United States Environmental Protection Agency

Optimization Review Report
Remedial Process Optimization Study

Better Brite Plating Co. Chrome and Zinc Shops Superfund Site
City of De Pere, Brown County, Wisconsin
EPA Region 5

OPTIMIZATION REVIEW

BETTER BRITE PLATING CO. CHROME AND ZINC SHOPS SUPERFUND SITE

CITY OF DE PERE, BROWN COUNTY, WISCONSIN
EPA REGION 5

FINAL REPORT
May 2020

EXECUTIVE SUMMARY

NATIONAL OPTIMIZATION STRATEGY BACKGROUND

The U.S. Environmental Protection Agency's (EPA's) definition of optimization is as follows:

> "*Efforts at any phase of the removal or remedial response to identify and implement specific actions that improve the effectiveness and cost-efficiency of that phase. Such actions may also improve the remedy's protectiveness and long-term implementation, which may facilitate progress towards site completion. To identify these opportunities, Regions may use a systematic site review by a team of independent technical experts, apply techniques or principles from Green Remediation or Triad, or apply some other approaches to identify opportunities for greater efficiency and effectiveness*."[1]

An optimization review considers the goals of the remedy, available site data, conceptual site model (CSM), remedy performance, protectiveness, cost-effectiveness, and closure strategy. A strong interest in sustainability has also developed in the private sector and within federal, state, and municipal governments. Consistent with this interest, principles of green remediation and environmental footprint reduction are now routinely considered during optimization reviews, when applicable.

This optimization review includes reviewing site documents, interviewing site stakeholders, conducting a virtual site tour, and compiling a report that includes recommendations intended to address the following:

- Remedy effectiveness
- Technical improvement
- Cost reduction
- Progress to site closure
- Reuse/revitalization
- Energy and material efficiency

The recommendations are intended to help the site team identify opportunities for improvements in these areas. Analysis of recommendations, beyond that provided in this report, may be needed prior to implementation. All recommendations are based on an independent review and represent the opinions of the optimization review team. The recommendations are not requirements; they are provided for consideration by the EPA Region and other site stakeholders. Also, note that while the recommendations provide some details, they do not replace other, more comprehensive, planning documents such as work plans, sampling plans, and Quality Assurance Project Plans (QAPPs).

The national optimization strategy includes a system for tracking the outcome of the recommendations and includes a provision for follow-up technical assistance from the optimization review team as mutually agreed upon by the site management team and EPA Office of Land and Emergency Management (OLEM), and the Office of Superfund Remediation and Technology Innovation [OSRTI]).

[1] EPA, 2012. Memorandum: Transmittal of the National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion. From: James. E. Woolford, Director Office of Superfund Remediation and Technology Innovation. To: Superfund National Policy Managers (Regions 1 – 10). Office of Solid Waste and Emergency Response (OSWER) 9200.3-75. September 28.

SITE-SPECIFIC BACKGROUND

The Better Brite Site is located in the City of De Pere, Brown County, Wisconsin and consists of two separate properties located in mixed residential/commercial areas within a quarter mile of the Fox River. The two properties are known as the Chrome Shop and the Zinc Shop (see **Figure 1**). The Chrome Shop is located at 519 Lande Street, and the Zinc Shop is located at 315 South Sixth Street.

Better Brite began chromium plating operations at the Zinc Shop in the late 1960s and was primarily engaged in plating 15 to 20-foot rollers for paper mills in the area. By 1978, chrome plating operations began at the Chrome Shop, and operations at the Zinc Shop were converted to zinc plating only. Vertical in-ground dip tanks were used for chromium plating operations. Known chemicals used include muriatic acid, sodium hypochlorite, degreasers containing volatile organic compounds (VOCs), chromic acid, and sodium cyanide solutions. Operational practices were reportedly poor, and numerous complaints from neighbors and employees regarding spills and dumping prompted initial investigations by Wisconsin Department of Natural Resources (WDNR) in 1979.

Several responses were conducted at both locations between 1979 and 1993, including excavation and off-site disposal of contaminated soil and conversion of the excavated areas into groundwater collection sumps. The Remedial Investigation (RI) and a Focused Feasibility Study (FFS) were conducted in 1995, and the Record of Decision (ROD) was signed in 1996. The remedies for both properties were implemented in 1999. At the Chrome Shop, ferrous sulfate was mixed into the soil to stabilize chromium in situ. Groundwater monitoring continues to evaluate remedy performance. At the Zinc Shop, the groundwater treatment facility previously operated at the Chrome Shop under the response actions was moved to the Zinc Shop. Groundwater extraction, treatment, and associated monitoring as initiated in 1996 and is ongoing. EPA funded WDNR to perform the remedy at the Better Brite Site under a cooperative agreement until July 18, 2011, after which WDNR became solely responsible for financing Operation and Maintenance (O&M).

SUMMARY OF CONCEPTUAL SITE MODEL

The source areas at the two locations are primarily leaks from the vertical inground dip tanks that were used for plating. Leaks over time resulted in chromic acid and other chemicals discharging to the surface and subsurface, resulting in hexavalent chromium and other contamination of the soil and groundwater. The soil underlying the two locations is a thin layer of topsoil covering silty clay to lean clay. Therefore, the contaminant plume migration and groundwater extraction are limited. The response actions conducted in 1993 involved removal of the soils in the release areas to a depth of 20 feet (ft) and replacement of the removed soils with gravel and perforated pipe to construct groundwater collection sumps. Therefore, substantial contaminant mass was removed prior to the RI/FFS and final remedy. Nevertheless, after five years of groundwater extraction from the collection sumps between 1993 and 1998, chromium concentrations in groundwater remained over 100,000 micrograms per liter (µg/L) at both locations.

For the 20 years between remedy implementation and 2019, the groundwater in one monitoring well at the Chrome Shop increased from 1,600 µg/L in 2000 to as high as 54,000 µg/L in 2005 and has subsequently decreased to 9,800 µg/L in 2019. The cause of the elevated chromium concentrations is uncertain. At the Zinc Shop, chromium concentrations in groundwater have consistently decreased demonstrating that the groundwater extraction system has been successfully removing mass and decreasing the footprint of the plume. However, significant contaminant mass remains. The chromium concentration in groundwater extracted from the sump in 2019 was 8,100 µg/L.

KEY FINDINGS

The key findings of the optimization review are as follows:

- The cause of the elevated chromium concentrations at Chrome Shop monitoring well MW-116 are uncertain. The cause may be due to soil within the treatment zone that was not sufficiently stabilized during the remedy or contamination that was present outside of the treatment area and is now migrating near MW-116. The first conceptual model suggests that there may be other portions within the former treatment area that may also have elevated concentrations that are not detected by the limited monitoring network. The second conceptual model suggests that chromium may have the potential to migrate and may eventually migrate outside of the former treatment area.

- Chromium concentrations in groundwater at the Zinc Shop have decreased substantially in many areas but remain elevated in a few monitoring wells and the collection sump, suggesting an area of high chromium mass that sustains the elevated groundwater concentrations.

- The extent of VOC contamination in groundwater at both locations is uncertain.

RECOMMENDATIONS

The optimization team provides the following recommendations for consideration by the Site team:

The groundwater monitoring network for the Chrome Shop groundwater plume should be improved. At present, the plume is characterized by a single monitoring well within the former treatment area, and this one well has elevated chromium concentrations. It is possible that other portions of the former treatment area are also impacted, and it is possible that chromium impacts may be slowly migrating. Finally, without additional monitoring wells, it would be difficult to argue that groundwater has been restored even if this single monitoring well were to meet cleanup standards in the future. The optimization team recommends expanding the monitoring program by installing six groundwater wells in specific locations..

The area between the collection sump, W-1, W-1A, MW-6, and MW-10 at the Zinc Shop may be the location where the most chromium mass remains in the subsurface. The optimization team recommends additional characterization of this area, and depending on the results, accelerating remediation by installing French drains that can be used for either groundwater extraction or clean water injection to flush contamination toward the sump.

Finally, the optimization team recommends modifications to the groundwater monitoring programs at both the Zinc and Chrome Shops. The optimization team recommends reducing the sampling frequency to once every two years. The six proposed monitoring wells for the Chrome Shop should be included in the monitoring program for at least two events, and all monitoring wells within the program at both locations should be sampled for VOCs for at least two events. During the monitoring events, water levels should be measured and used to prepare potentiometric surface maps. In net, the optimization team believes this modified monitoring program will have similar costs to the existing program but will provide the Site team with better information for evaluating remedy performance.

The optimization team has no specific suggestions for alternative uses of the properties and recommends keeping the land undeveloped at the Chrome Shop in case additional remediation is needed.

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NOTICE AND DISCLAIMER

Work described herein, including preparation of this report, was performed by HydroGeoLogic, Inc. (HGL) for the U.S. Environmental Protection Agency (EPA) under Task Order 0066 of EPA contract EP-S7-05-05 with HGL. The report was approved for release as an EPA document, following the Agency's administrative and expert review process.

This optimization review is an independent study funded by EPA that evaluates existing data, discusses the conceptual site model (CSM), analyzes remedy performance, and provides suggestions for improving remedy efficacy, reducing cost, and making progress toward Site reuse and closure at the Better Brite Plating Co. Chrome and Zinc Shops Superfund Site (Site). Detailed consideration of EPA policy was not part of the scope of work for this review. This report does not impose legally binding requirements, confer legal rights, impose legal obligations, implement any statutory or regulatory provisions, or change or substitute for any statutory or regulatory provisions. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by EPA.

Recommendations are based on an independent evaluation of existing Site information, represent the technical views of the optimization review team, and are intended to help the Site team identify opportunities for improvements in the current remediation strategy and operation and maintenance plan. These recommendations do not constitute requirements for future action; rather, they are provided for consideration by the EPA Region and other Site stakeholders.

While certain recommendations may provide specific details to consider during implementation, these are not meant to supersede other, more comprehensive planning documents such as work plans, sampling plans and Quality Assurance Project Plans (QAPPs), nor are they intended to override Applicable or Relevant and Appropriate Requirements (ARARs) established in the Record of Decision. Further analysis of recommendations, including review of EPA policy, may be needed before implementation.

PREFACE

This report was prepared as part of a national strategy to expand Superfund optimization practices from site assessment to site completion implemented by the U.S. Environmental Protection Agency Office of Land and Emergency Management (OLEM) (formerly Office of Solid Waste and Emergency Response [OSWER])[2]. The project contacts are as follows:

ORGANIZATION	CONTACT	CONTACT INFORMATION
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[2] EPA, 2012. Memorandum: Transmittal of the National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion. From: James. E. Woolford, Director Office of Superfund Remediation and Technology Innovation. To: Superfund National Policy Managers (Regions 1 – 10). Office of Solid Waste and Emergency Response (OSWER) 9200.3-75. September 28.

LIST OF ACRONYMS AND ABBREVIATIONS

μg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
ARAR	Applicable or Relevant and Appropriate Requirement
Better Brite	The Better Brite Plating Co.
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm/s	centimeters per second
COC	contaminant of concern
CSM	conceptual site model
EPA	U.S. Environmental Protection Agency
ES	WAC NR 140 Enforcement Standard
FFS	Focused Feasibility Study
ft	feet or foot
ft/d	feet per day
ft/yr	feet per year
FYR	Five-Year Review
HGL	HydroGeoLogic, Inc.
HQ	EPA Headquarters
NA	not available
NPL	National Priorities List
OLEM	Office of Land and Emergency Management
OSRTI	Office of Superfund Remediation and Technology Innovation
OSWER	Office of Solid Waste and Emergency Response
PAL	Preventative Action Limit
PCOR	Preliminary Close-Out Report
QAPP	Quality Assurance Project Plan
R5	EPA Region 5
RA	Remedial Action
RAO	remedial action objective
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SPLP	Synthetic Precipitation Leaching Procedure
VOC	volatile organic compound
WDNR	Wisconsin Department of Natural Resources

1.0 OBJECTIVES OF THE OPTIMIZATION REVIEW

For more than a decade, the Office of Land and Emergency Management (OLEM) has provided technical support to U.S. Environmental Protection Agency (EPA) regional offices by using independent (third party) optimization reviews at Superfund sites. The Better Brite Plating Co. (Better Brite) Chrome and Zinc Shop Superfund Site (Site) (CERCLIS ID WIT560010118) was nominated for an optimization review by the EPA Region 5 (R5) Optimization Coordinator in July 2019. The focus of this optimization review is to evaluate historical data and provide recommendations to optimize the current remedial response and associated Site characterization and monitoring.

This optimization review used existing environmental data to interpret the conceptual site model (CSM), identify potential data gaps, and recommend improvements to the remedy. The optimization review team evaluated the quality of the existing data before using the data for these purposes. The evaluation for data quality included a brief review of data collection and management methods (where practical, the Site Quality Assurance Project Plan [QAPP] is considered), the consistency of the data with other Site data, and the potential use of the data in the optimization review. Data that were of suspect quality were either not used as part of the optimization review or were used with the quality concerns noted. Where appropriate, this report provides recommendations made to improve data quality.

2.0 OPTIMIZATION REVIEW TEAM

The optimization review team, which collaborated with representatives of EPA Headquarters (HQ) and EPA R5, and the Wisconsin Department of Natural Resources (WDNR), consists of the independent, third-party participants listed in Table 1.

TABLE 1. Optimization Review Team

NAME	ORGANIZATION	TELEPHONE	EMAIL
Doug Sutton	HydroGeoLogic, Inc.	732-784-2812	dsutton@hgl.com

In addition to the individuals listed above, the following people contributed to the optimization review process, including attendance on a web-enabled conference call on March 24, 2020.

TABLE 2. Other Optimization Review Contributors

NAME	ORGANIZATION	TITLE/ROLE
Kirby Biggs	EPA HQ	Optimization Team Leader
Keld Lauridsen	WDNR	Project Manager
Judy Fassbender	WDNR	Section Chief
Lauren McCarrell	EPA R5	Remedial Project Manager
Amanda van Epps	EPA HQ	R5 Optimization Coordinator

Documents reviewed for the optimization effort are listed in Appendix A.

3.0 SITE BACKGROUND

3.1 SITE DESCRIPTION

The Site is located in the City of De Pere, Brown County, Wisconsin and consists of two separate properties located in mixed residential/commercial areas within a quarter mile of the Fox River. The two properties are the Chrome Shop and the Zinc Shop (see **Figure 1**). The Chrome Shop is located at 519 Lande Street, and the Zinc Shop is located at 315 South Sixth Street. Several homes directly border both properties, with the nearest residence located across the street to the west of the Zinc Shop property. Approximately seven single-family residences are adjacent to the Chrome Shop property. These two properties were listed as one Site on the National Priorities List (NPL) August 30, 1990 due to similarities in contaminants, Site history, and ownership.

Better Brite began operations at the Zinc Shop in the late 1960s and was primarily engaged in plating 15-20-foot rollers for paper mills in the area. By 1978, chrome plating operations began at the Chrome Shop, and operations at the Zinc Shop were converted to zinc plating only. Vertical in-ground dip tanks were used for chromium plating operations. Known chemicals used include muriatic acid, sodium hypochlorite, degreasers containing volatile organic compounds (VOCs), chromic acid, and sodium cyanide solutions. Operational practices were reportedly poor, and numerous complaints from neighbors and employees regarding spills and dumping prompted initial investigations by Wisconsin Department of Natural Resources (WDNR) in 1979.

3.1.1 Initial Response Actions for the Chrome Shop

EPA prepared a response plan in 1979, which Better Brite implemented, including excavation of a groundwater collection trench, installation of surface water controls and groundwater monitoring wells, and limited soil removal. Groundwater from the collection trench was discharged to a City of De Pere sanitary sewer. Following a 1985 bankruptcy, the Chrome Shop building was demolished and removed, the holding pond was excavated, and the former building area was capped with clay. In April 1986, EPA removed four subsurface plating tanks from the Chrome Shop property. In September 1986, EPA prepared a Site Assessment and Emergency Action Plan, which concluded that the Chrome Shop property area posed an immediate threat to human health. From September 1986 to April 1987, EPA completed actions that removed 83 tons of contaminated soil, 9,279 gallons of chromic acid, 3,600 gallons of caustic liquid, 550 gallons of cyanide solution, 150 pounds of cyanide sludge, and 500 gallons of flammable liquid. (Hydro-Search, Inc., 1995)

Better Brite discontinued pumping from the collection trench in 1986. As a result, chromium contaminated surface water began collecting in nearby yards. As an interim measure in March 1988, EPA started pumping from the collection trench and discharging waste to the sanitary sewer. In 1990, EPA built a 2,000 gallon per day system to treat groundwater prior to discharging to the sanitary sewer, and initiated pumping from a recovery well in addition to the collection trench. (Hydro-Search, Inc., 1995)

In 1993, EPA excavated impacted soil to a depth of 20 feet (ft) below ground surface (bgs) from beneath the southwest corner of the former Chrome Shop building and areas further south and west. An impermeable membrane was placed on the bottom of the pit, and a 6-inch perforate pipe was placed on the liner. The 6-inch perforated pipe was connected to a vertical standpipe, and the pit was then backfilled with pea gravel and limestone gravel, converting the former excavation into a large sump for groundwater collection. Groundwater was extracted and treated on-site in the treatment plant prior to discharge to the sanitary sewer. (Hydro-Search, Inc., 1995, pg. 26) Surface soils covering much of the area surrounding the Chrome Shop was also excavated in 1993.

The location and extent of the Chrome Shop deep excavation and sump is depicted in **Figure 2**.

3.1.2 Initial Response Actions for the Zinc Shop

Better Brite filed for bankruptcy protection and discontinued operations at the Chrome Shop in 1985, but operations continued at the Zinc Shop until 1989. (Hydro-Search, Inc., 1995)

In October 1989, EPA performed a site assessment at the Zinc Shop. Based on the results of the site assessment, EPA conducted a removal action from December 27, 1989 to October 22, 1993 that entailed sampling and sorting hazardous materials; securing, decontaminating, and heating the building; removing waste; and compiling the analytical results from previous investigations. (Hydro-Search, Inc., 1995)

In 1990, as part of the removal action, 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 during installation of the sump. In 1991, EPA conducted additional decontamination of the building and investigated beneath the concrete slab foundation. (Hydro-Search, Inc., 1995)

The Zinc Shop burned down in September 1992. From November 1992 to January 1993, EPA removed the remains of the building, the slab foundation, and two 15-foot long vertical in-ground dip tanks as part of the ongoing removal action. Contaminated soil was excavated from beneath the foundation until clean soil was reached. Similar to the Chrome Shop, the excavation was converted into a large sump for groundwater collection. Until the fall of 1999, contaminated groundwater was regularly extracted from the sump and trucked to the Chrome Shop for treatment and discharge. (Hydro-Search, Inc., 1995)

The location and extent of the Zinc Shop deep excavation and sump is depicted in **Figure 3**.

3.1.3 1995 Remedial Investigation/Focused Feasibility Study and Subsequent Actions

WDNR conducted a Remedial Investigation and Focused Feasibility Study (RI/FFS) in 1995, and EPA signed a Record of Decision (ROD) in 1996. The remedy was designed in 1998 and was implemented under WDNR lead between 1999 and 2000. WDNR has continued to operate the remedy, which includes groundwater extraction and treatment at the Zinc Area (but not the Chrome Area), from 2000 to present.

A chronology of Site events is presented in Table 3.

3.2 REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) identified in the ROD (EPA, 1996) are as follows:

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

The ROD further stated that EPA and WDNR concluded that WAC NR 140 Enforcement Standards (ESs) and Preventative Action Limits (PALs) provide sufficient protection of public health for residential groundwater use. The remedy is intended to achieve compliance with PALs for all contaminants of concern (COCs). The PALs are provided in Table 4 for the Chrome Shop and the Zinc Shop.

TABLE 3. Site Chronology

Date	Action
1979	Initial investigations were conducted into contamination based on complaints from neighbors and employees.
1986-1987	Fund-lead removal actions were conducted at the Chrome Shop.
1989	The Site was proposed for the NPL.
1990	The Site was listed on the NPL.
1991	The Interim ROD was signed.
1989-1993	Fund-lead removal actions were conducted at the Zinc Shop.
1995	The State-lead RI/FFS was completed.
1996	The final ROD was signed.
1998	The State-lead Remedial Design (RD) was completed.
1999	On-site Remedial Action (RA) construction started. The first Five-Year Review (FYR) was conducted.
2000	Construction was completed and the Preliminary Close-Out Report (PCOR) was issued.
2004	The second FYR was conducted.
2009	The third FYR was conducted.
2010	A restrictive covenant was filed with Brown County.
2011	The Zinc Shop groundwater removal and treatment system was upgraded.
2014	The fourth FYR was conducted.
2019	The fifth FYR was conducted.

3.3 Selected Remedy and Groundwater Cleanup Goals

The selected remedy for the Site as described in the ROD (EPA, 1996) is as follows:

- *Move the existing groundwater pretreatment equipment from the Chrome Shop to the Zinc Shop and construct a new building to house it;*
- *Continue removal, treatment and discharge to the sanitary sewer of contaminated groundwater from an existing groundwater collection sump at the Zinc Shop;*
- *Conduct in-situ stabilization and/or solidification treatment of the chromium contaminated soils and groundwater at the Chrome Shop;*
- *Continue groundwater monitoring; and*
- *Implement proper institutional controls and site access restrictions.*

The remedy further called for the following measures to prevent human contact with contaminated soil, dust, and groundwater at residences near the Zinc Shop:

- *Seal the interior access points of existing foundation drains;*
- *Waterproof existing exterior foundation walls;*
- *Construct new exterior building foundation drains with collected water treated at the Zinc Shop pretreatment facility;*

- *Predesign investigations of structure 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.*
- *Continue groundwater monitoring; and*
- *Remove and properly treat/dispose of any contaminated soil that pose health risks or could cause additional groundwater contamination near the Zinc Shop after a predesign soil investigation.*

Cleanup goals for specific COCs are summarized in Table 4.

TABLE 4. Groundwater Cleanup Goals (from Fifth FYR)

COC	Chrome Shop COC	Zinc Shop COC	Cleanup Goal (PAL) (µg/L)
Inorganics			
Aluminum	x	x	NA
Antimony	x	x	1.2
Arsenic	x		1
Beryllium	x	x	0.4
Cadmium	x		0.5
Calcium	x	x	NA
Cobalt	x	x	8
Chromium	x	x	10
Hexavalent Chromium	x	x	NA
Cyanide		x	40
Iron	x	x	150*
Lead		x	1.5
Magnesium	x	x	NA
Manganese	x	x	60
Nickel	x	x	20
Potassium	x	x	NA
Sodium		x	NA
Silver	x		10
Thallium	x	x	0.4
Vanadium	x	x	6
VOCs			
Carbon Disulfide	x		200
Carbon Tetrachloride		x	0.5
1,2-Dichloroethane		x	0.5
1,1-Dichloroethene	x		0.7
Tetrachloroethene	x		0.5
1,1,1-Trichloroethane	x		40
1,1,2-Trichloroethane		x	0.5
Trichloroethene	x		0.5

*µg/L = micrograms per liter; NA = not available; * = public welfare standard*

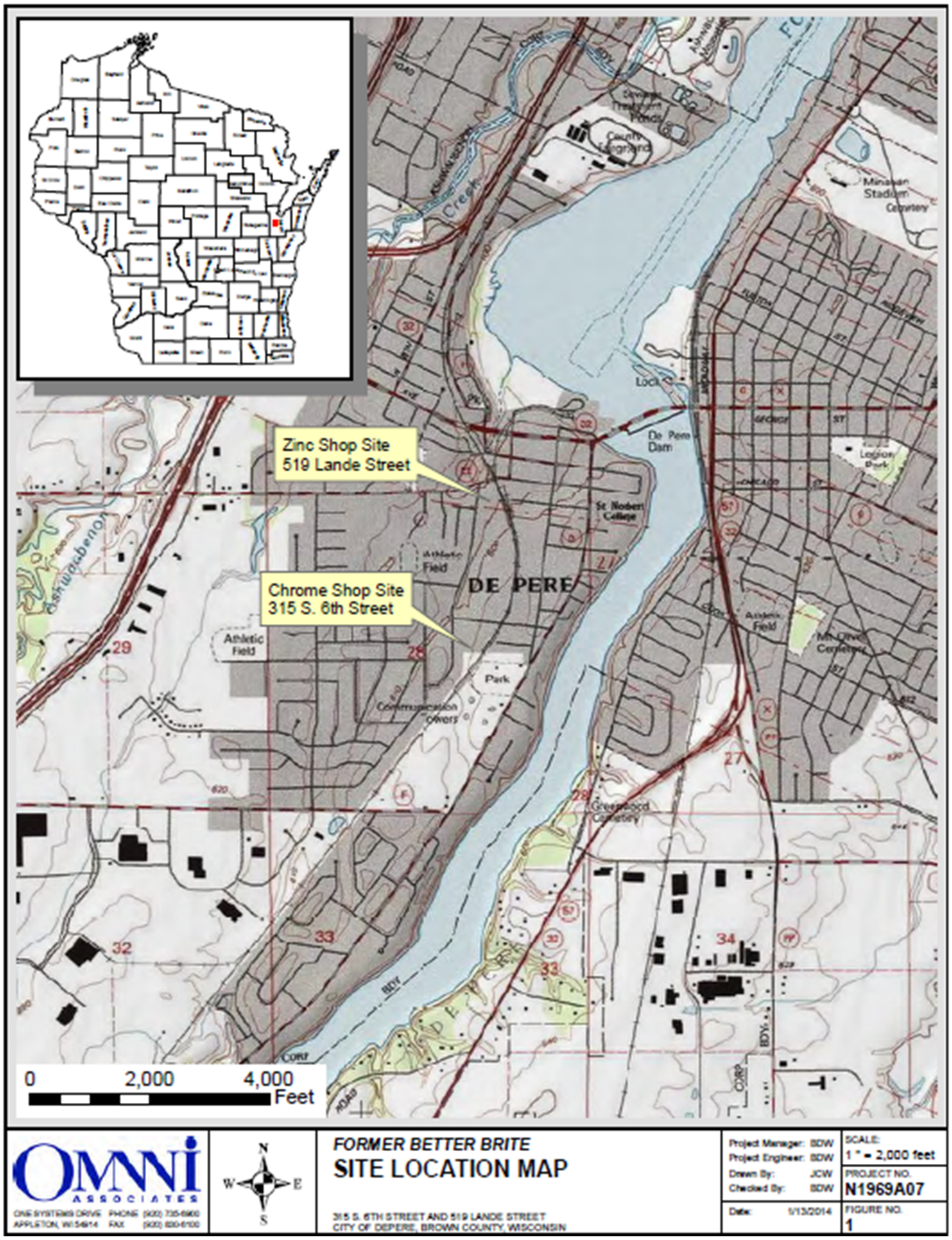

Figure 1: Facility Site Map. [Excerpted from the Summary of the May 2019 Groundwater Sampling Events (OMNI, 2019)].

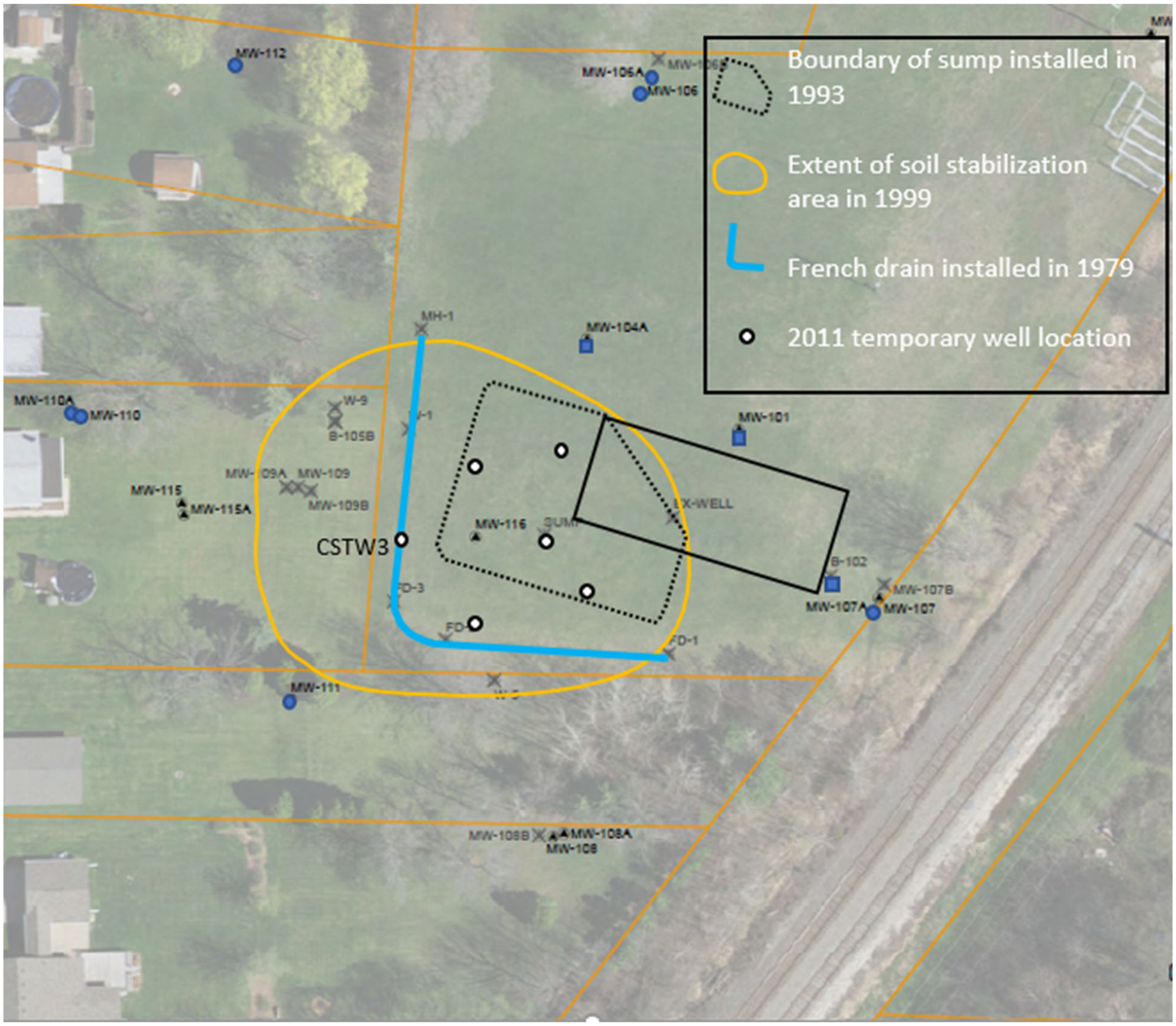

Figure 2: Chrome Shop Site Features. [Excerpt from the Summary of the May 2019 Groundwater Sampling Events (OMNI, 2019) with features added].

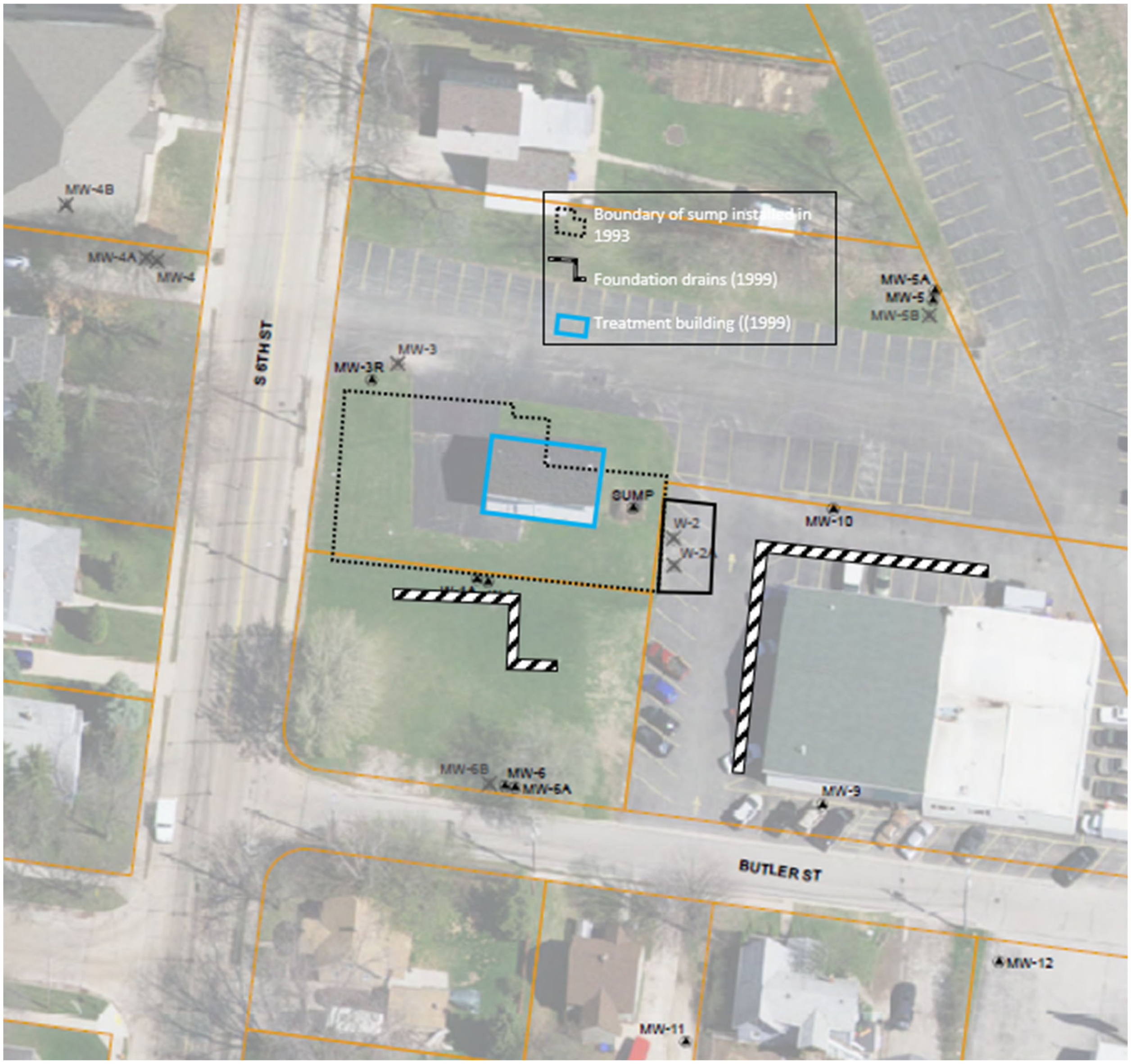

Figure 3: Zinc Shop Site Features. [Excerpt from the Summary of the May 2019 Groundwater Sampling Events (OMNI, 2019) with features added].

4.0 FINDINGS

4.1 WORKING CONCEPTUAL SITE MODEL

The optimization team's working CSM based on efforts to date is presented below.

4.1.1 Primary and Secondary Sources of Contamination

The primary sources of contamination were direct leaks of plating solutions (including VOCs and chromic acid) from vertical in-ground tanks. EPA reports that the tanks at the Chrome Shop leaked between 20,000 and 60,000 gallons of chrome plating solution while the plant was in operation. Given that the Zinc Shop was originally also used for chromium plating with a similar operation, the release mechanisms and volumes are assumed to be similar.

Concentrations of chromium in groundwater at the Chrome Shop in 1994, after EPA removal work conducted in 1986, were as high as 694,000 µg/L. Chromium groundwater concentrations at the Zinc Shop in 1994 were as high as 277,000 µg/L. These high concentrations relative to a cleanup goal of 10 µg/L indicate that pockets of high dissolved concentrations were present to potentially serve as a secondary source for a more dilute groundwater plume.

The release areas were excavated to 20 ft bgs in 1993 and replaced with groundwater extraction sumps; however, groundwater contamination persisted. In 1998, after approximately five years of extracting groundwater, the highest total chromium concentrations in groundwater at the Chrome Shop (125,000 µg/L) and Zinc Shop (131,000 µg/L) were from the sumps. These results suggest that high soil and groundwater concentrations outside of the former excavations/sumps persisted, serving as a continuing source of contamination for the groundwater extracted by the sumps.

4.1.2 Contaminants of Concern

The primary COC remaining above cleanup goals at both the Chrome Shop and Zinc Shop is total chromium, which has a cleanup goal of 10 µg/L. The chlorinated VOCs tetrachloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene (abiotic degradation product of 1,1,1-trichloroethane), and trichloroethene continue to be above cleanup goals in samples from MW-116 at the Chrome Shop. Sulfate is not a COC, but sulfate concentrations are present at the Chrome Shop above WDNR PALs and ESs as a result of ferrous sulfate use in the stabilization remedy. Cyanide is present above cleanup goals at the Zinc Shop, and there are sporadic detections of some chlorinated VOCs at the Zinc Shop.

4.1.3 Geology and Hydrogeology

The RI (HSI GeoTrans, 1995) states that, based on data obtained from on-site drilling, the Chrome Shop is underlain by 0.2 to 4 ft of topsoil, which overlies silty clay to lean clay. The upper clayey lacustrine deposits to depths of 19 to 26 ft bgs contain isolated seams and lenses of fine-grained silty sand, silt, clayey sand and gravel, sandy clay with gravel, and sandy lean clay. The RI further states that these lenses and seams do not appear to be continuous across the property. Glacial till, also predominantly consisting of clay, underlies the lacustrine deposits and are approximately 5.5 ft thick across the property. The upper bedrock beneath the till consists of fine-textured dolomite and is encountered at depths ranging from 24.5 ft bgs to 42.5 ft bgs. An exception to this geology is the large gravel-filled pit that is used for the groundwater collection sump at the Chrome Shop. The geology at the Zinc Shop is similar to the geology of the Chrome Shop, but the lacustrine deposits are slightly thinner and the glacial till is thicker. Bedrock at the Zinc Shop is encountered at depths ranging from 27.5 ft bgs to 31 ft bgs.

Consistent with the clayey unconsolidated sediments, groundwater flow in the unconsolidated sediments is very slow and the unconsolidated sediments are not capable of providing adequate water for residential use. The geometric means of the hydraulic conductivities estimated at the Chrome and Zinc Shops were 3.8×10^{-6} centimeters per second (cm/s) and 2.8×10^{-6} cm/s, respectively, or approximately 0.01 ft per day (ft/d). The RI estimated that the groundwater flow velocity outside of the area influenced by the sump is 0.4 ft per year (ft/yr) to 1.3 ft/yr at the Chrome Shop and 0.2 ft/yr to 0.7 ft/yr at the Zinc Shop. The upper portion of the dolomite bedrock also has a low hydraulic conductivity due to an apparent absence of fractures at that depth.

The potentiometric surface map for the Chrome Shop from 1999 (**Figure 4**) shows groundwater in the absence of sump operation flowing from the Chrome Shop west toward the back yards of neighboring residences. It also shows groundwater flowing to the east from the residences, indicating converging flow to the location between the Chrome Shop and the residences. There is a storm drain line along this area of convergence, and it is possible that groundwater is seeping into the storm drain causing the convergence of groundwater flow in this area. The potentiometric surface map for the Zinc Shop shows groundwater flow generally to the west.

4.1.4 Contaminant Fate and Transport

At the Chrome Shop groundwater flows from the source area near the former building to the west toward residences and former monitoring well MW-109. However, it is unclear if the contamination historically detected at former monitoring well MW-109 was due to migration in groundwater or was the result of overland transport of chromic acid plating solution that ponded in the residential yards and subsequently infiltrated. The ponding is consistent with historical complaints and removal activities in the 1980s. The potentiometric surface map depicted in **Figure 4** suggests that the contamination at MW-109 would have seeped from groundwater into the storm drain. However, sulfate concentrations of 230,000 µg/L detected in MW-110 in May 2004 after the soil stabilization remedy suggest that groundwater impacted by sulfate from the soil stabilization remedy may have migrated past the storm drain line, which contradicts a conceptual model of groundwater converging toward the storm drain line.

Given these uncertainties in historic contaminant fate and transport at the Chrome Shop, it is difficult to determine current fate and transport with the existing monitoring network. MW-116 is the only monitoring well where chromium exceeds the cleanup goals with a peak chromium concentration of 54,000 µg/L (hexavalent chromium) in May 2005 and a recent chromium concentration of 9,800 µg/L (hexavalent chromium) in May 2019. A temporary well downgradient of MW-116 (CSTW3) had a hexavalent chromium concentration of 1,000 µg/L in April 2011. The decreasing concentrations at MW-116 and the 2011 detection at CSTW3 potentially could be the result of contamination migrating further downgradient of MW-116.

Contaminant transport at the Zinc Shop is more predictable because of the continued groundwater extraction that has occurred at this location from an extensive sump system, and chromium concentrations in the monitoring network have been consistently decreasing.

The historical sampling data through 2019 for the Chrome Shop and the Zinc Shop are provided as Appendix B.

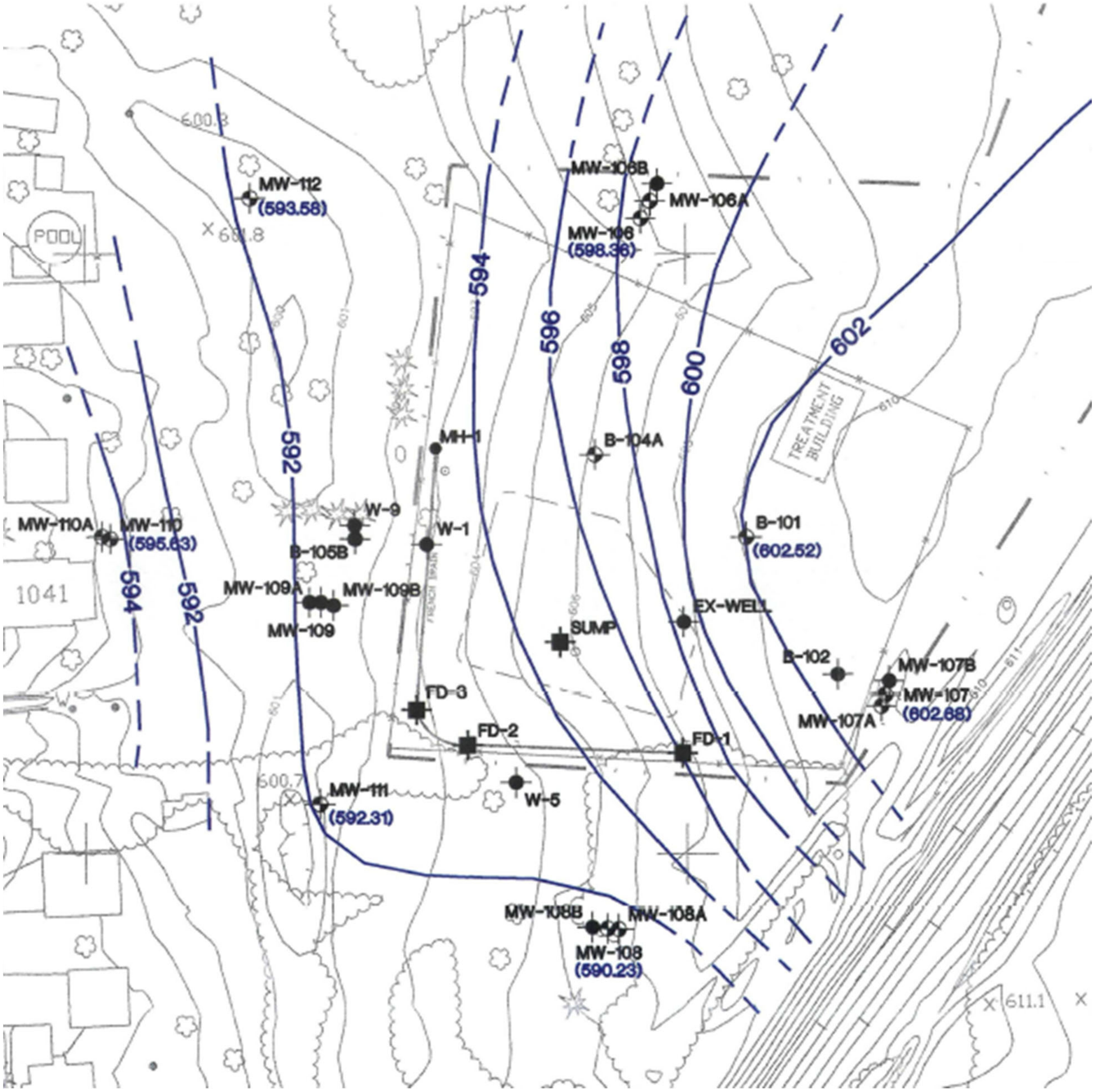

Figure 4: Chrome Shop Potentiometric Surface Map without Extraction. [Excerpt from the Remedial Action Report (HSI GeoTrans, 2000)].

4.1.5 Remedial System Performance

Remedy performance for the Chrome Shop stabilization remedy is difficult to evaluate given the limited data set available. With the exception of MW-111, monitoring wells located outside of the soil stabilization area were not impacted with chromium before remedy implementation and have not been impacted with chromium subsequent to remedy implementation. At MW-111, detections of chromium prior to the remedy were sporadic. Subsequent to remedy implementation, the results at MW-111 have been consistently non-detect; however, the detection limit has been over 51 µg/L since 2016. Therefore, it is difficult to determine if the remedy had an influence on reducing chromium migration.

Inside of the soil stabilization area, chromium concentrations were 12,200 µg/L at MW-109, 338 µg/L at the French drain, and 132,000 µg/L at the sump prior to soil stabilization. All of these sampling locations were removed during soil stabilization, so there have not been any sampling results from these locations to confirm decreased chromium concentrations. MW-116 was installed subsequent to the remedy, and chromium concentrations were as low as 37 µg/L in November 2000. However, chromium concentrations then increased to as high as 54,000 µg/L in May 2005 and have subsequently decreased to 9,800 µg/L in May 2019. Groundwater sampling elsewhere in the soil stabilization area has been limited to six temporary well samples in 2011, in which chromium was detected at one location (CSTW3) at 1,000 µg/L. It is unclear if the contamination at MW-116 has the potential to migrate, and it is unclear if there are other areas of contamination like detected at MW-116 elsewhere within the soil stabilization area.

The optimization team further believes that ferrous sulfate amendment used for soil stabilization has been spent. The last iron sample from MW-116, which was collected in 2011, had an iron concentration of 240 µg/L. Soluble ferrous iron was introduced for the soil stabilization, and if this ferrous iron were still present, the iron concentrations would be much higher. However, the soluble ferrous iron has been oxidized to the insoluble ferric iron as a result of reducing the hexavalent chromium to trivalent chromium. Therefore, any decreases in chromium concentrations in MW-116 are unlikely to result from further stabilization and are more likely to be the result of migration of contamination away from MW-116.

The Zinc Shop remedy appears to be performing well. Chromium concentrations have been decreasing consistently at MW-3/3R (since 2011), W-1 and W-1A, MW-5 (since 2003), MW-6 (since 2006), MW-9, and MW-10. The chromium concentrations at W-1 and W-1A have decreased by approximately 50 percent in three years, and the chromium concentrations in the other listed wells have decreased by one order of magnitude or more. These decreasing concentrations support a conclusion that the remedy is reducing the footprint of the plume via mass removal. A more robust assessment of the remedy performance, including a potential extent of the capture zone, could be provided if water levels were measured at the sump and each of the monitoring wells during the monitoring events. The chromium concentration at the sump was 8,100 µg/L in 2019 suggesting that contamination remains and that remedy operation in its current form will need to continue for many years.

4.1.6 Potential Human and Ecological Exposure Pathways

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 the Better Brite Site. The City of De Pere had six municipal wells, but as of 2007 the city uses Lake Michigan water. One municipal well was located 250 ft northwest of the Zinc Shop but was abandoned. A 1991 door-to-door survey located five unused and two operating private water supply wells near the Site, but these wells were abandoned according to the City of De Pere. The private wells drew water from the dolomite or the sandstone formations. Chromium soil contamination on the residential properties near the Chrome Shop has been addressed, and the basement sumps and groundwater collection system at the Zinc Shop prevent discharge of chromium contamination into local buildings. The optimization team is not aware of any complete exposure pathways for chromium. Sampling for VOCs has been very limited; therefore, the optimization team does not have sufficient information to rule out the presence of a potentially complete vapor intrusion pathway.

4.2 LONG-TERM GROUNDWATER MONITORING

Long-term groundwater monitoring at the Chrome Shop currently consists of monitoring four wells (MW-111, MW-115, MW-115A, and MW-116) for hexavalent chromium and one well (MW-116) for VOCs. Samples previously were analyzed for sulfate, sulfide, and iron because concentrations of these parameters increased as a result of introducing ferrous sulfate as the soil stabilization amendment.

Long-term groundwater monitoring at the Zinc Shop currently consists of monitoring seven wells for hexavalent chromium and monitoring the sump for hexavalent chromium, VOCs, and cyanide.

4.3 FINDINGS AND DATA GAPS

4.3.1 Chromium Groundwater Concentrations (Chrome Shop)

MW-116 is the only permanent monitoring point within the soil stabilization area at the Chrome Shop, and it is impacted with chromium several orders of magnitude higher than the groundwater cleanup goal. The source of this contamination is uncertain. The optimization team considers two potential conceptual models.

One conceptual model is that the contamination results from soil contamination that was incompletely treated during the stabilization remedy. Given the scale of the remedy, the clayey soil that needed to be treated, and the soil confirmation sampling program, it is possible that a pocket of chromium contamination was not sufficiently mixed with ferrous sulfate. If this conceptual model is correct, then it is possible that there may be other similar pockets within the soil stabilization area. Of the 12 soil boring samples collected from six locations in 2011, six of them had detectable hexavalent chromium concentrations. Five of the detections were in shallow soil and were as high as 21.1 milligrams per kilogram (mg/kg). One was from a depth of 4 to 6 ft at CSTW11 and had a concentration of 8.14 mg/kg. Based on the analyses conducted as part of the treatability study testing and summarized in Table 2-5 of the Final Design (HSI GeoTrans, 1998), these soil concentrations have the potential to result in elevated groundwater concentrations. Table 2-5 of the Final Design shows that 180 mg/kg of hexavalent chromium can result in Synthetic Precipitation Leaching Procedure (SPLP) hexavalent chromium concentrations of approximately 11.3 milligrams per liter (mg/L) (or 11,300 μg/L). Assuming a linear relationship, 8.14 mg/kg would result in a concentration of 0.5 mg/L or (500 μg/L) and a hexavalent chromium concentration of 21.1 mg/kg would result in a SPLP concentration of 1.32 mg/L (or 1,320 μg/L), which is much greater than the cleanup goal of 10 μg/L.

Another conceptual model is that there is remaining contamination outside of, and upgradient from, the soil stabilization area and that this contamination is migrating toward and past MW-116 toward CSTW11. Several of the temporary wells sampled in 2011 were upgradient of MW-116, so this conceptual model is less likely. The optimization team was not able to identify sampling that rigorously defined the upgradient boundary of the soil stabilization area. During stabilization, the Site team did identify two tanks and chromium contamination that was outside but adjacent to the stabilization area. These tanks and the associated soil were removed, but there may have been groundwater and soil contamination in other locations upgradient of soil stabilization area that were not addressed. There was also an assumption that treatment of soil to depth of 20 ft bgs would be sufficient based on the absence of contamination in the intermediate depth wells. However, the number of wells used to characterize the plume prior to remediation was fairly limited, and it is possible that there were areas where contamination extended deeper than 20 ft.

4.3.2 Potential for Chromium Migration in Groundwater (Chrome Shop)

Long-term monitoring data suggests that sulfate has migrated from the soil stabilization area as far as MW-110 near the residences. However, detectable concentrations of hexavalent chromium have not been identified at this location or MW-115, which is closer to the soil stabilization area. The reason for this discrepancy is unclear. It is possible that the soil is adsorbing hexavalent chromium as it migrates through the subsurface.

4.3.3 Residual Sources of Chromium Contamination (Zinc Shop)

The remedy at the Zinc Shop is progressing and has been effective at decreasing chromium contamination in groundwater. However, concentrations in the water extracted from the sump suggests that there is an ongoing source of chromium that, if addressed, could help reduce the amount of time to reach cleanup goals. The location and extent of this source or pocket of high concentration are not known.

4.3.4 Extent of VOC Contamination in Groundwater (Chrome Shop and Zinc Shop)

The long-term monitoring program has focused on sampling and analysis for chromium, and only MW-116 at the Chrome Shop and the sump at the Zinc Shop have been monitored for VOCs. If VOCs are present in other locations, there may be the potential for vapor intrusion of VOCs into nearby buildings. Although the soils are very tight at both locations, vapors that migrate through bedding of utility trenches, could provide a viable migration pathway.

4.4 COSTS

The State reports that the current cost for operating and monitoring at the two location is a total of $27,000 per year, of which $24,000 is for O&M and $3,000 is for monitoring.

5.0 RECOMMENDATIONS

Site-specific recommendations are provided for the six major areas associated with optimization: remedy effectiveness, cost reduction, technical improvement, progress toward Site closure, property reuse or revitalization, and energy and materials efficiency. Table 5 provides a summary of the recommendations and estimated costs (or savings) for implementing each recommendation. The levels of certainty for the cost estimates provided are comparable to those typically prepared for CERCLA FS reports (-30 to +50 percent) and are considered rough estimates for planning purposes.

5.1 IMPROVE MONITORING NETWORK FOR THE CHROME SHOP GROUNDWATER

The area treated with ferrous sulfate amendment for soil stabilization is currently characterized by one permanent monitoring well (MW-116), and this well is impacted with chromium concentrations that are orders of magnitude above the cleanup goal. It is possible that other areas of the former treatment area are also impacted, and it is possible that the impacts may be slowly migrating. In addition, it would be difficult to argue that groundwater has been restored even if this one well was to meet cleanup goals in the future. The optimization team recommends installing six shallow 2-inch diameter monitoring wells to a depth of approximately 20 ft as depicted in **Figure 5** and adding the new wells to the sampling program for gauging water levels (to help interpret groundwater flow directions) and water quality. Installing these wells and incorporating them into the monitoring program will help better characterize the remaining contaminant impacts, determine the potential for migration, and document eventual attainment of cleanup goals. The optimization team estimates that the cost for installing and surveying these wells will be approximately $45,000. The annual cost for incorporating these monitoring wells into the long-term monitoring program is incorporated into the cost estimate for the long-term monitoring program recommendation described in Section 5.3.

If the sampling results confirm that MW-116 is the only area of contamination, then the Site team might consider additional characterization and then targeted remediation of the remaining contamination. The fine-grained formation and the absence of a sump make it impractical to extract groundwater or effectively inject stabilization amendments. For this reason, if targeted remediation is considered, it should likely include excavation or in-situ mixing using the same or similar amendment and mixing approach that was used in 1999.

If the contamination is more widespread throughout the former treatment zone, then targeted remediation for the purpose of accelerating the remedy is unlikely to be practical. If the monitoring suggests that contamination is migrating, then the time frame for that migration to impact residential basements should be estimated and the contamination should be monitored to confirm the time frames are accurate. Additional remediation would likely be appropriate if the contamination continues to migrate and will impact residential basements. Depending on the extent of the contaminant migration, the installation of a French drain might be appropriate. Impacted groundwater could be extracted and transported to the Zinc Shop for treatment and discharge.

If groundwater contamination is found to be more extensive than currently believed, institutional controls may need to me updated.

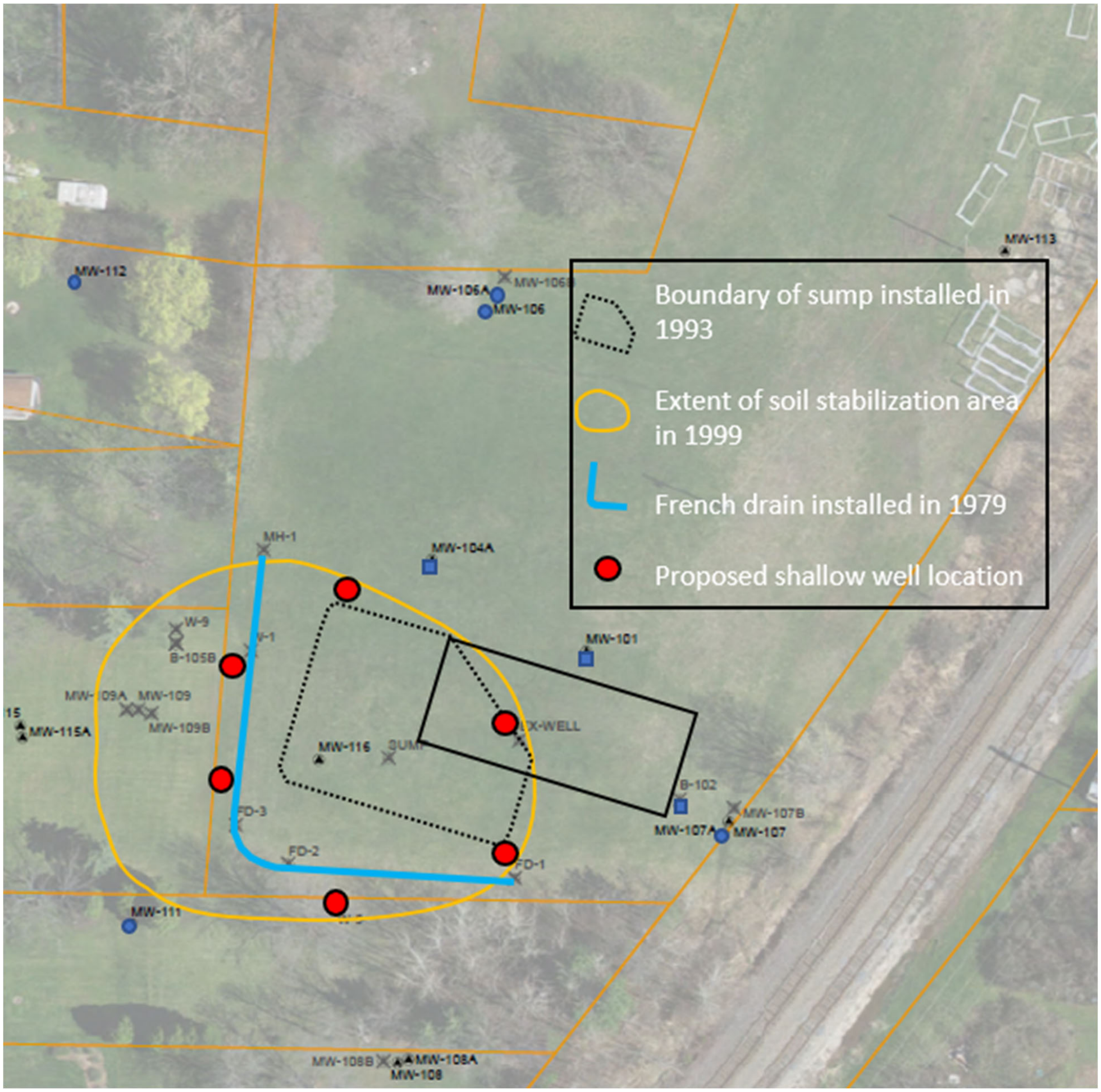

Figure 5: Recommended Monitoring Well Locations. [Excerpt from the Summary of the May 2019 Groundwater Sampling Events (OMNI, 2019) with features added].

5.2 Investigate Areas at the Zinc Shop for Targeted Remediation

The highest groundwater chromium concentrations at the Zinc Shop are currently at the sump, W-1, W-1A, MW-6, and MW-10, which suggests that the areas between the sump and these monitoring wells might have the most remaining contaminant mass. The optimization team recommends using direct-push and temporary wells to investigate groundwater chromium contamination to a depth of approximately 20 ft in the locations shown on **Figure 6**. The temporary wells around the sump will help determine if there is contamination entering the sump from various directions, and the temporary wells between the sump boundary, MW-6 (which includes W-1 and W-1A), and MW-10 will help determine if there is contaminant mass in this area that could be better targeted for remediation.

If contaminant mass is identified, a consideration might be to install additional French drains that could be used to either extract water to remove mass or inject water to push contaminated groundwater toward the sump and eliminate a stagnation zone. At least initially, the optimization team would not recommend injecting dissolved ferrous sulfate or other reducing agents because the precipitation of ferric iron or other solids may further impede the movement of groundwater and interfere with future use of the French drain for extraction or injection. Groundwater extraction has been successful at this location; therefore, the intention would be to enhance that remedy rather than alter the remedy. The optimization team estimates that the cost for the characterization would be approximately $25,000. The cost of enhancing the remedy will be dependent on the measures taken, and the Site team will need to consider the capital costs against the potential long-term cost savings before implementation. In general, the optimization team believes that an additional, strategically located French drain that is used for either extraction or injection could save money and resources over the long-term by reducing remedy duration.

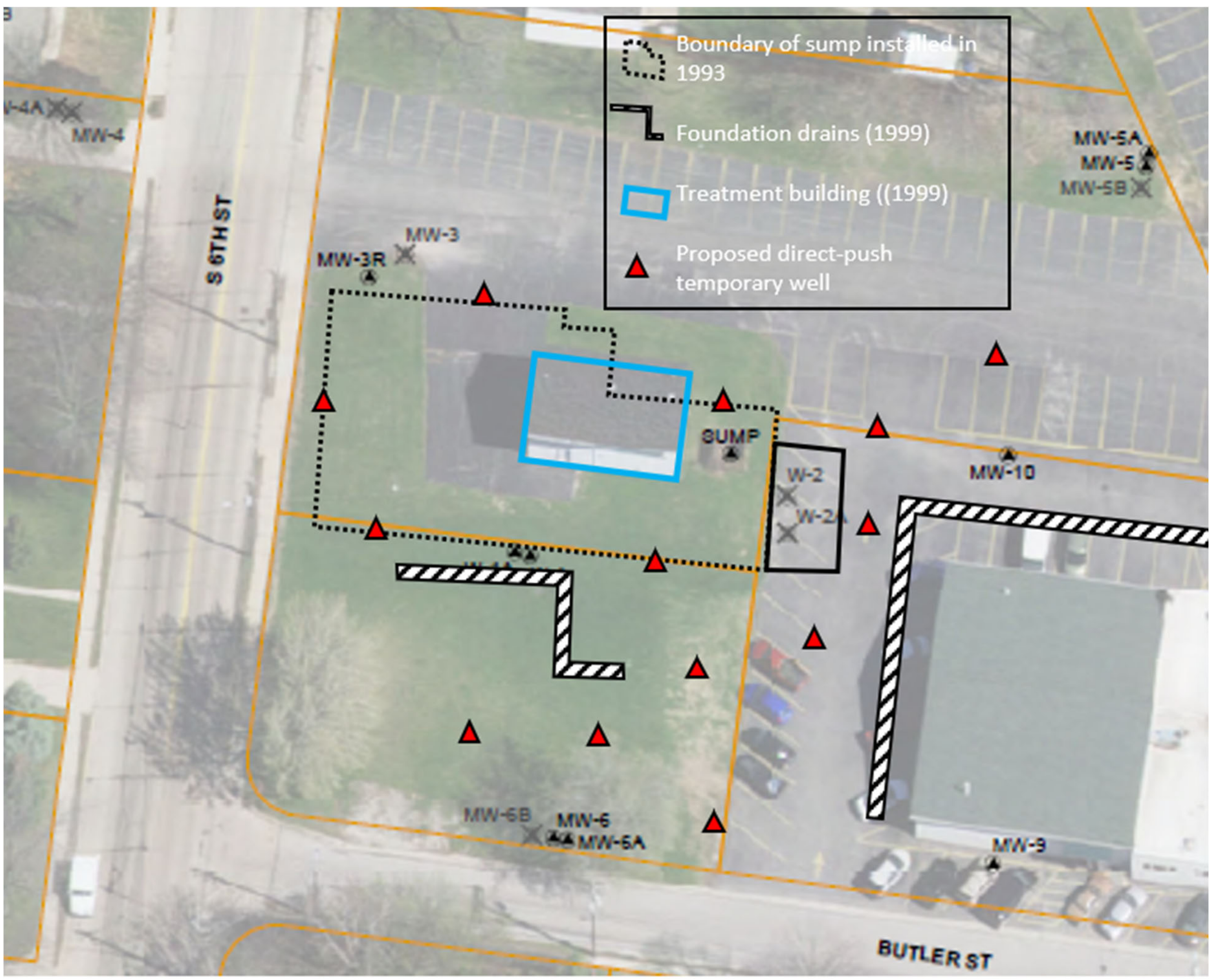

Figure 6: Recommended Direct-Push Temporary Well Locations. [Excerpt from the Summary of the May 2019 Groundwater Sampling Events (OMNI, 2019) with features added].

5.3 MODIFY THE LONG-TERM GROUNDWATER MONITORING PROGRAMS

The current long-term monitoring program consists of annual monitoring for hexavalent chromium. The optimization team recommends reducing the sampling frequency to biennial (once every two years) because groundwater flows slowly at the Site and changes in conditions will be slow. For at least two rounds of monitoring, it is recommended that the monitoring program include the wells currently in the monitoring program plus the wells recommended in Section 5.1 to enhance the Chrome Shop monitoring network. After these two rounds, it may be appropriate to eliminate some of the new monitoring wells and/or further reduce the frequency of monitoring of some wells to once every five years.

For these initial two years, it is recommended that all monitoring wells in the monitoring program be analyzed for VOCs to determine the extent of remaining impacts and the potential for migration. At the Zinc Shop, if VOCs are detected in monitoring wells near buildings or underground utilities, evaluating the potential for vapor intrusion would be appropriate. For each sampling event, water levels should be measured in each monitoring well and used to develop potentiometric surface maps to interpret groundwater flow directions. For the Zinc Shop, this may require resurveying existing wells that do not have a recorded elevation for the top of casing, but this surveying could be done during the same mobilization used to survey the new wells at the Chrome Shop.

At the Chrome Shop, the groundwater flow direction will help evaluate potential chromium migration. At the Zinc Shop, the groundwater flow direction should help evaluate the capture zone provided by groundwater extraction. In net, the optimization team believes that the cost of the monitoring program will remain the same because the increased cost of adding wells and VOC analysis will be offset by the reduced monitoring frequency. Additionally, the Site team will have better information (relative to the current monitoring program) for evaluating remedy performance and protectiveness.

5.4 REUSE CONSIDERATIONS

The Zinc Shop property has limited opportunity for reuse because of the neighboring buildings, extraction network, and treatment system. The Chrome Shop property is undeveloped, but the optimization team understands that the town continues to use the property. Keeping the property open is advisable to facilitate additional remediation, if necessary. Therefore, the optimization team has no specific suggestions for alternative reuse or redevelopment.

TABLE 5. Recommendations and Cost Summary

	RECOMMENDATION	EFFECTIVENESS	COST REDUCTION	TECHNICAL IMPROVEMENT	SITE CLOSURE	REUSE REVITALIZATION	ENERGY AND MATERIAL EFFICIENCY	ESTIMATED CAPITAL COST	CHANGE IN ANNUAL COST
5.1	***Improve Monitoring Network for the Chrome Shop Groundwater***	X			X			$45,000	$0
5.2	***Investigate Areas at the Zinc Shop for Targeted Remediation***	X	X	X	X		X	$25,000 initial investment	Dependent on outcome of investigation
5.3	***Modify the Long-Term Groundwater Monitoring Programs***	X	X	X	X			$0	$0
5.4	***Reuse Considerations***					X		$0	$0

"X" Indicates that the recommendation pertains to the indicated optimization category

APPENDIX A:

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APPENDIX B:

Historical Sampling Data through 2019 for the Chrome Shop and Zinc Shop

N
W E
S

Project Manager: BDW
Project Engineer: BDW
Drawn By: JCW
Checked By: BDW
Date: 11/5/2015

BETTER BRITE

MONITORING WELLS - CHROME SITE

CITY OF DE PERE
BROWN COUNTY, WISCONSIN

OMNI ASSOCIATES
ONE SYSTEMS DRIVE APPLETON, WI 54914
PHONE (920) 735-6900
FAX (920) 830-6100

SCALE:
1 " = 50 '

PROJECT NO.
N1969A07

FIGURE NO.
2

F:\ENVIRON\1969A07 (Better Brite State Lead)\GIS\Basemap_Chrome.mxd

Project Manager: BDW
Project Engineer: BDW
Drawn By: JCW
Checked By: BDW
Date: 11/5/2015

BETTER BRITE

MONITORING WELLS - ZINC SITE

CITY OF DE PERE
BROWN COUNTY, WISCONSIN

OMNI ASSOCIATES
ONE SYSTEMS DRIVE
APPLETON, WI 54914
PHONE (920) 735-6900
FAX (920) 830-6100

SCALE:
1 " = 50 '

PROJECT NO.
N1969A07

FIGURE NO.
3

F:\ENVIRON\1969A07 (Better Brite State Lead)\GIS\Basemap_Zinc.mxd

Well Specific Field Sheets

Facility Name: Former Better Brite - Chrome Shop
Date: May 15, 2019
Weather Conditions: Sunny, 75F
Person(s) Sampling: Kim Kennedy
Sampling Equipment: Dedicated bailers, Solonist 101 water level meter.

Well Name	**MW101**	**MW104A**	**MW106**	**MW106A**	**MW107**	**MW107A**	**MW108**	**MW108A**	**MW110**	**MW110A**	**MW111**	**MW112**	**MW13**	**MW115**	**MW115A**	**MW116**
Top of PVC Casing Elevation (MSL)			606.21	606.36	608.41	608.33	604.22	604.44	603.05	603.31	600.76	600.61	611.08	601.04	601.01	604.28
Depth to Bottom of Well (ft)		18.30	14.65	32.09		39.33	15.82	33.27	14.76	23.80	14.38	15.86	15.08	14.48	23.45	18.88
Water Elevation (MSL)	–	–	–	–	–	–	–	–	–	–	596.83	–	–	597.69	589.49	602.70
Measured Depth to Water (ft)	–	–	–	–	–	–	–	–	–	–	3.93	–	–	3.35	11.52	1.58
Time Purging Begun	–	–	–	–	–	–	–	–	–	–	10:43 AM	–	–	11:20 AM	11:07 AM	10:17 AM
Time Purging Completed	–	–	–	–	–	–	–	–	–	–	10:52 AM	–	–	11:31 AM	11:16 AM	10:27 AM
Amount Purged (gal)	–	–	–	–	–	–	–	–	–	–	7.0	–	–	7.0	7.5	11.3
Purged Dry? (Y/N)	–	–	–	–	–	–	–	–	–	–	N	–	–	Y	Y	N
Color (Y/N)	–	–	–	–	–	–	–	–	–	–	N	–	–	N	N	YELLOW
Odor (Y/N)	–	–	–	–	–	–	–	–	–	–	N	–	–	N	SLIGHT	N
Turbidity (Y/N)	–	–	–	–	–	–	–	–	–	–	Y	–	–	Y	Y	N
Time Sample Withdrawn	–	–	–	–	–	–	–	–	–	–	10:52 AM	–	–	11:36 AM	11:32 AM	10:27 AM
Well secured? (Y/N)	–	–	–	–	–	–	–	–	–	–	Y	–	–	Y	Y	Y
Cover Condition	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	One bolt snapped off. Cover in good condition.	Cover in good condition. Both bolts secure.	Concrete surround slightly moves. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.

Purge 2" Well = (Depth to Bottom of Well - Measured Depth to Water) x 0.163 x 4

Well Specific Field Sheets

Facility Name: Former Better Brite - Zinc Shop
Date: May 14, 2019
Weather Conditions: Sunny, 73F
Person(s) Sampling: Kim Kennedy
Sampling Equipment: Dedicated bailers, Solonist 101 water level meter, perastaltic pump for W-1, W-1A.

Well Name	**W-1** (1,2,4)	**W-1A** (1,2,4)	**MW2**	**MW3R**	**MW5**	**MW5A**	**MW6** (4)	**MW6A** (4)	**MW7**	**MW7A**	**MW8**	**MW8A**	**MW9**	**MW10** (4)	**MW11**	**MW12**	**Zinc Sump** (3)
Top of PVC Casing Elevation (MSL)				602.88	600.81	600.81			600.60	600.51	598.18	598.59	601.66		602.41	599.65	603.99
Depth to Bottom of Well (ft)	19.9	31.54	17.65	16.72	15.30	29.72	18.43	18.48	15.86	26.73	11.41	21.73	16.30	14.77	15.62	10.04	20.40
Water Elevation (MSL)	–	–	–	595.83	593.15	–	–	–	–	–	–	–	594.77	–	–	–	–
Measured Depth to Water (ft)	13.73	15.75	–	7.05	7.66	–	10.80	–	–	–	–	–	6.89	4.85	–	–	–
Time Purging Begun	Grab Sample (3)	Grab Sample (3)	Grab Sample (3)	12:32 PM	1:33 PM	–	11:18 AM	–	–	–	–	–	9:43 AM	10:31 AM	–	–	–
Time Purging Completed				12:41 PM	1:43 PM	–	11:27 AM	–	–	–	–	–	9:56 AM	10:45 AM	–	–	–
Amount Purged (gal)				6.3	5.0	–	5.0	–	–	–	–	–	6.3	6.5	–	–	–
Purged Dry? (Y/N)				N	N	–	N	–	–	–	–	–	N	N	–	–	–
Color (Y/N)	L. YELLOW	N	–	N	N	–	N	–	–	–	–	–	N	N	–	–	YELLOW
Odor (Y/N)	N	N	–	N	N	–	N	–	–	–	–	–	N	N	–	–	N
Turbidity (Y/N)	Y	N	–	N	N	–	N	–	–	–	–	–	N	N	–	–	N
Time Sample Withdrawn	12:11 PM	11:58 AM	–	12:41 PM	1:43 PM	–	11:27 AM	–	–	–	–	–	9:56 AM	10:45 AM	–	–	1:08 PM
Well secured? (Y/N)	Y	Y	–	Y	Y	–	Y	–	–	–	–	–	Y	Y	–	–	Y
Cover Condition	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Pro-top in good condition (some rust). Lock secure.	One bolt snapped off. Cover in good condition.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Pro-top in good condition (some rust). Lock secure.	Pro-top in good condition (some rust). Lock secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover is flush when bolted, but well and plug are raised when cover is off. Both bolts secure.	Cover in good condition. Both bolts secure.	Cover in good condition. Both bolts secure.	Gate overgrown with vegetation. Cover in good condition. Locks secure.

1 Depth to bottom of the well is suspect. Felt like soft bottom (sediment).
2 A standard bailer would not fit down the monitoirng well.
3 Sump was not running at time of sample collection.
4 Well height modified. New elevation unknown.

Purge 2" Well = (Depth to Bottom of Well - Measured Depth to Water) x 0.163 x 4

Table 1 Groundwater Analytical Summary, Better Brite - Chrome Shop
519 Lande Street, De Pere, WI BRRTS # 02-05-000030

Sample Location	Date	Detected Parameters (µg/L)				
		Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL
NR140 Enforcement Standard		100	100	300	250,000	NO ES
Chrome Sump (Abandoned)	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
	8/26/10	<3.9	5.4	NA	NA	NA
	6/16/11	<3.9	NA	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
	8/26/10	<3.9	1.1"J"	NA	NA	NA
	6/16/11	<3.9	NA	NA	NA	NA
MW-106B (Abandoned)	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
	8/26/10	<3.9	16.4	**4010**	16400	NA
	6/16/11	<3.9	NA	**3130**	83600	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
	8/26/10	<3.9	23.2	NA	NA	NA
	6/16/11	<3.9	NA	NA	NA	NA
MW-107B (Abandoned)	Aug-94	<10	NA	NA	NA	NA

Sample Location	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	PCE	1,1,1-TCA	1,1,2-TCA	TCE	VC
NR140 Preventive Action Limit	1.2	1	0.5	40	20	10	0.4	8	6	85	0.5	0.7	7	0.5	40	0.5	0.5	0.02
NR140 Enforcement Standard	6	10	5	200	100	50	2	40	30	850	5	7	70	5	200	5	5	0.2

NA - Compound not analyzed
Underlined - Concentration exceeds PAL
Bolded - Concentration exceeds ES

Table 1 Groundwater Analytical Summary, Better Brite - Chrome Shop
519 Lande Street, De Pere, WI BRRTS # 02-05-000030

Sample Location	Date	Detected Parameters (µg/L)																						
		Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	PCE	1,1,1-TCA	1,1,2-TCA	TCE	VC
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL	1.2	1	0.5	40	20	10	0.4	8	6	85	0.5	0.7	7	0.5	40	0.5	0.5	0.02
NR140 Enforcement Standard		100	100	300	250,000	NO ES	6	10	5	200	100	50	2	40	30	850	5	7	70	5	200	5	5	0.2
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																		
	8/26/10	<3.9	4.6"J"	NA	NA	NA																		
	6/16/11	<3.9	NA	NA	NA	NA																		
	12/5/13	<3.4	NA	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																		
	8/26/10	<3.9	1.3"J"	NA	NA	NA																		
	6/16/11	<3.9	1.3"J"	NA	NA	NA																		
	12/5/13	<8.6	NA	NA	NA	NA																		
MW-108B (Abandoned)	Aug-94	<10	NA	NA	NA	NA																		
MW-109 (Abandoned)	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 (Abandoned)	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 (Abandoned)	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																		
	8/21/07	NA	7.4	NA	NA	NA																		
	7/21/09	NA	5.3	NA	NA	NA																		
	8/26/10	<3.9	2.0 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.75	NA	<0.57	NA	<0.45	<0.9	NA	<0.48	<0.18
	6/16/11	<3.9	NA	NA	NA	NA																		
	10/24/12	<3.9	NA	NA	NA	NA																		
	12/5/13	<3.4	NA	NA	NA	NA																		

NA - Compound not analyzed
Underlined - Concentration exceeds PAL
Bolded - Concentration exceeds ES

Table 1 Groundwater Analytical Summary, Better Brite - Chrome Shop
519 Lande Street, De Pere, WI BRRTS # 02-05-000030

Sample Location	Date	Detected Parameters (µg/L)																						
		Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	PCE	1,1,1-TCA	1,1,2-TCA	TCE	VC
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL	1.2	1	0.5	40	20	10	0.4	8	6	85	0.5	0.7	7	0.5	40	0.5	0.5	0.02
NR140 Enforcement Standard		100	100	300	250,000	NO ES	6	10	5	200	100	50	2	40	30	850	5	7	70	5	200	5	5	0.2
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																		
	8/21/07	NA	1.9	NA	NA	NA																		
	7/21/09	NA	1.3	NA	NA	NA																		
	8/26/10	<3.9	1.8 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.75	NA	<0.57	NA	<0.45	<0.9	NA	<0.48	<0.18
	6/16/11	<3.9	NA	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																		
	8/21/07	NA	25	NA	NA	NA																		
	7/21/09	NA	23.6	NA	NA	NA																		
	8/26/10	<3.9	19.8	NA	NA	NA																		
	6/16/11	<3.9	NA	NA	NA	NA																		
	10/24/11	<3.9	NA	NA	NA	NA																		
	10/24/12	<3.9	NA	NA	NA	NA																		
	12/5/13	<3.4	NA	NA	NA	NA																		
	10/22/15	<3.9	NA	NA	NA	NA																		
	9/20/16	<51	NA	NA	NA	NA																		
	6/13/18	<130	NA	NA	NA	NA																		
	5/15/19	<130	NA	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																		
	8/26/10	<3.9	3.9	NA	NA	NA																		
	6/16/11	<3.9	NA	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																		
	8/26/10	<3.9	24.3	NA	NA	NA																		
	6/16/11	<3.9	NA	NA	NA	NA																		

NA - Compound not analyzed
Underlined - Concentration exceeds PAL
Bolded - Concentration exceeds ES

Table 1 Groundwater Analytical Summary, Better Brite - Chrome Shop
519 Lande Street, De Pere, WI BRRTS # 02-05-000030

Sample Location	Date	Detected Parameters (µg/L) Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL
NR140 Enforcement Standard		100	100	300	250,000	NO ES
MW-114 (Abandoned)	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
	8/21/07	NA	10	NA	NA	NA
	7/21/09	NA	5.8	NA	NA	NA
	8/26/10	<3.9	1.6 J	**3530**	24800	NA
	6/16/11	<3.9	NA	**4460**	10000	NA
	10/24/11	<3.9	NA	NA	NA	NA
	10/24/12	<3.9	NA	NA	NA	NA
	12/5/13	<5.7	NA	NA	NA	NA
	10/16/14	<3.9	NA	NA	NA	NA
	10/22/15	<3.9	NA	NA	NA	NA
	9/20/16	<26	NA	NA	NA	NA
	6/13/18	<130	NA	NA	NA	NA
	5/15/19	<51	NA	NA	NA	NA
MW-115A	May-00	<4.2	12.0	NA	NA	NA
	Oct-06	<6.8	4.6	NA	NA	NA
	8/21/07	NA	2.7	NA	NA	NA
	7/21/09	NA	2.9	NA	NA	NA
	8/26/10	<3.9	1.4 J	NA	NA	NA
	6/16/11	<3.9	NA	NA	NA	NA
	10/24/12	<3.9	NA	NA	NA	NA
	12/5/13	<8.6	NA	NA	NA	NA
	10/16/14	<3.9	NA	NA	NA	NA
	10/22/15	<3.9	NA	NA	NA	NA
	9/20/16	<26	NA	NA	NA	NA
	6/13/18	<130	NA	NA	NA	NA
	5/15/19	<51	NA	NA	NA	NA

Sample Location	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	PCE	1,1,1-TCA	1,1,2-TCA	TCE	VC
NR140 Preventive Action Limit	1.2	1	0.5	40	20	10	0.4	8	6	85	0.5	0.7	7	0.5	40	0.5	0.5	0.02
NR140 Enforcement Standard	6	10	5	200	100	50	2	40	30	850	5	7	70	5	200	5	5	0.2

NA - Compound not analyzed
Underlined - Concentration exceeds PAL
Bolded - Concentration exceeds ES

Table 1 Groundwater Analytical Summary, Better Brite - Chrome Shop
519 Lande Street, De Pere, WI BRRTS # 02-05-000030

Sample Location	Date	Detected Parameters (µg/L)																						
		Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	PCE	1,1,1-TCA	1,1,2-TCA	TCE	VC
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL	1.2	1	0.5	40	20	10	0.4	8	6	85	0.5	0.7	7	0.5	40	0.5	0.5	0.02
NR140 Enforcement Standard		100	100	300	250,000	NO ES	6	10	5	200	100	50	2	40	30	850	5	7	70	5	200	5	5	0.2
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																		
	8/21/07	NA	**39,000**	NA	NA	NA																		
	7/21/09	NA	**25,500**	NA	NA	NA																		
	8/26/10	**21,300**	**19,200**	**478**	**1330000**	NA	**162**	2.4 J	0.43 J	NA	10.3	<0.46	<2.2	NA	NA	30.9	NA	**22.1**	NA	3.2	76.9	NA	1.1	**0.21 J**
	8/26/10 LF	**20,200**	**17,700**	NA	NA	NA																		
	4/25/11	**34,600**	NA	NA	**1030000**	NA																		
	6/16/11	**13,800**	NA	240	**1660000**	NA	3.4 "J"	NA	NA	NA	NA	NA	NA	NA	NA	28.1	NA	**25.9**	NA	1.2	84.1	NA	2.2	<0.18
	10/24/11	**18,300**	NA	NA	NA	NA																		
	10/24/12	**22,300**	NA	NA	NA	NA																		
	12/5/13	**17,600**	NA	NA	NA	NA																		
	DUP	**17,500**	NA	NA	NA	NA																		
	10/16/14	**13,300**	NA	NA	NA	NA																		
	10/22/15	**16,500**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	43.5	0.32 J	**40.6**	1.5	1.7	145	0.46 J	1.6	**0.27 J**
	9/20/16	**16,100**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	34.8	<0.34	**34.8**	1.2 J	1.4 J	135	<0.39	1.5 J	<0.35
	6/13/18	**12,100**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	34.4	<0.34	**37.4**	0.93 J	1.1 J	125	<0.39	1.5 J	<0.35
	5/15/19	**9,800**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	38.9	<0.28	**44.3**	1.3	1.2	142	<0.55	2.1	<0.17
CSTW1	4/25/11	<3.9	NA	NA	**1,180,000**	NA																		
CSTW2	4/25/11	<3.9	NA	NA	**2,840,000**	NA																		
CSTW3	4/25/11	**1,000**	NA	NA	**2,010,000**	NA																		
CSTW4	4/25/11	<3.9	NA	NA	**426,000**	NA																		
CSTW5	4/25/11	4.9 "J"	NA	NA	**592,000**	NA																		
CSTW6	4/25/11	<3.9	NA	NA	**608000**	NA																		

NA - Compound not analyzed
Underlined - Concentration exceeds PAL
Bolded - Concentration exceeds ES

Table 2 Groundwater Analytical Summary, Better Brite - Zinc Shop
315 6th Street, De Pere, WI BRRTS # 02-05-000031

Sample Location	Date	Detected Parameters (µg/L)																			
		Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,1-DCE	PCE	1,1,1-TCA	TCE	VC
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL	1.2	1	0.5	40	20	10	0.4	8	6	85	0.7	0.5	40	0.5	0.02
NR140 Enforcement Standard		100	100	300	250,000	NO ES	6	10	5	200	100	50	2	40	30	850	7	5	200	5	0.2
W-1	10/22/15	**10,300**	NA	NA	NA	NA	**(Grab Sample, no purging)**														
	9/19/16	**9600**	NA	NA	NA	NA	**(Grab Sample, previously purged)**														
	6/12/18	**6600**	NA	NA	NA	NA	**(Grab Sample, previously purged)**														
	5/14/19	**4400**	NA	NA	NA	NA	**(Grab Sample, previously purged)**														
W-1A	10/22/15	**3,300**	NA	NA	NA	NA	**(Grab Sample, no purging)**														
	9/19/16	**2800**	NA	NA	NA	NA	**(Grab Sample, previously purged)**														
	6/12/18	**2700**	NA	NA	NA	NA	**(Grab Sample, previously purged)**														
	5/14/19	**1800**	NA	NA	NA	NA	**(Grab Sample, previously purged)**														
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															
	10/22/15	<3.9	NA	NA	NA	NA	**(Grab Sample, no purging)**														
	9/19/16	<5.1	NA	NA	NA	NA	**(Grab Sample, previously purged)**														
	6/13/18	<26	NA	NA	NA	NA	**(Grab Sample, previously purged)**														
MW-3/MW3R	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															
	7/21/09	NA	**717**	NA	NA	NA															
	8/24/10	**660**	**552**	NA	NA	NA															
	6/28/11	**2800**	NA	NA	NA	NA															
	10/24/11	**2200**	NA	NA	NA	NA															
	10/23/12	**560**	NA	NA	NA	NA															
	12/5/13	**140**	NA	NA	NA	NA															
	10/16/14	**190**	NA	NA	NA	NA															
	10/22/15	**100**	NA	NA	NA	NA															
	9/19/16	**380**	NA	NA	NA	NA															
	6/12/18	<130	NA	NA	NA	NA															
	5/14/19	88	NA	NA	NA	NA															

NA - Compound not analyzed
Underlined - Concentration exceeds preventive action limit
Bolded - Concentration exceeds enforcement standard

Table 2 Groundwater Analytical Summary, Better Brite - Zinc Shop
315 6th Street, De Pere, WI BRRTS # 02-05-000031

Sample Location	Date	Detected Parameters (µg/L)																			
		Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,1-DCE	PCE	1,1,1-TCA	TCE	VC
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL	1.2	1	0.5	40	20	10	0.4	8	6	85	0.7	0.5	40	0.5	0.02
NR140 Enforcement Standard		100	100	300	250,000	NO ES	6	10	5	200	100	50	2	40	30	850	7	5	200	5	0.2
MW-4 (Abandoned)	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 (Abandoned)	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 (Abandoned)	Oct-94	<10	<0.70	NA	NA	NA															
	Nov-94	<10	<2.5	NA	NA	NA															

NA - Compound not analyzed
Underlined - Concentration exceeds preventive action limit
Bolded - Concentration exceeds enforcement standard

Table 2 Groundwater Analytical Summary, Better Brite - Zinc Shop
315 6th Street, De Pere, WI BRRTS # 02-05-000031

		Detected Parameters (µg/L)																			
Sample Location	Date	Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,1-DCE	PCE	1,1,1-TCA	TCE	VC
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL	1.2	1	0.5	40	20	10	0.4	8	6	85	0.7	0.5	40	0.5	0.02
NR140 Enforcement Standard		100	100	300	250,000	NO ES	6	10	5	200	100	50	2	40	30	850	7	5	200	5	0.2
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															
	8/21/07	NA	**2,700**	NA	NA	NA															
	7/21/09	NA	**2,210**	NA	NA	NA															
	8/24/10	**1,300**	**1,180**	NA	NA	NA															
	6/28/11	**970**	NA	NA	NA	NA															
	10/24/11	**1,100**	NA	NA	NA	NA															
	10/23/12	**970**	NA	NA	NA	NA															
	12/5/13	**1000**	NA	NA	NA	NA															
	10/22/15	**330**	NA	NA	NA	NA															
	9/19/16	**460**	NA	NA	NA	NA															
	6/12/18	**180**	NA	NA	NA	NA															
	5/14/19	<51	NA	NA	NA	NA															
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															
	8/24/10	<3.9	2.5"J"	NA	NA	NA															
	6/28/11	<3.9	NA	NA	NA	NA															
MW-5B (Abandoned)	Aug-94	NA	NA	NA	NA	NA															
	Oct-94	<10	<5	NA	NA	NA															

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Table 2 Groundwater Analytical Summary, Better Brite - Zinc Shop
315 6th Street, De Pere, WI BRRTS # 02-05-000031

Sample Location	Date	Detected Parameters (µg/L)																			
		Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,1-DCE	PCE	1,1,1-TCA	TCE	VC
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL	1.2	1	0.5	40	20	10	0.4	8	6	85	0.7	0.5	40	0.5	0.02
NR140 Enforcement Standard		100	100	300	250,000	NO ES	6	10	5	200	100	50	2	40	30	850	7	5	200	5	0.2
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															
	8/21/07	NA	**8,900**	NA	NA	NA															
	7/21/09	NA	**10,400**	NA	NA	NA															
	8/24/10	**8400**	**7,540**	NA	NA	NA															
	6/28/11	**5200**	NA	NA	NA	NA															
	10/24/11	**6,500**	NA	NA	NA	NA															
	10/23/12	**7,300**	NA	NA	NA	NA															
	12/5/13	**6,100**	NA	NA	NA	NA															
	10/16/14	**3,300**	NA	NA	NA	NA															
	10/22/15	**360**	NA	NA	NA	NA															
	9/20/16	**3500**	NA	NA	NA	NA															
	6/13/18	**1400**	NA	NA	NA	NA															
	5/14/19	**1200**	NA	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															
	8/24/10	<3.9	1.7"J"	NA	NA	NA															
	6/28/11	<3.9	NA	NA	NA	NA															
MW-6B (Abandoned)	Aug-94	<10	NA	NA	NA	NA															

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Table 2 Groundwater Analytical Summary, Better Brite - Zinc Shop
315 6th Street, De Pere, WI BRRTS # 02-05-000031

Sample Location	Date	Detected Parameters (µg/L)																			
		Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,1-DCE	PCE	1,1,1-TCA	TCE	VC
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL	1.2	1	0.5	40	20	10	0.4	8	6	85	0.7	0.5	40	0.5	0.02
NR140 Enforcement Standard		100	100	300	250,000	NO ES	6	10	5	200	100	50	2	40	30	850	7	5	200	5	0.2
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															
	8/21/07	NA	4.4	NA	NA	NA															
	7/21/09	NA	9	NA	NA	NA															
	8/24/10	<3.9	3.7"J"	NA	NA	NA															
	6/28/11	<3.9	NA	NA	NA	NA															
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															
	8/24/10	<3.9	1.6"J"	NA	NA	NA															
	6/28/11	<3.9	NA	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															
	8/21/07	NA	2.3	NA	NA	NA															
	8/24/10	<3.9	96	NA	NA	NA															
	6/28/11	<3.9	NA	NA	NA	NA															

NA - Compound not analyzed
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Table 2 Groundwater Analytical Summary, Better Brite - Zinc Shop
315 6th Street, De Pere, WI BRRTS # 02-05-000031

Sample Location	Date	Detected Parameters (µg/L)																			
		Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,1-DCE	PCE	1,1,1-TCA	TCE	VC
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL	1.2	1	0.5	40	20	10	0.4	8	6	85	0.7	0.5	40	0.5	0.02
NR140 Enforcement Standard		100	100	300	250,000	NO ES	6	10	5	200	100	50	2	40	30	850	7	5	200	5	0.2
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															
	8/21/07	NA	0.92	NA	NA	NA															
	8/24/10	<3.9	1.7"J"	NA	NA	NA															
	6/28/11	<3.9	NA	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															
	8/21/07	NA	52	NA	NA	NA															
	7/21/09	NA	33.3	NA	NA	NA															
	8/24/10	*27*	30.3	NA	NA	NA															
	6/28/11	*14*	NA	NA	NA	NA															
	10/23/12	*18 J*	NA	NA	NA	NA															
	12/5/13	<3.4	NA	NA	NA	NA															
	10/16/14	<3.9	NA	NA	NA	NA															
	10/22/15	<3.9	NA	NA	NA	NA															
	9/19/16	<26	NA	NA	NA	NA															
	6/12/18	<130	NA	NA	NA	NA															
	5/14/19	<51	NA	NA	NA	NA															

NA - Compound not analyzed
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Bolded - Concentration exceeds enforcement standard

Table 2 Groundwater Analytical Summary, Better Brite - Zinc Shop
315 6th Street, De Pere, WI BRRTS # 02-05-000031

		Detected Parameters (µg/L)																			
Sample Location	Date	Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,1-DCE	PCE	1,1,1-TCA	TCE	VC
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL	1.2	1	0.5	40	20	10	0.4	8	6	85	0.7	0.5	40	0.5	0.02
NR140 Enforcement Standard		100	100	300	250,000	NO ES	6	10	5	200	100	50	2	40	30	850	7	5	200	5	0.2
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															
	8/21/07	NA	**17,000**	NA	NA	NA															
	10/22/15	**10,300**	NA	NA	NA	NA															
	9/19/16	**9,800**	NA	NA	NA	NA															
	6/12/18	**3,200**	NA	NA	NA	NA															
	5/14/19	**1,500**	NA	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															
	8/24/10	<3.9	8.9	NA	NA	NA															
	6/28/11	<3.9	NA	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															
	8/24/10	<3.9	6.5	NA	NA	NA															
	6/28/11	<3.9	NA	NA	NA	NA															
MW-13	Mar-95	<10 J	<2.9	NA	NA	NA															
	May-95	<10	<1.0	NA	NA	NA															

NA - Compound not analyzed
Underlined - Concentration exceeds preventive action limit
Bolded - Concentration exceeds enforcement standard

Table 2 Groundwater Analytical Summary, Better Brite - Zinc Shop

315 6th Street, De Pere, WI BRRTS # 02-05-000031

Sample Location	Date	Detected Parameters (µg/L)																			
		Hexavalent Chromium	Chromium	Iron	Sulfate	Sulfide	Antimony	Arsenic	Cadmium	Cyanide	Nickel	Silver	Thallium	Cobalt	Vanadium	1,1-DCA	1,1-DCE	PCE	1,1,1-TCA	TCE	VC
NR140 Preventive Action Limit		10	10	150	125,000	NO PAL	1.2	1	0.5	40	20	10	0.4	8	6	85	0.7	0.5	40	0.5	0.02
NR140 Enforcement Standard		100	100	300	250,000	NO ES	6	10	5	200	100	50	2	40	30	850	7	5	200	5	0.2
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															
	8/21/07	NA	**20,000**	NA	NA	NA															
	7/21/09	NA	**14,800**	NA	NA	NA															
	8/24/10	**12,100**	**11,300**	NA	NA	NA	**90.6**	NA	NA	40	NA	NA	<2.2	2.5 J	4.7 J	<0.75	<0.57	<0.45	1.5	<0.48	<0.18
	6/28/11	**4100**	NA	NA	NA	NA	**6.6**	NA	NA	**250**	NA	NA	<2.2	2.5 J	4.7 J	1.2	2.8	*0.84*	38.9	<0.48	<0.18
	10/24/11	**3,700**	NA	NA	NA	NA	**6.0 "J"**	NA	NA	**220**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/23/12	**110**	NA	NA	NA	NA	NA	NA	NA	40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/5/13	**5,100**	NA	NA	NA	NA	NA	NA	NA	**340**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/16/14	**9,600**	NA	NA	NA	NA	NA	NA	NA	190	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/22/15	**10,200**	NA	NA	NA	NA	NA	NA	NA	**220**	NA	NA	NA	NA	NA	2.9	2.5	1.2	49.0	<0.33	<0.18
	9/19/16	**14,000**	NA	NA	NA	NA	**<7.3**	NA	NA	160	NA	NA	NA	NA	NA	1.4	1.2	0.79J	22.6	<0.33	<0.18
	6/13/18	**9900**	NA	NA	NA	NA	NA	NA	NA	51	NA	NA	NA	NA	NA	<0.24	<0.41	<0.50	2.1	<0.33	<0.18
	5/14/19	**8100**	NA	NA	NA	NA	NA	NA	NA	100	NA	NA	NA	NA	NA	0.68J	1.2	0.45J	14.1	<0.26	<0.17
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															

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