also assisted in the review.

The five-year review consisted of Site inspections and review of relevant documents. The completed report will be available in the Site information repository and the EPA website for public view.

Community Notification and Involvement

WDNR issued a notification of the five-year review in a local newspaper on October 22, 2009 (attached). Public comments were solicited and will be reviewed and recorded. WDNR informed the City of De Pere about the five-year review and provided a copy of the newpaper notice.

Document Review

Documents reviewed include: Preliminary Health Assessment Better Brite Plating Chrome & Zinc, Wisconsin Division of Public Health, May 1991; the interim June 1991 ROD; Site Evaluation Report, Hydro-Search, Inc., March 13, 1992; Remedial Investigation Better Brite Plating, Inc., Hydro-Search, Inc., September 18, 1995; the Focused Feasibility Study Groundwater Operable Unit, Hydro-Search, Inc., March 13, 1996; the final September 1996

ROD; the Final Design Report; the Quality Assurance Project Plan for Groundwater Monitoring; the Remedial Action Documentation Report; Groundwater Monitoring Reports; previous (1999 and 2004) Five-Year Review Reports; a draft of the restrictive covenant between the City of De Pere and WDNR; and various correspondence.

Data Review

The following data was reviewed (see attached Figures 2-7 and 7-3 for monitoring locations): reports on groundwater monitoring on 8/21/2007 and 7/21/2009 (see attached Table 1 from the 7/21/2009 report for a summary of chromium, iron sufate and sulfide groundwater data from 1994 – 2009); a tabulation of the VOC results from groundwater monitoring in 2000, 2002, 2003 and 2005 (see attached Table 4-2); and a summary of metals groundwater monitoring in 1994, 1995 and 1998 (Table 2-1 of the Remedial Action Documentation Report).

Following are concerns resulting from the review.
1. The number of sampling locations may have been too limited: at the Chrome Shop, 5 out of 16 monitoring wells were sampled and at the Zinc Shop 8 out of 15 monitoring wells were sampled in 2007; and 6 out of 15 in 2009. According to the WDNR site manager, the number of monitoring points were reduced because of the very slow rate of groundwater movement. WDNR intends to include more monitoring points every few years.

2. The parameter list may be too limited: Only total chromium was monitored in 2007 and 2009. Hexavalent chromium was last monitored in 2006. Indicators for treatment (iron and sulfate) were monitored at some Chrome Shop monitoring wells from 2001–2005. VOCs were analyzed at the Zinc Shop sump in 2000, 2002, 2003, and 2005; at MW-116 in 2000 and 2005; and at MW-2 in 2000. Cyanide, a comprehensive list of metals, and field parameters are not included in the long-term monitoring program. WDNR's decision to reduce the frequency of hexavalant chromium and VOC monitoiring is reasonable because the data has consistently indicated that the total chromium in groundwater is mostly if not all hexavalent chromium, and VOCs are not the focus of the remediation. During the RI, VOCs were only detected exceeding ESs near the sumps. In subsequent monitoring, the only VOC detection exceeding an ES was 1,1-dichloroethylene at MW-116 (9.6 ug/l detected compared to the ES of 7 ug/l, see attached table 4-2). From review of the 1994–1998 data, it does not appear that there is enough data to screen out cyanide and some metals from the monitoring program. Cyanide consistently exceeded the ES in the Zinc Shop sump. There were detections of antimony and thallium exceeding the ESs in the Zinc Shop sump that do not appear to be attributable to background. There were detections of antimony, arsenic, cadmium, nickel, silver and thallium in the Chrome Shop sump or French drain that do not appear to be attributable to background or solids in the sample (as indicated by high aluminum). Data on field parameters could help reviewers interpret aquifer conditions. For example, dissolved oxygen and oxidation/reduction potential data could indicate whether there is a localized increase in dissolved oxygen, which could impact the stabilization of chromium. Turbidity data could indicate whether a sample is impacted by aquifer solids.

3. Because the formation is low in permeability and bailers are being used for sampling, it is possible that groundwater samples have not been representative because of entrainment of solids from the aquifer during the sampling process.

4. There were a number of mistakes and deficiencies in the monitoring reports, including:
(a) A different contractor performed the sampling and submitted the report than identified in the 1998 and 1999 planning documents, and it is unclear what sampling, analytical, and data validation procedures were followed;
(b) The depths of the A, B and C wells were not identified in the monitoring reports. This makes it impossible to interpret the vertical monitoring without review of the RI and other documents. Geological cross sections would help summarize geological conditions and the significance of the vertical monitoring for reviewers;
(c) The Chrome Shop map shows a fence that is no longer present;
(d) In the water level contour map, Figure 2 of the February 13, 2009 report, the water level at MW-3 is actually the top of casing elevation (based on the tabulation, there appears to have been no water level measurment at MW-3), and the depth to water at MW-10 was improperly recorded as 0.35 feet. As a result of these mistakes, Figure 2 incorrectly shows a groundwater mound at the Zinc Shop;
(e) In the water level contour map, Figure 2 of the September 16, 2009 report, the water elevation contours do not agree with the actual water level measurements. It appears that the contours are drawn to some previously measured water levels in the A wells, which are not water table wells; and
(f) There was no evaluation of groundwater capture, including no attempt to correlate representative groundwater removal rates to capture zone evaluation.

5. Groundwater samples from MW-116, which was installed within the Chrome Shop treated area after completion of the treatment, indicates chromium has increased from 470 ug/l in May 2000 to 25,500 ug/l in July 2009. Hexavalent chromium has been detected at similar concentrations. Because of the low permeability of the formation, it is unclear whether this is a localized condition or whether it reflects conditions throughout the treated area, in which case it would indicate failure of the soil treatment effort. 25,500 ug/l is much less than the pretreatment sump concentration (192,000 ug/l), but far exceeds the 100 ug/l ES.

6. The number and location of monitoring points for water levels measured in 2007 and 2009 are insufficient to evaluate whether the groundwater removal system is capturing all of the groundwater contamination at the Zinc Shop. Only 8 out of 15 water level monitoring points were utilized in 2007, and 6 out of 15 in 2009. The RI/FS capture zone evaluation depended heavily on water levels from MW-4 and W-1A, which are apparently no longer present (see Figure 3-4 from the FS). Without a water table water level near the sump (formerly W-1A) there would have been no indication that water north and south of the Zinc Shop flowed towards the sump. Without a water table water level on the west side of South Sixth Street (formerly MW-4), there would have been no indication that water west of the Zinc Shop flowed towards the sump. Water levels at W-3 and MW-10 may have helped, but were not measured (or were recorded incorrectly) in 2007 or 2009. W-3 is not a water table monitoring well, and, therefore, should not be used for the water table contour map.

7. The apparent increasing chromium concentrations at MW-5 (from 190 ug/l in July 1998 to 2,210 ug/l in July 2009) raises concern that off-site migration of chromium is occuring at the Zinc Shop.

8. Zinc Shop sump and MW-3 data appear to indicate an overall decreasing trend in chromium over the long-term in the source area, but concentrations still far exceed the ESs.

Site Inspection

WDNR's site manager has visited the site every one or two months to respond to various issues. During these visits, he has not observed any damage to the site covers or vegetation, nor improper storage or operation.

Interviews

The WDNR site manager regularly discusses issues with concerned parties who live near the site. Issues that have come up have included missing monitoring wells, abandonment of monitoring wells, mowing, and additional paving. Concerns about site risks and treatment operations have not been raised during the last five years. WDNR is regularly in contact with the treatment operators and the City. There have been no reports of improper entry onto site facilities, nor activities that could cause damage to the facilities or site covers.

Residents whose sumps were sealed were not contacted. However, the WDNR site manager explained that one of those residences had been torn down, and in the other the sump was in an unoccupied crawl space rather than a basement.

VII. TECHNICAL ASSESSMENT

Question A: Is the remedy functioning as intended by the decision documents? NO

1. At the Zinc shop, operation of the groundwater removal system has not been optimized to maximize groundwater removal rates and the groundwater capture zone; some data suggests that off-site migration of groundwater contamination is occurring; there are insufficient water level monitoring points to define the groundwater capture zone; no capture zone evaluation is being performed and no correlation of capture zone to groundwater removal rates; and, mistakes and deficiencies in the monitoring report have resulted in misrepresentation of the water table contours and made it difficult to interpret the extent of groundwater capture.

2. At the Chrome Shop, high chromium contamination at MW-116 calls into question whether the treatment to stabilize the chromium was effective, and whether there is potential for off-site migration of the chromium contaminated groundwater.

3. Because the shallow groundwater formation is low in permeability and bailers are being used for sampling, it is possible that groundwater samples have not been representative because of entrainment of solids from the aquifer during sampling.

4. Groundwater monitoring for cyanide and some metals has been discontinued even though detections substantially exceeded ESs in the source area groundwater, and lack of field data prevents assessment of some aquifer conditions.

5. At the Chrome Shop, soil treatment occurred beyond the boundaries of the City-owned property, and at the Zinc Shop groundwater contamination extends beyond the City-owned property.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid? NO

There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. Although it could be questioned whether there was sufficient data to screen out semivolatile organic compounds, pesticides, and polychlorinated biphenyls as contaminants, this is not be a concern for the following reasons: these types of compounds were not utilized in the Better Brite manufacturing processes; chromium is a good indicator of the extent of contamination from releases from these processes, and chromium was generally removed to background concentrations in surface soils (see attached Figure 2-13 of the RI for Chrome Shop removal); and soil covers, vegetation, and access controls prevent exposure to any contaminant residuals that remain at the site.

To screen whether updated exposure assumptions or toxicity factors would make a difference in interpretation of the soil data, the data[1] was compared to background concentrations and to the residential and industrial soil screening levels from the May 19, 2009 update of the Region 3 Screening Level (SL) Table. Only arsenic in one on-site sample, located away from the manufacturing operations and just east of the railroad tracks at the Chrome Shop, exceeded both the updated screening levels and background concentrations. This review supports the RI conclusion that the elevated arsenic was not a contaminant from the Better Brite manufacturing operations because only background concentrations of arsenic were detected in soils near the operations, where high concentrations of chromium were detected.

To screen whether updated groundwater ESs, or Region 3 SLs, would have made a difference in the remedial action, the following table compares the RI ESs (or Region 3 SLs where ESs were not available) with maximum RI detections, and with updated ESs for those parameters whose ESs have become more stringent since the time of the RI.

Table 4: Comparison of ROD Groundwater Criteria with Current Groundwater Standards where Current Standards Are More Stringent (concentrations in ug/l, source in parenthesis)

PARAMETER	ROD ES or SL	UPDATED ES	RI MAXIMUM
Arsenic	50 (ES)	10	902 (RI Table 8-1)
Cobalt	2,200 (SL)	40	124 (RI Table 8-2)

[1] The remaining high soil concentrations from attached RI Tables 6-1, 8-1, and 8-2, and the off-site soil data from Preliminary Health Assessment Table 8.

The updated ESs should not result in a change in the remedy, other than making sure that these and other parameters of concern in groundwater are included in the long-term monitoring, and that the arsenic and cobalt data is compared to updated ESs.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? NO

All available data has been considered in previous sections.

Technical Assessment Summary

In spite of the issues that have been identified, the remedy is protective for the following reasons: the removal and remedial actions addressed risks from soils and from groundwater recharge of building sumps; the soil cover is being maintained; groundwater monitoring is ongoing; the aquifer affected is low in permeability; and there are no longer any groundwater users in the vicinity of the site. Issues that call into question the effectiveness of the remedy, include those relating to containment of the groundwater at the Zinc Shop, and immobilization of chromium at the Chrome Shop. It is possible that these issues will be addressed by additions/improvements to monitoring and reporting. In addition, some monitoring parameters may have been screened out prematurely. Although, regulators have been developing a restrictive covenant between the City and WDNR, they apparently were unaware that the contamination extends beyond the City owned property. Updated ESs should be used for evaluating the arsenic and cobalt data.

VIII. ISSUES

Table 5: Issues

Issues	Affects Current Protectiveness	Affects Future Protectiveness
1. Operational and capture zone problems at the Zinc Shop	N	Y
2. Concern about effectiveness of stabilization treatment and off-site migration of the chromium contaminated groundwater at the Chrome Shop	N	Y
3. Concerns about representativeness groundwater samples	N	Y
4. Lack of monitoring for cyanide, some metals, and field parameters.	N	Y
5. Contamination extends beyond properties covered by the restrictive covenant.	N	Y

IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 6: Recommendations and Follow-up Actions

Issue	Recommendations	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness Current	Future
1	At the Zinc Shop: 1) implement measures to maximize the groundwater removal rate; 2) install additional water level monitoring points; 3) perform a capture zone evaluation correlating capture zone to removal rates; 4) submit accurate monitoring reports containing adequate information to interpret groundwater data; and 5) add more off-site, downgradient monitoring well locations, if needed.	WDNR	EPA	12/30/11	N	Y
2	At the Chrome Shop, further evaluate the effectiveness of the soil stabilization and the potential for off-site migration of chromium contaminated groundwater.	WDNR	EPA	12/30/10	N	Y
3	Evaluate whether it is possible to collect groundwater samples using a low-flow sampling procedure and the advisability of field filtration.	WDNR	EPA	12/30/10	N	Y
4	Add measurement of field parameters to future sampling events, and add analysis of cyanide and some metals to future comprehensive sampling events.	WDNR	EPA	12/30/10	N	Y
5	Evaluate whether restrictive covenants are necessary on affected properties not owned by the City, and, if so, pursue restrictive covenants on these properties.	EPA	WDNR	12/30/10	N	Y

Relative to Zinc Shop operations, the WDNR site manager stated that the new O&M contractor may automate the recovery system and improve record keeping. In the FS, Hydro-Search, Inc. advised that if the water level in the sump was kept low then it is possible that the quantity of groundwater removed and capture zone would be increased. It is also suggested that the sump be inspected and that historical removal rates be compiled going back in time as far as possible. A significant decrease in the removal rates or data from the inspection could indicate that the sump is plugged, in which case the sump should be cleaned, rehabilitated, and/or rebuilt.

At a minimum, water-level measurements both near the sump and just west of South Sixth Street need to be added to future hydraulic surveys, to adequately evaluate the extent of groundwater capture. Because water level measurements are relatively inexpensive, it is suggested that future monitoring events include water level measurements from all available monitoring points. Reports need to include the geological data necessary for interpretation of groundwater flow. Separate potentiometric surface maps should be prepared for the water table and for the deeper groundwater. If hydraulic capture is not demonstrated, additional monitoring wells downgradient from the groundwater contamination may be needed (for example between MW-7 and MW-5; southwest of the Zinc Shop; south of MW-6; and, north of MW-5).

Relative to the Chrome Shop, it is conceivable that the presence of the monitoring wells at MW-116 is causing localized oxidizing conditions in the aquifer that is affecting the stabilization of chromium. Geoprobe type sampling may be an efficient way to collect a number of groundwater samples in the stabilization area to determine whether the high chromium at MW-116 is an isolated occurrence or is representative of groundwater conditions in the stabilized soil.

Sampling, analytical, and data validation procedures need to be defined and identified in reports. There should be an evaluation of the ability and advantages of converting to low flow sampling and/or filtration in order to assure collection of representative groundwater samples. Arsenic and cobalt data should be compared to updated ESs.

The evaluation of whether restrictive covenants are necessary on affected properties not owned by the City could include an update of the risk assessment and an evaluation of the protectiveness of other controls.

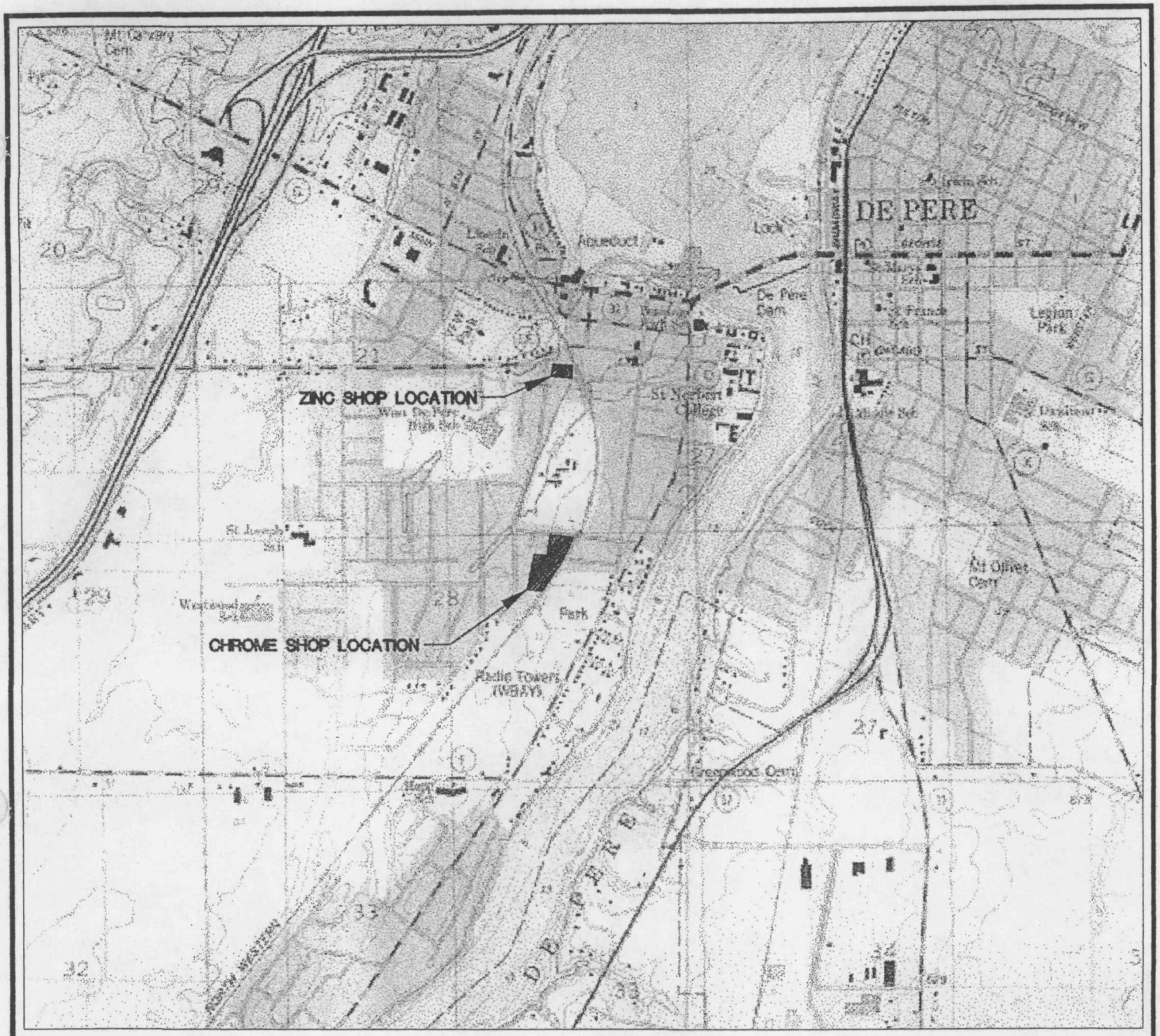
X. PROTECTIVENESS STATEMENT(S)

The remedy currently protects human health and the environment because the removal and remedial actions addressed risks from soils and from groundwater recharge of building sumps, the soil cover is being maintained, groundwater monitoring is ongoing, the aquifer affected is low in permeability, and there are no longer any groundwater users in the vicinity of the site. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:

- at the Zinc Shop:1) implement measures to maximize the groundwater removal rate; 2) install additional water level monitoring points; 3) perform a capture zone evaluation correlating capture zone to removal rates; 4) submit accurate monitoring reports containing adequate information to interpret groundwater data; and, 5) add more off-site, downgradient monitoring well locations, if needed;
- at the Chrome Shop, further evaluate the effectiveness of the soil stabilization and the potential for off-site migration of chromium contaminated groundwater;
- evaluate whether it is possible to collect groundwater samples using a low-flow sampling procedure, and the advisability of field filtration;
- add measurement of field parameters to future sampling events, and add analysis of cyanide and some metals to future comprehensive sampling events; and,
- evaluate whether restrictive covenants are necessary on properties not owned by the City and, if so, pursue restrictive covenants on these properties.

XI. NEXT FIVE YEAR REVIEW

The next five-year review will be completed within five years from the date of this review.



SCALE

0 5000

FEET

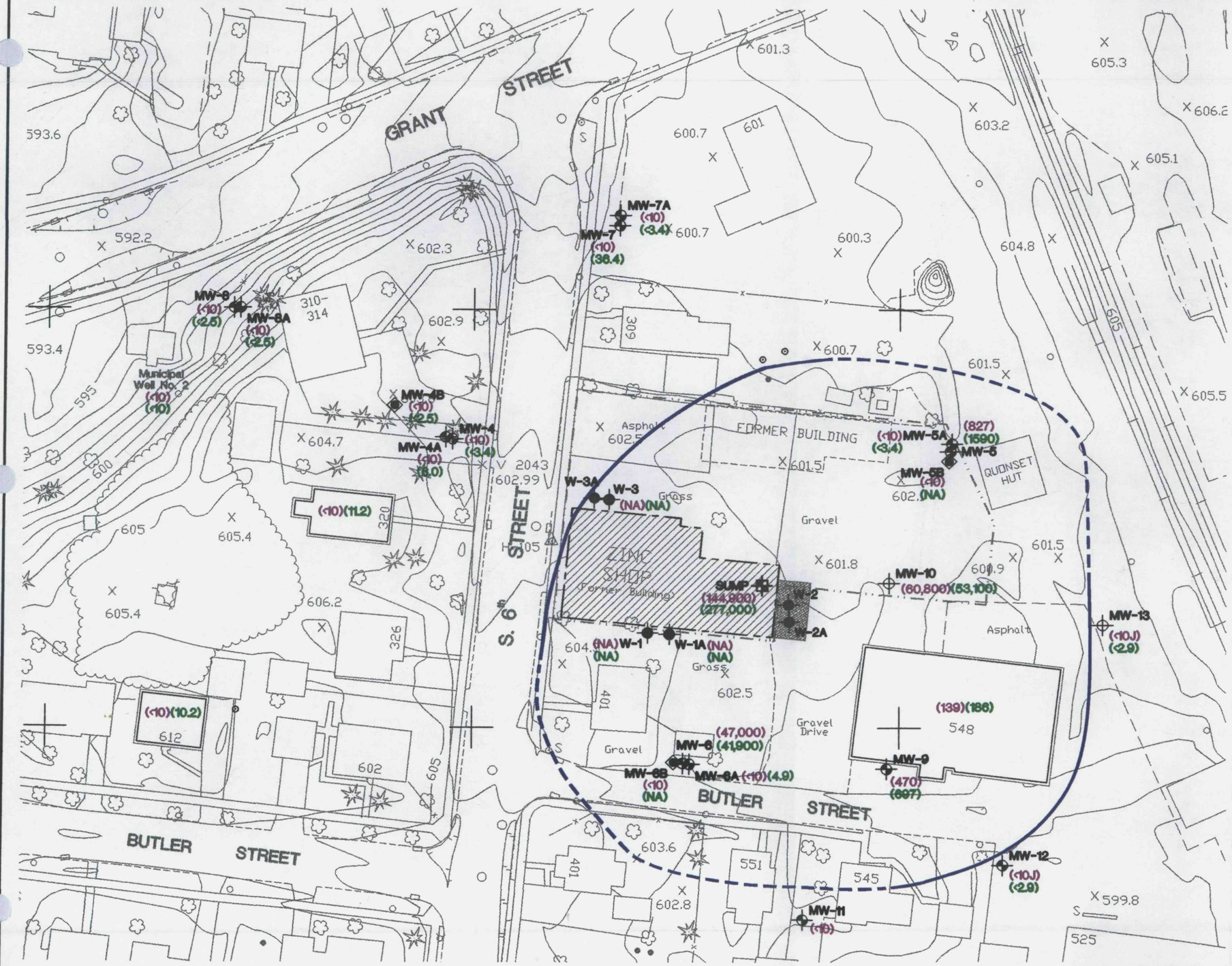
National Geodetic Vertical Datum of 1929
Contour Interval 10 Feet

N

QUADRANGLE LOCATION

BETTER BRITE DePERE, WISCONSIN	DATE: 1/4/2000
	DESIGNED: BOB
SITE LOCATION and LOCAL TOPOGRAPHY	CHECKED: JLF
	APPROVED: JLF
	DRAWN: BOB
	PROJ.: F119
HSI GEOTRANS A TETRA TECH COMPANY	Figure 2-1

Base map from U.S.G.S. 7.5' De Pere, Wisconsin topographic quadrangle map, 1959, revised 1971.



EXPLANATION

- MW-9 — MONITOR WELL LOCATION AND DESIGNATION
- SUMP — SUMP ACCESS LOCATION AND DESIGNATION
- MW-3 — ABANDONED MONITOR WELL LOCATION AND DESIGNATION
- MW-13 — NON LOCATABLE LOCATION AND DESIGNATION
- GROUND WATER COLLECTION SYSTEM EXCAVATION COMPLETED IN 1993
- GROUND WATER COLLECTION SUMP EXCAVATION COMPLETED IN 1990
- (139) — HEXAVALENT CHROMIUM CONCENTRATION IN GROUND WATER (ppb)
- (186) — TOTAL CHROMIUM CONCENTRATION IN GROUND WATER (ppb)
- (NA) — NOT AVAILABLE
- EXTENT OF DETECTABLE HEXAVALENT CHROMIUM IN GROUND WATER AND EXTENT OF TOTAL CHROMIUM EXCEEDING NR 140 ENFORCEMENT STANDARDS
- PROPERTY LINE
- SUMP BOUNDARY
- 320 — BASEMENT SUMP SAMPLING LOCATION

Note : Listed concentrations are highest measured levels from 1994 and 1995 sampling events.

N

SCALE

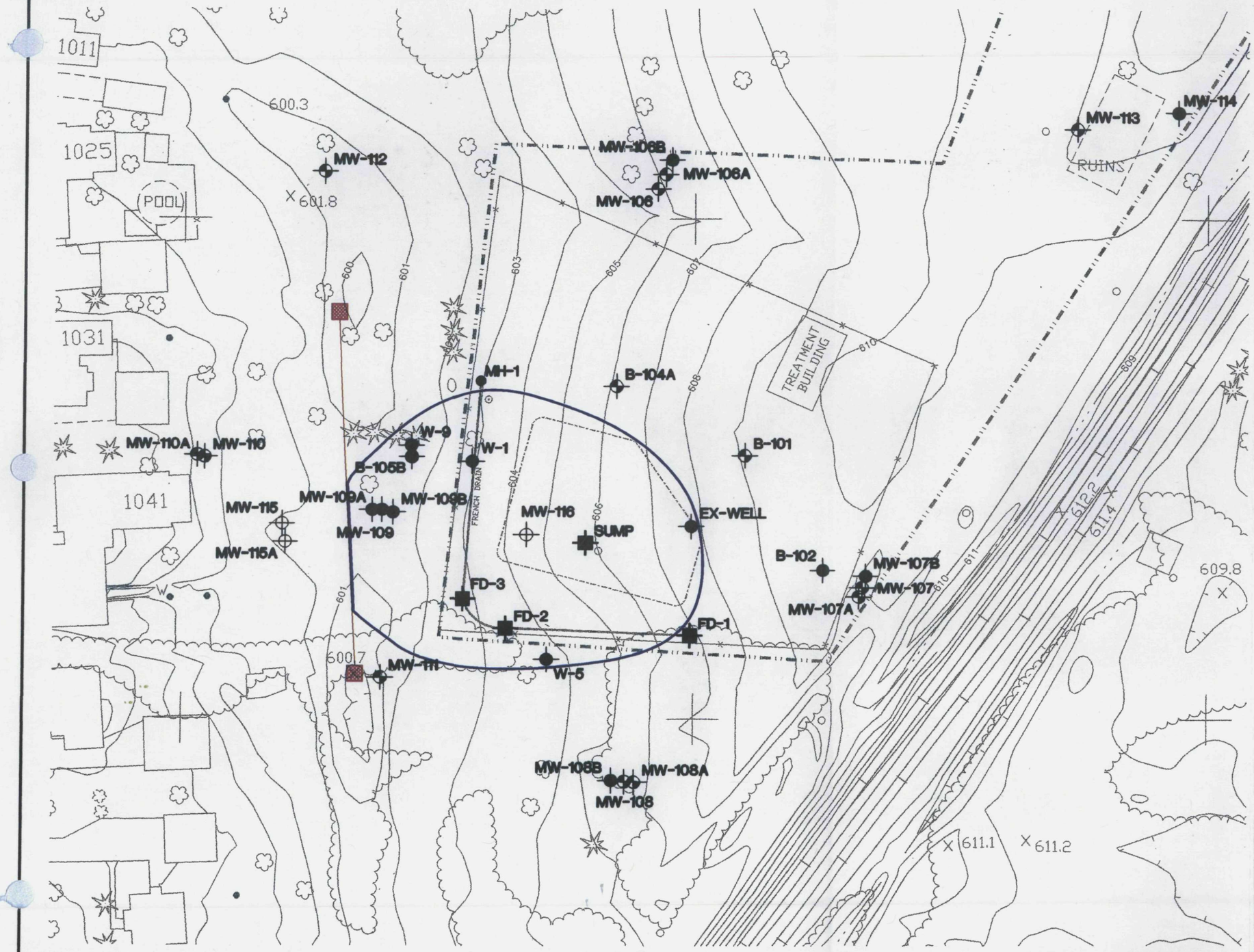
0 120

Feet

Base map from Aero-Metric Engineering, Inc., date of photography - 11/17/91.

/cad/better brite/f119/f119-009

BETTER BRITE DePERE, WISCONSIN	DATE:	12/1/99
	DESIGNED:	BOB
HEXAVALENT CHROMIUM/ TOTAL CHROMIUM IN GROUND WATER 1994/5 - ZINC SHOP	CHECKED:	JLF
	APPROVED:	JLF
	DRAWN:	BOB
	PROJ.:	F119
HSI GEOTRANS A TETRA TECH COMPANY	Figure 2-7	



EXPLANATION

MW-113	MONITOR WELL LOCATION AND DESIGNATION
B-101	MONITOR WELL LOCATION AND DESIGNATION
W-5	MONITOR WELL LOCATION AND DESIGNATION
SUMP	FORMER SUMP ACCESS LOCATION AND DESIGNATION
FD-3	FORMER FRENCH DRAIN ACCESS LOCATION AND DESIGNATION
EX-WELL	FORMER EXTRACTION WELL LOCATION AND DESIGNATION
MH-1	MANHOLE LOCATION
	SUMP BOUNDARY
	PROPERTY LINE
	SOIL STABILIZATION AREA
MW-11	ABANDONED MONITOR WELL LOCATION AND DESIGNATION
MW-115	PROPOSED MONITOR WELL LOCATION AND DESIGNATION

N

SCALE

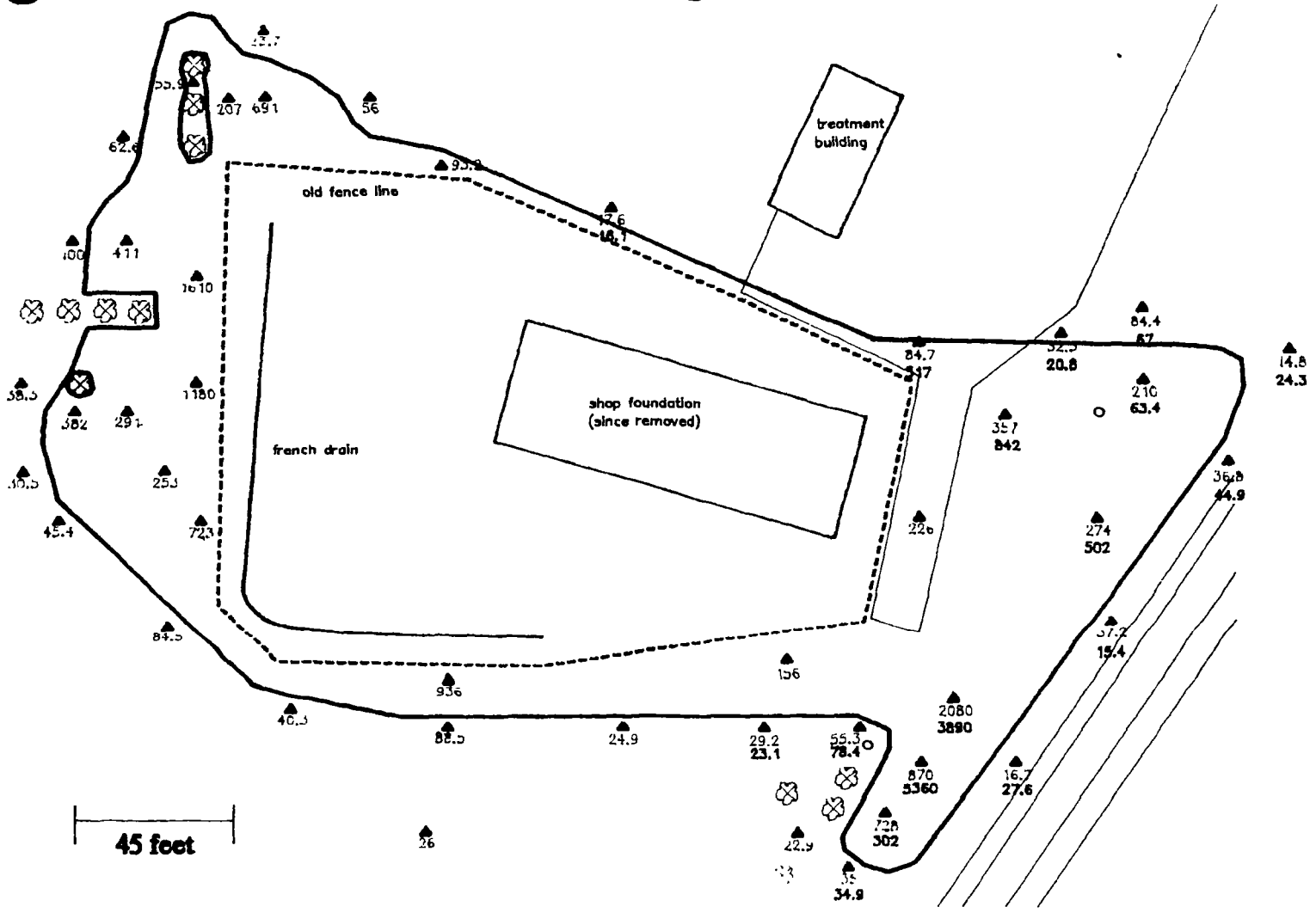
0 100

Feet

Base map from Aero-Metric Engineering, date of photography 11/17/91.

/cad/better brite/f119/f119-045

BETTER BRITE DePERE, WISCONSIN	DATE: 12/1/99
	DESIGNED: BOB
PROPOSED WELL LOCATIONS CHROME SHOP	CHECKED: KEB
	APPROVED: JLF
	DRAWN: BOB
	PROJ.: F119
HSI GEOTRANS A TETRA TECH COMPANY	Figure 7-3



LEGEND

- 156 — total chromium (ppm)
- 3890 — total lead (ppm)
- ▲ — triangulated sample
- ——— — extent of surface soil removed

Base map from Ecology and the Environment, Inc., 1994

BETTER BRITE DePERE, WISCONSIN	DATE: 05/18/95 DESIGNED: RAG CHECKED: JEN APPROVED: JLF DRAWN: RAG PROJ: 301483158
CHROME SHOP SURFACE SOIL EXCAVATION EXTENT 1993	
HYDRO-SEARCH INC A Tetra Tech Company	Figure 2-13

Table 6-1 Summary of Soil Analytical Results - Zinc Shop

Compound	Background Concentration	Generic Site Standard		Excavation Bottom Samples - 1/93							
		Non-industrial	Industrial	exz01-1b	exz02-1a	exz03-2b	exz04-2a	exz04-2a Dupe	exz05-3b	exz06-3a	exz07-sp
Arsenic	1 4 - 10	0 039	1 6	2 1b	3 8	2 1b	2 2b	2 3	1 9b	3 1	3 8
Cadmium	0 1 - 3 5	8	510								
Chromium	7 0 - 100	16000	NA	29 6	108	16 6	17 3	20 7	21 1	28 5	82 7
Cobalt	ND - 15			8 6b	8 4b	7 6b	7 3b	8 1	7 7b	8 7b	12 6b
Copper	11			28 5	25 6	22 6	19 5	20 2	19 6	23 4	38 6
Lead	ND - 30	50	500	5 1	5	4 6	5 4	5 2	5 2	5 2	13 1
Mercury	0 02 - 0 58						0 18				
Selenium	<0 1 - 1 0										
Silver	0 1 - 3 1			1 4b							
Zinc	25 - 180			26 7	26	24 5	24 6	27 .	27 5	27 8	50 9
Cyanide					11						

Compound	Background Concentration	Generic Site Standard		SSI Soil Samples 5/93											
		Non-Industrial	Industrial	1 0'- 0 5'	2 0'- 0 5'	3 0'- 0 5'	4 0'- 0 5'	5 0'- 0 5'	6 0 - 0 5'	6 Dupe 0' 0 5'	7 0'- 0 5'	8 0'- 0 5'	9 0'- 0 5'	9 2 5'- 3'	10 0'- 0 5'
Arsenic	1 4 - 10	0 039	1 6	3 9	4 6	6 2	4 3	4 7	4 5	4 4	3 2	4 1	4	4 7	1 8
Cadmium	0 1 - 3 5	8	510	0 42		0 41	0 51		5 1	4 6	5 1	3	2 1		0 92
Chromium	7 0 - 100	16000	NA	11 9	13 5	18 5	24 9	38 8	110	93	125	46 4	48 4	26 3	8 6
Cobalt	ND - 15			4 5b	4 9b	8 4b	8 1b	9 5b	7 1b	7 2b	9 2b	4 0b	3 8b	10 1b	1 1b
Copper	11			12 5	16 8	18 6	29 1	33 9	41 2	33 1	28 6	36	26 3	17 7	31 1
Lead	ND - 30	50	500	40 3	77 9	47 9	133	57 6	256	298j	37 7	111	208	293	250
Mercury	0 02 - 0 58			0 1	0 1	0 17	0 19	0 2	0 47	0 55		0 09	0 85	0 06	
Selenium	<0 1 - 1 0			1 3				1 6			0 3	3	2 1	1 9	
Silver	0 1 - 3 1					1 1		1 2	0 92		0 78	3 6			
Zinc	25 - 180			51 3	76 9	65 9	128	180	1050	977j	219	327	330	88	77 7
Cyanide					0 66			0 98	19	17 3j	5 9	20 8	11 6		0 53

HYDRO-SEARCH, INC A Tetra Tech Company

Compound	Background Concentration	Generic Site Standard		SSI Soil Samples 5 93								Background Samples 5/93		
		Non-industrial	Industrial	11 0'- 0 5	12 0'- 0 5'	12 2 5' - 3'	12 dupe 2 5' - 3'	13 0'- 0 5'	14 0'- 0 5'	14 2 5'- 3'	15 0'- 0 5'	16 0'- 0 5'	17 0'- 0 5'	17 Dupe 0'- 0 5'
Arsenic	1 4 - 10	0 039	1 6	4 2	3 8	4 3	4 8	5 9	4 2	3 5j	4 2	2 9	3 1	3 9
Cadmium	0 1 - 3 5	8	510								2 2			
Chromium	7 0 - 100	16000	N A	10 1	32 3	200	202	127	21 7	26 9	37 3	20 1	20 1	21 7
Cobalt	ND - 15			3	10 3	11 8	16 2	12 8	6	10 2	5 5	10 2	23	9 1
Copper	11			9 1	20 7	22 6	22 8	29 2	21 1	20 9	20 9	16 9	12 5	18 1
Lead	ND - 30	50	500	20 1j	20 6j	12 1j	14 1j	141j	60 2j	17 0j	155j	14 7	28 6	3 9
Mercury	0 02 - 0 58			0 07b	0 08b	0 11b	0 11b	0 20b	0 13b	0 10b	0 61	0 12b		
Selenium	<0 1 - 1 0				1 0b									
Silver	0 1 - 3 1						1 3b						1 4b	
Zinc	25 - 180			26 4j	161j	46 9j	51 2j	629j	92 8j	41 5j	853j	40 1	60 3	54 2
Cyanide				uj	0 75j	uj	uj	uj	uj	uj	9 3j			

Note NA - Not Available
ND - Not Detected
b - compound detected below the contract required detection limit
j - Value is estimated
Table represents results for 1992-1993 soil sampling

Table 8-1. Chrome Shop Contaminants of Concern (Page 1 of 2)

Contaminant	Ground Water (ppb)		Soil (ppm)				
	High	Enforcement Standard	Historical High	Remaining High	Typical Background	Generic Site Standard	
						Non-Ind.	Industrial
INORGANICS							
Aluminum	1,340	NA	Not a COC				
Antimony	1,370	6*	6.8	ND	<0.025-3.0	NA	NA
Arsenic	902	50	39.3	39.3	1.4-10	0.039	1.6
Beryllium	9.0	4*	Not a COC				
Cadmium	17.7	NA	116	1.7	0.1-3.5	8	510
Calcium	331,000	NA	Not a COC				
Cobalt	57.3	NA	16.8	16.8	ND-15	NA	NA
Copper	Not a COC		319	43.1	11	NA	NA
Chromium	694,000	100	16,100	52.9	7.0-100	16000	NA
Hexavalent Cr	620,000	NA	14,000	not analyzed	NA	14	200
Cyanide	Not a COC		4.7	4.7	NA	NA	NA
Iron	315	300**	Not a COC				
Lead	Not a COC		7,900	136	ND-30	50	500
Magnesium	200,00	NA	Not a COC				
Manganese	391	50**	Not a COC				
Nickel	173	100*	Not a COC				
Potassium	27,500	NA	Not a COC				
Silver	66.6	50	Not a COC				
Sodium	270,000	NA	Not a COC				
Thallium	111	2*	0.29	0.29	NA	NA	NA
Vanadium	7,310	NA	Not a COC				
Zinc	Not a COC		2,200	690	25-180	NA	NA

Table 8-1. Chrome Shop Contaminants of Concern (Page 2 of 2)

Contaminant	Ground Water (ppb)		Soil (ppm)				
	High	Enforcement Standard	Historical High	Remaining High	Typical Background	Generic Site Standard	
						Non-Ind.	Industrial
VOLATILE ORGANIC COMPOUNDS							
Acetone	Not a COC		200	200	NA	NA	NA
Carbon Disulfide	32	NA	Not a COC				
1,1-Dichloroethene	7	7	Not a COC				
Tetrachloroethene	59	5	Not a COC				
1,1,1-Trichloroethane	1,100	200	Not a COC				
Trichloroethene	59	5	Not a COC				

Notes:
* - Proposed Standard
** - Public Welfare Standard
Not a COC - Compound is not a contaminent of concern for this media
High - Highest detected concentration
NA - Not Available
ND - Non-Detectable
Typical background concentrations from Dragun, 1991, "Elements in North American Soils"
Enforcement standard as regulated under WAC NR140
Generic site standards as regulated under WAC NR720

Table 8-2. Zinc Shop Contaminants of Concern (Page 1 of 2)

Contaminant	Ground Water (ppb)		Soil (ppm)				
	High	Enforcement Standard	Historical High	Remaining High	Typical Background	Generic Site Standard	
						Non-Ind.	Industrial
INORGANICS							
Aluminum	151	NA	**Not a COC**				
Antimony	3,190	6*	24.3	8.2	<0.025-3.0	NA	NA
Arsenic	**Not a COC**		14.8	6.2	1.4-10	0.039	1.6
Barium	**Not a COC**		2970	834	150-1,000	NA	NA
Beryllium	5.4	4*	**Not a COC**				
Cadmium	**Not a COC**		38	8	0.1-3.5	8	510
Calcium	236,000	NA	**Not a COC**				
Cobalt	124	NA	230	230	ND-15	NA	NA
Copper	**Not a COC**		124	43	11	NA	NA
Chromium	277,000	100	2910	1100	7.0-100	16000	NA
Hexavalent Cr	144,900	NA	Not Analyzed				
Cyanide	939	200	600.9	408.9	NA	NA	NA
Iron	1,290	300**	**Not a COC**				
Lead	18.2	15	1540	298	ND-30	50	500
Magnesium	155,000	NA	Not a COC				
Manganese	387	50**	16250	8800	<2.0-7,000	NA	NA
Mercury	**Not a COC**		2	0.85	0.02-0.58	NA	NA
Nickel	146	100*	**Not a COC**				
Potassium	6,820	NA	**Not a COC**				
Selenium	**Not a COC**		10.4	3	<0.1-1.0	NA	NA
Silver	**Not a COC**		39.7	39.7	0.1-3.1	NA	NA
Sodium	134,000	NA	**Not a COC**				
Thallium	60.2	2*	**Not a COC**				
Vanadium	114	NA	**Not a COC**				
Zinc	**Not a COC**		13600	2700	25-180	NA	NA

Table 8-2. Zinc Shop Contaminants of Concern (Page 2 of 2)

Contaminant	Ground Water (ppb)		Soil (ppm)				
	High	Enforcement Standard	Historical High	Remaining High	Typical Background	Generic Site Standard	
						Non-Ind.	Industrial
VOLATILE ORGANIC COMPOUNDS							
Carbon Disulfide	32	NA	**Not a COC**				
Carbon Tetrachloride	5	5	**Not a COC**				
1,2-Dichloroethane	6	5	**Not a COC**				
1,1,2-Trichloroethane	3	0.6	**Not a COC**				

Notes:

* - Proposed Standard

** - Public Welfare Standard

Not a COC - Compound is not a contaminent of concern for this media

High - Highest detected concentration

NA - Not Available

ND - Non-Detectable

Typical Background concentrations from Dragun, 1991, "Elements in North American Soils"

Enforcement Standard as regulated under WAC NR140

Generic Site Standards as regulated under WAD NR720

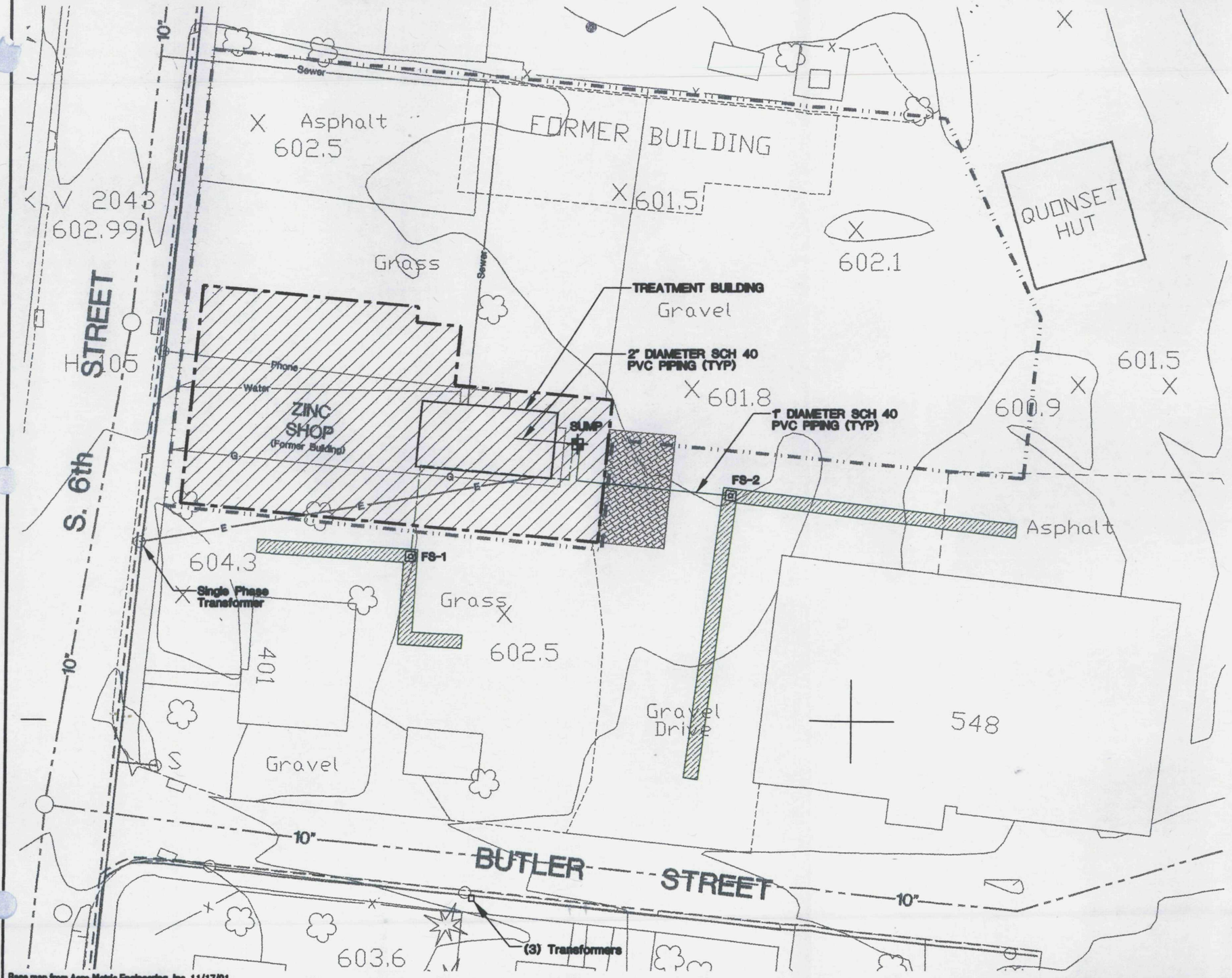
Table 8-3 U.S. EPA Region III Risk Based Concentrations

Contaminant	Tap Water	Ambient Air	Fish	Industrial Soil	Residential Soil
	µg/ℓ	µg/m³	mg/kg	mg/kg	mg/kg
Aluminum	110,000	11,000	3,900	1,000,000	230,000
Antimony & Compounds	15	1 5	0 54	410	31
Arsenic	11	1 1	0 41	310	23
Arsenic (as carcinogen)	0 038	0 00041	0 0018	1 6	0 37
Beryllium & Compounds	0 016	0 00075	0 00073	0 67	0 15
Cadmium & Compounds	18	0 00099	0 68	510	39
Carbon Disulfide	21	10	140	100,000	7,800
Carbon Tetrachloride	0 16	0 12	0 024	22	4 9
Chromium III & Compounds	37,000	0 0021	1,400	1,000,000	78,000
Chromium VI & Compounds	180	0 00015	6 8	5,100	390
Cyanides					
Calcium Cyanide	1,500	150	54	41,000	3,100
Free Cyanide	730	73	27	20,000	1,600
Potassium Silver Cyanide	7,300	730	270	200,000	16,000
Silver Cyanide	3,700	370	140	100,000	7,800
1,2-Dichloroethane	0 12	0 069	0 035	31	7
1,1-Dichloroethene	0 044	0 036	0 0053	4 8	1 1
Lead (tetraethyl)	0 0037	0 00037	0 00014	0 1	0 0078
Manganese & Compounds	180	0 052	6 8	5,100	390
Nickel (soluble salts)	730	73	27	20,000	1,600
Silver & Compounds	180	18	6 8	5,100	390

Table 8-3 U.S. EPA Region III Risk Based Concentrations (Page 2 of 2)

Contaminant	Tap Water	Ambient Air	Fish	Industrial Soil	Residential Soil
	µg/ℓ	µg/m³	mg/kg	mg/kg	mg/kg
Tetrachloroethene	1 1	3 1	0 061	55	12
Thallium					
Thallium Acetate	3 3	0 33	0 12	92	7
Thallium Carbonate	2 9	0 29	0 11	82	6 3
Thallium Chloride	2 9	0 29	0 11	82	6 3
Thallium Nitrate	3 3	0 33	0 12	92	7
Thallium Sulfate	2 9	0 29	0 11	82	6 3
1,1,1-Trichloroethane	1,300	1,000	120	92,000	7,000
1,1,2-Trichloroethane	0 19	0 11	0 055	50	11
Trichloroethene	1 6	1	0 29	260	58
Vanadium	260	26	9 5	7,200	550

Source U S EPA Region III, 1994 Risk Based Concentration Table



Base map from Aero-Metric Engineering, Inc. 11/17/91.

/cad/better brite/f119/f119-014

EXPLANATION

- SUMP — SUMP ACCESS LOCATION AND DESIGNATION
- GROUND WATER COLLECTION SYSTEM EXCAVATION COMPLETED IN 1993
- GROUND WATER COLLECTION SUMP EXCAVATION COMPLETED IN 1990
- PROPERTY LINE
- SUMP BOUNDARY
- FOUNDATION DRAINS
- FS-1 — FOUNDATION DRAIN SUMP

N

SCALE

0 60

Feet

BETTER BRITE DePERE, WISCONSIN	DATE: 12/1/99
	DESIGNED: BOB
ZINC SHOP TREATMENT BUILDING AND FOUNDATION DRAIN LOCATIONS	CHECKED: KEB
	APPROVED: PRC
	DRAWN: BOB
	PROJ.: F119
HSI GEOTRANS A TETRA TECH COMPANY	Figure 4-1

De Pere Journal

STATE OF WISCONSIN
BROWN COUNTY

DNR BUREAU OF WATERSHED MNGT WT/3
PO BOX 7921
MADISON, WI 537077921

Allison Rodriguez

Being duly sworn, doth depose and say that she is an authorized representative of the DePere Journal, a newspaper published in Brown County, Wisconsin, and that an advertisement of which the annexed is a true copy, taken from said paper, which was published therein on

Account Number: 1016538

Ad Number: 5833928

Published Date: October 22, 2009

Total Ad Cost: $23.85

(Signed) Allison M. Rodriguez **(Date)** 10/22/09

Legal Clerk

Signed and sworn before me

Notary Public, Brown County, Wisconsin

My commission expires 12/16/12

SARA WOLF
NOTARY PUBLIC
STATE OF WISCONSIN

OCT 27 2009

DNR & EPA Preparing Five-Year Review Report Better Brite Superfund Site De Pere, Wisconsin

The Wisconsin Department of Natural Resources and the U.S. Environmental Protection Agency are conducting a five-year review of the Better Brite Superfund site located in De Pere, Brown County, Wisconsin.

The Superfund law requires regular reviews of sites that have been cleaned up with waste managed on-site to make sure the cleanup continues to protect people and the environment.

This is the third five-year review of the site with the first completed in November 1999. In 1999, the remedy included soil stabilization at the Chrome Shop, dismantling and relocation of the groundwater treatment building to the Zinc Shop and ongoing groundwater extraction and treatment at the Zinc Shop.

The five-year review is an opportunity for the public to tell WDNR and EPA about site concerns they may have. Please provide any comments in writing to:

Mr. Keld Lauridsen
Wisconsin Department of Natural Resources
2984 Shawano Avenue
Green Bay, WI 54313

When the five-year review report has been finalized, it will be available at the Brown County Library, Kress Family Branch, 333 North Broadway, De Pere, Wisconsin.

Oct. 22, 2009
WNAXLP

DNR BUREAU OF WATERSHED MNGT WT/3
Re Ad#: 5833928

GANNETT WI MEDIA
435 EAST WALNUT ST.
PO BOX 23430
GREEN BAY, WI 54305-3430

GANNETT

PHONE 920-431-8298
FAX 877-943-0443
E-MAIL legals@deperejournal.com

Table 1: Groundwater Analytical Results
Better Brite
De Pere, Wisconsin

	Parameter	Date	Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide
	NR 140 PAL		10	10	150	125000	NO PAL
	NR 140 ES		100	100	300	250000	NO ES
CHROME SHOP	Chrome Sump	Aug-94	**620000**	**694000**	NA	NA	NA
		Oct-94	**300200**	**297000**	NA	NA	NA
		Apr-98	**195000**	**192000**	NA	NA	NA
		Jul-98	**132000**		NA	NA	NA
	French Drain	Aug-94	**25800**	**22000**	NA	NA	NA
		Oct-94	**32000**	**31700**	NA	NA	NA
		Apr-98	**1060**	**1010**	NA	NA	NA
		Jul-98	**336**	**312**	NA	NA	NA
	B-101	Aug-94	<10	<3.4	NA	NA	NA
		Oct-94	<10		NA	NA	NA
	MW-106	Aug-94	7	<2.8	NA	NA	NA
		DUP.	<10	<2.8	NA	NA	NA
		Oct-94	<10 J	<3.4 J	NA	NA	NA
		DUP.	<10 J	<3.4 J	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		DUP	<10	<5	NA	NA	NA
		May-00	<4.2	4	NA	NA	NA
	MW-106A	Aug-94	<10	<2.8	NA	NA	NA
		Oct-94	<10 J	<3.4 J	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	9.4	NA	NA	NA
	MW-106B	Aug-94	<10	NA	NA	NA	NA
	MW-107	Aug-94	<10	4.1 BJ	NA	NA	NA
		Oct-94	<10 J	<3.4	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	4.2	NA	NA	NA
		Jun-01	NA	NA	**530**	50	NA
		Nov-01	<4.2	26	**3900**	NA	1800
		May-02	7.8	1.2	230	NA	2300
		DUP	**100**	1.9	**490**	NA	2800
		Nov-02	NA	NA	**8200**	140000	2300
		May-03	<4.2	1.6	490	95000	1700
		May-04	6.5	1.7	260	100000	NA
		May-05	<5.0	0.89	380	97000	NA
	MW-107A	Aug-94	<10	<2.8	NA	NA	NA
		Oct-94	<10 J	<3.4 J	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	16	NA	NA	NA
	MW-107B	Aug-94	<10	NA	NA	NA	NA
	MW-108	Aug-94	<10	<2.8	NA	NA	NA
		Oct-94	<10	<3.4 J	NA	NA	NA
		Apr-98	<10	NA	NA	NA	NA
		DUP	<10	<5	NA	NA	NA
		Jul-09	NA	16.0	NA	NA	NA
	MW-108A	Aug-94	<10	3.0 BJ	NA	NA	NA
		Oct-94	<10	<3.4 J	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	55	NA	NA	NA
		Jul-09	NA	NA	NA	NA	NA
	MW-108B	Aug-94	<10	NA	NA	NA	NA
	MW-109	Aug-94	**6780**	**9570**	NA	NA	NA
		Oct-94	**2400**	**1980**	NA	NA	NA
		DUP.	**3100**	**1700**	NA	NA	NA
		Apr-98	**16500**	**18600**	NA	NA	NA
		Jul-98	**12200**	**11100**	NA	NA	NA
	MW-109A	Aug-94	<10	<2.8	NA	NA	NA
		Oct-94	<10	1.3 B	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		Jul-98	<10	7	NA	NA	NA
	MW-109B	Aug-94	<10	NA	NA	NA	NA
		Oct-94	<10	NA	NA	NA	NA
	MW-110	Aug-94	<10	3.6 BJ	NA	NA	NA
		Oct-94	<10	<3.4 J	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	37	NA	NA	NA
		May-04	<2.5	11	3400	230000	NA
		May-05	<5.0	0.89	82	70000	NA
		Oct-06	<6.8	1.8	NA	NA	NA
		08/21/07	NA	7.4	NA	NA	NA
		07/21/09	NA	5.3	NA	NA	NA

Concentrations in ug/L
ES - NR140 Enforcement Standard
PAL - NR140 Preventive Action Limit
NA - Compound not analyzed
Underlined - Concentration exceeds PAL
Bolded - Concentration exceeds ES

Table 1: Groundwater Analytical Results
Better Brite
De Pere, Wisconsin

	Parameter	Date	Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide
	NR 140 PAL		10	10	150	125000	NO PAL
	NR 140 ES		100	100	300	250000	NO ES
CHROME SHOP CONT'D	MW-110A	Aug-94	<10	<2.8	NA	NA	NA
		Oct-94	<10	<3.4 J	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	25	NA	NA	NA
		Oct-06	<6.8	4.2	NA	NA	NA
		08/21/07	NA	1.9	NA	NA	NA
		07/21/09	NA	1.3	NA	NA	NA
	MW-111	Aug-94	<10	<3.4	NA	NA	NA
		DUP.	<10	<3.4	NA	NA	NA
		Oct-94	<10	<0.70	NA	NA	NA
		Apr-98	226	<5	NA	NA	NA
		Jul-98	22	27	NA	NA	NA
		Nov-98	<0.5	<0.5	NA	NA	NA
		May-00	<4.2	36	NA	NA	NA
		Nov-02	<4.2	43	4400	130000	2600
		DUP	<4.2	38	3400	100000	280
		May-03	5.2	33	2700	98000	1400
		May-04	50	150	5000	93000	NA
		May-05	250	260	200	87000	NA
		Nov-05	<5.0	39	12000	98000	NA
		DUP	<5.0	55	21000	96000	NA
		Oct-06	<6.8	16	NA	NA	NA
		08/21/07	NA	25	NA	NA	NA
		07/21/09	NA	23.6	NA	NA	NA
	MW-112	Oct-94	<10	<0.70	NA	NA	NA
		Nov-94	<10	<2.5	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	4.1	NA	NA	NA
	MW-113	Aug-94	140	99.7	NA	NA	NA
		Oct-94	<10 J	8.6 B	NA	NA	NA
		May-95	43	20.3	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		Jul-98	<10	12	NA	NA	NA
		May-00	<4.2	22	NA	NA	NA
	MW-114	Mar-95	<10 J	<2.9	NA	NA	NA
		DUP.	<10 J	<2.9	NA	NA	NA
		May-95	<10 J	<1.0	NA	NA	NA
		DUP.	<10 J	<1.0	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
	MW-115	May-00	<4.2	6.0	NA	NA	NA
		Jun-01	<4.2	<0.52	160	92	NA
		Nov-01	<4.2	12	1100	NA	3000
		DUP	<4.2	10	3300	NA	3300
		May-02	<4.2	38	19000	NA	2800
		Nov-02	<4.2	38	7000	130000	3100
		May-03	<4.2	260	9700	90000	1400
		DUP	<4.2	56	3600	89000	1400
		May-04	<2.5	1.3	130	34000	NA
		May-05	<5.0	1.1	320	44000	NA
		Oct-06	<6.8	2.6	NA	NA	NA
		08/21/07	NA	10	NA	NA	NA
		07/21/09	NA	5.8	NA	NA	NA
	MW-115A	May-00	<4.2	12.0	NA	NA	NA
		Oct-06	<6.8	4.6	NA	NA	NA
		08/21/07	NA	2.7	NA	NA	NA
		07/21/09	NA	2.9	NA	NA	NA
	MW-116	May-00	1600	470	NA	NA	NA
		DUP.	1500	460	NA	NA	NA
		Nov-00	37	23	NA	NA	NA
		DUP	46	24	NA	NA	NA
		Jun-01	4400	2300	840	2100	NA
		Nov-01	3300	2100	690	NA	2400
		May-02	12000	7300	530	NA	2500
		Nov-02	5100	3200	720	20000	2900
		May-03	8900	6000	410	2700000	1700
		May-04	28000	22000	43	19000	NA
		DUP	28000	22000	280	24000	NA
		May-05	52000	52000	950	1900000	NA
		DUP	54000	53000	710	1800000	NA
		Nov-05	50000	61000	840	1800000	NA
		Oct-06	39000	36000	900	1800000	NA
		DUP	42000	36000	NA	NA	NA
		08/21/07	NA	39,000	NA	NA	NA
		07/21/09	NA	25,500	NA	NA	NA

Concentrations in ug/L
ES - NR140 Enforcement Standard
PAL - NR140 Preventive Action Limit
NA - Compound not analyzed
Underlined - Concentration exceeds PAL
Bolded - Concentration exceeds ES

Table 1: Groundwater Analytical Results
Better Brite
De Pere, Wisconsin

	Parameter	Date	Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide
	NR 140 PAL		10	10	150	125000	NO PAL
	NR 140 ES		100	100	300	250000	NO ES
ZINC SHOP	PF-MW-2	May-00	<4.2	7.6	NA	NA	NA
		Jun-01	<4.2	7.1	NA	NA	NA
		Nov-01	<4.2	10	NA	NA	NA
		May-02	<4.2	<0.52	NA	NA	NA
		Nov-02	<4.2	2.4	NA	NA	NA
		May-03	<4.2	49	NA	NA	NA
	MW-3	May-00	**230**	**330**	NA	NA	NA
		Nov-00	50	130	NA	NA	NA
		Jun-01	**3500**	**2200**	NA	NA	NA
		Nov-01	38	**1700**	NA	NA	NA
		May-02	<4.2	**220**	NA	NA	NA
		Nov-02	<4.2	18	NA	NA	NA
		May-03	**110**	55	NA	NA	NA
		Dup	83	49	NA	NA	NA
		May-04	89	**190**	NA	NA	NA
		May-05	<5.0	17	NA	NA	NA
		7/21/2009	NA	717	NA	NA	NA
	MW-4	Aug-94	<10	<3.4	NA	NA	NA
		DUP	<10	<3.4	NA	NA	NA
		Oct-94	<10 J	<3.4 J	NA	NA	NA
		DUP	<10 J	<3.4 J	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	4.6	NA	NA	NA
		Nov-00	<4.2	2.4	NA	NA	NA
		Jun-01	<4.2	12	NA	NA	NA
		Nov-01	<4.2	7.4	NA	NA	NA
		May-02	<4.2	1.4	NA	NA	NA
		Nov-02	<4.2	15	NA	NA	NA
		May-03	<4.2	27	NA	NA	NA
		May-04	<2.5	1.8	NA	NA	NA
		May-05	<5.0	9	NA	NA	NA
		Nov-05	<5.0	12	NA	NA	NA
	MW-4A	Aug-94	<10	<3.4	NA	NA	NA
		Oct-94	<10 J	6.0 B	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	8.7	NA	NA	NA
		Nov-00	<4.2	3.7	NA	NA	NA
		Jun-01	<4.2	3.7	NA	NA	NA
		Nov-01	<4.2	13	NA	NA	NA
		May-02	<4.2	38	NA	NA	NA
		Nov-02	<4.2	28	NA	NA	NA
		May-03	<4.2	32	NA	NA	NA
		May-04	<2.5	0.75	NA	NA	NA
		May-05	<5.0	2	NA	NA	NA
		Nov-05	<5.0	2.8	NA	NA	NA
	MW-4B	Oct-94	<10	<0.70	NA	NA	NA
		Nov-94	<10	<2.5	NA	NA	NA
	MW-5	Aug-94	**1590**	**827**	NA	NA	NA
		Oct-94	**460 J**	**299 J**	NA	NA	NA
		DUP	**510 J**	**763 J**	NA	NA	NA
		Apr-98	**212**	**631**	NA	NA	NA
		DUP	**207**	**667**	NA	NA	NA
		Jul-98	**1420**	**1230**	NA	NA	NA
		May-00	**120**	**190**	NA	NA	NA
		Nov-00	<4.2	6.6	NA	NA	NA
		Jun-01	**590**	**450**	NA	NA	NA
		Nov-02	**2200**	**2200**	NA	NA	NA
		DUP	**2200**	**2200**	NA	NA	NA
		May-03	**4900**	**3600**	NA	NA	NA
		May-04	**4700**	**3100**	NA	NA	NA
		May-05	**4000**	**3200**	NA	NA	NA
		Oct-06	**4900**	**4000**	NA	NA	NA
		08/21/07	NA	**2,700**	NA	NA	NA
		07/21/09	NA	**2,210**	NA	NA	NA

Concentrations in ug/L
ES - NR140 Enforcement Standard
PAL - NR140 Preventive Action Limit
NA - Compound not analyzed
Underlined - Concentration exceeds PAL
Bolded - Concentration exceeds ES

Table 1: Groundwater Analytical Results
Better Brite
De Pere, Wisconsin

	Parameter	Date	Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide
	NR 140 PAL		10	10	150	125000	NO PAL
	NR 140 ES		100	100	300	250000	NO ES
ZINC SHOP CONT'D	MW-5A	Aug-94	<10	<3.4	NA	NA	NA
		Oct-94	<10	<3.4 J	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	6.5	NA	NA	NA
		Nov-00	340	380	NA	NA	NA
		Jun-01	<4.2	3.9	NA	NA	NA
		Nov-02	<4.2	34	NA	NA	NA
		May-03	<4.2	22	NA	NA	NA
		DUP	<4.2	49	NA	NA	NA
		May-04	<2.5	2.7	NA	NA	NA
		May-05	<5.0	7.6	NA	NA	NA
	MW-5B	Aug-94	NA	NA	NA	NA	NA
		Oct-94	<10	<5	NA	NA	NA
	MW-6	Aug-94	15900	39200	NA	NA	NA
		Oct-94	47000	41,900 J	NA	NA	NA
		Apr-98	7650	4560	NA	NA	NA
		May-00	23000	26000	NA	NA	NA
		Nov-00	26000	23000	NA	NA	NA
		Jun-01	14000	15000	NA	NA	NA
		Nov-01	25000	29000	NA	NA	NA
		May-02	13000	13000	NA	NA	NA
		Nov-02	21000	22000	NA	NA	NA
		May-03	11000	9300	NA	NA	NA
		May-04	13000	15000	NA	NA	NA
		May-05	12000	11000	NA	NA	NA
		DUP	12000	11000	NA	NA	NA
		Oct-06	12000	12000	NA	NA	NA
		DUP	14000	12000	NA	NA	NA
		08/21/07	NA	8,900	NA	NA	NA
		07/21/09	NA	10,400	NA	NA	NA
	MW-6A	Aug-94	<10	4.9 B	NA	NA	NA
		Oct-94	<10	<3.4 J	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	6.6	22	NA	NA	NA
		Nov-00	<4.2	13	NA	NA	NA
		6/01	<4.2	11	NA	NA	NA
		Nov-01	<4.2	7.1	NA	NA	NA
		May-02	<4.2	51	NA	NA	NA
		Nov-02	<4.2	83	NA	NA	NA
		May-03	<4.2	59	NA	NA	NA
		May-04	<2.5	3.4	NA	NA	NA
		May-05	<5.0	12	NA	NA	NA
	MW-6B	Aug-94	<10	NA	NA	NA	NA
	MW-7	Aug-94	<10	6.6 BJ	NA	NA	NA
		DUP.	<10	<2.8	NA	NA	NA
		Oct-94	<10 J	36.4 J	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		DUP	<10	<5	NA	NA	NA
		May-00	<4.2	3.9	NA	NA	NA
		Nov-00	<4.2	1.1	NA	NA	NA
		Jun-01	<4.2	2.7	NA	NA	NA
		Nov-01	<4.2	9.7	NA	NA	NA
		May-02	<4.2	3.2	NA	NA	NA
		Nov-02	<4.2	1.9	NA	NA	NA
		May-03	<4.2	0.91	NA	NA	NA
		May-04	<2.5	0.88	NA	NA	NA
		May-05	<5.0	32	NA	NA	NA
		08/21/07	NA	4.4	NA	NA	NA
		07/21/09	NA	9	NA	NA	NA

Concentrations in ug/L
ES - NR140 Enforcement Standard
PAL - NR140 Preventive Action Limit
NA - Compound not analyzed
Underlined - Concentration exceeds PAL
Bolded - Concentration exceeds ES

Table 1: Groundwater Analytical Results
Better Brite
De Pere, Wisconsin

	Parameter	Date	Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide
	NR 140 PAL		10	10	150	125000	NO PAL
	NR 140 ES		100	100	300	250000	NO ES
ZINC SHOP CONT'D	MW-7A	Aug-94	<10	<2.8	NA	NA	NA
		Oct-94	<10 J	<3.4 J	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	4.7	NA	NA	NA
		Nov-00	7.9	5	NA	NA	NA
		Jun-01	<4.2	2.5	NA	NA	NA
		Nov-01	<4.2	<.52	NA	NA	NA
		May-02	<4.2	1.4	NA	NA	NA
		Nov-02	<4.2	0.98	NA	NA	NA
		May-03	<4.2	0.85	NA	NA	NA
		May-04	3.9	2.2	NA	NA	NA
		May-05	<5.0	0.65	NA	NA	NA
	MW-8	Oct-94	<10	<0.70	NA	NA	NA
		Nov-94	<10	<2.5	NA	NA	NA
		DUP.	<10	<2.5	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	15	NA	NA	NA
		Nov-00	13	13	NA	NA	NA
		Jun-01	5.3	2	NA	NA	NA
		Nov-01	<4.2	2.3	NA	NA	NA
		DUP	<4.2	6.7	NA	NA	NA
		May-02	<4.2	4	NA	NA	NA
		Nov-02	<4.2	23	NA	NA	NA
		May-03	<4.2	2.2	NA	NA	NA
		May-04	<2.5	1.7	NA	NA	NA
		May-05	<5.0	1.1	NA	NA	NA
		08/21/07	NA	2.3	NA	NA	NA
	MW-8A	Oct-94	<10	<0.70	NA	NA	NA
		Nov-94	<10	<2.5	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	16	NA	NA	NA
		Nov-00	<4.2	34	NA	NA	NA
		Jun-01	<4.2	3.7	NA	NA	NA
		Nov-01	<4.2	14	NA	NA	NA
		May-02	<4.2	2.5	NA	NA	NA
		DUP	<4.2	11	NA	NA	NA
		Nov-02	<4.2	20	NA	NA	NA
		May-03	<4.2	13	NA	NA	NA
		May-04	3.9	0.59	NA	NA	NA
		May-05	<5.0	2.6	NA	NA	NA
		08/21/07	NA	0.92	NA	NA	NA
	MW-9	Aug-94	**400**	**697**	NA	NA	NA
		Oct-94	**470 J**	**442 J**	NA	NA	NA
		Apr-98	**209**	<5	NA	NA	NA
		Jul-98	60	75	NA	NA	NA
		Nov-00	13	15	NA	NA	NA
		DUP	19	51	NA	NA	NA
		Jun-01	28	**180**	NA	NA	NA
		Nov-01	35	76	NA	NA	NA
		May-02	75	72	NA	NA	NA
		Nov-02	67	80	NA	NA	NA
		May-03	32	53	NA	NA	NA
		May-04	54	63	NA	NA	NA
		Dup	50	46	NA	NA	NA
		May-05	28	41	NA	NA	NA
		Oct-06	17	34	NA	NA	NA
		08/21/07	NA	52	NA	NA	NA
		07/21/09	NA	33.3	NA	NA	NA

Concentrations in ug/L
ES - NR140 Enforcement Standard
PAL - NR140 Preventive Action Limit
NA - Compound not analyzed
Underlined - Concentration exceeds PAL
Bolded - Concentration exceeds ES

Table 1: Groundwater Analytical Results
Better Brite
De Pere, Wisconsin

	Parameter	Date	Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide
	NR 140 PAL		10	10	150	125000	NO PAL
	NR 140 ES		100	100	300	250000	NO ES
ZINC SHOP CONT'D	MW-10	Aug-94	**60300**	**53100**	NA	NA	NA
		Oct-94	**60800 J**	**43,500 J**	NA	NA	NA
		Nov-00	**20000**	**18000**	NA	NA	NA
		Jun-01	<4.2	20	NA	NA	NA
		Nov-02	**35000**	**38000**	NA	NA	NA
		May-03	**38000**	**37000**	NA	NA	NA
		May-04	**25000**	**22000**	NA	NA	NA
		Nov-05	**13000**	**13000**	NA	NA	NA
		Oct-06	**14000**	**13000**	NA	NA	NA
		08/21/07	NA	**17,000**	NA	NA	NA
	MW-11	May-95	<10	<1.0	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	7.0	NA	NA	NA
		Nov-00	<4.2	4.1	NA	NA	NA
		Jun-01	<4.2	3.6	NA	NA	NA
		Nov-01	<4.2	7.8	NA	NA	NA
		May-02	17	<20	NA	NA	NA
		Nov-02	<4.2	27	NA	NA	NA
		May-03	<4.2	12	NA	NA	NA
		May-04	<2.5	2.3	NA	NA	NA
		May-05	<5.0	2.8	NA	NA	NA
	MW-12	Mar-95	<10 J	<2.9	NA	NA	NA
		May-95	<10	<1.0	NA	NA	NA
		Apr-98	<10	<5	NA	NA	NA
		May-00	<4.2	4.8	NA	NA	NA
		Nov-00	<4.2	6	NA	NA	NA
		jun-01	<4.2	6.4	NA	NA	NA
		Nov-01	<4.2	<0.52	NA	NA	NA
		May-02	<4.2	4.8	NA	NA	NA
		Nov-02	<4.2	1.3	NA	NA	NA
		May-03	<4.2	1.3	NA	NA	NA
		May-04	<2.5	1.8	NA	NA	NA
		May-05	<5.0	8.1	NA	NA	NA
	MW-13	Mar-95	<10 J	<2.9	NA	NA	NA
		May-95	<10	<1.0	NA	NA	NA
	Zinc Sump	Aug-94	**89000**	**209000**	NA	NA	NA
		Oct-94	**144900**	**277000**	NA	NA	NA
		Apr-98	**66000**	**38300**	NA	NA	NA
		Jul-98	**131000**	**131000**	NA	NA	NA
		May-00	**1800**	**1700**	NA	NA	NA
		Nov-00	**41000**	**27000**	NA	NA	NA
		Jun-01	**40000**	**110000**	NA	NA	NA
		Nov-01	**23000**	**56000**	NA	NA	NA
		May-02	**43000**	**14000**	NA	NA	NA
		Nov-03	**23000**	**30000**	NA	NA	NA
		May-03	**8400**	**6800**	NA	NA	NA
		May-04	**24000**	**6400**	NA	NA	NA
		May-05	**15000**	**13000**	NA	NA	NA
		Oct-06	**7500**	**5900**	NA	NA	NA
		08/21/07	NA	**20,000**	NA	NA	NA
		07/21/09	NA	**14,800**	NA	NA	NA
	Private	Aug-94	<10	<10	NA	NA	NA
	Municipal	Aug-94	<10	<10	NA	NA	NA
		DUP.	<10	<10	NA	NA	NA
		Oct-94	<10	<10	NA	NA	NA
		DUP.	<10	<10	NA	NA	NA
	USGS	Oct-94	<10	0.75 B	NA	NA	NA
	USGS-A	Oct-94	<10	11.9	NA	NA	NA

Concentrations in ug/L
ES - NR140 Enforcement Standard
PAL - NR140 Preventive Action Limit
NA - Compound not analyzed
Underlined - Concentration exceeds PAL
Bolded - Concentration exceeds ES

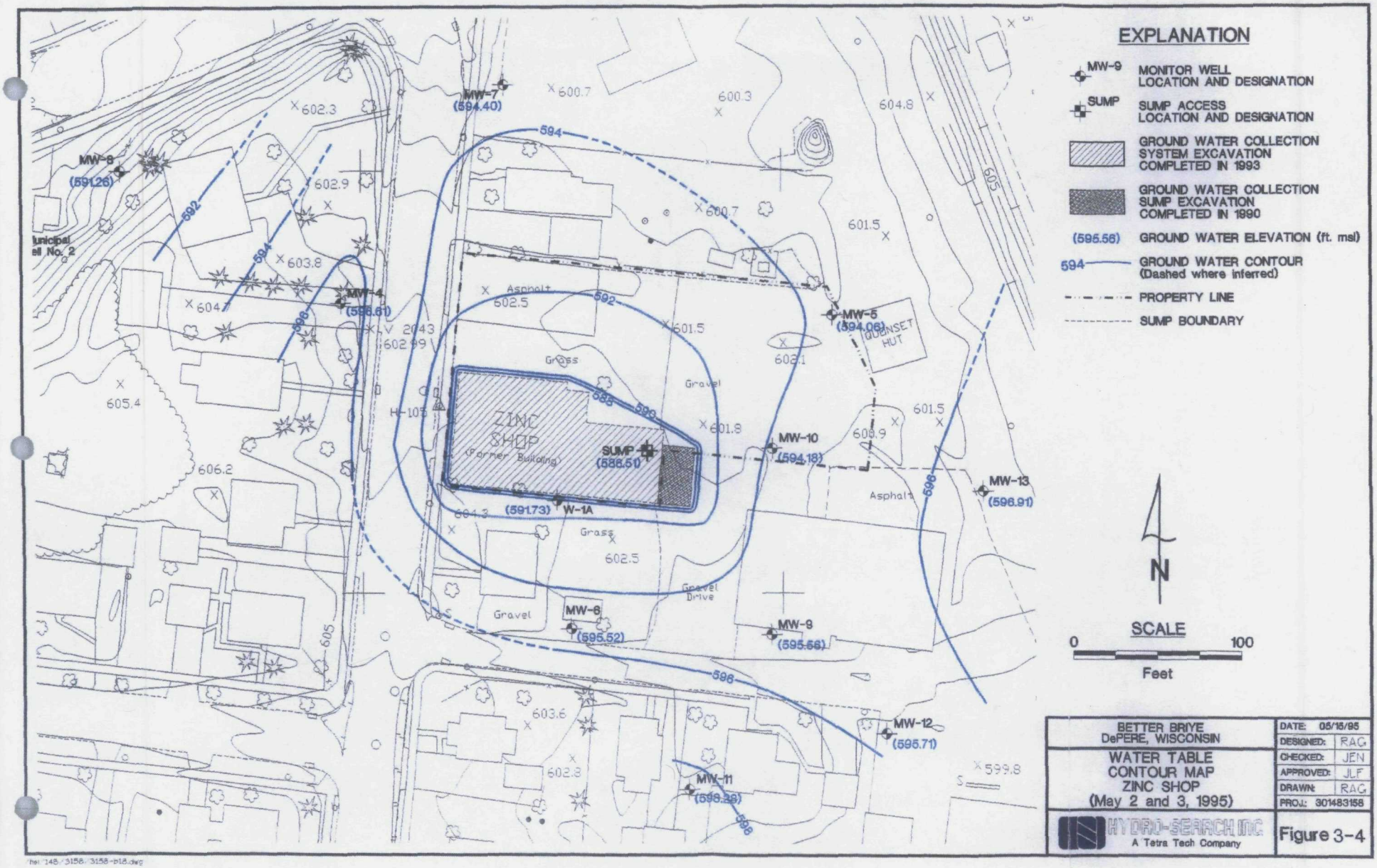
Table 4-2

Better Brite
DePere, Wisconsin

VOC Groundwater Anaytical Summary

		Volatile Organic Compounds (VOC)																				
		Benzene	sec-butylbenzene	Chloroethane	Chloroform	Dichlorodiflouromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	Ethylbenzene	Isopropylbenzene	Methylene Chloride	MTBE	n-Propylbenzene	Tetrachloroethene	Toluene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethene	Flourotrichloromethane	1,3,5-Trimethylbenzene	Vinyl Chloride	Xylenes
NR140 PAL		*0.5*	*None*	*80*	*0.6*	*200*	*85*	*0.5*	*0.7*	*140*	*None*	*0.5*	*12*	*None*	*0.5*	*0.2*	*40*	*0.5*	*0.5*	*None*	*96*	*0.02*	*1*
NR140 ES		**5**	**None**	**400**	**6**	**1000**	**850**	**5**	**7**	**700**	**None**	**5**	**60**	**None**	**5**	**1**	**200**	**5**	**5**	**None**	**480**	**0.2**	**10**
Sample Location	Sample Date																						
Zinc Sump	5/4/2000	<0.25	<0.25	<0.25	<0.25	<0.50	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.10	1.4	<0.25	<0.25	<0.25	<0.10	<0.25	<0.25
Zinc Sump	11/30/2000	<0.25	<0.25	<1.2	<1.2	<0.50	<1.2	<1.2	<1.2	<1.2	<0.25	<1.2	<1.2	<0.25	<1.2	<0.50	*50*	<1.2	<1.2	<0.25	<0.50	<1.2	<1.2
Zinc Sump	11/7/2002	<0.25	<0.25	<0.25	0.36	<0.50	2.4	<0.25	*2.7*	<0.25	<0.25	<0.25	<0.25	<0.25	*0.64*	<0.10	*64*	<0.25	<0.25	<0.25	<0.10	<0.25	<0.25
Zinc Sump	5/7/2003	<0.25	<0.25	<1.0	<0.25	<0.50	<0.50	<0.50	<0.50	<0.50	<0.25	<1.0	<0.50	<0.25	<0.50	<0.25	1.0	<0.25	<0.25	<0.25	<0.25	<0.50	<0.50
Zinc Sump	5/12/2005	<0.41	<0.89	<0.97	0.49	<0.99	2.7	*0.52*	*3.2*	<0.54	<0.59	<0.43	<0.61	<0.81	*0.8*	<0.67	*84*	<0.42	*<0.48*	<0.79	<0.83	<0.18	<2.63
MW-2	5/4/2000	*1.3*	1	<0.25	<0.25	<0.50	<0.25	<0.25	<0.25	0.37	2.6	<0.25	*34*	0.53	<0.25	0.12	<0.25	<0.25	<0.25	<0.25	<0.10	<0.25	<0.25
MW-116	6/5/2000	<0.10	<0.25	<0.25	<0.25	5.8	1.6	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	*1.7*	<0.10	3.2	<0.25	<0.25	4.4	<0.10	<0.25	<0.25
MW-116(D)	6/5/2000	<0.10	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	*1.5*	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
MW-116	5/12/2005	<0.41	<0.89	<0.97	<0.37	1.9	20	<0.36	*9.6*	<0.54	<0.59	<0.43	<0.61	<0.81	*3*	<0.64	37	<0.42	*0.89*	<0.79	<0.83	<0.18	<2.63
MW-116DUP	5/12/2005	<0.41	<0.89	<0.97	<0.37	1.9	22	<0.36	*11*	<0.54	<0.59	<0.43	<0.61	<0.81	*3.4*	<0.67	39	<0.42	*0.77*	<0.79	<0.83	<0.18	<2.63

NOTES:
Units reported are micrograms per liter (ug/L) which is approximately equal to parts per billion (ppb) unless otherwise noted.
PAL- Preventive Action Limit
ES - Enforcement Standard
NS - No Sample
- Not available or Not analyzed
VOC data prior to 2000 are contained in the "Remedial Action Documentation Report, February 21, 2000" and the "Final Design Report, January 14, 1999".
Italic - compound meets or exceeds PAL
< - Indicates less than.


EXPLANATION
MW-9 MONITOR WELL LOCATION AND DESIGNATION
SUMP SUMP ACCESS LOCATION AND DESIGNATION
GROUND WATER COLLECTION SYSTEM EXCAVATION COMPLETED IN 1993
GROUND WATER COLLECTION SUMP EXCAVATION COMPLETED IN 1990
(595.56) GROUND WATER ELEVATION (ft. msl)
594 GROUND WATER CONTOUR (Dashed where inferred)
PROPERTY LINE
SUMP BOUNDARY
MW-7 (594.40)
MW-8 (591.26)
MW-4 (596.61)
MW-5 (594.06)
MW-10 (594.18)
MW-13 (596.91)
MW-1A (591.73)
SUMP (586.51)
MW-6 (595.52)
MW-9 (595.56)
MW-12 (595.71)
MW-11 (598.28)
ZINC SHOP (Former Building)
GUNSET HUT
Asphalt
Grass
Gravel
Gravel Drive
N
SCALE
0 100
Feet
BETTER BRIYE
DePERE, WISCONSIN
WATER TABLE CONTOUR MAP ZINC SHOP (May 2 and 3, 1995)
DATE: 05/15/95
DESIGNED: RAG
CHECKED: JEN
APPROVED: JLF
DRAWN: RAG
PROJ.: 301483158
HYDRO-SEARCH INC
A Tetra Tech Company
Figure 3-4